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THE IRON AGE

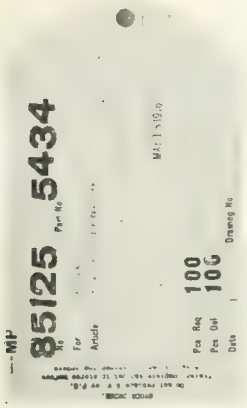
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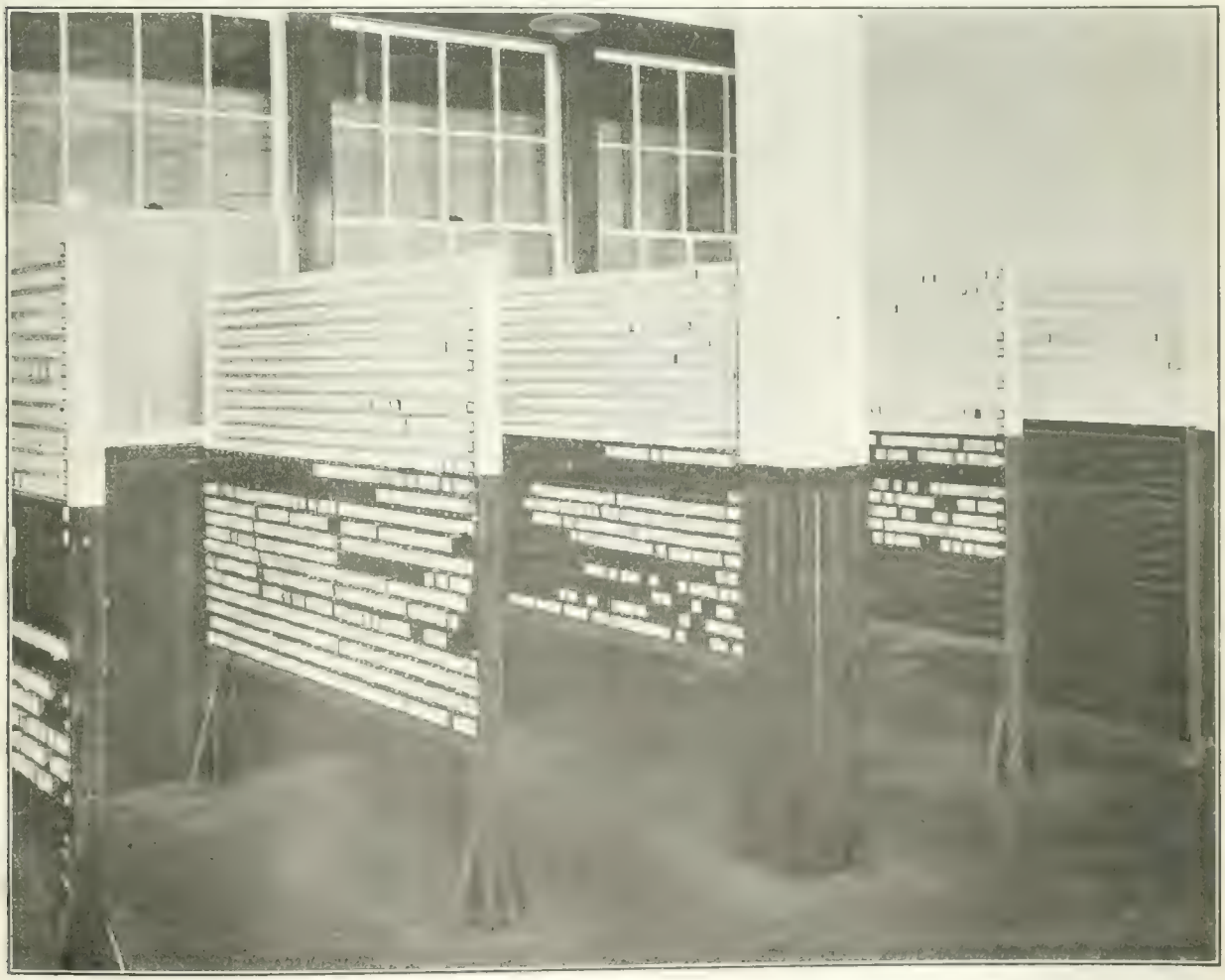
Dispatch System of Norton Grinding Company

Planning Board Visualizes Jobs Ahead of Each Machine, and Routing Sheets Indicate Dimensions and Limits of Each Operation



A COMBINATION of a planning board, which visualizes the jobs scheduled against each machine, and of routing sheets, that cover directions and limits of each machining operation, is a feature of the system for dispatching work through the plant of the Norton Grinding Company, Worcester, Mass. Also, instead of the ordinary traveler that generally accompanies the material in the factory, an envelope is used. This envelope, here shown, gives all the information usually furnished by the tag traveler. On the back of the envelope is evidence that it has been to the various departments necessary. It contains a blueprint of the finished piece, there being an individual print for each piece. Accompanying the blueprint are routing sheets shown among the illustrations. These routing sheets are in consecutive order





Each shelf on these dispatch boards represents a single machine, its number appearing on a black wooden block at the end of the shelf. Each job ahead for a machine is shown by a wooden block placed on the proper shelf

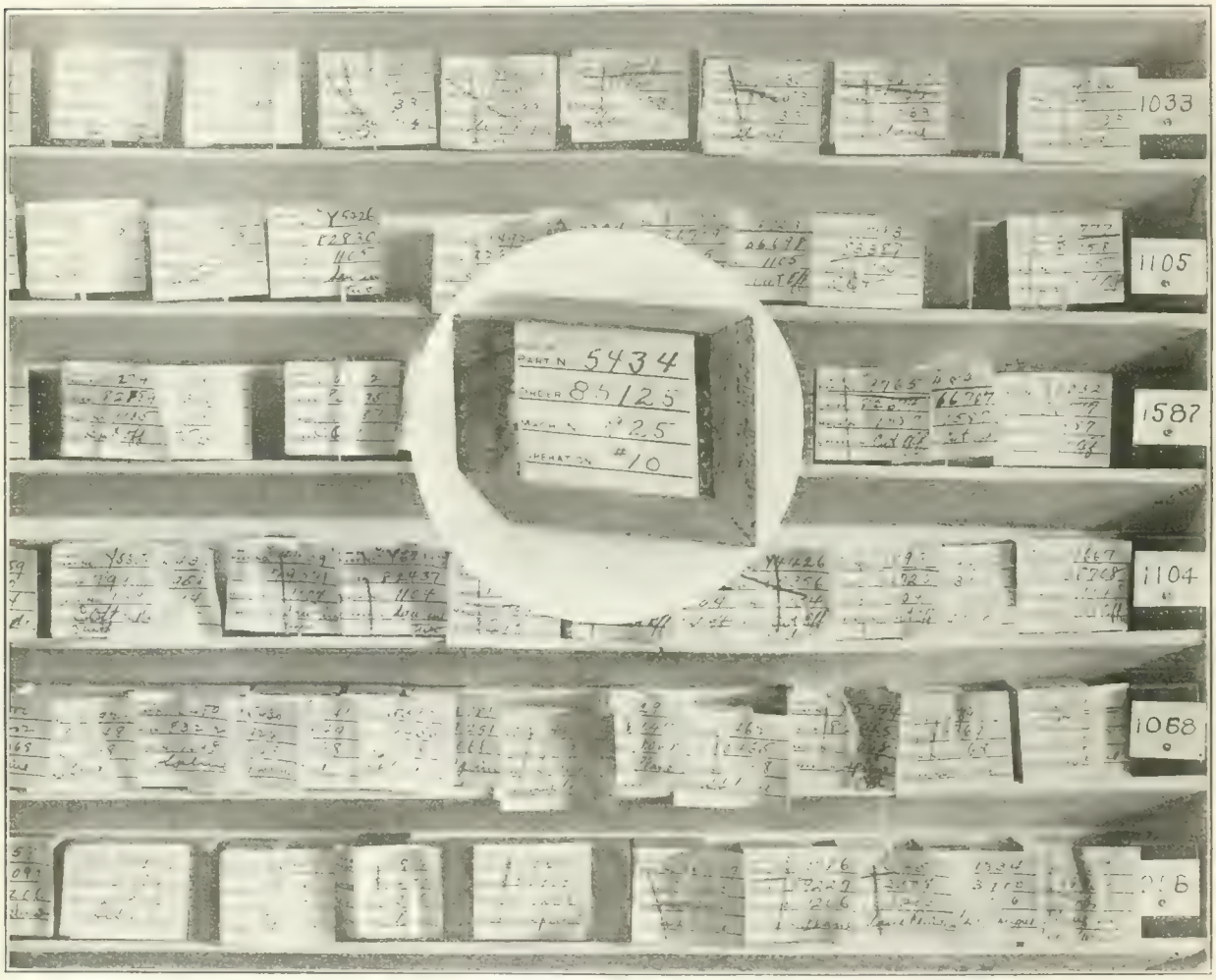
and are clipped together. They serve as a guide to the inspectors, the workmen and the foremen.

When an operation is completed the routing sheet is detached by the inspector and sent to the cost department as a further check on completed operations. Use is made of the routing sheet, as shown, to describe operations, or to bring out any particular points in connection with them, or to illustrate, by means of drawings, roughing operations. This takes from the operator the necessity for doing any mathematical work, and also obtains the same roughing dimensions in each succeeding lot of pieces. It is beneficial in several ways, not the least of which is elimination of quarreling over piece-work prices on account of the amount of stock that may be left for finish. The information conveyed to the operator on the routing sheets is such as to do away with the necessity for him to do any calculating of dimensions and limits or any extensive thinking. This is one of the developments due to the fact that most large machine shops now have a large force of machine operators but few machinists in the sense conveyed by the word machinist twenty years ago.

A time card is made out to agree with each of the routing sheets. These are complete in every detail except for the clock number of the operator. This means that the amount of clerical work actually done by shop men is reduced to the least possible amount.

The envelope is now ready for the stock clerk, who, having authorized the shop order, has already ordered his material. If the material has arrived, he so indicates on the envelope, and the envelope is ready for the shop to use. If the material has not arrived the stock clerk holds the envelope until he can obtain the material. The envelope is given to the dispatcher on the arrival of the material.

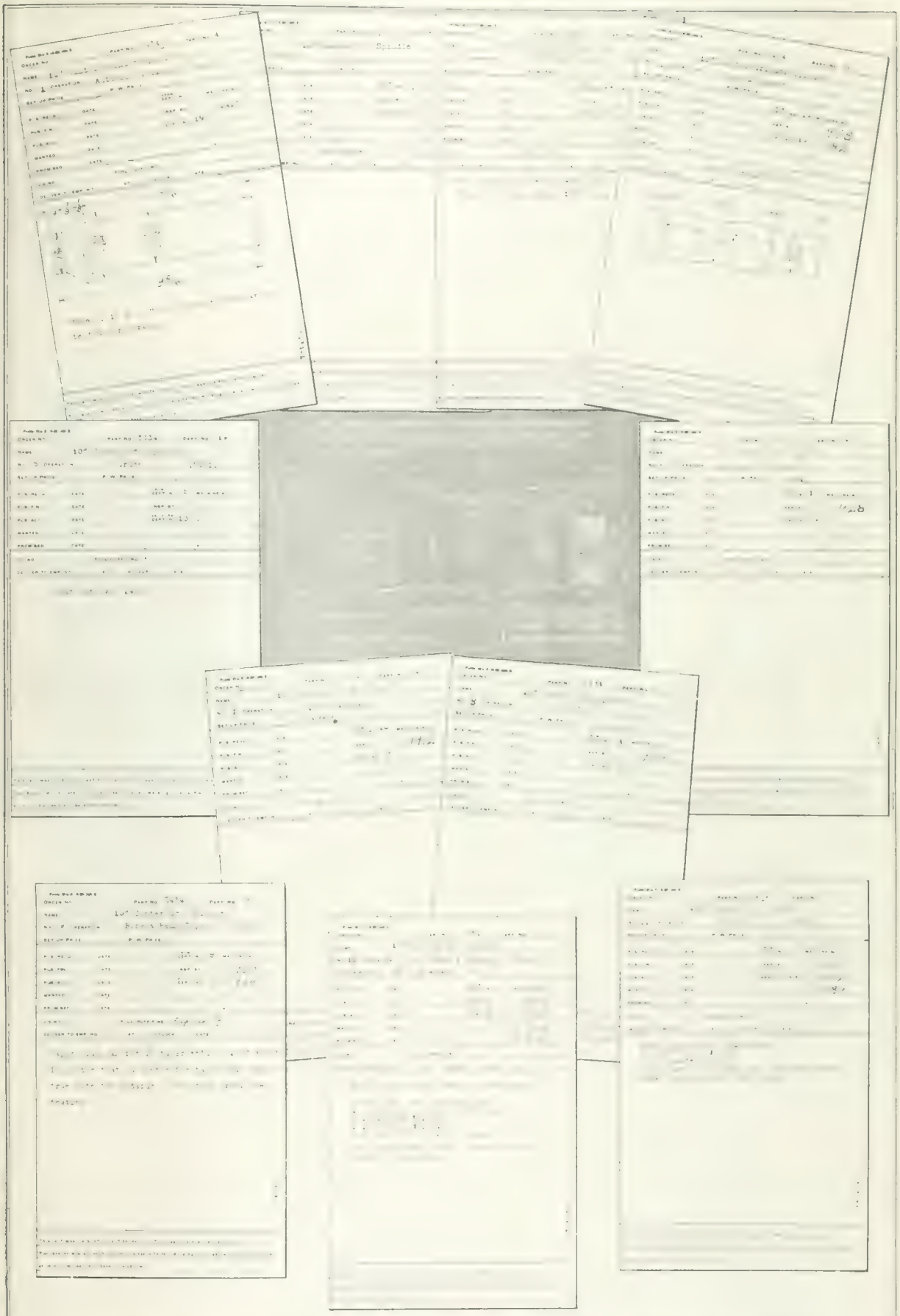
This department uses blocks of wood in the form shown in the illustrations to represent each operation shown by the time card in the envelope. The length of time required for an operation for the lot is shown by the length of the block, the blocks being made to the scale that 1/10 in. is equal to one hour of time. To these blocks are fastened stickers which give the part number, the shop order number, the name of the operation, and the machine best adapted for this operation. When the blocks for a given order have been filled out they are placed on the shelves, one of which represents a definite machine in the shop. The envelope with its blueprint and routings is then filed, ready for shop use.



This close view shows a section of a dispatch board. The black block at the right bears the machine number. Each wooden job block bears a job ticket. The blocks are made on a scale of 1/10 in. of length, representing one hour of time. A vertical blue line on the ticket shows that the previous operation is completed; a horizontal line that the time card for the job has been passed to the foreman

The general foreman, who has charge of production, starts the shop order into the factory in time to meet his needs on the assembly floor. He does this by ordering that the first operation on this job shall be given to that machine best adapted for that first operation. It is the duty of the general foreman to maintain ahead of each machine in the plant three operations, so that the workmen will at no time be out of work, and so that the foreman will not have to hunt for jobs for his men.

As soon as an operation is completed, the time card, which has just been rung out on that operation, is sent to the dispatcher. The dispatcher takes down from the machine shelf the corresponding block of wood. It is then his duty to call to the



BLUEPRINT OF A FINISHED PART AND THE ROUTING SHEETS FOR THE DIFFERENT OPERATIONS

A blueprint of the finished part is placed at [illegible] left. This [illegible] of a spindle for a center grinding attachment. The routing sheets which [illegible] the [illegible] and other operations on this part. The routing sheets for roughing [illegible] a sketch of the part with dimensions thereon. The plan obviates complaints from [illegible] stock left in roughing operations

attention of the general foreman the fact that a new operation should be found for this machine, in order that the machine may still have three operations ahead of it. In order that the general foreman may know what operations listed against the machine are available, when an operation is finished, the dispatcher marks the next succeeding operation with a vertical blue line, which tells the general foreman that this operation is available for the given machine. He can therefore select any such available operation to be the third operation demanded from that machine. When the vertical line is crossed by a horizontal line, it indicates that the foreman has received the time card.

As soon as an operation is selected as the third operation demanded from the machine, the dispatcher sends to the foreman having charge of that machine a time card for that particular operation. This notifies the foreman that the work is wanted, and saves confusion by keeping down the number of time cards in that department.

If occasion arises whereby plans must be changed in order to get out some rush job that comes in without warning, the general foreman has the authority to alter any blocks on the board, so long as he connects with the dispatcher who then rearranges the foreman's work. It is found, however, that continuous planning keeps these changes down to a minimum. The operation of changing the dispatch board is not an arduous one, and permits of great flexibility.

The foremen are invited to see the dispatcher at least once a day, and if they wish they can make a list of the three operations planned for each of their machines. This enables the foreman who has both a day gang and a night gang to keep in touch with his work very closely day by day.

The use of this dispatch board will enable one to get exactly what is wanted from each machine. A glance at the board shows approximately the number of machine hours ahead of each machine. During poor business times this gives the superintendent a clue to the amount of work ahead in the plant, and enables him to take up with the management the question as to whether they will give him more work, or whether they will run short time; also whether they will weed out the less efficient men and prolong the working time of the more efficient, in order to keep together the better part of the organization.

It will also show whether one or more machines have been given more work than will allow the entire plant to meet its schedule. In most shops it will be found that certain machines, because of their efficiency, are great favorites with the foremen, and because these machines turn out work cheaper than other machines in the department, the foreman will naturally give them all possible jobs to do. This may result in these favored machines having so much work on hand that the other machines will be out of work, and the schedule will be delayed. Hence, the board shows that some of these jobs should be taken from these machines and distributed to other machines, perhaps less efficient. It also gives the superintendent a tip to buy more of the favored machines, and get rid of some of the slower ones.

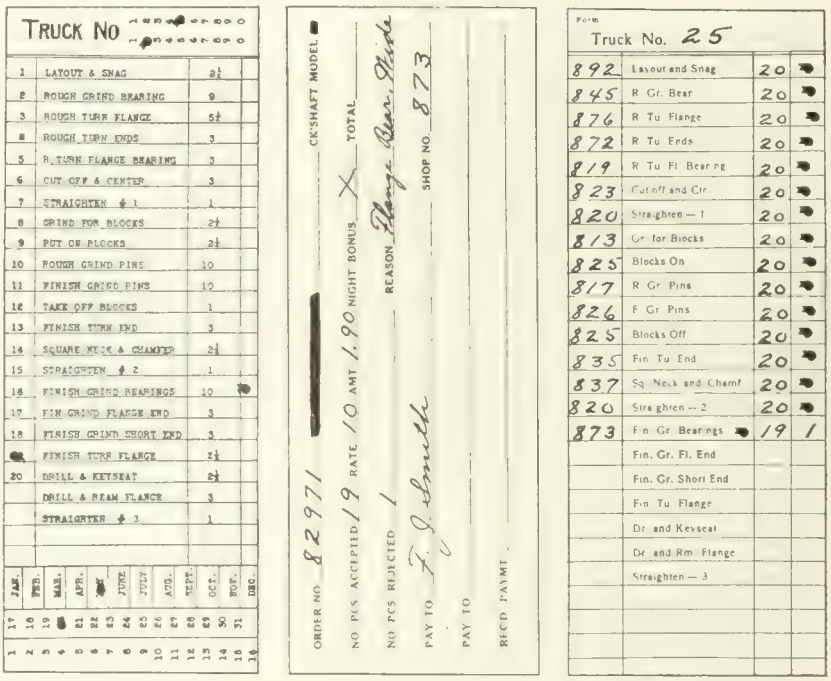
To operate such a control board as this requires co-operation on the part of the foremen, and demands a firm stand on the part of the management that the board shall be obeyed in every particular. Unless one has a sympathetic organization, he will find that certain of the older foremen will look on all such matters as added red tape, and that the dictates of the board will be disobeyed, and—just as would happen on a railroad—collisions or falling down on the schedule will result.

In the operation of this system, differing in this detail from many planning systems, no effort is made to predict the time when the job will be done. When no attempt is made to do this, the failure of a schedule due to the uncertainty of the human factor is eliminated. The principal functions of this system, which it is successfully performing, are the visualizing in a very concrete way of the amount of work ahead of each machine and the almost complete elimination of the running about of the foreman to locate the next job for each operator. It brings to one point for the survey of superintendent and general foreman, all the factors necessary for the completion of jobs at a promised delivery date.

The system is an adaptation of a similar system in use at the Hart-Parr Company, Charles City, Iowa.

For several years the Norton Grinding Company

The middle and the left of this group of illustrations are the two faces of a card punched by an inspector after an operation is finished. It is turned in to the time clerk by the operator and used to calculate piece wages. The fifth line on the reverse side enables the operator to assign payment to some other person. The punches show the truck number, number of pieces, piece price and date.



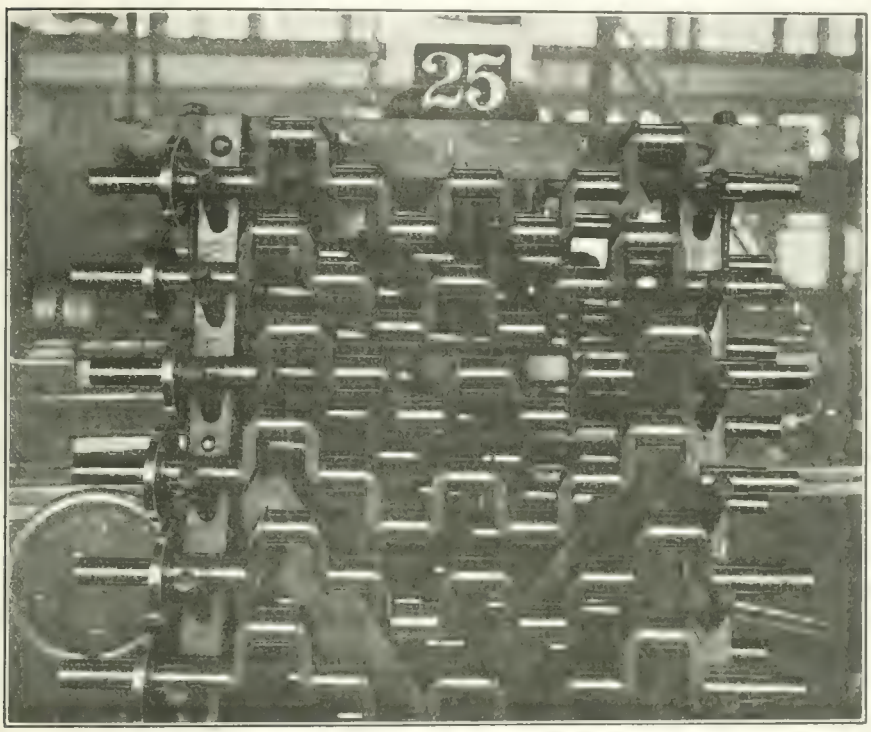
has specialized in the contract grinding of automobile parts, particularly crankshafts. It has recently devised an accounting method for its piece-work operators on this class of work which eliminates much of the bookkeeping, both for the operator and for the cost department.

Twenty crankshafts are mounted on a special truck and go through as one job. The truck bears a tag which is punched by the inspector as each operation on the crankshafts is finished. This tag stays with the truck through all the operations. There is a somewhat similar tag which the operator turns in and which is used in figuring up his time or piece-work wages in computing his pay for the week. At the top of this particular tag are two parallel series of figures from 1 to 0. The truck number is punched out on these numbers, as shown by the illustration. Down the left-hand side of the tag is a column of numbers from 1 to 20 which is punched to show the number of crankshafts on that truck. The center is printed with a description of each operation. On the right-hand side is a column giving the piece-work prices for each operation beside which is room for a punch hole which is made by the inspector when the operator finishes the job. At the bottom of the tag the months and the days of the month are printed and are punched out to show the date of the operation.

On the back of this tag, as shown, is some information regarding the order number, kind of crankshaft, number of pieces accepted and rejected, rate, amount of night bonus, and the total. This bears instructions filled in by the inspector giving the name of the employee and the stock number. There is an extra line so that the operator can assign the payment of his check to some other person who can draw his pay from the paymaster. Whoever draws the pay, whether the operator or the assignee, gives a receipt for the payment on the bottom line. This forms an extremely simple way of keeping track of piece-work and is of real service to the paymaster in making up the payrolls. The idea is borrowed from the practice in the shoe industry, but the tag in this case is modified somewhat after the lines of the transfer used by most of the street railway companies. This is one of the ways in which shop practices of the Norton Grinding Company have moved away from the beaten path followed by most manufacturing machine shops.

A distinctive method is used to mark the raw steel stock. The steel stock has been standardized to nine kinds which are designated by numbers, as in the following list:

No. 1. C. R. S. screw stock
No. 2. 15 to 20 P. C. O. H. M. S
No. 3. 30 to 40 P. C. O. H. M. S
No. 4. Crucible steel O. H.
No. 5. Center steel
No. 6. 100 to 110 P. C. tool steel.
No. 7. 15 to 20 P. C. alloy steel
No. 8. 30 to 40 P. C. alloy steel
No. 9. Alloy steel over 40 P. C. and high in nickel or vanadium, such as used for spindles



This shows a section of the truck used in the crankshaft grinding department and the manner in which the operation card is attached. This card, which is the right of the group on page 4, accompanies each truck of crankshafts, occupying a place on the top of the truck. The column on the left shows operator's number and the third column the number of pieces on the truck. The card is punched after each operation by an inspector.

A letter of the alphabet designates each concern from which steel is bought. The instructions read: Mark steel number first, then firm letter. Thus, center steel from Bethlehem Steel Company would be marked 5-G.

As the various producers and dealers differ in the end color marking for the same stock, the confusion that would thereby be caused is eliminated by the special code numbers and letters stamped upon the exposed end of each bar when it is placed in the rack. All portions cut from a bar are cut from the other end so that the last fragment still bears its distinguishing mark. The alphabetical marking makes it easy to tell from just which concern the steel was received.

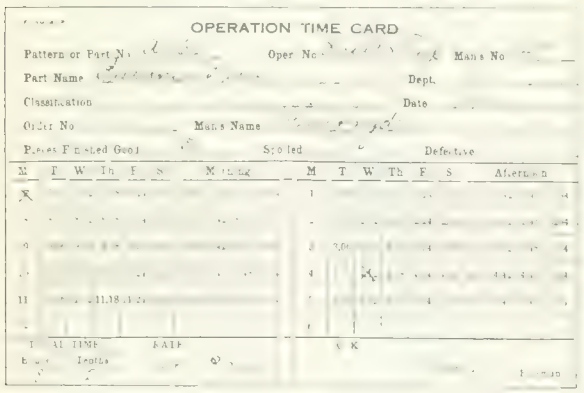
To make sure that the low carbon machinery steel does not contain an excess of carbon, an easy and certain method of analysis is employed. A disk, ½ in. thick, is cut from each bar and carbonized along with any of the regular jobs. One-eighth inch is next cut off one side of the disk. If the stock did not contain more than 20 points of carbon, the carbonized portion of this side should be removed by this operation. The disk is then sent to the hardening department and heated and quenched. One side should then be glass hard and the other side be easy to machine. This is determined by a drill test.

Keeping Track of Work in Process*

A Combined Production-Operation Order Cost Record Serves to Locate Every Part of Every Order at Any Time

BY H. A. RUSSELL

THE method followed in getting work through the factory can be best understood by following a particular lot of castings from the foundry to the machine shop and thence onward, operation by operation, until they are finished and either become a part of the complete machine or are placed in storage. The casting that has been selected weighs 64 lb. Castings of this weight, either in the rough or finished state, are piled one on top of the other. Smaller castings are placed in bins on which the designating letters and numbers have been stenciled. Each bin section, containing from twenty to sixty bins, has a number


OPERATION TIME CARD

Pattern or Part No. Oper No. Mach No

Part Name Dept.

Classification Date

Order No Mach Name

Pieces Finished Good Spoiled Defective

M	T	W	Th	F	S	Morning	M	T	W	Th	F	S	Afternoon
X						1							
9						3							
						4							
11						7							
						8							

TIME RATE

Fig. 1. The operator passes out the time device on the card most nearly corresponding to the actual time of starting work, [illegible] the time when he finishes. The elapsed time, rate and earnings are computed in the office

painted in large figures on each end of the section. Each row is designated by a letter starting with A for each section. These letters are also painted on each end of the row. On the front of each bin is another number which is one of a series starting with 1 and running up as high as necessary. Therefore, if the record should designate "Section 2-Row B-Bin 5," it is an easy matter to find the proper castings.

THE PRODUCTION-OPERATION RECORD COST CARD

The piece which will be followed through the factory is the crankshaft balance disk of an Ajax 7½ x 10-in. engine. The symbol of this part is A164. The yearly inventory on Jan. 1, 1916, indicated that 40 pieces of A164 were on hand in the rough state. The production department, having analyzed the estimated sales, found that it should order 210 pieces of A164 from the foundry to complete 250 engines which had been specified. The first step is to fill in the production-operation cost card, Fig. 2, with the symbol number and name of the part, the name and size of a machine on which the casting is used, the minimum quantity to be carried in stock, the size of the desirable order, the weight per piece and the location in the storeroom. When the casting or other part is used on several different sizes of machine all of the sizes are specified. The number of castings required for each complete machine is also given. When the quantity of pieces on hand is reduced to the minimum designated on the card as the "low limit" the clerk in charge of the record notifies the production chief by means of a written memorandum. The item "desirable order" quantity is subject to such change as may appear necessary. The principal reason for this item is to bring to the attention of the production chief the most desirable quantity of each casting to start through the factory. If, however, there is an unusual run on any one size of machine he uses his judgment as to the quantity to be ordered, as was done in the case under review. Here the full 210 pieces needed were ordered, possibly to give the foundry a good start or to meet a shortage of work for certain machines in the engine department.

In the columns headed "operation" the sequence of machine operations is given. The piece-work price and the department number in which each operation will be performed is filled in as shown. A part may be partly finished in one department and then proceed to another for completion. The production operation order is ruled and printed on both sides, giving space for the recording of eight separate operations. If more than eight operations are required for finishing any one part a second card must be used. When this is done the cards are plainly marked Card No. 1, Card No. 2, etc.

The piece-work prices given in the illustrations are fictitious and other items have been changed, but the method of recording the items is identical with the method now in force.

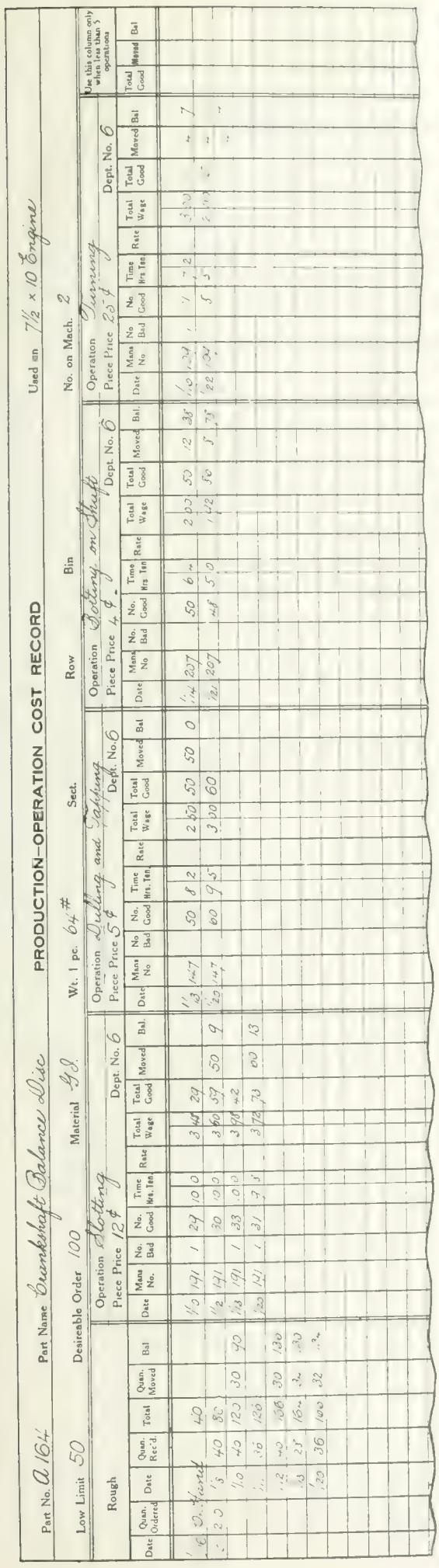
The first quantity recorded on the card is the 40 pieces reported in the inventory. See entry on top line in "rough" column. On Jan. 5 the production department sent the molder's work card to the foundry, ordering 210 pieces to be made, a notation to this effect first being made in the first two columns of the production-operation order. On Jan. 8 the goods-received report indicated that 40 rough castings A164 had arrived in the engine department, making a total of 80 pieces on hand. On Jan. 10, 40 more pieces were received, making a total of 120 pieces, but as on the same day 30 pieces were delivered to the operator for slotting, the total of rough pieces was reduced to 90.

KEEPING THE MEN'S TIME

The production-operation order showed the slotting operation had been completed on 29 pieces on Jan. 10. This record was taken from the operation time card, Fig. 1. The operation time card is 4 x 6 in. and of medium weight paper. Day work cards are white and piece-work cards green. When the operation is performed under an hourly wage, instead of a piece rate the entries are made in the same manner, excepting that the hourly wage is filled in the "rate" column. The difference in the color automatically warns the party making the entry. From these cards the pay roll is made up, each card being O.K'd by the assistant foreman in the department.

At the completion of each job the operator makes a cross-mark over the nearest tenth of an hour to

*Second of a series of three articles describing the production methods of a large agricultural implement factory. The first appeared in THE IRON AGE, June 29.



PRODUCTION–OPERATION COST RECORD

Part No. A 164 Part Name Crankshaft Balance Disc Used on 7½ × 10 Engine

Low Limit 50 Desireable Order 100 Material G.I. Wt. 1 pc. 64 # Sect. Row Bin No. on Mach. 2

Rough: Date; Quan. Ordered; Date; Quan. Rec'd.; Total; Quan. Moved; Bal.

Operation Slotting — Piece Price 12¢ — Dept. No. 6: Date; Mana No.; No. Bad; No. Good; Time Hrs. Ton; Rate; Total Wage; Total Good; Moved; Bal.

Operation Drilling and Tapping — Piece Price 5¢ — Dept. No. 6: Date; Mana No.; No. Bad; No. Good; Time Hrs. Ton; Rate; Total Wage; Total Good; Moved; Bal.

Operation Bolting on Shaft — Piece Price 4¢ — Dept. No. 6: Date; Mana No.; No. Bad; No. Good; Time Hrs. Ton; Rate; Total Wage; Total Good; Moved; Bal.

Operation Turning — Piece Price 25¢ — Dept. No. 6: Date; Mana No.; No. Bad; No. Good; Time Hrs. Ton; Rate; Total Wage; Total Good; Moved; Bal.

Use this column only when less than 5 operations: Total Good; Moved; Bal.

Rough Date	Rough Quan. Ordered	Rough Date	Rough Quan. Rec'd.	Rough Total	Rough Quan. Moved	Rough Bal.	Slotting Date	Slotting Mana No.	Slotting No. Bad	Slotting No. Good	Slotting Time Hrs. Ton	Slotting Rate	Slotting Total Wage	Slotting Total Good	Slotting Moved	Slotting Bal.	Drilling Date	Drilling Mana No.	Drilling No. Bad	Drilling No. Good	Drilling Time Hrs. Ton	Drilling Rate	Drilling Total Wage	Drilling Total Good	Drilling Moved	Drilling Bal.	Bolting Date	Bolting Mana No.	Bolting No. Bad	Bolting No. Good	Bolting Time Hrs. Ton	Bolting Rate	Bolting Total Wage	Bolting Total Good	Bolting Moved	Bolting Bal.	Turning Date	Turning Mana No.	Turning No. Bad	Turning No. Good	Turning Time Hrs. Ton	Turning Rate	Turning Total Wage	Turning Total Good	Turning Moved	Turning Bal.	Use this column only when less than 5 operations: Total Good	Use this column only when less than 5 operations: Moved	Use this column only when less than 5 operations: Bal
1/6	0. Hand			40			1/10	141	1	24	10 0		3 40	29			1/13	147		50	8 12		2 50	50	50	0	1/14	207		50	6 25		2 00	50	50	0													
1/20	1/3		40	80		30	1/12	141		30	10 0		3 60	57	50	9	1/20	147		60	9 35		3 00	60			1/21	207		48	5 10		1 92	56	56														
	1/0		40	120		90	1/13	141	1	33	0 0		3 90	42																																
			16	136		106		141	1	31	7 5		3 72	73	60	13																														
	1/2		30	166	30	136																																						
	1/3		25	161	32	104																																						
	1/20		36	100	32	32																																						

Fig. 2 The production-operation cost record gives complete information regarding the progress of each part through the factory. It not only shows what work has been completed but what work is ahead of each department. The card is split to fit the page.

the actual minute of finishing the last casting. The time record can never be more than 3 min. away from the actual facts. The starting time had been indicated in the same manner and the actual time consumed is easily determined. The total time, rate and amount earned is filled in when the cards reach the office. Each day all of the cards for the previous day's work are collected, and as fast as the calculations are made the entries are recorded on the proper production-operation cost record card. The progress of the various operations and the movement of the work from department to department is clearly shown in Fig. 2.

FOLLOWING THE ORDER THROUGH THE SHOP

The total number of castings slotted at the end of Jan. 12, was 59 pieces. On Jan. 13, 50 pieces were sent to be drilled and tapped. On Jan. 14, these 50 pieces moved to the third operation, "bolting on shaft." On Jan. 16, 12 pieces passed to the final operation, "turning." As one casting proved to be defective while being machined, only 11 good castings remained, but as the operator had practically finished machining the defective casting before the defect became apparent, he was given credit for 12 pieces. Under "slotting" three separate castings are noted in the "bad" column. The operator was not paid for these, as the defects were discovered before any work was done on the castings. In order to keep the record straight all castings or other parts are reported, no matter whether they are good, bad, broken or spoiled in any way.

On the extreme right-hand side of the production-operation order card is an additional set of columns, headed respectively "total good," "moved," "balance." These columns are used for the purpose of checking off the finished parts as they become a part of the completed machine, or when they are sold as repair parts. When there are more than four operations on a part the two sets of columns on the reverse side of the card are used. Two columns are necessary for this purpose, because castings and other parts are generally machined in lots which are greater than the daily requirements of completed machines. Therefore it was necessary to provide for the greater number of entries which would go into these columns.

The production-operation cost record, Fig. 2, shows that on Jan. 22 (the date of the last entry) that there were on hand 134 rough castings, 13 castings slotted only, 78 castings bolted to the shafts and 7 castings ready to become a part of the complete engine. If the foreman of the engine department wishes to know the condition of the stock of parts for any size of engine the information can be secured from this record. He also can learn what work is ahead for each machine. Two entry clerks can handle several thousand items per day. The reports from the shop must come in accurately however, but this is principally a matter of training.

LOW LIMITS AND DESIRABLE ORDER QUANTITIES

The inventory on Jan. 1 indicated that only 40 pieces of A164 castings were on hand, while the low limit had been fixed at 50 pieces. At the end of the year quantities are allowed to fall below the low limits, as it makes the inventory an easier matter, and as there are usually a number of corrections to be made in the cards. A casting will disappear and another one will be found of which there is no record. These discrepancies generally result from reporting the incorrect number or letter and are bound to happen at times, no matter how much care is taken. So while the low limits

and desirable order quantities have been fixed through consultations between the production chief and the foremen of the respective departments, there is no hard and fast rule regarding them. Circumstances are allowed to alter the case as may seem expedient. The production department chief must be allowed to use his best judgment, and in order to do so he must keep in daily touch with the output of each department in the factory, speeding up one department so as to avoid delaying another. Should there be any danger of a department being held up by the non-receipt of material, the production chief must have other work planned. If there is a break in the output of one line another can be substituted without delay, thus preventing the loss of output by that department.

PRODUCTION DEPARTMENT INSTRUCTIONS

When the production department was organized certain instructions were issued, in the form of typewritten memoranda. While these were necessarily somewhat voluminous, they were planned to be permanent and to be in such complete form that a new man in the department, after reading the instructions, would have a thorough understanding of the duties and responsibilities of it. The duties and functions of this department are divided as follows:

Division 1. Records and record-keeping.
Division 2. Reports *to* production department.
Division 3. Low limits and desirable order quantities.
Division 4. Production orders and erecting orders.
Division 5. Relations with purchase department.
Division 6. Reports *by* production department.
Division 7. Follow-ups and promises.

The first division relates to records and the manner of keeping them. Among these are the production-operation cost record cards covering such items as gray-iron and malleable castings, brass castings, steel castings, steel parts, crankshafts, etc. Another set of records covers all shipments of engines, sawmills, threshing machines, etc. A third set refers to the production orders that have been issued for complete machines and also the total yearly sales of each style and size of machine. Still another set refers to all patterns that have been made in the pattern department or have been sent to the factory by customers.

Division 2 covers all the reports which should come to the production department to enable the records to be kept accurately. The responsibility of securing these reports at the required intervals rests on the production department.

Division 3 relating to low limits and desirable-order quantities is especially interesting. To quote from the memorandum covering this division:

> Theoretically, the low limit of machines of any type (product) would be just enough of them finished on hand to last until an entirely new production-order could be issued, the castings made and finished, purchased material ordered, received, forged, finished and the complete set of new machines erected. This would therefore be the low limit of each piece in such machine.
>
> But it is impossible to provide room for storage of so much finished product.
>
> Consequently the aim is to carry on hand the fewest possible finished machines consistent with being able to fill customers' orders.
>
> From this it follows that there are necessarily different low limits for finished product and for pieces composing the finished product.
>
> Therefore we fix the low limits as follows:
>
> First. The low limit of any particular finished machine is the fewest number of machines that will answer the requirements of our trade.
>
> Second: The low limit of any piece in a machine must be sufficiently large to allow ample time (after it is just passed) for a new requisition to be issued for the piece, to make it, or purchase and receive it, to finish it and erect it in new finished machines. This involves many considerations, which may be grouped as follows:
>
> Group 1. Castings from the foundry. Consider the number of days required to mold the desirable quantity—depending upon whether bench or floor work, whether cores must first be made, quantity of flasks on hand of a suitable size, size of castings, percentage of loss, time required to finish in machine department, etc.
>
> Group 2. Purchased articles on which we do work. Consider whether worked on in finishing department only or in several departments, such as connecting rods, which are forged in the blacksmith shop and then go to the machine shop to be finished. Ordinarily standard sizes of bar steel can be secured in from four to six weeks, but large rounds and squares, malleables, steel castings, odd sizes of flat steel, special shapes, etc., may take two or three times as long.
>
> Group 3. Purchased articles upon which we do no work.
>
> A. Where regular—can be obtained in from one to three weeks, depending upon kind and circumstances (such as valves, pipe fittings, etc.).
>
> B. Where special—(such as special safety valves or special traction throttle valves, etc.) will take from three to seven weeks or more. Low limits vary accordingly.

The desirable quantity to machine at one time varies, to some extent, upon the cost of setting up the various machines. Certain operations may require several hours to get ready before any actual productive work can be started, in other instances a few minutes may be sufficient. In the blacksmith shop it may mean the changing of heavy dies and to hammer only a few pieces would be an expensive operation per piece. Another element to be given consideration is the amount of material on hand of the proper size and quality. Still another factor is the length of time needed to finish a given number of pieces. If a lathe or planing machine or hammer is tied up too long on one part of the product it may throw some other line of product too far behind.

Division 4 contains the instructions for issuing production and erecting orders. The production order goes direct to the foreman of the department and indicates the actual quantity of each part that is to be made. The erecting order contains instructions as to the quantity of each size and style that is to be assembled complete, ready for shipment. As the production department controls the supply of parts, it is always in a position to issue the erecting orders correctly. The production order was illustrated previously.* It is a loose-leaf binder sheet, 8½ x 11 in., with the words "production order" printed at the top. The body of the sheet is ruled with horizontal lines. No attempt is made to provide for each item separately, on account of the variety of parts manufactured. Before issuing a production or erecting order the following facts are considered: Stock on hand; parts and finished machines; warehouse or storage capacity; season of the year.

Division 5 covers the relations that must exist between the production and purchase departments. Frequent consultations must be the rule. With the right spirit of co-operation between the two departments costs are lowered, production increased, and a good example of thoroughness is set for the other departments in the office, as well as in the factory. When the two departments cannot, or will not, work in harmony, there is something wrong and the sooner the matter is given the proper attention the better for all concerned. The instructions covering Division 5 are complete and specify clearly what the duties of the production department are, as affecting its relationship with the purchase de-

*THE IRON AGE of June 29, page 1557.

partment. Certain items are ordered by the purchase department on its own responsibility, but a copy of the purchase order goes to the production department, minus prices and terms, but including a notation as to the time the material may be expected.

Division 6 refers to the reports which the production department must make to the management, also to the other departments. These reports cover such items as the monthly inventory of finished machines on hand, the yearly report of machines built and a somewhat similar report which shows the number of machines and implements actually shipped, arranged so that there is a means of making a quick comparison with the previous year's shipments. To the sales department a weekly report is made covering the machines on hand ready to ship. This last report is filled in on a printed form (by the sales department) and copies are mailed weekly to the dealers.

The method of following orders through the factory is outlined in Division 7. In this division the attention of the production chief is called to the fact that the real function of his department is to speed up the various departments, so that maximum results will be obtained at a minimum cost. Consultations are held daily or oftener with the foremen of each department in the factory. The production department is also in telephonic connection with each factory and office department.

ADVANTAGES OF THE PRODUCTION-OPERATION ORDER

The forms illustrated have proven their adaptability to the system and give records which are dependable. The production-operation cost card furnishes information which permits of the following results: The shop departments can more readily and easily plan their work. The production department can more easily and intelligently issue production orders and follow them up. The sales department will receive promises which can be depended upon regarding the shipment of customers' orders. The cost department will have easy access to correct costs. The time department will have a check on earnings and piece-work counts.

All of these results depend, however, upon the accuracy of each individual daily time slip. As these same time slips are the ones from which the pay-roll is made up, the question of accuracy is a fundamental one and no greater amount of work is entailed than that which is necessary for the purpose of the time department. In planning the production-operation cost card the first consideration was to avoid duplication of work, and the results obtained do not require a single item of information in excess of what would be in any event turned in daily.

Tennessee Company Improvements

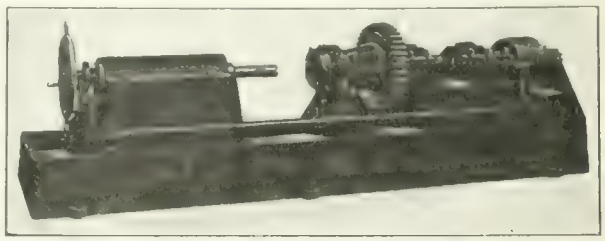
BIRMINGHAM, ALA., July 3, 1916.—(*By Telegraph*).—The Tennessee Coal, Iron & Railroad Company announces plans for several improvements. One is the installation of an electric furnace at Ensley for preheating ferromanganese and another is the doubling of the blowing capacity for the Bessemer end of the duplexing plant at Ensley by the installation of a spare engine. Further items on the program are the building of employees' bathhouses and school buildings at a number of the company's operations.

Forty-seven large manufacturing concerns at Oshkosh, Wis., on July 1 put into effect the "extra daylight" plan by permitting all employees to start and finish work an hour earlier.

A Heavy Boring Lathe for 6-In. Shells

An unusually heavy projectile boring lathe designed especially for high-speed work on 6-in. shells has been put on the market by the Osborne & Sexton Machinery Company, Columbus, Ohio.

The bed, which is of heavy deep pattern with double-webbed box type girts to prevent vibration and springing, has a total length of 12 ft. 6 in. The lathe has a 40-in. swing and is geared at a ratio of 8 to 1. A 1½-in. hole with a depth of 12¾ in. can be bored in a 6-in. solid billet in 25 min., while on drawn shell work this operation can be performed in approximately 5 min. The length between the faceplate gear and tailstock spindle is 48 in., so that the machine can bore a hole 21 in. in depth. The two sets of driving gears are cut from the solid and have heavy guards.



A Heavy Lathe for Boring 6-In. Shells Capable of High-Speed Work

The spindle bearings are 6 x 10 in. The diameter of the pinion and pulley shaft is 2 15/16 in. The driving pulley has a 10-in. face and is 16 in. in diameter, and the diameter of the faceplate gear is 26 in.

The headstock is 36 x 55½ in. and is provided with lugs for the motor brackets. The tailstock base is provided with tongues to fit in the groove in the top piece to permit of lateral adjustment by the screws shown and thus take the thrust of the cutter bar. The tailstock spindle is of high-carbon steel and ground to fit in the tailstock and the cutter bar end of the spindle has a No. 6 Morse taper hole with a slot across the end of the spindle for a driving key. This key is made small enough so that it will shear off, should the cutter become fouled and thus prevent damage to the bar. The variable feed to the tailstock spindle is through a lay shaft at the back of the machine, which is operated by a rocker arm on the shaft and a crank-pin on the end of the main spindle, the two being connected by a connecting rod. On the tail end is a rocker arm which is connected with a second rocker arm on the screw by a connecting rod, and the rocker arm on the screw has a pawl engaging a ratchet wheel keyed to the screw.

The total shipping weight is 16,000 lb. and the manufacturer recommends that not less than 15 hp. be provided for heavy work.

The French Army Helmets

The French army steel helmets are stamped out of the best half-hardened sheet steel, about 1 mm. thick, according to the *Bulletin des Armées*, a government publication. Four pieces make up the helmet: The cap, the peak, the neck protector, and the crest, and they are riveted together and sprayed with a gray-blue paint just enough to prevent rust. After drying for three hours at 135 deg. C., the helmet is lined and fitted with the chin strap. Each one requires about 2 lbs. of steel and a little aluminum to stiffen the lining. Over 3,500,000 have already been made, and 50,000 per day are turned out, three-quarters of the work being done by women.

The Wight Electric Recorder Company, Cleveland, will place on the market an electric time recorder for water in steam boilers. It is the invention of James Wight, formerly master mechanic in the employ of the Otis Steel Company, Cleveland. The machines, for the present, will be manufactured by the Fanner Mfg. Company, Cleveland. The Wight Company has been incorporated with a capital stock of $30,000.

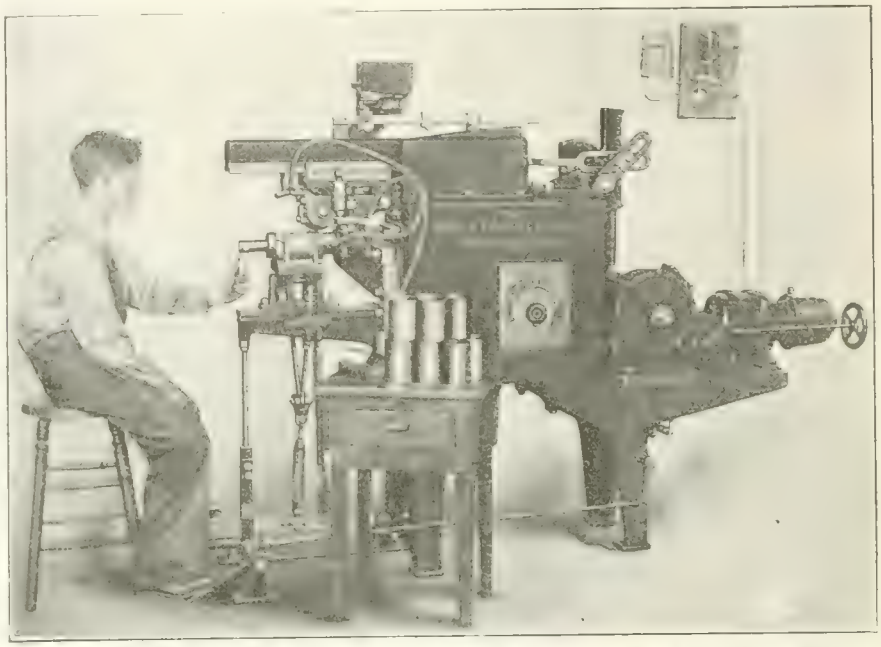
A Motor-Driven Seam-Welding Machine

A new type of motor-driven seam-welding machine has recently been put on the market by the Toledo Electric Welder Company, Cincinnati, Ohio. These machines are especially adapted for welding the side seams of coffee pots, pails, phonograph horns and other articles made from clean, pickled sheet steel of light gages. It is stated that the edges of the stock overlap only from 1/32 to ⅛ in., and that the pressure of the rolls forces the stock together so that it is only from 0.002 to 0.003 in. thicker at the joint than it is outside the welded area, so that when the articles are enameled or japanned it is almost impossible to detect the place where the weld was made.

The machine is also used in the manufacture of oil-stove cylinders that are 3¼ x 4½ in. of No. 24 lead-coated stock, where the weld, of course, must be absolutely tight and with a smooth finish. It is claimed that 5000 of the cylinders can be welded on the machine in 9 hr. The rolls pass from the cylinder at the rate of 18 ft. per minute, and only a fraction of a second is required to weld a 4½-in. seam. Two men operate the machine and two jigs are used. One operator places the stock in the jig and passes it to the man doing the welding, and while this operation is being done the second jig is filled as quickly as the first piece can be welded. The jig holding the cylinders is placed over the lower stationary horn of the welder that serves as one electrode. A slight pressure on the foot treadle shown trips a clutch that sets a worm drive in motion and thus carries the upper copper roll over the overlapping edges of the stock to be welded. The roll passes from the cylinder in 1½ sec. and the current is automatically turned on at the instant that the copper roll touches the cylinder, and it is turned off immediately when the roll reaches the outer edge of the cylinder. At the same time the worm drive is reversed and the roll is returned to its original position ready for the next weld. The roll is water-cooled to prevent overheating.

An alternating current of either 25 or 60 cycles can only be used at either 220 or 440 volts. A special transformer located inside the machine reduces the current to about 3 to 5 volts, so that there is no danger of the operator receiving a shock. Based on a current cost of 1c. per kilowatt hour, it is stated that the expense would be only 10c. per 1000 ft. of welded surface.

To take care of varying thicknesses of stock, a regulator is furnished to give different degrees of heat at the weld and the pressure of the rolls can be varied to suit the different stock used. The speed of work depends practically on the size and shape of the pieces handled and the rapidity with which the operator can pass them over the welding horn.



A Motor-Driven Machine for Electrically Welding the Side Seams of Articles Made of Light-Gage Sheet Steel, Such as Coffee Pots, Pails, Phonograph Horns, Etc.

The Taylor-Wharton Iron & Steel Company, High Bridge, N. J., has increased its capital stock from $2,000,000 to $4,000,000.

The Bulletin Board as a Safety Adjunct

The bulletin board may be made of great use in the safety campaign in the factory, according to Bulletin No. 77 of the Department of Labor, New York. It may also, if overdone, chill interest in the subject. The contents of bulletin boards, when read, make a constant appeal for safety. When unread, they are monuments to a dead cause. The following suggestions are given as to making the safety bulletin board most effective:

Brevity. Few men stop to read a wordy bulletin. Even at lunch time a long, printed bulletin must be of unusual interest to hold the attention of the workers.

News. Bulletins are effective in inverse proportion to the length of time they are posted. After they have been up for two weeks they are of doubtful value.

Statistics. Detailed statistics have not been universally demonstrated to be effective in use on safety bulletin boards. Not all workmen understand them. However, their results can be so charted as to be intelligible to most workmen.

Pictures. Pictures are most generally "read"—photographs especially. A picture is often used effectively to call attention to a short printed or typewritten statement.

Letters. Short letters or typewritten communications signed by some one in authority in the factory attract attention better than do printed statements.

Cartoons. Occasional cartoons or the use of subject matter other than safety varies the monotony but also detracts from the value of the board as a safety reminder if too much extraneous matter is introduced.

Simple Language. Bulletins must be in the language understood by the workmen. If they read Croatian put simple Croatian on the bulletin boards. If they read no printed language, post pictures instead.

Location of Boards. Have a definite place for posting bulletins, so situated as to reach the greatest number of men. If more than one bulletin board is accessible to the same group of men, put different subject matter on them.

Discontinuance. If all known means of keeping up interest in bulletin boards fail, leave the boards bare for a while. A bulletin which is not read is worse than none at all. Later the system may be renewed. Moving the board to another part of the plant will renew the interest of the workmen.

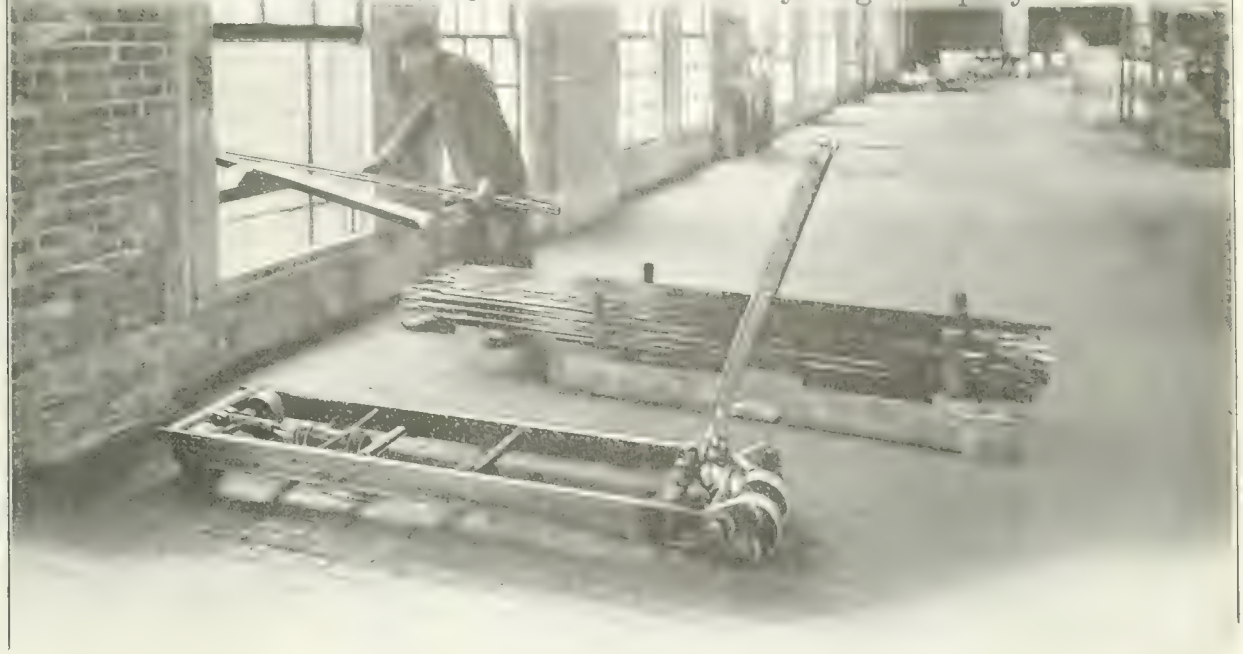
The Northwest Steel Company and Willamette Iron & Steel Works, Portland, Ore., have received a contract for the fifth steel steamer to be constructed by them, according to President Ball of the Willamette Works. The two plants now have work totaling $5,000,000 contracted for, which it will take two years to complete.

The Zenith Furnace Company, Duluth, Minn., will add 15 coke ovens to its present plant. Both this and the Northwestern Iron Company's 36-oven plant at Mayville, Wis., which is to be doubled, are Solvay process plants.

A strong steel guard is erected outside the window [illegible] which serves as a point of support for the chute [illegible] to a skid

Steel Storage in a Hartford Factory

Special Unloading and Storage Methods and Requisition and Inventory System of the Whitney Mfg. Company



A WELL–PLANNED and well-conducted steel storage room and system is that of the Whitney Mfg. Company, Hartford, Conn., which makes roller chains, silent chains, Woodruff keys in large quantities, besides machinery and other products. The steel room itself is 56 x 164 ft. and a recent addition which is 56 x 80 ft. is used for the storage of steel in coils. The construction is of steel and brick with wood block floors. The space between one of the side walls and the end of the storage racks forms a broad aisle through both storage rooms.

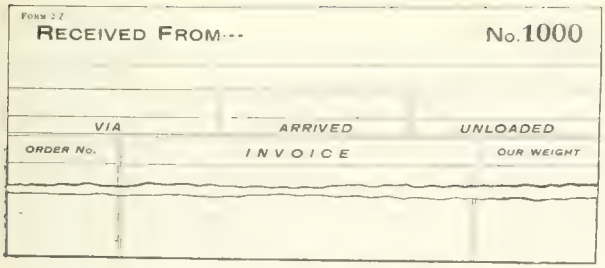
At the inner end of the main aisle is an elevator with a capacity for hoisting a loaded 3-ton motor truck. A truck with supplies for the other portions of the plant is run upon this elevator and carried up to any desired floor. The elevator is stopped so that the body of the truck is level with the floor and goods are easily unloaded on hand or conveyor trucks.

A spur track runs along one side of the building its entire length. Cars containing steel bars and rods or wire are unloaded through any one of the windows, as shown in one of the illustrations. Outside of each of the windows is erected an iron framework to guard the window casings and a steel cross-bar on this serves as a support for a chute from the car to the inside of the building. Cars containing other materials than raw steel are set at the end of the spur track where there is a loading platform connecting through a large door with a removable platform at the foot of a large elevator previously described.

Special skids are used, upon which steel bars and rods are placed as they come down the chute from the cars. These are moved about by an elevating conveyor truck. Unless market exigencies prevent, all the raw bar and rod stock is bought in 8-ft. lengths. As fast as a skid is filled it is hauled to the scales and weighed. The tare of each skid is marked on it, and the weight of the various conveyor trucks is also known. An empty skid is placed immediately beside the scales, which serves to hold surplus stock, as the net load on any one skid is made as nearly as possible 1 ton. This is for a purpose which will be explained.

The storage racks are made of steel and are divided into vertical sections. Such stock as is carried in large quantity is put into these sections and each ton lot is separated by wood cross-ties as is shown in the illustration of one of the stock aisles. If the average amount of stock is small the vertical sections are divided into two, four or other convenient divisions by steel cross-arms and that particular kind is put into the racks having subdivisions. All of the vertical sections and each sub-division of the racks have the size of stock in the section below painted upon the cross-bar. Some of the racks are roofed over with planks, furnishing extra storage space for materials not otherwise provided for. A small yellow slip bearing the number of the measuring card and the order number is inserted between the bars stored in each section. By this method the name of the shipper, the date of receipt and all other needed information is quickly made available. While extremely simple, this method of inserting the small slip of paper has been found to be very quick and reliable and serves to distinguish between different shipments of the same kind of stock.

Steel in coils is unloaded and handled in much the same manner as bar and rod stock. There is,


FORM 2-7

RECEIVED FROM--- No. 1000

VIA ARRIVED UNLOADED

ORDER No. INVOICE OUR WEIGHT

The Card Filled Out When Material is Received

manufacturing order, and three columns showing the weights received, the weights delivered to the departments and the weight on hand. This inventory sheet is also shown by illustration.

The routine of moving stock from the steel room to the job is as follows:

The department needing the stock sends a slip entitled "shop order wanted" to the planning department. This slip is on orange paper and has but little printing, the space being left largely to be filled in by the department head to meet his requirements. When this slip reaches the planning

FORM B-12

RAW STOCK Size .1875" x .313" B/P L-2211 Key No. 9

Ordered from Crucible Steel Co. Grade Clipper Months' Supply tons

ORDERED			BILLED		RECEIVED		BAL DUE	REMARKS
DATE	ORDER NO	AMOUNT	DATE	AMOUNT	DATE	AMOUNT		
Mar. 8/15	42,560	24,000	Mar. 29	7292	Apr. 3	7292		
			" 3	1480	" 6	1480		
			" 8	2303	" 9	2303		
			" 10	1542	" 13	1542		
			" 14	5774	" 16	5774		
			" 16	4460	" 23	4460		
			" 17	1750	" 23	1750	Filled	
May 24	43,827	30,000	Sept. 18	958	Sept. 25	958		
			" 22	2848	" 25	2848		
			" 28	2396	Oct. 1	2396		

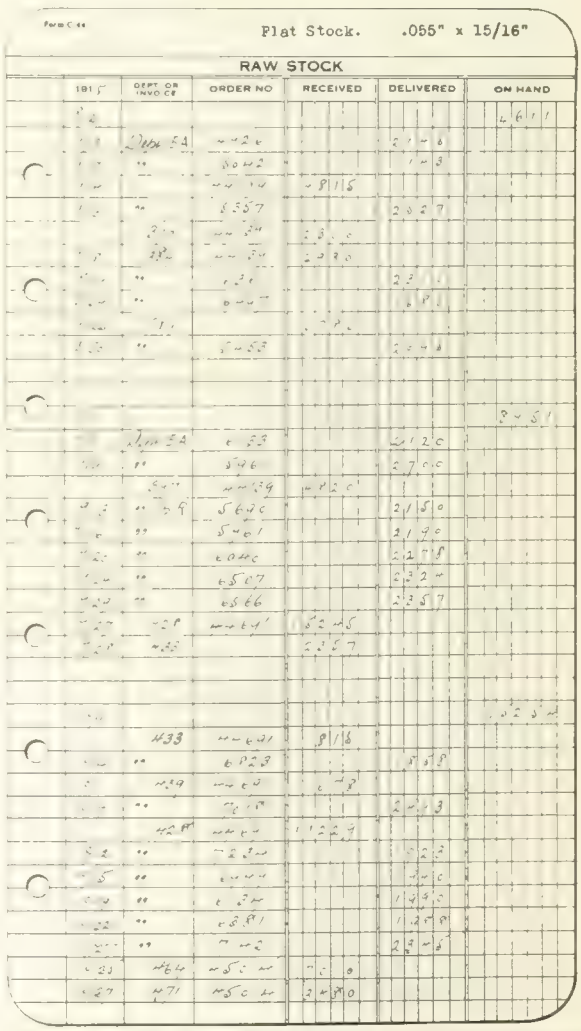
The Form in Which Raw Material Records Are Kept

however, no effort made to get the same weight upon each skid. The skids each bear a card which conveys the same information as the yellow slip inserted in the bar stock and the net weight of the wire upon the particular skid.

Large use is made of special skids and elevating conveyor trucks. These trucks are used to carry stock to the cutting-off machines and for delivery to the different departments throughout the shop. The cutting-off department is located at one end of the storage room and has an adequate equipment for cutting all the varieties of stock carried, of which, owing to the nature of the business, there is a great diversity.

The office sends to the steel room a shipping notice which contains the information on the customer's invoice. When the stock comes in, a receiving card is made out for each shipment. This card gives details of the shipment, the routing by which the goods came, the date of arrival, the date of unloading, the order number, the weight, the kind of material as shown by the invoice and the actual weight as determined on the company's scales. The information on these receiving cards is put on a special form known as the raw stock card, which gives the size of material, the blue print, if it is special, the product for which it is to be used, the shipper's name, the grade of stock and the specifications for a month's supply. Columns upon the card show the date of order; the order number and the amount; the date and amount billed; the date and amount received; the balance due, and there is a column for special remarks. A specimen of this card is shown in one of the illustrations.

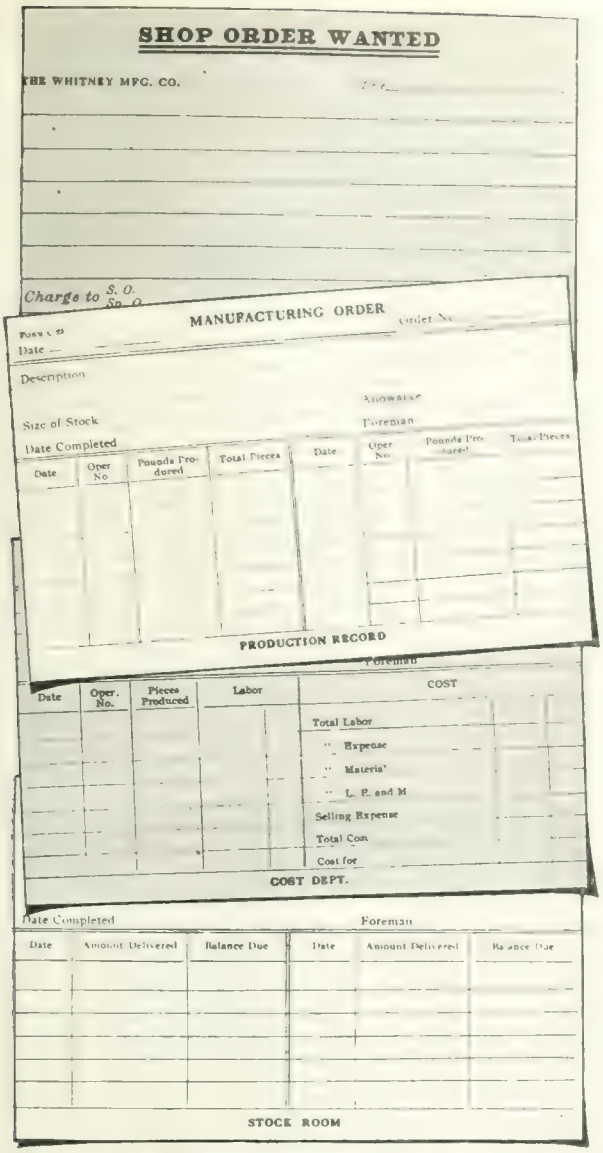
The date, order number and amount of each shipment is also kept on a special loose-leaf inventory sheet which has columns for the date of receipt of delivery to any department, the department or invoice number, the number of the steel order or


Flat Stock. .055" x 15/16"

RAW STOCK

1915	DEPT. OR INVOICE	ORDER NO	RECEIVED	DELIVERED	ON HAND

A Page from the Loose-Leaf Inventory of Raw Stock; the Distribution by Departments is Shown



SHOP ORDER WANTED

THE WHITNEY MFG. CO.

Charge to S. O. / So. O.

MANUFACTURING ORDER

Order No.

Form C 23

Date

Description

Allowance

Size of Stock

Foreman

Date Completed

Date	Oper No	Pounds Produced	Total Pieces	Date	Oper No.	Pounds Produced	Total Pieces

PRODUCTION RECORD

Foreman

Date	Oper. No.	Pieces Produced	Labor	COST
				Total Labor
				" Expense
				" Materia'
				" L. P. and M
				Selling Expense
				Total Cost
				Cost for

COST DEPT.

Date Completed

Foreman

Date	Amount Delivered	Balance Due	Date	Amount Delivered	Balance Due

STOCK ROOM

The Blanks Used When a Department Starts a Job of Manufacturing by Applying to the Planning Department

department there is marked upon it the kind of stock to be issued and the allowance. A clerk then proceeds to fill in a manufacturing order which is manifolded on four forms. A yellow original gives the date, order number, description, size of stock, allowance (weight), date completed and foreman. It has columns for date, operation, number, pounds produced and total pieces. This yellow sheet goes to the head of the department, and when the operation is completed it is returned by him to the planning department and by them, after inspection, sent to the cost department as an additional check against the cost card.

When writing the yellow sheet a carbon copy is made upon a manila card which has columns for date, amount delivered and balance due. This manila card goes direct to the steel room and when the requisition is filled is put into its permanent files.

A second operation is the filling out of another yellow sheet, precisely like the first one, which is put into the files of the planning department. In the writing of this a carbon copy is made upon a blue card which goes direct to the cost department. This has columns for the date, operation number, cases produced and labor. It has also an itemized list for sub-division of the labor and material costs.

It has been found that the method of piling bars in 1-ton lots has several advantages. It gives a quick means of making a physical inventory at any time to check against the perpetual inventory. It also enables the man filling requisitions to estimate very closely to the correct weight put upon the skid at the first trial. During the year a large volume of stock is handled, yet the perfection of the system by skillful planning and much care in the delivery to the job is such that it rarely happens that stock reaches a department in excess of the allowance given by the planning department. A check is thus kept upon extravagant use of stock or waste in any of the operations. If an operator is unable to complete a job without calling for more stock, the planning department, the foreman of the steel room and the foreman of the department im-



The bar stock is put into racks with wood cross ties separating each ton lot. Plentiful allowance is made for the movement of trucks. Special skids and elevating conveyor trucks are used for nearly all trucking.

mediately get busy ascertaining just where the trouble lies. After an operator has become familiar with this system and the various ways in which the care he exercises is checked by purely routine methods, he learns to become careful and accurate.

The planning department has succeeded in getting its allowance so close to the amounts required by the average operator that the amount of stock furnished for the job, let us say, of making 50,000 No. 9 Woodruff keys, will come out with less than a variance of 100 keys of the amount desired.

NEW UNIVERSAL TURRET LATHE

Machine Tool Handling Heavy Steel Forgings or High-Speed Brass Work

The Oliver Machinery Company, Grand Rapids, Mich., will shortly place on the market a heavy-duty screw machine and turret lathe built to meet the modern needs of high speeds and heavy duties. It is designed to cover a range of work from the heavy chucking of iron or steel forgings to high speeds of brass work. The legs are of the regular type, giving a solid, wide and substantial foundation. The weight of the machine is distributed throughout where the loads and strains exist and the bed is not left narrow or light for the pressed steel drip pan to stiffen.

The lathe is of friction back geared type controlled by a lever directly at the left of the operator. The headstock is cast integral with the bed and follows the contour of the cone pulley up to the centerline of the spindle, thus stiffening the head; it is solid underneath the cone pulley and of generous proportions throughout. The ways are flat, 1⅛ in. thick and wide, and the width across the shears is exceptional for turret lathes of similar capacity. The depth of bed at the smallest section is 11 in. and the connecting sections are of the box type.

The gears in the friction back gear mechanism are entirely inclosed, the cover for the forward gears and frictions being instantly removable for inspection or adjustment. The adjustment of the friction rings is made by a single screw regulating the pressure of the rings. The friction is of the expanding ring type. Both front and rear spindle bearings are oiled by felt wipers extending down into capacious oil chambers.

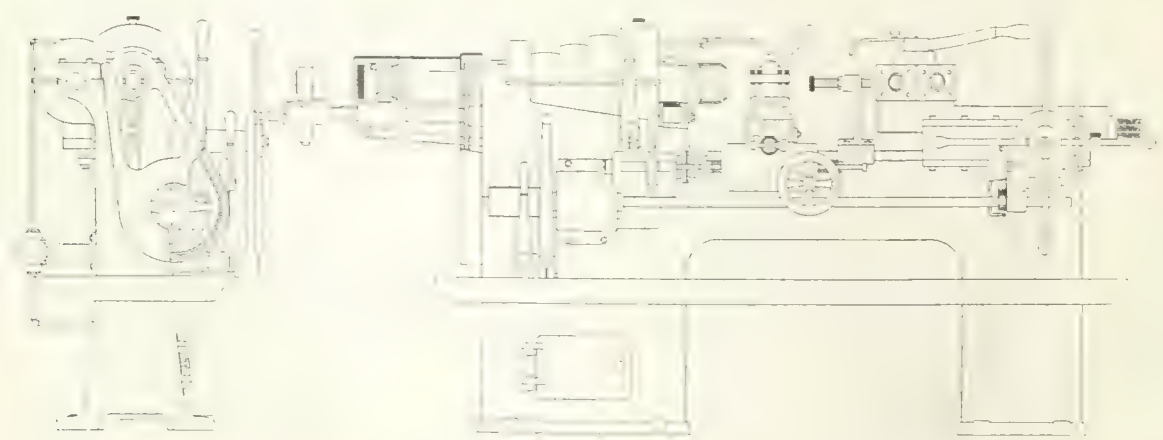
When operated by power, six feeds are obtainable, ranging, in keeping with the turret, from 0.006 to 0.052 in., but these are entirely independent of the turret feeds, the combination of the two sets being quickly obtainable if desired. The power cross feed operates the carriage longitudinally in either direction or can operate the cross-slide forward or back by clamping the carriage to the bed shears and throwing the cross feed into play. Automatic throw-outs are provided in both the cross-slide and the carriage to disengage the power feeds and operate in both directions. A small lever controls the direction of the feed and cross-feed screws for accurate shoulder spacing work and reads to 0.001 in.

The cross-slide is flat and wide with two parallel T-slots in the rear and one at right angles in front, permitting a great variation of tools for cross-slide operation. Regular equipment includes an open side cut-off tool in the rear and a four-sided turret tool holder in the front. The latter clamps with a powerful lever and is convenient for all classes of work.

When not required, power feed may be omitted and hand-operated longitudinal feed provided. The cross-slide remains the same, the four-tool turret being replaced by a single-tool holder and the power gearing omitted. The handwheel is provided with dial reading to 0.001 in. for accurate turning longitudinally, while the cross-slide dial remains as for power feed. Longitudinal travel is the same with either power or hand feed. If desired, a lever cross-slide arrangement will be supplied in place of the screw feed. This is more rapid for some classes of work, but is not as general in its application as the screw cross feed.

The turret is made from special cast iron, bored and counterbored in position on the lathe to assure alignment. The clamping lever is unusually heavy and gives stability to the turret under a cutting load. The turret stud is 2½ in. in diameter and drilled to permit stock for long screws or shafts up to the capacity of the machine to pass entirely through the turret. The locking plunger is hardened and ground tool steel, has a hardened tool steel seat and slides in a hardened and ground sleeve.

The turret slide is either power or hand fed. If power the following feeds may be employed, 0.006, 0.010, 0.015, 0.025, 0.040 and 0.052 in. per revolution of spindle. The control of these feeds is by a lever at the left of the gearbox and a plate and pointer will show exactly the feed given the turret. Being of the sliding key type the selection of feeds may be made when the machine is either running or idle. The turret slide is secured in place by taper gibs on each side and by ample hold-down gibs, all of which are hand scraped to a true bearing. The multiple stops projecting at the extreme right provide a throw-out for the power feed at each face of the turret and form a positive stop by a slight forward movement of the hand lever. The multiple-stop mechanism is directly geared to the turret head



Chucking of Heavy Steel or Iron Forgings as Well as the Handling of Brass Work at High Speeds Is Performed by this Heavy-Duty Screw Machine and Turret Lathe

and is not likely to get out of adjustment. The power feed mechanism consists of a steel rack and gears and a drop worm which is either released or thrown into mesh by opposite movements of the same lever, handily located for the operator.

The turret ways are adjustable on the shears of the bed, forward or backward to the limit of the length of bed and are clamped externally by large rectangular gibs acting outside of the shears. Adjustment for wear is provided for by a large taper gib under the entire ways which is adjustable by two large fine-thread screws. The application of taper gibs to the slides and ways is relied upon to give complete control of adjustment due to wear in any direction.

The change gear system consists of steel and cast-iron gears running in an oil bath and is of the sliding key type. A single lever controls both turret and cross feeds and a plate placed so as to readily be seen by the operator shows by means of a pair of pointers at just which rate the turret and cross-feed mechanisms are operating. All bearings in the gearbox are bronze bushed and the gears running in oil assure good continuous lubrication. The gearbox is located underneath the headstock, which is inclosed and chips and dirt cannot get in. It is easily accessible, being secured entirely from the front of the machine.

An independent and adjustable stock stop, clasped to the shears of the bed, is a regular part of the equipment of the universal turret lathe only. This stop allows the entire six faces of the turret to be used for cutting tools.

The wire feed lever is long and designed to give easy leverage to the feed mechanism. It is of the sliding cone type, with tool steel hardened dogs acting on a spring collet held in the automatic chuck. The chuck is hardened and ground and the work is thus held true to center. A guard over the automatic chuck prevents oil from flying over the room and the feeding mechanism in the rear has a metal guard to prevent accident from the rotating dogs.

The pan is made of formed sheet steel, is stiff and light and extends entirely around the machine, being placed to allow easy cleaning of chips from underneath the bed. The oil or cutting lubricant reservoir is contained in the headstock leg and is of several gallons capacity. There is a perforated cover over the opening in the pan under the headstock. A large handhole plate in the rear of the lathe is readily removable for cleaning purposes, and to clean out the tank it is not necessary to remove the pump or piping. The pump is of the reversible type, giving a large steady flow of lubricant to each of the two spouts, one for the turret tool and one for the cross slide. The pump is driven directly from the countershaft and is therefore independent of the speed of the spindle or cutting feeds.

Norway exported 9910 metric tons of ferrosilicon in 1915, against 6144 and 6323 tons in 1914 and 1913, respectively. Iron ore and iron-ore briquette exports were 423,400 tons last year, against 467,800 tons in 1914, and 568,800 tons in 1913. Total imports of pig iron and finished steel were 302,200 tons in 1915, as compared with 223,200 tons in 1914 and 219,700 tons in 1913. Of these totals the pig-iron imports were 33,200 tons in 1915 and 32,200 tons and 30,700 tons in 1914 and 1913 respectively.

Chilean exports of bar copper in 1915 were 45,022 tons, against 25,795 tons of bar copper and 15,987 tons of copper ingots in 1914. In January, 1915, the price was $287 per ton; in June, $410.60 per ton, and in December, $418.50 per ton.

Machine Milling Two Keyseats at Once

The Newton Machine Tool Works, Inc., Philadelphia, Pa., has designed and installed in its plant a new design of duplex keyseat milling and cottering machine. It is explained that the production possible is increased and the time lost in laying out



A Duplex Milling Machine Capable of Cutting Keyseats in Opposite Sides of a Shaft Simultaneously

the work where two keyseats are cut in opposite sides of a shaft is eliminated. The machine is designed to handle shafts up to a maximum diameter of 4 in. and the width of keyseats that can be cut ranges from $\frac{1}{8}$ to $\frac{3}{4}$ in.

The spindles have double taper bearings and are 2 11/16 in. in diameter at the large end of the taper and 1 5/16 in. at the driving section. An adjustment is provided whereby the distance between the ends of the spindles can be varied from 0 to 10 in. Draw-in collets are furnished and the spindle heads have automatic feed with a safety release for use in cottering, the maximum feed being 1/16 in. per stroke of the table. There are four geared speed changes provided for the spindle without removing gears, and this is doubled by the back gears on each head, giving a range of 300 to 1465 r.p.m. The higher speeds are, of course, obtained by an open belt and the slower ones through the engagement of the individual sets of back gears on the heads.

Power is supplied from a countershaft pulley 20 in. in diameter with a $2\frac{3}{4}$-in. face running at 365 r.p.m. From this pulley power is transmitted to the driving pulley, which is 10 in. in diameter with a $2\frac{1}{4}$-in. face. This pulley, which operates at 730 r.p.m., has drums 12 in. in diameter with an 8-in. face mounted upon the same shaft inside the base which are connected by belts to the spindles.

The work table or cross carriage has an over-all length of 44 in. and $38\frac{1}{2}$ in. over the finished surface. It measures 9 in. in width and has three feed changes, the feed being either continuous for long splines or reversing automatically for cottering. The maximum cross feed to the carriage is 24 in. and the height from the table to the center of the spindles is $31\frac{1}{2}$ in.

A fixture has been developed for the builder's slotting machine for use in connection with the milling machine for cutting both internal keys at one time. In this way, it is pointed out, an accurate fit of the keys on all sides is assured.

Buying Material on a Scientific Basis

The Position Purchasing Occupies in Business—Points to Be Considered in Placing Orders—Question of Terms and Delivery

BY H. B. TWYFORD*

The function of buying holds an important strategic position in the great complex structure called business, in that it precedes every other activity. Developments in the art affect every undertaking in the realm of transportation, manufacturing, construction or commerce. Regulated and right buying is a study in economics, and its proper performance has a positive favorable influence on the profits, whereas promiscuous buying is a serious handicap to any concern.

Since the world began property of all kinds has been bartered, traded, exchanged, bought and sold. There always have been two parties to the transaction and always will be. In fact, all human effort is dual in its nature so the seller will continue to exist just as long as the buyer does and there are transactions to be negotiated pertaining to the change of ownership of any kind of property.

Scientific buying means not only that the function of purchasing itself is conducted at a higher percentage of efficiency, but that important economic advantages are secured for the other departments of an establishment. This should be apparent in a factory, or a railroad or in construction work. But it has a wider significance which affects the entire business world—it does materially reduce the cost of selling—and this is one of its chief claims to greater recognition.

STRATEGY—BUT NOT SCIENCE

One of the arguments put forth by a theorist for the elimination of the salesman is given here as it will lead to a better appreciation of the fundamental principles of scientific buying when they are discussed. It is related of a company which purchased articles that had been established as standard by them. They had thoroughly canvassed the market and placed orders for these articles with a manufacturer who had given them a satisfactory price and delivery. When it became necessary to place repeat orders for these articles the buyer proceeded on the basis that the seller would not incur any expenses in obtaining the order and that he (the buyer) was entitled to a lower price, the reduction to be equal to the amount previously added by the seller to the cost of the article for selling expenses.

The executives and officials of the company manufacturing the articles were approached in an informal and pleasant manner by the purchaser who after discussing some business generalities, adroitly turned the conversation into the channel of costs and finally obtained from them a very fair idea of the manner in which they distributed them.

Armed with this information, the buyer when next placing an order for the articles exactly of the same quality and description as previously furnished, put forth the claim that as there were no selling expenses incurred by the manufacturer in obtaining the order, he (the buyer) was entitled to a reduction in the price and having ascertained through his previous conversation with the manufacturer, the percentage his selling expenses bore to the price, he finally was able to place the order with this percentage deducted.

This is a piece of strategy which can be viewed from many angles, but to claim it as scientific buying is a fallacy. Have the seller's expenses actually been reduced? If not, then some buyer has got to pay them. If a manufacturer had a sufficient number of customers similar to the one mentioned in the above instance, he could dispense with salesmen entirely; in fact, his selling expenses would be nil. But if he were without a selling organization and he should lose the orders, he would be stranded. Certainly a buyer who placed an order under the circumstances cited would not hesitate about deserting his regular source of supply and buying elsewhere if he saw a pecuniary advantage in doing so.

Suppose we give the buyer credit for the intention to give the business to the same manufacturer permanently, can he guarantee to do it in view of the continual changes in manufacturing methods and processes, and in the raw materials which enter into the products? In view of these, is it not necessary to canvass the market periodically for prices? If a manufacturer accepted business under the conditions named and subsequently discovered that by some improved manufacturing methods he could substantially reduce his costs, would he give the advantage of the reduction to such a buyer? It is not conceivable that he would voluntarily give any concession in price and would only do so when brought into competition again with other manufacturers. It is necessary, therefore, to get revised prices and quotations periodically, however stable the product.

ILLUSTRATIONS OF INEFFICIENT BUYING

Whatever the contentions and arguments advanced in favor of proceeding along such lines as outlined, it is not scientific buying. Scientific buying, however, does reduce the cost of selling and any economies achieved in this direction by the better methods of the purchasing department of any organization must ultimately have its effect on prices. As an illustration, the writer knows of an order which was placed for a large number of spiral springs. When the manufacturers were asked to quote on these, only 40 per cent of them were able to bid. Of the remaining 60 per cent some did not make the particular kind of spring required, some were specialists in elliptical springs, some made only springs of larger diameter wire and some only of smaller diameter wire. The efforts of the purchaser were wasted to the extent of 60 per cent and the same percentage of the manufacturers incurred an addition to their selling expenses in answering these inquiries without any hope of securing business.

Another illustration is where an inquiry is sent out asking for quotations and is so ambiguously worded that considerable uncertainty exists among the bidders as to what is required. In these cases salesmen are frequently sent to call and make in-

*Purchasing department Otis Elevator Company, New York City, and author of "Purchasing, Its Economic Aspects and Proper Methods."

quiries or the loose wording of the inquiry involves correspondence to clear up the moot points. Such incidents as these undoubtedly increase the selling expenses of practically all business concerns. These expenses must be charged to the cost of the goods and eventually paid for by the buyer.

SALESMANSHIP AND THE ART OF BUYING

In spite of the fact that enormous educational efforts are directed toward attaining more scientific salesmanship, it cannot altogether cope with such situations as are created by unscientific buying and largely for this reason the cost of selling is disproportionate to the other expenses which are loaded on the cost of an article before it finally reaches the consumer.

This disproportion can be brought into proper relation with other expenses only by more scientific buying. Certainly scientific salesmanship has not accomplished it. Both selling and buying need to be treated and considered more on the lines of economic studies. If by better and more accurate methods a buyer is enabled to reduce selling costs he will eventually obtain positive and direct benefits in the matter of prices and at the same time operate his own department at a higher degree of efficiency and lower cost. The education in the art of selling has been devoted too largely to schemes for getting business, irrespective of wasted effort, while the tendency in buying has been to sacrifice too much effort through lack of more complete knowledge and in inaccurate methods with unproductive results. The crying need of the business world to-day is to rectify these matters, and whatever can be accomplished will assuredly benefit both parties to a transaction.

WHERE AND WHAT QUANTITY TO BUY

One of the first objects to be striven for is the avoidance of promiscuousness, either in canvassing the market for prices and quotations or in placing orders. The harmful results in wasted effort and loss of efficiency caused by sending out invitations to tender broadcast have already been pointed out. The remedy for this is a closer and better knowledge of sources of supply. Exact information can be accumulated and registered by the purchasing agent of all those concerns he is buying from or may buy from not only as to the nature of their product but also the quantities they are able to turn out in a stipulated time, whether they keep their promises, whether they are located geographically to serve the buyer to the best advantage, whether they are hampered financially or through lack of the requisite facilities to take care of his business.

The buyer need have no uncertain feeling in placing an order if he has the right information on file. The concerns he has asked to bid are the best in the country to serve him and give him best prices. He knows his order will receive proper attention, and any doubts as to its being executed in accordance with its terms and conditions are practically eliminated. He also has the satisfaction of knowing that this has been accomplished with the minimum amount of effort and expense to his own concern and also to those who catered for his business.

In these days of freight embargoes, geographical considerations are important. Those locations which admit of free movement of freight between the point of shipment and destination should be favored. It is not good policy at any time to be entirely dependent on one source of supply or on one transportation line. Strikes, breakdowns and other interruptions might seriously interfere with the delivery of the goods ordered and the economic benefits of having placed an order advantageously be lost.

Buying the right quantity is just as important a feature as buying from the right supplier. It is just as poor policy to buy too much as too little. The reasons for this are obvious and it is only by scientific methods that the correct quantity can be ascertained.

The question of quantity is not always left to the decision of the purchasing agent, but he can always have a voice in deciding it. If for instance he has kept proper records, he can forecast with considerable accuracy the trend of market prices. On a declining market the proposition is fairly simple, but the reverse conditions involve questions of financing the purchases, storing the material until consumed or resold, if arrangements cannot be made to take shipments in quantities as required. Every buyer at times has offers made to him of larger quantities than he contemplates ordering at lower prices. If a ready market can be found, well and good, but if not, the actual price paid for the goods is not their true cost. To this price must be added cost of financing, storage, insurance, etc.

One cannot always buy for the future on the basis of consumption in the past, nevertheless records of the quantities consumed over a given period are extremely valuable in determining how much to buy. If the purchasing is being done for a factory making a well established and standardized product, it is almost as simple a proposition to specify future quantities required as to tabulate quantities consumed in the past. But in those factories where constant changes are taking place in the product and new articles being made it is sometimes exceedingly difficult to gage the quantities. In these cases the sales manager and production manager must be called into consultation and their views, combined with the purchasing agent's forecast as to prices, should determine the matter.

SPECIFICATIONS AND REPORTS ON MATERIALS

It is imperative that correct specifications be on file and accompany every order placed and every request for quotations. This specification may be only a few words or figures giving dimensions, but of whatever it consists, it must be worded in such a manner that no misconception can possibly exist as to the nature, quality and size of the material or article it covers. If this is strictly adhered to, it will be conducive toward the smooth, efficient and economic operation of the department and save time, expense and annoyance to the recipients. It also emphasizes the point already made that anything which can be done to save money for the seller eventually means a saving for the buyer. This feature is one to which closer attention could be paid by the great majority of buyers.

To determine that the material bought is actually being delivered, and to add to his knowledge of his purchases, a buyer should have reports regarding the quality of articles and materials. These reports may be made by inspectors appointed to test and inspect the material in process of fabrication in the supplier's factory or in the course of its progress through the buyer's factory.

There are also large numbers of small articles received into stores which must be checked and examined before placing them in the bins. Considerable variation is frequently seen in the products of manufacturers. Although apparently supplying the same article at the same price, one may be rougher in finish or not quite as accurate in size or carelessly packed. Reliable reports on all these points should be furnished to the purchasing department and

properly tabulated there in the information bureau.

It is a debatable point whether the inspection of material purchased should be under the control or independent of both the purchasing agent and user of the material, but there is no question as to the advisability of the purchasing agent accumulating all the information possible regarding the material and articles he buys. This knowledge of materials is exceedingly useful to the buyer in those cases where substitutes are offered in place of the regular material. A decision can usually be given on the matter at once without reference to other departments and considerable time and trouble saved.

QUESTION OF PRICE NOT ALL IMPORTANT

A buyer goes into the market to purchase at the lowest possible price the particular grade or quality already determined as being most suitable for uses to which the material or article is to be put. If price is made the sole consideration in buying, and persisted in, it will have a tendency to force manufacturers to produce a cheaper product, and this policy has elements of danger. Price and quality must be considered together. They cannot be divorced in making a purchase. It is obvious that if the quality is not suitable for one's purpose the price is of minor or secondary importance. This question of quality applies to both higher and lower grades. A better quality might have constituents which to the user or in the manufacturing process might prove objectionable. It is essential, therefore, that the quality shall have been predetermined. The determination of quality is not always within the province of the purchasing agent, but it has to be definitely decided before he goes into the market.

Competition will help to settle the buyer's convictions that he is paying the right price, but, as already pointed out, this competition must be between those firms who are in the best position to supply one's needs. A record of prices paid in the past will serve as a guide together with the present condition of the market.

BUYING FOR THE FUTURE

Close observation of the tendency of the market will often prove extremely valuable in coming to a decision as to how far ahead of requirements purchases should be made. Good judgment in this connection will largely add to the profits of many concerns. This has been called scientific guessing, but it is far from that and is also entirely distinct from speculation. The greatest financial successes have been created through buying for future rather than immediate profits, and the element of risk is almost entirely eliminated when the purchasing agent knows he has an output for his purchases and has adequately informed himself regarding market conditions and prospects.

In buying ahead of requirements, shipments should be arranged on a schedule to conform closely to consumption demands, otherwise many additional features must be calculated and taken into consideration. If it means tying up money, the loss of interest must be computed, or if it means the occupation of additional storage space, the rental value must be estimated, also the larger insurance it may be necessary to carry. If the goods are liable to deterioration, this fact must not be overlooked.

CASH DISCOUNTS, TERMS AND CONDITIONS

In certain lines of goods and certain trades there are established rules and terms which are supposed to be strictly adhered to. Nevertheless, they are sometimes deviated from, and in other transactions where no fixed rules abound it is always open to the buyer and seller to arrange terms. This is a powerful factor in determining the economy of a purchase and large use can be made of it in closing a negotiation. It is not the regular terms recognized and allowed in many lines of business that it is desired to call attention to. It is assumed that these can be obtained practically without asking, but where larger cash discounts can be secured or better terms arranged, substantial savings can be effected, and these are the cases on which emphasis is laid. Taking 30 days as the net time for payment, if the seller can be made to concede an extra half of 1 per cent for cash in 10 days, it means that he is willing to forego this percentage to obtain his money 20 days earlier, which is equivalent to over 9 per cent per annum; 1 per cent for the same period is just double this, and 2 per cent is over 30 per cent per annum. If the net time is 60 days, these percentages are 3.65, 7.30 and 14.60 respectively.

If his concern has to borrow money at 6 per cent to take advantage of these cash discounts, a buyer can figure out to what extent savings can be effected. It must not be overlooked, however, that the exact amount cannot always be borrowed for the exact time between the discount date and maturity date of an invoice, therefore, a certain amount of borrowed money will be idle, but not in sufficient amount to offset some of the advantages gained.

The time of the payment is also an important factor, particularly with those concerns working on a limited amount of capital, and in such cases a buyer can be of considerable value if he can arrange payments on long time, but if this has to be done at a sacrifice of price or cash discount, probably no saving will be effected. If facilities are available for borrowing money at the usual recognized commercial rates, it will generally be found that it is economically advantageous to do this and secure the cash discount rather than buy on extended time. It is of paramount importance to first secure the lowest price and then the longest time or the largest cash discount. Having obtained from the seller every possible concession in the matter of time and discount a review of the financial position of the buying concern will determine on which basis to close the transaction.

Transportation charges bear an important relation to the cost of some goods and must be given due consideration. To relieve his concern as much as possible, every purchasing agent should endeavor to make the seller pay transportation charges. If a price has been quoted f.o.b. point of shipment with freight allowed to destination, it means that the buyer has to provide finances for freight payments with the attendant clerical work of checking freight bills and having in force an infallible system by which these charges are debited to the seller.

If a buyer can arrange for all such shipments f.o.b. destination, freight prepaid, it means that he is securing for his concern very appreciable economic benefits. To go still further with this question of freight, it is possible in some cases to negotiate successfully with the seller for its prepayment even in those cases where the price has been agreed upon f.o.b. point of shipment, without any freight allowance. In these instances the buyer is getting the seller to carry his freight bills for him and the conditions mentioned in the last paragraph are reversed.

GETTING DELIVERY OF PURCHASES

If a purchase has been made on the most favorable basis as to all its terms and conditions and at the lowest obtainable price, all these economic benefits might be lost if the goods were not delivered on

time. It is imperative, therefore, due provision be made in the arrangement of the routing work of the buyer's office to follow these orders up and obtain shipment at the required time.

If the goods are bought for resale, the market for them might be lost in case of non-delivery, and if they are for manufacturing purposes a whole factory may be tied up or its work dislocated or hindered to such an extent as to involve heavy losses. In construction work a delay in receiving one item of material may entail serious consequences through the stoppage, not only of the particular work for which the material was needed, but other work which was contingent to it.

INVOICES AND PAYMENT

It is incumbent on the purchaser not only to buy and obtain delivery, but also to satisfy himself that the cash discounts, terms, conditions and other benefits he contracted for when closing the negotiation are positively secured. To insure this, it is essential that invoices be obtained from the seller in good time and that they are properly checked, approved and passed through his office for payment strictly in accordance with the terms of the agreement made at the time the order was placed.

A problem in connection with payments is when the point of shipment is at such a distance from destination that it is impossible to get delivery of the goods, properly check and examine them and approve the invoice in time to make the payment before the discount period expires. In these cases it is sometimes possible to obtain from the seller an extension of the time in which the discount is available or even to make this time date from arrival of goods at buyer's factory. When this cannot be done, the payment can be made in advance of the receipt and checking of the goods, but the purchaser must be doing business with reliable concerns whom he will have already selected by his process of elimination and selection already described.

Heat Losses in the Gas Engine

The distribution of the heat in gas-engine cylinders was the subject of a research made by Prof. A. H. Gibson and W. J. Walker at the engineering laboratories of University College, Dundee, Scotland, and described in a paper read before the Institution of Mechanical Engineers. The water jacket was divided into two parts, one covering the exhaust valve and that part of the cylinder containing the exhaust passage, while the other covered the cylinder barrel and the breech end. This arrangement enabled heat losses to be properly divided between jacket and exhaust losses. The research was made to ascertain the variation in heat distribution with variations in speed, brake horsepower, compression and the richness of the air-gas mixture.

The mechanical efficiency increased with increasing loads, diminished with increases of the air-gas ratio and speed, and was independent of the compression ratio, which varied between the limits of 5.17 and 6.62. The maximum efficiency was 88 per cent, obtained at full load with the richest (7:1) air-gas mixture, and at 150 r.p.m., the lowest speed. With the same mixture and at the normal speed of 200 r.p.m., the efficiency was 85 per cent. At normal speed and with an 11:1 mixture the efficiency was 76.7 per cent. The thermal efficiency increased with the load and compression ratio. Measured by the indicated horsepower, it increased slightly with an increase of speed, and reached a maximum with an air-gas mixture of 10:1. Measuring the thermal efficiency by the brake horsepower, the maximum was attained with an air-gas ratio of 8:1.

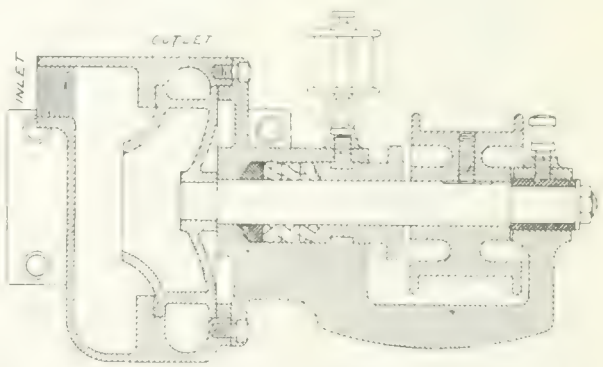
The percentage of exhaust losses diminished with increases of load and compression ratio, and slightly with increased air-gas ratio. They increased with the speed. The exhaust losses ranged from 33.6 per cent with a weak mixture, high compression and low speed to 42.5 per cent with a rich mixture, low compression and fast speed.

The percentage of heat carried away by the jacket water, including that of the exhaust valve jacket, increased with the load, diminished with an increase of the air-gas ratio and the speed, and was independent of the compression ratio. With a 7:1 mixture at full load the percentage of heat transmitted to the jacket was 11.9 times as great at 150 r.p.m. as at 200 r.p.m. With an 11:1 mixture the ratio became 1.23. The rate of heat transmission through the cooling surfaces is more rapid at the highest speed.

The heat lost by radiation from the hot exposed surfaces of the piston and of the unjacketed portion of the breech, and from the outer surface of the jackets diminished as the load and speed increased, but increased with increases of the air-gas ratio, and slightly with increases in the compression ratio. At full load, radiation accounted for from 5 to 14 per cent of the heat delivered to the engine. The former value was obtained with a rich mixture, high speed and low compression ratio; the latter with a weak mixture low speed and high compression ratio. The percentage value of the heat entering the exhaust valve jacket ranged from 8.0 to 12.5. It is greatest at low loads, low speeds and with low compression ratios and rich mixtures. If this be added to the jacket loss it gives the jacket loss as determined by trials of an engine fitted with the ordinary jacket arrangement.

A Grinding Machine Circulating Pump

A substitute for the submerged fan type pump formerly used on the grinding machine has been brought out by the Cincinnati Lubricant Pump Company, Cin-



Sectional Elevation of a Centrifugal Circulating Pump for Grinding Machines

cinnati, Ohio. It is of the centrifugal type and one of the special features is the absence of bearings in the pump proper. It is also explained that the pump can be mounted above the level of the liquid being handled and will retain its prime without the aid of a check valve or other working parts on account of the positive trap arrangement forming a part of the design.

The outer shaft bearing is of phosphor bronze and takes care of the end thrust, while the inner bearing, which is cast iron, is combined with the stuffing box gland, a combination of metallic, graphite, rubber and flax packings being relied upon to guard this bearing against the entrance of emery, grit and dirt. Semi-automatic lubrication for both bearings is furnished from large oil reservoirs.

With a suction lift of 12 in. and a head lift of 4 ft. the pump will deliver 5 gal. per minute with a pulley speed of 1200 r.p.m. This flow can be increased to 15 gal. by causing the pulley to operate at 1600 r.p.m., and if a greater flow at this head lift or the same flow at a greater lift is desired, the speed of the pump pulley is augmented.

Recent statistics issued by the Japanese Government show that the number of vessels being built at Japanese shipyards is 99, with an aggregate tonnage of 439,470.

Recrystallization of Boiler Tubes*

Failure in Large Boiler Plant with Its High Evaporative Rate Held to Indicate Higher-Carbon Tubes Desirable

BY A. E. WHITE AND H. F. WOOD

AT a central steam boiler plant in Detroit where very heavy loads were carried for a number of weeks at a time, the metallographic examination of tubes showing incipient failure, revealed coarse crystals at the surface of the tube exposed to the high temperature. These failures also universally occurred in the front row of tubes where the temperature was highest and only on the side exposed to the flame. The question then naturally arose as to the conditions under which the coarse crystallization could have resulted. The effect of time, temperature and stress, therefore, on boiler-tube metal was accordingly investigated.

The object of the present research has been as follows:

To obtain a curve indicating the relation between the time and temperature governing crystal growth at temperatures below the critical range in a deformed low-carbon steel; and

To make a systematic study of the conditions existing where low-carbon steel is used at moderately high temperatures, after having been subjected to sufficient stress to result in permanent deformation, and to ascertain if the recrystallization phenomena, known to exist under such conditions, have any influence upon the possible failure of the metal.

To accomplish this, a steel of the following chemical composition was used:

Carbon	0.113 per cent
Manganese	0.479 per cent
Phosphorus	0.023 per cent
Sulphur	0.035 per cent
Silicon	0.023 per cent

EFFECT OF HEAVY RATINGS AND SCALE

Under normal ratings, the bagging of a tube at this particular central station seldom occurs, but when high rates of evaporation are maintained over long periods of time, trouble of a more or less aggravating nature is encountered. It is felt that the difficulty is due to heavy ratings combined with thin scale deposits.

The authors feel that the presence of a thin film of scale on the inside of a tube may so interfere with a rapid heat transmission that a tube may become locally overheated. The temperature to which the metal may arise will be well above that found in the tubes free from scale, and yet below the upper critical temperature of the metal. Such a temperature would in no way affect grain size in thoroughly annealed metal, but it may materially induce and produce grain growth in low-carbon steel previously deformed at temperatures below its critical point. This latter phase is the condition almost universally encountered in the boiler tubes used in present-day practice.

Under the best of refinements it is difficult to see how a tube perfectly free from strains can be obtained. Therefore, it is difficult to see how a tendency for coarse crystallization from such metal can be prevented. It is possible to make tubes with a higher carbon content, or possibly with the same carbon content as at present but containing a special element, such as nickel, which will not possess the same strong recrystallization tendency. These features merit consideration, and in fact, the first one is about to undergo a trial at one of the central heating stations in Detroit.

COARSE GRAINS AND PHYSICAL PROPERTIES

The extent to which coarse grains make low-carbon-steel boiler tubes weak and brittle, however, was determined by a number of tension and fatigue tests. Three sets of samples were employed; the first of untreated metal, the second of metal annealed for ten minutes at 950 deg. C. and then cooled in the furnace, and the third of coarse-grain metal, produced by stressing all of the test specimens the same amount and in all cases past the elastic limit, and following this by an annealing for a period of three hours at a temperature of 800 deg. C.

The elastic limits and tensile strengths of the untreated samples averaged 34,420 lb. per square inch for the former and 54,450 lb. per square inch for the latter; while the values for the annealed samples were 21,700 lb. per square inch and 50,507 lb. per square inch, respectively. Such results showed that these samples had as good physcal properties as could be expected from any metal of like composition and heat treatment. The elastic limit and the tensile strength of the coarse-grain samples averaged 14,117 and 39,633 lb. per square inch, respectively. These results were 58.2 and 43.1 per cent lower than were the results of the untreated samples, and proclamed, therefore, a decidedly inferior grade of metal.

The actual stresses occurring in a boiler tube are tension and shear. If the principal stress resulting from a combination of the tension and shear becomes greater than the elastic limit of the metal, failure will take place. Since a coarse-grain metal has such an exceedingly low elastic limit, its use should be avoided when it is possible to get metal with a much higher elastic limit.

A very interesting development in connection with the tension tests is the fact that the percentage of elongation and the percentage of reduction of area remain practically constant throughout the entire series. This shows that the ductility of the metal is but little affected by the size of the crystals. It may therefore be said that coarse-grain ferrite is weak, but not brittle.

Fatigue tests were run on samples prepared in the same way as those for the tension tests. The coarse-grain metal was found to have an average resistance to fatigue 16.43 per cent lower than the untreated and 77.75 per cent lower than the annealed samples. This is very important when one considers that boiler tumes are constantly under the influence of alternating stresses.

GENERAL CONCLUSIONS

The many conditions studied and developed have resulted in the acquisition of a number of generalizations which, it is trusted, will prove to be of some value in certain connections. The six most important ones are summarized as follows:

1. The time-temperature relations for every fall of temperature of 25 deg. C., starting at 675 deg. C., governing the recrystallization of deformed low-carbon steel at temperatures below the Ac1 critical point, follow the formula for geometrical progression, that is,

$$T = a, ar, ar^2, ar^3, \ldots ar^{n-1},$$

in which T represents time in minutes and a and r are equal to 8 and 3, respectively.

2. The etched surface of deformed low-carbon steel does not undergo the process of recrystallization when heated, even for long periods of time at temperatures below the critical point, although the metal immediately below the surface does show such change.

3. The recrystallization process on deformed low-carbon steel is an exceedingly rapid one at all temperatures below the A3 point and above 700 deg. C. and between these limits recrystallization takes place in all cases in a fraction of a minute.

4. It is felt that perhaps the transformation occurring at 690 deg. C. has some effect upon the recrystallization process, since crystal growth took place at 700 deg. C. in a fraction of a minute and at 675 deg. C. in eight minutes. The present investigation has been insufficient, however, to warrant

*From a paper presented at the annual meeting of the American Society for Testing Materials at Atlantic City, June 28, 1916. Professor White is professor of chemical engineering at the University of Michigan, Ann Arbor, Mich

any definite statement on the matter. It certainly offers a splendid opportunity for further work.

5. The evidence obtained during the present investigation seems to show that boiler tubes, if kept free from scale, will never fail because of the recrystallization of the ferrite crystals. A very thin layer of scale in the tubes, however, resulting in rise in temperature of the metal, may result in the recrystallization phenomenon.

6. Low-carbon steel in a deformed state is so stable at atmospheric temperatures that the time-temperature influence alone, at such temperatures, would probably require thousands of years for the production of crystal growth.

Alternating Current Driving in Factories

The types of alternating current motors best adopted to different classes of machinery, form the subject of a paper read before the Junior Institution of Engineers (Great Britain), by G. H. Ayres. The recommendations for the different types of machines are as follows:

Cranes.—For cranes a direct-current series-wound machine is recommended, but where alternating current only is available, a squirrel-cage motor should be used, which gives practically as good service as a direct-current machine and requires only half the number of trolley wires required by a slip-ring alternating current motor.

Fans.—For the driving of fans the slip-ring motor is desirable.

Machine Tools.—Large machine tools often require speed variation. It is usually preferable to use a constant-speed, squirrel-cage motor driving through a counter shaft by means of cone pulleys, or some other speed reduction gear. Slip-ring motors with resistance in the rotor circuit are entirely unsuited for this service. However, where a change-speed counter shaft is impractical a multi-speed motor designed for pole changing may be employed. Such motors can be made to give the same output at the lowest and highest speeds. This type of motor, however, possesses the disadvantage of being somewhat expensive.

Hydraulic Pumps.—Multi-speed motors are ideal for driving hydraulic pumps. Speed changes are made by a controller operated by the travel of the accumulator. The controller arrangements are considerably cheaper than is the case with direct current motors.

Line Shafts.—For workshops driven from line shafting, the separate machines being provided with tight and loose pulleys, the alternating current squirrel-cage motor is exceedingly convenient. It can remain permanently connected to the generator, and will run up to speed with the generator without excessive current consumption. An exciter rather larger than usual is necessary, but this method of starting is considered an excellent one by the author. When single phase current is supplied, the Arno-Ferraris starting system is recommended.

Pattern Making Machinery.—Motors usually ranging from 5 to 25 hp. are employed. As they start light, squirrel-cage machines with star-delta starters may be used. A duct should be placed under the floor extending from side to side of the room and open to the atmosphere outside of the building. Pipe-ventilated motors, drawing the air from this duct and discharging it through a gauze into the room, are the most suitable for pattern shops.

Foundry.—For the foundry, a short length of shafting can be used to drive rumblers, grinders, band saws and sand blast. The shafting should be driven by an open protected-type squirrel-cage motor. The motor must be cleared of dust by an air blast. Cupola blowers should be driven by slip-ring motors with regulating resistance in the rotor circuit.

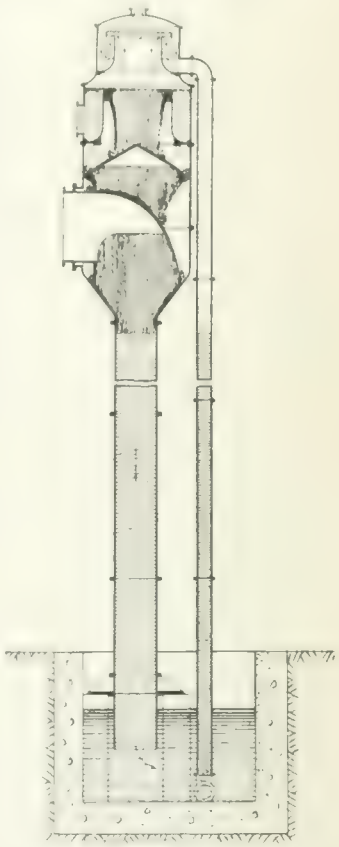
Blowers.—Blowers and exhausters in blacksmith shops should be driven by high speed squirrel-cage motors with star-delta starters.

Forge and Structural Shops.—Drop hammers, shears and angle choppers may be driven by high slip squirrel-cage motors. A simple switch connecting the stator windings directly to the mains is sufficient for the control apparatus, the torque being ample to accelerate the flywheel within a reasonable time.

Hydraulic lifts, presses, etc., would be supplied by three-throw pumps driven by multi-speed motors as already described. The advantage of the multi-speed motor over the stop and start system is that it runs for longer periods at one speed and thus saves continual breaking of the circuit. Air compressors supplying air to pneumatic tools, must on account of the heavy torque needed, be driven by slip-ring motors.

Condenser to Be Made by Ingersoll-Rand Company

Patent rights to the Beyer barometric condenser have been secured by the Ingersoll-Rand Company, 11 Broadway, New York City. This condenser, which is of the counter-current type, enables the company to supply complete steam condensing plants for all service conditions.



The Ascending Steam and the Descending Water Are Brought into Intimate Contact by a Series of Conical Baffle Plates

In the condenser air and cooling water flow in opposite directions, the steam inlet being at the bottom of the condensing vessel, with the water inlet above and the air removal opening at the top. The water entering the condenser forms a pool that constantly overflows and then is brought into intimate contact with the entering steam by conical baffle plates. In this way, it is explained, the water absorbs the latent heat of the steam to its full capacity, the non-condensable air liberated in the action rising through the falling water to the opening at the top and being cooled in its passage to practically the temperature of the incoming water. The air entrained in the cooling water is removed before it mixes with the steam, which is relied upon not only to facilitate the mixing process but permits the removal of air and vapor at a comparatively low temperature, thus giving a reduced volume to be handled and effecting a saving in the amount of power required by the vacuum pump.

A large-diameter steam inlet is employed to give a low velocity and a hood is provided to cause the steam to be discharged into the center of the condensing vessel. The air removal opening, which also has a large area, is protected by a self-draining baffle and trap, which is relied upon to prevent water from being carried over into the vacuum pump. The hot waste water is discharged through a self-draining tail pipe which straddles the hot well and supports the condenser.

French Duty on Tool Steel

French customs officers, says *L'Usine*, of Paris, have been charging a duty of 15 francs per 100 kg., the regular duty on high-class steels, on ordinary steels, on the pretext that the value of common steels has risen above 50f. per 100 kg. The Minister of Finance has decided that during the war no steel is to be classed as high-grade steel for customs purposes unless its value is 75f. per 100 kg. or more, instead of 50f., as before. The journal quoted claims that the application of a duty of 15f. on common steels is contrary to law, as the customs tariff does not draw any free distinction, the quality only justifying the application of a higher duty.

CONDENSER TUBE TROUBLES*

Faults in Manufacture Which Have Caused Splitting in Service

BY A. E. WHITE

An investigation was conducted by the author in 1913 for the Edison Illuminating Company, Detroit, to: (1) account for the splitting of brass condenser tubes in service; (2) determine the proper chemical composition, mechanical treatment and heat treatment which should be given to the tubes; (3) formulate such specifications as would be of material service in the purchase of tubes. The specifications finally formulated completely eliminated the troubles previously encountered.

Chemical analyses were made to determine whether or not the splitting was due to the presence of such impurities as antimony, bismuth, iron, etc. The analyses showed the tubes to be of fairly uniform composition, and to be made on a basis 60 per cent copper and 40 per cent zinc, corresponding to Muntz metal. The percentage of impurities found was exceedingly low and these could not be held responsible for the tube failures. Subsequent investigations discovered the cause of splitting to be faulty manufacture. Specifically, the faults were excessive pinching during drawing, insufficient annealing between drawings or an omission of annealing or incomplete annealing after the final drawing.

CHEMICAL COMPOSITION

For fresh, unpolluted water the best composition is believed to be 70 per cent copper and 30 per cent zinc. For salt or polluted water an Admiralty mixture, 70 per cent copper, 29 per cent zinc and 1 per cent tin, is especially good, as are mixtures of 80 per cent copper, 20 per cent zinc, and 90 per cent copper, 10 per cent zinc respectively. For normal conditions, these latter three are expensive and may be disregarded.

The 70-30 mix is regarded as most desirable for the following reasons: (1) Such a proportion has the maximum ductility of all the brass compositions. See Fig. 1. (2) This mix gives a greater promise of adequate cold working and annealing. (3) The tube will have but one metallographic constituent, which will preclude the possibility of electrolytic action.

While a tube of 55 per cent copper and 45 per cent zinc has a greater tensile strength than one of the 70-30 composition, yet the greater ductility of the latter renders it superior for condenser use. Moreover, the tensile strength of the 70-30 tube is ample for the purpose for which it is used. In regard to working the tubes, the temptation is to work them hot as much as

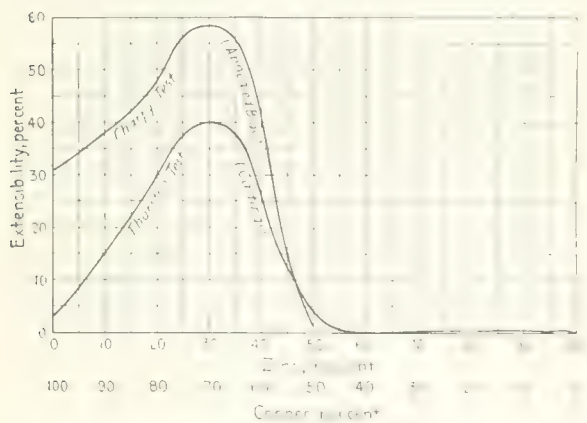


Fig. 1. The maximum ductility of copper-zinc alloys is found to be at a mixture of 70 per cent copper and 30 per cent zinc

possible, this being less expensive than cold working. The very nature of the 70-30 metal precludes to some extent the tendency to hot working. Cold drawing, when not too severe, assures a breaking down of existing crystallization, resulting in both smaller and better interlocked grains. It also makes necessary annealing between each set of cold drawings, both of which processes improve the quality of the tube. Too much cold drawing between annealings will distort the grain structure to such an extent as to produce heavy slip

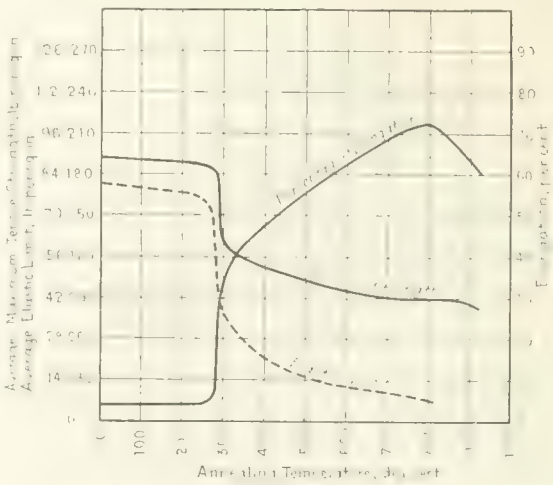


Fig. 2. The best condenser tube as regards its physical properties is the one that combines maximum ductility with maximum strength indicated by the crossing of the curves representing those properties. The above is a record of the annealing tests of a tube of 67 per cent copper and 33 per cent zinc

bands which are almost impossible to eliminate. It is more desirable to reduce the thickness of the tube by many light drafts than by a few heavy drafts. Not less than six drawings should be made, and twelve or even more cold drawings are to be preferred.

CHEMICAL IMPURITIES

The following impurities have a bad effect on the quality of condenser tubes. They should be limited as follows:

Lead.—If more than 0.1 per cent lead is present the ductility of the tube may be impaired. Lead is detected by the microscope, appearing as black dots scattered at irregular intervals over the surface.

Arsenic and Antimony.—Antimony tends to cause cracks in the metal containing it. It is advisable to keep the arsenic and antimony under 0.02 and 0.002 per cent respectively.

Bismuth.—The effect of bismuth is similar to that of antimony, although it is less injurious. It should be kept below 0.01 per cent.

Iron.—Iron will not have any appreciably harmful effect on the tube, providing it does not exceed 0.075 per cent.

HEAT TREATMENT

The heat treatment of condenser tubes should consist in annealing each tube between each cold drawing or set of cold drawings, at a temperature high enough to remove the grain distortion caused by the cold drawing, but not at such a temperature as will permit crystalline growth to take place to such an extent as to cause coarse crystallization. After the final drawing, each tube should be annealed just enough to break down the distorted structure produced by the last drawing. No specific temperatures can be given, as variations in the chemical composition and initial crystal size produce changes in the annealing temperature.

The correct annealing temperature of each composition should be ascertained by microscopic and physical test researches. Fig. 2 is a typical curve of such a research. The best annealing temperature is probably that at which the curve of tensile strength crosses that of percentage of elongation. The length of time the tube is held at the annealing temperature is also of importance. A Muntz metal tube of 60 per cent copper and 40 per cent zinc gave a maximum ductility when heated seven hours at between 560 and 690 deg. C.,

*Abstract of a paper read at the annual meeting of the American Society for Testing Materials at Atlantic City, N. J., June 26. The author is professor of chemical engineering University of Michigan, Ann Arbor, Mich.

while the same metal annealed for one-half hour at 750 deg. C. also attained maximum ductility. These temperatures are too high for commercial work as they produce an unnecessarily large grain. When tubes are heated to, but not held at, a given temperature and cooled at different rates, the metal which cooled the slowest lost its original structure the earliest and produced coarse crystallization the quickest.

SPECIFICATIONS

As a result of the investigation a set of specifications for condenser tubes was prepared. These conform somewhat closely to the U. S. Navy Department specifications but have had added a provision for microstructure examination.

A Theory of the Corrosion of Steel

Two theories have been advanced to account for the actual corrosion of iron, says Leslie Aitchison of Sheffield, England, in a paper "The Theory of the Corrosion of Steel," presented at the annual meeting of Iron and Steel Institute in London, May 4, 1916. In a large number of experiments the material employed has been pure, or nearly pure, iron, and in most cases the interest has centered around the attack upon this of pure water. At the present time the question is an open one as to the actual details of the corrosion under these conditions. Most workers have left the theory of the corrosion of steel, which is a material of much greater complexity of structure than iron, rather well alone.

The complex structure of steels, composed as they are almost invariably of carbides embedded in a matrix of some carbon-free materials, renders it almost certain that the action going on in a steel during its corrosion is a galvanic one. The large number of galvanic couples present in an ordinary sample of steel can be well imagined, and these couples will consist of the carbide on the one hand and the ferrite or solid solution on the other. This postulates at once that one of the two constituents will be anodic in its action and the other cathodic.

The intensity of the galvanic action between the two constituents will depend, other things being equal, upon the potential difference between the two constituents with respect to the corrosive liquid which is in contact with the steel. The carbides in all steels, although of varying chemical composition, will be likely to be possessed of very similar electrical properties, and hence it appears reasonable to assume that the electrolytic solution pressure of all the carbides will be the same, or nearly so.

On the other hand, the solid solution, which may range from practically pure iron to an alloy containing many percentages of a second element, will be a material of very varying electrical properties. As a result the electrolytic solution pressure of this constituent will change very considerably from steel to steel, and will in consequence produce a considerable variation in the potential difference existing between the constituents of the steel. Thus the corrosion of the steel should vary a great deal with changes of composition.

The three pieces of evidence—the microscopic, the analytical by sulphuric acid, and the effect upon the corrosion—may be taken as conclusive in proving that the carbides act throughout as cathodes. The rest of the material then becomes the anode in the various galvanic couples present in the material. This residue of the steel is practically always solid solution. In the case of ferrite the solution is extremely dilute, sufficiently so for the ferrite to be termed pure iron, while in other cases there may be as much as 12 or 15 per cent of a second element.

The author drew the following conclusions:

That the corrosion of a steel takes place purely by the action of the ferrite or the solid solution.

That the action upon pure ferrite may be due entirely to the potential difference set up in consequence of the different solution pressures of the grains of the metal and the inter-granular cement, it being probable that this latter is possessed of a greater electromotive force.

That the percentage of the third element added to iron and carbon in steels must be sufficiently great to produce a fairly high percentage in the solid solution, if there is to be any beneficial effect from the use of this element.

That the electromotive force of the solid solution with respect to the corrosive liquid is the deciding factor in the corrosion of a steel.

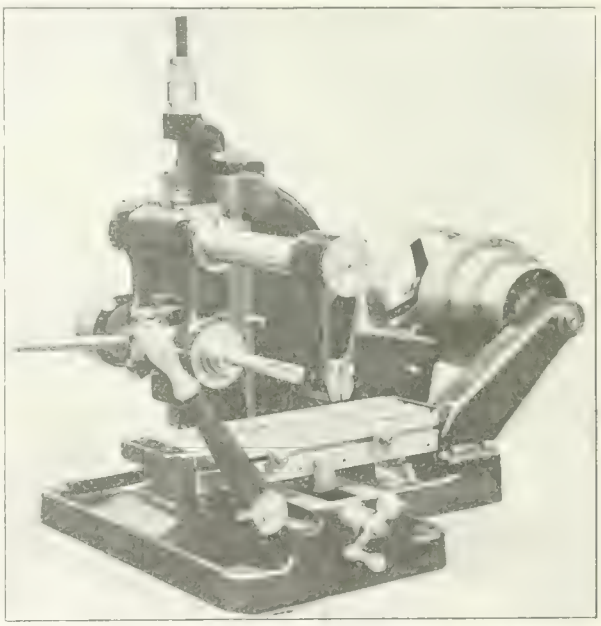
That the pearlite in a steel does not corrode as a whole, but as a mixture of ferrite and cementite, the disintegration of the latter being due to mechanical and not to chemical action.

That carbides are not decomposed by ordinary corrosive agents, and that they act merely as cathodes to the anode of the ferrite or solid solution.

Adjustable-Head Bench Milling Machine

A bench milling machine in which the head is moved up and down the column by a rack and segment has been placed on the market by the Morris Machine Tool Company, Cincinnati, Ohio. A micrometer depth gage is also furnished for the head and if desired the whole machine can be supplied mounted on a pedestal.

The rack and segment arrangement which provides for a vertical adjustment of 5 in. is operated by a lever that can be placed in two positions to suit the convenience of the operator. A counterbalance weight is furnished for the head and can be adjusted to take care of different sizes of cutters or arbors, thus it is emphasized giving an accurate balance for the head. The spindle, which has a No. 7 Brown & Sharpe taper, runs in bronze bearings, the front one being of the



A Navy Bench Milling Machine in Which the Head Is Moved Up and Down the Column by a Rack and Segment Operated by a Lever

taper type and having an adjustment to take care of wear. Bronze bearings are also furnished for the back shaft and all bearings are lubricated by a capillary oiling system. A three-step cone pulley receives power from a countershaft, and by reversing the pulleys on the ends of the spindle and the back shaft it is possible to secure six speeds ranging from 120 to 1080 r.p.m. with a countershaft speed of 360 r.p.m.

The table measures 4 x 15 in. and has a feed of 6 in. A lever operating through a rack and pinion provides the traverse for the table. A square thread screw with micrometer adjustment is employed to feed the saddle in or out.

The Merchants' and Manufacturers' Association of Milwaukee, Wis., and the Milwaukee Real Estate Association have joined in a plan to organize a stock corporation to loan money on good security to needy industries of merit.

American Society for Testing Materials

New and Amended Steel Specifications—Heat Treatment of Axles, and Boiler Tubes, Condenser Tubes and Elastic Limit Discussed

SPECIFICATION making again stands out as a prominent achievement of the American Society for Testing Materials. The annual meeting of the society was held at Atlantic City, N. J., last week, and while consideration of specifications as well as of methods of testing occupied only a part of the time, the society did enough to add measurably to its prestige as a national engineering organization which is particularly active in consummating things of immediate practical value. As has been the case in late years, differences between consumers and producers were ironed out in committee gatherings prior to the meeting, at least so far as iron and steel matters are concerned, and the meeting devoted itself to ratification of the committee recommendations. Thus the changes and new specifications approved, as noted below, are substantially now in force, the formality of a mail ballot of the membership alone being necessary; unless the experience in this regard is upset, which would be for the first time, the action of the meeting will be upheld by a substantial preponderance of the voters by mail.

In the field of iron and steel, chief discussion occurred over the hunt for the elusive elastic limit, over the quenching of axles in oil or water and over the possibilities that higher-carbon boiler tubes are a necessity with the modern high rates of evaporation in large steam boiler plants. In the non-ferrous field, brass condenser tubes, the uses and grades of spelter and a review of the tin situation preliminary to drafting a specification received chief consideration. Tests for refractory firebrick were discussed at length, but the topic over which there was something of the old-time controversy was cement.

Sessions were held beginning Tuesday, June 27, and continued through June 30. The leading points of the first day's sessions were noted in last week's issue, including the plan to bring out new and amended specifications only every even-numbered year, that is, biennially; and the very definite added influence given to the A. S. T. M. specifications by the U. S. Department of Commerce by its translating them into foreign languages and distributing them through United States consular offices. In spite of simultaneous meetings of national engineering societies elsewhere—of civil engineers in Pittsburgh and electrical engineers in Cleveland—the attendance exceeded the record of last year. Subjoined is a detailed statement of what the committee on steel has done in the past year, under the chairmanship of C. D. Young, engineer of tests of the Pennsylvania Railroad, and a necessarily brief report of the sessions on iron and steel, on tests and testing, on nonferrous materials and on cast iron, coke, etc.

THE WORK OF COMMITTEES

Prof. Mansfield Merriman, in his address as president, devoted himself to the work of the society's committees. He paid a tribute to William R. Webster, who was long chairman of the committee on steel and who "introduced indeed those principles and methods which have formed the basis of all work subsequently done." The specifications issued by the society differ materially from those of the International Association, he pointed out, in that they are complete for the use of both producers and consumers, instead of relating mainly to methods of testing. It must be confessed, he continued, that this practice has caused the orginal aim of the International Association—to establish standard methods of testing—to be lost sight of to a considerable extent and it seems desirable that further work in this direction should be done.

The real work of a large committee, he agreed, is usually done by a few of its members and about twelve is the number which generally produces the most satisfactory results. The society has now actively at work 37 committees, and 15 of these have 89 sub-committees. These are classified under five groups: A, designating iron and steel; B, non-ferrous metals; C, cement and concrete; D, miscellaneous materials, and E, miscellaneous subjects. The largest committee is A-1, which has 97 members. Group A has 8 committees, 255 members and 25 sub-committees. Altogether the membership of the 37 committees is 913, which is nearly one-half the membership of the society, but since some men are on two or more committees it is probable that only about one-third of the members are engaged in committee work.

At the time of the issue of the last list, there was a total membership of 1902, of which about 16 per cent were firms and corporations. But on the rolls of committees the percentage is much higher, it being, for instance, 51 per cent in the large committee A-1. Since companies usually defray the expenses of their representatives to committee meetings, it appears that their attendance is better than that of individual members, and that thus the influence of firms and corporations is greater than that of individuals. No objection can be made to this, for companies, whether they be producers or consumers, are working not only for themselves but for their customers.

It is undoubtedly due to corporations and firms that the committee work of the society is conducted so cheaply. Owing to the large volume of their trade it is necessary for companies to make numerous tests and to carry on considerable research, the results of which are freely communicated to committees by their representatives. During the period of two years from Jan. 1, 1914, to Dec. 31, 1915, the total expenses of all technical committees, including joint conferences, were $2,440.16, which is nearly 5 per cent of the total disbursements for all expenses of the society during the same period.

Report of the Committee on Steel

The report of the committee on steel, A-1, summarized briefly the rail situation as it stands to-day; announced the organization of a sub-committee to prepare specifications for carbon tool steel; offered revisions to seventeen existing specifications; proposed six new specifications; made a number of miscellaneous recommendations, and promised that in the ensuing year specifications for steel tires will be studied, that the variation in weight and thickness of sheared plates for ship use and of thin plates and sheets as for electrical work, metal furniture and passenger car trim will be investigated, and that the order and manner of reporting various physical properties of steel and the method of describing the character of fracture will be taken under consideration. The report, comprising in all 123 pages, indicated that a tremendous amount of work had been done in the year, and all the recommendations of the committee were approved.

The review of the rail situation points out that two ideas predominate as to what needs to be done: one is the elimination of the failures which are commonly associated with segregation, and the other the elimination of the failure by transverse fissure. The report says:

SEGREGATION IN RAILS

There seems to be a fairly well-crystallized opinion that split heads and mashed heads are generally associated with segregation, and a number of tests have been proposed which will permit the easy detection of this condition. Those most commonly known are:

Estimation of Segregation by Means of Chemical Analysis of Center and Outside of the Rail.—The objection to this test

is the most involved and the equipment required. The facilities which have been found necessary by the large railroad which has used this method [illegible] of many smaller railroads. The results, however, are definite, are not to any great extent functions of the personal equation of an inspector, and the [illegible] purchased subject to this method of testing are exceptionally good, the rails being practically free from failures after a considerable period of service.

Estimation of Segregation by the Appearance of the Transversely Fractured Section of the Rail.—The estimation of segregation from the appearance of [illegible] much affected by the personal equation of the individual, and is not of such a positive character as to permit of any absolute check in case of disagreement between the manufacturer and the inspector. It is further claimed that the results obtained in some experiments, made to corroborate and correlate the results of judgment based on appearance of fracture with chemical analyses made on drillings taken from the fractured piece, showed that while in some cases the judgment based on the fracture was corroborated by analysis, in many cases it was contradicted.

Estimation of Segregation by Means of Brinell Hardness Tests Made at Center and Outside of a Transverse Section of the Rail.—Experiments have been made to determine whether segregation in rails can be detected by Brinell hardness tests at center and outside of a transverse section, checking the hardness readings by chemical analyses. The results obtained were not of a character to give much hope that this method would be of practical value.

TRANSVERSE FISSURES IN RAILS

This type of failure, which has come into prominence in the last few years, is not so clearly understood as the other principal types which have been under observation for a longer period. Various theories have been advanced as to the causes of this type of failure, varying from included foreign matter in combination with high chemical hardeners and internal stresses to possible checks from cooling or from cold straightening. Although the initial cause at the start of the fracture is unknown, it is generally agreed that the development of the fracture up to the point of final breakdown of the section is due to the repeated loading, causing deflection, upon the rail in track. On the other hand, some engineers attribute this type of failure to the action of heavy wheel loads and the stress produced in the rail by the cold rolling of the surface under traffic in combination with some unknown condition in the steel. No definite proof has been offered as to the absolute cause for this type of failure and, therefore, the means of correction are not at hand.

In general, the research which is being done upon rail steel is being carried forward in such a manner as to justify hope for the future. Both manufacturers and consumers are active in endeavoring to improve the quality of the steel in order to eliminate the failures, and are working out the problem in thorough cooperation.

PERMISSIBLE VARIATIONS IN PLATES

The revision in existing standards included steel plates in six structural steel specifications. A table was drawn up for the permissible variations when plates are ordered by weight and a new table of permissible overweight of plates ordered to thickness. These are here reproduced, and, it is understood, will be formally adopted by the Association of American Steel Manufacturers.

In the society's specifications on track bolts the following supplementary requirement has been added: "The length of the bolt under the head shall not vary more than ⅛ in. from that specified."

In the specification on structural steel for cars it is hereafter provided that the tensile strength of rivet steel may range from 45,000 to 60,000 lb. per square inch, instead of 48,000 to 58,000 lb., the present requirement.

CHANGES IN FORGING SPECIFICATIONS

In respect to steel forgings, the committee's recommendation of the method of determining the elastic limit of heat-treated or cold-rolled steels is in brief as follows:

[illegible] Weight

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Note: The weight per square foot of individual plates shall not vary from the ordered weight by more than one and one-half times the amount given in this table.

The elastic limit called for by these specifications shall be determined by an extensometer reading to 0.0002 in. The extensometer shall be attached to the specimen at the gage marks and not to the shoulders of the specimen nor to any part of the testing machine. The observer shall watch the elongation of the specimen as shown by the extensometer and shall note, for this determination, the load at which the rate of elongation shows a sudden increase.

Where requirements involve the determination of the crystallin nature of the fracture, "the fracture shall be considered crystallin if the crystals which it contains are so large that the cleavage planes or sides of these crystals are easily visible to the eye."

As regards drop test requirements of car and tender axles, the committee is cooperating with the Master Car Builders' Association, involving a proposal to use a 2240-lb. tup instead of a 1640-lb. tup, as at present.

The collars of quenched and tempered axles and other forgings must hereafter be rough turned, instead of being left rough forged.

In rolled wheels for railroad service, the requirement as to rotundity has been changed so that the opening between the tread and the ring gage shall not exceed 1/16 in. instead of 1/32 in.

The three classes of steel tires hereafter have carbon content requirements as follows: Class A, passenger locomotive driving tires, 0.50 to 0.70 per cent; Class B, for freight locomotives and cars, 0.60 to 0.80 per cent; Class C, for switching locomotives, 0.70 to 0.85 per cent. The drop test has been omitted.

SPECIFICATIONS RELATING TO BOILER STEEL

The steel boiler tube specifications have been extended to include tests for superheater pipes and the

Table II—Permissible Overweights of Plates Ordered to Thickness

Ordered Thickness, in.	Permissible Excess in Average Weights per Square Foot of Plates for Widths Given, Expressed in Percentages of Nominal Weights.								
	Under 48 in.	48 to 60 in., excl.	60 to 72 in., excl.	72 to 84 in., excl.	84 to 96 in., excl.	96 to 108 in., excl.	108 to 120 in., excl.	120 to 132 in., excl.	132 in. or over.
Under 1/8	9	10	12	14	..	..	..	..	..
1/8 to 3/16 excl.	8	9	11	12	..	..	..	..	..
3/16 " 1/4 "	7	8	9	10	12	..	..	..	..
1/4 " 5/16 "	6	7	8	9	10	12	14	16	19
5/16 " 3/8 "	5	6	7	8	9	10	12	14	17
3/8 " 7/16 "	4.5	5	6	7	8	9	10	12	15
7/16 " 1/2 "	4	4.5	5	6	7	8	9	10	13
1/2 " 5/8 "	3.5	4	4.5	5	6	7	8	9	11
5/8 " 3/4 "	3	3.5	4	4.5	5	6	7	8	10
3/4 " 1 "	2.5	3	3.5	4	4.5	5	6	7	8
1 or over	2.5	2.5	3	3.5	4	4.5	5	6	7

table of standard weights has been changed. A new diameter, 1⅞ in., has been added and two new thicknesses of pipe wall, and the weights are given in three decimal places. The table is here reproduced, together with a table for small superheater pipes, which is new.

In the specifications for boiler and firebox steel, besides the tables of permissible weight and thickness variations already referred to, it is also required that hereafter the tension test specimen is to be taken longitudinally from the bottom and the bend test specimen transversely from the middle of the top of the finished rolled material. In present practice both are taken longitudinally from the bottom. The bend test specimen is to be tested cold only, omitting the quench-bend test, and the requirements as to cold bend are now that the specimen for material 1 in. or under in thickness shall bend around a pin, the diameter of which is equal to the thickness of the specimen; and for material over 1 in. in thickness, around a pin the diameter of which is equal to twice the thickness of the specimen.

specimens, cold bending and the match marking, and also in allowing 55,000 to 65,000 lb. per square inch tensile strength of firebox steel, while the boiler code specifies 55,000 to 63,000 lb.

ORDER OF REPORTING CHEMICAL COMPOSITION OF STEEL

The committee has adopted and recommends the following order for reporting chemical composition of steel: Carbon, manganese, phosphorus, sulphur, silicon, copper, nickel, and chromium. It further recommends that percentages of carbon, manganese and silicon be reported to two decimal places and percentages of phosphorus and sulphur to three decimal places. The committee has requested the cooperation of the Association of American Steel Manufacturers in extending the use of these practices.

METHODS FOR PHYSICAL TESTS

The question of standard holders for 2-in. tension

[illegible] Plates

Nearest B. w. g. or In.	Fraction	1¾	1⅞	2	2¼	2½	3	3½	4	4½	5	5½	5⅝	5¾	6
[illegible]	13	1.679	1.806	1.932	2.186	2.440	[illegible]								
0.110	12	1.926	2.073	2.220	[illegible]	2.807	3.395								
[illegible]	11	[illegible]	[illegible]	2.503	2.836	3.170	[illegible]	4.505	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	10	2.328	2.508	2.688	3.049	[illegible]	4.130	4.851	[illegible]						
[illegible]	[illegible]	2.560		2.960	3.360	3.760	4.565	5.366	[illegible]	[illegible]	[illegible]	8.170	[illegible]	[illegible]	9.370
[illegible]	5/32						[illegible]	5.579	6.414	7.248	[illegible]	[illegible]	8.708	8.917	[illegible]
0.164	[illegible]					[illegible]	[illegible]	5.877	6.758	7.639	8.520	[illegible]	9.181	[illegible]	10.282
[illegible]	[illegible]					4.460	5.421	6.382	7.343	8.304	9.266	[illegible]	[illegible]	10.227	11.188
[illegible]	[illegible]						5.632	6.633	7.634	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	11.639

[illegible] Pipes (Seamless Only)

Nearest B. w. g. or In.	Fraction	[illegible]	11/16	[illegible]	[illegible]	[illegible]	15/16	1	1¼	1⅜	1 7/16	1½	1⅝
0.095	13	[illegible]	0.6012						[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0.120	11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.6100	1.7900	1.8800	1.9700	2.1500
0.150	9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.7600	1.9600	2.0600	2.1600	2.3600
[illegible]	5/32	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.9400	2.1300	2.2400	2.3500	2.5700

Match marking of test coupons has also been provided for as follows:

"(*b*) When specified on the order, plates shall be match marked as defined in Paragraph (*c*), so that test specimens representing them may be identified. When more than one plate is sheared from a single slab or [illegible], each shall be match marked so that they may all be identified with the test specimen representing them.

"(*c*) Each match mark shall consist of two overlapping circles each not less than 1½ in. in diameter, placed upon the shear lines, made by separate impressions of a single-circle steel die.

"(*d*) Match-marked coupons shall match with the sheets represented and only those which match properly shall be accepted."

NEW AND PROPOSED SPECIFICATIONS

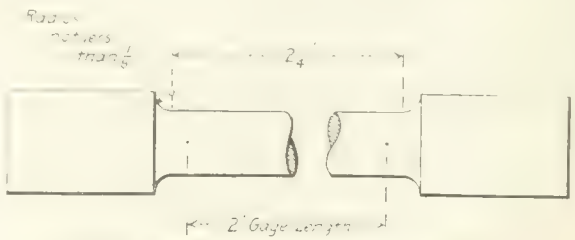
Seven steel specifications which have been in existence one year as tentative specifications were approved and ordered submitted to the membership for a mail ballot. These cover springs and alloy-steel forgings. The committee reported it was not yet ready to report on the requirements as to permissible variations in dimensions of bars for railroad and automobile springs.

The six new specifications are as follows:

For steel track spikes.
For steel screw spikes.
For steel tie plates.
For carbon-steel bars for railway springs with special silicon requirements.
For elliptical springs for automobiles.
For boiler and firebox steel for stationary service.

The specifications on elliptical springs for automobiles are virtually the same as those of the Society of Automobile Engineers, with which society the committee is co-operating, while that on boiler and firebox steel for stationary service is a result of revising the specification for boiler and firebox steel already referred to to agree with the boiler code of the American Society of Mechanical Engineers. It differs from that in the new provisions covering the selection of test

test specimens was considered. The Panama Canal Commission pointed out that in many laboratories special holders for 2-in. tension test specimens for steel castings were in use which did not require threading of the ends and which seemed to give entirely satisfactory service. The committee accordingly recommended that tension test specimens shall conform to



Tension Piece Need Not Have Threaded Ends

the dimensions shown in the accompanying illustration. The ends shall be of a form to fit the holders of the testing machine in such a way that the load shall be axial.

TENSION TESTS IN 150 SECONDS

Following the presentation of the report of the committee on steel, some motion pictures of testing at the Altoona laboratories of the Pennsylvania Railroad were shown. One of these indicated remarkable speed in making complete tension tests. The total time was 150 sec.; of this 35 sec. sufficed for getting the elongation and 55 sec. for determining the breaking load, leaving the remainder for such details as inserting the specimen in the machine, attaching and removing the extensometer, etc.

HEAT TREATMENT OF AXLES

A paper by C. D. Young on the heat treatment of carbon-steel locomotive axles was offered by the author

(*Continued on page* 64)

American Car & Foundry Report

The seventeenth annual report of the American Car & Foundry Company, covering operations for the fiscal year ended April 30, 1916, is an interesting document, as it dissipates the extravagant expectations of huge profits accruing from war orders. President W. H. Woodin says:

"The net earnings of the company for the fiscal year amounted to $2,816,017.55—this being $485,081.47 in excess of the net earnings for the preceding year. From these net earnings there has been paid the regular dividend of 7 per cent ($2,100,000) on the preferred stock, and a dividend of 2 per cent ($600,000) on the common stock, and the remaining $116,017.55 has been added to the company's surplus.

"Repeatedly throughout the year reports were current of the letting of contracts for the production of enormous quantities of munitions of war of various kinds, with extravagant estimates of accruing profits. Many of such reports were gross exaggerations, and many were without any foundation. That the exact facts so far as concerned your company might be known, your president caused to be publicly stated the precise figures (approximately $7,300,000) of all such contracts undertaken by it.

"Your company has not ventured rashly upon this field of industrial effort. The problems presented in connection with such contracts were, as matter of actual experience, in large measure new. These problems, and the general conditions attendant upon this class of work, were made the subject of most careful study. The contracts have been taken at prices that may reasonably be expected to yield a fair margin of profit. While the work has not been without its difficulties, it has progressed satisfactorily. Up to the close of your company's fiscal year, the deliveries made under these contracts were inconsiderable in amount, and in consequence no profits from this work are included in the report. At no time, however, have your officers lost sight of the fact that this class of business is in its nature transitory; and there has been no impairment of the capacity of your company to meet promptly and efficiently all demands that may be made upon it by the requirements of peaceful commerce.

"The generally prosperous condition of the oil industry of the country during the year stimulated the demand for tank cars. The demand for this class of equipment comes not only from the railroads but also, and in larger measure, from the concerns whose immediate business is the production and distribution of the commodity, and to whom the ownership of vehicles of transportation is essential.

"The needs of the railroads with respect to additional equipment were substantially as great at the close as they were at the beginning of the year. There was in evidence throughout the year a desire on the part of the roads to supply by purchase some part at least of the additional equipment required to handle properly the traffic of the country, and there was buying in larger volume than during the preceding year. The need for steel and steel products of all kinds to meet the requirements both of foreign demand and of domestic industries has been most urgent, and beyond the capacity of the mills to meet promptly, and the resulting advance in the cost of material and the difficulty in procuring reasonably prompt deliveries have affected adversely the tendency of the railroads toward increased buying. It is to be expected that in time the steel industry will be able to adjust its facilities to meet demand.

"It is worthy of note that of the cars to be built by your company there are some of wooden construction. For cars of this type there have been placed but few orders during recent years—although they have some advantages in the line of economy over steel cars for certain classes of service. They have, under existing conditions, the great advantage that they can be more quickly delivered than can steel cars. While your company has of recent years enlarged its capacity for the construction of steel cars to keep pace with the constantly increasing demand for cars of that type, it has at no time lessened its capacity for the production of cars wholly or partly of wood; and hence it is in position adequately to care for all equipment orders, whether the cars required be of steel or of wood, or partly of steel and partly of wood.

"For the reasons already discussed, the orders for new equipment have not been as great as they undoubtedly would have been had conditions been otherwise. Your board is nevertheless able to report that the number of car orders on the books was considerably larger at the close than it was at the beginning of the year. There has been during the year a considerable foreign demand for equipment. Your company's export department has been thoroughly organized, and has obtained a fair share of such orders."

MESABA STRIKE WANING

Ore Shipments Keep Up Well—Dock Workers Refuse to Go Out

DULUTH, MINN., July 5.—[By Telegraph.]—The Mesaba range strike situation stands about where it did a week ago. A few men have returned to work in Virginia, but about 400 have gone on strike at Nashwauk. The efforts made to organize the dock workers in this city and Two Harbors were without avail and the leaders who were at work in the two cities have departed for the range. The Duluth officers would not tolerate the I. W. W. methods and informed the agitators that they would have to leave.

Ore shipments are going on steadily, with little falling off in tonnage. The open pit mines that are operating are doing everything possible to get out all of the ore that they can in order to make up for the underground mines that cannot ship.

A deputy sheriff and an innocent bystander lost their lives Monday afternoon when a party of deputy sheriffs went to serve warrants on striking miners who were lodged in a house in Biwabik. The strikers opened fire before the deputies had reached the house and James C. Myron, prominent in Duluth, was killed instantly. All of the strikers were arrested later and charged with murder. Four killings have occurred since the trouble started a month ago. Public opinion is now strongly against the I. W. W. and the strikers. The officers have received orders to stop all intimidation and protect all men who desire to work. The three principal leaders of the I. W. W. who went to the range have been arrested and brought here. They are charged with inciting riots and will be held without bail. From the present outlook it is not believed that the strike can continue much longer.

Mine operators believe the crisis is past. There has been no further spread of the strike and some of the strikers show a disposition to return to work. It is estimated that the curtailment in production since the strike was inaugurated has been less than 20 per cent. Shipments in July will be affected, however, for the reason than even if the strike is entirely broken the return of men is expected to be gradual, and some have left the region.

Steel Corporation Improvements and New Work

The United States Steel Corporation's plans for construction work at Ojibway, Ontario, look to the putting forward of dock and other preliminary construction this year and it is probable steel works construction will not be undertaken on any considerable scale before 1917.

A considerable extension of the iron and steel foundries of the Gary, Ind., works of the Indiana Steel Company has been authorized.

The plate mill at the Shoenberger works of the American Steel & Wire Company has long been inoperative. The improvements recently under way will probably be completed so that it can be started up by the middle of August.

ESTABLISHED 1855

THE IRON AGE

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Proposed Tariff Legislation

The majority members of the Ways and Means Committee of the House of Representatives have agreed on the provisions of a bill to amend the existing tariff act which has been adopted by the committee and is to be called up in the House on Thursday of this week, with the expectation of forcing its passage by Saturday. This bill marks a distinct departure from the principles of the party now in control of the National Administration and of Congress.

Yielding to public sentiment, and recognizing that the country is confronted by "a condition and not a theory," a distinctly protective measure has been evolved in providing for a duty on dyestuffs, which it is expected will be sufficient to safeguard this industry from destructive foreign competition. So anxious, however, are the framers of the bill to prevent, as far as lies in their power, a permanent adherence to the protection of manufacturers of dyestuffs that the bill provides that beginning five years after its passage these duties shall be reduced for five successive years by 20 per cent annually of the rate imposed so that at the end of the ten years dyestuff duties shall no longer be levied, and, further, if at the expiration of five years from the date of the passage of the act the President finds that there is not being manufactured as much as 60 per cent of the domestic consumption of such articles he shall by proclamation so declare and then the special duties now imposed shall no longer be levied.

This imposition of protective duties, however, is not the only means by which this industry, as well as American industries generally, will hereafter be safeguarded. Another portion of the bill provides that it shall be unlawful for any person importing any article from any foreign country into the United States to sell such articles here at a price substantially less than the actual market value or wholesale price of such articles, at the time of exportation to the United States, in the principal markets of the country of their production or of other foreign countries to which they are commonly exported, after adding to such market value or wholesale price the freight, duty and other charges and expenses incident to the importation and sale thereof in the United States. It is provided, however, that such act or acts must be done with the intent of destroying or injuring an industry in the United States or preventing the establishment of any industry here or of restraining or monopolizing any part of trade or commerce of such articles in this country. A penalty is specified of a fine not exceeding $5,000 or imprisonment not exceeding one year, or both, at the discretion of the court. Another provision is that any person injured in his business or property by reason of any violation of or combination or conspiracy to violate this section may sue therefor and shall recover threefold the damage sustained. Another provision forbids the importation of an article produced in a foreign country under any agreement that the importer or any other person in the United States shall not use or purchase such articles of any other person, the penalty for which is a special duty, equal to double the amount of the ordinary duty.

While it would be an easy matter to suggest provisions which would be more efficacious in promoting the interests of American manufacturers and safeguarding them from destructive competition following the war, it is nevertheless gratifying to note that a disposition exists among those at present in control of national legislation to do something for our business interests. They have done so much to injure these interests as to place themselves in a position which is regarded as one of direct antagonism. It is possible that this slight change of front may be made for political reasons, in view of the approaching Presidential and Congressional campaign, but the business interests of the country should probably be thankful for whatever is done in their behalf, no matter what may be the ulterior purpose.

Resale Shell Machinery

For many months machine-tool builders have been speculating on the probable effect on their industry of the resale of tools which were bought, some of them in lots of a hundred or more, by manufacturers who entered the business of making shells. The issuance of lists of machines for resale by companies which have finished their contracts indicates that the questions long asked in this connection may soon be answered.

A hopeful view held by many has been that the tools purchased for munitions work would be fit only for the scrap pile. To a certain extent this will prove true, but probably not to the degree which sanguine sellers expected. Many standard

machines were taken in the rush for equipment, and these do not wear out so easily. Indeed, it might almost be said that it would be a reflection on the builders if they did. It is true that rough, reckless handling and forced production have injured the machines, and many parts have been broken. Supplying parts broken through the ignorance of workmen has been a good business. But the machines can be renovated, and with parts replaced they will be useful for some time.

Most encouraging to those who have feared a surplus of used tools in the market is the fact that a majority of the machines taken by munitions makers were of the single-purpose type, or standard tools so modified that they are not readily adaptable to ordinary manufacturing. The beds of lathes were shortened; they were denuded of tailstock, and a turret was mounted on the carriage. Changes were made in drive and in feed mechanism.

Still another reason for encouragement to machine-tool manufacturers is that the larger manufacturing plants which bought tools to fill war orders will retain at least some of this extra equipment for their regular work. This is true of a large locomotive company, and also of one making pneumatic tools and machinery which was so well versed in boring small cylinders that it turned its attention to shell production with confidence and with practically no effort. The latter company is about through with shells, but finds the demand for its normal products large enough to keep its plants busy at capacity.

It is a noteworthy fact that several companies which produced shells are not anxious for further work of the kind if it were to be had. One reason may be the closer margin of profit which has prevailed in recent months, while another is the extent to which activity in the regular lines of these companies has increased.

More Common-Labor-Saving Devices

Labor-saving devices are advancing further into the field of common labor. Their replacement of such labor has long been a feature in large industries where quantity production makes it possible soon to absorb the capital outlay for the machinery; but now, even in the small plants, there is more consideration of equipment to replace workers of the lower wage scales. It is not that the wages of this class have advanced out of proportion, generally speaking, to those of the more skilled workers, nor is there a greatly disproportionate scarcity of common labor. This later increase in man-displacing machinery is largely the result of inefficiency even in workmen of whom not much has been expected. The fact is that the price per man-hour has worked so far out of line, measured in results and also in terms of the nervous strain on shop heads, that steps are being taken for larger elimination of uncertainty as to output. While immediate results may not show in dollars and cents, yet for the long pull owners are considering more than ever the cost of the harassment of their responsible men by careless and irresponsible employees.

Efficiency inoculation does not readily "take"; least of all has been its effect upon labor of the strong-arm-and-back class. Inventors will still do much to compensate certain industries for the disappearance of "cheap hand labor," but there will still be the serious problem with which the Government as well as industry will have to reckon, in the large numbers of workers who are neither teachable nor susceptible of further mental development.

Capital Results of Our Foreign Trade

Very large favorable balances were a feature of our foreign trade throughout last year, and thus that has become an old story. There is a new story in our foreign trade, however, in that each successive month this year, through May, has made a new high record for imports, a fact that is perhaps not generally apprehended. Our imports do not ordinarily advance by such leaps and bounds, by any means. High points in our imports—months in which previous records were broken—have been as follows: December, 1906; December, 1909; December, 1911; December, 1913, representing intervals of two or three years, December invariably being the month of the year in which the record was broken. It was not until January of this year that the record of December, 1913, was broken. February, March, April and May followed with successive new records, the May imports, as indicated by preliminary returns, being $229,000,000 as compared with $184,025,571 in December, 1913, the high record prior to this year.

Successive high records for a favorable trade balance have been made as follows: December, 1880; October, 1896; October, November and December, 1898; October, 1900; December, 1903; December, 1905; December, 1907; January, 1908; November, 1912; October, 1913, the last indicated record being $138,912,162. The first month of last year broke that record, and six months of the twelve stood above it. Thus extremely large trade balances featured all of last year, but it is only this year that extremely large imports have occurred. However, each of the five balances thus far this year has been in excess of the balance in October, 1913, so that, despite the heavy imports, this year has done better even than last year in the matter of the merchandise balance. The average balance in the five months this year is 33 per cent in excess of last year's average, thus setting at rest any fear that the increasing imports may be undermining our favorable balance. The exports have increased still more than the imports. The trade is of tremendous proportions, the total in May, imports plus exports, being at a rate nearly three times that of 1906, ten years ago.

The nature of the imports is well worth studying, particularly from two viewpoints, their revenue-producing character and their character as representing an aid or an injury to American industries.

As to revenue-producing character the showing is extremely bad. The revenue is wretchedly small in proportion to the total value of the imports, and this is due in part to the change in the tariff in October, 1913, and in part to a change that occurred after the war started, in the character of the imports. The comparable periods are the ten months ending April, 1913, the last such period before the

change in tariff, the ten months ending April, 1915, substantially the first ten months of war, and the ten months ending April, 1916, the last period for which full data are available. In the ten months ending April, 1913, imports of $1,366,536,251 (53.46 per cent being free) produced $258,451,236 of customs duties. In the ten months ending April, 1915, $1,374,189,749 (61.77 per cent being free) produced $247,774,507. That was, temporarily at least, a better showing than would be expected from the new tariff, there being only a moderate decrease in revenue while there was a slight increase in the total imports. Thereafter a complete change must have occurred in the nature of the imports, for in the ten months ending April, 1916, $1,722,368,115 of imports (68.98 per cent free) produced only $171,765,334 of revenue. Thus under the same tariff law imports increased 25.3 per cent and revenue decreased 1.5 per cent. This curious change was due only in part to the proportion of free imports increasing. There was a slight increase even in the dutiable imports, commodities carrying higher duties evidently yielding to commodities carrying lower duties.

As to the character of the imports in their relation to industry there has been a very decided improvement. There has been a large increase in crude materials for manufacturing and a large decrease in manufactures ready for consumption. In foodstuffs, crude and finished, the increases have been only slight. It is evident that the increase in imports has been due chiefly to our industrial activity, whereby the manufacturing industries have required more raw and partly manufactured materials, while with our prosperity we have purchased less, rather than more, of manufactured goods ready for consumption. Whether this change is due in part to less desire to make such purchases or entirely to inability to obtain the goods is another matter. The fact is that we have not done so.

There is a natural desire to measure the extent to which the favorable trade balance has prospered us, and the extent to which the capital of the country has been augmented. Of course, no accurate measurement is possible, but the figures are so large that they are suggestive, even though many items cannot be the subject of anything more than guesses. As the merchandise balance is not directly a measure of our profits, there being an unseen balance as well as a movement of gold, it is necessary to proceed by the comparative method. In the ten years before the war, through the calendar year 1913, the merchandise balance averaged $486,600,000 in our favor, and showed only relatively minor fluctuations in the period, while the gold movement represented an average of $5,600,000 coming into the country, so that there was left an average of $481,000,000 a year to be settled by other means, such, for instance, as the movement of securities, the payment of interest and dividends on securities held abroad, freights paid to foreign vessel owners, money spent abroad by American tourists, etc.

In the calendar year 1914 the merchandise balance was only $324,348,049 in our favor, while gold exports exceeded imports by $165,228,415, so that the combined showing was only $159,000,000 in our favor, instead of the previous standard of $481,000,000, making a deficiency of $322,000,000. In 1915 the merchandise balance was $1,768,883,677, against which there was an excess of $420,528,672 in gold imports, leaving $1,348,355,005 to be settled by other means. Deducting $481,000,000 as the normal balance, as well as the $322,000,000 deficit accumulated in 1914, there is left $545,000,000 to the good. Making the same computation for the first five months of this year we have $977,000,000 of a merchandise balance with $7,000,000 net gold imports, leaving an accumulation of $770,000,000 after allowance for the previous standard rate of merchandise balance. Thus there appears to have accumulated to our credit, to June 1, 1916, $1,315,000,000 either of credit or of a balance that has been settled by some other means than gold, and this is after allowing for $250,000,000 of the merchandise exports to have been settled by the $250,000,000 of gold that has come in since January 1, 1914, in excess of the small annual amount that had previously been coming in.

Thus we are ahead, altogether, in gold, credit, etc., to the extent of fully $1,600,000,000, and our capital is increased by this amount, provided we have not had an excess of unseen expenses. We have saved by a reduction in the amount of money spent abroad by American tourists, while we have lost in paying higher freights on such of our imports, a slightly smaller proportion than formerly, as are brought by foreign vessels, while we have gained slightly by having more American vessels carrying exports. Probably no great sum should be set as the net total of these and other items that cannot be gauged, and thus it seems fair to assume that the capital of the country has thus far been increased by about a billion and a half, in gold, in foreign securities purchased, chiefly the Anglo-French loan, in American securities returned, and in various minor items. This is not the billions sometimes loosely spoken of, but it is a very considerable sum.

A Poor Manganese Showing

Record high prices and a large demand resulted in an output of only 9651 gross tons of manganese ore in the United States in 1915, according to the Geological Survey. And this was three times that for 1914 and the largest since 1901. Last year's production came from 34 operators in 10 States. It is an unsatisfactory revelation of the apparently meager domestic supply of a raw material so absolutely essential to the great steel industry of this country.

The lack of a home supply is the more impressive when it is realized that to furnish the steel industry with the 201,743 tons of ferromanganese, available and necessary for consumption last year, over 500,000 tons of manganese ore was necessary. Our domestic output was therefore only 1.9 per cent of that actually necessary. It was only 2.5 per cent of the ore necessary to produce the 146,542 tons of the alloy made within our own borders. At the present rate of steel output, estimated to require from 270,000 to 295,000 tons of ferromanganese for 1916, our ore requirements rise to 675,000 to 700,000 tons for the year. Unless the domestic output of ore can be greatly enlarged, it will be only 1.3 to 1.4 per cent of that necessary.

Dependent as we are, and are likely to continue to be for many years, on foreign sources for manganese, it behooves the metallurgists of the country to take advantage of every possible suggestion that may seem to offer a substitute for manganese in steel, especially from a preparedness point of view. The war's lessons in this field, from present indications here and abroad, promise to be unusually fruitful.

CORRESPONDENCE

Substitutes for Ferromanganese

To the Editor: With the shortage of supply of the 80 per cent ferromanganese and its excessive cost, due to the cessation of exports from Europe, the American steel maker naturally became somewhat pessimistic and fearful for his source of supply of this all-important constituent. Thanks to American ingenuity, American metallurgists and producers, urged on by necessity, were soon able to cope with the situation by the domestic production of high manganese, specular irons and by the use of substitutes. In your able editorial, which appeared in the issue of June 15, you called attention to the various measures to which some of the steel makers have had to resort in order to offset the shortage of supply and the excessively high cost of ferromanganese. Naturally many of them resorted to the use of spiegeleisen. Because of the low manganese content and the proportionately larger amounts necessary to be used, they were forced to the additional cost and inconvenience of preheating this material. Some others reduced the percentage of 80 per cent ferromanganese and in addition used an equivalent amount of specular irons of lower percentages in order to offset the initial preheating. Some others were forced to resort to this latter method in view of the high phosphorus content of spiegeleisen, the extensive use of which might affect the specification tolerances for phosphorus. Unfortunately, too, at times such as these the steel maker very often has presented to him many substitutes to meet his various needs, only to find by experience that they are of no particular value.

SILICON—TITANIUM—ALUMINUM

With the embargo which has been placed on Caucasus ores by the Allies, Germany has been able to meet the shortage of ferromanganese by the use of calcium-silicide. In this country, American steel manufacturers have tried as a substitute a by-product of the abrasive industries, referred to in your article as silicon-aluminum-titanium, with indifferent and variable success. The designation of this alloy is in a measure a misnomer, inasmuch as only a relatively small amount of aluminum is present. In addition to this small aluminum content there is at present a large per cent of alumina, which has no function as a deoxidizer but in reality is a menace, in that the inactive alumina will not always find its way to the slag but remains in the steel as a slag inclusion. Some of the titanium present in this alloy is also present in the form of its most stable compound, titanium-oxide, and has no value as a deoxidizer. Inasmuch as this material is a by-product, the deoxidizing constituents, silicon, titanium and aluminum, are present in variable quantities. The writer used some of this material, hoping that it would be a remedy for the adverse situation arising from the shortage of ferromanganese. The results were indifferent and a disappointment, insofar as the aluminum, for which a deoxidizing value had been hoped, manifested itself as alumina.

FERRO-CARBON-TITANIUM

Realizing that the function of manganese in the final product contributes to the ultimate strength of steel only indirectly in that the usual percentage of approximately 75 points of manganese assures complete deoxidation and a resulting homogenity, some tests were instituted, wherein the final manganese content was reduced about 35 per cent further. In the preliminary experiments the original ferromanganese addition was reduced about 35 per cent and the deoxidation was further augmented by the use of ferro-carbon-titanium. Although ferro-carbon-titanium normally sells at a considerably higher price than ferromanganese, its substitution was economically possible at the current price of 80 per cent ferromanganese, permitting the conservation of the present supply of the latter. Physical tests indicated that the elastic limit, ultimate strength, elongation and contraction were the same as in previous practice when 80 per cent ferromanganese was in abundance. Further economies were found from experiments which led to the use of 30 per cent of the original 80 per cent ferromanganese addition, augmented by twice the amount of 40 per cent spiegel and the addition of 3 lb. of ferro-carbon-titanium alloy per net ton of metal charged.

With the shortage of ferromanganese, American metallurgists have begun investigations to determine whether a manganese content of 75 points in steel castings is really essential, and whether the lower limits usually specified in rolled products are not sufficient.

W. A. JANSSEN,
Superintendent Steel Foundry, Bettendorf Company.
Bettendorf, Iowa, June 28, 1916.

A Million Tons of Unfinished Steel to Europe

Exports of ingots, billets and blooms from the United States have assumed enormous proportions—at the rate of over 1,000,000 tons per year. With an increase from 50,942 tons per month in the last quarter of 1915 to 84,770 tons per month for the first four months of 1916, the outgo has reached the record rate of 1,017,240 tons per year. The following table from Government data is interesting:

Exports of Ingots, Billets and Blooms from the United States

	Gross Tons	Tons per Month
February, 1916	87,306	88,770
March, 1916	107,696	
April, 1916	88,764	
Last quarter, 1915	152,826	50,942
1915	760,728	16,727

The present export rate is therefore nearly twice that of 1915 and is strong testimony to the extent to which foreign steel producers are unable to meet the demand. To June 1, 1916, Great Britain had imported only 101,347 gross tons of ingots, billets, blooms and slabs from the United States, leaving about 238,000 tons of our total exports of 339,081 tons to May 1, 1916, to go to other countries. In the first quarter of this year France has taken 194,367 tons of ingots, billets and blooms, the rate greatly increasing each month.

Pennsylvania Sale to Bethlehem Confirmed

At Philadelphia, July 1, in the suit brought by Clarence H. Venner, Judge McPherson of the United States Circuit Court of Appeals refused to interfere with the plan of the Bethlehem Steel Company to purchase the assets of the Pennsylvania Steel Company of New Jersey and its subsidiaries.

The Snyder Electric Furnace Company, 53 West Jackson Boulevard, Chicago, calls attention to an error on page 1587 in THE IRON AGE of June 29, in which the statement is made that the Western Crucible Steel Casting Company is installing a Snyder electric furnace which will produce 2800 lbs. of metal per 24 hrs. This should be 28,000 lbs. of metal per 24 hrs.

The Foundation Company, Ltd., Montreal, has received two contracts from the Algoma Steel Corporation, Sault Ste. Marie, Ontario. One is for the revision of the yard, including the engineering and constructing of three plate-girder bridges, and the other is for the construction of the foundations of two open-hearth furnaces and a gas producer.

Provisions of the New Tax on Munitions

Rates Range from 1 to 8 Per Cent of Gross Receipts—Copper Smelting and Refining Included—Ten Per Cent Profit Exempt

WASHINGTON, D. C., July 4, 1916.—Chairman Kitchin of the Ways and Means Committee on July 1 formally introduced the omnibus revenue bill. It will be reported to the House on Thursday and taken up under a special rule providing for a final vote on Saturday. It will be promptly considered by the Senate Finance Committee and will probably be passed and signed on or before July 25.

The general character of the bill has been fully foreshadowed in THE IRON AGE. Income taxes, both individual and corporate, are increased nearly 100 per cent; a federal inheritance tax levied by the bill imposes rates ranging from 1 to 5 per cent on estates of $50,000 and upward. A tax on munitions manufacturers is a novel feature of the measure, the rates ranging from 1 to 8 per cent of the gross receipts of individuals, partnerships or corporations engaged in the manufacture of various specified classes of war material, including the smelting, refining or alloying of copper, an exemption equal to a net profit of 10 per cent being allowed in all cases. The provisions of the Rainey tariff commission bill, heretofore described in this correspondence, are included in the measure, increased duties on dyestuffs are provided and a so-called anti-dumping clause is embraced in the bill. Certain of the special taxes on bankers, brokers, etc., levied by the emergency war revenue act are re-enacted, but all the documentary stamp taxes embraced in Schedule A of that statute are repealed. The bill is intended to produce a net increase of revenue of $197,000,000, but is not calculated to meet any extraordinary expenditures due to the Mexican crisis, which are to be defrayed by the cash balance now in the treasury, supplemented, if necessary, by a bond issue to be hereafter authorized.

THE MUNITIONS TAX

The provisions of the munitions manufacturers' tax will be examined by readers of THE IRON AGE with special interest. Section 201 provides for the imposition of these taxes as follows:

SECTION 201. That every person manufacturing gunpowder or other explosives shall pay for each taxable year an excise tax equivalent to the following percentages of the gross receipts during such year from the sale or disposition of such explosives manufactured in the United States, except blasting powder and dynamite:

Five per centum of the amount of such receipts not in excess of $1,000,000, and

Eight per centum of the amount by which such receipts exceed $1,000,000.

Every person manufacturing (a) cartridges, loaded or unloaded, caps or primers, or (b) projectiles, shells or torpedoes of any kind, including shrapnel, loaded or unloaded, or fuses; or (c) firearms of any kind, including small arms, cannons, machine guns, tubes and barrels of (c) and any parts of any of the articles mentioned in (a), (b), or (c), shall pay for each taxable year an excise tax equivalent to the following percentages of the gross receipts during such year from the sale or disposition of any such articles manufactured in the United States:

Two per centum of the amount of such receipts not in excess of $250,000;

Three per centum of the amount by which such receipts exceed $250,000 and do not exceed $500,000;

Four per centum of the amount by which such receipts exceed $500,000 and do not exceed $1,000,000, and

Five per centum of the amount by which such receipts exceed $1,000,000.

Every person smelting copper ore, refining metallic copper, or alloying copper, shall pay for each taxable year an excise tax equivalent to the following percentages of the gross receipts during such year from the sale or disposition of refined copper or copper alloys and from the sale or disposition of crude or unrefined copper if sold or disposed of for any purpose except for refining or alloying:

One per centum of the amount by which such receipts exceed $25,000 and do not exceed $1,000,000;

Two per centum of the amount by which such receipts exceed $1,000,000 and do not exceed $10,000,000, and

Three per centum of the amount by which such receipts exceed $10,000,000.

Evasion of the taxes provided by the bill are guarded against by the following provision:

SECTION 202. If any person during any taxable year or part thereof, whether under any agreement, arrangement, understanding or otherwise, sells or disposes of any such article at less than the fair market price obtainable therefor, either (a) in such manner as directly or indirectly to benefit such person or any person directly or indirectly interested in the business of such person, or (b) with intent to cause such benefit, the amount of the gross receipts of such person during such year or part thereof from the sale or disposition of such article shall be taken to be the amount which would have been received from the sale or disposition of such article if sold at the fair market price.

Ten Per Cent Profit

Exemptions including a 10 per cent net profit are prescribed by Section 203, as follows:

SECTION 203. That if the net profit derived during such year from the sale or disposition of such articles manufactured in the United States is less than ten per centum, no tax shall be levied, collected, and paid; and if the payment of the tax would reduce such net profit below ten per centum, the tax to be levied, collected and paid shall be equal to such net profit in excess of ten per centum. Such net profit shall be computed on the amount actually invested in the United States in the manufacture of such articles, making reasonable allowance, in the case of the increase or decrease of such amount during the taxable year, for the proportion of such year during which such increased or decreased amount has been employed in the manufacture of such articles.

In cases where such person has undivided capital invested in the manufacture of the articles specified in section 201 and of other articles, the amount invested in the manufacture of the articles specified in section 201 shall be considered as in the same ratio to the total amount invested as the gross receipts from the sale and disposition of such articles bear to the total gross receipts from the sale and disposition of all articles manufactured.

The duty of establishing to the satisfaction of the Commissioner of Internal Revenue the fact that the net profit is less than ten per centum or that the payment of the tax would reduce the net profit below ten per centum shall devolve upon the person subject to the tax.

The Basis of "Net Profits"

In order that there may be no controversy as to the basis upon which "net profits" may be legally calculated under the terms of the bill, the following specifications are incorporated:

SECTION 204. That when used in this title the term "net profit" means the aggregate gross receipts during the taxable year from the sale and disposition of such articles manufactured in the United States less the following items, or the proportionate part thereof chargeable to the manufacture of such articles, any deductions not kept separate from similar items arising in connection with the joint manufacture of other articles not specified in section 201 being ascertained according to the ratio above prescribed for the determination of the amount invested:

(a) The cost of raw materials entering into the manufacture;

(b) Running expenses, including rentals, cost of repairs and maintenance, heat, power, insurance, management, salaries, and wages;

(c) Interest paid within the taxable year on debts or loans contracted to meet the needs of the business, and the proceeds of which have been actually used to meet such needs;

(d) Taxes of all kinds paid during the taxable year with respect to the business or property relating to the manufacture;

(e) Losses actually sustained within the taxable year in connection with the business of manufacturing such articles, including losses from fire, flood, storm, or theft, and not compensated for by insurance or otherwise; and

(f) A reasonable allowance, according to the circumstances peculiar to each concern, for amortization of the values of buildings and machinery, according to the basis of the additional depreciation of special plants.

Section 205 provides that any person manufacturing any of the articles specified "through the agency of a subsidiary concern or a sub-contractor shall be deemed the manufacturer of such articles instead of the subsidiary concern or sub-contractor." Manufacturers subject to these provisions of the bill are required to make returns on or before Feb. 1 of each year under oath to the local collector of internal revenue and the taxes thus determined to be due must be paid on or before April 1. Any person violating these provisions of the proposed law or knowingly making a false statement in any return, is rendered liable, in addition to paying any tax which may be found to be due, to be fined not more than $10,000, or imprisoned not exceeding one year, or both, in the discretion of the court.

Lest the new law may be invalidated should the courts find any of its provisions unconstitutional, it is provided that if any part of the act shall be adjudged to be invalid, such judgment shall not impair the remainder of the act, but shall be confined to the part thereof directly involved in the controversy in which such judgment shall have been rendered. W. L. C.

June Ore Shipments a Record

June iron-ore shipments from the Lake Superior region were 9,507,578 gross tons, the record month in the history of Lake ore carrying. They exceeded those for May by 1,057,996 tons, then the record month, and were 58.32 per cent greater than those for June, 1915. The comparative shipments by ports for May and for the season were as follows in gross tons:

	June, 1915.	June, 1916.	To July 1, 1915.	To July 1, 1916.
Escanaba	720,261	1,149,454	1,248,530	2,692,824
Marquette	363,837	79,527	547,002	1,151,110
Ashland	604,127	1,101,170	1,161,792	2,204,262
Superior	926,536	1,945,234	1,777,600	3,878,915
Duluth	2,146,501	3,116,665	4,295,811	6,325,990
Two Harbors	1,244,026	1,645,556	2,490,248	3,449,435
Total	6,005,091	9,507,576	11,521,283	19,604,567
Increase, 1916		3,502,485		8,094,284

The increase to July 1, this year, is 70.26 per cent, which reveals the rate that is making for a record season's shipments. The Duluth and Superior percentage of the total to July 1, this year, was 52.01 per cent, against 52.70 per cent last year. The Escanaba proportion this year is 13.27 per cent, as compared with 10.86 per cent last year.

Locomotive Orders Decreasing

Locomotive orders in June were the lowest this year. In the last three weeks orders for 77 have been placed, while new inquiries are for less than 40. The Baldwin Locomotive Works will build 25 Mallets for the New York Central and 8 Santa Fes for the Texas & Pacific, while the Lima Locomotive Corporation will furnish the Chesapeake & Ohio with 25 Mallet locomotives. It is understood that the Canadian Locomotive Company has secured the Russian order for 1000 small locomotives and that at least a large majority of these will be sublet to the American Locomotive Company, the Baldwin Locomotive Works and the Lima Locomotive Corporation. It is reported that the Baldwin Locomotive Works has taken an order for 100 small trench locomotives for the French Government and that the Westinghouse Electric & Mfg. Company will furnish the New York, New Haven & Hartford with 100 electric engines.

The Ransome Concrete Machinery Company, with executive offices at 115 Broadway, New York City, and an enlarged factory at Dunellen, N. J., has established another office at St. Louis, Mo., located at 12-18 South Twelfth Street, with E. Gwynn Robinson, agent. The latest types of all kinds of mixers, from the bantam to the road paver, will there be on exhibition.

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LESS PIG IRON IN JUNE

Daily Production Rate Falls Off 1500 Tons

Blast Furnace Performance Slackens in Nearly All Districts

There was a general letting down at the blast furnaces of the country in June, the output of pig iron being 3,211,588 tons, or 107,053 tons a day, as against 3,361,000 tons in May, or 108,422 tons a day. Steel works furnaces are responsible for nearly all of the falling off, there being indications that heavy driving for many months is having its natural effect. There was a net gain of two furnaces in the month, 323 being in blast July 1 against 321 one month previous. However, based on operations in June our capacity rating for July 1 is less than that of June 1—107,822 tons a day against 108,386 tons.

DAILY RATE OF PRODUCTION

The daily rate of production of coke and anthracite pig iron by months, from June, 1915, is as follows:

Daily Rate of Pig-Iron Production by Months—Gross Tons

	Steel Works	Merchant	Total
June, 1915	59,022	20,339	79,361
July	62,895	19,796	82,691
August	67,801	21,865	89,666
September	70,977	24,108	95,085
October	73,595	27,227	100,822
November	73,282	27,962	101,244
December	73,647	29,686	103,333
January, 1916	72,614	30,132	102,746
February	75,305	31,151	106,456
March	76,274	31,393	107,667
April	77,226	30,366	107,592
May	77,706	30,716	108,422
June	76,526	30,527	107,053

OUTPUT BY DISTRICTS

The accompanying table gives the production of all coke and anthracite furnaces in June and the three months preceding:

Monthly Pig-Iron Production—Gross Tons

	Mar. (31 days)	Apr. (30 days)	May (31 days)	June (30 days)
New York	2[illegible]4	189,312	210,464	190,140
New Jersey	0	1,[illegible]8	6,686	6,379
Lehigh Valley	109,598	112,210	117,870	111,689
Schuylkill Valley	94,264	90,773	94,254	93,552
Lower Susquehanna and Lebanon Valley	63,142	69,407	80,293	75,092
Pittsburgh district	793,910	752,068	750,903	728,071
Shenango Valley	193,[illegible]3	191,799	195,867	172,259
Western Pennsylvania	175,738	165,790	167,913	157,909
Maryland, Virginia and Kentucky	9[illegible]6	9[illegible]4	94,302	85,687
Wheeling district	120,222	127,101	131,764	125,889
Mahoning Valley	3[illegible]4,527	309,[illegible]4	324,739	31[illegible]675
Central and Northern Ohio	2[illegible]7,8[illegible]3	239,963	274,693	274,526
Hocking Valley and Hanging Rock	53,237	50,120	46,079	48,840
Chicago district	479,659	467,147	481,[illegible]11	462,394
Mich., Minn., Mo., Wis. and Col.	11[illegible]6[illegible]	11[illegible]6[illegible]4	127,278	123,116
Alabama	2[illegible]8,[illegible]8	2[illegible]7,[illegible]17	223,439	204,076
Tennessee	[illegible]1,[illegible]	[illegible]0,424	32,815	[illegible],[illegible]94
Total	[illegible]67,691	3,[illegible]21,[illegible]768	3,361,[illegible]67[illegible]	3,211,588

PRODUCTION OF STEEL COMPANIES

Returns from all furnaces of the United States Steel Corporation and the various independent steel companies show the following totals of product month by month. Only steel-making iron is included in the figures below, together with ferromanganese and spiegeleisen. These last, while stated separately, are also included in the columns of "total production."

Production of Steel Companies—Gross Tons

	Pig, total production— 1914	1915	1916	Spiegeleisen and ferromanganese 1914	1915	1916
Jan.	1,261,430	1,115,944	2,251,035	17,325	18,041	24,866
Feb.	1,329,414	1,237,380	2,183,845	10,524	13,319	23,877
Mar.	1,704,688	1,551,082	2,365,116	20,133	12,274	29,288
Apr.	1,635,226	1,584,111	2,316,[illegible]	18,676	12,337	31,862
May	1,457,847	1,[illegible]85,[illegible]	[illegible]85,[illegible]	21,504	13,440	[illegible],[illegible]44
June	1,[illegible]9[illegible],[illegible]	1,[illegible]7[illegible],[illegible]	[illegible],[illegible]54,[illegible]	16,[illegible]4	19,200	[illegible],[illegible]97
July	1,[illegible]97,[illegible]51	1,949,750	[illegible],[illegible]...	16,524	17,[illegible]4	[illegible]...
Aug.	1,[illegible]7[illegible],[illegible]54	2,101,[illegible]18	[illegible]...	11,577	27,463	[illegible]...
Sept.	1,390,322	2,129,322	[illegible]...	13,786	23,159	[illegible]...
Oct.	1,[illegible]21,[illegible]26	2,[illegible]81,[illegible]46	[illegible]...	17,435	[illegible],[illegible]...	[illegible]...
Nov.	1,059,1[illegible]9	2,[illegible]19[illegible],[illegible]59	[illegible]...	[illegible],[illegible]67[illegible]	[illegible],[illegible]...	[illegible]...
Dec.	1,[illegible]61,[illegible]02	2,[illegible]28[illegible],047	[illegible]...	20,733	25,004	[illegible]...

CAPACITY IN BLAST JULY 1 AND JUNE 1

The following table shows the daily capacity in gross tons of furnaces in blast July 1 and June 1 by districts:

Coke and Anthracite Furnaces in Blast

Location of furnaces	Total number of stacks	July 1— Number in blast	July 1— Capacity per day	June 1— Number in blast	June 1— Capacity per day
New York:					
Buffalo	19	17	5,950	17	6,174
Other New York	5	3	590	3	615
New Jersey	6	1	213	1	216
Pennsylvania:					
Lehigh Valley	20	12	3,362	14	3,615
Spiegel	2	2	195	2	212
Schuylkill Val.	12	11	3,133	10	3,040
Lower Susquehanna	6	5	1,510	5	1,515
Lebanon Valley	8	7	1,003	6	917
Ferro and Spiegel	1	1	90	2	183
Pittsburgh Dist	53	51	23,851	51	23,824
Ferro	3	3	372	3	398
Shenango Val.	19	19	5,942	19	6,076
Western Pa	24	18	5,403	17	5,328
Ferro and Spiegel	3	1	103	1	75
Maryland	3	3	1,247	3	1,260
Ferro	1	1	108	1	112
Wheeling District	14	13	4,196	13	4,396
Ohio:					
Mahoning Val.	25	24	10,522	24	10,153
Central and Northern	24	23	9,154	23	8,984
Hock. Val., and Hang'g Rock.	15	11	1,657	10	1,536
Illinois and Ind.	35	32	15,425	32	16,055
Ferro	1	1	87	1	84
Michigan, Wis. & Minn.	12	11	2,952	11	3,043
Colorado and Mo.	6	3	998	2	1,015
Ferro	1	1	173	0	0
The South:					
Virginia	18	8	989	7	826
Kentucky	5	4	558	4	628
Alabama	38	28	7,018	27	7,112
Tennessee	15	10	1,041	11	994
Total	394	323	107,822	321	108,386

Furnaces blown in in June include Keystone in the Schuylkill Valley, one Donora in the Pittsburgh district, Claire in the Shenango Valley, the new No. 9 stack of the Cambria Steel Company and Rebecca in western Pennsylvania, one Low Moor in Virginia, Jisco in the Hanging Rock district, one Iroquois in the Chicago district, one Pueblo in Colorado and one Ensley in Tennessee.

Among the furnaces blown out are one Hokendauqua and one Lock Ridge in the Lehigh Valley, one Lucy in Pittsburgh district, one stack of the Cambria Steel Company in western Pennsylvania, Buena Vista in Virginia, one South Works stack of the Illinois Steel Company in the Chicago district and Napier in Tennessee.

THE RECORD OF PRODUCTION

Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1912—Gross Tons

	1912	1913	1914	1915	1916
Jan.	2,057,911	2,795,331	1,885,054	1,601,421	3,185,121
Feb.	2,100,815	2,586,337	1,888,670	1,674,771	3,087,212
Mar.	2,405,318	2,763,563	2,347,867	2,063,834	3,337,691
Apr.	2,375,436	2,752,761	2,269,655	2,116,494	3,227,768
May	2,512,582	2,822,217	2,[illegible]62,[illegible]86	2,263,470	3,361,073
June	2,[illegible]49,[illegible]4	2,628,565	1,917,783	2,[illegible]80,[illegible]27	3,211,588
6 mo.	14,379,207	16,348,774	12,401,715	12,100,817	19,400,453
July	2,410,889	2,560,646	1,957,645	2,563,420	.....
Aug.	2,512,431	2,545,763	1,995,261	2,779,647	.....
Sept.	2,463,[illegible]39	2,505,927	1,882,577	2,852,561	.....
Oct.	2,689,933	2,546,261	1,778,186	3,125,491	.....
Nov.	2,630,[illegible]54	2,233,123	1,518,316	3,037,308	.....
Dec.	2,782,737	1,983,607	1,515,752	3,203,322	.....
Total, yr.	29,383,490	30,724,101	23,049,752	29,662,566	.....

DIAGRAM OF PIG-IRON PRODUCTION AND PRICES

The figures for daily average production, beginning January, 1909, are as follows:

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1909—Gross Tons

	1909	1910	1911	1912	1913	1914	1915	1916
Jan.	57,975	84,148	56,752	66,384	90,172	60,808	51,659	102,746
Feb.	60,[illegible]76	8[illegible],616	64,090	72,442	92,369	67,452	59,813	108,456
Mar.	54,[illegible]34	84,[illegible]49	70,036	77,591	89,147	75,753	66,575	107,667
Apr.	57,962	82,792	68,836	79,181	91,759	75,665	70,550	107,592
May	60,[illegible]77	7[illegible],[illegible]02	61,079	81,071	91,039	67,596	73,015	108,422
June	64,656	75,516	59,585	81,358	87,619	63,916	79,361	107,053
July	67,[illegible]93	69,[illegible]05	57,841	77,738	82,601	63,150	82,691	.....
Aug.	72,[illegible]46	67,963	62,170	81,046	82,057	64,363	89,666	.....
Sept.	77,[illegible]07	68,[illegible]76	66,[illegible]08	82,128	83,531	62,773	95,085	.....
Oct.	85,[illegible]56	67,520	67,811	86,722	82,133	57,361	100,822	.....
Nov.	84,917	63,[illegible]59	66,[illegible]48	87,697	74,453	50,611	101,244	.....
Dec.	85,[illegible]0	2,[illegible]37,[illegible]49	65,912	89,766	63,987	48,896	103,333	.....

The fluctuations in pig-iron production from January, 1908, to the present time are shown in the accompanying chart. The figures represented by the heavy

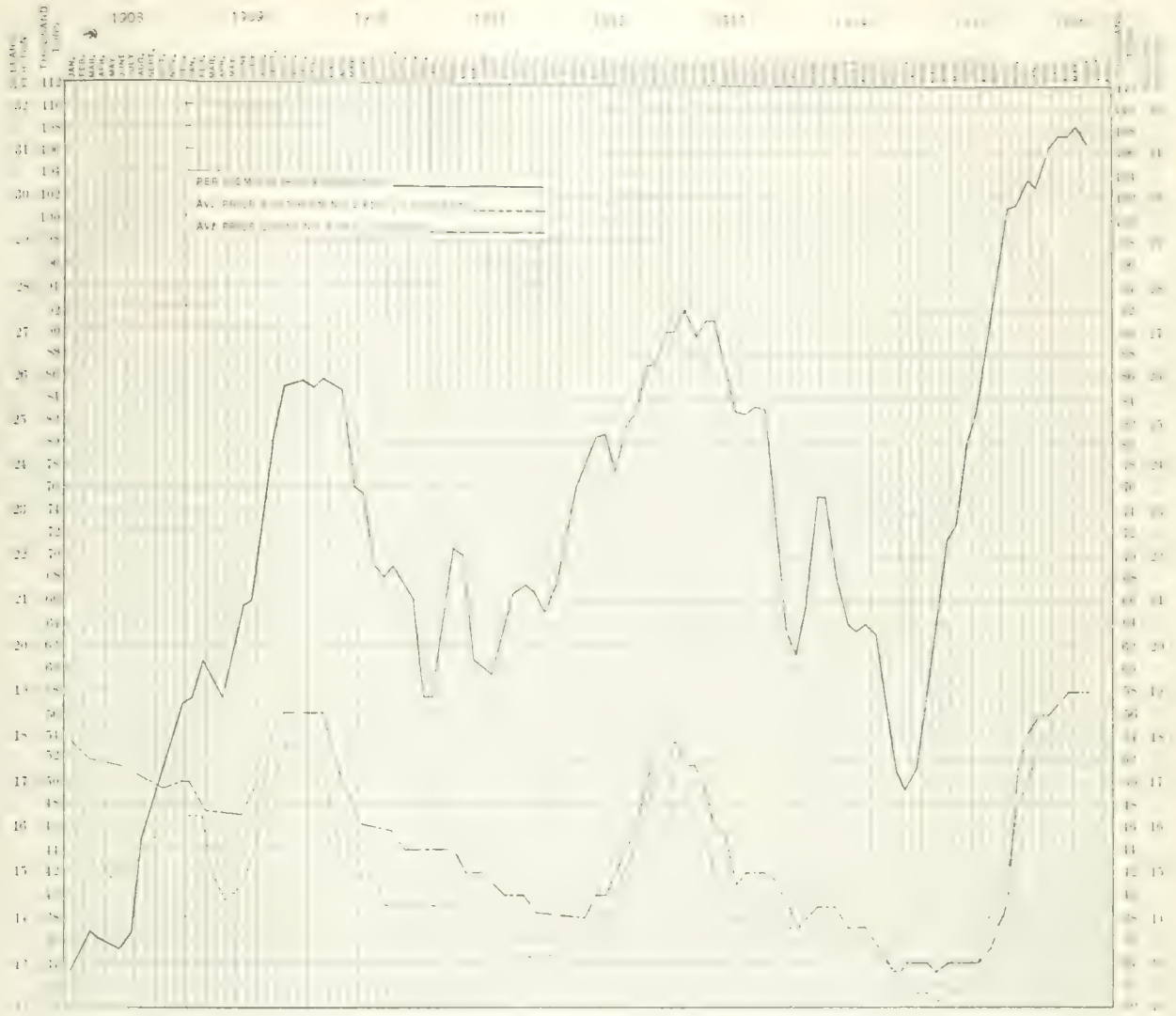


Diagram of Daily Average Production by Months of Coke and Anthracite Pig Iron in the United States from Jan. 1, 1908, to June 1, 1916; Also of Monthly Average Prices of Southern No. 2 Foundry Iron at Cincinnati and Local No. 2 Foundry Iron at Furnace at Chicago.

lines are those of daily average production, by months, of coke and anthracite iron. The two other curves on the chart represent monthly average prices of Southern No. 2 foundry pig iron at Cincinnati and of local No. 2 foundry iron at furnace at Chicago. They are based on the weekly market quotations of THE IRON AGE.

Blast Furnace Notes

The record for daily production at the Bethlehem Steel Company's blast furnace department was broken June 28, when 2961 tons of iron was produced in 24 hr. The highest previous record, made on April 19, was 2931 tons.

Furnace D of the Iroquois Iron Company group at South Chicago, Ill., was blown in June 30 after being equipped with a new McKee top.

Grumwold furnace of the Reading Iron Company at Emaus, Pa., will be blown in this week.

The furnace of the Donner Steel Company at Buffalo, N. Y., was out of blast from June 8 to June 26.

The blast furnace of the Struthers Furnace Company, Struthers, Ohio, which has been undergoing relining and extensive repairs, will be put in blast early this month, and will make Bessemer iron.

The Napier Iron Company blew out its furnace at Napier, Tenn., for relining on July 1.

The Spencer Wire Company, Worcester, Mass., has given its employees a bonus of 6 per cent of their wages for the year, amounting to about $30,000.

New Installations of Rennerfelt Furnaces

Six more Rennerfelt electric steel furnaces have been sold by Hamilton & Hansell, 17 Battery Place, New York, as follows:

One ¾-ton furnace, 225 kw., to the Samson Iron Works, Stockton, Cal., for making steel.

One ½-ton furnace, 100 kw., to the Titanium Alloy Mfg. Company, Niagara Falls, N. Y., for making bronze.

One ½-ton furnace, 100 kw., to the Gerline Brass Foundry Company, Kalamazoo, Mich., for making bronze.

One ⅔-ton furnace, 150-kw., to the Tungsten Products [illegible]

Two furnaces of 3 and 6 tons capacity have been sold to [illegible] of ferrotungsten, the name being withheld for the present.

The sale of two electric furnaces to make bronze and three to make ferrotungsten is significant of the expansion in their use. These six furnaces make 14 Rennerfelt furnaces in operation or contracted for in the United States. Besides these, three have been sold in Europe, making 64 of this type in the world.

The Engineering Societies Building is also to accommodate the American Society of Civil Engineers. A mail ballot of that society announced at its meeting last week in Pittsburgh, showed a vote of 6 to 1, of 2963 ballots counted, in favor of joining the mechanical, mining and electrical engineering societies in the conduct of building and thus in moving its headquarters there. A large number indicated favoring a plan of spending $250,000 to add two and one-half stories to the existing structure.

Iron and Steel Markets

HEAVY SPECIFICATIONS

Steel Corporation's Total 6,000,000 Tons

Pig-Iron Production Falls Off—Will Lake Ore Shipments Meet the Demand?

The unusual extent to which business now on the books of the steel companies is in the form of definite specifications is shown in the statement this week that the Steel Corporation, which for some time has had roundly 10,000,000 tons of unfilled orders, now has specifications for 6,000,000 tons. With this condition general in the trade there is no strong expectation of any material change in prices this year.

The figures for Steel Corporation orders as of June 30, to be published Monday, will show little change in the month and there may be a slight decrease.

With strictly domestic business lessening, as has been the case for some weeks, such a showing is confirmation of the very considerable new contracts for war steel reported in the latter part of June. One of these, taken by the Steel Corporation, is for 1,000,000 forgings for large shells. Late shell machining contracts are further confirmation, two just closed in Ohio representing 75,000 tons of steel.

Of the Russian rail inquiries, which were for 350,000 tons, independent rail makers have taken relatively little thus far. They are believed to be quite well sold on rails through the first quarter of 1917. The Steel Corporation has booked nearly 200,000 tons for Russia, deliveries running to July of next year.

Locomotive works are putting increasing pressure upon the plate mills and the oversold condition of some of the latter is indicated by their efforts to place round tonnages with other mills. Nearly 13,000 tons of plates have just been placed for five new Lake boats.

In other finished steel lines the features are further weakness in black sheets, in spite of higher wages and the high level of sheet bars; a decline of $2 in galvanized sheets; some increase in demand for wire products, though the price advance expected in some quarters for July 1 did not come; rather more activity in bars, with sales of 35,000 tons, all for industrial and not war uses, reported at Chicago.

The ability of Lake Superior iron ore shippers to get down enough ore this year continues to figure in pig-iron and steel calculations throughout the market. June shipments were 9,507,000 tons or far beyond any previous record. To July 1 the season total was 19,615,000 tons. If July, August, September and October average 9,000,000 tons and November falls to 6,000,000 tons, the season total would be 61,615,000 tons. To maintain the present rate of pig-iron production a year would mean 64 to 65 millions of Lake ores and some leaders in the trade look for an ore shortage of several million tons.

Thus far the Mesaba miners' strike has not affected shipments, but if prolonged it can prove a serious factor and its developments are watched with no little concern.

Pig-iron production fell off about 1400 tons a day in June. The total was 3,211,588 tons, or 107,053 tons a day, against 3,361,073 tons in May, or 108,422 tons a day. Furnaces have been pushed so long that nearly all districts last month showed poor working. Thus the capacity rating came down from 108,422 tons a day for 321 furnaces active June 1 to 107,053 tons a day for 323 furnaces on July 1, the month showing a net gain of two in the active list.

The buying of steel-making pig iron for export goes on, and probably 25,000 tons was closed in the past week, largely for Italy. Bessemer iron is stiffening under this demand and $21.50 at Valley furnace was done on one order. A 20,000-ton sale of basic in southern Ohio was made at close to an $18 Valley furnace basis. Low scrap prices have brought a larger use of old material in open-hearth furnaces, which tends to hold basic pig iron to the present level.

The Carnegie Steel Company and Illinois Steel Company have been heavy buyers of scrap in the past week, the former taking from 75,000 to 100,000 tons at $16 and higher, while in the Chicago district dealers showed a great eagerness for a share of the business at figures below $14.50.

Pittsburgh

PITTSBURGH, PA., July 3, 1916.

The steel trade enters the second half of the year under most auspicious conditions. While it is true that buyers are placing orders at present only for such material as they must have, yet conditions with the mills are excellent, they having orders on their books for four or five months' run. Consumers, as a rule, are specifying freely against contracts; in a few cases there have been some cancellations, and in a few others consumers are not specifying for the full amount. These exceptional cases are not worrying the mills to any extent. Prices on everything are firm but do not show any signs of being higher. July 1 was the date on which the trade expected an advance in wire and wire nails, and possibly also on pipe, but nothing was done. Any falling off in domestic demand has been more than offset by an enormously heavy export demand which embraces Bessemer pig iron, open-hearth and Bessemer billets, tin plate and other finished products. This export demand is helping largely to sustain prices, which might otherwise have gone off because of the decline in domestic business. There has been some movement in Bessemer and basic iron and in Bessemer and open-hearth semi-finished steel, mostly for export on the latter, and the heavy buying of steel scrap by a local consumer has put the market in better shape. Many buyers have yet to place orders for material, and, while July and August will likely be quiet on account of the vacation period, a buying movement is looked for early in September for the last quarter of this year and the first quarter of 1917. Many consumers who have material due them in

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

	July 5, 1916.			
Pig Iron, Per Gross Ton				
No. 2 X, Philadelphia	$19.00	[illegible]	[illegible]	$16.00
No. 2, Valley furnace	18.00	18.00	15.00	13.00
No. 2 Southern, Cincinnati	19.65	19.65	15.65	13.65
No. 2, Birmingham, Ala.	14.00	14.00	11.00	10.00
No. 2, furnace, Chicago*	19.00	19.00	15.00	13.00
Basic, del'd, eastern Pa.	19.00	19.00	15.00	13.00
Basic, Valley furnace	18.00	18.00	15.00	13.00
Bessemer, Pittsburgh	21.26	21.26	17.26	17.00
Malleable Bess., Chicago*	19.00	19.50	16.00	14.00
Gray forge, Pittsburgh	18.75	18.75	15.75	13.75
L. S. charcoal, Chicago	19.50	19.50	16.50	15.00
Billets, etc., Per Gross Ton				
Bess. billets, Pittsburgh	27.00	27.00	21.00	21.00
O.-h. billets, Pittsburgh	27.00	27.00	21.00	21.00
O.-h. sheet bars, Pgh.	27.00	27.00	22.00	21.00
Forging billets, base, Pgh.	60.00	60.00	50.00	45.00
O.-h. billets, Phila.	50.00	50.00	40.00	38.00
Wire rods, Pittsburgh	40.00	40.00	30.00	30.00
Finished Iron and Steel, Per Lb to Large Buyers	Cents	Cents	Cents	Cents
Bess. rails, heavy, at mill	1.471	1.471	1.121	1.121
O.-h. rails, heavy, at mill	1.56	1.56	1.06 1/2	1.11
Iron bars, Philadelphia	2.00	2.00	1.50	1.25
Iron bars, Pittsburgh	1.90	1.90	1.40	1.35
Iron bars, Chicago	1.90	1.90	1.40	1.30
Steel bars, Pittsburgh	2.75	2.75	2.25	1.25
Steel bars, New York	2.919	2.919	2.419	1.419
Tank plates, Pittsburgh	2.75	2.75	2.25	1.30
Tank plates, New York	3.119	3.119	2.619	1.569
Beams, etc., Pittsburgh	2.75	2.75	2.25	1.25
Beams, etc., New York	2.969	2.969	2.469	1.419
Skein, grooved steel, Pgh.	3.35	3.35	2.85	1.45
Skelp, sheared steel, Pgh.	2.45	2.45	1.95	1.30
Steel hoops, Pittsburgh	3.75	3.75	3.25	1.80

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

	July 5, 1916.			
Sheets, Nails and Wire				
Per Lb to Large Buyers	Cents	Cents	Cents	Cents
[illegible]	[illegible]	[illegible]	[illegible]	1.75
Galv. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	1.60
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Old Material, Per Gross Ton				
[illegible]	$18.00	$18.00	$18.50	$17.00
[illegible]	20.00	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	16.50	[illegible]
[illegible]	16.00	[illegible]	[illegible]	11.75
[illegible] rap, Phila.	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	15.75	15.75	[illegible]	[illegible]
No. 1 cast, Philadelphia	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Coke, Connellsville, Per Net Ton at Oven				
Furnace coke, prompt	$2.75	[illegible]	[illegible]	$1.75
Furnace coke, future	[illegible]	[illegible]	[illegible]	1.75
Foundry coke, prompt	[illegible]	[illegible]	[illegible]	2.00
Foundry coke, future	[illegible]	[illegible]	3.50	[illegible]
Metals, For Lots to Large Buyers	Cents	Cents	Cents	Cents
Lake copper, New York	[illegible]	[illegible]	28.25	22.50
Electrolytic copper, N. Y.	[illegible]	[illegible]	[illegible]	[illegible]
Spelter, St. Louis	10.75	11.10	[illegible]	21.50
Spelter, New York	[illegible]	[illegible]	[illegible]	[illegible]
Lead, St. Louis	[illegible]	[illegible]	[illegible]	6.25
Lead, New York	6.85	[illegible]	[illegible]	[illegible]
Tin, New York	[illegible]	[illegible]	[illegible]	[illegible]
Antimony, Asiatic, N. Y.	[illegible]	[illegible]	[illegible]	[illegible]
Tin plate, 100 lb. box, Pgh.	$6.00	$6.00	[illegible]	$3.10

third quarter will not get deliveries before the last quarter of this year and on part of it possibly not before the first quarter of next year. The holiday this week, causing loss of operations in the coke regions, has put up the price of prompt coke. More coke contracts have been placed for last half of the year at prices ranging from $2.35 to $2.65 at oven, depending on the quality.

Pig Iron.—There is a very active export demand for Bessemer iron, and we note one lot of 1000 tons and another of 10,000 tons closed for export to Italy, the latter iron being for delivery in the third quarter of this year, all at $21, Valley furnace; also a sale of 2000 tons at $21.50, Valley furnace, which was paid for spot shipment, a boat waiting at New York. The Portsmouth Steel Company, Portsmouth, Ohio, has bought 20,000 tons of basic for delivery in the last quarter from Columbus and Ironton furnaces at prices equal to about $18, or slightly higher, at Valley furnace. We note a sale of 500 tons and one of 300 tons of Bessemer to domestic consumers at $21, Valley furnace. The Colonial Steel Company has not yet closed on its inquiry for 10,000 tons of basic for the last half of the year, and the United Steel Company, Canton, Ohio, is in the market for 10,000 tons of basic for last half. The situation in basic is tightening; offers of $18 have been refused in several cases. A sale of 500 tons of basic for Eastern delivery is reported at $18.50, Valley furnace, and several other lots amounting to close to 10,000 tons, also for Eastern delivery, are in the market. We quote Bessemer iron at $21; basic, $18 to $18.50; gray forge, $17.75 to $18; malleable Bessemer, $18.50 to $19, and No. 2 foundry, $18.25 to $18.50, all at Valley furnace, the freight rate to the Pittsburgh and Cleveland districts being 95c. per gross ton.

Ferroalloys.—There is practically no new inquiry for ferromanganese for prompt or future shipment, and prices are softer. Domestic 80 per cent for prompt delivery is quoted at $200 to $225, and for the last half of the year $175 to $200 at maker's furnace. It is not believed there will be any trouble in buying 80 per cent domestic ferromanganese at $175 for delivery over the last half of this year. This is also the price asked for English 80 per cent at seaboard, but without any guarantee as to delivery. Prices on spiegeleisen are also easier. We quote 18 to 22 per cent spiegeleisen at $45 to $50, and 25 to 55 per cent at $50 to $55 at furnace. One maker is still offering ferrosilicon at about $2 per ton less than the other two makers are quoting. We quote 50 per cent ferrosilicon at $85 for lots up to 100 tons; over 100 tons and up to 600 tons, $84, and over 600 tons, $83, all per gross ton, f.o.b. Pittsburgh. Prices of Bessemer ferrosilicon for delivery over remainder of the year are now quoted as follows: 9 per cent, $32; 10 per cent, $33; 11 per cent, $34; 12 per cent, $35; 13 per cent, $36.50; 14 per cent, $38.50; 15 per cent, $40.50, and 16 per cent, $43. Seven per cent silvery for the same delivery is $28.50; 8 per cent, $29; 9 per cent, $29.50; 10 per cent, $30; 11 per cent, $31, and 12 per cent, $32. All these prices are f.o.b. at furnace, Jackson or New Straitsville, Ohio, or Ashland, Ky., each of these points having a freight rate of $2 per gross ton to Pittsburgh.

Billets and Sheet Bars.—We can report a very heavy export demand for Bessemer and open-hearth billets, with negotiations under way involving 40,000 to 50,000 tons. This demand has taken up any slack that existed either in prices or in demand, and both Bessemer and open-hearth steel are stronger than they were early in June. Offers of $40 per ton for Bessemer or open-hearth billets by domestic consumers have been refused, and sellers who are handling export inquiries say the lowest prices that are being quoted are $42 to $45, several mills holding for the higher price. A sale of 1200 tons of open-hearth sheet bars for July and August shipment is reported at about $42 at maker's mill, and possibly 15 000 to 20,000 tons of Bessemer and open-hearth billets will be closed within a short time for export. We quote soft open-hearth billets and sheet bars at $42 to $45; Bessemer billets, $40 to $42; and Bessemer sheet bars, $40 to $42, maker's mill, Pittsburgh or Youngstown district. We quote forging billets at $60 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take $1 extra.

Plates.—About 10,000 tons of plates and shapes will be needed for the three bulk freighters ordered recently

by M. A. Hanna & Co., Cleveland, Ohio, all of which will be furnished by the Carnegie Steel Company. The Baltimore & Ohio Railroad has withdrawn its inquiry for 1000 steel underframes, and at present there are no large inquiries for cars in the market. There is an insistent demand for plates for fairly prompt shipment, on which mills are able to get 3.25c. to 3.50c., and in some cases up to 4c. at mill. The mill price on ¼-in. and heavier steel plates is 2.75c. for delivery in the last quarter of this year and first quarter of 1917. For shipment in four to six weeks, prices range from 3c. to 4c., at mill, depending entirely on the amount of material involved and deliveries wanted by the customer. So far as we know, only one mill is quoting 3c., all others asking 3.25c. to 4c.

Structural Material.—New inquiry is quiet. Bids have gone in on 1000 tons of shapes for an extension to Mercy Hospital in this city, but the contract has not been closed. Local fabricators are well filled up for the remainder of this year, and several are not actively bidding on the new work. We quote beams and channels up to 15 in. at 2.50c. to 2.75c. at mill for delivery in third and fourth quarters, while small lots from stock are held at 3.25c. up to 4c., prices depending entirely on the size of the order and how soon deliveries are wanted.

Steel Rails.—The Havana Central Railroad of Cuba has placed 800 tons of standard sections with the Steel Corporation, and it is assumed these will be rolled at the local mill. New orders for standard section rails are small. Inquiry for light rails is only fair, coming mostly from the coal-mining interests, the traction companies doing very little. It is said a good part of the new business in light rails is going to the rerolling mills, whch are naming lower prices than the mills making new light rails. We quote 25 to 45-lb. sections at $47; 16 and 20-lb., $48; 12 and 14-lb., $49, and 8 and 10-lb., $50 in carload lots, f.o.b. at mill, the usual extras being charged for less than carload lots. We quote standard section rails of Bessemer stock at 1.47½c. and of open-hearth, 1.56½c., Pittsburgh.

Sheets.—There is a further decline in prices of galvanized sheets, due to the lower spelter market, some mills naming as low as 4.50c. at mill for No. 28. One leading mill that has a number of contracts for galvanized sheets on its books at 5c. at mill, and which have no cancellation clause, is insisting that the buyers take out these sheets, and is making shipments as called for in the contracts. New demand for light black sheets is quiet, but prices are fairly strong. On blue annealed and electrical sheets most mills are sold up for the remainder of this year. The sheet mills report they are getting very prompt deliveries on Bessemer sheet bars, but there is still a scarcity in the supply of open-hearth bars. We quote blue annealed sheets, Nos. 9 and 10, at 3c. to 3.25c., for delivery at convenience of the mill, which would be late this year. We quote No. 28 Bessemer and open-hearth black sheets at 2.90c. to 3c.; No. 28 galvanized, Bessemer and open-hearth, 4.50c. to 4.60c.; Nos. 22 and 24 black plate, tin mill sizes, H. R. & A., 2.90c.; Nos. 25, 26 and 27, 3c. to 3.10c.; No. 28, 3.10c. to 3.15c., and No. 29, 3.20c. to 3.25c. These prices are for carloads and larger lots, f.o.b. mill, Pittsburgh.

Tin Plate.—There is some domestic inquiry for tin plate for last quarter delivery, but two or three of the leading mills say they cannot quote, as their entire supply is sold up for all of this year. Export demand is active, and there is no trouble getting $6.25 to $6.50 per base box by mills that are in position to make the deliveries wanted. A sale of 5000 boxes for China was made recently at $6.20 per base box at mill. We quote wasters from stock at $5.75 and primes at $6 for the domestic trade, while for export $6.25 to $6.50 per base box at mill is quoted. We quote 8-lb. coated ternes at $8.50 to $8.75 for 200 lb., and $8.75 to $9 for 214 lb., all f.o.b. at maker's mill.

Skelp.—New inquiry is quieter, but the two or three local mills that roll skelp say they are pretty well filled up for the remainder of this year. Prices are firm. We quote grooved steel skelp at 2.35c. to 2.40c.; sheared steel skelp, 2.45c. to 2.50c.; grooved iron skelp, 2.70c. to 2.80c., and sheared iron skelp, 3c. to 3.10c., all delivered to consumers' mills in the Pittsburgh district.

Cold-Rolled Strip Steel.—Nearly all consumers have covered their needs for the remainder of this year, and the demand on contracts is quiet. One contract was placed last week for 500 tons for last half delivery at 6c. per lb. base, f.o.b. Pittsburgh. Small lots for shipment in the next two or three months bring $6.50 to $7 per 100 lb. On contracts we quote cold-rolled strip steel at $6 per 100 lb., base, and on small lots for fairly prompt delivery, from $6.50 to $7. Extras, standard with all the mills, were printed in full on page 810 of THE IRON AGE of March 30.

Railroad Spikes.—The local market is very quiet, and there are no active inquiries, the railroads being covered for the remainder of this year. Regular prices, which are only fairly strong, and which have been shaded in one or two cases lately, are as follows:

Standard railroad spikes, 4½ x 9/16 in. and larger, $2.65 to $2.75; railroad spikes, ½ and 7/16 in., $2.75 base; railroad spikes, ⅜ in. and 5/16 in., $3.05 base; boat spikes, $2.80 base, all per 100 lb., f.o.b. Pittsburgh.

Nuts and Bolts.—The new domestic demand is quiet, as consumers are covered over the remainder of the year. Specifications are coming in quite freely, but in a few cases some consumers are not specifying for the full amount called for in contracts. Export inquiry is quiet, but nut and bolt makers report they have their output pretty well sold up over the next three or four months. Discounts in effect from May 19, which the makers state are for prompt acceptance only, are as follows, delivered in lots of 300 lb. or more where the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days:

Carriage bolts, small, rolled thread, 50 and 10 per cent; small, cut thread, 50; large, 40.

Machine bolts, h. p. nuts, small, rolled thread, 50, 10 and 5 per cent; small, cut thread, 50 and 5; large, 40 and 10.

Machine bolts, c. p. c. and t. nuts, small, 40, 10 and 5 per cent; large, 35 and 5. Blank bolts, 40 and 10 per cent; bolt ends with h. p. nuts, 40 and 10, with c. p. nuts, 35 and 5. Rough stud bolts 15. Lag screws (cone or gimlet point), 50 and 10

Forged set screws and tap bolts, 10 per cent. Cut and round point set screws, case hardened, 60. Square and hexagon head cap screws, 55. Flat, button, round or fillister head cap screws, 30.

Nuts, h. p. sq., tapped or blank, $2.90 off list; hex, $2.90 off; c. p. c. and t. sq. tapped or blank, $2.60 off; hex., $3 off; semi-finished hex., 60 and 10 per cent; finished and case hardened, 60 and 10.

Rivets, 7/16 in. in diameter and smaller, 45, 10 and 10 per cent.

Wire Rods.—New demand is quiet, as consumers are covered over the remainder of the year and, in fact, there are very few surplus rods being offered in the open market. We quote soft Bessemer, open-hearth and chain rods at $50 to $55 per ton, f.o.b. Pittsburgh.

Wire Products.—The expected advance in prices on wire and wire nails about July 1 was not made. The new demand is only fair, as the wire trade is now in the dull season. Mills report specifications against contracts of domestic consumers as fairly active, while the export demand for barb wire is still very heavy. The regular price of wire nails is $2.50 base per keg, but in some cases $2.60 is being obtained for delivery later in third quarter and fourth quarter of this year. Regular prices are as follows: Wire nails, $2.50 to $2.60 per keg; galvanized, 1 in. and longer, taking an advance over this price of $2, and shorter than 1 in., $2.50. Plain annealed wire, $2.45 per 100 lb.; galvanized wire, $3.15; galvanized barb wire and fence staples, $3.35; painted barb wire, $2.65; polished fence staples, $2.65; cement coated nails, $2.50, base, all f.o.b. Pittsburgh, with freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing are now 61½ per cent off list for carload lots, 60½ per cent for 1000-rod lots and 59½ per cent for small lots, f.o.b. Pittsburgh.

Iron and Steel Bars.—It is stated that quite a few large contracts for steel bars for delivery in first half of next year have been closed by leading implement makers on the basis of 2.50c. at mill. In fact, two of the largest makers of steel bars say that in no case will they shade this price, as they will put the steel into

other forms of products if they are not able to sell their full output of steel bars. Specifications against contracts are active and no cancellations are reported. In a few cases consumers are not taking out the full amount of steel bars called for in their contracts. The new demand for iron bars is only fair and prices are none too firm. We quote steel bars at 2.50c. by local mills for delivery probably not before last quarter, and also 2.50c. from one mill which is promising deliveries in four to six weeks. Small lots from warehouse are quoted at 3c. and higher, depending on quantity. We quote refined iron bars at 2.50c. to 2.60c., and railroad test bars at 2.70c. to 2.80c. at mill.

Rivets.—Makers report the new demand as quieted down, due largely to the fact that consumers are covered over the remainder of the year. Specifications are active and there is a fair amount of export inquiry. Makers' prices, which are sometimes shaded by jobbers, are as follows: Buttonhead structural rivets, ½ in. in diameter and larger, at $4 per 100 lb., base, and conehead boiler rivets, same sizes, $4.10 per 100 lb., base, f.o.b. Pittsburgh. Terms are 30 days net, or one-half of 1 per cent for cash in 10 days.

Shafting.—Most of the buying of shafting in large quantities for this year has been done, nearly all consumers being covered on their needs for last half at about 20 per cent off, but on a few contracts 15 per cent was done. Makers say they have their output well sold up for the remainder of the year. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots for delivery in last quarter of this year and first quarter of 1917, and 10 per cent off in less than carload lots, f.o.b. Pittsburgh, freight added to point of delivery.

Cotton Ties.—It is said that most of the business in cotton ties for this year will be done during July, as nearly all consumers will cover this month for their entire needs. We quote cotton ties at $1.35 per bundle of 45 lb., f.o.b. Pittsburgh for July shipment. It is stated that the Sharon Steel Hoop Company, Sharon, Pa., will not make any cotton ties this year.

Hoops and Bands.—Consumers are well covered over the remainder of the year and new demand is quiet. We quote steel hoops at 2.75c. and steel bands at 2.50c., with extras on the latter as per the steel-bar card.

Merchant Steel.—Shipments by the mills are heavy against contracts, but new demand is dull, as nearly all consumers are covered over the remainder of the year. Prices on small lots are about as follows: Iron-finished tire, ½ x 1½ in. and larger, 2.35c., base; under ½ x 1½ in., 2.50c.; planished tire, 2.55c.; channel tire, ¾ to ⅞ and 1 in., 2.85c. to 2.95c.; 1⅛ in. and larger, 3.25c.; toe calk, 2.95c. to 3.05c., base; flat sleigh shoe, 2.70c.; concave and convex, 2.75c.; cutter shoe, tapered or bent, 3.25c. to 3.35c.; spring steel, 2.95c. to 3.05c.; machinery steel, smooth finish, 2.75c.

Wrought Pipe.—Reports are that a Youngstown mill has taken a contract for 140 miles of 6 and 8 in. line pipe for an Oklahoma oil interest, and that another larger contract from the same buyer will shortly be placed. The general demand for merchant pipe is fair but for oil country goods is very heavy. On lap-weld pipe, mills are well sold up for the remainder of the year, but on butt-weld sizes they can make delivery in two to three weeks. The demand for galvanized pipe is light, but all the mills are running full, and turning out more pipe and making the heaviest shipments ever made in their history. Discounts on iron and steel pipe, printed on another page, are firmly held.

Boiler Tubes.—On merchant and boiler tubes mills are well sold up for the remainder of the year, and on seamless tubing into the first half of next year. Some large contracts for boiler tubes for locomotives placed by Russia in this country have been given to local makers. Discounts on iron and steel boiler tubes, printed on another page, are very firm.

Coke.—A holiday this week and the consequent falling off in output will make a shortage in supply, and, as a result, there is quite a flurry in prompt furnace coke, consumers offering up to $2.75 per net ton at oven. There have been some contracts closed for blast-furnace coke for shipment over the last half of the year. A Shenango Valley furnace interest has bought 10,000 tons of high-grade coke for July and August at $2.50 per net ton at oven. Two Eastern furnace interests have closed for their needs, one taking about 8000 tons and another about 10,000 for the last half of the year at about $2.35 at oven, this coke usually selling at slightly less than the regular market. A Shenango Valley furnace interest closed last week for high-grade coke, 10,000 tons, for delivery over the last half at $2.65 at oven. A consumer in the Wheeling district has closed for a large quantity of furnace coke for July and August shipment at about $2.50 at oven. Prices on furnace coke on contracts for over the last half of the year range from $2.35, the lowest, up to $2.65, which has been paid in three different cases for high-grade coke. We quote prompt furnace coke at $2.75 at oven. We quote 72-hr. foundry coke at $2.75 to $3 for prompt and $3 to $3.25 on contracts for the last half of the year. The Connellsville *Courier* gives the output of coke in the upper and lower Connellsville regions for the week ended June 24 as 417,540 net tons, a decrease over the previous week of 10,733 tons.

Old Material.—There has been quite an improvement in the local scrap market, due to the heavy buying of the leading interest, which has been out of the market for two months or more. This largest consumer is reported to have taken from 75,000 to 100,000 tons of heavy steel scrap at prices ranging from $16, the lowest, up to probably $16.50 per gross ton. There has also been buying of scrap by consumers in Massillon and Canton, Ohio, and by the leading consumer at Sharon, Pa. A heavy demand has developed for old carwheels, and prices are strong. They are being bought by open-hearth steel plants, broken up, and used as heavy steel scrap and to replace basic iron, a shortage in which is feared as a result of the strike in the ore regions. Dealers are now quoting for delivery in the Pittsburgh and nearby districts that take the same rates of freight, per gross ton, as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	$16.00 to $16.50
No. 1 foundry cast	15.75 to 16.00
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	16.50 to 16.75
Hydraulic compressed sheet scrap	14.50 to 14.75
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	12.00 to 12.75
Bundled sheet stamping scrap	11.50 to 11.75
No. 1 railroad malleable stock	14.00 to 14.25
Railroad grate bars	11.00 to 11.25
Low phosphorus melting stock	19.00 to 19.50
Iron car axles	25.50 to 26.00
Steel car axles	26.00 to 26.50
Locomotive axles, steel	28.00 to 28.50
No. 1 busheling scrap	13.25 to 13.50
Machine shop turnings	8.25
Old carwheels	14.00 to 14.50
Cast iron borings	8.25
*Sheet bar crop ends	16.00 to 16.50
No. 1 railroad wrought scrap	18.75 to 19.00
Heavy steel axle turnings	12.00 to 12.25
Heavy breakable cast scrap	13.50 to 13.75

*Shipping point.

Philadelphia

PHILADELPHIA, PA., July 3, 1916.

The Independence Day holiday was so extensively observed that there was little opportunity for developments of moment. Some executive and sales offices attempted no business between noon Saturday and the morning of July 5, while others were open only long enough on Monday morning to dispose of urgent mail In many cases the extra holiday was welcomed as affording some relief from the strain of recent months. In general, comment on conditions made a week ago can be reiterated. The foreign demand for certain grades of pig iron continues to grow, while the domestic market remains quiet, with prices weak and concessions possible to find. The export demand for steel plates is heavy also, while the domestic demand is unabated. Bessemer bars are available at 2.659c., Philadelphia, and Bessemer shapes at 2.909c. Old material has a better tone in sympathy with Pittsburgh, but actual betterment in prices has not arrived.

Pig Iron.—The only domestic inquiry of notable size

before the trade is one for 4500 tons of basic required by a Lebanon interest. The volume of foreign inquiries for low phosphorus and special and standard Bessemer continues to grow, although it appears greater than it really is because of duplication. At the same time the amount of iron required for export, especially to Italy, is very large. For standard low phosphorus export prices range from $34 to $35, seaboard. Though June was accounted a quiet month, so far as domestic business was concerned, some sellers are surprised at the excellent aggregate which was done. Prompt deliveries, with some through the second half, were called for chiefly. The past week has been quiet. Several of the larger producers continue to quote $20, furnace, as their minimum for eastern Pennsylvania, No. 2 X, but the fact remains that considerably below this figure can be done without difficulty. There are some furnaces which seem to want business, and the resale or speculative iron which has been on the market for some time is not entirely absorbed, although it is believed to be nearing its end. In this connection there is a phase of the situation which has not been generally considered in regard to consumption, and this is the fact that melters have not only been taking a large part of current production, but also have been using up the iron which was bought by speculators or investors months ago when prices were at the bottom, all of which speaks well for consumption. The attitude of some important interests with regard to prices is that the producers should not endeavor to meet the quotation made by these outside interests, inasmuch as if they do the resellers will only cut deeper, and presumably get the business anyway. It is argued that with the producers in the comfortable position in which they find themselves to-day they should stand firmly for the prices which eventually must be met, unless consumption collapses, an exigency of which there is no indication at this time. Meanwhile, No. 2 X can be obtained at $19.75, delivered, and it is more than probable that this price could be shaded. The situation is somewhat irregular, for the reason that while some consumers appear to have underestimated their requirements, others have been oversupplied because of the shortage of labor, the latter being the case with a stove foundry whose molders are twelve under the normal quota. In no grade is there any change in quotations to report. Quotations for standard brands, delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa., No. 2 X foundry	$19.75 to $20.25
Eastern Pa., No. 2 plain	19.75 to 20.00
Virginia, No. 2 X foundry	21.25
Virginia, No. 2 plain	20.75
Gray forge	18.50 to 19.00
Basic	19.75 to 20.00
Standard low phosphorus	33.00 to 34.00

Iron Ore.—The only arrival of foreign ore in the week ended July 1 consisted of 7700 tons from Cuba.

Ferroalloys.—Domestic 80 per cent ferromanganese is weaker, a fact indicated by prices accepted for comparativelc small lots. Whereas $225, seaboard, has been quoted for prompt by domestic makers, a bid of 9½c. per pound., delivered at Colon, was made on 5 tons required by the Government at the Panama Canal and, inasmuch as a freight rate of about $6 per ton is involved, it means that a price of about $206.80 was acceptable in this case. For 7 tons to be delivered at Washington, 9½c. per pound was named also. On an inquiry for 10 tons, delivery at Buffalo, 10c. per pound, or $224, less freight, was quoted. All these involved prompt deliveries. For the last quarter of this year and first quarter of next, $175, seaboard, can be done. For spiegelsisen $58 to $60 is quoted. Contract ferrosilicon, 50 per cent, is unchanged at $83 to $85, Pittsburgh, according to quantity, and 11 per cent at $35.44.

Plates.—Many thousands of tons of plates for export are under inquiry, and the demand from domestic sources shows no abatement. One mill turned down an order for 6000 tons for first quarter delivery, although the price was admittedly satisfactory, for the reason that it cannot handle an order of such size this side of next April. This mill continues to quote 4c., Pittsburgh, as its minimum, equal to 4.159c., Philadelphia. The Pusey & Jones Company, Wilmington, Del., which recently passed into the hands of Norwegian interests, is reported to have additional orders for twelve ships, six to be 225 ft. in length and six to be 300 ft. It had eight vessels under construction. Quotations are uniformly 4.159c., Philadelphia, except with one maker whose sizes are limited. He quotes 3.909c., Philadelphia.

Bars.—Bessemer bars are obtainable at 2.659c., Philadelphia, but open-hearth bars range about 1c. higher. Contracts for the last half have been made at the 2.659c. level. Contracts for open-hearth bars were booked at the same figure, but deliveries in these cases are understood to be indefinite.

Structural Material.—No improvement in new business is reported, but specifications keep the mills fully employed. The quarter just entered will bring the specifying of much material which will cost 2.659c., Philadelphia, and upward. How far the higher cost of materials will curtail specifications remains to be seen. Bessemer shapes can be had at 2.909c., Philadelphia, but eastern Pennsylvania makers adhere to 3.159c. for their open-hearth material.

Billets.—Steel is no easier to obtain than it was several months ago, and there is much hunting around by consumers. A Lebanon consumer is inquiring for 1500 tons of small billets, and round lots are wanted for export also. The quotation for open-hearth rerolling steel is unchanged at $50, and that for forging steel at $65.

Sheets.—On attractive contracts, 3.159c., Philadelphia, or close thereto, is acceptable for No. 10 blue annealed sheets. For prompt deliveries up to 3.909c., Philadelphia, is asked.

Coke.—The quantity of furnace coke stated to have been taken by an eastern Pennsylvania furnace a week ago was about 60,000 tons, instead of 17,000 to 20,000 tons. Some furnace coke has been sold for export at about the ruling domestic prices. Prompt furnace ranges from $2.40 to $2.60 per net ton at oven, and contract at $2.25 to $2.35. Prompt foundry is quoted at $3.25 to $3.50, and contract at $3.35 to $3.50 per net ton at oven. Freight rates from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Old Material.—There is a better feeling in the market, based on the higher prices which have been paid for material in the Pittsburgh district, and within a few days higher prices are looked for here. As yet, however, there has not been a sufficient increase in business to justify any advance in local quotations. There is a good demand for low phosphorus crop ends for export to Italy. They are quoted at $22.50 to $23.25. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania, and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$14.75 to $15.25
Old steel rails, rerolling	17.00 to 18.00
Low phos. heavy melting steel scrap	20.50 to 21.50
Old steel axles	26.00 to 27.00
Old iron axles	28.00 to 29.00
Old iron rails	20.00 to 20.50
Old carwheels	16.00 to 16.50
No. 1 railroad wrought	19.50 to 20.00
Wrought-iron pipe	12.50 to 13.00
No. 1 forge fire	13.00 to 13.50
Bundled sheets	13.00 to 13.50
No. 2 busheling	10.50 to 11.00
Machine shop turnings	8.50 to 9.00
Cast borings	10.00 to 10.50
No. 1 cast	16.00 to 16.50
Grate bars, railroad	11.75 to 12.25
Stove plate	11.75 to 12.25
Railroad malleable	13.50 to 14.00

The war's effect on Argentina's consumption of iron is demonstrated by that country's imports of pig iron and steel for 1915 of only 203,805 metric tons. This is more than 50 per cent less than the imports in 1914—433,924 tons—and only one-third of those in 1913, which were 680,709 tons. Argentina imported only 2708 tons of pig iron and sheet iron last year, against 92,628 tons in 1914 and 186,576 tons in 1913. Steel-rail imports fell from 156,592 tons and 84,936 tons, in 1913 and 1914 respectively to 13,391 tons in 1915.

Cleveland

CLEVELAND, OHIO, July 4, 1916.

Iron Ore.—Lake ore shipments are now finally past the 9,000,000-ton mark. The movement in June amounted to 9,507,576 gross tons, and for the second time this year a new record in shipments was made. In May the movement was 8,449,580 gross tons, passing the previous high record of 8,206,416 tons in July, 1913. The June movement was a gain of nearly 60 per cent over June, 1915, when the Lake shipments amounted to 6,005,091 tons. The total of shipments by water this season up to July 1 was 19,615,567 tons, a gain of 8,094,284 tons over the corresponding period a year ago. We quote prices as follows, delivered lower Lake ports: Old range Bessemer, $4.45; Mesaba Bessemer, $4.20; old range non-Bessemer, $3.70; Mesaba non-Bessemer, $3.55.

Pig Iron.—The market is unusually dull. Labor troubles and the scarcity of labor are affecting foundry production. While these so far have not resulted in holding up shipments to any extent, they doubtless have affected the demand for iron for additional requirements. The only inquiry of any size is from a Lima, Ohio, consumer for 2000 tons of Southern iron for the last half. In the absence of buying, Ohio furnaces generally are adhering to the recent quotation of $18.50, at furnace, for No. 2, and it is not known whether the low price on Southern iron will affect the prices on Northern grades, although some purchasers are not disposed to meet this competition. Southern iron is quoted by furnaces at $14.50, Birmingham, for No. 2 for the last half and $14.50 to $15 for the first half, with resale iron offered at $13.50 to $14. Prices on Ohio silvery iron are being shaded somewhat, but not sufficiently to meet the low prices of Tennessee furnaces. We quote, delivered Cleveland, as follows:

Bessemer	$21.95
Basic	18.35
Northern No. 2 foundry	18.50 to 19.00
Southern No. 2 foundry	18.00 to 18.50
Gray forge	18.50
Jackson Co. silvery, 8 per cent silicon	28.62 to 30.62
Standard low phos., Valley furnace	32.00

Coke.—The market is lifeless. Foundries are practically all under contract and there is little demand for prompt shipment coke. We quote standard Connellsville foundry coke at $3 to $3.25, per net ton at oven, for prompt shipment and $3.25 to $3.50 for contracts.

Finished Iron and Steel.—The demand is more active than in the past two or three weeks. Considerable business, either for early delivery or in third or fourth quarter contracts, is being placed. A large rivet maker has closed for a round tonnage of bars for the first quarter of next year. The American Shipbuilding Company has taken a foreign order for two boats of the Welland Canal size, and the steel for these boats and the three ore boats recently ordered, amounting to 12,800 tons, has been placed with the Carnegie Steel Company. Contracts are being placed for steel bars for the third quarter at 2.50c., Pittsburgh, and for structural material at 2.50c. to 2.75c. for the third quarter or for delivery at convenience of the mills. Bessemer steel bars are quoted at 2.50c., Pittsburgh, for early shipment. Plates are in good demand but very firm at 3.50c. to 4c., Pittsburgh, for early delivery and 2.90c. for delivery at convenience of the mills. One Ohio consumer has just closed for 1000 tons of boiler and tank plates for third quarter delivery at 4c. There is considerable demand for semi-finished steel for third quarter delivery, with a rather wide spread in quotations. We note a sale of 700 tons of open-hearth sheet bars at $40 by a Pittsburgh mill to an Ohio consumer, and a sale of 1000 tons of open-hearth slabs at $43, Youngstown, to a Cleveland mill for early shipment. Forging billets are being sold at $65 at mill. Bar iron is unchanged at 2.50c., Cleveland, and hard steel bars at 2.25c., Western mill. New demand for sheets is only fairly active, and several Ohio mills are in better shape on deliveries than they have been for some time. We quote sheets at 2.90c. to 3c., Ohio mill, for No. 28 black; 3c. to 3.25c. for No. 10 blue annealed, and 4.50c. to 4.65c. for No. 28 galvanized. Local warehouse business showed some falling off during June as compared with May, this being attributed to the fact that jobbers' stocks are badly depleted. Warehouse prices are unchanged at 3.25c. for steel bars and structural material, 3.65c. for plates and 3.20c. for [illegible]

Old Material.—The market is dull and weak. Heavy melting steel has declined $1 per ton in Cleveland. Some [illegible] have sold the steel works to local mills at $14.50, but these mills have withdrawn their offer to $14, and sales to outside mills have been made at the latter price. Old car wheels sold by the Nickel Plate Railroad late in the week [illegible] at $15, or considerably less than recent quotations. Busheling has further declined 50c. per ton, and prices are being cut to a local mill at $11 per net ton. The production of scrap continues in excess of the demand, and the lower prices are not stimulating buying. Youngstown and Sharon mills are holding back on shipments. We quote, f.o.b. Cleveland, as follows:

Gross Ton	
[illegible]	[illegible]
[illegible]	18.00 to 19.00
[illegible]	25.00 to 26.00
[illegible]	14.00 to 14.50
[illegible]	13.00
[illegible] 0 lb. and over	12.50
[illegible]	12.50 to 12.75
Railroad [illegible]	14.00 to 14.50
Steel axle turnings	12.00 to 12.25
Light bundled sheet scrap	12.00 to 12.25

Per Net Ton	
Iron car axles	$24.00 to $24.00
Cast borings	5.75 to 6.00
Iron and steel turnings and drillings	5.75 to 6.00
No. 1 busheling	11.00 to 11.50
No. 1 railroad wrought (nominal)	15.00 to 15.50
No. 1 cast	14.00 to 14.25
Railroad grate bars	9.00 to 9.50
Stove plate	10.00 to 10.25

Bolts, Nuts and Rivets.—There is some improvement in the new demand for bolts and nuts, which has been rather quiet for a few weeks. Prices are firm. Rivet specifications are not so heavy as they have been, but there is considerable contracting for third quarter and last half. Manufacturers' prices are firm, but jobbers are shading prices $1 to $2 per ton for prompt shipment. We quote rivets at 4c., Pittsburgh, for structural and 4.10c. for boiler rivets. Bolt and nut discounts are as follows:

Common carriage bolts, ⅝ x 6 in., smaller or shorter, rolled thread, 50 and 10; cut thread, 50, larger or longer, 40; machine bolts with h. p. nuts, ⅝ x 4 in., smaller and shorter, rolled thread, 50, 10 and 5; cut thread, 50 and 5; larger and longer, 40 and 10; lag bolts, gimlet or cone point, 50 and 10; square h. p. nuts, blank or tapped, $2.90 off the list; hexagon, h. p. nuts, blank or tapped, $2.90 off; c. p. c. and t. square nuts, blank or tapped, $2.60; hexagon nuts, all sizes, $3 off; cold pressed semi-finished hexagon nuts, all sizes, 60 and 10.

Buffalo

BUFFALO, N. Y., July 3, 1916.

Pig Iron.—Sales have been moderate, totaling somewhat less than 4000 tons of all grades. Inquiry has been for small lots only and for last half delivery. Foundrymen find themselves unable to put out the full measure of production they had anticipated, on account of the shortage of labor. This situation has resulted in carrying over iron intended for first-half use. Requirements for the immediate future are accordingly uncertain, pending the adjustment of these labor conditions. There has been no change in the price schedule, which we quote as follows, f.o.b. furnace, Buffalo, for last-half delivery:

[illegible]	$19.00 to $19.50
[illegible]	18.50 to 19.50
[illegible]	18.50 to 19.00
[illegible]	18.00 to 18.50
[illegible]	18.50
[illegible]	18.50 to 19.50
[illegible]	19.50 to 20.50
[illegible]	21.50 to 22.50
Charcoal, regular brands and analysis	21.00 to 22.00

Finished Iron and Steel.—Some checks to shipment are noted, due to mill labor conditions. New business is comparatively light. A considerable amount of concrete reinforcing bars for the Niagara Alkali Company, Niagara Falls, is before the market. In structural lines, bids have been asked for 400 tons for the Bank of Buffalo; for 100 tons for the Buffalo Foundry & Machine Company, and for a fair quantity for the Titanium

Alloy Mfg. Company at Niagara Falls. The Buffalo Structural Steel Company has a contract for 200 tons for the International Acheson Graphite Company, Niagara Falls, and for 700 tons for the new buildings for the Wickwire Steel Company.

Old Material.—The embargo has been removed by one of the largest consumers of scrap material in the Pittsburgh and Valley district, which noticeably helps the situation, particularly as regards heavy melting steel, which is now in good demand. Numerous inquiries have been received within the past few days, and dealers state that it looks as though a buying movement has been started. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	$17.50 to $16.00
Low phosphorus steel	20.00 to 20.50
No. 1 railroad wrought scrap	17.25 to 17.75
No. 1 railroad and machinery cast scrap	15.50 to 16.00
Steel axles	24.00 to 24.50
Iron axles	24.00 to 24.50
Carwheels	13.00 to 13.50
Railroad malleable	15.00 to 15.50
Machine shop turnings	6.25 to 6.75
Heavy axle turnings	12.00
Clean cast borings	7.25 to 7.75
Iron rails	18.00 to 18.50
Locomotive grate bars	11.50 to 12.00
Stove plate (net ton)	11.00 to 11.50
Wrought pipe	12.00 to 12.50
Bundled sheet scrap	11.50 to 12.00
No. 1 busheling	13.00 to 13.50
No. 2 busheling	11.00 to 11.50
Bundled tin scrap	15.00 to 15.50

Birmingham

BIRMINGHAM, ALA., July 3, 1916.

Pig Iron.—What the future will bring forth is more interesting to iron makers than what the present is. The stagnation in sales has reached a point where so little is done that no one ventures to say what the market basis really is. Small orders are being booked from carload lots to a few hundred tons for domestic use and now and then an order for export is received. The domestic business is for current and rush needs, on which $15 is paid. No large domestic buyer is even suggesting business. If there was a chance to book as much as 20,000 tons, recessions would be made to take it. How deep the maker would cut below $15 cannot be forecasted. The export business is sporadic. One lot of 3000 tons, two of 1000 tons each and, during the past week, one of 500 tons, were booked in June. Makers do not say at what price. There is an inquiry for as much as 10,000 tons for export, but ocean rates are so high that no large business can yet be foreseen. The lowest rate recently offered was over $25. What to do with the proposed increase in production is another factor. The Woodward Iron Company has put in one stack on basic and the Woodstock furnace at Anniston will surely resume around July 15. Two other stacks are scheduled for July 15 and Sept. 1. Stocks, up to June 1, had not climbed sufficiently to create pessimism, but if something does not happen soon and orders still cease to come in, the present state of production will pile up iron in no inconsiderable quantity, to say nothing of the coming in of additional stacks. The hope lies in basic and the export business. Meanwhile, both buyer and maker are content to wait until after the holiday before trying out each other for the next fall. Quotations remain unchanged. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 soft and foundry	$15.25 to $15.50
No. 2 soft and foundry	14.75 to 15.00
No. 3 foundry	14.25 to 14.50
No. 4 foundry	14.00 to 14.25
Gray forge	13.75 to 14.00
Basic	14.75 to 15.00
Charcoal	22.00 to 22.50

Coal and Coke.—The coal market is in the midst of its summer dullness. Several cargoes of Warrior River coal have been shipped in ocean-going barges to Havana and Key West, a new business that appears to be a success. The railroads are taking a fair quantity of coal. Standard beehive foundry coke is selling to the extent of manufacture at $4.25 to $4.50 per net ton, f.o.b. oven. The demand for furnace coke was slightly increased recently by the Anniston furnace, which is to resume soon and is securing supplies from independent makers.

Cast-Iron Pipe.—The pipe market is rather inactive, the orders coming in being just about sufficient to justify keeping up the same pace in manufacture. Southern municipalities are heard from very little. There is enough stability in the demand to maintain prices. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., $28; 6-in., $25, with $1 added for gas pipe and 16-ft. lengths.

Old Material.—The market remains soft and will be so until consumers' yards are less gorged with stocks. Better business after the holiday is expected. Activity in steel plants is indicated for the rest of the year, and this means that scrap will catch up in the long run. Dealers are inclined to hang on to stocks on hand rather than yield to the temptation to part with them at low prices. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old steel axles	$24.00 to $25.00
Old steel rails	11.00 to 11.25
No. 1 steel scrap	9.50 to 10.00
No. 1 wrought scrap	13.00 to 13.50
No. 1 cast scrap	11.00 to 11.50
Extra heavy cast scrap	9.50 to 10.00
Stove plate and light	10.00 to 10.50
Old carwheels	10.50 to 11.00
Tram carwheels	9.50 to 10.00

St. Louis

ST. LOUIS, MO., July 3, 1916.

Pig Iron.—Buying has been confined to small lots for immediate or special needs. Owing to the unsettling tendency of the resale iron of the market, buyers, some of whom are understood to be ready to make purchases, are not disposed to put out inquiries or to close any transactions of moment. Furnace representatives hold that there is relatively little of the resale iron. Some interest is attaching to the expected blowing in of the furnace here of the Mississippi Valley Iron Company, which will get its ores from various sources. Owing to delays in the rehabilitation of the old St. Louis blast furnace, which will form the first unit, it is not now expected that the furnace will blow in before July 15.

Old Material.—No business is being transacted, and therefore the quotations made are really no more than estimates of value. No scrap material is being taken in by rolling mills, foundries or steel plants and rejections continue extremely severe. Owing to the succession of holidays, the usual first of the month lists will not appear until later in the week. Relaying rails continue the only strong feature of the second-hand material market; they are scarce and in good demand. In general scrap dealers are not even trading among themselves, so dull is the market. We quote dealers' prices f.o.b. customer's works, St. Louis industrial district, as follows:

Per Gross Ton

Old iron rails	$16.25 to $16.75
Old steel rails, rerolling	15.25 to 15.75
Old steel rails, less than 3 ft.	15.75 to 16.25
Relaying rails, standard section, subject to inspection	22.00 to 23.00
Old carwheels	11.25 to 11.75
No. 1 railroad heavy melting steel scrap	14.50 to 15.00
Heavy shoveling steel	14.50 to 15.00
Frogs, switches and guards cut apart	14.25 to 14.75
Bundled sheet scrap	9.25 to 9.75

Per Net Ton

Iron angle bars	$15.25 to $15.75
Steel angle bars	12.75 to 13.25
Iron car axles	22.75 to 23.25
Steel car axles	23.50 to 24.00
Wrought arch bars and transoms	18.50 to 19.00
No. 1 railroad wrought	14.00 to 14.50
No. 2 railroad wrought	13.75 to 14.25
Railroad springs	13.25 to 13.75
Steel couplers and knuckles	13.25 to 13.75
Locomotive tires, 42 in. and over, smooth inside	18.25 to 18.75
No. 1 dealers' forge	10.25 to 10.75
Mixed borings	7.50 to 8.00
No. 1 busheling	11.50 to 12.00
No. 1 boilers, cut to sheets and rings	8.00 to 8.50
No. 1 railroad cast scrap	11.00 to 11.50
Stove plate and light cast scrap	8.25 to 8.75
Railroad malleable	10.50 to 11.00
Agricultural malleable	9.50 to 10.00
Pipes and flues	9.50 to 10.00
Railroad sheet and tank scrap	9.00 to 9.50
Railroad grate bars	8.25 to 8.75
Machine shop turnings	6.75 to 7.00

Finished Iron and Steel.—Reports show that there are no heavy lots in the yards of the fabricators, who regard the continuing outlook good. Business out of

warehouse is active at firm prices, and up to the capacity of the shipping departments. On stock out of warehouse we quote as follows: Soft steel bars, 3.1[illegible] iron bars, 3.10c.; structural material, 3.15c.; tank plates, 3.50c.; No. 10 blue annealed sheets, 3.30c.; No. 28 black sheets, cold rolled, one pass, 3.30c.; No. 28 galvanized sheets, black sheet gage, 5.55c.

Coke.—The smelter inquiry for 36,000 tons reported last week has not been closed, but will be divided in all probability among Virginia and Connellsville ovens and the local by-product plant, according to present indications.

Cincinnati

CINCINNATI, OHIO, July 3, 1916.

Pig Iron.—As far as the local market is concerned, buying is almost at a standstill. A few small lots of Southern iron have been taken lately by nearby consumers for prompt shipment. In Indiana several sales of Southern foundry are reported, the largest of which is 300 tons. Southern resale prices are weak, although it was predicted that there would be a strengthening in that market after July 1, because most of the resale iron in that territory was expected to have changed hands on account of the contract stipulations for shipment in the first half. From $14.50 to $15 are the regular furnace quotations for last half shipment, but $14, Birmingham basis, can be done on resale iron, and offers below $13.50 were solicited last week. A sale of 1000 tons of malleable iron from the Ironton district was made to an Illinois consumer for last half shipment. Northern furnaces continue the quotation of $19, Ironton, on foundry, malleable and basic for any shipment this year or in the first half of next year. Speculative foundry iron in that territory holds the prompt shipment price down to $18.50 or lower. The Southern silvery irons are offered at a considerably lower price than the minimum asked by the Northern producers, which is $27 at furnace for an 8 per cent analysis. The substitution of scrap iron at present costs is a matter that foundry iron sellers have to consider. Nearly all pig-iron salesmen are off the road this week. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	$17.40 to $18.40
Southern coke, No. 2 f'dry and 2 soft	16.90 to 17.90
Southern coke, No. 3 foundry	16.40 to 17.40
Southern coke, No. 4 foundry	15.90 to 16.90
Southern gray forge	15.40 to 16.40
Ohio silvery, 8 per cent silicon	28.26 to 28.76
Southern Ohio coke, No. 1	20.76 to 21.26
Southern Ohio coke, No. 2	19.76 to 20.26
Southern Ohio coke, No. 3	19.26 to 19.76
Southern Ohio malleable Bessemer	19.76 to 20.26
Basic, Northern	19.76 to 20.26
Lake Superior charcoal	21.20 to 22.20
Standard Southern carwheel	24.90 to 25.40

Finished Material.—Jobbers report a slackening in business, which they consider natural at this season, due, in a measure, to the cessation of building and manufacturing activities on account of the holiday. Quite a number of local firms closed their plants at Saturday noon until Wednesday of this week. Building contractors are also taking advantage of the opportunity for a midsummer vacation. While new orders for building materials are scarce, a number of contracts were made the first part of last week that will draw on warehouse stocks to a considerable extent. No price changes are noted, and we quote from stock as follows: No. 10 blue annealed sheets, 3.50c.; steel bars and small structural shapes, 3.20c.; wire nails, $2.75 per keg, base; barb wire, $3.60 per 100 lb.; plates, 3.50c.; smaller size machine bolts, 60 per cent off list; larger sizes, 40 and 10 and 5 per cent off; hot pressed square and hexagon nuts, 2.70c. off list; malleable washers, 5½c. per lb.; cast-iron washers, 3c. per lb.; cold-rolled rounds, 10 per cent plus list. The nearby mills quote No. 28 black sheets at 2.90c., f.o.b. Cincinnati or Newport, Ky., and No. 28 galvanized sheets at 4.90c.

Coke.—The market is very dull. Few purchases have been made of foundry coke and none is reported of furnace grades, unless a few carloads of special 48-hr. coke for domestic purposes can be taken into consideration. It is stated that while the consumption of foundry coke has been reduced on account of the holiday idleness of several plants in this vicinity, the production has also been reduced in all three fields for the same reason. Connellsville furnace coke is unchanged around $2.35 to $2.50 per net ton at oven, and foundry coke is quoted at $3 to $3.50. Wise County and Pocahontas operators are selling around $3.25 to $3.50, and New River foundry coke is quoted at $4 to $4.25.

Old Material.—Quotations are unchanged, although weak at the figures named below. This applies to practically all grades of scrap. The demand is much below normal, and some dealers state that they are unable to give definite reasons for the present dullness or to predict what the near future may bring forth. The following are dealers' prices to consumers f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton	
Bundled sheet scrap	$11.25 to $11.75
Old iron rails	15.50 to 16.00
[illegible]	21.00 to 21.50
[illegible]	14.[illegible] to 17.00
[illegible]	14.00 to 14.50
Steel rails for melting	13.00 to 13.50
Per Net Ton	
[illegible]	$13.25 to $13.75
[illegible]	4.[illegible] to 5.25
Steel turnings	5.25 to 5.75
[illegible]	11.00 to 11.50
No. 1 machinery cast scrap	12.75 to 13.25
Burnt scrap	8.25 to 8.75
Iron axles	21.00 to 22.00
Locomotive tires (smooth inside)	19.50 to 20.00
[illegible]	9.[illegible] to 10.00
[illegible]	10.[illegible] to 11.25
Railroad tank and sheet scrap	8.50 to 9.00

Rogers, Brown & Co. have been given the agency for the by-product coke to be produced at Terre Haute, Ind., by the Indiana Gas & Coke Company. Furnace, foundry and domestic grades will be produced, commencing Sept. 1. The company's output will be about 11,000 tons per month.

San Francisco

SAN FRANCISCO, CAL., June 27, 1916.

The past month has brought a marked curtailment of business. This is due in some measure to labor troubles, ocean and river shipping having been badly tied up for several weeks; also to the vacation season, but principally to the heavy arrivals on old orders, which have placed fair stocks in the hands of merchants and regular consumers. Shipbuilders and some other large consumers with special work in hand are still short of material, and prices for prompt delivery remain very high, but the general feeling as to supplies is distinctly easier. There has been a strong tendency toward industrial expansion, but the high cost of installing plants and the uncertain attitude of labor have held this within very conservative limits. Export demand has dropped off.

Bars.—The distributive movement is lighter than for several months, as most small consumers are getting delivery on material ordered early in the year, and in many places requirements are below early estimates. Some large consumers, also, have put in small rolling outfits to work convenient forms of scrap into bars. The general movement is still quite large, however, as local mills are three to six months behind on delivery of many sizes, though little Oriental business has been taken for some time. The demand in the Orient has fallen off, partly owing to large arrivals on old orders and partly to the excessive freight rates. The jobbing price of steel bars remains at 4c., with mills quoting 3.50c. for prompt delivery to the trade, or 3c. for shipment at their convenience.

Structural Material.—While there is little conspicuous work in the market, the local shops are all quite busy on old contracts and small work, the volume of which is large in the aggregate. The largest recent letting was the theater at Fourth and Market Streets, taken by the Golden Gate Iron Works. Dyer Brothers have taken an addition to the Moana Hotel, Honolulu, 450 tons, and the McClintic-Marshall Company will fabricate 621 tons for a bridge near Sacramento, Cal.

The general contract has been let for the projected addition to Lane Hospital. A. Huth is planning a large building on Broadway near Alder Street, Portland, Ore. The Missouri Valley Bridge & Iron Company will build two bridges for the Northern Electric Railway. Dyer Brothers have a 700-ton job for the California & Hawaiian Sugar Company, Crockett, Cal. The project for a bridge across San Francisco Bay is apparently making some progress, but the prospect of its being built in the near future still seems doubtful.

Plates.—The distributive movement is moderately active, but not much new business is going to the mills, which are offering very little for early delivery. Some new ship contracts have appeared, but the yards are booked too far ahead to permit much more business. Some buying is noted for pipe and tank work. The Western Pipe & Steel Company has taken a large contract for the Anderson-Cottonwood Irrigation District, and will build a lot of tanks at Martinez for the Associated Oil Company. Deliveries on old contracts are very heavy. The jobbing price, San Francisco, remains at 4.75c.

Sheets.—Galvanized sheets still receive little attention, and, with increasing shipments on old orders, immediate needs are fairly well supplied. Current building requirements are limited. A good fall demand is expected, though consumers are not pleased with the prevailing prices. Supplies of blue annealed are still light, though most buyers are covered for the remainder of the year. Routine requirements are fairly large, and the tonnage has been increased by several new manufacturing enterprises.

Wrought Pipe.—Orders going to the mills are lighter than last month, as the jobbing houses, both here and in the oil fields, have put in large stocks which were purchased at lower prices, and new business in lap-weld is curtailed by the inability of mills to deliver. The material in store, however, is moving out in good shape, the plumbing sizes receiving more attention than for some time. The town of Aberdeen, Wash., has taken figures on a lot of 36, 28 and 16 in. lap-weld pipe.

Cast-Iron Pipe.—While municipal business remains rather quiet, buying is a little better than for some weeks. The town of Whittier has contracted for 200 tons, and the Anderson-Cottonwood Irrigation District has taken 118 tons of 36-in. for siphons. Pasadena, Cal., has placed a good sized order, and a small lot has been ordered for Puyallup, Wash. Othello, Wash., is in the market for a lot of 4 and 6 in. A Government inquiry is expected for a line of 4-in. pipe from Key Route pier to Yerba Buena Island.

Pig Iron.—The weakness of primary markets is, of course, reflected in local values, and as a result those who have not already placed contracts covering the remainder of the year are disposed to hold off. There is a limited amount of business for prompt shipment, but current requirements are pretty well met by deliveries on old contracts. No. 1 Southern foundry iron is quoted here at about $25.50 to $26 per gross ton.

Coke.—A rather large tonnage is coming in, taking care of all immediate needs, and there is not much contracting for the future, though a few new bookings are reported. The general range on offerings from various sources shows little change, Southern foundry coke being about $16 per net ton.

Old Material.—While requirements are increasing, the high prices lately offered have brought out a very heavy tonnage, and there is an immense quantity in sight at points off the railroads. Steel makers have already purchased enough to last them for some time. and dealers have rather large accumulations, which, however, are generally firmly held. The top price of steel melting scrap is $12 per gross ton at present, with less desirable material offered as low as $8. There is enough call for cast-iron scrap to prevent any great accumulation, prices ranging from $16 to $18 per net ton.

Ferroalloys.—Ferrosilicon continues firm. There is a small amount in stock here, and a shipment is expected shortly, but it is impossible to shade the prices that have prevailed for some time. Ferromanganese is much easier, with shipments of foreign material coming via New Orleans in good shape. A large tonnage of chrome ore is being shipped East from several California points, and some is also being used locally.

The Pacific Coast Steel Company is starting one of its new furnaces this week, and will start the other in about a month. The opening was delayed by tardy delivery of refractory brick from the East. While a very large tonnage of magnesite has been going from California to Eastern steel centers for a year, the manufacture of magnesite brick has not yet been successfully undertaken here, and it is very hard to get deliveries from the East.

Chicago

CHICAGO, ILL., July 5, 1916.—(*By Wire.*)

The renewal of interest which buyers had begun to evince a week ago has since become more apparent. In the matter of specifications, in particular, a clearly defined broadening of the market is to be noted. There are indications also that a part of the considerable volume of business which has been held in check by high prices is very close to being put upon the market. The resumption of foreign buying on a large scale and the further assurances that have been found regarding the extent to which the larger mills are sold up appear to have restored the interest of many buyers in their future requirements. In some respects the market appears to be on a more sound basis than at any time. Sales of rails in miscellaneous lots last week totaled 35,000 tons and of bars for industrial uses 35,000 tons. Inquiry for steel for 1917 delivery is again more general but, except as contracts are taken for shipment at mill convenience, the mills are not opening their books for first quarter or first half. Irregularities in the prices of sheets continue to manifest themselves, and the volume of business is not sufficient to prevent extreme competitive concessions despite the strengthening influence of the new scale of wages. The domestic market for pig iron is without interest, except for the concern which attaches to the weakness in the South. It is no longer certain that lower than $14, Birmingham, cannot be done. Inquiry for export iron is broadening out to include foundry grades. In the scrap market the Steel Corporation has again been a buyer of steel scrap, but its purchase of 20,000 tons was dwarfed by comparison with the supply of scrap available for sale.

Pig Iron.—Except for the inquiry from abroad, which has now extended itself to foundry as well as steelmaking iron, the pig-iron market is exceedingly quiet, with Southern prices emphatically weak. Such little business as is being placed is being taken by Southern interests. This, however, is almost entirely spot or prompt shipment iron in small quantities. On such business there is reason to believe that $14, Birmingham, is being done, and with respect to resale iron even lower prices are reported. Inquiry in connection with which the Northern furnaces are able successfully to compete is very limited and scattering. There is some business in charcoal iron. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of $1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

[illegible] Nos. 2 to 7	$19.75
[illegible] No. 1	20.25
Lake Superior charcoal, No. 6 and Scotch	20.75
Northern coke foundry, No. 1	19.50
[illegible], No. 2	19.00
[illegible], No. 3	18.50
Southern coke, No. 1 f'dry and 1 soft	$19.00 to 19.50
Southern coke, No. 2 f'dry and 2 soft	18.50 to 19.00
Malleable Bessemer	19.50
[illegible]	19.00 to 19.50
[illegible]	34.00 to 36.00
[illegible] per cent	31.50
Bessemer ferrosilicon, 10 per cent	33.50 to 35.50

(By Mail)

Rails and Track Supplies.—Transactions last week in light and heavy section rails for domestic and export shipment totaled nearly 35,000 tons. Of these the largest lot was one of 9000 tons of light rails for portable track in France. Inquiry from Western roads for

track fastenings is limited to requirements of grea necessity. The railroads now appear to be a ered in that respect for the remainder of the year and for next year interest has largely subsided. The duplication of earlier sales of track fastenings for 191 a premium of $3 per ton would now be decidedly difficult. Quotations are as follows: Standard railroad spikes, 2.75c., base; track bolts with square nu to 3.50c., base, all in carload lots, Chicago; tie-pl $50, f.o.b. mill, net ton; standard Bessemer rails, Chicago, $33, base; open-hearth $ 25 to 45 lb., $40; 16 to 20 lb., $41; 12 lb., $42; 8 lb., $4 angle bars, 2c., Chicago.

Structural Material.—The conditions already outlined as existing for several weeks, with respect to the reselling of structural steel, are still unchanged. Considerable inquiry for plain material in small lots is being satisfied out of fabricators' stocks and from store, but new mill business is light. Mill offerings of Bessemer shapes for prompt shipment still appear. Specifications in general are heavier, even from the carbuilders, whose situation, however, is far from satisfactory. Without an early resumption of car buying, the carbuilding plants seem to have ahead of them an enforced idleness during a considerable period, some plants being even now within sixty days of the end of their orders. Contracts for fabricated steel reported last week include 200 tons for the McKay Building, Chicago, taken by Holmes, Pyott & Co.; 225 tons for the Milford Building, Chicago; 175 tons for a tower tank at Seattle, taken by the Chicago Bridge & Iron Company, and 1530 tons for two factories of the Great Western Sugar Company. The American Bridge Company took a small order for plant extensions for the Great Western Smelting & Refining Company. We quote for Chicago delivery of structural steel from mill 2.689c.

We quote for Chicago delivery of structural steel from jobbers' stock 3.10c.

Plates.—In this district the effect of the large demand for ship plates is reflected rather than direct. Although inquiry covering a heavy tonnage has been received here, there is practically no product available for deliveries such as are required. In small lots Bessemer plates may be had for reasonably prompt shipment, and some orders have been placed for open-hearth stock, but the entire volume of business has been inconsiderable. We quote for Chicago delivery of plates from mill on contract 3.089c. and for prompt shipment 3.689c. to 4.189c.

We quote for Chicago delivery of plates out of jobbers' stocks 3.50c.

Sheets.—The range of prices for black sheets still indicates that under stress of competition various mills are sufficiently eager for business to make concessions which leave them but scant profit on the basis of present sheet-bar prices. Sales are recorded on the basis of 2.80c. to 2.90c., Pittsburgh, and some contracting has been done at as high as 3c. for No. 28 black sheets. On the basis of the new Amalgamated scale, the mill cost of sheets will be increased by about 7 per cent. Some of the mills have indicated their intention to make selling prices take care of this advance, and on the whole the market is somewhat stronger. Blue annealed sheets sold last week in lots of fair size as low as 2.90c. for No. 10, and one contract for 1500 tons was closed on that basis. Galvanized sheets are selling at quotations ranging from 4.50c. to 4.60c., approximately equivalent to a spelter cost of 10c. We quote for Chicago delivery, blue annealed, No. 16 and heavier, 3.089c. to 3.339c.; box annealed, No. 17 and lighter, 2.939c. to 3.039c.; No. 28 galvanized, 4.939c. to 5.039c.

We quote for Chicago delivery of sheets out of stock, minimum prices applying on [illegible] tons: No. 10 blue annealed, 3.40c.; No. 28 black, 3.10c. to 3.20c.; No. 28 galvanized, 5.40c. to 5.50c.

Bars.—New business in steel bars last week was again noteworthy, bookings for domestic delivery and for export for other than ammunition purposes totaling 35,000 tons. Inquiry exceeded business actually placed by a wide margin, owing to the fact that local mills can no longer make definite delivery promises. The bar-iron mills are still in a very comfortable situation, although new orders are decidedly light. We quote, mill shipment, Chicago, as follows: Bar iron, 2 [illegible] cent off contracts, 3.15c. For prompt shipment; hard steel bars, 2.50c.; shafting, in carloads, 20 per cent off; less carloads, 15 per cent off.

[illegible]

Rivets and Bolts.—The market for rivets is attended with unusual indefiniteness as to prices, a situation due in part to the price of 3.50c., at which rivets are obtainable out of stock. Before quoting, manufacturers are seeking to get the exact specifications and quantities in which customers are interested, and quotations are made with some irregularity to meet the particular circumstances. Specifications for bolts and nuts are being maintained in large volume. We quote carriage bolts up to ⅜ x 6 in., rolled thread, 50-10-5; cut thread, 50-5; larger sizes, 40-5; machine bolts up to ⅜ x 4 in., rolled thread, with hot pressed square nuts, 50-10-10; cut thread, 50-10; larger sizes, 40-10-5; gimlet point coach screws, 60; hot pressed nuts, square, $2.90 off per 100 lb.; hexagon, $2.90 off. Structural rivets, ¾ to 1¼ in., 4c. to 4.15c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

We [illegible] out of stock: Structural rivets, 3.50c.; boiler rivets, [illegible] machine bolts up to ⅞ x 4 in., 60-10; larger [illegible] carriage bolts up to ⅞ x 6 in., 60-5; larger [illegible] off; hot pressed nuts, square, $2.65, and hexagon, [illegible] off per 100 lb.; lag screws, 65.

Old Material.—The actual situation in the scrap market appears to have been disclosed last week through the purchase of about 20,000 tons of steel scrap for the Illinois Steel Company and an additional quantity for associated interests at Pittsburgh. The opinion has largely prevailed that prices for scrap were simply nominal in the absence of demand, but that the appearance of any order of consequence would immediately result in a sharp recovery of strength. Developments have indicated an unexpected eagerness to sell, and the above orders were readily placed on the basis of $14.50 and with every appearance that the market would have absorbed a larger tonnage without further advance in price. Except for the fact that the sale price establishes the market for the few grades of scrap directly affected, other prices remain weak and buying in general continues at very low ebb. Railroad offerings for the week include 4000 tons from the Chicago & Northwestern, 2700 tons from the Santa Fe and lists from New York Central and Pennsylvania lines. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	$15.00 to $15.50
Relaying rails	19.50 to [illegible]
Old steel rails	14.00 to 14.50
Old steel rails, rerolling	15.00 to 15.50
Old steel axles, [illegible]	18.00 to 18.50
Heavy melting steel scrap	14.00 to 14.50
Frogs, switches and guards, cut apart	14.00 to 14.50
Shoveling steel	13.50 to 14.00
Steel rails, [illegible]	9.25 to 9.75

Per Net Ton

Iron car axles	$15.50 to $15.75
Steel car axles	20.00 to 20.50
No. 1 railroad wrought	14.50 to 15.00
No. 1 [illegible]	13.50 to 14.00
No. 1 [illegible]	13.50 to 14.00
No. 1 [illegible]	13.00 to 13.50
No. [illegible] husheling	12.00 to 12.50
No. [illegible]	8.00 to 8.50
Steel [illegible]	12.50 to 13.00
No. [illegible]	13.00 to 13.50
[illegible]	20.00 to [illegible]
[illegible]	5.25 to [illegible]
[illegible]	11.00 to 11.50
[illegible]	10.00 to 10.50
[illegible]	11.75 to 12.25
[illegible]	10.75 to 11.25

Cast-Iron Pipe.—The awards of 1000 tons of pipe at Milwaukee and 450 tons at Waukegan, Ill., have not yet been made, although in the former instance the busi-

ness is expected to go to the leading interest. A few small lots comprise all the additional business in sight. We quote as follows, per net ton, Chicago: Water pipe, 4 in., $33.50 to $34; 6 in. and larger, $30.50 to $31, with $1 extra for class A water pipe and gas pipe.

Wire Products.—In the last week some improvement is noted in the volume of both specifications and contracts for the common forms of wire, an improvement attributable in many instances to the replacement of stocks at distributing points. Renewal of inquiry from abroad on a large scale has likewise had a strengthening influence. Prices are without change. We quote as follows: Plain wire, Nos. 6 to 9, base, $2.639; wire nails, $2.689; painted barb wire, $2.839; galvanized barb wire, $3.539; polished staples, $2.839; galvanized staples, $3.539, all Chicago.

New York

NEW YORK, July 5, 1916.

Pig Iron.—Export inquiry is still of much more importance than anything for home consumption. A New England maker of machine tools has bought from 600 to 700 tons of foundry iron for delivery this year, and some resale iron has figured in scattered foundry buying for this district. Apparently Virginia resale iron has now been pretty well taken up, but the softening effect of Southern resales is apparent in the general foundry-iron market. One local pig-iron firm has sold 7500 tons of Bessemer iron for shipment to Italy, and another has sold several thousand tons of steel-making iron for export in the past week. There is inquiry from Holland for a number of lots of foundry iron amounting to several thousand tons. One item in the very large amount of Italian business that is in the market is 10,000 tons of charcoal iron, but the requirements in phosphorus are below anything American makers are prepared to entertain. Whether low phosphorus coke iron will be taken eventually instead does not appear. One inquiry for Bessemer iron for export is for 10,000 tons running 0.08 in phosphorus and 1 to 2 per cent in silicon. There is also some inquiry for pig iron from South America. We quote at tidewater for early delivery: No. 1 foundry, $20.50 to $21; No. 2X, $19.75 to $20.25; No. 2 plain, $19.50 to $20; Southern iron at tidewater, $20 to $20.50 for No. 1 and $19.50 to $20 for No. 2 foundry and No. 2 soft.

Ferroalloys.—Ferromanganese for early delivery is weaker and it is understood that a small lot has been sold at $175, seaboard. The quotation a week ago was $225 to $250. Further quantities are reported to have been offered at $175 for spot shipment, but the demand is so weak that the market has not really been tested. Consumers are evidently well covered for some time and domestic offerings are increasing. Foreign inquiries for about 1000 tons have also appeared, but they are not reported to have resulted in any sales. Spiegeleisen is quiet at $50 to $55, furnace, on contract. Ferrosilicon, 50 per cent, is very strong and selling at $90 to $100 for early delivery.

Finished Iron and Steel.—Export buying is easily of chief interest in a week otherwise dull. Settlement of the Russian purchases of rails, barb wire and railroad cars is imminent, while inquiries under fresh consideration include 5000 tons of plates for Japan, 4000 tons for Italy, 1500 tons of soft Bessemer good size rounds for export, a round tonnage of 84 and 155 millimeter bars for France or Italy, and offerings for different forms of steel from non-belligerent nations, with Argentine among others asking for wire. Bessemer steel is not so freely offered, a quotation on billets being $51 and one on rounds about 3 in. in diameter being 3¼c. per pound. The situation in structural steel is that fabricators with over two months' work ahead (and few have over three months to the windward) cannot take much of the smaller jobs in project, owing to the delivery time exaction, and fabrication and erection work is thus being well distributed. As regards the plain material, deliveries are somewhat better and the price range is narrow between prompt and future shipments. Universal plates have sold for 3½c. for four weeks delivery, but sheared plates are strong at 4c. The higher premiums for steel bars are not so easily obtained. We quote mill shipments of plain structural material at 2.669c. to 2.919c., New York; steel plates at 2.919c. to 4.169c., New York, according to the time of delivery, with universal plates at 3.669c. to 3.919c.; steel bars at 2.669c. to 2.919c., and iron bars at 2.669c. New York. Out of warehouse, we quote iron and steel bars and structural material at 3.10c. to 3.30c., New York, and plates at 4c. to 4.25c.

Cast-Iron Pipe.—Jersey City, N. J., will open bids July 11 on about 300 tons of 4, 6, 8 and 12 in. Private buying continues in about the same volume. Prices are unchanged. Carload lots of 6-in., class B and heavier, are quoted at $30.50 per net ton, tidewater, class A and gas pipe taking an extra of $1 per ton.

Old Material.—A few transactions are reported, principally in steel scrap and rolling-mill stock, but the general situation continues quiet. Brokers quote buying prices about as follows to local dealers and producers, per gross ton, New York:

Heavy melting steel scrap (eastern Pennsylvania specifications)	$11.75 to $12.25
Old steel rails (short lengths) or equivalent	12.75 to 13.25
Relaying rails	28.00 to 30.00
Rerolling rails	15.50 to 16.00
Iron car axles	26.00 to 27.00
Steel car axles (for domestic use)	28.50 to 29.00
Steel car axles (for export)	30.00 to 31.00
No. 1 railroad wrought	18.00 to 18.50
Wrought iron track scrap	15.00 to 15.50
No. 1 yard wrought, long	14.50 to 15.00
No. 1 yard wrought, short	11.75 to 12.25
Light iron (nominal)	5.00
Cast borings (clean)	8.00 to 8.25
Machine shop turnings (nominal)	6.25 to 6.50
Mixed borings and turnings	6.50 to 6.75
Wrought pipe	10.00 to 10.50
Old carwheels (nominal)	15.00 to 15.50
Malleable cast (railroad)	12.25 to 12.75

The disposition of molders to demand higher wages and shorter hours, together with the slack demand for castings for machine shops, is causing foundries to withhold buying orders, and the week has therefore been extremely dull. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

No. 1 cast (machinery)	$16.00
No. 2 cast (heavy)	15.00
Stove plate	12.00
Locomotive grate bars	12.00

British Steel Market

Pig-Iron Selling Freely—Little Demand for American Billets

(*By Cable*)

LONDON, ENGLAND, July 5, 1916.

Pig-iron makers are booking freely until December. Export trade is small with licensing difficulties paramount. American billets are dull. Tin plates are unsettled and irregular at 33s. to 35s.

Benzol is quoted at 11½d., toluol at 2s. 3d., solvent naphtha at 2s. 2d. and ammonium sulphate at £15 17s. 6d. Quotations, mostly nominal, are as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 33s. to 35s., against 35s. a week ago.
Steel black sheets, No. 28, export, f.o.b. Liverpool, £20 5s.
Steel ship plates, Scotch, delivered local yards, £13 17s. 6d.
Steel rails, export, f.o.b. works port, £10 17s. 6d.
Hematite pig iron, f.o.b. Tees, about 140s.
Sheet bars (Welsh) delivered at works in Swansea Valley, £11 5s.
Steel bars, export, f.o.b. Clyde, £18 5s.
Ferromanganese, £35 nominal.
Ferrosilicon, 50 per cent, c.i.f., £29

Scarcity of Semi-Finished Steel—A New Manganese Ore Deposit in Africa

(*By Mail*)

LONDON, ENGLAND, June 20, 1916.—Although every effort is being made in the British industry to force production to the utmost capacity, the scarcity of both crude iron and finished material is as intense as ever. Exports are severely restricted, although the returns for May showed a very large increase, largely due to

the abnormally heavy quantities sent to the Allies in order to keep pace with their most urgent needs. A good deal of iron will probably yet be sent to France, but now licenses for new export business are very hard to get. The distribution of supplies in the home trade has given more satisfaction to consumers lately, but the deliveries are rigidly controlled, while it is understood that the control committee on the East Coast decided to suspend shipments of Cleveland to Scotland till the stocks of Scotch iron are exhausted.

Owing to the increased cost of production the tendency of pig iron is still upward, makers in various districts urging an increase in the maximum price for delivery after July 1, for which an advance to 87s. 6d. was already announced in the case of Cleveland iron. It is hoped, however, that with the increase looked for in the output more iron will become available shortly, both for home consumers and the Allies. Export terms for Cleveland and hematite have remained quite nominal, the latter being almost unobtainable. The tendency of Spanish ore has been harder again.

Steel producers find increasing difficulty in covering their needs, and there is no relief in sight from the dearth of semi-finished steel, which has compelled France of late to have resort to additional supplies from American and Canadian producers at high costs. The rolling mills are very short of steel. There is a famine in Welsh sheet bars, the cost of which to local consumers has risen to well over £14 a ton.

The tin-plate mills are severely handicapped by the scarcity of steel and labor. There has been some reaction in prices from the highest figures recorded, owing to sales by second hand, which has checked the demand, but this is merely temporary.

The various finishing grades are now almost entirely under government control, but requirements are getting further ahead of the supply available, war orders taking up the great bulk of the material, so that mercantile users find it hard to get supplies. About 10,000 steel smelters in Sheffield will benefit by an award given by the Board of Trade arbitrator, which gives workmen earning up to 40s. a week an advance in wages of 7½ per cent and workmen earning 40s. to 60s. a week, 5 per cent, this in addition to the war bonus of 8d. to 10d. a day which the men were already receiving.

The export demand for ferromanganese has been somewhat quieter, but the tone remains firm at prices ranging upward of £35 basis, f.o.b., for loose, according to shipment. It is now very hard to place orders for this year's shipments, for producers are already heavily booked. There is a little more doing in Indian manganese ore since freight room is somewhat more plentiful.

Manganese ore deposits have been found on the property of the Fanti Consolidated Mines (West Africa), which are to be exploited, and shipments are likely to be made soon.

German Steel Output for April

The German steel output for April was 1,202,598 metric tons or 52,286 tons per day, which contrasts with an output of 1,347,795 tons in March at 49,918 tons per day, the war record. The production in February also exceeded the April output, but the April daily rate for the 23 working days was the largest for the war. The April production was made up of 606,662 tons of Bessemer steel, 508,447 tons of open-hearth steel, 67,457 tons of steel castings, 7977 tons of crucible steel and 12,055 tons of electric steel. The steel output to May 1, 1916, was 5,015,158 tons, as against 4,047,886 tons to May 1, 1915. The electric steel output still maintains its high rate.

At South Bethlehem, Pa., last week an important conference of operating managers and safety engineers of the subsidiary companies of the Bethlehem Steel Corporation was held, which occupied several days. Standardizing of safety and welfare methods were discussed, as well as other matters pertaining to safety and welfare work.

Iron and Industrial Stocks

NEW YORK, July 5, 1916.

The stock market has been subjected to varying influences. For a few days conditions were regarded as favorable and a slight upward movement took place, but this was followed by a decline, due to disappointment over the showing made in the annual report of the American Car & Foundry Company, together with the proposal by the Ways and Means Committee of the House of Representatives to put a heavy tax on the production of munitions. The range of prices on active iron and industrial stocks from Wednesday of last week to Monday of this week was as follows:

[illegible]	- 25	Ry. Stl. Spring, [illegible]	103 - 103½
[illegible]	- 73½	Ry. Stl. Spring, pref.	96½
[illegible]	109½	Republic, com.	45½ - 46
Am. Car & Fdy.,		Republic, pref.	107 - 107½
Am. Car & Fdy., pref.	76½	[illegible]	17 - 18
Am. Loco., com..	116½-117	[illegible]	20 - 21¼
Am. Loco., pref.	65 - 69	U. S. Steel, com..	83⅜ - 86⅝
Am. Steel Fdries.	101 - 102	U. S. Steel, pref.	117⅛ - 117⅝
Beth. Loco., com.	47 - 48¼	[illegible]	19
Beth. Loco., pref.	69 - 70	Westing. Elec.	93¼ - 93¾
Beth. Steel, com.	104 - 105⅛	Am. Rad., com.	395 - 399
Case (J. I.), pref.	437 - 442	Am. Ship, com.	43 - 44
Colorado Fuel	41 - 42½	[illegible]	99½ - 99¾
Deere & Co., pref.	[illegible]	Int. Mer. Marine, pref.	30¼ - 30½
Gen. Electric	165 - 168	Lack. Sup. Corp.	10½ - 10¾
[illegible]	[illegible]	[illegible]	[illegible]
Int. Harv. of N. J., com.	[illegible]	Cruc. Steel, com.	69¾ - 78½
Int. Harv. Corp., com.	78	Cruc. Steel, pref.	114½ - 117¾
[illegible]	[illegible]	Hack. Walk. Refrac., com.	[illegible]
N. Y. Air Brk.	130 - 135	Hack. Walk. Refrac., pref.	102½ - 103
[illegible]	[illegible]	[illegible]	[illegible]
Pressed Stl. Car, com.	17 - 17¾	Pressed Steel, com.	39
Pressed Stl. Car, pref.	86	Pressed Steel, pref.	117 - 118
Va.-Car. Chem., com.	[illegible]	Va.-Car. Steel	64¼ - 64¾

Dividends

The E. W. Bliss Company, extra, 100 per cent on the common stock, payable July 14. In the first six months of 1916 the company has declared a total of 125 per cent, or $62.50 a share on the common stock. In 1915 dividends on the common amounted to 20 per cent, or $10 a share. The present 100 per cent is to be paid out of accumulated earnings.

The Pittsburgh Coal Company, regular quarterly, 1¼ per cent on the preferred stock, payable July 25.

The Steel Company of Canada, regular quarterly, 1¾ per cent on the preferred stock.

The Colorado Fuel & Iron Company, 30 per cent on the preferred stock, payable Aug. 1. The amount still due on account of accumulated dividends will then be 2 per cent.

The Tungsten-Molybdenum System

The tungsten molybdenum system is discussed by Dr. Frank A. Fahrenwald of Cleveland, Ohio, in a paper to be presented at the Arizona meeting of the American Institute of Mining Engineers in September. The results of an investigation of alloys of these two elements, in which methods were employed that avoided the usual difficulties accompanying high-temperature alloy investigations, are summarized as follows:

1. By compressing the mixed reduced powders of tungsten and molybdenum into briquets and then heating with an electric arc in an atmosphere of hydrogen, alloys of this series were prepared varying in composition from 100 per cent tungsten to 100 per cent molybdenum.

2. The solidus curve for the series was located by means of optical pyrometer temperature measurements and checked by comparing the fusing current with a standardized watt-age-temperature curve.

3. The equilibrium diagram for this series shows no critical points, appearing as resistance fluctuations, corresponding to a separation of a new phase. Its construction [illegible] upon results of macro- [illegible]

4. Curves for hardness and for opposing temperatures are smoothly convex, being typical of an uninterrupted series [illegible]

5. As a result of thermal and microscopical analysis, the metals tungsten and molybdenum are reported to be completely isomorphous.

6. All alloys of this series are malleable and ductile under proper conditions.

The American demand for Japanese zinc dust has expanded greatly since the war. About 600 tons is sent yearly to New York and San Francisco importers from the Nagasaki distri[illegible]

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, effective from April 10, 1916, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c.; Pacific coast (by rail only), 65c.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 2.50c. to 2.75c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H beams over 18 in.	.10
Angles over 6 in., on one or both legs	.10
Angles, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1 1909	20 to .80
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Plates.—Tank plates, ¼ in. thick, 6 in. up to 100 in. wide, 2.90c. to 4c., base, net cash, 30 days, or ½ of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras

	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers)	.10
Boiler and flange steel plates	.15
"A B M A" ordinary firebox steel plates	.20
Still bottom steel	.30
Locomotive firebox steel	.50

Marine steel, special extras and prices on application.

Gage Extras

Rectangular, ¼ in. thick, over 6 in. wide to 100 in. wide	Base
Lighter than ¼ in., to 3/16 in., up to 72 in. wide	.10
*Lighter than ¼ in., including 3/16 in., over 72 in. to 84	.20
*Lighter than ¼ in., including 3/16 in., over 84 in. to 96	.30
*Lighter than ¼ in., including 3/16 in., over 96 in. to 100	.40
*Lighter than ¼ in., including 3/16 in., over 100 in. to 102	.45
Lighter than 3/16 in., including No. 8, up to 72 in. wide	.15
*Lighter than 3/16 in., including No. 8, over 72 in. to 84	.25
*Lighter than 3/16 in., including No. 8, over 84 in. to 96	.35
Lighter than No. 8, including No. 10, up to 60 in. wide	.30
Lighter than No. 8, including No. 10, over 60 in. to 64	.35

Up to 72 in., not less than 10.2 lb. per sq. ft. will be considered 1 in.

Over 72 in. must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.

Over 72 in. wide, ordered less than 11 lb. per sq. ft. down to weight of 3/16 in., take price of 3/16 in.

Over 72 in., ordered weight 3/16 in., take No. 8 price.

Over 72 in., ordered weight No. 8, take No. 10 price.

Width Extras

Over 100 in. to 110 in. inclusive	.05
Over 110 in. to 115 in. inclusive	.10
Over 115 in. to 120 in. inclusive	.15
Over 120 in. to 125 in. inclusive	.25
Over 125 in. to 130 in. inclusive	.50
Over 130 in.	1.00

Length Extras

Universal plates 90 ft. long up to 95 ft. long	.05
Universal plates 95 ft. long up to 100 ft. long	.10
Universal plates 100 ft. long up to 110 ft. long	.20

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over.

Lengths under 3 ft. to 2 ft. inclusive	.25
Lengths under 2 ft. to 1 ft. inclusive	.50
Lengths under 1 ft.	1.55
Circles 3 ft. in diameter to 100 in.	.30
Circles over 100 in. to 110 in. (width extra)	.35
Circles over 110 to 115 in. (width extra)	.40
Circles over 115 to 120 in. (width extra)	.45
Circles over 120 to 125 in. (width extra)	.55
Circles over 125 to 130 in. (width extra)	.80
Circles over 130 in. (width extra)	1.30
Circles under 3 ft. to 2 ft. inclusive	.50
Circles under 2 ft. to 1 ft. inclusive	.80
Circles under 1 ft.	1.85
Half circles take circle extras.	
Sketches not over four straight cuts, inc. straight taper	.10
Sketches having more than four straight cuts	.20
Plates sheared to irregular shape take complete circle extras.	

*Including extra for width.

Wire Rods.—Including chain rods, $50 to $55.

Wire Products.—Prices to jobbers, effective May 1: Fence wire, Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, $2.45; galvanized, $3.15. Galvanized barb wire and staples, $3.35; painted, $2.65. Wire nails, $2.50 to $2.60. Galvanized nails, 1 in. and longer, $2 advance over base price; shorter than 1 in., $2.50 advance over base price. Cement-coated nails, $2.50. Woven wire fencing, 61½ per cent off list for carloads, 60½ off for 1000-rod lots, 59½ off for less than 1000-rod lots.

The following table gives the price per 100 lb. to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb

Nos.	6 to 9	10	11	12&12½	13	14	15	16
Annealed	$2.50	$2.55	$2.60	$2.65	$2.75	$2.85	$2.95	$3.05
Galvanized	3.20	3.25	3.30	3.35	3.45	3.55	4.00	4.10

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from April 21, 1916, all full weight pipe:

Butt Weld

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
⅛, ¼ and ⅜	63	30½	⅛ and ¼	52	19
½	67	46½	⅜	53	20
¾ to 3	70	50½	½	57	33
			¾ to 1½	60	38

Lap Weld

2	65	45½	1¼	48	26
2½ to 6	68	48½	1½	54	33
7 to 12	65	44½	2	55	34
13 and 14	53½	..	2½ to 4	57	37
15	51	..	4½ to 6	57	37
			7 to 12	56	36

Reamed and Drifted

1 to 3, butt	68	48½	¾ to 1½, butt	55	32
2, lap	63	43½	1¼, lap	42	20
2½ to 6, lap	66	46½	1½, lap	49	27
			2, lap	50	28
			2½ to 4, lap	52	31

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	59	35½	⅛, ¼ and ⅜	52	29
½	64	45½	½	57	38
¾ to 1½	68	49½	¾ to 1½	61	40
2 to 3	69	50½			

Lap Weld, extra strong, plain ends

2	63	44½	1¼	50	28
2½ to 4	66	47½	1½	55	34
4½ to 6	65	46½	2	57	37
7 to 8	61	40¼	2½ to 4	59	40
9 to 12	56	35½	4½ to 6	58	39
			7 to 8	52	33
			9 to 12	47	28

Butt Weld, double extra strong, plain ends

	55	38½	¼	44	26
½ to 1½	58	41½	¾ to 1½	47	29
2 to 2½	60	43½			

Lap Weld, double extra strong, plain ends

2	55	38½	1¼	44	25
2½ to 4	57	40½	2	44	25
4½ to 6	56	39½	2½ to 4	46	30
7 to 8	51	36½	4½ to 6	45	29

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Sheets.—Makers' prices for mill shipments on sheets, of U. S. standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Box Annealed Sheets

	Cents per lb.
Nos. 3 to 8	2.90 to 3.20
Nos. 9 to 10	3.00 to 3.25
Nos. 11 and 12	3.05 to 3.30
Nos. 13 and 14	3.10 to 3.35
Nos. 15 and 16	3.20 to 3.45

Box Annealed Sheets, Cold Rolled

Nos. 17 to 21	2.70 to 2.80
Nos. 22 and 24	2.75 to 2.85
Nos. 25 and 26	2.80 to 2.90
No. 27	2.85 to 2.95
No. 28	2.90 to 3.00
No. 29	2.95 to 3.05
No. 30	3.15 to 3.25

Galvanized Sheets of Black Sheet Gage

Nos. 10 and 11	3.50 to 3.60
No. 12	3.60 to 3.70
Nos. 13 and 14	3.60 to 3.70
Nos. 15 and 16	3.70 to 3.80
Nos. 17 to 21	3.85 to 3.95
Nos. 22 and 24	3.95 to 4.05
Nos. 25 and 26	4.10 to 4.20
No. 27	4.35 to 4.45
No. 28	4.50 to 4.60
No. 29	4.65 to 4.75

Boiler Tubes.—Discounts on less than carloads, freight to destination added, effective from April 15, 1916, are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1½ in.	35	1½ in.	27
1¾ and 2 in.	47	1¾ and 2 in.	39
2¼ in.	44	2¼ in.	36
2½ and 2¾ in.	50	2½ and 2¾ in.	42
3 and 3¼ in.	55	3 and 3¼ in.	47
3½ to 4½ in.	56	3½ to 4½ in.	48
5 and 6 in.	49	5 and 6 in.	41
7 to 13 in.	46	7 to 13 in.	38

Locomotive and steamship special charcoal grades bring higher prices.

1¾ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery.

	Copper, New York						
		Electro-	New	New	St.	New	St.
June	Lake	lytic	York	York	Louis	York	Louis
28	27 25	26 50					
29	27 25	26 50					
30	27 25	26 50					
July							
1	27 00	26 50					
3	27 00	26 50					
4							

NEW YORK, July 5, 1916.

Copper continues dull, with prices nominal. Tin is quiet and lower. Lead is in light demand and irregular. The downward trend in spelter continues, but consumers are not interested. Antimony is inactive and lower. The holiday contributed to the quiet of the entire market.

New York

Copper.—The market has been so dull that it is difficult to see how it could be more so, and naturally there are few features of interest to report. One, however, is that near-by copper is not so plentiful as it was, despite all reports. Prices continue to be supported by the sold-up condition of the producers. There is a growing feeling that the great drive of the Allies now under way may create a fresh demand, inasmuch as enormous quantities of ammunition are being destroyed. The exports in June reached the excellent total of 35,753 tons. This, with one exception, was the largest for any month since the war started. Electrolytic is nominal at 26.50c., New York, for prompt delivery, and Lake is nominal at 27c.

Copper Averages.—The average price of Lake copper for the month of June, based on daily quotations in THE IRON AGE, was 27.82c., and of electrolytic, 27.31c.

Tin.—Throughout the week, on the few days when business was done, the market has been dull and weak. Straits tin was quoted on Monday at 38.87½c., but the low price did not tempt buyers. The supply is large. The arrivals in June totaled 5695 tons. Deliveries totaled 6398 tons, indicating that consumption is heavy. Of the total deliveries, 2198 tons came from the Pacific coast, a considerable part of which was Chinese tin. In view of the large deliveries, a dull market is predicted for July. In stock and landing, June 30, was 3963 tons, against 2468 tons on May 31, an increase of 1495 tons. The total of American deliveries in the past six months was 28,621 tons, which compares with 22,217 tons in the first half of 1915, an increase of 6404 tons. The London market continues weak.

Lead.—Views of the market are mixed, and indicate irregularity. Some interests say the market is very dull, while others report a fair demand. It is reported that substantial concessions have been made for shipments over the remainder of the year. The New York quotation of independent sellers Monday was 6.85c., and that at St. Louis, 6.65c., with the leading interest continuing to quote 7c., New York, and 6.92½c., St. Louis. The June exports total 2029 tons. The London market is weak.

Spelter.—This metal is the most inactive of any, and the steadily declining prices while closely watched by consumers have not stirred them into buying. Prompt can be had easily at 11c., New York, and 10.75c., St. Louis. July delivery is obtainable at 10.50c., St. Louis, and August at 10c. The London market is keeping pace with that of New York in the downward trend. The exports in June total 4275 tons.

Antimony.—The dullness and weakness which have characterized this metal in the past few weeks are as acute as ever. The quotation for spot is 16c., but it is believed that a firm offer at considerably less would be accepted. July delivery can be had at 15c. It is not believed that the price will stiffen to any considerable degree unless there is a revival of shrapnel shell orders in this country, and this is regarded as very doubtful.

Aluminum.—The quotation for No. 1 virgin aluminum, 98 to 99 per cent pure, is easier at 60c. to 62c.

Old Metals.—The market is very unsettled. Dealers' selling prices are as follows:

	Cents per lb.
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
Heavy machine compositions	17.75 to 18.25
No. 1 yellow rod brass turnings	13 to 13.[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

Chicago

JULY 3.—Notwithstanding fair activity in copper, prices continue heavy, and the unusual spread between casting and Lake persists. Spelter suffered another sharp decline, spot prices going to 10.50c. in some instances, while third quarter contracts are even lower. Prices generally are lower. We quote: Casting copper, 24.50c.; Lake copper, 27c.; tin, carloads, 40c., and small lots, 42c.; lead, 6.70c. to 6.80c.; spelter, 10.75c.; sheet zinc, 18c.; Cookson's antimony, 50c.; other grades, 19c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 18.25c.; copper bottoms, 16c.; copper clips, 17c.; red brass, 15.50c.; yellow brass, 11.50c.; lead pipe, 4.75c.; zinc, 5.25c.; pewter, No. 1, 20c.; tinfoil, 24c.; block tin pipe, 29c.

St. Louis

JULY 3.—Market conditions have been quiet, with a tendency to ease off. Quotations at the close to-day were as follows: Lead, held at 6.75c., with 6.65c. bid; spelter, nominally 11.25c. to 11.50c. for prompt shipment and 11c. for all July shipment; tin, 39.35c.; Lake copper, 28c. to 28.25c.; electrolytic copper, 26.75c. to 27c.; antimony, Asiatic, 18c. In the Joplin district there was a further decline in prices, with the top figure for 60 per cent zinc ore $85 per ton, with premium settlements as high as $87.50, and the range was down to $60, second grade, with the average for the week $68. Calamine sold at $45 to $60, with the average for the week $50. Lead ore was unchanged at $77.50, basis of 80 per cent metal, with the district average at $75. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 8.50c.; heavy yellow brass, 11.50c.; heavy red brass and light copper, 15c.; heavy copper and copper wire, 18c.; pewter, 25c.; tinfoil, 32c.; zinc, 7.50c.; lead, 5c.; tea lead, 4c.

May Iron and Steel Exports a Record

WASHINGTON, D. C., July 5, 1916.—(*By Telephone.*)—The value of exports of iron and steel commodities of all kinds for the month of May, 1916, was $72,918,913, as compared with $58,722,411 for the month of April. This exceeds the best previous monthly record by 24 per cent. For the 11 months ended May, 1916, the total value was $545,418,532, as compared with $194,131,255 in the same period in 1915, and $279,377,451 in 1913, the movement for the eleven months thus surpassing the record by nearly 100 per cent.

W. L. C.

Steel merchant vessels building or under contract in private American shipyards on June 1, 1916, numbered 372 of 1,147,534 gross tons, comparing with 368 of 1,129,014 gross tons on May 1. Twenty new contracts were closed in May representing a tonnage of 81,470, and 13 vessels completed having a tonnage of [illegible],840.

The Harrisburg Pipe & Pipe Bending Company, Harrisburg, Pa., which recently completed two orders for 700,000 shrapnel shells for the British Government, has received an order for 22,000 3-in. shells for use in the United States Ordnance Department.

REVIEW OF THE TIN SITUATION*

A Preliminary to the Drafting of a Specification by the A. S. T. M.

BY L. ADDICKS AND W. A. COWAN

A specification to be generally adopted must reasonably reconcile the inherent different points of view of producer and consumer. This requires a classification of the material which will allow the producer to market everything produced and the consumer to choose the grade suitable for his particular work, paying accordingly. It is obviously necessary to understand the situation from both sides when a specification is to be drawn up, and this providing of a common ground is one of the chief functions of this society.

In the case of tin this mutual understanding is wholly lacking at the present time, due chiefly to the great geographical distance between the points of production and consumption and the speculative basis on which tin is handled by a broker as a middleman. This brief review is offered after investigation by the committee instead of a formal specification because it is believed that a preliminary discussion is necessary before even the foundation of a specification can be laid.

Practically speaking, there is but one ore of tin, cassiterite, which in some cases is almost pure stannic oxide. It occurs as "vein tin" in mineral lodes and as "stream tin" in alluvial deposits. Vein tin is generally associated with other minerals, while stream tin is much purer.

GEOGRAPHICAL DISTRIBUTION

Tin is found in paying quantities in very few places. The relative importance of the sources may be judged by their approximate outputs, stated below in gross tons of metallic tin per annum.

	Gross Tons
Straits	[illegible]
Bolivia	[illegible]
Banka and Billiton	[illegible]
Cornwall	[illegible]
Australia	[illegible]
China	[illegible]
South Africa	[illegible]
Miscellaneous	[illegible]
	115,000

The Straits tin comes from Penang, Singapore and Malacca, the two latter being towns on the Malay Peninsula and the former an island off the west coast and in English hands. Banka and Billiton are islands in the Dutch East Indies.

METALLURGY

The metallurgy of tin is very simple in the case of the pure deposits. The ores, which run but a few tenths of a per cent in tin, are readily concentrated by ordinary wet methods to a 60 to 70 per cent product, on account of the high specific gravity of cassiterite. The concentrate is smelted in a reverberatory furnace with coal as a reducing agent and the fluxes necessary to slag the remaining gangue. The resulting crude tin is then refined by liquating and drossing. As stannic oxide is difficult to reduce, the various impurities present are also reduced and largely collected in the crude tin, from which they can be but imperfectly removed by liquation. The result is that the purity of the final product depends largely upon that of the original tinstone, so that certain deposits have come to have a reputation as producers of high-grade tin. At this writing electrolytically refined tin is just beginning to appear on the market in quantity from the treatment of foul bullion produced in the usual way from Bolivian concentrates. Electrolysis of course should obliterate the past history of the crude tin.

MARKET

It has been the fixed policy of the Dutch and English colonies to smelt the tin concentrates at the point of production, export duties having been imposed on tin ores. Prior to the war, the Bolivian concentrates were sent to England and Germany, where they were worked into a low-grade tin. They are now coming chiefly to the United States and the crude tin obtained therefrom electrolytically refined as stated above. Up to this time it has been impossible to buy the desirable Straits and Banka products which make up the bulk of the high-grade output except upon reputation by brands, and the sales in America have been handled by brokers who are practically subject to the dictation of the Dutch-English ring controlling those brands, in spite of the fact that this country consumes 45,000 tons a year, or over a third of the world's production. The recent importation of Bolivian concentrates and their local treatment it is to be hoped will alter this situation.

According to the rules of the London Metal Exchange, tin is merchantable as standard tin only when the warrant is accompanied by analysis certifying that the metal contains either 99.00 or 99.75 per cent of pure tin, according to whether the quality is that of a common tin or refined tin, and also that it is of the correct physical condition.

Straits, Australian, English Refined, Banka and Billiton fall within the highest class, namely, refined tin. The Chinese tins are "off-grade," carrying considerable lead, and the German tins resulting from the smelting of Bolivian concentrates are very foul. Off-grade tins are sold on the basis of a sliding scale for tin content. The worst of them will run over 90 per cent tin, while the high-grade tins will run 99.8 to 99.9 per cent. The only tests required for good merchantable tin aside from its origin are that it shall run at least 99.75 per cent tin and that a bar when nicked and bent double shall not crack.

ANALYSES

The consumer has generally met the situation in which he finds himself by buying a first-class brand, analyzing it when he gets it, and then sorting the lots by analysis for certain uses. It is of doubtful value to give here a long list of analyses of different brands, but a rough idea of the various grades given above in Table I will illustrate the situation.

Table I—Analyses of Different Brands of Tin—All Values in Per Cent

Elements	Electrolytic*	Straits, Banka, Billiton	Australian	English Common	English Refined	German	Chinese	Bolivian
Tin	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Antimony	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Arsenic	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Bismuth	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Copper	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Iron	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Lead	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Zinc	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

*Representative analyses of the new electrolytic tin are not available at this writing.

USES

The principal uses of tin, aside from tin salts and pigments, are as metal in pipe, fusible boiler plugs, etc.; as a coating, as in tin plate, tinned wire, tin-lead foil, etc.; and in an alloy, as in bronze, babbitt, solder, britannia metal, type metal, fusible alloys, etc. The bronzes are alloys with copper and zinc; babbitt metal with antimony and copper; solder with lead and a little

*Presented at the meeting of the American Society for Testing Materials, Atlantic City, N. J., June 30.

antimony; britannia metal with antimony; [illegible] alloys with lead, bismuth and cadmium.

ALLOWABLE IMPURITIES

The impurities in tin may cause trouble by poisoning, as in the case of pipe and tin cans; by impairing fluidity, causing an excessive consumption of tin used for coating, or making solder hard to apply; by fouling an alloy and spoiling its appearance; by impairing the ductility of alloys which have to be worked, such as bronze or britannia metal; by causing local galvanic action and possibly "tin pest;" and by affecting the melting point of fusible alloys.

In a general way the purest obtainable tin is desired for pipe and boiler plugs. The U. S. Bureau of Standards has found that zinc, generally introduced by a foul pot when remelting tin, causes serious deterioration in boiler plugs and recommends as nearly as possible absolute freedom from zinc and lead.

One of the tin-plate manufacturers states that lead makes a mottled finish, iron causes rough surface and impairs fluidity, and arsenic and zinc tend to form poisonous salts. They suggest maximum allowable percentages as follows:

Lead	[illegible] per cent
Copper	0.02 per cent
Iron	[illegible] per cent
Arsenic	[illegible] per cent
Antimony	0.02 per cent
Zinc	0.05 per cent

One of the manufacturers of wrought bronze gives the following maximum allowable percentages:

Antimony	[illegible] per cent
Bismuth	0.001 per cent
Lead	[illegible] per cent
Iron	[illegible] per cent

Book Review

Exporters' Encyclopaedia for 1916. Pages 1175, 5½ x 8 in. Published by the Exporters Encyclopaedia Company, 80 Broad Street, New York. Price, $7.50, including monthly corrections and Exporters' Review.

Designated as a complete shipping guide, this volume, now in its twelfth yearly edition, contains a vast fund of information of value to all engaged in export trade or have need to post themselves on its intricacies. It contains such a wealth of detail that a complete recapitulation of its contents cannot be here attempted. The area, population, commerce and products of each country are given, as well as such information as points through which bills of lading are issued, shipping routes, cable tolls, consular charges and regulations, coinage conversion tables, location of consulates, banks and bankers in foreign trade, collection of drafts, distances, duties, packing, forwarding, freight rates, etc. The book is highly indorsed by transportation lines, export houses, forwarders and manufacturers.

Stainless Steel from a German Viewpoint

Commenting on stainless steel, a recent British invention, a German technical paper the *Metallbörse*, says that its investigations reveal that the steel is a high-grade chromium alloy containing up to 12 per cent chromium, an average analysis of one sample showing: Carbon, 0.28; manganese, 0.12; silicon, 0.01; chromium, 12.7; cobalt, 0.45; and iron, 86.6 per cent. It found the limits of elasticity and elongation to alter with the heat treatment, the former being very high, from 28 to 33 tons per sq. in. in the forged material, with the tensile strength at 44 to 55 tons per sq. in. Annealed material showed an excellent elongation, frequently exceeding 27 per cent, with a reduction of area of 50 per cent. The Brinell hardness was reported as 185, necessitating great care in forging and rolling. Although capable of resisting ordinary corrosive influences, this authority states that these alloys are attacked by 10 per cent sulphuric acid, the loss of a 10 per cent chromium alloy being 18 per cent and of a 15 per cent alloy as high as 33 per cent.

The Corrosion of Condenser Tubes

The third report of the Committee on Corrosion of the British Institute of Metals was presented at the recent annual meeting of the Institute at London. The report was written by William E. Gibbs, special instructor of metallurgy in the University of Liverpool, who was responsible for the later portion of the investigations. It also embodies work by R. H. Smith, late Wiggins scholar in metallurgy in the University of Birmingham, and Dr. Guy D. Bengough, lecturer in metallurgy in the University of Liverpool.

A preliminary note states that the work has been rendered difficult because of the war. It contains, however, 127 pages and records work done on the corrosion of condenser tubes that has been carried on at the Institute's experimental plant at Liverpool. It is divided into eight sections. The following extracts are from an abstract of the committee's work made by the London *Iron and Coal Trades Review*.

It may briefly be recorded that the sea water corrosion of ordinary brass (70 per cent copper and 30 per cent zinc) at 30 deg. C., 50 deg. C., and 60 deg. C., has been compared with that of Admiralty metal (70:29:1), a special lead-brass (70:28:2), phosphor-bronze (96:4), and aluminum-copper (92:8). It is found that aluminum-copper dissolves more slowly than the brasses. The phosphor-bronze dissolves more rapidly than the brasses. In each case both hard-drawn and annealed test pieces of the alloys were used. Generally speaking the hard-drawn metal dissolved less rapidly than the annealed, but is more readily attacked locally and selectively. Aeration of the sea water accelerates the rate of corrosion, more especially at the lower temperatures.

Corrosion in gently aerated diluted sea water (e.g., estuary water) has been examined in some detail. The rate of solution of each alloy is diminished by diluting the seawater, but the degree of selective corrosion is greatly increased. It is found that the rate of solution of pure copper is diminished by diluting the sea water, and is least in distilled water. That of pure zinc is greatly increased by diluting the sea water, and is greatest in distilled water.

Diluted sea water also facilitates the formation of deposits of oxy-salts of zinc upon the surface of the metal. These oxy-salts are found to promote local selective corrosion. In diluted sea water the phosphor-bronze is the most satisfactory of the alloys considered.

The corrosion of the above mentioned five alloys has also been examined in distilled water saturated with carbon dioxide, at 30 deg. C. and 50 deg. C., and in a 0.15 per cent solution of common salt, at 30 deg. C. and 50 deg. C. Dezincification is promoted by a low concentration of salt, and by a relatively high concentration of carbon dioxide. Contact with coke is found to promote dezincification of the Admiralty metal, provided that good electrical contact exists between the metal and the coke. Under service conditions good contact is probably the exception rather than the rule.

The influence of the surface condition of the metal has been investigated, and is shown to be important during the early stages of the corrosive attack. The corrosion of 70:30 brass has been compared with that of pure zinc and water.

The report contains a section which is devoted to a consideration of the bearing of the results of the experimental work upon the practical problem.

Some Welsh Tin-Plate Details

Tin-plate bars for use in the Welsh tin-plate industry rose from $24 to $58 per ton in 1915, with tin selling at one time at $905 per ton, and with sulphuric acid very scarce. Tin plates themselves advanced from $3.09 per box of 108 lbs. for Bessemer coke (I.C. 14x20), f.o.b. Cardiff or Swansea, to $6.07 per box in December, 1915, the highest price since 1880, when it was $7.78, with $9.73 some years before. Exports to France rose from 21,332 tons in 1913 to 59,703 tons in 1915, and to Norway from 25,166 tons in 1913 to 38,510 tons in 1915. Exports to the United States in 1915 were only 1014 tons, against 21,516 tons in 1913 and 17,468 tons in 1914.

PERSONAL

Samuel M. Vauclain, vice-president of the Baldwin Locomotive Works, was presented with a silver loving cup at his home, "Broadlawn," at Rosemont, near Philadelphia, on Saturday, July 2. The presentation was made by J. P. Sykes, general superintendent of the Baldwin Works, in behalf of the employees of the Remington Arms Company and the Eddystone Ammunition Company, besides those of the Baldwin Locomotive Works, 600 of whom were present. The event was in recognition of Mr. Vauclain's thirty-third year as a member of the Baldwin organization.

Capt. Robert W. Hunt, Chicago, has had conferred upon him by the Rensselaer Polytechnic Institute, with which he has long been identified, the degree of doctor of engineering. His interest in this institution has been a very close one, and recently he contributed largely toward the cost of erecting new dormitories, at which time a portrait done by Lewis Betts was also presented to the school.

Prof. Henry M. Howe's friends have learned with pleasure of his appointment as honorary vice-president of the (British) Iron and Steel Institute. There are but two others—Prof. D. Tschernoff of Russia and Giorgio E. Falck of Italy.

Harry H. Pinney, a vice-president of the Remington Arms-Union Metallic Cartridge Company, is now in charge of the arms plant of the company at Bridgeport, Conn., retaining charge also of the ammunition plant of the company at Hoboken, N. J. Major Walter G. Penfield, general works manager, goes to the New York office to take up important special work. Mr. Pinney was formerly for four years manager of the Union Metallic Cartridge Company and has held important positions with the Westinghouse Electric & Mfg. Company, National Cash Register Company and Chalmers Motor Car Company. He was born in Glastonbury, Conn., and learned the machinist and toolmaking trade with the Pratt & Whitney Company, Hartford, Conn.

L. S. Voigt, formerly mechanical engineer with the Hydraulic Press Mfg. Company, Mt. Gilead, Ohio, is now connected with the coke and by-products department of the Illinois Steel Company at Gary, Ind.

William Hugus, who has been superintendent of the Crescent plant of the American Sheet & Tin Plate Company, Cleveland, Ohio, has been appointed superintendent of the Laughlin plant of this company at Martins Ferry, Ohio, effective July 1. He has been succeeded in Cleveland by C. M. Ballou, who has been connected with the company's National works at Monessen, Pa.

Carl F. Meyer, formerly of Baltimore, will sail for Liverpool, England, July 22, where he will represent the Landis Machine Company, Waynesboro, Pa.

K. W. Zimmerschied, metallurgist, General Motors Company, Detroit, Mich., was made a life member of the Society of Automobile Engineers at its annual meeting in June in recognition of his work as chairman of the Steel Standards Committee.

H. B. McMaster, formerly general manager of branches of the Berger Mfg. Company of Canton, Ohio, has resigned to become vice-president and general manager of the Gordon Tire & Rubber Company, also of Canton.

W. D. Crawford, former president of the LaBelle Iron Works, Steubenville, Ohio, is spending the summer months at East Quogue, Long Island.

J. B. Kessler, general agent of the Carnegie Steel Company, Pittsburgh, has returned to that city after an absence of several months on the Pacific coast.

The American Steel & Wire Company, Pittsburgh, C. L. Miller, vice-president and general superintendent, announces the following appointments, effective July 1: John Wheeldon, formerly superintendent of the Cuyahoga works, Cleveland, Ohio, district, has been appointed superintendent of the South works, Worcester, Mass., district, succeeding J. F. Tinsley, resigned. G. L. Peters, formerly superintendent of the American works, Cleveland district, appointed superintendent of the Cuyahoga works, Cleveland district. F. Ingraham, formerly superintendent of the Rockdale works, Joliet, Ill., appointed superintendent of the American works, Cleveland district. L. E. Booth, formerly superintendent of the Scott Street works, Chicago district, appointed superintendent of the Rockdale works, Chicago district. H. R. Patterson, formerly superintendent of the Trenton, N. J., works, appointed superintendent of the Scott Street works, Chicago district. B. J. Spalding, formerly assistant superintendent of the Donora wire works, Donora, Pa., appointed superintendent of the Trenton works, which are also included in the Pittsburgh district.

A. E. Bateson, assistant purchasing agent of the Allis-Chalmers Mfg. Company, Milwaukee, Wis., has been promoted to manager of the purchasing department to fill the vacancy caused by the death of William P. Harper. F. E. Haker has been promoted to first assistant. Mr. Bateson has served the Allis-Chalmers Company and its predecessors for 26 years in various capacities.

George A. Yule, who will continue to act as treasurer, has been elected president of the Bain Wagon Company, Kenosha, Wis., to succeed his father, George Yule, who died two weeks ago. William Head Yule, Akron, Ohio, was elected vice-president and J. C. Lund, formerly of Ravine, Wis., is the new secretary. The new president has been active manager of the business since 1901.

L. H. Mesker has been appointed sales manager of the Kearney & Trecker Company, milling machines, Milwaukee, Wis. He will have his headquarters at Milwaukee, but for the present will retain the direct supervision of sales in the Ohio territory.

William M. Henderson, who recently resigned as assistant superintendent of the frog, switch and signal department of the Steelton plant of the Pennsylvania Steel Company, has become assistant works manager of the Easton, Pa., plant of the Taylor Iron & Steel Company. He was with the Pennsylvania Steel Company 19 years.

John E. Ericson, supervisor of improvements at the Steelton plant of the Pennsylvania Steel company, has resigned, effective July 5, and has become associated with the Clinton N. Scovell Company, consulting engineer, of Boston, New York, Chicago and Springfield, Mass. He will be identified with the scientific management end of the work and will be stationed at Boston, where he will assume his duties July 17.

George D. Kirkham, since the first of the year representing the American Steel & Wire Company in the jobbing trade in Iowa, Wisconsin and Illinois, made his thirtieth annual vacation trip to New York and the Atlantic seaboard last week, leaving on July 1 for a short trip to Nova Scotia. His headquarters are now in Chicago, where he lived until 14 years ago, when he was given Southern territory for the American Steel & Wire Company, with headquarters in Memphis.

W. H. Mixer, vice-president Syracuse Smelting Works, Brooklyn, N. Y., has completed an extended tour about the country.

E. R. Marker, district manager of the T. L. Smith Company, maker of concrete and other mixing machinery, has moved to new quarters at 609 Wells Street, Milwaukee, Wis., where he will take charge of the business of the company as Wisconsin representative. He will carry a stock of contractors' supplies.

Herman Nieter, formerly sales manager for the Kennicott Company, Chicago, and later manager of the New York office of the Blaw Steel Construction Company, is now sales engineer with the American Spray Company, 26 Cortlandt Street, New York, engaged in installing water and air cooling systems and gas and fume cleaning systems.

E. H. Collister has been appointed superintendent of the new Koppers by-product coke plant of 94 ovens now being built by the LaBelle Iron Works, Steubenville, Ohio.

F. J. Denk of the Steel City Engineering Company, House Building, Pittsburgh, has been appointed con-

sulting engineer for the Phoenix Glass Company, Pittsburgh and Monaca, Pa.

A. C. Niemann of the sales force of the Gisholt Machine Company, Madison, Wis., has been transferred to the New York office of the company as an assistant to R. D. Heflin, manager.

D. N. Barker, in charge of the Chicago branch office and warehouse of the Jones & Laughlin Steel Company, resigned July 1 after 44 years of service. He has been succeeded by S. E. Hackett, formerly with Joseph T. Ryerson & Son, Chicago, in charge of purchases. Mr. Barker will retire from active business.

William T. Todd, Jr., has been added to the selling force of the Somers, Fitler & Todd Company, Pittsburgh. He graduated from Cornell University in June as a mechanical engineer.

Wallace R. Johns has been appointed manager of the machine tool department of the Somers, Fitler & Todd Company, Pittsburgh. He has been connected with the company for the past eleven years.

Midvale Establishes New Office Department

A. C. Dinkey, president Midvale Steel Company, announces that in order to expedite the handling of orders it has been decided to organize an order and shipping department, located in the Widener Building, Philadelphia, under John C. Neale, general manager of sales, who has appointed F. H. Lewis as manager of orders. The purpose of the department is to receive orders from the sales department and place them at the various mills for execution.

It is not the intention, for the present at least, to make the actual mill entry in the Widener Building, but copies of all mill orders will be on file at this point, and all original orders will be returned here after proper entry has been made. The department will be in position at all times to give full and complete information regarding shipping matters, and will be responsible for keeping promises made to customers.

All correspondence regarding shipment of orders, changing of orders, etc., in the case of the Midvale Steel Company and Worth Brothers Company should be addressed to F. H. Lewis, manager of orders, Philadelphia, from which point answers will be sent. In the case of the Cambria Steel Company, all mail pertaining to orders should be addressed to F. H. Lewis, manager of orders, Widener Building, Philadelphia, with a copy to F. E. Thompson, superintendent of order department, Johnstown, and reply will be sent direct from Johnstown, with copy, to Philadelphia.

Another Electric Steel Plant

The Crucible Steel Forge Company, Cleveland, Ohio, will build a new plant, and will make electric steel for use in its forge shop. A Roechling-Rodenhauser induction furnace of two tons capacity will be installed for making steel of the higher qualities and alloy steels. After the first furnace is in operation the company plans to install a similar furnace of larger capacity. The company's new plant will be located in Newburgh, on the Belt Line Railroad, and will occupy a building about 45x400 ft. Its products are alloy and tool-steel forgings. A new forging press and several hammers will be installed. Its forging capacity will be trebled, and its furnace capacity will be four or five times that of the present plant. The company's electric furnace will be the third of this type to be installed in the United States, two having recently been started at the plant of the American Iron & Steel Mfg. Company, Lebanon, Pa.

The annual meeting of the directors of the Barney & Smith Car Company, Dayton, Ohio, was held in that city June 30. All of the old officers of the company were elected as follows: President, H. M. Estabrook; first vice-president and general manager, A. J. Stevens; second vice-president and treasurer, J. Frank Kiefaber; secretary and assistant treasurer, E. A. Oblinger; assistant secretary, E. H. Sines.

Providence Engineers' Annual Meeting

Reports read at the annual meeting of the Providence Engineering Society, Providence, R. I., held in the Engineering Building, Brown University, June 28, showed that the society had made rapid strides in growth and influence in the few months since its formation. In the afternoon, through the courtesy of F. E. Winsor, chief engineer of the Water Supply Board of Providence, about 120 members of the society enjoyed a view of the site and the preparatory work of the engineers of the big reservoir now under construction in the town of Scituate. This project will take several years to complete, and will furnish a dependable and pure supply of water calculated to take care of the city's needs for forty or fifty years.

At the conclusion of the tour of inspection, the members dined at the University Club and then adjourned to the Engineering Building. Here Mr. Winsor gave an illustrated talk on the Scituate water supply. G. T. Seabury, an engineer of the Water Supply Board, in charge of field operations, gave an interesting account of the method of making borings and the facts so far discovered in the work. F. E. Waterman, another member of the engineering staff engaged on the reservoir work, gave a rather humorous description of the difficulties involved in determining real-estate values and ownership.

R. A. Annan, Rhode Island Tool Company, retired president, discussed the future of the society, and received a rising vote of thanks for the fine work he had done in bringing the society into existence and in guiding its affairs during its formative days. Prof. J. Ansel Brooks, Brown University, was elected president, and the other officers chosen were: Vice-presidents, R. W. Adams, General Electric Company; G. A. Carpenter, city engineer, Pawtucket; W. T. Robertson, architect. Corresponding secretary, A. E. Thornley, Narragansett Machine Company; recording secretary, W. C. Kennedy, General Fire Extinguisher Company; treasurer, A. E. Whatley, consulting engineer; councillors for three years, F. E. Winsor, R. E. Brunet, W. C. Pickersgill and L. Earle Rowe.

Eighty-one applicants were voted into membership and 66 applications were received. These bring the total membership to 487.

Mechanical Engineers' Annual Meeting

The valuation of industrial property will be the feature of the annual meeting of the American Society of Mechanical Engineers, to be held in the Engineering Societies Building, 29 West Thirty-ninth Street, New York City, Dec. 5 to 8. Among the topics to be considered are: Actual Appraisals by Short Methods; Does Valuation of Industrial Property Differ from Public Utility Valuation; Relation Between the Perpetual Inventory Value and Appraisal Value; Engineering Economics of Partial Construction dealing with piecemeal construction—how such construction is regarded in appraisals, Amortization and Depreciation. There will also be the usual sessions under the auspices of the railroad, machine-shop practice and gas-power subcommittees, together with a number of miscellaneous papers.

The 1917 spring meeting of the society will be held at Cincinnati. The exact date has not yet been definitely settled.

Holden A. Evans has been elected president of the Baltimore Drydocks & Shipbuilding Company, Baltimore, Md. The other officers are Clement C. Smith, Milwaukee, Wis., vice-president; J. M. Willis, Baltimore, second vice-president; Edwin W. Poe, Baltimore, secretary; George Allison, Baltimore, treasurer. The controlling interest of the company was recently taken over by Milwaukee interests. Mr. Evans was formerly general manager.

P. F. Burke, South Boston, Mass., has sold his patent steel toe-calk and horseshoers' foot vise business to the Franklin Steel Works of Joliet, Ill., and Cambridge, Mass.

STRIKES AND SETTLEMENTS

The Situation at Milwaukee

The controversy between employers and operatives in the metal-working industry in the Milwaukee district over the 8-hr. day was brought to a climax July 1 by the announcement of a reduction of 2½ hr. in the time per week, or from 55 hr. to 52½ hr., at the present hourly rate of pay. The present schedule of hours will continue, but overtime will commence from 52½ hr. instead of 55 hr. The announcement followed the conclusion of an exhaustive investigation of the hours-of-labor situation in competitive industries in the Middle West under the direction of the Industrial Commission of Wisconsin, at the request of 35 Milwaukee employers. Although the investigation shows that the working time in a majority of competitive shops is 55 hr. and over per week, the Milwaukee employers voluntarily reduced the hours per week.

Whether or not the organized machinists will accept the 52½-hr. week as a compromise of their demand for an 8-hr. day at the present 9-hr. pay remains to be seen. A few days ago the representatives of the unions announced at a mass meeting that, unless the employers acceded to the demand for an 8-hr. day before July 7, a strike would be inevitable. The effect of the voluntary reduction in hours is therefore awaited with deep interest.

In the investigation, conducted for the commission by Edwin E. Witte, University of Wisconsin, statistics were obtained from 983 shops of competitive industries in the Middle West, employing 93,540 people. Thirty-eight per cent of the shops are working less than 54 hr. per week, while 62 per cent are working 55 hr. or over per week. Twenty-two per cent are working less than 54 hr. per week and 78 per cent are working 54 hr. or over per week. In order to appreciate the comparison, it should be understood that the metal-trades shops in the Milwaukee district have been on a 55-hr. basis. The report shows further that, on the basis of employees, 50 per cent of the 93,540 operatives are working less than 55 hr. per week, and 50 per cent are working 55 hr. or over per week. Thirty-six per cent are working less than 54 hr. per week, and 64 per cent are working 54 hr. or over per week.

The 35 industries affected by the investigation and hours-of-work reduction are the largest employers in the Milwaukee district, and include machinery, machine-tool, crane, motor-truck, lubricating and counting machinery manufacturers and all lines of the foundry business.

Other Localities

The strike fever in New England seems to be nearly over. No disturbances of any prominence have been reported the past week and conditions where trouble has existed are fast approaching normal. The plant of the Plume & Atwood Mfg. Company, Thomaston, Conn., reopened June 27 and the strikers are rapidly resuming their places. The factory was opened under the conditions previously offered to the strikers as a compromise. The minimum wage will be 25c. an hour and other wages will be raised to correspond; time and a half will be paid for overtime and the weekly working schedule will be 55 hr. The striking brass molders at the Russell & Erwin division of the American Hardware Corporation, New Britain, Conn., have nearly all returned to work, having accepted an offer which they had some time ago refused, of a 5 per cent bonus after a stated day's wages have been earned. The directors of the Colt's Patent Firearms Mfg. Company, Hartford, Conn., have voted to continue the bonus payments to employees for another six months. Bonuses are paid every three months and average about 12½ per cent of the net profits of the company.

Employees at the Carnegie Steel Company's plant, Bush and Wicomico streets, Baltimore, Md., went on strike last week, demanding an 8-hr. day, an increase of 10 per cent in wages and time and a half for overtime work.

The labor situation at Cincinnati, Ohio, is about normal as far as the local machine-tool plants are concerned, and only a few plants are still being picketed. An arrangement effected last week between the local street railway company and its employees has set at rest rumors that a strike would be called this summer. At Hamilton, Ohio, one large machine shop is still having some trouble, although most of its men who went out eight weeks ago have returned to work. In Dayton, Ohio, unskilled workmen in one plant caused some inconvenience last week, but the supply of this class of men is in excess of the demand and the trouble was speedily adjusted.

A general strike of organized machinists in Philadelphia and vicinity was called July 1 by the International Association of Machinists. The union is demanding an 8-hr. day. No demand is made for wage increases. According to the officers of the union, about 7000 machinists have answered the call, but these figures are disputed by employers. Sixty-eight concerns in Philadelphia and vicinity, employing machinists and other metal workers, have published a statement that they are unable to grant the shorter workday.

The most serious of the many problems confronting manufacturers in the extreme Northwest is the continuance of labor troubles in all Pacific coast ports. The big strike of several weeks ago had been settled only a few days when it broke out anew, and the Puget Sound and Columbia River ports are now paralyzed by strikes of longshoremen and union dock workers. The coastwise trade is absolutely idle, and tidewater lumber mills specializing in coastwise markets report rapidly congesting docks, with little hope of immediate remedy. Many carloads of machinery for mills in Oregon and Washington routed north by sea from San Francisco, have been held up at that port, pending settlement of the strike.

Steel Bar and Barb Wire Exports

The contributions of this country to the war continue to mount to higher figures. The following table of Government data shows our exports of steel bars and barb wire to be very much greater now than at any previous time:

	Steel Bars		Barb Wire	
	Gross Tons	Tons Per Month	Gross Tons	Tons Per Month
January, 1916	38,400		33,962	
February, 1916	33,891		29,577	
March, 1916	57,111	56,904	37,242	32,117
April, 1916	58,214		27,689	
Last quarter, 1915	129,666	43,222	75,732	25,244
1915	426,002	35,500	248,619	20,718

Steel bar exports are now at the rate of 682,848 tons per year, judged by those for the first four months of this year, a 50 per cent increase over those for 1915. Barb wire exports, based on the average of 32,117 tons per month to May 1, 1916, are at the rate of 385,404 tons per year, also an increase of 50 per cent over the total for 1915.

Great Britain's exports of steel bars in 1915 were 489,464 gross tons, which was less than our present rate.

Larger Imports of Manganese Ore

Imports of manganese ore into the United States in April were 48,413 gross tons, the largest this year. This brings the average to May 1, 1916, up to 24,989 tons per month, which compares with 26,731 tons per month in 1915 and 28,757 tons per month in 1913. For the 10 months to May 1, 1916, the total imports have been 355,795 tons, against 159,203 tons and 242,748 tons for the same periods in 1915 and 1914, respectively. The present rate is above the five-year average. In April, 1915, the imports were only 218 tons.

The Woodard automatic safety exit doors are to be manufactured by the Up-To-Date Mfg. Company, 945 North Tenth Street, Terre Haute, Ind., which company has secured manufacturing and selling rights in the United States territory from the patentee of the door, C. B. Woodard, Springfield, Tenn. The door, it is understood, has the official approval of the committee on standards of the New York City fire department and of the American Society for Fire Prevention.

Pittsburgh and Nearby Districts

The recently organized United States Electrical Steel Company, which proposes to build a steel plant at South Connellsville, Pa., will not install sheet mills, as has been reported. The company will make high-grade electric steel in either plate or billet form. The only contract placed so far is for a 10-ton Greenwood Dixon electric furnace. The remainder of the equipment will be bought in the near future.

James A. Campbell, president Youngstown Sheet & Tube Company, Youngstown, Ohio, denies reports of a proposed merger of his company and the Inland Steel Company of Chicago. No negotiations of any kind are on at present looking to a merger of the Sheet & Tube Company with any other interest.

The Pressed Steel Products Company, manufacturer of drawn, stamped and spun-metal specialties, Sharon, Pa., will erect a new building of mill construction, 60x200 ft., one story, for the manufacture of steel drums for carrying oil.

The Wilkes Rolling Mill Company, Sharon, Pa., whose plant has been idle for a long time, may put it in operation at an early date. The plant has puddling furnaces, and its output is muck bar only.

The Pennsylvania Railroad is stated to be having a satisfactory experience with its 70-ton steel cars, which have been in commission for some months, and will build more. In fact, it has out an inquiry for 5000. The car itself weighs 57,600 lbs., and its length is 47 ft.

The Harrison-Walker Refractories Company, Pittsburgh, for the six months ended March 31 reports a surplus after all charges and dividends of $739,534. This compares with a surplus of $562,889 for the entire previous fiscal year. The statement for six months shows earnings after expenditures, $1,714,972; extraordinary expenses, $327,438; net profits, $1,387,534; dividends on preferred and common, $648,000; surplus, $739,534.

The American Lead Company, Pittsburgh, will increase its capital stock from $100,000 to $300,000.

The H. C. Frick Coke Company, Pittsburgh, has sold 52 acres of land in East Huntington Township, Westmoreland County, to the United States Cast Iron Pipe & Foundry Company for a consideration of $7,587.

The LaBelle Iron Works, Steubenville, Ohio, has made application to list on the Pittsburgh Stock Exchange $3,500,000 5 per cent gold bonds. This is part of an issue of $7,000,000 in 5 per cent gold bonds, authorized by this company some time ago, but only half of which was sold. The proceeds will be used largely in the building of a steel bridge across the Ohio River from the West Virginia side to Steubenville, and also in payment for 94 Koppers by-product coke ovens, now being built, and which will be completed in a few months.

Reports that the American Steel & Wire Company, of Pittsburgh, is the purchaser of the old Zug & Co. property, formerly known as the Sable Iron and Steel Works, at Thirteenth and Etna streets, Pittsburgh, are incorrect, as it has neither bought the property nor tried to purchase it. It is believed, but not confirmed, that the property was bought by the Pennsylvania Railroad Company.

The Driggs-Seabury Ordnance Company, Sharon, Pa., has received an order from the United States Government for 2550 Lewis machine guns.

Herbert Du Puy, chairman of the Crucible Steel Company of America, Pittsburgh, denies that his company has recently received an order for $4,000,000 of munitions from the United States Government; and he further states that his company has not received any orders from the Governmentf or munitions since Jan. 15 last.

The North East Foundry & Machine Company, manufacturer of gray iron and semi-steel castings, North East, Pa., was recently organized and has elected the following officers: President, J. J. Finerty, Buffalo, N. Y.; vice-president and general manager, F. G. Pottmeyer, Midland, Pa.; secretary and treasurer, E. A. Finerty, Midland. It has purchased the property formerly owned by the North East Foundry Company at North East, Pa., and will begin operations July 5, 1916, producing light miscellaneous castings, and also intends to specialize in tube mill castings and split molds for crucibles. F. G. Pottmeyer, manager, formerly assistant superintendent of the Pittsburgh Iron & Steel Foundries Company plant at Midland, Pa., is making extensive alterations, also installing new equipment in the machine shop and foundry. E. A. Finerty, secretary and treasurer, comes from the Pittsburgh Crucible Steel Company. Among the stockholders of the new company is J. J. Finerty of Buffalo, N. Y.

The Lakeside Forge Company, maker of drop forgings, Erie, Pa., has just started an addition to its machine shop, 75 x 80 ft., at a cost of about $10,000, to provide additional capacity for the manufacture of wrenches. The company has recently installed a number of new hammers and otherwise greatly increased its equipment.

The Jones & Laughlin Steel Company is rebuilding its No. 11 merchant steel bar mill at its South Side works, Pittsburgh, which when completed will have an output of about 8000 tons per month. The company has added in the past year one Bessemer converter at its South Side works and one at its works at Aliquippa, Pa., which give the company a total of about 15,000 more tons of Bessemer steel per month. This increased steel output will be used largely in the new bar mill and also in the new skelp mills which are being built at Aliquippa, and which will be making skelp about Sept. 1.

The New British High Speed Steel

Our London correspondent sends the following concerning the new non-tungsten high speed steel, referred to in THE IRON AGE, June 29, 1916:

A new steel alloy known as Reactol, and produced at Sheffield, is arousing a good deal of interest in England among makers of high-speed tool steel. It is said that it contains neither tungsten nor cobalt, and that it requires neither forging, hardening nor tempering, but merely has to be ground into shape in order to make it ready for work of the heaviest character. Very high service claims are made for it.

As is well known the greatest drawback to the use of high-speed tools is the length of time it takes to make them. It is claimed for Reactol that it does away with nearly all of this, thus saving large sums in material, plant and labor. In a recent test it was found impossible to rough a shell in less than 14 minutes by the employment of ordinary high-speed steel tools, but Reactol is reported to have roughed 5 similar shells in 9 minutes. It may be stated that the Reactol alloy has been invented purely for high speeds and heavy cuts. Therefore, it would be almost impossible to use it on low-speed machines unless, of course, they possessed very heavy feeds. Experiments are being made in England with tools made from this new alloy, but the various rates at which they can be run are unknown at present.

Ohio Works Get New Shell Orders

The Barney & Smith Car Company, Dayton, Ohio, has received an order for forging approximately 2,000,000 shells for the British Government ranging in sizes from 3½ in. to 6 in. Work will be commenced immediately and the contract is expected to be completed before the end of the year. This company has recently completed the delivery of 3,000,000 shrapnel shells for the Russian and French governments. It is estimated that its new order will require approximately 50,000 tons of steel bars.

Another shell order has also been placed recently in southern Ohio, calling for approximately 300,000 shells ranging from 6 in. to 9.2 in., all for shipment this year.

The Poese Machinery & Mfg. Company, Cleveland, Ohio, announces that in the future it will be known as the American Speed-Machinery Company.

Machinery Markets and News of the Works

RESALE TOOLS APPEARING

Offers Follow Ending of War Contracts

Current Domestic Orders Keep the Trade Comfortably Busy—General Electric to Purchase Several Tools

Lists of machine tools are now being quite extensively offered for resale by munition manufacturers, most of whom have been engaged on contracts for shrapnel and small-sized high-explosive shells. On the other hand important new business is reported from Chicago from firms who have taken some of the recently placed shell contracts, and are actively gathering together special machinery and more powerful tools for making the large high-explosive shells.

The large export orders for motor trucks are also said to be nearly completed; nevertheless all through the Central West truck makers are busy and continue to buy machine tools, although not in large quantity.

Deliveries on standard tools are easier. Domestic inquiry is a little irregular; but it still keeps sellers in a comfortable position. The demand for large-sized machine tools is better, especially for planing, boring and radial drilling machines.

The railroads remain averse to entering the market for equipment while it is at its present high level. This condition is general not only throughout this country, but also in Canada. The Pennsylvania Railroad has issued a good inquiry for lathes for its Altoona shops. This is about the only attractive new business from these sources.

The first let-up in industrial expansion in New England within two years is noted, and is attributed not to any measureable slackening in production, but to the scarcity of labor and the exorbitant wages paid for unskilled workmen. Some noteworthy construction work is being undertaken in the Chicago district, where the Pullman company is reported to be having plans drawn for shop buildings to cost $3,000,000, and the Moline Plow Company of Rock Island, Ill., has announced plans for additional plant construction to cost about $1,000,000.

The General Electric Company has issued a rather extensive list of equipment.

New York

New York, July [illegible], 1917

Dealers in machine tools are beginning to receive lists of machines offered for sale by firms which have completed or nearly completed their contracts for shells. Practically all of them made shrapnel and the smaller sizes of high explosive shells.

The American Locomotive Company has cleaned up its contract, and it is reported that the company will send some of the tools stored or operated by it several months ago to its plant at Montreal, Canada, a part will be retained and the [illegible] sold.

The Worthington Pump & Machinery Corporation, New York, the International Arms & Fuse Company, Bloomfield, N. J., and the Traylor Engineering & Mfg. Company, Allentown, Pa., are also reported to have machines to sell, one or two in fact having issued lists of the tools of which they wish to dispose. In one case a complete fuse plant is offered for sale.

The Canadian Car & Foundry Company states that it has shipped about 1,500,000 of the 5,000,000 shrapnel shells ordered by the Russian Government. Shipments to date total about $22,000,000. It is expected that the total contract, amounting to about $85,000,000, will be completed by Nov. 1. About 30 companies took sub-contracts from the Canadian Company. Component parts of shells are being delivered at a fast rate, as they have been for some time.

The J. L. Mott Company, Trenton, N. J., and the General Electric Company, Schenectady, N. Y., are figuring on a contract for steel fuse contracts, but there is not much new business in shells or parts, outside of the larger sizes in which the regular manufacturers of munitions are chiefly interested.

Roe & Brundage, 29 Broadway, New York, mill representatives, are making inquiry for shops which can machine fuses, the material being furnished by Roe & Brundage.

Frank Searle, 120 Broadway, New York, representing the British Ministry of Munitions, has for some time been the most important buyer for Great Britain. He has an elaborate suite of offices in the Equitable Building. Russian representatives continue to buy.

Domestic inquiry is a little irregular, but keeps sellers in a comfortable position. The Pennsylvania Railroad has issued a good inquiry for turret lathes for its Altoona shops. The Bijur Motor Lighting Company, Hoboken, N. J., is in the market for about 12 similar machines.

The General Electric Company, Schenectady, N. Y., is inquiring for a number of machines, in addition to those on which estimates were asked recently. Included in the new list are boring mills, large turret and engine lathes.

The Driggs-Seabury Ordnance Company, Sharon, Pa., manufacturer of rapid fire guns, shells, trench digging machinery and munitions generally, has been almost a steady buyer of machine tools of late.

A busy industrial center has been created in that section of Newark at Newark Transfer near Avenue R and Newark Bay. At one time a marsh, it has been converted within the past 18 months into a large manufacturing district, representing invested capital estimated about $20,000,000, and employing several thousand men. Its expansion has been even more remarkable and is due to the great demand which has been created in this country for chemicals. The Balbach Smelting & Refining Company and the Texas Oil Company have been located in this section some time. Among the newer additions to the colony are the American Synthetic Dyes Company, Marden Orth & Hastings Company, aniline dyes; the Public Service Railway Corporation, the Aniline Company of Newark, the Columbus Crystal Company, the Amalgamated Dyestuff & Chemical Works, the Keystone Company, the Rockwell Furnace Company, the Central Dye & Chemical Company, the Harrison Chemical Company, and the Sun Oil Company.

The Levering & Garrigues Company, 552 West Twenty-third Street, New York, has been awarded the structural contract for a one-story brick and steel factory, 46 x 215 ft., at Plainfield, N. J., for the Niles, Bement, Pond Company, 111 Broadway, New York, from plans by Harris & Richards, Drexel Building, Philadelphia, Pa., architects. It will cost about $25,000.

The Berlin Construction Company, 220 Broadway, New York, has the general contract for a one-story brick and steel chemical building, 50 x 84 and 50 x 75 ft., on the Shore Road, for the Oakland Chemical Company, 10 Astor Place, Rossville, Staten Island, N. Y., from private plans, to cost $[illegible].

The Valley Forge Cutlery Company, 101 Duane Street, New York, is building a two-story addition to its plant at 24 South Sixth Street, Newark, N. J., 50 x 90 ft., to be used for increasing its production of pocket knives. Work will be completed about Aug. 1 and full operations will be started shortly after. Gilbert C. Higley is the architect. Considerable special equipment will be installed.

The E-Z-Fit Artificial Limb Company, 7 East Forty-second Street, New York, recently incorporated with a capital stock of $25,000, has established a plant. Victor G. Aubry is president, H. Egli, vice-president, and Albert G. Follett, secretary and treasurer.

The Union Tank Line Company, 26 Broadway, New York, plans to erect at Olean, N. Y., a new car repair shop, of steel construction, 80 x 150 ft., to take two tracks, and have

a weekly capacity of about [illegible] house and office 25 x 120 ft. H. J. [illegible]

The U. S. Electro Galvanizing [illegible] Brooklyn, N. Y., manufacturer of [illegible] zing and plating equipment [illegible] W. J. Conway, 100 Union Street [illegible] tion of an extension to its [illegible] L. Potthoff is president and [illegible] manager.

The Lockport Glass Company, Lockport, N. Y., will erect an addition, 60 x 100 ft., to the [illegible] Street at a cost of about $[illegible]; it will be of steel and concrete, two stories. The company will [illegible] present force of 200.

The North East Electric Company, Rochester, N. Y., will build an addition to its plant, [illegible] equipment, $80,000.

The Barcalo Mfg. Company, [illegible] Erie Railroad, Buffalo, manufacturer of brass and iron beds, has let contract for a further addition to its factory, 90 x 106 ft., of reinforced concrete, to cost $[illegible].

The Wetzel Mechanical Stoker Company, Port Jefferson, N. Y., capitalized at $15,000, has been incorporated by T. M. McGrath, C. S. Yawger and F. C. Williams to manufacture stokers, general hardware and [illegible] general foundry.

The Mohegan Tube Company, Long Island City, N. Y., has let contract for erection of a manufacturing plant on Davis Street, 100 x 250 ft.

The Covert Motor Vehicle Company, Lockport, N. Y., will add to its plant a two-story grinding building, 30 x 65 ft., of brick and steel.

The King Sewing Machine Company, Buffalo, has let contract for a one-story addition, 60 x 80 ft., to foundry at its plant at Rano Street and the Lackawanna Railroad.

The foundry additions to be made to the plant of the American Locomotive Works, Schenectady, will be 100 x 175 ft.; 55 x 200 ft., and 55 x 200 ft., one story. Construction contract has been let at $85,000.

The Elderfield-Hartshorn Hardware Company, Niagara Falls, N. Y., has plans in preparation for a manufacturing plant to be built at Lockport, N. Y.

The Endicott-Johnson Company, Johnson, N. Y., shoe manufacturer, has plans in preparation for an electrical shop, 50 x 101 ft., one story and basement, to be added to its plant.

Philadelphia

PHILADELPHIA, PA., July 3, 1916.

Manufacturing firms in this city are reported to have applied recently to the United States army recruiting station to send them all men between 18 and 50 years old who have been rejected by the recruiting officers. It is said the firms will pay the men from $3.50 to $[illegible] a day.

Virtually every industry in Eddystone is hampered by the lack of labor, both experienced and inexperienced. The Baldwin Locomotive Works has for weeks been advertising for labor, the Remington Arms Company is advertising for 200 inexperienced men, in addition to men skilled in various lines. The Eddystone Mfg. Company also has been advertising for weeks for men and girls. Men are needed so badly that this company, which operates the Eddystone Print Works, is offering as an inducement "light, airy sleeping apartments with all conveniences for $2 a week." The Eddystone Ammunition Corporation is employing men as rapidly as they can be found. The only handicap faced by the Eddystone factories is the inability to get experienced workmen.

Orders estimated to cost more than $150,000,000 are now held by Eddystone manufacturers. One year ago the town had a few industries, employing but little in excess of 3000 men. To-day it boasts of more than 25,000 well-paid wage earners. It is producing motor tractors for army transports for the Russian Government, truck engines for the French Government, shells and shrapnel for England, Russia and France; army rifles for these allied powers, textiles, structural steel and locomotives.

The Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa., for some time has been negotiating for the purchase of a large tract of land in Tinicum township, near Chester, Pa. The company has finally secured an option on 440 acres at this place, the land having a frontage on the Delaware River between Essington and Lester. It is part of the estate of W. W. Hill. In case the company purchases this property, which it probably will, it has made no plans thus far for putting any manufacturing plants on it. What will be done with the property will be decided [illegible] but for the present no active work of any kind will be started.

[illegible] & Norton, [illegible] 1501 Stanton Avenue, Philadelphia, Pa., manufacturer of pyrometers and electrical [illegible] being prepared by Morris & Erskine, Crozer Building, Philadelphia.

The [illegible] Repair Company, Mifflin Street and [illegible] has leased an irregular plot of land extending from Delaware Avenue to [illegible] Avenue, adjoining its present plant, for [illegible] The new [illegible] large [illegible] J. McDonough, president.

William R. Warner & Co., 639 North Broad Street, Philadelphia, has let plans [illegible] for six-story factory, 150 x 200 ft., estimated to cost $300,000. The William R. Steele & Sons Company, [illegible] North Street, Philadelphia, is the engineer [illegible] company also contemplates the [illegible] another six-story building to cost $[illegible].

Announcement has been made that the Pyrites Company, Wilmington, Del., intends to erect another building to cost about $[illegible]. This will bring the investment up to about $[illegible].

New England

BOSTON, MASS., July 3, 1916.

For the first time in [illegible] years a general lessening of factory building and new business enterprises in New England is noted. This report does not seem to indicate an immediate slackening in production. The most important factor is probably the scarcity of labor and the abnormal wages which must now be paid to secure even unskilled workmen. The rapid increase in domestic orders is compelling many manufacturers to discontinue the special work they have been doing to help the munitions plants. The general trend indicates continued high production, but along nearly normal lines.

In most metal-working centers announcements have been issued that the usual annual shutdown for vacations and repairs will not be possible this year owing to the pressure of business. Some manufacturers, however, will not allow the condition to break up their long established custom of closing down for a week or more in midsummer. The Brown & Sharpe Mfg. Company, Providence, R. I., has issued a notice that its plant, except the offices, will shut down from July 28 to Aug. 5.

The appropriations recently made for war supplies are already making themselves felt in this section. The vote for $5,000,000 to manufacture army rifles has brought joy to Springfield, Mass., as it is believed it means the resumption of full production at the Springfield Armory, which is equipped with machinery to turn out 1500 rifles in 8 hr., but is now turning out only 75 rifles a day, with a working force of 450 men. No machine guns have been made at the plant for two or more years and it is hoped that the production of these arms may be resumed so that the number of employees may be increased to 2000 or more. The Locomobile Company, Bridgeport, Conn., has received large orders from the Government for motor trucks for the Mexican border and is quoted as saying that it is not seeking foreign orders, as domestic demand for trucks and pleasure cars is keeping it busy.

The Barnes & Kobert Mfg. Company, New Haven, Conn., [illegible] a plant at Middletown, Conn., has changed its name to the B. & K. Mfg. Company and increased its capital stock from $[illegible] to $[illegible]. It will move its business to New Haven, Conn., where a factory has been leased from the Hartford Automobile Parts Company. James H. Carnes and John H. Trumbull, of the latter company, are stockholders [illegible] B. & K. Mfg. Company and are on the new board of directors. Russell Trumbull, New Haven, is president and treasurer, Roger Sherman, also of New Haven, is secretary. Mr. Carnes will be general manager of both companies.

The Standard Brass & Copper Tube Company, New London, Conn., has purchased the plant which has been occupied by the [illegible] and will [illegible].

The Scott & Williams Mfg. Company, South Windham, Conn., is erecting [illegible] a factory, 40 x 150 ft., one story.

The Crane Road Tool Company, Bridgeport, Conn., will [illegible] number of Ridgeway and Hallock screw machines [illegible] use.

The J. E. Stevens Company, New Haven, Conn., has let contract for an addition, 24 x 60 ft., with an ell, 38 x 38 ft.

The Abbott Ball Company, Elmwood, Hartford, Conn., [illegible] contract for the additional buildings. George D. Moore, [illegible]

The S. W. Card Mfg. Company, Mansfield, Mass., is having plans drawn for an addition, 50 x 150 ft., four stories.

Barrett Brothers, Inc., Boston, Mass., general machine shop and castings manufacturer, has been incorporated with capital stock of $10,000. Edward A. Carroll, 675 Boylston Street, is president and treasurer, and H. M. Cook and W. N. Buffum are other directors.

The American Valve Tool Company, Plainville, Conn., has awarded a contract for a factory, about 40 x 60 ft., to be erected in the Marion District.

The Boston Machine Screw Company, 133 Oliver Street, Boston, Mass., has awarded a contract for a factory, 50 x 147 ft., one story, to be built at Tudor and Emily streets, Cambridge, Mass.

The Arrow Electric Company, Hartford, Conn., has bought the factory which it occupies at 103 Hawthorn Street from the Hartford Chamber of Commerce Building Association.

The Superior Corundum Wheel Company, Waltham, Mass., is to build an addition, 45 x 60 ft., one story.

Baltimore

[illegible], July 3, 1916.

The Baltimore & Ohio Railroad Company, Baltimore, has awarded a contract for the construction of its new pier to H. S. Kerbaugh, Inc., 723 Munsey Building, Baltimore. It is estimated to cost $500,000.

Levering Brothers, Baltimore, Md., iron founders, have purchased a tract of land with buildings at Hanover, Pa., extending along the Western Maryland Railroad from the York Railway Bridge to Broadway. No announcement of further building operations has been made.

Prices on a Corliss engine, 12 x 30 in., are being sought by the Harvey Company, 113 South Street, Baltimore.

A new power and electric light plant will be erected at St. Michaels, Md., by the city authorities.

With $3,000 capital stock the Porter Chemical Company, Hagerstown, Md., has been incorporated by John J., Harold M. and Edith F. Porter, all of Hagerstown.

Hackley Morrison, Richmond, Va., is seeking prices on motor[illegible]

A large number of [illegible] shop will be built by A. T. Hofheimer, Norfolk, Va.

Improvements will be made at the machine shops of W. S. Forbes, Richmond, Va.

The [illegible] Railroad, [illegible]

Chicago

[illegible], July 5, 1916.

The important new business has to do with the buying of additional equipment by manufacturers who have taken some of the recently-placed shell contracts. While most of these contracts have been placed with interests who have had previous orders and have had most of their equipment, a demand has been created for special machinery and for more powerful tools necessary to the making of the larger sizes of shells. In the normal industrial trade a fair amount of equipment in small lots is being purchased, although the aggregate volume of business is less than it has been in recent weeks. Railroad inquiry still outstanding is very slow to close and no new lists have appeared.

The Pech Foundry Company, LeMars, Iowa, has about completed the construction of an addition, 60 x 150 ft., to be used as an automobile repair shop, storeroom, etc.

Plans for shop buildings and crane runways, estimated to cost $3,000,000, are being prepared by the Arnold Company, architects, engineers and contractors, 15 South La Salle Street, for the Pullman Company, 79 East Adams Street, Chicago.

The Herschfield-Piper Foundry & Machine Company, Chicago, [illegible] Solari, 332 South Michigan Avenue, and J. E. Lee.

The Midland Metal Company, Chicago, has been incorporated with a capital of $25,000 by Thomas J. Dee, 5 South Wabash Avenue; Walter Y. C. Hunt and Harry E. Radix.

The Shanklin Mfg. Company, Springfield, Ill., will build a factory, 50 x 180 ft., to cost $10,000. It manufactures brass novelties.

The General Refractories Company, Trinity Building, New York, will build a plant at Joliet, Ill., work to be started at once.

The [illegible] Plow Company, Rock Island, [illegible] nounced its plans for the erection of additional factory buildings, the cost of which is expected to approach $1,000,000.

The Chippewa Foundry & Machine Company, Eau Claire, Wis., has been reorganized with a capital of $100,000 and will erect a new factory.

The Resilient Auto Wheels Company, Wausau, Wis., recently organized, has purchased a factory building and will install new machinery.

The Valley City Chair Company, Grand Rapids, Mich., is preparing plans for the erection of a brick factory, a temporary frame building having been built for immediate use.

The Acme Universal Joint Company, Kalamazoo, Mich., plans to begin the erection within 30 days of a new factory to be in operation Oct. 1. Lewis Rosenbaum is president.

The Lansing Fuel & Gas Company, Lansing, Mich., has plans for doubling the capacity and equipment of its plant which will involve an expenditure of $250,000.

The Rhys-Alden Control Company, Grand Rapids, Mich., has been organized with a capital of $10,000 by Percy F. Rice, William Alden Smith and William Alden Smith, Jr. It will manufacture and sell gear-shift and control devices and other motor vehicle accessories.

The Republic Motor Truck Company, St. Louis, Mo., will equip a machine shop and garage.

Kansas City, Mo., will install a turbine engine at its waterworks plant, to cost approximately $100,000. H. B. Jackson is superintendent.

The H. J. Frank Foundry & Machine Company, Davenport, Iowa, will build a branch plant in Moline to consist of a foundry, machine shop and forge shop. Construction is to begin at once.

Lee Brothers, Springfield, Mo., will locate at Yellville, Ark., where they will operate a foundry and machine shops.

The Fisher Governor Company, Marshalltown, Iowa, has plans for the erection of a two-story factory. It manufactures machinery and steam pumps.

Indianapolis

INDIANAPOLIS, IND., JULY 3, 1916.

The Diamond Chain & Mfg. Company, Indianapolis, Ind., will immediately begin the erection of a complete manufacturing plant on the six-acre tract of land which it acquired four years ago, located on Kentucky Avenue. The plans contemplate a concrete structure containing four stories with 150,000 sq. ft. of floor space. The main building will be 60 x 380 ft., with two ells 100 ft. long, making the entire frontage 700 ft. The additions will be the power plant and auxiliary buildings. The plans and construction will be done by the Westinghouse Church Kerr & Co., 37 Wall Street, New York. W. I. Ballentine is consulting engineer for the owner. The buildings and new equipment will double the present plant and capacity, which will be operated intensely until the new plant is completed, making no break in present production, which is being rapidly increased over the capacity during the past few months. L. M. Wainwright is president.

The Dice Machine Company, Anderson, Ind., is planning the installation of new machinery to double the output of its factory.

The Chesterton Iron Works, Chesterton, Ind., has been incorporated with a capital of $25,000 to manufacture steel, iron and metal tanks, by Charles F. Remmert, Charles R. and M[illegible] Folsom.

E. C. Atkins & Co., Indianapolis, Ind., will build an addition to their plant to cost about $75,000.

The Balls Brothers Mfg. Company has purchased a plant at Muncie, Ind., which will be used for the manufacture of corrugated paper.

The Lindley Box & Paper Company, Gas City, Ind., whose new plant will cost about $25,000, advises that it will soon be in the market for additional motors, heating equipment and sprinklers.

The Wheeler-Schebler Carburetor Company, Indianapolis, has been incorporated with $1,000,000 capital stock to manufacture carburetors and other automobile equipment. The directors are Frank H. Wheeler, Douglas F. Wheeler and Seymour Avery.

The Indianapolis Household Supply Company, Indianapolis, has been incorporated with $25,000 capital stock to manufacture metal and wooden household utensils. Hardy W. Robbins, Thomas S. Catlin and Augusta P. Catlin are the directors.

The Quick Action Ignition Company, South Bend, Ind., has been incorporated with $450,000 capital stock to manufacture electrical machinery and devices. The directors are Otto R. Beyler, Gilbert T. Dunklin and Emil E. Hawkinson.

The Retherford Brothers Mfg. Company, Muncie, Ind., manufacturer of electric fixtures, has increased its capital stock by $25,000, in order to enlarge its plant.

The Rockford Bit Company, Kokomo, Ind., has filed preliminary articles of dissolution.

The Pierce Governor Company, Anderson, Ind., has increased its capital stock from $2,000 to $100,000.

The Koons Oil Furnace Company, Anderson, Ind., has filed preliminary articles of dissolution.

The Fellwock Automobile & Mfg. Company, Evansville, Ind., has increased its capital stock from $60,000 to $85,000.

The Faucett-Humphrey Chair Company, Morgantown, Ind., has been incorporated with $100,000 capital stock to manufacture furniture. The directors are Lewis C. Humphrey, Joseph Faucett and Charles A. Hubbard.

The quartermaster's department, Jeffersonville, Ind., has awarded to the Studebaker Corporation, South Bend, Ind., a contract for 500 ambulances, delivery to be completed in 120 days.

The Service Motor Truck Company, Wabash, Ind., has increased its capital stock, $100,000 by an issue of preferred certificates, the proceeds to be used in extension of the business.

The Champion Auto Equipment Company, Wabash, Ind., has bought 16 acres adjacent to its plant, which together with another ten acres, will be used partly for additional factory buildings, but mostly for dwelling houses for its employes.

The Hayes Wheel Company, Anderson, Ind., will spend $25,000 in making improvements to its plant. J. M. Aiken is superintendent and C. B. Hayes, Jackson, Mich., is president.

Detroit

DETROIT, MICH., JULY 3, 1916.

The Michigan Iron & Wire Works, Detroit, has been incorporated with $10,000 capital stock to manufacture a line of ornamental metal specialties. The incorporators are C. A., L. E. and J. A. Weigel.

The General Engineering Company, Detroit, has been incorporated with a capital stock of $200,000 by Abner Doble, C. L. Lewis and M. J. Hammers, to manufacture motor vehicles and equipment therefor.

The Detroit Edison Company, Detroit, has taken out a building permit covering the erection of a commercial heating plant to cost $65,000. The new structure will be 58 x 125 ft., eight stories.

The Detroit Fibre Package Company, Detroit, has begun the erection of a one-story factory at Currie and Hartford avenues.

The J. R. Stone Tool & Supply Company, Detroit, has purchased the plant of the General Mfg. Company, 93-103 Meldrum Avenue, and will engage in the manufacture of metal specialties, jigs and fixtures.

The Premier Cushion Spring Company, Detroit, will provide for expansion by the increase of its capital stock from $25,000 to $100,000.

The Manufacturers Brass Foundry Company, Detroit, has been incorporated with $3,000 capital stock to manufacture small brass castings. The stockholders are L. C. Vecelius, G. J. Rinke and Richard Agricola.

The Dort Motor Car Company, Flint, Mich., has purchased additional land and will erect a new manufacturing building to cost $60,000.

The Michigan Screw Company, Lansing, Mich., has increased its capital stock from $100,000 to $400,000.

The Albion Bolt Company, Albion, Mich., has been incorporated with a capital stock of $10,000 to manufacture nuts, bolts and other small automobile parts. The incorporators are Mark Merriman and M. C. Morrey, Lansing and Otto Schwacha, Albion. A factory has been acquired.

The Gile Tractor & Engine Company, Ludington, Mich., has increased its capital stock from $100,000 to $300,000.

The Flint Cushion Spring Company, Flint, Mich., has been organized by L. A. Young, president of the Detroit Wire Spring Company and ground for the erection of the first unit of the company's plant will be broken at once. The plans for the new plant provide for seven buildings.

Johnson Brothers, Grand Haven, Mich., boilermakers, lost their plant by fire recently with a damage of about $140,000. A new plant is now under construction about 50 per cent larger than the former one. Production is also going forward in temporary structures.

Milwaukee

MILWAUKEE, WIS., JULY 3, 1916.

The [illegible] in the Milwaukee district [illegible] the [illegible] of past months is [illegible] is [illegible] of an abnormal [illegible] the [illegible] of single tool and small lot [illegible] the aggregate furnished a volume of large [illegible] The [illegible] considered more than satisfactory. At the beginning of July a revival of the large-lot [illegible] was [illegible] but no actual transactions have been reported.

[illegible] the establishment of new [illegible] the [illegible] for the metal-working trades do not lead the advance, as before, because of the absolute lack of [illegible] of new steps. Milwaukee foundries [illegible] for the first half show a gain of $1,878,494 over the same period of 1915, or approximately 46 per cent. The Mexican situation appears to have had some effect in slightly restricting general buying, especially in retail lines; but otherwise the situation in general is considered satisfactory.

The Fitzsimmons Steel Products Company, Milwaukee, which recently completed work on its plant in the Menomonee Valley, has been authorized by its corporate articles to increase [illegible] the capital stock from $40,000 to $75,000. Robert T. Fitzsimmons is president and Ernst Prinz is secretary.

The Ozaukee Heater Company, which recently established a plant at Saukville, Wis., for the manufacture of oil burners, stoves, tank heaters, etc., has filed articles of incorporation. The capital stock is $50,000 and the incorporators are H. J. Clary, W. Graves and Klaus de Buhr.

The Wisconsin Veneer Company, Rhinelander, Wis., has awarded contracts for a manufacturing addition and is buying a small list of wood-working machinery and mill equipment. R. C. Dayton is secretary.

The Wald Mfg. Company, Eighteenth Street and Martin Avenue, Sheboygan, Wis., will award contracts this week for the erection of a one-story brick and mill machine shop, 80 x 100 ft. Judd & Sixta, engineers, are in charge.

The Suburban Garage Company, 26 State Street, Wauwatosa, Wis., is preparing to build a second story, 75 x 130 ft., and a two-story addition, 20 x 40 ft. Some new equipment is required.

The Modine Mfg. Company, Racine, Wis., recently incorporated, will manufacture sheet-metal products and mechanical appliances. A. B. Modine is president and general manager.

The Heil Company, Twenty-sixth and Montana avenues, Milwaukee, structural fabricator, etc., has engaged Klug & Smith, consulting engineers, Mack Block, Milwaukee, to prepare plans for a shop building, 80 x 220 ft., one-story, of reinforced concrete, brick and steel. J. P. Heil is general manager.

The Jamieson Brothers Company, Poynette, Wis., are building a garage, machine shop and warehouse on the Northwestern railroad siding.

Peter Pirsch & Co., 109 Market Street, Kenosha, Wis., manufacturers of fire apparatus, have engaged White & White, architects, Public Service Building, Milwaukee, to prepare plans for a one-story factory addition, 100 x 200 ft., to contain the blacksmith shop, toolroom, paintshop, stockroom, etc.

Carl Barkhausen, architect, 408 Iron Block, Milwaukee, is preparing plans for a foundry, to be erected at Sixty-third Avenue and Burnham Street, West Allis, of hollow tile and brick, 70 x 90 ft., one story, cost about $5,000. The name of the owners is withheld.

A contracting engineering shop has been opened at Burlington, Wis., by Chester Bennett and John Nelson, Racine, Wis., who are remodeling the Wagner machine shop on Pine Street.

The Michigan Electro-Chemical Company, Menominee, Mich., has been incorporated under the laws of Michigan to manufacture at Marinette, Wis., and Menominee, Mich., a plant and laboratory. The capital stock is $1,000,000, of which $500,000 is subscribed as follows: President Edward Ashcroft, general manager, Menominee & Marinette Light & Traction Company, Menominee; R. F. Goodman, Marinette, secretary; A. L. Ames, Marinette, treasurer; C. W. Gram, Menominee.

John Steckart, Sr., De Pere, Wis., is erecting a garage and repairshop, 40 x 60 ft.

Bids will be taken by A. Lewis for the erection of the new [illegible] and machine shop of the John Oberg Barge Company, Milwaukee, at Sixty-third Avenue and Lapham Street, West Allis. The engineers are Klug & Smith, Mack Block, Milwaukee.

The Four Wheel Drive Automobile Company, Clintonville, Wis., which is filling large orders from the war department, as well as European governments, is rushing work on the latest machine shop addition, 100 x 200 ft., and is outlining preliminary plans for a new foundry to be added in the fall.

Citizens of Waupaca, Wis., have subscribed for nearly all of the capital stock required by the Jersild Fire Escape Company, Neenah, Wis., to insure its location there. It is likely that one of the idle factory buildings will be leased as a plant.

J. H. Newbury, Warsaw, N. C., and associates of Akron, Ohio, have practically closed a deal with local capital at Spooner, Wis., to establish a rubber and tire factory, the initial unit of which will be 60 x 100 ft. Cheap hydroelectric power available at Spooner is the main factor.

The O-U-Lite Company, Racine, Wis., has been incorporated with a capital stock of $12,000 by F. C. Christensen, T. W. Fuller and J. C. Christensen to manufacture electrical generating systems for automobiles, farms, etc.

The Pan-American Rubber Company, Milwaukee, has been incorporated with a capital stock of $200,000 to manufacture a cellular pneumatic inner tire. It has established a factory in the Kopmeier Building, Third and Prairie streets, and is already employing 50 operatives. F. J. Ramler is president and general manager.

Birmingham

BIRMINGHAM, ALA., July 3, 1916.

The continuous changing from steam to electricity in mine and mill in Alabama is calling for a variety of electrical appliances. It is one of the leading features of the machinery trade. The quicker delivery on machine tools is gratifying. Business continued good up to the holidays.

The Alabama Iron Works, the Ollinger & Bruce Dry Docks and the Gulf Dry Docks companies, Mobile, have consolidated. D. R. Dunlap, of the Alamaba Iron Works, will be president The capital will be $500,000. It is planned to build a drydock and install steel plate-working shop for constructing steel vessels, floating docks, wharves, sawmills, wood-working plants, etc. Ample capital and works already in successful operation are embraced.

The Macon Veneer Company, Macon, Ga., has been incorporated by James T Wright, George W Hubbell and others with a capital stock of $80,000 to manufacture wooden boxes, baskets, barrels, etc.

Cleveland

CLEVELAND, OHIO, JULY 3, 1916.

An improved demand is noted for large machine tools, some single tool inquiry having come out for planing machines, boring mills and radial drilling machines in large sizes. Inquiry is absent for round lots of standard machines but dealers report a fair volume of orders for one or two tools. Deliveries on some lines of standard machines have improved somewhat. The labor situation is slightly easier owing to the fact that some automobile plants in the Central West are not crowding production as they have been the past few months. It is understood that the large export orders for motor trucks for war purposes have about all been filled. Skilled workmen are still scarce. The demand for twist drills continues quite heavy.

The Kuhlman Car Company, Cleveland, is enlarging its plant by the erection of a steel frame shop with brick walls 80 x 440 ft. to be used for the construction of steel car bodies for street railway cars. The power plant is being enlarged by the installation of two 315 hp Sterling boilers.

The Babbitt Spring Oiler Company, Cleveland, has been incorporated with a capital stock of $100,000 by G. G. Babbitt, A. R. Edgerton, N. S. Banker, George H. Pitts and H. C. Morris.

The Firestone Tire & Rubber Company, Akron, Ohio, has had plans prepared for a new power plant, understood to be of about 12,000 kw. capacity, or about doubling its present plant.

The Urschel Drop Forge Company, Bowling Green, Ohio, recently incorporated, has acquired a two-acre site upon which it will erect a plant including a main building 45 x 125 ft., another 30 x 60 ft. and several smaller buildings. Some electrically driven machinery will be installed.

The Hinderer Brothers Company, Canton, Ohio, will erect a two-story brick foundry and pattern shop. It will specialize in the construction of steam and hot water heating apparatus.

The Ashtabula Leather Products Company, Ashtabula, Ohio, has been incorporated with a capital stock of $50,000 to manufacture leather specialties and will erect two two-story buildings, 40 x 75 ft. and 20 x 50 ft. respectively.

W. H. Fetters, Plymouth, Ohio, will establish a machine shop in Bellevue, Ohio, in the plant of the Klein Iron & Steel Company.

The Westcott Motor Company is establishing a plant in Springfield, Ohio, in the factory of the Buckeye Implement Company. It is expected that some machine tool equipment will be required.

Cincinnati

CINCINNATI, OHIO, July 3, 1916.

Auto-truck manufacturers in the Central West are very busy and are quietly buying machine tools, but not in any large numbers. It is freely predicted that this branch of the manufacturing trade has an extended period of prosperity before it. The railroads are only buying sparingly, and an official is credited with the statement that presents costs of all kinds of shop equipment are holding back purchases.

The Cincinnati Planer Company, Oakley-Cincinnati, has let contract for an addition to its plant, 55 x 150 ft., one story, of regular mill construction, to be used for pattern storage purposes. Annealing furnaces will be installed in one part of the building.

The Barrett Mfg. Company, Cincinnati, has let contract for a two-story addition to its plant in West End that will be 75 x 100 ft., of mill construction, to be used exclusively for storage purposes.

The National Fender & Auto Parts Company, Cincinnati, has been incorporated with $50,000 capital stock by J. J. Shevlin and others. Nothing is yet known as to manufacturing plans.

The Dayton Research Laboratories Company, Dayton, Ohio, whose incorporation was recently noted, will engage in research work in electrical, mechanical and chemical lines E. A. Deeds is one of the principal incorporators.

The Steel Products Engineering Company, Springfield, Ohio, recently incorporated, has fitted up a machine shop on Dakota Avenue.

The Miller Improved Gas Engine Company, Springfield, Ohio, has let contract for an addition to its plant that will be 62 x 120 ft., one story, of brick and concrete construction.

The Concrete Steel Construction Company, Springfield, Ohio, has commenced work on the new plant of the Blackwood Steel Castings Company.

The J. P. Gordon Company, Fourth and Naghten streets, Columbus, Ohio, will fit up a plant for the manufacture of automobile tires.

The Urbana Tool & Die Company, Urbana, Ohio, is reported to have recently received a large order for dies from the Ford Motor Company and is adding to its mechanical equipment.

The Cullen & Vaughn Company, Hamilton, Ohio, factory building contractor, has opened an office at 8 East Broad Street, Columbus, Ohio, and it is currently reported that its headquarters will be removed to that city.

St. Louis

ST. LOUIS, MO., July 3, 1916.

The demand for machine tools continues quite active Users of equipment, still aware of the comparative difficulty of getting orders filled, are continuing their policy of buying as they can get quick hold of desirable machinery. No second-hand equipment is appearing, and the supplies of such machinery are at the minimum.

The Mineral Refining & Chemical Company, St. Louis, Mo., has been organized with a capital of $2,000,000 by Joseph Marimon, Havana, Cuba; M. J. Mandulay of Havana, and R. Bonastre of New York, with headquarters at the Planters Hotel, St. Louis. Contracts are being let for the first manufacturing unit with a daily capacity of 50 tons.

The Prestolite Company, 27th and Locust streets, St. Louis, Mo., will equip a service station and machine shop for repair work.

A company with $50,000 capital is being formed in St Louis by Jacob Engel, 4737 Washington Boulevard and others, and will shortly begin installing equipment for the manufacture of a patented attachment for printing presses.

The Twentieth Century Mfg. Company, St. Louis, has been incorporated with a capital stock of $13,000 by Edward M. Lynch, Bernard P. Bogy and Humphrey A. Buck to manufacture automobile parts.

The Newell Motor Car Company, St. Louis, Mo., has been

incorporated with a capital stock of $[illegible] by James E Newell, M Frank and E B Foote to operate a machine shop, repair shop, etc.

The Shaw Marble & Tile Company, St Louis, Mo., has been incorporated with a capital stock of $[illegible] by James Shaw, Louis M Brohammer, Joseph B Gatzert, George W Aurin and Harry J. Smith to operate a quarry and manufacture stone.

The Commercial Auto Body Company, St. Louis, Mo., has been incorporated with a capital stock of $[illegible] by H F and M E Cartwright and others to manufacture automobile bodies and will add equipment to a wood-working plant already in operation.

The Anuser Mfg Company, St Joseph, Mo., has been incorporated with a capital stock of $18,000 by J. A. Aniser, John D. Richardson and J E Dolman to manufacture machinery and tools.

St. Joseph, Mo., will expend about $[illegible],000 on additional equipment for its electric light plant which will be reconstructed.

The Helena Compress Company, Helena, Ark., has been incorporated with a capital stock of $50,000 by W. N. Straub, Lee Pendergrass and S H Swenson and will equip a cotton compress.

The Independent Gin Company, Jonesboro, Ark., has been incorporated with a capital stock of $[illegible],000 by William Craddock, J. L. Magers and others.

The Farmers Gin Company, Little Rock, Ark., has been incorporated with a capital stock of $15,000 by W. N. and A. W. Godbey and A G. Kahn

The Marvell Electric Light & Power Company, Marmaduke, Ark., has been incorporated with a capital stock of $15,000 by A., S. and J. R. Bertig and B. G. Brinkmann and will equip a plant.

The Southern Lumber Company, Warren, Ark., will equip an additional sawmill unit of 125,000 ft. daily capacity.

A plant for the manufacture of spokes and other wheel-stock will be equipped at Montrose, Ark., by the Archibald Wheel Company, Lawrence, Mass.

The United Brick & Tile Company, Tulsa, Okla., has been incorporated with a capital stock of $100,000 by John D. Richards, W. D. Abbott and B. A. Peek and will establish a brick plant.

The Imperial Washing Machine Company, Sand Springs, Okla., has been incorporated with a capital stock of $60,000 by W. E. Page, G. W. Moore and Ed Mondell all of Tulsa

The Hartsaw Tank Protector Company, Tulsa, Okla., has been incorporated with a capital stock of $100,000 by D W Hartsaw, Sam Arrendale and R. W. Conger of Bristow, Okla., and E. M. Barber of Drumright, Okla.

The Chief Oklahoma Garage Company, Shawnee, Okla., has been incorporated with a capital stock of $15,000 by J. T. Lucas, James H. Turner and A. O. Turner.

Joseph Areny, Enid, Okla., will equip a wood-working plant for the manufacture of automobile bodies. He will install an isolated electric lighting plant.

Mound Bayou, Miss., will install an oil engine, pump and other waterworks equipment for which it will receive bids until July 13. S. H. Harris is city clerk.

E. T. Alcus & Co., New Orleans, La., have bought the Tylertown Box Mfg. Company's plant at Tylertown, Miss., and will double its capacity.

Lake Charles, La., will construct large wharf and warehouse facilities as part of a dock system on which will be installed mechanical freight-handling equipment.

Lockport, La., will equip a waterworks pumping station W. R. Pennington is chairman in charge.

The Sewerage and Water Board, New Orleans, La., F. S. Shields, secretary, will receive bids on one 75-hp. motor with accessories, and some electric equipment.

Texas

AUSTIN, TEX., JULY 1, 1916

Industrial conditions in Texas continue remarkably good. The demand for machinery that enters into manufacturing plants is greater than for a long time. Crop prospects are excellent, good rains having fallen in most parts of the State the last few days.

The Main Street Garage, Houston, will build a garage and repair shop. George F Howard is manager

The Texas Plating & Wire Works Company, Beaumont, will install equipment for plating and manufacturing wire devices. John Dollinger is in charge.

The Petroleum Refining Company, Houston, recently incorporated with a capital stock of $[illegible],000 under the laws of Delaware, has purchased a site six miles south of Harris [illegible] on the Houston Ship Channel, where it will locate a refinery. J. S. Cullinan is a stockholder

The Farmers Union Gin Company, Geronimo, has increased its capital stock from $10,000 to $15,000 and will enlarge its cotton gin.

E. E. Townsend, Alpine, will install an irrigation pumping plant on Cienobosa Creek to irrigate 1000 acres of land

The Weikman Land & Development Company is constructing an irrigation system near Maricopa, Ariz. A pump and 140-hp. engine are specified.

The Texas Utilities Company, Plainview, will install a 500-hp. oil-burning engine in its central electric power station.

The Republic Box Company, Dallas, has leased land upon which it will build a factory for the manufacturing of wire-bound boxes. R O Harris is vice-president and general manager.

The Dallas Union Terminal Company has been authorized by the State Railroad Commission to issue an additional $[illegible],000 worth of bonds, the proceeds to be used in completing the new union station at Dallas. The sum will bring the bond issue up to $5,000,000

A. H. Dunkerley is erecting a building at Ennis which will be occupied by the National Garage as a garage and machine shop

F. D. Thomas, Dallas, and associates, have purchased 190 acres at Hone, Tex., upon which they will build a plant for manufacturing guncotton, absorbent cotton and surgical bandages, at a cost of about $250,000

It is announced by Frank Andrews of Houston, chairman of the Gulf Coast Lines which include the New Orleans, Texas & Mexico, the Beaumont, Sour Lake & Western, and the St. Louis, Brownsville & Mexico that the general shops of these roads will be built at Kingsville

The Pacific Northwest

SEATTLE, JUNE 27, 1916

A policy of gradual curtailment in the lumber industry is being put into practice throughout the entire Northwest After five months of good business with wages advancing and mills speeded up, a marked lull in demand has set in and prices have been lowered in an effort to stimulate the market. While the curtailment move is not organized, it is being put in practice in all the larger mills.

Reports from Oregon indicate that shipbuilders in that section are experiencing an unparalleled period of prosperity. Orders now on hand are sufficient to keep the larger plants busy for five years, and every plant is running day and night. The industry has become almost independent in that section, as most of the yards operate their own lumber mills, thus obviating the difficulty of delivery.

A movement is on foot to establish a smelting plant for the electrolytic reduction of zinc ore in Spokane, Wash., at a cost of $500,000. Jap P. Graves, J. P. McGoldrick, George Turner, J. D. Sherwood and Walter J. Nicholls, all capitalists of Spokane, are back of the enterprise. J. O. Pateneaude, inventer of a refining process, is also a promoter.

The Boise-Payette Lumber Company, Boise, Idaho, will begin work within 30 days on the construction of a sawmill at Emmett, Idaho, to cost $500,000. The plant will cover an 80-acre site and will be electrically operated, with a daily capacity of 200,000 ft. The company will also expend about $100,000 in additions and extensions to its mill near Boise. C. A. Barton is vice-president and general manager.

The Pacific Foundry & Machinery Company, Seattle, has been incorporated for $500,000 by J. L. MacDonald, H. S Hendrickson and Frank S. Paul.

The Astoria Machine Company's plant in Astoria, Ore., has been purchased by John Fox, president of the Seattle-Astoria Iron Works, Seattle, and C. E. Mack of Portland The new owners will install $25,000 worth of new machinery, and will equip the plant for marine, logging camp and mill work.

The Pacific Boiler Company, 549 Dock Street, Tacoma, Wash., has commissioned Bullard & Hill, architects, Tacoma, to prepare plans for another addition to its recently completed plant. It will be 50 x 80 ft. The plant is at present running three 8-hr. shifts. O. T. Nelson and H. H. Chrisman have charge of the company

The American Shipbuilding Company, Spokane, Wash., has finally determined upon Warrenton, Ore., as the site for its proposed shipbuilding plant. A site 10 miles from the ocean has been donated by the city, and construction

work is to be rushed, under the personal charge of W. F. Lafrenz, chief engineer. Harry B. Spear is president.

The Olympic Metals Company, Edmonds, Wash., has recently leased a building which will be remodeled as a smelting plant.

The Williams Blow Pipe Company, Tacoma, Wash., will construct a new plant, 40 x 75 ft., in the tideflats manufacturing district, to be completed this year. The proposed building will provide room for the installation of new machinery and the enlargement of operations made necessary by growing business. P. F. Finnegan and Dayton M. Maltby are the owners.

The Garford Motor Truck Company, Lima, Ohio, will establish a branch factory in Seattle. A new structure will be built and will be in charge of A. W. McKinzie. E. A. Williams, Jr., president and general manager, recently visited Seattle.

The Foundry of the Huffschmidt-Dugan Iron Works, Bend, Ore., was seriously damaged by a recent fire. The foundry building was entirely destroyed and the pattern shop damaged. New structures will be built and equipped with new machinery.

The Grays Harbor Lumber Company, Aberdeen, Wash., plans the addition of a lathe factory in connection with its sawmill.

The Kamiah Asbestos Mfg. Co., Grangeville, Idaho, has recently been organized, and plans the construction of a factory to be in operation by fall.

The J. A. McEacher Company, Astoria, Ore., which recently established a shipbuilding yard in that city, has been reorganized by the incorporation of the McEacher-Standifer-Clarkson Ship Company, which has a capital stock of $500,000. The present plant is to be doubled, and a large drydock built. The company also announces that its future plans include the establishment of a yard constructing steel vessels.

The consolidation of the Puget Sound Mills & Timber Company, of which Michael Earles, Seattle, is president, and the Charles Nelson Company of San Francisco, operating a fleet of steam lumber carriers, has been effected, bringing under one control properties valued at more than $8,000,000. The Puget Sound Mills Company owns standing timber in Clallam County estimated at 400,000,000 ft., and a sawmill plant at Port Angeles. The merger will assist both companies in the way of market extensions.

Canada

TORONTO, JUNE 30, 1916.

Satisfactory progress was made at conference recently held between Thomas White, Minister of Finance, and the committee of the Canadian Bankers' Association regarding an extension of the credit to the Imperial Government to facilitate the purchases of war supplies in Canada. No announcement is being made as to the extent of the new credit. As a result of the previous conference a credit of $76,000,000 was established with the result that $100,000,000 additional orders were obtained. At the present time the Imperial Munitions Board is disbursing in Canada from $1,000,000 to $1,500,000 per day, which is keeping busy over 300 plants. In addition, Mr. White brought to the attention of the association the desirability of Canada being financially prepared for a greatly increased export trade with Russia and the other allies after the war, and it is understood that attention will be given to the question of establishing, if necessary, a financial agency or agencies to deal with foreign credits.

It was recently reported by an official of the Canadian Car & Foundry Company of Montreal that in June nearly $1,500,000 worth of the original 5,000,000 shrapnel shells ordered by the Russian Government will have been shipped from American ports. The value of the shells which will have been shipped by the end of June was placed at nearly $12,000,000. All the component parts are now coming forward rapidly and it is anticipated that by the first of November the entire $85,000,000 contract will have been completed. Apart from the Russian business the company has $13,000,000 in orders on its books. Two-thirds of this business is made up of domestic orders, which include contracts for shell parts from the British Government. The balance is for railroad equipment, 70 per cent of which calls for cars for shipment to Europe. The Canadian demand for equipment continues very light and it is believed that roads in Canada will withhold their orders as long as possible, to avoid paying the increased prices now prevailing for all raw material. In this connection it may be noted that the price of an equipment has advanced from 50 to 60 per cent.

Shipments made last month by the Nova Scotia Steel & Coal Company, New Glasgow, N. S., have created a new record, and several new daily records were also made during the month. The shipments include a large quantity of 8.8-in. and 9.2-in. shells. Notwithstanding the large output, the unfilled orders on hand on June 15 were greater than the unfilled orders on hand May 15. The work of building steamers at New Glasgow, in which the steel company is interested, has begun. The first steamer will be of 2,000 tons register.

Canada's trade for May reached a figure more than double that of the corresponding month of 1915. The total for last month was $176,837,000, as compared with $86,023,000 for May, 1915. For the first two months of the fiscal year, April and May, the aggregate was $284,555,000, as against $145,244,000 a year ago. The increase is general all round and is taken as reflecting generally prosperous conditions.

The Roelofson Machine & Tool Company, Ltd., Galt, Ont., will commence the erection of a plant 105 x 185 ft. on Beverley Street, for the manufacture of machinery, tools, etc. E. C. Roelofson, Toronto, is president; A. C. Roelofson, works manager; and E. B. Roelofson, vice-president.

The Packard Electric Company, St. Catharines, Ont., has commenced the erection of an addition 50 x 145 ft., two stories.

The Standard Steel Construction Company, Port Robinson, Ont., has leased the building recently occupied by the Dominion Canners and will install new equipment and have facilities for 200 additional hands.

The Canadian Gasoline Corporation, which is in course of organization in Canada with a capital stock of $3,000,000, has acquired the Canadian patents for the Greenstreet process of gasoline manufacture. It will be operated as a subsidiary of the Gasoline Corporation of the United States. The syndicate financing the Canadian proposition is headed by H. T. Bush, president of the Standard Ideal Company of Port Hope, Ont.; Donald Mann and Daniel Currie, president of the Canadian Car & Foundry Company are represented in the syndicate.

Work will be commenced at an early date on the building of a shipbuilding plant at the Songhees Reserve, Victoria, B. C., for the Cameron-Genoa Mills Shipbuilders, Ltd. J. H. Price, manager of the St. Helens Shipbuilding Company, St. Helens, Ore., is the general superintendent and architect who will supervise the ships to be constructed at the new yards.

The Hendry Crossman Electric Company, Ltd., 80 Dufferin Street East, Vancouver, B. C., is in the market for a 12 or 15 kw., 110-volt direct-current generator.

The Chevrolet Motor Company, Oshawa, is building a factory at a cost of $40,000.

The William Davies Company, 521 Front Street East, Toronto, has had plans prepared by Heuschlieu & McLaren, 431 South Dearborn Street, Chicago, Ill., for a brick and concrete cold-storage and ice plant to cost $50,000.

The Canadian Cartridge Company, Sherman Avenue North, Hamilton, Ont., will build an addition to its plant at a cost of $20,000.

The Department of Public Works, Ottawa, Ont., proposes to establish an electric generating plant at Peace River, Alberta., and has had plans prepared by W. D. Cromarty, University of Alberta, Edmonton, Alberta. R. S. Desrochers is secretary of works department.

The foundry at Beauceville, Que., owned by Marcoux & Poirier was destroyed by fire with a loss of $12,000.

The Acadia Coal Company of Stellarton, N. S., will install a 3000-kw. steam turbine at its plant. F. Mosebaert, Stellarton, is chief engineer.

The Watrous Electric Light Company, Watrous, Sask., will install a new gas producer plant.

The Chapman Engine & Mfg. Company, Ltd., Dundas, Ont., has been incorporated with a capital stock of $250,000, by Stephen H. Chapman, care of the Ontario Wind Engine & Pump Company, Liberty Street, Toronto, George W. Williams and others of Dundas, Ont.; Edward Fairbairn, Buffalo, N. Y., to manufacture engines, electric motors, etc.

The Canadian Collapsible Tube Company, Ltd., Toronto, has been incorporated with a capital stock of $100,000 by Richmond W. Hart, 1126 Traders Bank Building; Kenneth D. McKenzie, William W. Perry, Scarborough Junction and others, to manufacture collapsible metallic tubes.

The fire, light and power committee of Winnipeg, Man., will purchase two gasoline pumps instead of one, as formerly reported.

Wilson Brothers, Vancouver, B. C., an American Company with timber holdings on Vancouver Island, is making arrangements for the erection of a lumber mill there to cost about $4,000,000.

Government Purchases

WASHINGTON, D. C., June 27, 1916.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, July 18, schedule 9821, for one hydraulic joggling press at Boston; schedule 9822, for two air compressors and one pipe-cutting and threading machine, all for Boston; until July 20, schedule 9824, for four main circulating pumps at Mare Island and Norfolk; schedule 9825, for miscellaneous lathe chucks for Mare Island and Brooklyn; schedule 9826, for one combined foot and power lathe for Puget Sound; until date not set schedule 9859, for one fire pump for Brooklyn; schedule 9860 for one centrifugal pump for Philadelphia; and schedule 9861, for one complete hydraulic accumulator for Brooklyn.

The general purchasing officer of the Panama Canal, Washington, will receive sealed proposals until 10.30 a. m., July 20, under Panama circular 1005, for a pipe-threading and cutting-off machine; under requisition 3072-F for furnishing one second-hand 12 to 18-in. x 10 to 16-ft. engine lathe, preferably motor driven. Details of specification can be had from Major E. I. Brown, general purchasing officer, corps of engineers, Army Department.

Bids were received at the Bureau of Supplies and Accounts, Navy Department, Washington, June 27, for supplies for the naval service, as follows:

Schedule 9740, Ordnance, for Newport

Class 61—Five hand and power feed milling machines with three vertical attachments—Bid 19, $2,340, 64, $2,395, 73, $2,672.50, 92, $2,334, 142, $2,675, 217, $2,672.50.

Class 62—One tool grinder—Bid 19, $611.50 and $862.50; 123, $2,604, 143, $300.

Class 63—One drill grinder—Bid 107, $194; 123, $170 and $82; 142, $203, $109 and $107, 165, $180.

Class 64—12 toolmakers' engine lathes—Bid 67, $1,242.25; 123, $1,350; 144, $1,250; 164, $1,336 and $1,104.

Class 65—Eight bench lathes—Bid 64, $678; 92, $742.50; 123, $349.25 and $600; 142, $2,960, total, and $4,784, total; 164, $851.75.

Class 66—One universal cutter and tool grinder—Bid 19, $1,053.50; 77, $355; 142, $395, $450, $607 and $275; 144, $670; 153, $612.

Class 67—One sliding-head drill—Bid 85, $295; 123, $440; 142, $242 and $245; 144, $221; 165, $236.

Class 68—One machine for filing, sawing and lapping—Bid 123, $278; 154, $100; 202, $100.

Class 69—One surface grinding machine—Bid 19, $433.75; 123, $430.

Class 70—Two horizontal tapping machines—Bid 19, $611.75; 113, $1,625; 123, $1,625; 142, $756 and $300.

Class 71—One hand screw press—Bid 142, $330; 183, $415.

Class 72—Six polishing and finishing machines—Bid 19, $132; 142, $100.

Class 73—One semi-automatic screw slotter—Bid 143, $345.

Class 74—One polishing or buffing machine—Bid 142, $190; 257, $300 and $385.

Class 75—Two bench drills—Bid 113, $220.50; 123, $220.50; 142, $217.

Class 76—One vertical riveting machine—Bid 123, $189; 142, $144, $175 and $202; 196, $215; 205, $195; 254, $319.

Class 77—One inclinable power press—Bid 142, $310, $318 and $298; 165, $370; 174, $265; 183, $265.

Class 78—One saw sharpener. Bid 122, $222 and $180; 254, $297.

Class 79—Six shaft-straightening presses—Bid 79, $120, 123, $387.55; 142, $447.

Class 80—One portable crane and hoist—Bid 37, $83.88; 67, $93.25; 70, $74.37; 87, $115; 122, $74.90; 123, $57.75; 142, $61 and $68; 217, $89.99; 254, $89.50 and $67.40.

Class 81—Two sensitive assembly drills—Bid 85, $135; 142, $380, $480 and $370.

Class 82—Three bench sensitive drill presses—Bid 37, $161.40; 64, $145; 112, $187; 113, $225; 123, $225; 142, $432, $360 and $489.

Class 83—One oil extractor—Bid 123, $672 and $625; 142, $555, $657 and $707; 155, informal; 254, $613.

Class 84—Six engine lathes—Bid 67, $1,074.25; 123, $1,750 and $2,250; 144, $1,895; 165, $1,465.

Class 85—Two sensitive drill presses—Bid 112, $207; 123, $456 and $346; 142, $236, $235 and $165; 165, $156; 241, $335.20.

Class 86—Two full automatics—Bid 143, $3,490.

Class 87—Two hand screw machines—Bid 19, $433; 123, $515 and $371; 221, $552.

Class 88—Two hand screw machines—Bid 19, $504, 123, $515 and $410; 221, $598.

Class 89—Two turret lathes—Bid 19, $1,296; 23, $1,430; 72, $1,308; 123, $942; 165, $1,475 and $1,550; 221, $1,490.

Class 90—One heavy plain milling machine—Bid 19, $2,754.50 and $2,254.50; 144, $3,200.

[illegible]—Four [illegible] machines—Bid 19, $1,125, [illegible] $1,562.

[illegible]—Two [illegible] machines—Bid 19, $1,300, [illegible].

[illegible]—Two [illegible] machines—Bid 164, $1,010.

Class 91—Two profiling machines—Bid 112, $900; 123, [illegible].

Class 92—Two universal grinding machines—Bid 19, [illegible].

Class 93—One [illegible] crank grinder—Bid 30, $900 and $1,[illegible].

Class 97—Two sensitive drill presses—Bid 112, $397, 123, $429 and $446, 142, $429 and $446, 165, $416, 241, $392.40.

Class 98—One universal milling machine—Bid 19, $1,[illegible].

Class [illegible]—One universal milling machine—Bid 19, $1,776.

Class 100—Two turret machines—Bid 143, $3,670, 242, $1,677 and $1,781.40.

Class 101—Four turret lathes—Bid 99, $1,980.

Class 102—Four flat turret lathes—Bid 99, $1,900, 123, $1,800, 165, $2,070 part, and $2,190, part, 221, $2,420 and $2,838.

Class 103—Two turret drills—Bid 123, $810, 165, $415.

Schedule 9782, Steam Engineering

Class 253, Norfolk—Sixteen valve reseating machines—Bid 24, $2,160, 80, $2,160, 84, $2,160, 107, $2,360, 109, $2,160, 114, $2,160, 119, $2,160, 122, $2,160, 126, $2,160, 179, $2,160, 182, $2,160, 241, $2,160, 254, $2,160.

Schedule 9787, Construction and Repair

Class 261, Brooklyn—Three motor-driven pipe threading machines—Bid 101, $373, part; 107, $835 and $1,528.75; 109, $2,818, 142, $2,021, 254, $2,388.

Schedule 9788, Construction and Repair

Class 262, Boston—One chain-testing machine—Bid 59, informal; 151, $43,500; 252, $50,000.

Schedule 9806, Construction and Repair

Class 263, Brooklyn—Two drop hammers—Bid 16, $3,581; 67, $2,116.80; 123, $1,700; 142, $2,200; 208, $2,250; 240, $1,975.

Class 264—Two trimming presses for drop forgings—Bid 67, $1,862; 189, $1,875; 249, $1,832.

Schedule 9807, Construction and Repair

Class 265—Two bulling lathes—Bid 107, $236.50 and $319; 142, $175 and $190.

Class 266—One drill press—Bid 107, $423 and $382; 142, $345 and $291; 144, $435.

Class 267—One spindle drill—Bid 107, $1,006.75 and $555; 112, $537; 142, $480; 144, $1,095.10.

Class 268—One sensitive drill—Bid 35, $116; 107, $115; 142, $110 and $142.50; 144, $328.25.

Class 269—Two single stand hammers—Bid 16, $1,566 and $1,272; 123, $1,060 and $1,160; 142, $1,350; 144, $975.

The names of bidders and the numbers under which they are designated in the above list are as follows:

Bid 16, Buffalo Foundry & Machine Company; 19, Brown & Sharpe Mfg. Company; 23, Bardons & Oliver; 24, F. S. Banks & Co.; 30, Bryant Chucking Grinder Company; 35, James Clarke, Jr., Electric Company; 37, Carroll Electric Company; 59, A. H. Emery; 64, the Fairbanks Company; 67, Federal Sales & Service Company; 70, Frank Ferguson; 72, the Walter H. Foster Company; 73, Fox Machine Company; 77, Greenfield Machine Company; 79, P. A. Geier Company; 80, Richard W. Geldart; 84, Richard H. Grey; 85, Hoefer Mfg. Company; 87, Charles H. Hughes; 92, Hill, Clarke & Co.; 99, Jones & Lamson Machine Company; 101, Jarecki Mfg. Company; 107, Kemp Machinery Company; 109, Knickerbocker Supply Company; 112, Leland-Gifford Company; 113, Langelier Mfg. Company; 114, Leavitt Machine Company, 119, McArdle & Cooney, 122, Manhattan Supply Company; 123, Manning, Maxwell & Moore, Inc.; 126, Montgomery & Co.; 142, D. Nast Machinery Company; 143, National-Acme Mfg. Company; 144, Niles-Bement-Pond Company; 151, Tinius Olson Testing Machine Company; 153, the Oesterlein Machine Company; 154, Oliver Instrument Company; 155, Oil & Waste Saving Machine Company; 164, Pratt & Whitney Company; 165, Prentiss Tool & Supply Company; 168, A. D. Quint; 174, Rockford Iron Works; 179, Richard B. Sherman; 182, Thomas Somerville Company; 183, Standard Machinery Company; 189, D. H. Stoll Company, Inc.; 196, F. B. Shuster Company; 202, Taylor Machinery Company; 205, Williams, White & Co.; 208, United Engineering & Foundry Company; 217, Ward & Co.; 221, Warner & Swasey Company; 240, E. W. Bliss Company; 241, Brownell Machinery Company; 242, Cleveland Automatic Machine Company; 249, Niagara Machine & Tool Works; 251, James D. Rawles Company, 252, Riehle Brothers Testing Machine Company, 254, Universal Tooling Company, 257, Gardner Machine Company.

American Society for Testing Materials

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as a contribution of general interest rather than as an additional piece of literature likely to interest actively those closely engaged in heat-treatment work, but it evoked considerable discussion. Dr. Henry M. Howe, in a written review of the paper, questioned that a drawing temperature as high as 635 deg. C. was needed.

Our present evidence, he said, indicates that the chemical transformation from the high to the low-temperature state, which is obstructed by the rapid cooling in quenching, becomes complete on drawing at about 400 deg. If, for instance, he argued, the quenching stresses become harmless on drawing at say 500 deg., then 500 deg. is the proper drawing temperature. Should this leave the strength too great and the ductility too small, it would seem better, he suggested, to get the needed weakening and ductilizing through smaller carbon content than through higher drawing temperature. The paper was abstracted at length in last week's issue.

R. P. Devries, assistant physicist, Bureau of Standards, Washington, D. C., noted that the ratio of elastic limit to ultimate strength is greater for the water-quenched than for the oil-quenched axles. In work done on repeated stress testing of heat-treated steel, he had found the ratio apparently a good criterion of endurance. The differences encountered in the mechanical properties of the axles quenched in water or oil appeared to him to be small, due doubtless to the high drawing temperatures employed. The microstructures shown by the author seem to show, he added, that the heat treatment as a whole was little more than a grain-refining process with a slight difference in favor of the water-quenched axles.

QUENCHING HIGH-CARBON ARTICLES IN OIL

Dr. J. S. Unger, manager of the Central Research Bureau of the Carnegie Steel Company, Pittsburgh, presented a written discussion. If segregation is to be made responsible for cracking on quenching, he wanted to know, how it is possible to water-quench a piece of case-hardened steel or of deeply cemented steel without cracking. We have, he said, produced artificial segregation of the carbon many times greater than tabulated by the author, yet case hardened pieces do not break. He added that as the carbon in steel increases it becomes more sensitive to rapid thermal changes. For example, an axle containing 0.55 per cent carbon will stand more thermal abuse than one containing 1 per cent carbon, and it is practically impossible to water-quench a 10-in. hollow axle containing 1 per cent carbon without breaking it into several pieces. He said that small articles of high carbon steel, such as for tools, valves, saws, etc., which must be hard, are quenched in oil not because of the segregation but because rapid cooling in water will induce strains that will rupture the material, even though homogeneous. Section and size of object have a great influence on the cracking of steel when quenched in water. Crops from rails at the hot saws when thrown into water invariably crack between the head and web, but this does not happen if the piece is quenched in oil. No large forgings of the grade of steel discussed by the author are, he added, ever quenched in water.

To make a comparison, he held that the axles should have been rolled from the same ingot and as nearly as possible from the same location in the ingot. Since this is impossible, however he suggested that the axle should be cut transversely at the center and each half treated at the same time and in the same furnace. He stated that vegetable, animal and mineral oils have shown differences in hardness of about 15 per cent for the same steel quenched in them, all other conditions the same.

Dr. Unger said that a water-quenched steel is harder on the surface than one oil quenched. When the same physical properties are desired, the drawback temperature after water quenching in regular axle practice is about 25 deg. C. higher than for oil, but in the test made by Mr. Young the reverse is true, the oil-quenched axle having been drawn back at 15 deg. C. higher than the water.

Mr. Young emphasized that the time rate of cooling is the important point and not the medium. With the same drawing temperature, about 550 deg., the time for axles quenched vertically in agitated water was 6 min., and for quenching horizontally in oil, 35 to 40 min. He intimated that heat treatment of axles is pursued to secure the ductility of annealed forgings with 50 per cent higher elastic limit, and that the high drawing temperature is occasioned by the relation between the chemical composition and the physical requirements. The mechanical engineering department of the railroad sets the allowable fiber stresses, in the light of the experiences of failures, and asks for the longer elongation, so that Mr. Young owned to a belief that it would be a long time before forging steel with as low a ductility as 15 per cent would be acceptable.

Lawford H. Fry, Standard Steel Works Company, Burnham, Pa., as showing the influence of the conditions of quenching, told of the physical qualities of pieces of steel quenched in a bath without circulation and taking 20 min. and quenched in a bath agitated by means of compressed air and taking 10 min. In the former case, the elastic limit was 49,500 lb. per square inch, and in the latter 69,000 lb.; the ultimate strength was 95,000 lb. in the one and 105,000 lb. in the other; the elongation in the two cases was 20.5 and 21 per cent; the reduction of area, 43 and 42 per cent. With regard to the ductility factor, he mentioned that forgings subjected to alternating stresses and of 20 per cent ductility have been replaced satisfactorily by 15 per cent ductile forgings of 80,000 lb. elastic limit. As regards horizontal quenching, he had noted no difference from vertical quenching, the point being that with oil the cooling is relatively slow.

BOILER TUBE FAILURES AT HIGH TEMPERATURES

A paper by Prof. A. E. White and H. F. Wood on failures of tubes of steam boilers through recrystallization also developed considerable discussion. A review of the paper is given elsewhere in this issue. Prof. C. F. Hirshfeld, chief of the research department of the Edison Illuminating Company of Detroit, emphasized how the metal surfaces of large modern steam boilers are performing a duty two and three times that of previous practice, and the fact, he said, has brought numerous complications and may even mean the use of different boiler metals. In Detroit, where the troublesome tubes were in use, phenomenally pure water is available and it is used in distilled form. Yet an eggshell scale is deposited and bagging of tubes results. One way out of the trouble suggested by the experiments is, he suggested, the use of higher carbon steel. The U. S. Navy, he mentioned, has been driven to the use of nickel steel.

F. N. Speller, metallurgical engineer, National Tube Company, believed the investigation showed no fault in the manufacture of the tubes, as if there had been original strain, the recrystallization would have been deeper. What recrystallization there was he regarded as hardly affecting as much as 5 per cent of the cross-section and accordingly there was a small loss in tensile strength of the tube. As showing the effect of temperature on the tensile strength, he told briefly the results obtained in his own laboratory on a 0.15 per cent carbon seamless tube. A maximum tensile strength of 65,000 lb. was obtained at 300 deg. C., but at 700 deg. the tensile strength was 10,000 lb. and at 800 deg. 7500 lb.

Professor White maintained that the recrystallization extended one-eighth of the distance in from the fire side. He believed that once a higher carbon is rolled into the tube sheet, it will remain tighter, being less ductile. Dr. Howe doubted it would be necessary to consider very high carbon tubes; that with 0.12 per cent carbon steel, the 14 per cent of pearlite might serve as a bar to grain growth. Mr. Speller said it would be easy to supply 0.15 or 0.18 carbon tubes, but at Detroit the experience was with 0.11 per cent carbon steel.

SHEET CORROSION TESTS

The committee on corrosion of iron and steel submitted to the society last year a report giving the outline of a corrosion test which it proposed to make. The work is still in progress. The outline covered a great quantity of work, greater probably than the society realized, in the collection, inspection and analysis of sheets; erection of sheds, and final exposure of the samples, and also in obtaining the funds necessary for carrying on the work. The sheets of metal have been furnished and inspected and it was decided that all of the sheets which had been secured and analyzed should be exposed and additional sheets desired be obtained.

Tests and Testing

An entire evening was given to the discussion of tests and testing, much interest being taken in the various views presented on the relation between yield point and proportional limit in various grades of steel. This discussion carried one back to the earlier meetings of the society when the battle waged warmly between the late Gus Henning and others over the relation between yield point and elastic limit.

G. Lanza, chairman, presented the report of Committee E-1, on Methods of Testing, which recommended some slight changes in methods for tension and compression tests and inserted the following definitions of terms:

Elastic Limit is the greatest load per unit of original cross-section which does not produce a permanent set. (This determination is rarely made in the commercial testing of materials.)

Proportional Limit is the load per unit of original cross-section at which the deformations cease to be directly proportional to the loads. (This determination is rarely made in the commercial testing of materials.)

Yield Point is the load per unit of original area at which a marked increase in the deformation of the specimen occurs without increase of load. It is usually determined by the drop of the beam of the testing machine, or by the use of dividers.

YIELD POINT AND PROPORTIONAL LIMIT

The topical discussion on the relation between yield point and proportional limit followed the above-mentional report. J. E. Howard, engineer-physicist of the Interstate Commerce Commission, the author of the first paper in this discussion, expressed a preference for the long-used term elastic limit, because of its definite meaning and because of the possibility that the alternative term proportional limit might include permanent sets of magnitude. He considered "yield point" to be vague and neither a desirable nor useful term to employ, but generally taken to mean a value above the elastic limit. Reference was made to the obscuring of elastic limit by initial strains in the steel.

T. D. Lynch, engineer of tests of the Westinghouse Electric & Mfg. Company, presented an elaborate and interesting series of curves, bearing on the relation between yield point and proportional limit. On the one hand were those showing a long and gradual curvature between proportional limit and yield point, in tests from untreated castings, heat-treated steel forgings and heavy plates finished hot at the rolls. The ratio of yield point to proportional limit in one of these was 144 per cent, 150 per cent in another, and as high as 189.6 per cent. Over against these were curves of short and relatively sharp curvatures between proportional limit and yield point, shown in tests from steel castings subjected to cold work in heat treatment, rounds finished relatively cold at the mill and from various grades of heat-treated steel. Here the ratio of yield point to proportional limit was close—102.9 per cent in one case, 103.8 per cent in another, and in others 104.2 per cent, 110.2 per cent, 107 per cent, 112 per cent and 121.2 per cent. He suggested to designers a careful study of the curves for different grades of steel and varying heat treatments and methods of manufacture, so that the load applied will always fall below the proportional limit of the material.

R. P. Devries, assistant physicist of the Bureau of Standards, continued the discussion with valuable suggestions. He referred incidentally to yield point as giving some information which the engineer does not discard as to the ductility of the metal. There was also presented the written discussion of George R. Olshausen, who suggested that the terms elastic limit and proportional limit be both retained in order to indicate in what manner the determination of the limit was made. H. L. Morse favored the abandonment of elastic limit and the substitution of proportional limit, and at an earlier session Prof. H. M. Howe referred to the "passing of elastic limit."

C. D. Young said that after a long use of the term elastic limit, testing engineers are just coming to the point of determining what it is. There is to be considered first, the designer, who decides what material he will use. Then there is the engineer of tests, whose problem is to find in a few minutes for a large tonnage the same things found by the designer in tests extending over months. The intention of Committee A1 in defining elastic limit was to recognize in it a test which would give in a short time approximately what the designer had previously found—a recognition of the commercial side as well as the engineering side of the problem.

H. F. Moore and F. B. Seely presented a paper on "Constants and Diagrams for Repeated Stress Calculations," supplementary to their paper of last year on "Failures of Materials Under Repeated Stress."

A RAPID METHOD OF CORROSION TESTING

F. N. Speller, National Tube Company, gave an account of an accelerated method for testing the durability of pipe under corrosion, one he had used for two years in research work and which was not open to the objections made to the so-called acid test. The method duplicated conditions commonly found in service where pipe is subject to aerated water at a temperature of 140 to 180 deg. Fahr. under pressure, the only difference being in providing a continuous flow with the greater amount of oxygen and carbonic acid, thereby brought into contact with the interior surface of the pipe.

CENTIGRADE SCALE IN GOVERNMENT PUBLICATIONS

At the session devoted to tests and testing a resolution was passed on the recommendation of the executive committee, declaring it to be the sense of the meeting "that the effort to obtain legislation requiring the use of the Centigrade scale in all future Government publications be heartily approved." This resolution now goes to letter ballot. In connection with it A. A. Stevenson called attention to the fact that it was the first time the society had been asked to go on record on a matter of legislation.

ENDURANCE AND IMPACT TESTING

D. J. McAdam, Jr., gave an account of some methods of endurance and impact testing developed at the U. S. Naval Engineering Experiment Station at Annapolis, Md. The endurance test consists of alternating torsion applied to specimens of cylindrical test section and tapered fillets. It is likely to prove of considerable value in investigating metals. The appearance of the surface of the specimen during test may reveal any lack of uniformity in the material. The method of impact testing consists of the shearing of an unnicked specimen by impact applied by means of a swinging pendulum and the measuring of the energy used in the shearing. It has the advantage of applying a single kind of stress instead of a combination, of eliminating the uncertainty connected with unnicked specimens, and of making it possible to shear the same specimen several times and utilize the average results.

Non-Ferrous Metals and Alloys

W. H. Basset presented the report of committee B-1 on Copper Wire, in which it was stated that the work on tinned copper wire had been more of a task than was anticipated, particularly the formulation of tests to determine the thickness of the tin coat. By another year this matter will be covered by a formal report. On the recommendation of the committee the

tentative specifications for high strength bronze trolley wire were ordered submitted to letter ballot.

SPECIFICATIONS FOR NON-FERROUS METALS

Committee B-2, on Non-Ferrous Metals and Alloys, submitted five sets of tentative specifications, as follows:

For copper plates for locomotive fireboxes.
For copper bars for locomotive staybolts.
For seamless copper boiler tubes.
For seamless brass boiler tubes.
For non-ferrous alloys for railroad equipment in ingots, castings and finished car and tender bearings

In the last-named set were included steam metal, red brass, yellow brass and brazing metal. Several members representing interests having to do with railroad work took exceptions to the chemical composition provided for steam metal for cocks, valves, injectors and other castings. The range of tin in steam metal as provided in the proposed specification was 5 to 7 per cent. One interest suggested that the maximum be raised to 12. Other exceptions were taken to the steam metal, red brass, yellow brass and brazing metal analyses proposed and it was decided to re-submit these classes of railroad work alloys to the committee. Otherwise the proposed specifications were accepted for publication in the *Proceedings*. A revision of the standard specifications for spelter, as submitted by the committee was referred to letter ballot for adoption. In addition to high grade, intermediate, brass special and prime Western, originally provided for, a fifth grade is inserted between the last two, called "selected." Its limits are 0.80 per cent lead, 0.04 iron and 0.75 cadmium. It shall be free from aluminum and the sum of the lead, iron and cadmium shall not be more than 1.25 per cent. Changes were made also in the sections on sampling and analysis.

MANUFACTURE OF BRASS CONDENSER TUBES

A paper by A. E. White on "An Investigation Leading to Specifications for Brass Condenser Tubes" recited the work done by the author in seeking to remedy the frequent splitting of brass condenser tubes in service at the plant of the Edison Illuminating Company of Detroit. An abstract is given elsewhere. The specification developed as the result of his study was presented by Professor White and the statement was made that in over two and a half years since the recommendations submitted were acted upon no instance of a failed tube had come to light, while previously there were many days on which as many as five tubes out of the 20,000 in service at the Detroit plant had been either plugged or removed because of failure.

Exceptions were taken by W. Reuben Webster to some of the statements which Professor White had made. He did not consider that sufficient reason had been given for the choice of the formula 70 per cent copper and 30 per cent zinc. Maximum ductility would not be a sufficient reason. Mr. Webster thought that too much stress had been put on cold working. Hot worked tubing will give entirely satisfactory results. The specifications for the Navy Department do not impose the restrictions as to mechanical treatment which Mr. White had provided. No evidence had been furnished that bismuth is deleterious. Other exceptions were taken on behalf of manufacturers of tubes, which prompted the comment by Cloyd Chapman that if the manufacture of condenser tubes that will stand up in service was as easy as might be inferred from some of the statements made, it would be pertinent to ask why users have so much trouble with tube failures.

In closing the discussion Mr. White said that he had no desire for controversy with manufacturers, but would point out that since the specification he had presented had given the user condenser tubes which did not fail from splitting, whereas such failures had been common before, it was fair to say that it met the chief requirement of a good specification, namely, that a product manufactured in accordance with it has stood the test of service.

TESTS OF MANGANESE BRONZE AND ALUMINUM BRONZE

W. M. Corse and G. F. Comstock gave in a joint paper results of tension tests and endurance tests with the Landgraf-Turner and White-Southe machines made on manganese bronze and aluminum bronze, showing that although the former may give better figures when tested in tension, the latter is far superior in endurance of alternating stresses. A method of heat treatment was described by which the proportional limit of 10 per cent aluminum bronze was raised substantially, without the loss of too much ductility. This was shown to be applicable to castings of ordinary size. It increases endurance under alternating stresses as well as the proportional limit in tension.

A. A. Stevenson raised the question whether the society had not reached the point where it should recommend some standard magnifications for work with the microscope. The variations in magnification used in research work were commented on by several speakers. A resolution was passed asking the executive committee to appoint a committee on the subject.

Miscellaneous Materials

At the opening of the last session Dr. Richard Moldenke took the floor to pay tribute to Leslie S. Robertson, secretary of the British Standards Committee, who lost his life on the Hampshire. As a mark of respect the members rose.

The report of Committee A-3, on Cast Iron and Finished Castings, referred to some work by the subcommittee on carwheels which would be continued in the coming year, also to the attempt to form a subcommittee on specifications for cast-iron soil pipe and fittings. Tentative specifications have been circulated but without conclusions thus far. A recommendation was presented and adopted that the tentative methods of sampling and analysis of pig and cast iron published in 1915 be referred to letter ballot for adoption.

Dr. Moldenke also presented the report of Committee D-6, on Coke, recommending that the present tentative specifications for foundry coke be referred to letter ballot, and this was done. The report also submitted tentative methods for laboratory sampling and analysis of coke and these will be printed in the 1916 Year Book.

A paper by H. L. Morse was read by title, describing an apparatus for testing the standard cast-iron arbitration bar. It was designed by Mr. Morse for use on the 100,000-lb. Emery testing machine in the ordnance laboratory at Watertown Arsenal. The device utilizes the Ames dial by means of a thrust spindle and bell crank in such a way as to give an accurate measurement of deflection at the instant of fracture of the bar and at the same time avoid injury to the dial.

The last name registered on Friday brought the total of those attending the meeting up to 516.

Merger of Engine Parts Makers

The Steel Products Company and the Metals Welding Company, Cleveland, Ohio, and the Michigan Electric Welder Company, Detroit, Mich., three affiliated interests, have been merged in one company, which will bear the name of the Steel Products Company, and will have a capital stock of $4,000,000. The products of the plants include valve stems and other gas-engine and automobile parts and welding equipment. The present officers of the Steel Products Company will remain at the head of the new company. They are C. E. Thompson, president; W. D. Bartlett, vice-president; and J. A. Krider, secretary and treasurer. Additional directors are E. C. Rader, C. F. Clarke, C. N. Osborne and S. Livingston Mather. The other merged companies will operate under their own names as subsidiary plants.

The Swind Machinery Company, dealer in new and second-hand machinery and tools, has removed its office and salesroom from the Bourse Building, Philadelphia, to room 1110 Widener Building.

SPRAY COOLING PONDS

A Feature in Converting a Small Mill Steam Plant to Condensing Operation

Small mill power plants, operated non-condensing on account of lack of cooling water, could, by installing a small earthen pond or concrete basin fitted with a spray cooling system effect a net saving in the cost of power of from 15 to 20 per cent, according to Lee H. Parker, president of the Spray Engineering Company, Boston, in a paper read some time ago before the National Association of Cotton Manufacturers. The most important feature of such a system are the nozzles, whose function is to produce a fine spray at the outlet, with a low operating pressure and without clogging. The nozzles are of high-grade bronze finished smooth inside and out. The piping is generally of cast iron with flanged connections, valves and fittings. Such a system, Mr. Parker says, resting on concrete piers will have an indefinite life with practically no maintenance cost.

The average loss of water from evaporation has been determined by tests to be about 1¼ per cent of the water sprayed in New England installations and about 2 per cent in the Southern states, the higher figure in the latter case being due to the greater evaporation at the higher atmospheric temperatures. The average amount of heat dissipated from the surface of a natural cooling pond, provided with partitions to force the water to travel as long a distance as possible between intake and outlet, has been shown to be 3.5 B.t.u. per square foot per hour per degree of temperture difference. The average heat dissipated by a spray cooling pond is given as 127 B.t.u. per square foot per hour per degree of temperature difference. Thus a natural cooling pond, capable of taking care of a 100-hp. plant, can be made to take care of a 3600-hp. plant by the addition of a spray cooling system.

With cooling ponds of any type the feed water for the boilers is taken from the pipe line and the pond, thus saving the heat in that portion of the condensing water returned to the boilers. It is important to have the ratio of condensing water to steam condensed large enough to keep the water in the pond in equilibrium for any desired vacuum. If this ratio is such that the heating effect of the condenser is greater than the cooling effect of the pond, the temperature of the pond will rise and the vacuum decrease correspondingly, thus impairing the economy of the plant.

When there is no breeze, an upward air current is created around each nozzle due to the combined effect of the movement of the spray and the heating effect of the spray on the air. This current carries away rapidly the warm moist air, which is replaced by cool air from the surface of the pond. Spray ponds are more efficient in extremely hot weather with high humidity than in cool weather with low humidity. The following table shows typical results obtained with spray ponds.

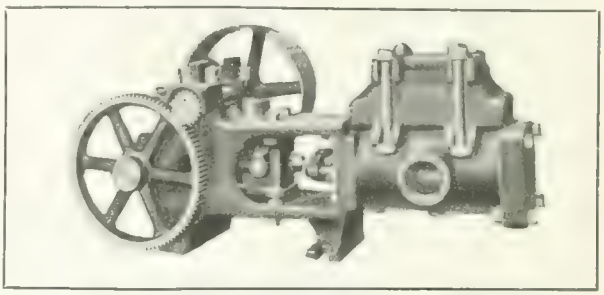
Air Temperature, Deg. Fahr.	Relative Humidity, Per Cent	Temperature of Water, Deg. Fahr. Before Spraying	After Spraying	Season of Year
18	72	100	60	Winter
20	..	104	63	Winter
22	..	105	64	Winter
24	..	107	65	Winter
26	..	108	66	Winter
30	..	110	66	Winter
56	..	99	82	Spring
59	79	100	85	Spring
62	..	101	86	Spring
64	..	103	88	Spring
66	..	104	88	Spring
70	..	105	88	Spring
69	..	104	87	Summer
71	40	108	92	Summer
75	..	110	94	Summer
78	..	112	96	Summer
88	..	114	98	Summer
90	70	108	90	Summer
98	..	118	93	Summer
85	32	86	76	July
93	19	90	80	July

The above results were obtained with single spraying. Greater cooling effects could be obtained by successive sprayings or by mixing a portion of the cooled water with the hot water in the discharge line, and spraying the mixture at the resulting average temperature. To determine whether or not a cooling system will pay, it is only necessary to compare the cost of city water used for condensing, or the cost of pumping, if the water is obtained from a distant source, with the fixed charges on a cooling system plus the costs of operation and maintenance.

An Improved Design in Power Pumps

A general utility power pump has recently been added to the line of pumps manufactured by Bean Brothers Steam Pump Works, Indianapolis, Ind. The power frame is a separate casting, not cast integral with the pump cylinder. Suction and discharge valves are contained in separate valve plates, which are renewable at small expense; and can be removed for examination without disturbing piping or breaking any permanent joints. This feature is especially advantageous when strong corrosive acids, as liquids containing sulphur or strong alkalis, are being handled. The piston is the two-piece, packed type, using square duck packing. The water cylinder is brass lined and the removal of the four outside bolts makes all valves immediately accessible without the use of special wrenches.

The power end is notably simple. All bearings, which are lined with babbitt, have removable shims, allowing the cups to be set closer when it becomes necessary to take up wear. The bearings have lubricating devices with adjustable sight feed and capacity for a full day's run. The crankshaft and connecting rod are of drop forged steel of high tensile strength. The cross head is of the plain box type working in slides that are adjustable for wear and easily renewable, a feature for small power pumps. The gears have machine cut teeth instead of cast teeth.



General Utility Type of Pump Brought Out by Dean Brothers Steam Pump Works

At 92 r.p.m. this pump delivers 36 gal, per minute. The pump is guaranteed to operate against pressures up to 60 lb. per square inch. In a shop test of 120 days' duration, the pump operated against 60-lb. pressure for 90 days and against 80-lb. pressure for 20 days. The discharge valve was then closed down and the pressure mounted to 240 lb., when the valve was opened. The pressure was then increased to 90 lb. and the pump operated against this pressure for 10 days. On completion of the test bearings were found in good condition and gear teeth indicated no signs of wear.

Carpenter Steel Adds to Open-Hearth Capacity

The Carpenter Steel Company, Reading, Pa., will build two stationary basic 10-ton open-hearth furnaces, with auxiliary equipment, to increase its capacity for making special steels. The company now has in operation four 32-pot crucible furnaces, one 10-ton basic open-hearth furnace, and one 6-ton Heroult electric furnace. Previous to the installation of the electric furnace, its plant had an annual capacity of 10,000 tons of crucible ingots and 10,000 tons of open-hearth ingots.

After a long idleness, the puddle mill and the butt-weld department of the pipe mill of the Susquehanna Iron Company, Columbia, Pa., now under lease to the A. M. Byers Company, resumed operations July 5.

Judicial Decisions

ABSTRACTED BY A. L. H. STREET

LIABILITY CONCERNING PORTABLE BRIDGEWAYS.—The rule of law which requires an employer to provide a reasonably safe place of work for his employees extends to a removable bridgeway placed between a factory building and railroad cars in loading and unloading freight, and the employer is liable for injury caused by displacement of the bridgeway through want of a cleat to prevent its slipping, the injured man not being chargeable with notice of the defective condition, and being entitled to assume that his employer had taken all steps reasonably necessary to avoid such an accident. (Kentucky Court of Appeals, Reffitt vs. Southern Sheet & Tin Plate Company, 186 Southwestern Reporter, 155.)

AMOUNT RECOVERABLE BY INJURED MOLDER.—A verdict for $3,109.20 in favor of an injured molder is not excessive when it appears that his hand has been badly crippled in an accident attributable to fault of the employer, requiring him to see much less remunerative employment. (Pennsylvania Supreme Court, Freed vs. Standard Scale & Supply Company, 97 Atlantic Reporter, 72.)

WAIVER OF LIEN ON ORE.—Sales agents for an iron mining company who had a contracted lien on ore produced by the company for advances could not, on selling some of it, assert a lien against a different kind of ore bought on behalf of the company, the lien being discharged by sale of the company's produced ore. (United States Circuit Court of Appeals, Second Circuit, Hillman vs. New York State Steel Company, 231 Federal Reporter, 936.)

STEAMSHIP COMPANIES' LIABILITY CONCERNING FREIGHT.—A steamship company accepting a shipment of articles crated in a customary manner, which had previously proved safe and sufficient, was bound to stow the freight with reference to the weight of the articles and the manner of crating, and is liable for injury to the shipment resulting from piling in too high tiers. A stipulation releasing a ship from liability for injury to freight resulting from "perils of the sea" does not relieve from responsibility for loss resulting from storms of no greater severity than are reasonably to be expected, considering the route, season and known manner in which the freight has been packed. (United States District Court, Northern District of California, the Erskine M. Phelps, 231 Federal Reporter, 767.)

UNSAFE CONDITION OF WAREHOUSE PREMISES.—One going to a warehouse on business, but using another than a customary door and finding his passage obstructed and dark, is not entitled to recover damages resulting from falling down an elevator well which was unguarded; an owner of premises not being bound to keep them safe as to places to which persons are not expressly or impliedly invited to go. (New York Supreme Court, Appellate Division, Miller vs. Barker, Rose & Clinton Company, 158 New York Supplement, 865.)

EXCUSE FOR SELLER'S DELAY IN DELIVERY.—When, in an action by a seller to recover the agreed price of equipment, the buyer counterclaims damages for failure of the seller to deliver within an agreed time, the latter is entitled to show in rebuttal that the delay resulted from the buyer's own breach of contract. (Kentucky Court of Appeals, Lam vs. Earlington Machine Works, 186 Southwestern Reporter, 152.)

CONTRIBUTORY NEGLIGENCE OF EMPLOYEE.—A steel company's stationary engineer who pried an engine's fly-wheel to get the engine off "dead center" while the steam was on was guilty of contributory negligence, which bars recovery for injury resulting from being struck by the bar used in the prying when the engine started. (Pennsylvania Supreme Court, Kephart vs. Carbon Steel Company, 97 Atlantic Reporter, 574.)

EMPLOYERS' LIABILITY ACTS.—The Oklahoma law which requires employers to safeguard dangerous machinery, such as revolving set screws, etc., does not render them liable for injuries resulting from an unguarded condition but directly attributable to the injured man's own contributory negligence. (Oklahoma Supreme Court, Kester vs. Enid Mill & Elevator Company, 157 Pacific Reporter, 355.)

GUARANTEED CAPACITY OF PUMPS.—A buyer of a pump sold under warranty of its capacity to lift a certain quantity of water per minute, under certain conditions relating to the flow of clear water in the well, is not entitled to recover damages on the theory of failure of the pump to come up to the warranty, in the absence of proof that the well furnished enough clear water to meet the guaranteed capacity of the pump. (California District Court of Appeals, Fairbanks, Morse & Co. vs. Zimmerman, 157 Pacific Reporter, 509.)

RECOVERY UNDER KANSAS COMPENSATION ACT.—Recovery can be had under the Kansas workmen's compensation act only on the basis of disability to labor resulting from the injury received in the course of employment, without the intervention of any independent cause, the separate consequences of which admit of definite ascertainment. It cannot be augmented by the fact that the disabling effects of the injury are increased or prolonged by incompetent or negligent surgical treatment, even where the employer is responsible therefor. (Kansas Supreme Court, Ruth vs. Witherspoon-Englar Company, 157 Pacific Reporter, 403.)

AN EXEMPTION FAVORING INTERSTATE COMMERCE.—A contract for sale of machinery to be installed in Wisconsin, formed by a Minnesota machinery company's acceptance in Minnesota of an order given by the buyer, the machinery being shipped from the latter mentioned State, constitutes interstate business not affected by the Wisconsin statute which prohibits suit in Wisconsin on contracts made in that State by a non-resident corporation which has not complied with the Wisconsin statutes limiting the right of foreign corporations to do business in that State. (Wisconsin Supreme Court, Charles A. Stickney Company vs. Lynch, 158 Northwestern Reporter, 85.)

EMPLOYEE ASSUMES OBVIOUS RISKS.—An employer's direction to a workman to perform a dangerous task will not render the former liable for injury resulting from an apparent defect in an appliance which the employee is required to use. (Georgia Court of Appeals, Niblett vs. La Grange Mills, 88 Southeastern Reporter, 1009.)

RECLAIMING PROPERTY CONDITIONALLY SOLD.—One who sells chattel property under a contract reserving title until payment of the purchase price, as evidenced by notes given therefor, does not lose the right to reclaim the property on non-payment of notes remaining in his hands by reason of transferring part of the notes; but the buyer is entitled to cancellation and delivery of all unpaid and outstanding notes. (West Virginia Supreme Court of Appeals, Orenstein-Arthur Koppel Company vs. Martin, 88 Southeastern Reporter, 1064.

WHEN SELLER DOES NOT IMPLIEDLY WARRANT GOODS.—When a buyer of goods accepts them after inspection, or after opportunity to inspect them, there is no implied warranty on the part of the seller as to the quality or merchantableness of the goods. (West Virginia Supreme Court of Appeals, Showalter vs. Chambers, 88 Southeastern Reporter, 1072.)

SALE OF MACHINERY ON TRIAL.—When machinery is sold on trial for a certain period, the buyer retains it beyond that time, and the seller sues for the price, title will be held to have passed from the seller to the buyer. But as long as there is nothing to show that the parties have expressly or impliedly agreed that the trial shall be merged into an absolute sale, the right remains in the seller to reclaim the property on insolvency of the buyer and his non-payment of the price. If no period of trial be fixed, the mere fact that the buyer has retained possession nearly two years will not preclude the seller from recovering possession on the theory that there was no absolute sale. And when a machine is sold on trial, but no price is fixed, either party may rescind the contract at any time before a price is agreed upon. (Delaware Court of Chancery, James Bradford Company vs. United Leather Company, 97 Atlantic Reporter, 620.)

THE IRON AGE

New York, July 13, 1916

ESTABLISHED 1855 VOL. 98: No. 2

Steel Castings as Ship Stabilizers

The Largest Gyroscopic Rotors Made Now Being Installed in a U. S. Army Transport— Their Application to Submarines and Aeroplanes

STEEL castings are being introduced into a new field. One of the latest developments in naval construction is the gyroscopic stabilizer for large and small ships and the steel casting is the leading feature in their construction.

The accompanying illustration shows the largest casting for this new purpose ever made. As a result of extensive investigations and experiments by the United States Government, two of these stabilizers are being installed on United States Navy transport No. 1, now nearing completion at the Philadelphia Navy Yard. They are the outgrowth of successful attempts to apply this principle and apparatus to the United States destroyer Worden.



The Largest Rotor Casting Ever Made. It weighs 56,000 lb. and two are being installed on U. S. Transport No. 1, as part of a Sperry Gyroscopic Stabilizer

The first attempts at stabilizing ships were made by Sir Phillip Watts who in the eighteen - eighties placed damping tanks on English battleships of the Invincible class. Later Sir John I. Thornycroft, an Englishman, employed a large weight as a stabilizer, equal to about 5 per cent of the ship's displacement. Quite recently Herr Frahm again invented damping tanks, partly filled with water and made in the shape of horseshoes, which he placed on several large ships. Dr. Schlick, a German engineer, first employed a gyroscope as a stabilizer for ships. It was a large wheel, mounted horizontally in the ship, and so located as to swing freely with its shaft vertical, constituting a passive type of gyroscope.

The weak point in most of these ideas was ineffectiveness in damping the ship's roll until a motion of considerable magnitude had set in. An American engineer, Elmer A. Sperry, has lately perfected a gyroscopic stabilizer, known as the active type, which, it is claimed, actually prevents a ship from rolling under any conditions. It is for this new type of stabilizer that these large castings and smaller ones have been made successfully by the Penn Works at Chester, Pa., of the Penn Marine & Ordnance Castings Company.

While the design of the casting itself does not present any unusual problems in steel foundry practice, it is not one that can be easily made acceptable in every respect. Subjected as it is to an unusually severe inspection before its final acceptance, great care is necessary in making the mold, in its drying, in its heading and gating, and in the soundness of the metal. The casting as shown weighs about 56,000 lb. as it leaves the foundry. It is 10 ft. in diameter and 27 in. thick on its face. Revolving as it must at a very high rate of speed —1150 r.p.m.—to perform its function, uniformity of section and absolute soundness are very important essentials. To insure this the heading of such a casting must be ampler than is normally the practice for a casting of this design. In this case five large heads were put on the outside rim so that the actual metal necessary to pour it was nearly 110,000 lb. It was cast with the broad side down. Another consideration requiring soundness is the fact that the castings are machined practically all over, and any blowholes, defects or shrinkage cavities would militate against their acceptance. They must be nearly perfect.

The metal is plain carbon, open-hearth steel but made from carefully selected stock and under conditions insuring the best steel possible by this process. The average composition of castings for this purpose is 0.25 to 0.30 per cent carbon, 0.60 to 0.70 per cent manganese, 0.25 to 0.30 per cent silicon, and a phosphorus and sulphur content of about 0.040 per cent. No alloys have been considered necessary either for purifying purposes or as a constituent of the metal.

The removal of all interior strains and initial

stresses in the metal is even more essential in such a casting than in many others, and therefore a most careful and thorough annealing is resorted to—a heat treatment that insures a complete heat permeation of every part of the casting and a thorough rearrangement and adjustment of the crystals and the neutralization of all ingotism. This is not easy unless unusual care is practised in the annealing process. The casting being subjected to severe strains in its rapid revolutions, there must be no possibility of cleavage between groups of large and small crystals.

Besides the castings here described, others have been made of smaller dimensions and applied to smaller ships. In addition to those installed on the United States destroyer Worden, a successful commercial installation is that on the small yacht Widgeon, plying on the Great Lakes and owned by M. A. Hanna, Jr., of Cleveland, Ohio. In this case the weight of the gyro-rotor or casting, the shaft and armature is 2150 lb. and its revolutions per minute are 2750. The rotor itself is 3 ft. in diameter and has a 10-in. face. The total weight of the equipment is about 1 per cent of the displacement of the yacht.

The smallest gyro-rotor in service is one on a speed motor boat. It makes 5000 r.p.m., is 24.5 in. in diameter and weighs 550 lb. The boat has a speed of 37 miles per hour. Proper steel for such a casting is even more difficult to make than for the very large rotor.

Submarines are also being stabilized by means of such castings and the principle is also being applied to aeroplanes. The field apparently is large.

Keeping Records of Finished Products*

Accurate Records of Completed Machines Are Necessary for Estimating Future Sales and for Furnishing Repair Parts for Customer's Equipment

BY H. A. RUSSELL

WHEN the production department receives its copy of the estimated sales and has issued the necessary manufacturing orders, the permanent production record sheet (Fig. 1) is filled in. The catalog number and description of the machine are written in the space at the top, together with the figures which indicate the year or season for which the machines are built, and the word Regular or Catalog. At times a special lot of machines may be built for a customer, in which event the word Special would be written instead. It even may be advisable to furnish a more complete description of the machine for future reference.

In the left-hand column is entered the quantity of machines specified on the estimated sales and the office order number. In the next column will appear two dates. The first is the date of the order and the second the approximate date on which the machines should be finished. The second date really indicates the beginning of the season for that particular machine. A copy of each customer's order is sent to the production department and entered in the third, fourth, fifth and sixth columns. As each machine is finished it is reported in writing to the production department by the foreman of the fin-

*The third and final article of a series on regulating and balancing production in a large agricultural implement factory. The previous articles appeared in THE IRON AGE of June 29 and July 6

Form 7 P 1000-11-15-13

MACHINE NAME #25 THRESHING MACHINE FIG. NO. 1915 - REGULAR

STOCK ORDER No	DATE ISSUED DOE	No	OFFICE ORDER No	CUSTOMER	DATE PROMISED	DATE TAGGED AND FINISHED	DATE SHIPPED	SHOP NUMBER	REMARKS
50 95409	12-1 1914	1	96627	JOHN SMITH	6-6	6-5	6-6	7421	
		1	96629	A. S. CLARK	6-10	6-5	6-9	7422	
	6-1 1915	1	96643	JONES AND JONES	6-10	6-5	6-10	7423	
		1	"	" " "	"	"	"	7424	
		1	"	" " "	"	"	"	7425	
		1	96685	BROWN & CO	6-5	"	6-6	7420	
		1	97207	SANSOM & ANDREWS	6-12	6-8	6-12	7426	
								7427	
								7428	
								7429	

Fig. 1—The permanent production record sheet tells how many uncompleted machines are in process, when they will be finished and who purchased the completed ones. The customer's name and promise date are entered as soon as the order is received and the other entries are made as the work progresses. The sheet is a loose leaf sheet, ruled on both sides and is 10 x 13 in.

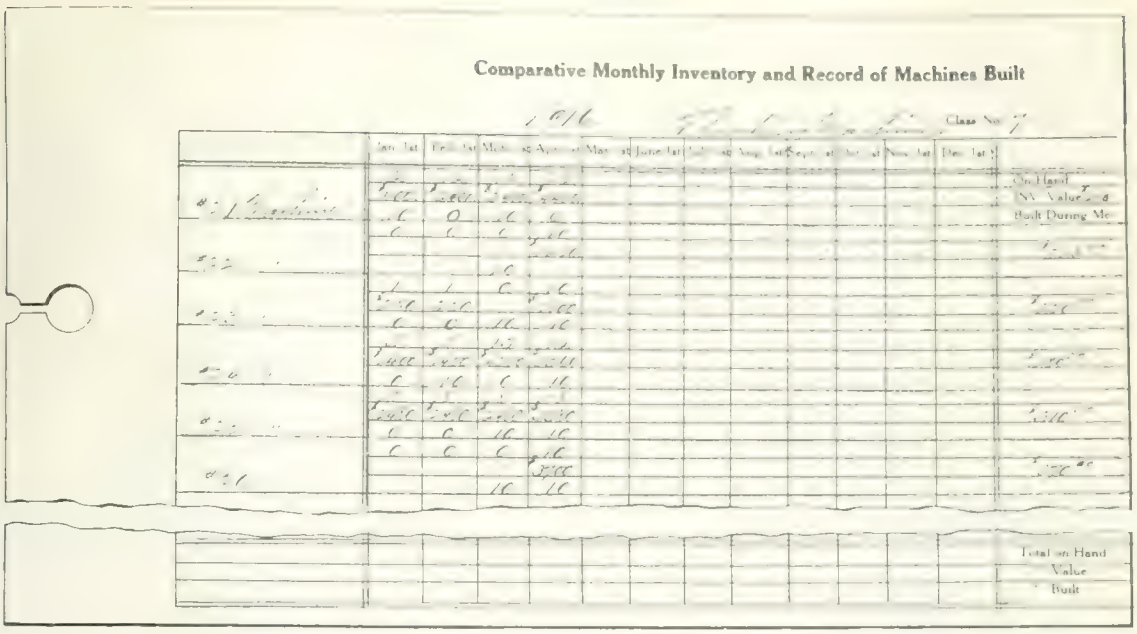


Fig. 2—The monthly inventory shows the quantity and value of finished machines on hand and compares them with the figures of corresponding months in other years.

ishing department, who gives a description and the shop number of the machine. The shop number is stamped on the brass name plate which is securely attached to the machine. The entries are then made in the proper columns and on the correct line, that is, the machines as finished are recorded by number on the same line as the customer's name and according to the shipping date that has been promised.

The production order for parts calls for fifty sets but the first erecting order calls for only ten machines. As soon as these ten are finished another erecting order is issued, providing it was not deemed more expedient to erect a group of another size or style of machine. The production department has a complete grasp on the situation because each customer's order is recorded as received and if there is a run on any particular size or style machine, it is notified automatically through the recording of the orders. Fig. 1 shows that there were three more machines finished than the number of orders received, at the time of the last entry. The record is accurate at all times because the entries are made daily. The customer's order furnishes one entry, the foreman's report furnishes another and the copy of the shipping order, which is given to the production department the morning after the shipment is made, furnishes the final entry. The number of machines actually finished and ready for shipment is always available. The quantity of machines that are in course of erection and their approach to the finished state, is a matter that the production chief keeps in touch with daily.

On the first of each month the production department fills in the sheets covering the monthly inventory of finished machines on hand and also the report showing the number of machines of each kind and size built during the month. See Fig. 2. The entire product of this factory is divided into seventeen different groups or classifications. All of the monthly inventory sheets for each classification

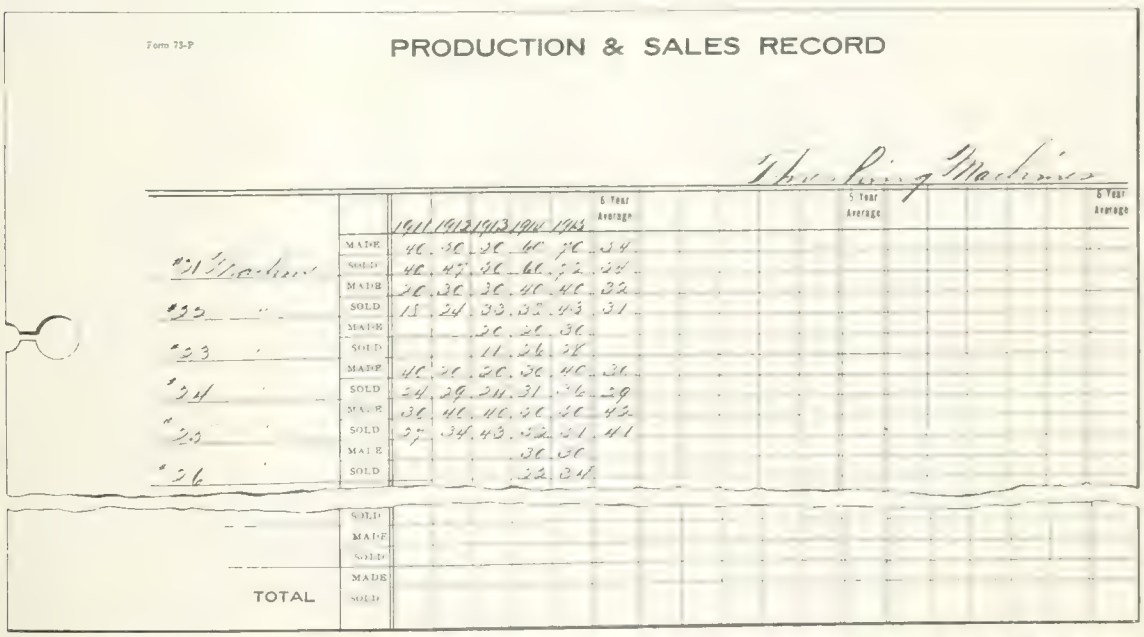
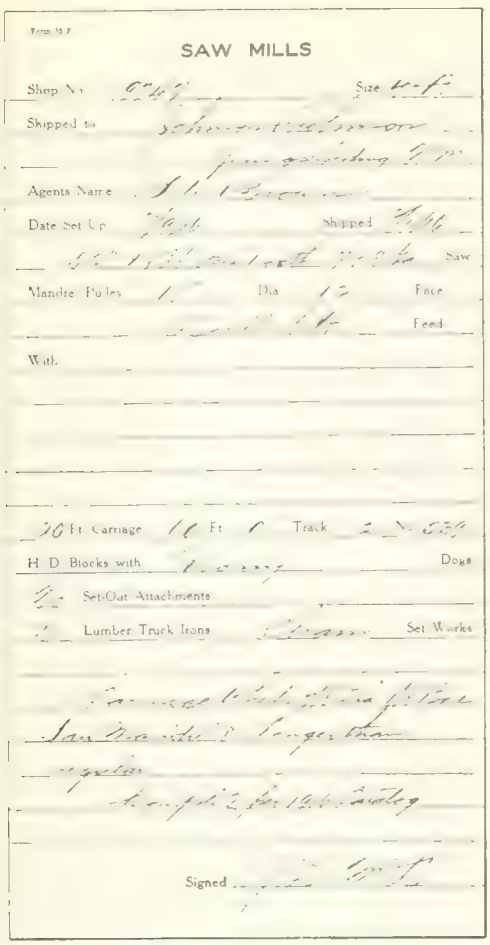


Fig. 3—The production and sales record gives a complete picture of the sales and production during a five-year period. It is used as a basis in planning the production for the [illegible]



SAW MILLS

Shop No. 9246 Size 44-ft

Shipped to Johnston Lumber Co
for gasoline 5 H.P.

Agents Name A. L. Brown

Date Set Up 1916 Shipped Feb 16

5 ft 11 in Saw

Mandrel Pulley 1 Dia 12 Face

Feed

With

20 Ft Carriage 60 Ft 6 Track 2 No 539

H D Blocks with 1 Long Dogs

Set Out Attachments

Lumber Truck Irons Steam Set Works

Samuel Hall Shingle Co
San Diego Cal
Engine
Sample Saw 1916 Catalog

Signed

Fig. 4. The packer's card conveys to the production department complete information, including the number of every machine shipped

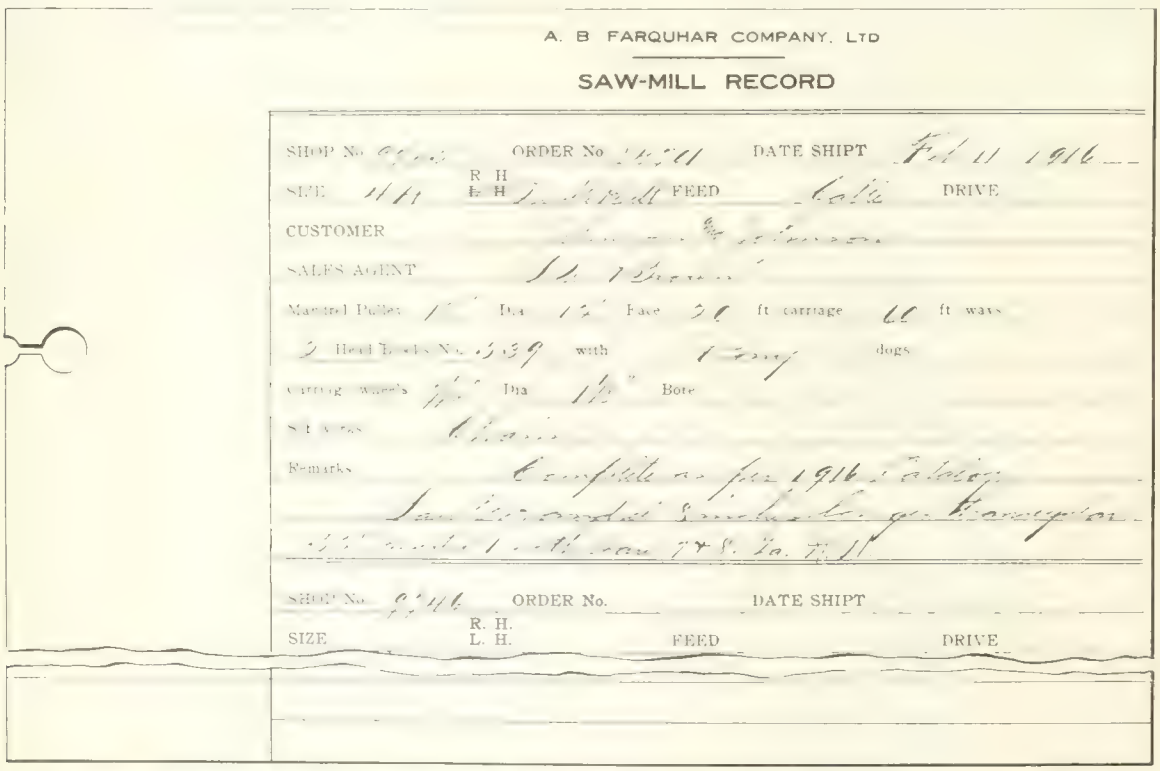
are totaled and recorded on a comparative sheet. It is thus easy to compare the values of the different classifications on hand, not only with the preceding month but also with the corresponding months in the previous years. The total of all the classifications is treated in the same manner. This report goes to the management and furnishes a means to prevent overstocking or understocking of finished machines.

Fig. 3 shows the "Production and Sales Record" sheet. This exhibits the quantity of each size and style of machine made, the quantity sold year by year and the average for each five years, as a check. This record is made up from the machine record sheets shown in Fig. 1. At the foot of the production and sales record sheet a yearly total is inserted, which indicates the total quantity of machines built and sold in each group but without reference to sizes. The five-year average also is taken into consideration.

The lines manufactured in this factory are many and varied, and the forms were designed to record each and all groups, without changing the printed headings or making many insertions in long hand. When the time comes around each year to issue the estimated sales or stock order, the records of the production department furnish complete information as to the sales of previous years. The estimated sales sheet is made up from this information, but is governed by the outlook for the season ahead.

HANDLING ORDERS FOR REPAIR PARTS

The shipping of the completed machine to the customer in many cases does not end the manufacturer's interest in it. This is particularly true as regards agricultural machinery. The manufacturer must be prepared to provide repair parts for any machine, which may have changed hands several times, even after the lapse of many years, and upon the most meager information. In the early days, when the number of patterns was limited and the volume of business small, the question of furnishing correct repairs was generally settled by reference to memoranda kept by foremen or workmen. Often the repair part was shipped solely on the say-so of some one person who had erected the



A. B FARQUHAR COMPANY, LTD

SAW-MILL RECORD

SHOP No. 9246 ORDER No. 14511 DATE SHIPT Feb 11 1916

SIZE 44 R. H. L. H. FEED Gate DRIVE

CUSTOMER Johnston Lumber Co

SALES AGENT A. L. Brown

Mandrel Pulley 1 Dia 12 Face 20 ft carriage 60 ft ways

2 Head Blocks No. 539 with 1 Long dogs

Carrying Wheels 11" Dia 1½" Bore

Set Works Steam

Remarks Complete as for 1916 Catalog
San Diego Cal Engine to go Barrington
Ill. with 1 Steel Saw 7 ft. Dia. 7/11

SHOP No. 9246 ORDER No. DATE SHIPT

SIZE R. H. L. H. FEED DRIVE

Fig. 3.—Information is copied from the packer's card to the permanent record sheet of the production department. These are filed in a loose leaf binder in the order of the shop numbers. Each record sheet, 10 x 13 in., has space for three records on each side

machine in question, or other machines similar to it and who could vizualize that machine and know, in the majority of instances, what part or parts the customer wished to secure. With the increase in the number of different types of machines built, and with a large increase in the volume of sales each year, it becomes impossible to depend on such crude methods for the correct shipment of repair parts.

The ordinary farm machine, for example, consists of hundreds of parts in each machine. A slight change in design may mean the substitution of ten, twenty or thirty new parts for the parts formerly used. The same applies to a change in a grain drill, a portable sawmill or a traction engine. It is evident that some other method than scattered memoranda is necessary to keep track of the changes that are made from year to year, and in some instances oftener. The drafting room must keep all old tracings so that they are readily accessible. As each machine is designed, a complete list of parts should be made, including even the ordinary bolts, rivets, etc. When a change is made in the design, the change is either noted on the original tracing, or a new tracing is made, together with a new list of parts. Every tracing and every list of parts must be dated. Whenever it is possible to note the date of the change, it is advisable to do so.

It is not possible to keep track of machines, after they are shipped, either by customer's name or location. Therefore each machine leaving this factory has firmly attached to it a brass name and number plate. The designating number is stamped in the plate when the erecting of the machine is completed.

When a machine is being packed for shipment a card known as the "packer's card" is filled in by the party in charge and turned in to the production department the day the machine is shipped. Fig. 4 shows the card used for reporting sawmills. The information is then copied from the packer's card to the sawmill record loose sheet, Fig. 5. When the loose leaf record sheets are placed in the binder they form their own index as the shop number of the machine regulates the position of the sheet. The packer's card is filed separately.

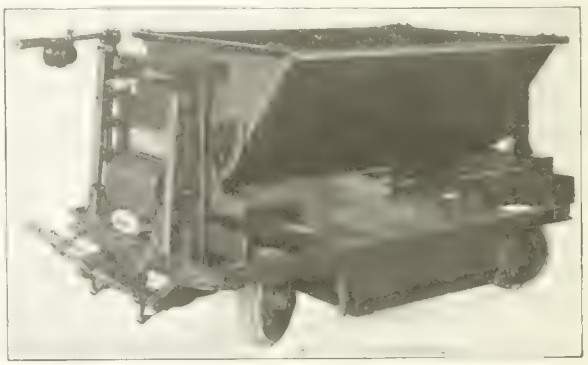
The information on these records is so complete that the proper part can be furnished if the machine number is given. Repair parts thus can be ordered by the shop number of the machine. If that number is given the order can be filled correctly. It sometimes happens that the shop number has been removed from the machine and in an instance of this kind the only thing is to send the old part back to the factory to be duplicated, if the machine has been out any length of time. The "order-by-number" idea has spread rapidly during the last decade.

The matter of proper records so as to be able to fill repair orders promptly has more than one side. From the manufacturer's standpoint there is the satisfaction of shipping to the customer the correct repairs promptly and the thought that the service to the customer did not cease with the shipment of the original machine. From the customer's viewpoint the needed repairs should be shipped within a few hours from the time that his order is received in the manufacturer's office. This is not always possible because no manufacturer could keep duplicate or triplicate sets of all parts on hand at all times. At times, parts of the equipment are broken through the results of an unusual accident and the part broken is one which would never break from ordinary wear. Patterns are stored for many years after the machines for which they were designed have become obsolete, and if the casting must be secured from an outside source, there will naturally be a few days' delay.

The records are kept by the production department because it is constantly in touch with the output from each factory department, and is therefore in a position to catch any mistakes that might be made by the packers the day the mistake is made. A month later would leave the matter in a state of confusion and doubt. If these records were kept by any other department there would be much duplicated work, as the other department would have to go out in the factory and gather the information which the production department absorbs naturally in the course of its regular duties.

Storage Battery Truck of Dumping Type

The successful application of electric storage battery trucks for handling material in various manufacturing plants has resulted in the further adoption of these trucks for the transfer of bulk materials and the bringing out of an electric dump truck for this purpose.



A Side Dump Truck of All-Steel Construction Propelled by a Storage Battery

The accompanying illustration shows a new truck of this type that is being placed on the market by the Elwell-Parker Electric Company, Cleveland, Ohio.

This truck is built with either an end or side dump body and in capacities of 22½ and 36 cu. ft. The end dump type is provided with a hand winch to draw the body back to a horizontal position without the operator leaving the truck. The side dump truck is equipped with a balanced hopper which is easily tipped to either side by releasing a latch located immediately in front of the truck operator.

The trucks are furnished with either fixed or detachable hopper equipment. The latter type with the hopper removed can be used for various handling purposes. The fixed hopper truck is adapted for handling such material as chips, small castings, foundry sand, ashes, coal, chemicals, etc., and is said to be very economical in operation.

The truck is of all-steel construction, is provided with totally inclosed worm drive and is fitted with solid rubber tires. It can be operated by ordinary common labor.

How to make a shop magazine has been summarized by Arthur T. Morey, assistant to the president of the Commonwealth Steel Company, St. Louis, and editor of the *Commonwealther*, published by that company. His observations are of course of chief interest to a company contemplating a shop paper, and a reprint of them in bulletin form has been made and can undoubtedly be had by applying to the National Safety Council, W. A. Cameron, Continental and Commercial Bank Building, Chicago. Incidentally, Mr. Morey is now president of the National Safety Council. A good, modern, up-to-date company, he emphasizes, does not exist for its stockholders alone, or just for its management, or only for its workmen. It should exist and be conducted for the benefit of them all. The shop magazine "can help idealize and actualize this."

The Electrically Driven Reversing Mill*

Comparison of the Relative Advantages of the Steam Engine and the Reversing Motor for Driving Blooming Mills

In making a decision whether to adopt steam engine or electric drive for reversing rolling mills there must be taken into account: 1. First cost; 2. cost of operation; 3. energy saved during reversal; 4. power consumption with partial load; 5. economy of time in operation. It has been claimed that the steam engine is the equal or superior of the electric drive on all these points. This contention can be answered by means of data already available from electrically driven reversing mills in operation in the United States.

FIRST COST

The first cost depends not only on the type of engine or motor adopted, but upon the auxiliaries required for each, and also upon the arrangement of the plant. The auxiliary engine equipment will include the boiler plant, coal and ash handling facilities, coal storage, piping, condensing apparatus and foundations. The electric drive will require, in addition to the motor, a flywheel motor-generator set and the generating equipment in the power house. If power is purchased, only the driving motor, motor-generator set and control apparatus are necessary. Table I compares the first cost of an electric drive with that of a steam engine drive for a 40-in. blooming mill to roll 60,000 tons of steel per month. The figures given therein do not bear out the statement that the first cost of the reversing engine is only a small fraction of the aggregate cost of an electric drive.

Table I Comparison of First Cost of Steam and Electrically Driven Reversing Mills

Electric drive with purchased power:	
Complete cost of reversing motor, flywheel motor-generator set, exciters and control equipment..	$185,000
Foundations, wiring, etc	10,000
Total	$195,000
Electric drive with power generated at plant:	
Complete cost of reversing motor, flywheel motor-generator set, exciters and control equipment..	$185,000
Foundations, wiring, etc	10,000
Proportion of power house cost, 2500 kw., at $50 per kw	125,000
Transmission and outside wiring	5,000
Total	$325,000
Steam drive:	
Compound reversing engine	$125,000
Condenser, exhaust piping, including pumps	25,000
Foundations	10,000
Boilers, 2500 hp., including stokers, coal and ash handling plant, at $30 per hp	75,000
Steam piping with covering, valves, etc	15,000
Water tunnel for condenser with discharge 50 mgal of water per minute	50,000
Total	$300,000

COST OF OPERATION

Under normal operating conditions, with a 5000-hp. turbine generating power for the electric drive, and operating at 70 per cent of load, 1 hp. hr. can be generated with 13.6 lb. of steam. Table IV shows the horsepower required by an electrically driven reversing mill under different conditions of operation. The steam required can easily be calculated, and compared with the steam consumption of engine driven mills as exhibited in tables II and III. Tables II and III are from a paper by Karl Nibecker, steam engineer, Youngstown Sheet & Tube Company, Youngstown, Ohio, before the Engineers' Society of Western Pennsylvania. According to these figures the steam consumption of the electrically driven mill will range from 50 to 60 per cent of the engine-driven one.

Table II Steam Consumption of Reversing Steam-Driven Blooming Mill—Pounds of Steam Per Ton

No.	Ingot	Bloom	Elongations	Lb. Steam Per Ton
A	20 x 22 in.	6 x 7 in.	9.04	587
B	20 x 22 in.	6 x 7 in.	9.04	490
C	20 x 22 in.	6 x 7 in.	9.04	497
D	20 x 22 in.	6 x 7 in.	9.04	520
E	20 x 22 in.	6 x 7 in.	9.04	518
F	20 x 22 in.	6 x 7 in.	9.04	575
G	20 x 22 in.	3¼ x 7¾ in.	15.10	767
H	20 x 22 in.	3¼ x 7¾ in.	15.10	610
I	20 x 22 in.	3 x 11¾ in.	10.75	694
J	20 x 22 in.	3 x 11¾ in.	10.75	625
K	18 x 32 in.	4½ x 23¾ in.	5.13	522
L	18 x 32 in.	4½ x 23¾ in.	5.13	423
M	19 x 46 in.	4¾ x 36½ in.	4.63	356
N	19 x 46 in.	4¾ x 36½ in.	4.63	292

Table III Steam Consumption of Reversing Steam-Driven Blooming Mill

Ingot	Bloom	Number of Elongations	Lb. Steam Per Ton	Lb. Steam Per Ton at 5 Elong.	Lb. Steam Per Ton at 9 Elong.
20 x 22 in.	3 x 11¾ in.	11.50	643	444	591
20 x 22 in.	3¼ x 7¾ in.	15.00	600	375	505
20 x 22 in.	6 x 7 in.	9.00	495	350	495
18 x 32 in.	4½ x 23¾ in.	7.00	420	420	...
16 x 32 in.	5 x 29 in.	3.25	280	...	...
19 x 46 in.	4¾ x 36½ in.	4.75	300	...	...
18 x 32 in.	3 x 23½ in.	7.50	410	256	...

Table IV Electrically Driven Reversing Mill

Ingot	Bloom, In.	Elongation	Hp-hr. Per Ton	Remarks
18-in. round	7⅜ x 7⅜	4.66	11.4	High Carbon
18 x 20 in.	8 x 8	12.20	23.0	High Carbon
18 x 20 in.	2 x 16	9.20	19.4	Soft Steel
18 x 20 in.	4 x 4	18.50	26.0	
15 x 17 in.	4 x 4	16.00	24.0	
20 x 20 in.	5 x 5	16.00	25.5	
20 x 20 in.	8 x 8	6.25	17.0	

SAVING OF ENERGY

Comparisons of the saving of accelerated energy by the electrically driven mill and the steam engine driven mill are difficult since the characteristics of engine and motor are essentially different. Ideal operation will cause the metal to leave the rolls at practically zero speed, all the energy in the mill then having been returned and usefully consumed. This ideal condition of operation is not possible and the equipment should be designed so that power consumption is not materially affected by unskillful operation. The speed of the reverse in the motor is proportional to the throw of the controller handle and does not vary appreciably with the load. Ideal conditions, therefore, can be more nearly approached than with the steam engine. The steam engine will often race after the metal has left the rolls, especially if the draft has been heavy. The engine must be stopped and energy is required to do it. In the case of the electric drive, the motor is stopped by requiring it to act as a generator. This enables the braking to be done rapidly and also economically, as the energy stored in the rotating apparatus is returned to the flywheel of the motor-generator set. The only losses are those due to the resistance of the winding. The point of energy saved, however, is of little importance as it appears in the relative power consumption of the two methods of drive.

*From a paper presented by Wilfred Sykes and David Hall before the American Institute of Electrical Engineers, Cleveland, June 27-30.

POWER CONSUMPTION WITH PARTIAL LOAD

With the electrically driven mill, the economy falls off somewhat with a decrease in the output. This is due to the continuous windage and friction losses of the flywheel motor-generator set, which are independent of the load on the machine. Aside from these losses, the unit power consumption has but little effect where one to thirty ingots are rolled per hour. That is, unit power consumption per ton of steel is independent of the quantity rolled. A similar condition exists with the steam engine, which has certain constant losses due to leakage, piping and auxiliary power. Outside of these losses, however, the steam consumption will not be constant per unit of work done, as the expansion conditions in the engine vary.

ECONOMY OF TIME

The time required for operation is largely governed by conditions entirely outside of the time required for actually rolling metal. While the steam engine can reach certain given speeds more quickly than can the reversing motor, the engine will not necessarily roll a greater amount of metal than the motor. The amount of metal depends, among other conditions, upon the way the metal is handled on the tables, the maximum speed reached and the time lost in manipulating the driving unit.

Table V is a comparison of the time required for various passes on an engine-driven and a motor-driven mill respectively. These figures are not intended to show the advantage of one over the other system of driving, but indicate that in practice the reversing motor will operate just as quickly, if not more quickly, than the engine. Due to the ease of control of the motor, the operator is able to continue running the mill at the maximum capacity with less fatigue than in case of a steam-driven mill.

Table V—Elapsed Time, in Seconds, for Rolling Ingots in Steam and Electric Driven Reversing Mills

Pass No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Engine Drive	0	3.5	9.7	13.0	17.2	20.8	27.2	31.8	37.0	42.0	50.0	55.0	62.0	67.7	75.8
Motor Drive	0	3.2	9.4	12.7	15.6	18.8	26.0	29.2	31.8	35.7	41.4	44.7	48.5	53.4	59.8

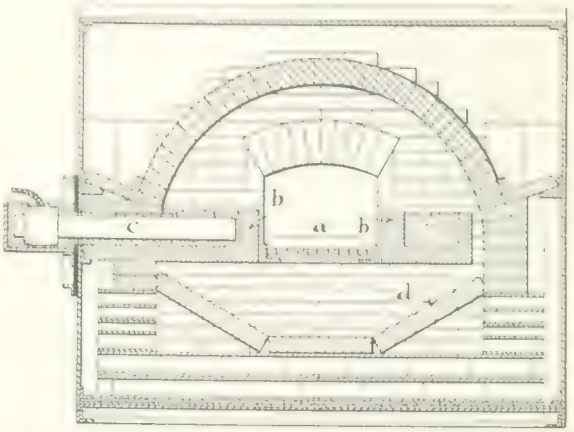
Table VI presents statistics of three successful reversing motor-driven mills. The first is that of the Steel Company of Canada, at Hamilton, Ont., which was the first successful installation of a reversing motor-driven blooming mill. The installation consists of a double reversing motor, capable of developing a maximum of 10,000 hp., which is supplied with power from a flywheel motor-generator set with two generators. The Bethlehem installation is the largest at present in operation. It drives a 25-in. blooming mill at the Lehigh plant. Both it and the Hamilton installation have double motors, due to the amount of power required. The third installation is that of the Central Steel Company, Massillon, Ohio, which is somewhat similar to the other two excepting that a single motor is used, the capacity being approximately 8000 hp.

Table VI—Statistics of Motor-Driven Mills

	Hamilton	Bethlehem	Massillon
Size of ingot, in.	15 x 17	19 x 23	18 x 20
Weight, lb.	4,000	10,000	5,000
Size of finished material, in.	1 x 1	1 x 1	1 x 1
Elongation	16	10-12	Up to 20
Number of passes	19	17-21	19-21
Capacity, tons per hour	60	100	60
Roll diameter, in.	30	30	30
Pinion diameter, in.	34	35	34
Speed, full motor field, r.p.m.	70	40	50
Speed, weakened motor field, r.p.m.	100	120	120
How driven from motor	Direct	Direct	Direct
Number of motors	2	2	1
Voltage across each armature	600	600	700
Maximum operating torque, ft.-lb.	900,000	1,550,000	750,000
Maximum motor horsepower	10,000	12,000	8,000
Number of generators	2	2	1
Rated horsepower of driving motor of set	1,800	2,000 kw.	1,500
Weight of flywheel, lb.	100,000	100,000	60,000
Speed of flywheel set, r.p.m.	500	375	375

Electric Heat-Treating Furnace

Heat treating of electricity in an electrical resistance furnace is the subject of a patent (U. S. 1,176,018—March 21, 1916) granted to T. F. Bailey and F. T. Cope of Alliance, Ohio. It has been assigned to the Electric Furnace Company of that city. The illustration shows a cross section of the furnace. The arched roof reflects down upon the hearth the heat from the granular carbon resistance elements. The material to be treated rests on the hearth. Extending the length of the furnace on each side of the middle space, *a*, are troughs, *b*, which hold the granular coke or charcoal. At each end of these resistance elements are the electrodes, *c*. From these the heat rises to the arched roof from which it is reflected back on the material. The inclined walls, *d*, are also located below the resistance elements so as to send back the heat to the hearth which is radiated downward. By this construction it is claimed that the majority of the heat radiating from the resistance material as heat rays will be reflected back toward the hearth from all directions, tending to concentrate the greater part of the heat within the heating chamber on the hearth.



Cross-Section of an Electric Heat-Treating Furnace

Women Employees in British Shipyards

The woman worker has appeared in the British shipyard. According to the London *Times*, six firms on the northeast coast are now giving employment to some hundreds of women in their yards, so that the capacity of women for undertaking this class of work is being seriously tested. Their present work is stated to be of a character calling for only limited skill. They perform arduous work, however, such as scraping, painting, bolt screwing and countersinking. As the men continue to go to war, a considerable increase is expected in the number of women shipyard employees. The attempt to introduce women workers into so important an industry as shipbuilding is being watched with keen interest, says the same paper—an interest which is accentuated by the knowledge that competition in shipbuilding is likely, with the advent of new rivals, to enter a more strenuous phase after the war.

The No. 2 furnace of the Woodward Iron Company, at Woodward, Ala., was out 21 days in June for relining. The second Vanderbilt stack of this company was blown in June 10. All five furnaces are now in blast.

Crystallization in Cold-Worked Steel*

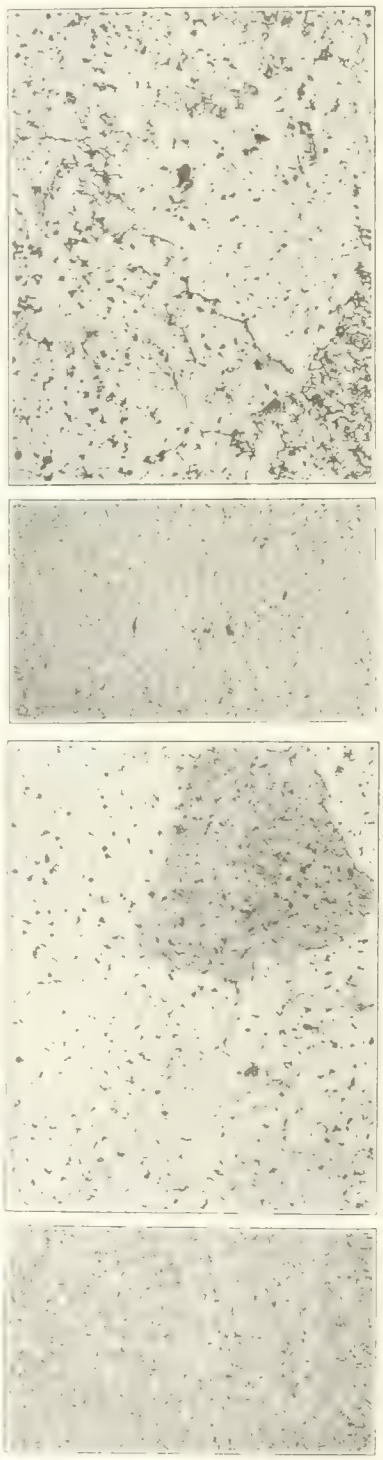
Causes of Grain Growth in Cold-Pressed and Cold-Drawn Parts, and the Remedies—Effect of the Carbon Content

BY RALPH H. SHERRY

AN article of interest to manufacturers using various forms of cold-worked, low-carbon steel was published in the *Bulletin* of the Society of Automobile Engineers for May, 1916. The author has investigated the occurrence of coarse crystallization or grain growth in low-carbon steel with a number of commercial materials, particularly hot-rolled rod, cold-drawn wire, hot and cold-rolled sheet, cold-rolled strip, cold-drawn tubing, and pressings. In the manufacture and use of these materials mysterious epidemics of breakage have appeared from time to time, often only aggravated by the use of treatments supposed to put the steel in the best possible condition. Material supposed to be of fine grain would frequently break with a coarsely crystalline fracture.

Recent investigations, of which a brief survey is given, have thrown considerable light upon this phenomenon, and methods of prevention and cure for many materials have been determined. According to the author, "the formation of coarse grains in low carbon steel will follow the action of a limited amount of strain exceeding the elastic limit and subsequent annealing within certain temperature ranges. This has been confirmed by all investigators."

In the writer's investigations it was noted on varying by narrow steps the amount of strain within the range mentioned that the less the applied strain the greater was the grain size on subsequent annealing. Within the limiting range of strain and near the lower limit there seems to be a definite or "critical" strain below which the range of temperature within which grain growth occurs is limited by the Ar_1, Ar_2 thermal critical points (about 690 and 780 deg. C.—1275 and 1435 deg. Fahr.). When the material is strained beyond this point, the annealing range is considerably extended, falling between about 650 and 900 deg. C. (1200 and 1650 deg. Fahr.). The moderate grain growth occurring below 650 deg. C. (1200 deg. Fahr.) noted by other investigators was not found in the author's investigation. This "critical" strain mentioned above has not been noted by other investigators, but the quantitative effect of strain on the grain size has been partly confirmed by the work of Chappell.



[illegible] of Cold Working and Annealing on Steel [illegible] Diameter, Drawn from [illegible] Annealed 1 hr. at 790 deg. C. Photomicrographs at [illegible] diameters. They represent 5 per cent copper and a 9 per cent (lower) reduction material, the small photomicrograph in each case showing the same reheated to 790 deg. C.

DETAILS OF EXPERIMENTS

The experimental operations were carried on by forging, cold-drawing, cold-rolling and cold-pressing, i. e., stamping. The reduction of area, with its origin at the elastic limit, was selected as the standard of measurement in the quantitative determinations on account of its convenience and ready application.

Some coarse crystallization was produced in hot-rolled rod by hammering cold and subsequently annealing within the temperature ranges mentioned. None was noted in hot-rolled rod or annealing after the rolling operations.

Samples of hot-rolled rod of from ¼ to ½ in. diameter were drawn to various sizes and samples from each draft annealed at temperatures between 650 and 900 deg. C. (1200 and 1650 deg. Fahr.). No grain growth was found outside of this range. In a number of tests the amount of reduction was varied by as narrow steps as possible, in some cases 0.001 in. These samples were annealed at various temperatures within the range mentioned. It was found that within certain limits the grain size after annealing is inversely proportionate to the applied strain, decreasing gradually with increasing strain until the normal size is reached, with reductions of area of about 25 to 30 per cent.

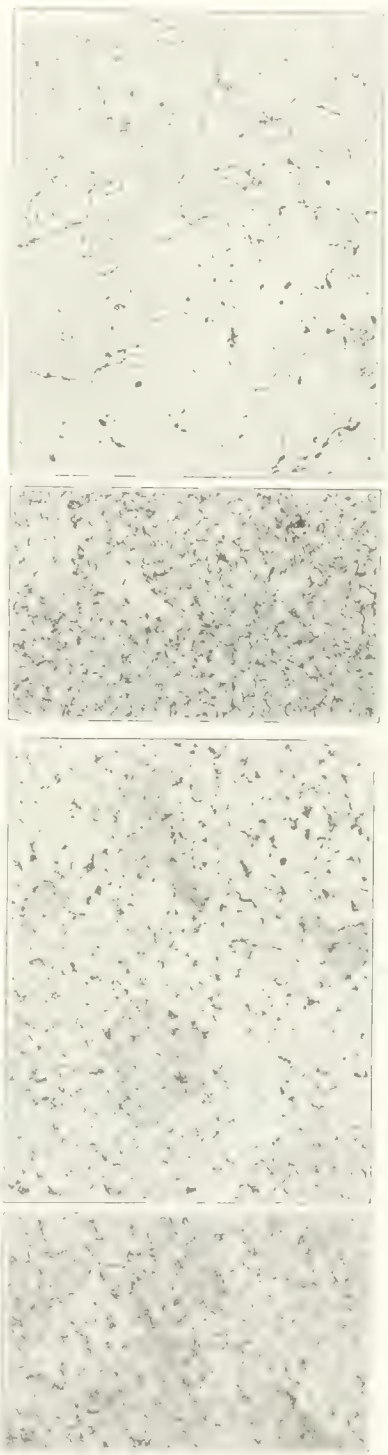
In these experiments it was noted that with reductions of about 9 per cent or less, the temperature range within which grain growth occurs on annealing lies between about 690 and 780 deg. C. (1275 and 1435 deg. Fahr.), annealing above the higher temperature completely refining the grain. The only exception noted was in cases where the action of the strain was irregularly distributed. On the other hand, when the reduction of area is greater than about 9 per cent, the range of temperature within which grain growth occurs on annealing falls between about 650 and 900 deg. C. (1200 and 1650 deg. Fahr.). There is apparently a "critical"

*Abstract of a paper presented at the semi-annual meeting of the Society of Automobile Engineers, June 12-16, 1916. The author is metallurgist of the General Motors Company, Detroit, Mich.

strain occurring at about 9 per cent reduction of area. Little or no effect was produced by reductions of area below about 8 per cent. Photomicrographs illustrating clearly the quantitative effect of strain are shown.

These results were checked by a number of similar experiments. Some difficulty was encountered in duplicating the results, especially with the lowest reductions, owing to slight variations in the diameter of the rod or to its being slightly out of round, the effect at times being confined to the periphery or to local areas. Somewhat similar results were obtained with cold-rolled strip.

The same conditions were found to occur in certain cold-pressing operations. In pressings of the cup type the greatest amount of strain occurs at the periphery of the blank, reaching a minimum at the bottom of the pressing. On annealing typical pressings within the temperature ranges mentioned, grain growth was found to occur, of greatest extent near the bottom where the strain was the least, and decreasing gradually toward the top, where the maximum strain was applied. The same "critical" strain noted in the cold drawing was found in these pressing operations. The effect is illustrated in the photomicrographs shown.



an 11 per per cent (lower) reduction
C., the small photomicrograph in each
790 deg. C.

GRAIN GROWTH AND PHYSICAL PROPERTIES

The presence of coarse crystallization has considerable effect upon the physical properties. The resistance to shock and the tensile properties are noticeably affected. In tests made it was found that the elastic limit, maximum strength, and elongation are all lowered.

The author discusses at length the occurrence of coarse crystallization in commercial materials such as sheet and strip steel, tube, cold-drawn rivet steel and cold-pressings. In hot-rolled sheet no grain growth was found in sizes heavier than 0.130 in., but was common in all thinner sheet down to 0.065 in., the lightest size examined. The grain growth was generally moderate, usually being between 0.08 and 0.12 mm. diameter. In some cases grains as large as 0.40 mm. diameter were noted, usually in the heavier sizes. Where grain growth was found in cold-rolled annealed sheet it was generally coarser than that found in the hot-rolled. Sheet of decided coarse grain may give serious trouble in certain operations such as pressing. When it is necessary to refine such material annealing above 790 deg. C. (1450 deg. Fahr.), or in some cases above 900 deg. C. (1650 deg. Fahr.), is necessary.

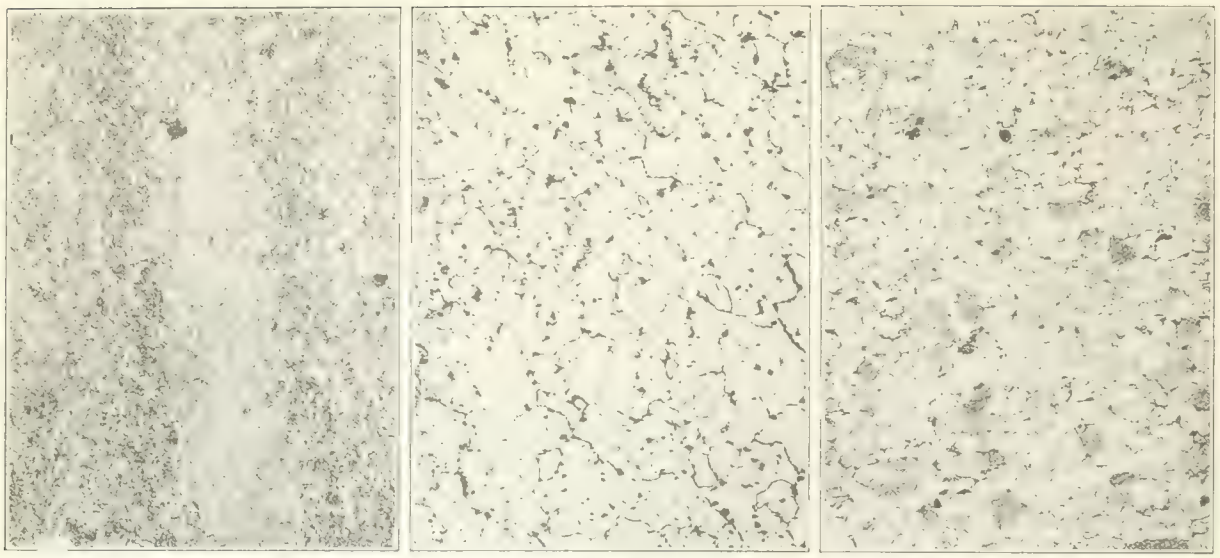
On a commercial scale the detection of grain growth is rather difficult when applied to sheet, requiring the combination of a microscopic examination [illegible] a tensile test.

OCCURRENCE OF GRAIN GROWTH

The prevention of grain growth in hot-rolled [illegible] the control of a number of factors rather difficult to regulate. To insure its absolute elimination, annealing above 900 deg. C. (1650 deg. Fahr.) is required. The difficulty of annealing sheet at [illegible] temperature is obvious, although box annealing should be feasible. Somewhat the same conditions apply to cold-rolled sheet, where control of the reduction of area, a decidedly difficult factor to control, is necessary.

Grain growth may readily occur after certain cold pressing operations. Where 0.20 carbon steel can be used, no grain growth will occur, but in the usual practice low-carbon steel is used in which grain growth can readily be produced. Where the pressing operations are light improper annealing will cause grain growth, and control of the annealing temperature is of the utmost importance in such cases. The annealing of pressings is usually looked upon as an operation requiring only elementary control, the main consideration being that the metal reach a temperature high enough to soften it. The usual tendency is to keep the temperature up and so it may frequently rise within the dangerous range. The selection of the proper annealing temperature depends to some extent upon the nature of the operation and the condition of the metal. Certain upsetting operations require annealing at temperatures slightly above 690 deg. C. (1275 deg. Fahr.) and a few pressing operations are of this nature. In such cases or where a decidedly coarse-grained structure exists in the metal, annealing it at about 790-800 deg. C. (1450-1470 deg. Fahr.) may refine it sufficiently; if not, 900 deg. C. (1650 deg. Fahr.) will be required. Temperatures between 600 and 650 deg. C. (1110 and 1200 deg. Fahr.) are usually sufficiently high to remove the effect of cold work. In the case of pressings, annealing just below 690 deg. C. (1275 deg. Fahr.) will usually produce grain growth so slight that it will not be the cause of any trouble in further operations.

Grain growth can only occur when the strain applied has been comparatively light and control of this factor, as for instance by the increase in the extent or number of the operations before annealing, will generally permit the use of any normal annealing temperature. Very often, however, the effect of the operation cannot be foretold and some variation from normal may occur resulting in a comparatively light strain in some unexpected place.



Grain Growth in Ferrite Band of Hot-Rolled Sheet, 0.18 Per Cent Carbon

Reduction 12.5 Per Cent. Annealed 1 Hr. at 700 Deg. C.

Reduction 16 Per Cent, Annealed 1 Hr. at 700 Deg. C.

Photomicrographs reduced about 40 Per Cent, from an original of 100 diameters

Grain growth, usually of a moderate size, generally occurs on the edges of annealed blanks, following the action of the blanking press. Where further work is applied to the blank before annealing, grain growth does not usually occur. This same condition may occur around punched holes. Grain growth will occur following certain light bending operations if the annealing temperature is not properly controlled.

PREVENTION OF GRAIN GROWTH

General methods of prevention and cure are given by the author. The control of the annealing temperature as mentioned is of primary importance. Where grain growth has occurred and refining becomes necessary heating above 900 deg. C. (1650 deg. Fahr.) will refine the grain completely. If the scale produced should be troublesome, the material may be quenched in water, subsequently annealing at 540 to 675 deg. C. (1000 to 1250 deg. Fahr.) if necessary. A little concentrated hydrochloric acid thrown into the furnace at the start will loosen the scale so that it can be readily removed. In many cases annealing at 790 deg. C. (1435 deg. Fahr.) will refine the grain sufficiently to prevent further trouble. To summarize, it is stated that grain growth in low-carbon steel can be avoided by the use of comparatively heavy operations on the metal before annealing, or by proper selection and control of the annealing temperature according to the working conditions. If the material is not annealed, no grain growth can occur.

The table accompanying the photomicrographs will illustrate this effect. This example is selected from a number of tests tabulated.

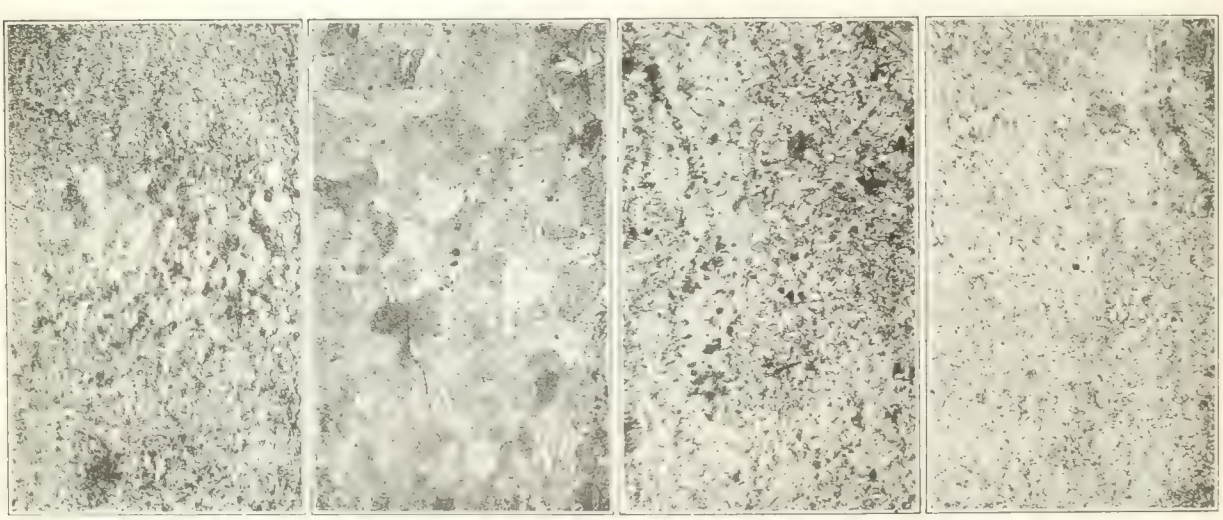
Hot Rolled Rod 0.320 In. in Diameter

After Drawing		Grain Size in Mm. After 1 Hr. at	
Diameter, Inches	Reduction of Area, Per Cent	700 Deg. C. (1290 Deg. F.)	800 and 850 Deg. C. (1470 and 1560 Deg. F.)
0.309	6.5	0.02	0.02
0.307	8.0	Some 0.02 ; rest 0.40 to 0.80	0.02
0.305	9.0	0.28 to 0.56 ; a few 0.02	0.02
0.303	10.0	0.25 to 0.40 ; a few 0.02 ;	0.02 ; some 0.18
0.302	11.0	0.20 to 0.25	0.20 to 0.25
0.300	12.0	0.15	0.15
0.297	16.0	0.07	0.07

The author's conclusions are as follows:

1. Grain growth in low-carbon steel may be produced by permanent deformation within certain limits, followed by annealing within certain temperature ranges.

2. The greater the amount of strain applied within



Annealed at 675 Deg. C.

Annealed at 705 Deg. C.

Annealed at 790 Deg. C.

Annealed at 705 and Reheated to 790 Deg. C.

Parallel Strips Cut from Pressing. Enlarged 25 diameters. Annealed 30 minutes. The photomicrographs are reduced about one-half from the original

these deformation limits, the smaller will be the grain size produced by annealing.

3. The annealing range within which grain growth, due to strain beyond the elastic limit, may be produced, lies between 650 and 900 deg. C. (1200 to 1650 deg. Fahr.) except in certain cases where it lies between 690 and 780 deg. C. (1275 and 1435 deg. Fahr.).

4. When the applied strain falls below a certain or "critical" amount, the annealing range within which grain growth can occur seems to be limited by the thermal critical points at about 690 and 780 deg. C. (1275 and 1435 deg. Fahr.).

5. The most practical standard by which to measure the strain applied seems to be the reduction of area. Experiments based upon such measurements show that no grain growth occurs following a reduction of area of less than about 7 or more than about 25 to 30 per cent. The "critical" strain mentioned seems to be marked by a reduction of area of about 9 per cent.

6. The refining action taking place at about 780 deg. C. (1435 deg. Fahr.) is a further indication of the presence of a thermal critical point at this temperature.

7. No serious grain growth was found in steel the carbon content of which was uniformly above about 0.15 per cent.

TESTING PIPE CORROSION*

Apparatus for Securing in Three Months the Conditions After Two Years' Service

The main factors controlling corrosion in a pipe are: 1. The amount of free oxygen in solution in the water; 2. The volume of flow, which is an important factor, mainly on account of the greater amount of oxygen available; and 3. Temperature. Corrosion increases with the temperature, reaching a maximum somewhere between 160 and 180 deg. Fahr.

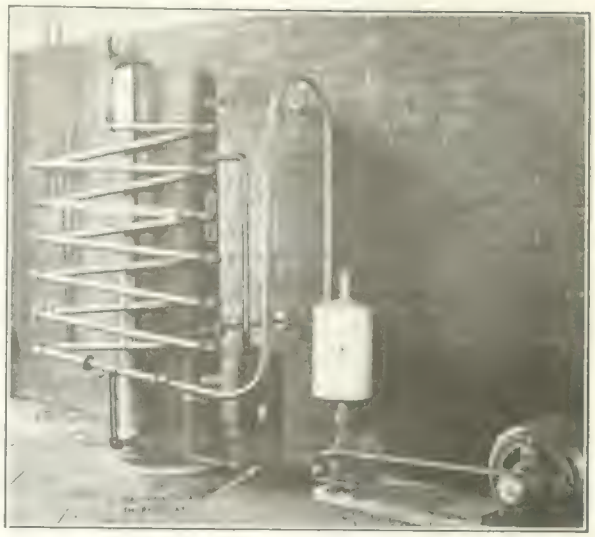
These conditions are reproduced in the apparatus shown in the accompanying illustration. This consists of a tank or reservoir open at the top, which may be filled with a supply of any kind of water selected for the test. This water is maintained at any desired temperature by means of a small gas heater *B* fitted with a thermostat, or a steam coil may be inserted if more convenient. An ejector is provided at *C* and operated by air under 3 or 4 lb. pressure. The air should first be passed through a mass of excelsior or similar material to remove oil. The heated water is thus aerated, forced up through the coil of pipe and discharged continuously into the top of the tank. The coil consists of alternate lengths of the materials under test. A glass tube may be inserted in the coil if it is desired to observe the flow. By keeping up a continuous flow in this way at a temperature of 160 to 180 deg. Fahr., the relative tendency of pipe to corrode may be determined in three to four months. The amount of corrosion found in that time with this apparatus will be found equal to about two years under the same conditions in actual service.

The acceleration of corrosion in this apparatus is principally due to the continuous flow and the greater amount of oxygen and carbonic acid which is thereby brought into contact with the interior surface of the pipe. The details of this machine may be altered according to local conditions. If the water is not fresh and almost pure, the supply should be renewed from time to time.

The amount of corrosion in both wrought-iron and steel hot-water-supply pipe, as measured by the depth of pitting, will frequently amount to about 0.1 in. in two years. We have found with this apparatus nearly this amount of corrosion in pipe of this kind in three months, with the water circulating at the rate of 1 to 2 gal. per minute. The relative depth of pitting is apparently the same in each case.

The writer has used this scheme for two years in research work on the improvement of pipe and pipe coatings, with much saving of time compared with similar tests on pipe in actual use.

*Paper, substantially in full, presented on June 28, before the American Society for Testing Materials, Atlantic City, by F. N. Speller, metallurgical engineer, National Tube Company, Pittsburgh.

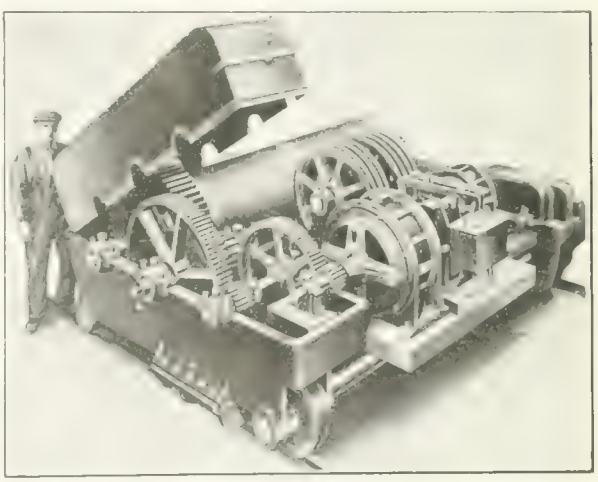


Apparatus for Hot Water Is Circulated Through a Series of Lengths of Pipe of Different Materials to Ascertain Their Corrosive Resistance

Trolley for Crane Handling Locomotives

The Whiting Foundry Equipment Company, Harvey, Ill., has recently completed one of the largest alternating-current cranes ever built for handling locomotives. The crane, which was supplied to the Seaboard Air Line for its new shops at Portsmouth, Va., has a capacity of 160 tons and there are two 80-ton trolleys, one of which is equipped with a 10-ton auxiliary hoist.

All the gears of the trolleys run in an oil bath. The motor pinion has an outboard bearing and the idler sheaves are mounted on a separator instead of being hung on. This latter arrangement enables the operator to inspect the hoisting rope and oil the sheaves while standing on the top of the trolley in addition to increasing the lift of the crane by approximately 30 in. All the shafts in the gear train are on the same line and with the exception of the drum shaft do not extend across the trolley. The pinions and the drum gear are forged. Steel castings are used for the trolley sides and separator. The housing is of structural steel and contains the handholes required for inspection and easy removal of parts for making repairs.



One of Two 80-Ton Trolleys for One of the Largest Alternating-Current Cranes Ever Built for Handling Locomotives

The Charleston Steel Company, Charleston, W. Va., maker of simple and alloy steels, has opened general sales offices at 111 Broadway, New York, under the management of Atkinson & Utech, Inc. The company will specialize in electric-furnace steel.

TESTS OF ALUMINUM BRONZE*

A Double Heat Treatment Increases the Resistance to Alternating Stresses

Aluminum bronze subjected to a double-heat treatment of quenching followed by annealing, has its proportional limit raised without any great sacrifice of ductility, and at the same time is so improved in quality as to offer much greater resistance to alternating stresses. In this respect its qualities approach those of steel. These facts were determined by a series of tests in the Landgraf-Turner and White-Souther testing machines of a series of alloys, both with and without heat treatment.

ALTERNATING AND REPEATED STRESS TESTS

In the Landgraf-Turner machine, a ⅜-in. cylindrical specimen was bent backward and forward through a small angle by blows of a hammer, the number of blows required to produce fracture being automatically recorded. Tests of several alloys were made, with slots of ¾ in. and 1 in. between the hammers, the latter giving a less severe test. The character of the alloy and the average number of alternations of stress required for each of the specimens, without heat treatment, to produce failure is given in Table I.

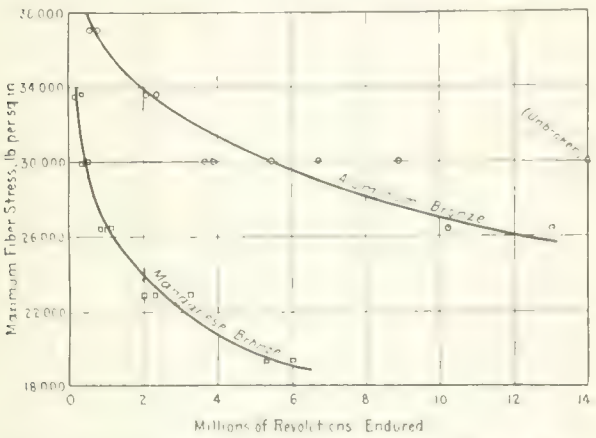


Fig. 1. Stress-Endurance Diagrams for White-Souther Tests.

Table I. Results of Landgraf-Turner Endurance Tests.

Alloy No.	Name of Alloy	Approximate Constituents	Alternations to Produce Failure: Standard Test ¾-in. Slot	Alternations to Produce Failure: Endurance Test 1-in. Slot
3	Phosphor Bronze	10% tin	7,[illegible]	[illegible]
5	10 per cent aluminum bronze	10% tin 10% zinc 1% iron	1,485	5,220
29	Manganese bronze	10% tin 10% Zn 2% Mn 10% Al.	[illegible]	[illegible]

*¾-in. slot between hammers.

The results of the tests on alloys Nos. 5 and 29 are fairly comparable with tests of steel rails and axles. Alloy No. 5 gave results far superior to steel, and had a remarkable endurance of severe alternating stresses.

The White-Souther machine more nearly reproduces the conditions of service. The specimen is revolved in the axis of a wheel at 1300 r.p.m., the ends of the specimen being loaded with weights hanging constantly downward. The number of revolutions endured before fracture varies with the fiber stress and the character of the material. Tests were made on manganese-bronze and aluminum-bronze specimens, cast half in sand and half in a chill. The physical properties were as follows:

	Manganese Bronze	Aluminum Bronze
Proportional limit, lb per sq in	[illegible]	[illegible]
Tensile strength, lb per sq in	57,400	76,[illegible]
Elongation in 2 in. per cent	[illegible]	[illegible]
Reduction of area, per cent	[illegible]	27.6

*Abstracted from paper presented to the American Society for Testing Materials at Atlantic City, June 30, by W. M. Corse and C. F. Comstock, Electro Alloy Mfg. Company, Niagara Falls, N. Y.

Tests were made at maximum fiber stresses of 33,600, 30,000, and 26,400 lb. per square inch for both materials, and in addition at a stress of 37,100 lb. per square inch for aluminum bronze and 22,900 and 19,400 lb. per square inch for manganese bronze. The results of the tests are plotted in Fig. 1.

HEAT TREATMENT OF ALUMINUM BRONZE

Aluminum bronze can be hardened by quenching from a high temperature. Tests were made to determine the proper quenching temperature of the No. 5 alloy, and also to determine the effect of a short air cooling prior to quenching. Test specimens about ½ in. in diameter were quenched from 700, 800, 900 and 1000 deg. C., and a temperature of 850 deg. C. was adopted as the proper quenching heat. One of the specimens so quenched had the following physical properties:

Proportional limit, lb per sq in	39,800
Tensile strength, lb per sq in	97,400
Elongation in 2 in. per cent	1.0
Reduction of area	None
Brinell hardness number	240

Tests made to determine the effect of air cooling before quenching indicated that this treatment lowers the elastic limit of the quenched material with only a slight increase in ductility. If not over 10 sec. elapses between the withdrawal of the piece from the furnace and its immersion in water, the quenching effect will not be lessened. Nothing is gained by intentional air cooling before quenching.

The effect of annealing after quenching was determined by a series of tests in which the specimens were heated to various annealing temperatures, and

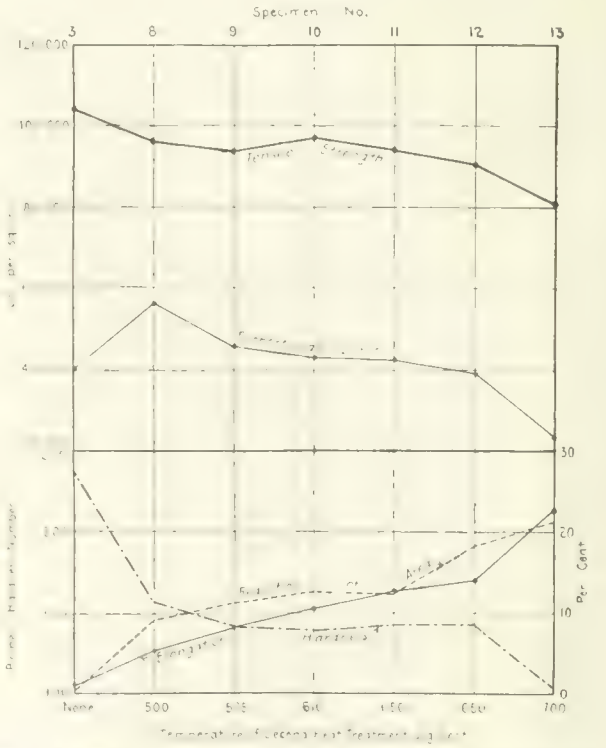


Fig. 2. Physical Properties of Specimens Annealed after Quenching from 850 Deg. C.

then cooled either in the air or in the furnace. The specimens cooled in the furnace gave better results than the air-cooled ones, the speed of cooling apparently having an important effect on the physical properties. The results of the various annealing tests on the furnace cooled specimens are plotted in Fig. 2.

To determine the effect of the double-heat treatment on larger castings, similar tests were carried out on rectangular blocks 2 x 4 x 9 in., on a bar 2¼ in. in diameter and on two bars 1½ in. in diameter. These were quenched and reheated to 650 deg. C., excepting that the 1½-in. bars were tempered at 600 deg. C. and 630 deg. C. respectively. The results, given in table II, indicate that the double-heat treatment improves large castings in about the same way as it does smaller ones, although the values finally obtained with large castings are not so good as those obtained with small ones.

The resistance of the material to alternating stresses after heat treatment is shown by Fig. 3.

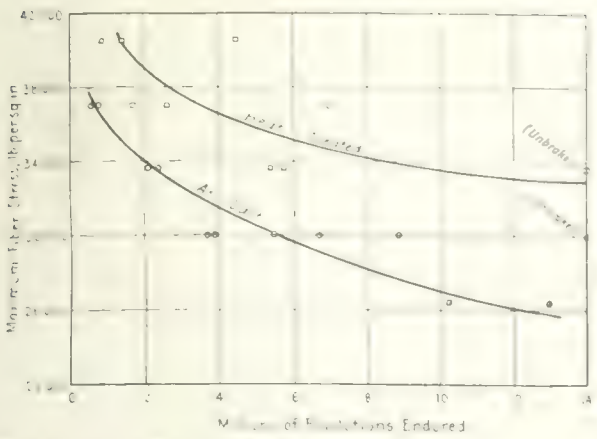


Fig. 3—Stress-Endurance Tests on Annealed Steel Specimens Cut from Large Castings and Heat Treated

Table II—Results of Tests on Specimens of Large Steel Castings Annealed to Double Heat Treatment

Original Size	Tensile Strength, lb. per sq. in.	Elastic Limit, lb. per sq. in.	Elongation in 2 in., per cent	Reduction of Area, per cent
1½ in. in diameter	650	39,700	9.5	15.0
1½ in. in diameter	650	39,700	9.5	15.0
2¼ in. in diameter	650	39,700	9.5	15.0
2 x 4 in. block	650	39,700	9.5	15.0
2 x 4 in. block.....	650	39,700	78,200	9.5	15.0
2 x 4 in. block	650	39,700	9.5	15.0

*This value is for yield point instead of proportional limit

New Oliver Heavy-Duty Engine Lathe

A heavy-duty 26-in. engine lathe has been designed by the Oliver Machinery Company, Grand Rapids, Mich. The headstock is heavily ribbed, has a long bearing on the bed and has a front bearing of 6½ in. x 10 in., with a rear bearing 4½ x 7 in. It is of special all-geared design, with a single pulley. There are two speeds from the countershaft, giving a range of 12 spindle speeds from 8 to 300 r.p.m. The tailstock spindle is of steel 4 in. in diameter, and is held by clamps acting on two sides. Four large clamp screws with hardened nuts secure the tailstock in place, and it is moved along the bed by a pinion and crank.

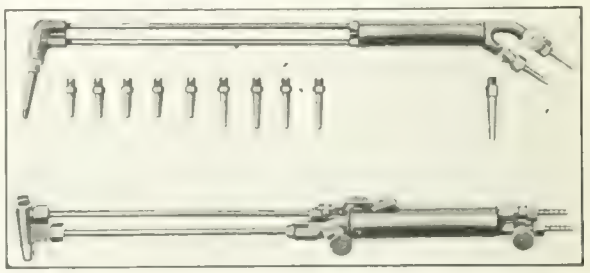
The bed, which may be arranged for a taper attachment, is of box type design, with no overhang on the box column legs. It is of ample depth and width to prevent any spring under the heaviest cuts. The V's are wide and heavy, with a span of 24¾ in. over all, and are reinforced by box-section braces closely spaced. The carriage is heavy and has a length on the shears of 40 in. The bridge is deeply ribbed and massive. The cross and tool post slides have taper gibs adjustable for wear, and all the slides are scraped to a bearing and the carriage is scraped to fit the V-ways of the bed. A novel feature is the 30-deg. angle of presentation of the tool-holder slide, which affords a solid bearing for the tool and renders manipulation easier. The slot in the slide is large and the tool holder is secured by a steel sliding block. Micrometer dials reading to 0.001 in. make the setting and finishing of accurate diameters easy for the operator and a thread dial at the right of the carriage slide is provided.

The apron is of the box type with bearings at both ends of each shaft. It has a removable front plate, permitting quick and easy access to the entire internal mechanism without removing the apron from the lathe. Both longitudinal and cross feeds are friction driven and can be engaged by one lever arranged so that both feeds cannot be thrown in at the same time, nor the feed mechanism engaged when the lead screw is in operation. The apron is tongued and grooved to the [illegible] ways, being perfect alignment. The crank for moving the carriage by hand, instead of power, is connected by compound gearing to the rack pinion so as to operate easily, and rapid traverse may be obtained by shifting the crank from the compound to the screw shaft. The rack pinion has an extra bearing beyond the rack, a feature not usually incorporated. The feeds and threads are provided by the quick change gear box, 22 feeds ranging from 0.013 to 0.333 in. per revolution of spindle, and 32 threads ranging from 1 to 24 per inch being secured by changing the lever positions as indicated on the table on the gearbox.

The headstock is designed to permit individual direct or alternating current motors to be used, the driving pulley being removed and a geared connection substituted. A substantial taper attachment, built to become part of the machine, can be supplied. It is secured in place by a wide planed slide on the back of the bed, the holding bolts being locked to a T-slot in the bed. The attachment main casting is scraped to fit this slide, and when locked in place forms the foundation for the taper elements of the mechanism.

Light Welding and Cutting Torches

A new line of oxy-acetylene welding and cutting torches has been placed on the market by Bishop-Babcock-Becker Company, Cleveland, Ohio. The welding torch is provided with two needle valves conveniently placed below the handle for controlling the pressure. The mixing chamber is designed to reduce to a mini-



A New Line of Oxy-Acetylene Welding and Cutting Torches Characterized by Light, Yet Strong Construction, and Convenient Arrangements for Controlling the Flow of the Gases

mum the danger of back-firing caused by shutting off the flow when the tip is brought in contact with the work. This is accomplished by the arrangement of the mixing chamber, the gases coming into this chamber at the same pressure and at sufficient speed so that they will not have time to become hot, and by having an unusually long tip that makes it difficult for the flame to back-fire. The oxygen has a straight passage from the inlet tube to the tip. The acetylene enters an annular cavity in the mixing head and is fed through small ports into the mixing chamber. The entire torch is made of brass except the extreme end of the tips, which is of copper. It is 24¼ in. long and the handle is 1¼ in. in diameter. It is furnished with seven interchangeable welding tips for various drill sizes.

In the case of the cutting torch the acetylene, controlled by a needle valve, passes through five holes in the tip, these surrounding the oxygen opening. The oxygen is controlled by a thumb valve at the top of the handle with an automatic locking device that is released by a pressure of the thumb. In starting to use the torch the acetylene is turned on with sufficient oxygen to produce combustion. When the metal is sufficiently hot the oxygen is turned on at high pressure in the central jet through the surrounding flame. This torch is made of brass and is 24½ in. long and its handle is 1½ in. in diameter.

The production of bituminous coal and anthracite in the United States in 1915 amounted to 531,619,487 net tons, valued at $686,691,186, an increase, compared with 1914, of 3.5 per cent, in quantity, and of 0.8 per cent in value, according to C. E. Lesher, of the United States Geological Survey.

FURNACE GAS FOR BOILERS*

The Conditions which Insure Maximum Economy in Its Use

There are four causes for low boiler efficiency in the utilization of blast-furnace gas: 1.—Incomplete combustion. 2.—Combustion with large excess of air. 3.—Water vapor in the gas. 4.—Deficiencies in the boiler plant itself.

LOW COMBUSTION TEMPERATURE

The highest combustion temperature is obtained when the gas is fairly dry and burned without excess of air. For most blast-furnace gas, this temperature is between 2450 deg. and 2500 deg. Fahr. with cold gas, and from 2.8 to 11.8 per cent higher with gas of a temperature of 200 to 600 deg. Fahr. It is an accepted rule that for the same quantity of any given gas passed in a given time, the stack temperatures will be in inverse relation to the combustion temperature. This shows the importance of a low excess of air, as a large excess will not only increase the volume but also the temperature of the waste gas.

Fig. 1 shows the effect of excess air, water vapor and unburned CO on the combustion temperature, and gives the losses of both sensible and latent heat due to incomplete combustion for gases containing 25 to 30 per cent CO with 0 to 13 per cent CO in the waste gas without excess of air. If the analysis of the waste gas shows excess of oxygen despite the unburned CO, both CO_2 and CO must be multiplied by the factor depending on the amount of oxygen in the waste gas. The value of these factors is given by Fig. 2. The chart is correct for all gases containing 38 per cent CO + CO_2, 3 per cent H_2, and 59 per cent N_2, dew-point being 120 deg. Fahr., and the gas temperature 400 deg.

Fig 3 illustrates the effect of water vapor in the gas on the combustion temperature. It is based on burning blast-furnace gas with 10 per cent excess of air, the air being at 60 deg. Fahr., and carrying different amounts of water vapor per cubic foot of dry gas measured at 60 deg. Fahr. and atmospheric pressure. This curve will answer questions as to the temperature to which blast furnace gas should be cooled to give the best efficiency. Without exceptionally cold water gas cannot be cooled below 75 deg. Even this temperature will be seldom obtained, as it is usually profitable to use cooling water from the blast furnace for washing purposes, so that the above temperature usually lies between 80 and 100 deg. Fahr. The difference in the combustion temperature will not be greater than about 40 deg. Fahr., or less than 2 per cent. Heat abstracted by water vapor in the waste gas is negligible.

SENSIBLE HEAT

It has been held that cold clean gas is preferable to hot unwashed gas. This does not apply to water-tube boilers where the tubes can be cleaned once each turn. Fig. 4 gives the thermal capacity of the various constituents of blast-furnace gas from 60 to 1000 deg. Fahr., and may be used to ascertain the value of the sensible heat in the gas. Hot gas containing, say, 107 B.t.u. both in latent and sensible heat is just as valuable as cold gas of 60 deg. Fahr. containing the same amount of heat in the latent form alone. A boiler efficiency of 75 per cent or higher should be obtained without difficulty with uncleaned gas. This efficiency on hot gas corresponds to an efficiency of 80.5 per cent on cold gas, and unless this latter figure can be exceeded there would be no profit in washing the gas.

Fig. 5 shows losses of sensible heat due to washing, while Fig. 6 shows the effect on combustion temperature of sensible heat when the gas is burned with excesses of air of 10 to 50 per cent respectively. Fig. 7 shows the percentage losses for each 100 deg. Fahr. rise of temperature over the boiler house temperature, for varying CO_2 in the waste gas, from furnace gases containing 25 to 30 per cent CO.

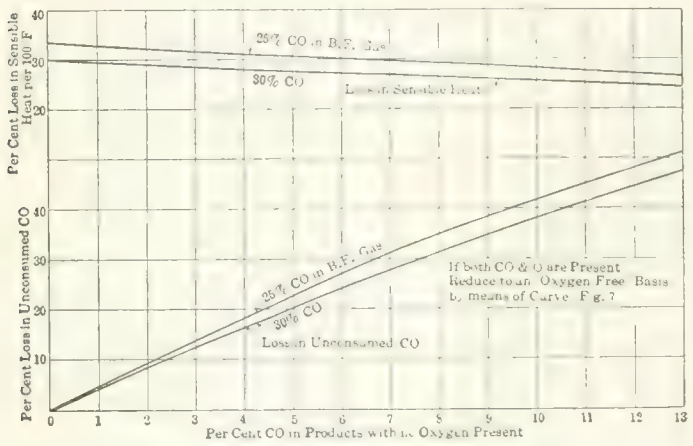


Fig. 1.—Losses Due to Incomplete Combustion

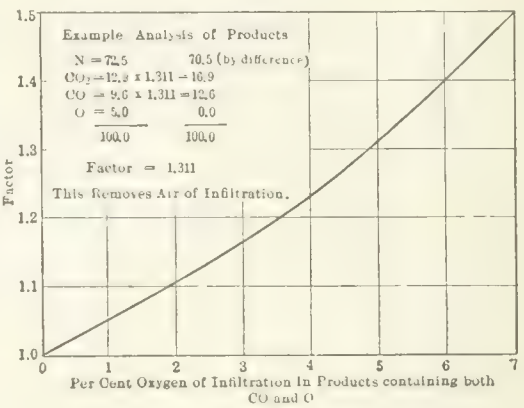


Fig. 2.—Factors for Correcting Analyses

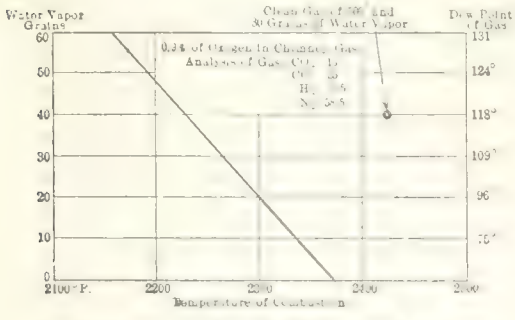


Fig. 3.—Temperatures of Combustion of Blast Furnace Gas

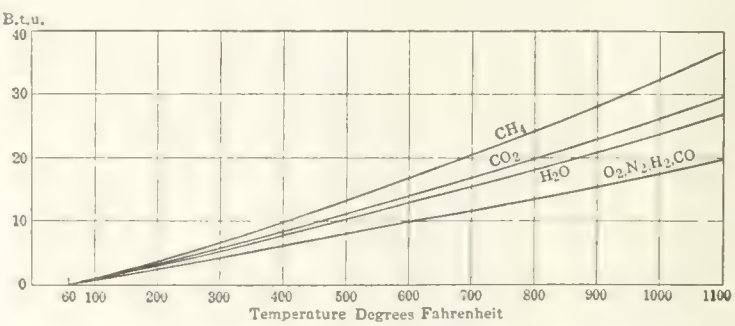


Fig. 4.—Thermal Capacity of Gas of Different Temperatures

Gas burned with air at 60 deg. Fahr. and 10 per cent excess air. Gas saturated with varying amounts of water vapor per cubic foot of dry gas measured at 60 deg. Fahr. and atmospheric pressure.

*From a paper presented by K. Huessener before the New York meeting of the American Institute of Mining Engineers.

BAD BOILER CONDITIONS

Bad boiler conditions and the losses resulting therefrom, are: Defective brickwork, causing air leakages; insubstantial brickwork, causing high radiation and conduction losses; lack of boiler houses with the same results; defective baffles; scale; or too short passages for the products of combustion. The effect of air infiltration is shown by the following figures obtained at Johnstown:

CO_2	11.7	13.0	13.3	18.8	19.7	15.0	18.0
Rear temperature, deg F.	626	[illegible]					

Air infiltration here caused loss not only because it all had to be heated to stack temperature, but also because it resulted in an increase of stack temperature, thus reducing the heat absorption capacity of the boiler tubes.

As regards boiler loads, high boiler efficiencies are compatible with overloads of 200 per cent or more. The load depends on the chimney draft, and the limit is not reached until all dampers are wide open and balanced draft is established in the combustion chamber. At this draft the boilers receive all the air and gas which the stack can handle. Further increase of boiler capacity beyond this point may be made by the installation of induced draft. The maximum boiler load is dependent somewhat on the dust in the gas. The limit is reached when it is no longer possible to keep the tubes clean by blowing once every turn. This limit is about 180 per cent of the capacity. This load, however, can be exceeded if the gas is cleaned.

Boiler construction has considerable influence on the economy, even aside from the condition of the boiler setting. While the one-pass boiler is considered almost hopeless from the standpoint of efficiency, nevertheless the author found these boilers could be run on 100 per cent load with an efficiency of 75 per cent. Attempts to overload, however, were futile. The chief disadvantages of the one-pass boilers are the difficulty of keeping them air tight, together with a large radiation and conduction loss in comparison with their capacity. Inasmuch as it is possible to run this type of boiler on gas with high efficiency at its rated load, it will not pay to install more modern boilers for the purpose of increasing the efficiency, if ample capacity in one-pass boilers is available. Equally good efficiencies can be obtained on all types of boilers, provided the combustion arrangements are carefully designed.

The factor of second importance is that of draft. The statement that a burner of the type which employs a preliminary mixture of gas and air provides its own combustion air independent of the chimney draft is not wholly true. The ispiration of any burner is chiefly dependent on chimney draft and stands in direct relation to the velocity in the mixing chamber. In order to keep the relation between the gas and air [illegible] constant, the pull and velocity of the gas and air mixture by chimney draft must be kept constant, or the quantitive relation between the gas and air will be upset. The importance of draft regulation depends on the variation in the gas pressures. Where these variations are small, the draft regulation is of relatively small importance. It is, however, of great importance where it is desired to burn gas with a low excess of air, for with the dampers in a stationary position any increase in the gas pressure necessarily results in incomplete combustion. It is not safe to raise CO_2 higher than 21 per cent without automatic draft regulation, whereas with such regulation, 24 per cent CO_2 can be safely maintained.

Specifications for Railroad Spring Bars

A specification for carbon-steel bars for railroad springs, with special silicon requirements, has been adopted tentatively by the American Society for Testing Materials. The specification will be published in the forthcoming year book of the Society, and a year hence, at the annual meeting, will come up for consideration. It requires the favorable vote of the annual meeting before a given specification is submitted to the membership for a mail ballot, and then, a majority of the voters approving, the specification becomes one of the standards of the society.

The proposed specification, like the existing A. S. T. M. standard for carbon-steel bars for railroad springs, provides for two classes—class A for elliptical and helical springs, and B for helical springs. The requirements for the chemical composition, covering carbon, manganese, phosphorus and sulphur, are identical with those of the existing standard specification, but there is the addition of the silicon content, which is put at 0.25 to 0.50 per cent for both classes of springs. In the new specification, however, no table of permissible variations is provided for, but, instead, the permissible variations in the width and thickness of the bars is to be agreed upon by the manufacturer and the purchaser.

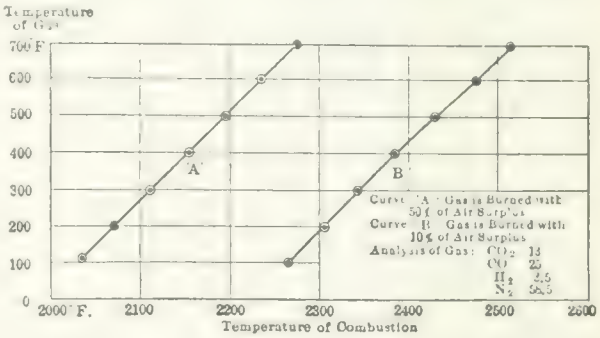


Fig. [illegible] Combustion Temperature with Varying Amounts of Excess Air

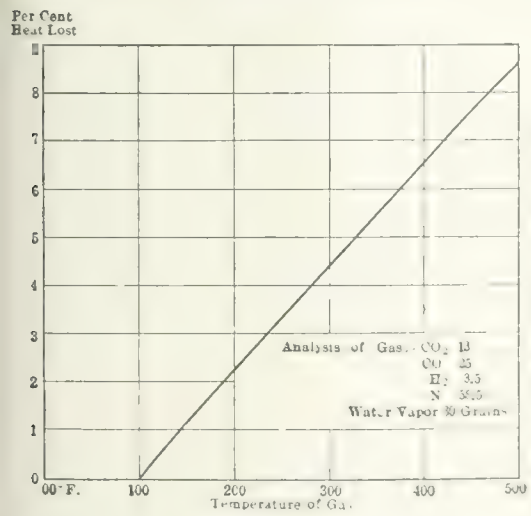


Fig. [illegible] Losses Due to Washing

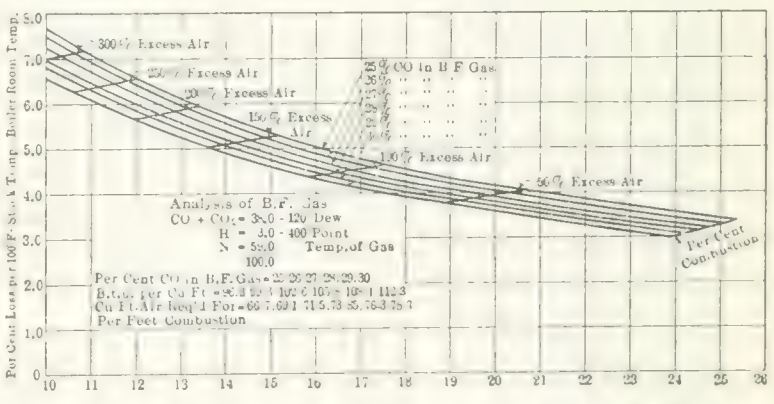


Fig. [illegible] Percentage Losses of Heat in Stack Gases Based on the CO_2 Content

TESTING FIRE BRICK*

Methods Which Simulate Working Conditions in Iron and Steel Manufacture

BY C. E. NESBIT AND M. L. BELL

The selection of a suitable refractory calls for a study (1) of the temperatures involved, and (2) of the nature of the hot material and resulting slag to which the refractory will be exposed. In the iron and steel industry the more important uses of refractories are (a) in the blast furnace, (b) in the blast furnace stoves, (c) in the open hearth, (d) in soaking pits, heating furnaces, mixers, ladles, etc., where the temperature is lower than in the other furnaces. Two general conclusions have been derived from a review of the use of refractories around iron and steel plans: The life of a furnace is determined by the life of its brickwork and different furnaces demand different physical properties in the brick used.

In the blast furnace the ore, coke and limestone are often fed in wet or frozen. Since the material must pass slowly through the furnace the wear on the lining is very heavy. The temperature at the top is low and the lining must withstand principally abrasion. The temperature increases as the fusion zone is reached, where the brickwork must resist heat and slag action rather than abrasion. In the stoves, the brick are required to withstand sudden thermal changes, abrasion, slagging due to the dust carried by the burning gas, and they must also possess good heat absorbing qualities.

In the open hearth silica brick are usually used, although the regenerators are built of fire brick. The silica brick are sensitive to thermal changes, but are highly infusible and will withstand heavy loads, even when heated to a high temperature. Any varation in manufacture of material which will tend to decrease their sensitiveness to heat changes without sacrificing their other good qualities will directly increase the life of the furnace. In heating furnaces, soaking pits, etc., the brick must mainly resist the action of molten metal, iron scale and slag.

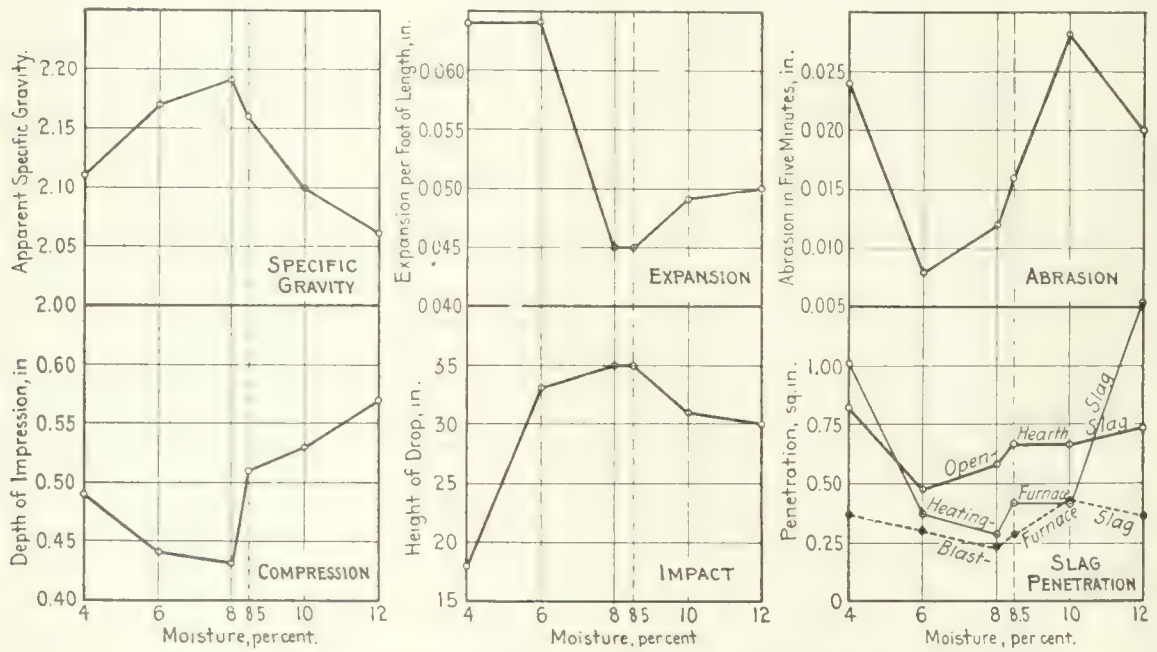
In the tests made by the writers the actual conditions of service were limited, so far as possible, rather than laboratory conditions. For instance, in investigating brick for the blast furnace, tests had to be devised which would in a short time reproduce the actions of impact, abrasion and spalling, which would take place in an actual service of several years.

IMPACT TEST

After considering rattler and similar tests it was decided to employ a steel ball 2½ in. diameter, dropped from various heights on the brick heated to the working temperature. Beginning with a drop of 2 in., the ball was dropped from heights progressively increased 2 in. at each drop, upon the end of the brick heated to 260 deg. C. The height to which it was necessary to raise the ball to produce fracture of the brick represented the resistance to impact of the brick. A brick heated to 260 deg. C. and thus tested was 20 per cent weaker than a brick of the same brand tested at 20 deg. C., and 40 per cent weaker when tested at 540 deg. C.

ABRASION TEST

Former abrasion tests have been conducted with the brick cold, by means of an emery wheel. For the tests under consideration a test temperature of 260 deg. C. was adopted for top-wall and pipe brick and of 1350 deg. C. for all others. The heated brick was pressed against a revolving carborundum wheel, pressure and time being constant. The depth of cut was measured when the brick cooled and the result reported as the linear inches abraded in five minutes. The tests developed that bricks are not the same at both ends, there sometimes being 10 to 20 times the abrasion at one end as the other.



Influence of Water Used in Manufacture on Physical Properties of Fire Brick

SPALLING TESTS

Spalling usually results from thermal changes accompanied by mechanical pinching. In service one end or one side of the brick is exposed to heat action. The test for spalling finally decided upon consisted in placing the brick in the wall of the furnace, exposing only one end and subjecting it to a temperature of 1350 deg. C. for one hour. It was then cooled for 25 min. in an air blast. Thirty alternate heatings and coolings were found necessary to produce a measurable spall and accordingly the brick was cooled in water for three minutes instead. This was a more severe test, cooling in water being found to be three times as effective as cooling in air. The amount of spalling is reported as the percentage loss in weight.

SLAGGING TESTS

Slag tests were made by drilling a cavity in the brick and filling it with slag. Experiments determined the

*Abstract of a paper read at the annual meeting of the American Society for Testing Materials, Atlantic City, June 28.

effect of the fineness of the slag, time of exposure to heat and the effect of destroying the surface texture by drilling. To measure the slag penetration the brick was cut so as to expose a cross section of the slag pocket and the area of the slag penetration exposed was measured by a planimeter.

COMPRESSION TEST

To determine the ability of brick to stand up under loads when highly heated a modified Brinell ball test was applied by heating the brick to 1350 deg. C., removing it from the furnace and forcing a 2½-in. steel ball into it under a pressure of 1600 lb. The depth of compression was measured when cold by a Brown & Sharpe micrometer depth gage.

RESULTS OF TESTS

It has been found that fire brick tend to group themselves according to density. Other qualities being the same, the brick of high density have, as a rule, the best qualities—viz., least abrasion, good resistance to slag and least compression. Spalling is slightly increased, but not dangerously so, if the brick are not overburned. Specific gravity, obtained by weighing and measuring the brick, is the measure of density. Various makes of brick have characterstic values for apparent specific gravity and the method of manufacture influences the density.

To determine the effect of pressure and moisture in producing a dense brick a standard fire clay mixture was used in which the moisture varied from 4 to 12 per cent. All brick were pressed at 2,000 lb. per sq. in. and then burned in a regular kiln. The results of these tests are given in the diagram, Fig. 1. Power pressing a brick during manufacture up to 1500 lb. per sq. in. has been found to materially improve the quality of most fire brick. Beyond that figure little improvement is made. The accompanying table compares tests on a high pressure, low moisture brick and a hand made, repressed, ordinary moisture brick, both being of the same mixture.

Comparative Tests of High Pressure, Low Moisture Brick, and Hand Made, Repressed, Ordinary Moisture Brick

Properties Considered		Kind of Brick: Pressure of 1500 Lb. Per Sq. In. Moisture, 7 Per Cent	Hand Made, Repressed, Ordinary Moisture
Compression at 1350 deg. C., depth of impression, in.		0.29	0.55
Expansion per foot of length at 1350 deg. C., in.		0.062	0.059
Impact at 260 deg. C., height of drop, in.		45	28
Abrasion at 1350 deg. C. in five minutes, in.		0.02	0.04
Spalling loss, per cent		9.4	10.6
Slag Penetration, sq. in.	Blast-furnace slag	0.27	0.56
	Heating-furnace slag	0.26	0.67

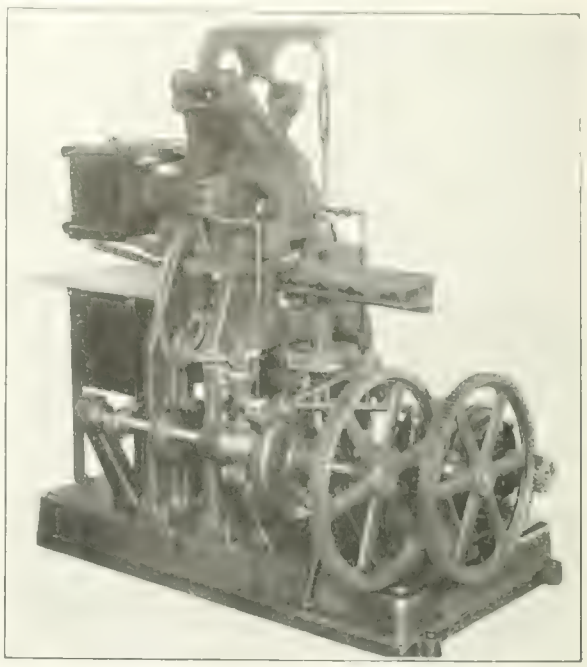
The methods above described have been developed mainly with reference to the brick used in iron and steel plants. Slight modifications, to imitate the actual working conditions, will enable them to be applied to almost any service in which the brick may be used. An appendix to the paper contains detailed descriptions of the apparatus used in making the above tests.

The property of the Nova Scotia Car Works, Halifax, N. S., is to be sold at auction on July 26, with a reserve price of $154,000. Before Justice Chisholm, at Supreme Court Chambers, Halifax, on July 4, tenders for the property were received from F. B. McCurdy & Co., for $153,000; and from the Nova Scotia Steel & Coal Company for $152,500. J. R. Douglas and other shareholders, in an affidavit, stated that if possible they would buy the property for the shareholders, and would give more than the tenders offered. It was finally decided by all concerned to sell at auction at the date stated.

The first heat of vanadium cast-steel locomotive frames was made in 1907 by the Union Steel Casting Company of Pittsburgh. Two pairs of frames were cast in this heat, and both are said to be still in service. A leading Western railroad has now 30 consolidation engines of 48,500-lb. traction power, which have been in service five years; 11 Mikado locomotives of 60,500-lb. tractive power, in service for three years, and passenger locomotives weighing 190,000 lb., all equipped with vanadium cast-steel frames.

A Special Spot Welding Machine

A special spot welding machine that is entirely automatic in its operation has been designed and built by the National Electric Welder Company, Warren, Ohio. It is used for assembling work in a shop specializing in pressed steel forms. Formerly this work was done by several riveting machines, and, while they have been



This Special Automatic Spot Welding Machine Was Developed for Use in a Plant Specializing in the Production of Pressed Steel Forms and Simultaneously Makes Welds in Both Sides of a 12-Ft. Length of Material at the Rate of 40 Per Minute

supplanted on this particular class of work, they will still be used for other operations where electric welding is not practical from an economical standpoint. The work handled by the machines consists of two 12-ft. sections, one a flat member and the other a formed section having a series of holes in the apex. The machine will spot weld the two pieces together automatically, the welding being done on both sides simultaneously at the rate of 40 welds per minute.

The work is fed through the machine by friction rollers, which are operated by a ratchet gear above and to the left of the second large gear, that in turn is controlled by a cam at the left of this gear. In the intervals between the movements of the ratchet gear, the welding points, which are water cooled, are brought into contact with the work by a cam, which can be seen between the uprights of the frame just below the water hose. The temperature and flow of the water supplied for cooling the welding points is indicated in the drip cup through which the water passes as it flows from the cooling system into the waste. The power for operating the machine is furnished by a 2-hp. motor, mounted on the machine base and running at 1200 r.p.m., which in turn operates through a train of gears.

"Some Manganese Mines in Virginia and Maryland" is the title of Bulletin 640-C, by D. F. Hewett, just published by the United States Geological Survey. It is based on data collected during brief visits in the spring months of 1913, 1914 and 1915 in connection with the gathering of statistics of the production of manganese ore. Virginia is stated to have furnished 61 per cent of the domestic production of manganese ore for the period 1880 to 1914.

The Donovan Boiler Works, owned by Hugh Donovan, Jr., manufacturer of steam boilers and tanks, Parkersburg, W. Va., is building a brick addition to its plant on Sixth Street, which will more than double its boiler output. It is installing individual motor drive on its equipment, which has been contracted for.

SPELTER: ITS GRADES AND USES*

The Common Impurities in Their Relation to Various Lines of Service

BY G. C. STONE†

Spelter, like all commercial metal, contains impurities, but, unlike most other metals, none of these impurities are advantageous for any of the purposes for which it is used. The effects of these impurities on different products made from it vary greatly, hence the necessity for several grades differing in purity. Spelter is used for the following purposes, in quantities in the order mentioned: galvanizing, alloys, rolling, ornamental castings and miscellaneous uses.

For ordinary galvanizing the effect of the common impurities is not very great. Iron is objectionable as causing a loss in dross and in making the coating more brittle and liable to crack and peel off. Lead, up to the limit found in commercial spelter, has no serious effect, but is objectionable when present in large quantity, as it liquates in the bath and does not enter the coating and is, therefore, wasted. Lead is usually worth less than zinc and the purchaser does not wish to pay for it at zinc prices.

The four higher grades of spelter are chiefly used for alloys and the specifications were principally made for the alloy makers and do not, in all cases, call for metal suitable for some of the other purposes for which it is used.

ALUMINUM

In alloys, aluminum is frequently very injurious, 0.01 per cent in many cases making brass useless for the purposes for which it is intended. In the few instances where its presence is desired, it is more satisfactory to add it directly than as a constituent of the spelter. The specifications [as proposed for the American Society for Testing Materials in 1915], therefore, require that the four higher grades of spelter shall be entirely free from aluminum.

IRON

Iron is always present in spelter, but is very undesirable in brass and similar alloys, making them harder and greatly increasing the hardness due to cold working. The increased hardness is very objectionable, causing a greater consumption of power and endangering the rolling mills and drawing presses.

LEAD

Lead is very objectionable in some alloys and essential in others, and the main variation in the different grades of spelter is in the allowable amount of lead. High-grade spelter, which is used for alloys that are to be subjected to the most severe spinning and drawing operations, can be rejected if it contains over 0.07 per cent of lead, as lead reduces the ductility of brass.

Intermediate spelter, with a lead limit of 0.20 per cent is used for alloys that do not have to undergo as severe treatment, and also very largely for alloys like manganese bronze that are used both cast and wrought.

Brass special has a lead limit of 0.60 per cent, and is mainly used for brasses where the maximum ductility is not required. The lead and iron are limited to 0.60 per cent and 0.03 per cent respectively, because brass made from such spelter is used for ordinary drawing, spinning and forming work where the requirements are not especially severe.

Selected spelter carrying the maximum 0.80 per cent of lead and 0.04 per cent iron is used by brass manufacturers for making alloys to which lead is added in order to secure free cutting qualities. Material of this kind is usually made into rods and heavy sheets for the manufacturing of small articles by turning, milling and drilling operations. Such brass must contain sufficient lead to reduce the strength of the material and cause the chips to break easily.

Owing to the fact that brass is usually made in crucibles in small quantities, uniformity in the spelter is of the greatest importance. As lead segregates badly, and more markedly the higher the proportion, the lead limit of the average sample is made low enough to allow for this tendency without injurious effect on the product. Even when the brass manufacturer adds lead, he does so in known amounts and thus obtains a uniform alloy from the different pots, which would not be possible if all the lead needed were contained in the spelter.

CADMIUM

There is very little doubt that cadmium in zinc is very injurious for some of the purposes for which it is used, as it renders it harder and much more brittle. There is, however, considerable difference of opinion as to how far these undesirable properties persist in alloys made from zinc containing cadmium. The majority of the brass makers are of the opinion that the high temperature of the brass pots cause so much of the cadmium to voltalize that the residual amount has very little deleterious effect.

There is no doubt that large amounts of cadmium, say 1 or 2 per cent, make brass hard and brittle. We have no reliable information at present showing the effect of small amounts of cadmium on the alloys, and the evidence on this point is extremely conflicting.

Cadmium, together with lead, seems to intensify the effect of the latter and also causes the brass to become more sensitive to the effect of overheating in the various annealing operations to which the wrought material is subjected.

Very little spelter is made containing as much cadmium as is allowed for intermediate and brass special and the specifications, therefore, put practically no limit on cadmium except for high grade. Whatever the facts may be for alloys, it is certain that the amounts of cadmium allowed by the specifications are much greater than are permissible for other purposes for which zinc is used. The question of cadmium in the better grades is complicated by the fact that until the last year and a half practically all the high-grade and most of the intermediate spelter was made by one company from ores that are free from cadmium. The alloy makers have, therefore, had no extended experience with the effect of cadmium in the better grades of spelter, and during the last eighteen months conditions have been so abnormal that it is difficult to draw conclusions.

High-grade spelter is very extensively used for galvanizing telegraph and telephone wires which are required to stand sharp bending when making the "lineman's splice;" as it has been found that if impure spelter is used, the coating cracks and peels off the joint. The only high-grade spelter that has been used for this purpose is entirely free from cadmium. Cadmium being the element most likely to cause this trouble, it is very doubtful whether metal containing as much as is allowed by the specifications (0.05 per cent) would be suitable for this purpose.

For rolling, cadmium causes such severe cracking that metal containing much of it is not economical; but as practically all the zinc rolling mills produce their own spelter, this matter is within their own control and the specifications do not affect them.

For ornamental castings no spelter described by the specifications would be satisfactory. The high-grade is all right as far as lead and iron are concerned, but with the maximum cadmium allowed, it would be impossible to make castings of many of the common shapes.

*Submitted as an addendum to the report of the Committee on Non-Ferrous Metals and Alloys at the meeting of the American Society for Testing Materials, Atlantic City, N. J.

†Metallurgist New Jersey Zinc Company.

Marked bars is a term which for some 60 years has been applied to the highest quality iron bars made in South Staffordshire, England. The word marked means branded, and, according to *The Engineer*, originated in the circumstance that each bar turned out in the mill is branded with the maker's "best iron" trademark. It may be a lion rampant or some such emblem. Formerly some nine firms or so made this class of iron, but the number has now decreased to five, and the tendency is for it to get less and less.

New Menace of Higher Manufacturing Costs

Health and Unemployment Insurance for Workmen Would Strike Hard at Industrial Profits — Much Greater Burden Than That of Workmen's Compensation

BY JOHN NELSON

American industries are facing the possibility, even the probability, of legislation establishing compulsory sickness and unemployment insurance for workmen, which would affect in a really important way the cost of manufacturing. Already in most sections of the country workmen's compensation is a fixed charge. What the proposed benefits would develop into in dollars and cents can only be conjectured. Their advocates do not pretend to have satisfactory figures, for statistics upon which to base them are meager. But the annual cost to the employer might be put at something like the following:

Sickness or health insurance	$3 per $100 of total payroll
Unemployment insurance	$1 per $100 of payroll
Total	$4 per $100 of payroll

The basis of these figures is that both classes of insurance are confined to persons earning $25 a week or less. They are partly guesswork and partly based on estimates made up from the experience of individual establishments. A glance at the benefits provided in bills already presented to legislatures, details of which will be found below, suggests that the figures given are too low rather than too high. One large company, which for a number of years has looked after the health of its employees in an organized way and has complete records, estimates that the cost of sickness insurance as at present planned would be seven times that of workmen's compensation. The burden of the latter system is something around 1 per cent of the payroll.

A LARGE ADDED BURDEN

To add a charge equal to 3 or 4 per cent of the labor cost of a product would be no small factor in most cases.

The State, too, would feel the effects of these new forms of insurance, for it would share the cost with the employer and the employee. It is estimated that the State tax of Massachusetts would be increased 50 per cent by health insurance alone, which on the present levy would add about 50 cents per $1,000 to the full tax rate.

The answer is that the cost would be borne by the ultimate consumer; that the cost already exists, and its distribution would be better cared for, especially because it would remove the workman further from the atmosphere of charity and pauperism.

Apart from their actual cost, a great objection to these systems of insurance is that they would introduce additional elements into the realm of disputes between employer and employee. The workman's contributions would be subtracted from his pay envelope, and thus would assume a part in the question of amount of wages. Abroad they do it in a different way; the employee pays the state direct; his wages are not tampered with by his employer.

It was hoped, in fact confidently expected, that workmen's compensation would get rid of a large part of the controversies regarding awards of damages for accidents which were common under employers' liability. But such has not been the result. The cases which get into the courts are constantly increasing in number, and presently may exceed the experience under the old practice. They indicate what might be expected under health or unemployment insurance.

Still later, an old age pension system is likely to be brought forward. This would add something to the burden of costs, but not so much as either of the others. Statistics show that the number of workmen who would be entitled to benefits under old age pensions is relatively small.

AN ORGANIZED MOVEMENT

The movement for sickness and unemployment insurance has been started in an organized way. Among the bills to establish the former is one prepared by the Committee on Social Insurance of the American Association for Labor Legislation, which has been submitted to the legislatures of a number of the States, particularly New York and Massachusetts. The Massachusetts Committee on Unemployment has introduced in the Legislature of that State a bill to establish unemployment insurance.

All of these measures follow the lines of European practice. Both health and unemployment insurance are in successful operation in England and Germany, or were before the war, and the same is true of old age pensions. Industrial systems such as these are brought to us after they have been tried out abroad. A dozen years ago the idea that workmen's compensation would be transplanted here was not considered seriously; yet it is now thriving in this country. Therefore owners of industrial plants will find it well to get acquainted with what they will have to meet. The American employer will have to admit that usually he knows little regarding pending issues of this character, until it is too late for him to apply his experience and knowledge to a just solution of questions involved.

Workmen's compensation has never been considered as an entirely new expense, because it replaced the old employers' liability, the average cost of which was a large percentage of the present charges resulting from accident. But the proposed forms of insurance would be absolutely new costs. One great trouble would be that the increase would not be uniform between the States. It is not difficult to conceive of such legislation increasing to the extent of compelling manufacturers to move their works out of a State, or of causing the shutting down of plants the owners of which have factories in other States where manufacturing could be done more cheaply.

It is argued that Germany and England maintain not only health and unemployment insurance, but old age pensions as well, and have highly developed them without creating too great a burden, the manufacturers sharing the cost with the workmen and the state, and adding it to the price of the product. These two countries are our chief competitors. But labor there is paid much less than in this country. Our competition with European manufacturers here and in foreign markets proves that they are better able to carry such burdens. Most important, too, is the fact that their governments

legislate for the whole country and the burdens fall on all manufacturers.

HEALTH INSURANCE AND WORKMEN'S COMPENSATION

Health or sickness insurance for the United States must be considered in connection with complications that have developed in workmen's compensation. The compensation acts are not satisfactory in their relation to sickness. Some form of health insurance may be desirable on that account. The several causes of incapacity of employees are these:

1. Injury sustained by accident during employment.
2. Sickness arising out of injury, such as septic poisoning.
3. Sickness not resulting from an accident but originating in the employment, as among workers in lead or cyanide.
4. Sickness not originating in the employment, but aggravated or accelerated by it, the worker bringing the hazard to the employment, as in the case of a weakened heart or a predisposition to tuberculosis.
5. Sickness and accident having nothing to do with the employment.

The first two classes come under compensation everywhere. Most employers agree that the third class should be cared for; that occupational disease entails upon them some degree of financial responsibility. But they hold that the compensation statutes should sharply define this liability.

As to the fourth class, which in some States has been held to come under compensation, owners are unwilling to acknowledge that they should be held liable in these cases in the same manner as where an employee had suffered in an accident. If a workman has a weakness, some obligation rests with him to discover it and to select his employment accordingly. At most, the responsibility should be divided between him and his employer, it is argued. The exponents of compulsory health insurance believe their system would solve all such differences. The benefits of compensation might be confined to accidents and their direct results and perhaps occupational diseases. Health insurance would care for everything else.

Compulsory Health Insurance

The bill of the committee on Social Insurance of the America Association for Labor Legislation provides for compulsory health insurance for every person employed at manual labor under any form of wage contract, and for every other employee whose remuneration does not exceed $100 a month. The insured and his dependents would receive benefits in case of any sickness or accident, or for death, not covered by workmen's compensation, as follows:

A cash benefit, beginning with the fourth day of disability on account of sickness, equal to two-thirds of the weekly wages of the insured member. It would be paid only during the continuance of disability, and not to the same person for a period longer than thirteen weeks in any one case, and not over twenty-six weeks in any consecutive twelve months.

A cash benefit equal to one-third of the wages of an insured member receiving hospital treatment, to be paid to his family or other dependents while he is in the hospital, during which period he relinquishes all other benefits.

Medical, surgical and nursing attendance during the continuance of the sickness, not to exceed twenty-six weeks from the first day, and if not paid by the owner, cash for the cost of such service not to exceed one-half the weekly cash benefit. Or treatment in a hospital might be substituted in case of contagious disease or for other good reason.

Medicines and supplies, such as crutches, trusses and eyeglasses, not to exceed in cost $50 in any year.

Medical and surgical treatment for dependent members of the family of the insured.

Maternity benefits, consisting of all necessary medical and surgical aid, materials and appliances, which would be given insured women and the wives or widows of insured men. Also for insured women a weekly cash benefit equivalent to the regular sick benefit of the insured, for a period of eight weeks.

Funeral benefits to the amount of $50, which would apply also where death ensues within six months after discontinuance of sick benefits because of the exhaustion of the time limit, provided that the workman had not within six months returned to work.

COST OF HEALTH INSURANCE

It is proposed that the State contribute one-fifth of the total expenditures for benefits, the employer one-half of the balance and the employee one-half, except that if the earnings of the insured fall below $9 a week, the shares of the employer and employee shall be in proportion to their joint contribution as indicated in the following schedule:

If Earnings Are Under	But Not Under	Employer	Employee
$9	$8	60 per cent	40 per cent
8	7	70 per cent	30 per cent
7	6	80 per cent	20 per cent
6	5	90 per cent	10 per cent
5	..	100 per cent	0 per cent

Just how this apportionment would work out as a total no one knows. A great many employees earn less than $9 a week. Taking these into account one estimate makes it that the State would pay 4/20, the employee 7/20 and the employer 9/20.

The cost of this insurance cannot be based on actuarial experience. The advocates of the bill state:

Investigations for the United States Bureau of Labor Statistics and for private institutions agree that at least 4 per cent of the income of working class families goes for care of sickness and for burial expenses. Based on German experience this would be about the percentage of wages required for all the benefits in this draft.

This estimate cannot take into full account the cash benefits. The workman and his family would receive a very large part of what he had been paying for without help from anyone in the "care of sickness and in burial expenses," excepting burial expenses for dependents, and in addition he would be given a cash income while he was laid up. Also the important correction must be made that the outlay from the insurance fund would be a constant one. When people were out of work they would still be entitled to the insurance for which they had paid. And the income would decrease automatically with a falling off of employment. Therefore, contributions would have to be large enough in prosperous periods to pay benefits than in dull times also.

However, the law would exclude those employees receiving more than $25; and for the sake of estimate this may be presumed to offset these other charges which would bring the cost above the 4 per cent.

COST OF ADMINISTRATION

But it would not offset the very large addition that would have to be made to the 4 per cent, or whatever it might be, to take care of the cost of administration, always an important factor in such systems. It is known that about 37 per cent of the total cost of workmen's compensation is apart from the money paid employees. The cost of administering health insurance would be greater than that for compensation, since the benefits would be much more broadly distributed. Assuming 40 per cent to be a fair approximation, would mean that the $4 per $100 of the payroll represented in cash expenditures of one form or another would be 60 per cent of the total outlay. Thus the latter figure would be more than $6.50 per $100 of total payroll. Under the division already indicated, the State would pay $1.30 per $100 of payroll, the employee $2.275 and the employer $2.925.

Against his share the employer could charge the expenditures he is now making voluntarily in looking after his employees when they are in need of assistance.

THE EMPLOYER'S PART

The reasons for the employer's large share in financing sick benefits are thus given by the advocates of the plan:

> The share of industry in causing sickness is not recognized. Not only the more clearly defined occupation diseases like lead poisoning and caisson sickness, but tuberculosis, anaemia, digestive and nervous disorders are partly or wholly caused by dust, speeding up, monotony, long hours and other conditions associated with modern business. Aside, therefore, from the advantage of interesting the employer financially in decreasing sickness by improving working and living conditions, and from his gain by a healthier working force, there is ample justification for requiring industry as such to contribute to the insurance.

The establishment of this system would give a great boost to the practice of compulsory physical examination. Probably, also, hygienic conditions would prevail more generally, though the advance in this respect is so constant that in most cases no unusual stimulus would be needed.

The bill contains various other provisions than those cited above. One is that the commission shall, if petitioned to do so, assess upon any employer, any of whose employees are insured in labor union or benevolent societies, a sum equivalent to the employer's contributions had such employees been insured under the general provisions of the act.

Insurance rates for different industries might vary with the sickness ratio in each, and the commission would have the power to go a step further and increase the contributions paid by the employer in particular establishments which show a higher sickness rate than others in the same industry.

Unemployment Insurance

The measure submitted by the Massachusetts Committee on Unemployment to the Legislature of that State is entitled "a bill to provide insurance for workmen in certain industries who are temporarily unemployed." These industries are essentially the same as those having workmen's compensation. The application would be to all men and women over 18 years of age engaged in employment, manual or otherwise, excepting clerks, at a wage of $25 a week or less. The law would be compulsory.

The benefits for the unemployed would be paid from a fund administered by an "unemployment insurance commission" and contributed to by employee, employer and the State in equal share. The bill divides the employees into three groups. The first, earning $8 a week or less, would receive $3.50 weekly; the second, earning $12 a week or less, $5.25, and the third, earning $12 or more, $7. Benefits would not be paid an employee for more than ten weeks in one year.

ESTIMATED COST

In the beginning the amount of contributions would have to be fixed by guess. Doubtless it would be placed too high, in order that the fund would surely be large enough to meet any unusual demand that might be made upon it. In the event of an industrial crisis what would happen? Men and women by the thousands would be thrown out of work, and the greater portion of them would be entitled to the benefits for ten weeks. Out of approximately 700,000 people employed in the manufacturing industries of Massachusetts, it might happen that 100,000 of the insured would become enforced idlers all within a few weeks. At an average benefit of $4.50 a week for 10 weeks $4,500,000 would be required—rather a tidy sum for an insurance fund to meet all of a sudden. In a period of really dull times a very much larger proportion of the employees would draw the full benefit, or a part of it, some time or other before twelve months was up. In a moderately poor year great sums would have to be expended in this form of compensation, and even in flush years there would be a steady paying out.

As neither the State, the employer nor the employee would be contributing when the last-named is out of work, the income would decrease or increase automatically as times were bad or good. When income was at its highest point expenditures for benefits would be at their lowest, and vice versa.

The amount of the contributions resolves itself into the average percentage of the insured who would receive unemployment benefits. Taking as a basis the $350,000,000 annual payroll of Massachusetts manufacturing industry and 700,000 employees (these figures do not pretend to be more than roughly accurate), and presuming that one-fifth of the people receive in the course of a year the full compensation at an average of $4.50 a week, the money expended for actual benefits would be $6,300,000. If this is 60 per cent of the total cost, administration consuming the other 40 per cent, the grand total would be $10,500,000. This is 3 1/3 per cent of the total payroll, making the employer's share of contributions more than $1 per $100 of his payroll.

The average of unemployment might be more or it might be less than one-fifth. There is no way of getting at the truth.

Into this question enters the proved fact that in maintaining an industrial force the number of men hired annually is three or four times the average number on the payroll. In a period of prosperity such as the present the transients are more numerous than when things are dull. How many of these transients would receive benefits under unemployment insurance between jobs?

COST OF HIRING AND "FIRING"

Unemployment has one meaning to employers which few of them understand, though it has been pointed out to them from time to time, in that to lay off a man when there is no work for him to do and by so doing to lose his services permanently is to incur an expense which is reckoned at from $25 to $40, taking the experience of various American companies which have caused the matter to be investigated. To break in a new man means a loss because he cannot reach the efficiency of his predecessor until he becomes experienced in the work, and oftentimes several men have to be tried before the position is permanently filled and the job is running smoothly again. Work has been spoiled probably and production has been lowered. A manufacturer might carry a fund as insurance against such unemployment, but it is doubtful if the compulsory insurance system would assist much in reducing the evil.

RESTRICTIONS ON UNEMPLOYMENT PAYMENTS

The various restrictions on the operation of the proposed law are interesting and some of them very important. In granting unemployment benefits, among the requirements are the following:

> That since the date of his last application for benefits he has been continuously unemployed.
>
> That he is capable of work but has been unable to obtain suitable employment. [The words "suitable employment" should be noted well.]

A workman is not deemed to have failed to fulfill

(Continued on page 116)

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Easing the Strain in Steel

The fact that the Steel Corporation's unfilled orders fell off nearly 300,000 tons in June is variously commented on in financial columns. When it is pointed out that producers are glad of a change from the steady mounting of contract obligations, we are told that new orders and not those of the past are what the public, meaning probably the speculative public, wants to see. But Wall Street has always given the Steel Corporation's statement of orders an exaggerated significance. With a total of 9,600,000 tons of orders ahead and 60 per cent of these in the form of specifications, the corporation now makes a showing that is without precedent in other years, in the tonnage of firm orders on its books. Yet the fact that shipments in June were more than new orders is given an untoward significance. It seems to be overlooked, in such views, that those who have bought for months ahead, under unusual incitements, cannot keep on buying indefinitely.

The speculative community does not take into account the conditions under which orders accumulated so rapidly in the early months of the year. Fear that they would not be able to get material when wanted was the compelling influence with many buyers in those months. Many of them were buying speculatively against further advances. As time went on and it began to appear that in general prices had reached the high point, eagerness to buy for far-off delivery diminished and consumers of steel began to lose their fear of a steel famine. To-day there is no longer competitive buying, stimulated by the fear that consumers' plants might have to close down for lack of material. The present situation, in which buyers are able to look forward calmly to a market no higher than to-day's, with the expectation that increasing capacity will reduce the congestion at the mills and thus cut down premiums on prompt material, is much healthier than that which prevailed at the beginning of the year. Then, too, the unparalleled prices for steel have at length had some of the predicted effect upon domestic consumers. The process of readjustment is not likely to be rapid, but it will only be following precedent if at length it brings users of steel into closer step with the operations of the mills and reduces the amount of speculative buying for the distant future.

Our Half-Yearly Index

The Index of THE IRON AGE for the past half year, January to June, inclusive, has been compiled and printed and is now ready for distribution. It will be forwarded promptly to those who have entered their names on our list as desiring it. Others who may have use for copies will be furnished them by addressing our Circulation Department.

A Million Tons Extra Scrap

The condition of the United States producing a larger tonnage of steel ingots and castings than of pig iron was accentuated in 1915. Last year's statistics are naturally compared with those of 1913, as the outputs in the two years were not greatly dissimilar, while 1914 was very decidedly an "off" year. The production of pig iron decreased from 30,966,152 tons in 1913 to 29,916,213 tons in 1915, while the production of steel ingots and castings increased from 31,300,874 tons to 32,151,036 tons. In 1913 steel exceeded pig iron by 334,722 tons and in 1915 by no less than 2,234,823 tons.

Only a very small part of this change of alignment was due to the production of steel-making iron decreasing less than the production of foundry grades. It will be understood that long-range comparisons like these are purely statistical. What occurs is that in the steel mill and steel foundry large quantities of scrap are used, the major portion of the scrap arising in the works itself, and the use of this scrap fully offset in 1913, and much more than offset in 1915, the pig iron that does not reach the steel mill or steel foundry being used in the iron foundry and, to a limited extent, in the puddling furnace. Another factor is the steel-making pig iron that may accumulate in one year or be drawn from stocks in another.

The useful comparison is that between the output of steel-making pig iron and the output of steel ingots and castings. As nearly all the Bessemer pig iron produced passes to the acid open-hearth steel works and the Bessemer steel works, the production of ingots and castings by the two acid processes may be compared with the production of Bessemer and low-phosphorus pig iron, the proportions of steel to pig iron being 93.19 per cent in 1913 and 91.77 per cent in 1915, showing that last year's larger production of steel as compared with pig iron was not due to what occurred in connection

with the acid open-hearth or Bessemer steel-making processes, but rather in despite of what occurred. In this slight change in relations there is the suggestion that probably stocks of pig iron were not drawn upon in 1915 any more than in 1913, if they were in that year. If that is true with Bessemer iron it is perhaps true of basic also, for the one grade would be stocked about the same as the other.

Making for basic iron a comparison similar to the foregoing, it is found that in 1913 the production of basic open-hearth steel ingots and castings was 162.3 per cent of the production of basic pig iron, while in 1915 the proportion was 170.4 per cent, showing a large increase. Dividing in reverse manner, the basic pig iron was 61.63 per cent of the basic steel in 1913 and 58.69 per cent in 1915. Evidently more scrap was used in 1915, and one naturally infers that the larger supply was due chiefly to greater production of works scrap on account of there being a large output of war steel, involving much more than the normal cropping.

Comparing the figures in another way, if the proportions between basic pig and basic steel that obtained in 1913 had obtained in 1915 the production of basic steel would have been 1,100,000 tons less than it was. Possibly that figure is suggestive of the extra amount of scrap used last year.

There is a means of checking the inference just drawn, that an unusually large proportion of scrap passed into steel ingots last year. The production of finished rolled steel can be compared with the production of steel ingots. The percentages of merchantable rolled steel to ingots have been as follows in the past five years:

	Per cent
1911	76.33
1912	76.01
1913	76.33
1914	75.28
1915	73.83

The drop in 1915 is decidedly marked, considering how slightly the percentages fluctuated in the four years preceding. Taking 76 per cent as the normal proportion, the 23,098,091 tons of rolled steel in 1915 would have required 30,390,000 tons of ingots instead of the 31,284,212 tons actually produced, the divergence being 900,000 tons. Thus, comparing basic pig iron with basic steel, 1915 showed a divergence of 1,100,000 tons, while comparing ingots and rolled steel a divergence of 900,000 tons is indicated, and in the absence of further information one may regard it as strongly suggested that the production of heavily cropped shell steel in 1915 resulted in the production—and use—of about a million tons more scrap than the normal.

Prospects of Car Buying

There is some speculation as to whether the railroads will place additional car orders of any magnitude while steel prices remain at their present level. The fact that car buying seems to have almost ceased is not in itself conclusive proof that it will not be renewed without a change in steel prices. As a rule cars are scarcest late in the year, when the crops are to be moved, and deliveries are desired before that period. When the time comes that such deliveries could not be expected the railroads naturally [illegible] The recent curtailment in car buying was not due exclusively to the high cost of steel. Car equipment commanded high prices and deliveries were difficult to arrange. Car shops were quoting prices that represented a very fair margin of profit. When the present car orders are larger completed and reports indicate that such a time will be reached in the not distant future it may be assumed that the margin of profit demanded by car shops will be materially reduced and that car equipment can be purchased for earlier deliveries and at more moderate prices. All the deterrent influences except the prices of iron and steel would then be removed and it is by no means a foregone conclusion that the railroads would not begin placing car orders again in considerable volume.

An analysis of recent car buying indicates that the cars ordered during the period of particularly high prices have represented special needs in very large part, rather than an effort to increase the general carrying capacity of the road placing the order. Excluding export orders, the distribution as to type of cars ordered since April 1 has been about as follows:

	Per Cent		Per Cent
Box	67	Flat	1
Gondola	19	Work	1
Automobile	3	Coal	1
Hopper	3	Miscellaneous	1
Tank	2		
Stock	2		100

A glance at the table shows that the distribution is altogether removed from the normal. For two-thirds the orders to be in box cars is altogether out of line, while for automobile and hopper cars to be ordered in the same proportion is quite inconsistent with the usual distribution, and it is quite abnormal for twice as many stock cars as coal cars to be ordered. It is evident that the railroads have simply been engaged in rounding out their equipment, and they may be forced to continue this process, even at high prices, though, of course, the total orders would not be large.

There has been some addition recently to the discussion as to the life of steel cars. As summarized in THE IRON AGE of June 22, page 1511, estimates range from 16 to 30 years and even the higher estimate falls quite short of the early expectations. If a trustworthy estimate could be secured, however, it would still be of little use to apply it to the total number of cars in service, to determine the number that would have to be bought from year to year to maintain the equipment, for the reason that experience with steel cars is confined practically to hopper and gondola cars, which suffer harder usage than ordinary box cars and various special types. The last Interstate Commerce Commission report shows 2,356,338 cars in freight service and 95,934 cars in company service on June 30, 1915, and an estimate some time ago placed the number of private freight cars at about 140,000, making a total of about 2,600,000 cars, to replace which in an average period of 16 years would require 165,000 cars a year, while 87,000 cars a year would be required to replace them in 30 years. In this connection it is to be noted that only about one-half the cars in service are of all-steel or steel underframe

construction, and the remaining wooden cars will necessarily be wearing out rapidly in the next few years.

A few years ago the railroads became more deeply concerned over the matter of securing better mileage from their freight cars, the average travel per day being about 21 miles, two-thirds of the mileage being loaded and one-third empty. Despite serious efforts made to improve conditions the average travel per day has been increased only 10 or 15 per cent, and the record suggests that no very great improvement in this respect can be expected. Naturally it is much better to increase the service of the cars than to increase their number, for there is not only the added investment in cars, but also the additional track room occupied. More recently attention has been directed more strongly to the light loading of cars, the average load having increased much less than has the average car capacity. Indeed, the service performed by cars seems ridiculously small. In the past two years the freight ton-mileage has averaged about 283,000,000,000, while the aggregate capacity of the freight cars is about 100,000,000 tons. Thus, if the cars were loaded to capacity they would need to travel less than eight miles per day in order to do their work, or 55 miles per week. If the life of cars is to be less than was expected, however, there is less incentive to make them do more mileage, as their life would thereby be shortened. Having made but little progress toward heavier loading of cars and greater mileage, the railroads may conclude to adopt a freer policy in future in the matter of adding to the number of their cars.

Coming back to the subject of costs, it is to be observed that the average price of pig iron in the various markets to-day is only about $2.50 per gross ton higher than the average of the past ten years, while plates and shapes are $25 a net ton above the average. Thus in a car weighing, say, 20 net tons, the cost of the fundamental raw materials does not bear so heavily upon the total cost. If the other service rendered in building and equipping the car is priced moderately the finished car need not cost the railroad a prohibitive figure.

Women in War Industries

To have predicted, early in the war, that woman would have achieved the important position in industry which she holds to-day in the belligerent countries would have stamped one as a bold if not a visionary prophet. But the war has dealt many blows to the old order. To-day 300,000 women are vital factors in the British metal-working industries which have to do with munitions alone, and where 184,000 were employed in war industries in 1914 now 666,000 women are toiling daily. That some hundreds of women are now employed in British shipyards is the latest and most striking development in this unusual movement. In France the necessity for women's aid in producing war supplies is freely acknowledged, and in Germany, it is understood, much the same condition obtains. In one German locomotive plant 1600 women are doing efficient work. As the war continues there may be even more unlikely extensions of woman's work.

A labor union president in a recent address to the Workers' Union Conference at Birmingham, England, warned those who are jealous of women that to oppose them as workmates is hopeless. He said:

> While the old-type trade unionists may swear by his traditions, the new trade unionist, whose ideals of life are beyond this stage, must put aside fetish and superstition. The part that woman is going to play is not one that will have evil results, but a part that will teach her responsibility and give her confidence. Woman is bringing revolution into the industrial world. She is going to be responsible for an amazing increase in the powers of production and she is going to be on our side.

In his presidential address before the Iron and Steel Institute Sir William Beardmore gave a more concrete expression to the issue that has been raised by the unexpected performance of women workers in shell manufacture. Girls employed in projectile factories turned out twice as much work as thoroughly trained mechanics. That demonstration of the throttling of industry by British unionism, in the country's gravest extremity, can never be forgotten, and it will figure largely in the reconstructive work that will follow peace. Labor leaders will reckon without their host if they count on this new-found power of women workers being exerted in behalf of their backward-looking limitations. Germany, when eventually she takes up the work of restoring her highly efficient industrial machinery, may decree the retirement of her war-time women workers in favor of men; but in England the industrial revolution due to women has gone too far for a return to the old status. There may be a large element of patriotism in what girls and women have done for the British munitions output; but with all allowance for that, we cannot doubt that women, having developed an earning capacity of which they had not dreamed, will not be satisfied to resume their old status. The need of their undivided labors in keeping guns fed with steel will pass, but many of them will certainly find other work once thought out of their field. If Great Britain is to have an industrial regeneration as one of the fruits of the war, women will have had a large share in bringing it about.

Lessened Imports of Iron Ore

Iron-ore imports for 1916 are at the rate of 88,313 gross tons per month, or 1,059,756 tons for the year as judged by those for the first four months of this year. The following table from Government data shows these imports in gross tons:

		Per Month
January, 1916	84,844	88,313
February, 1916	93,814	
March, 1916	94,882	
April, 1916	75,712	
16 months ended April 30, 1916	1,112,661	111,266
10 months ended April 30, 1915	975,565	97,556
16 months ended April 30, 1914	1,853,536	185,335

For the 10 months to April 30, 1916, the imports are 167,399 tons in excess of those for the same period a year ago. In 1915 the total imports were 1,341,281 tons, or 111,773 tons per month. Of the receipts for the 10 months to May 1, this year, 63,610 tons came from Spain, 181,539 tons from Sweden, 84,343 tons from Canada, 685,399 tons from Cuba and 128,073 tons from other countries.

The Autocar Company, Ardmore, Pa., builder of motor vehicles, has increased its paid-in capital from $1,500,000 to $1,800,000. The company is to make large additions to its plant.

Iron and Steel Exports in May, 540,000 Tons

Fabulous Figures Reached in Foreign Trade—Machine Tools Show 50 Per Cent Increase Over April—Bars and Billets Lead

WASHINGTON, D. C., July 11, 1916.—All records were swept away by the phenomenal exports of iron and steel commodities in May, 1916, according to the official statistics compiled by the Bureau of Foreign and Domestic Commerce. Huge gains were made in total exports by values, in shipments of tonnage commodities, and in machinery and machine tools. Not only did the totals for the month in all these classes far surpass those of May, 1915, but the banner months of the entire fiscal year 1916 were beaten by large margins.

The total shipments of iron and steel products on a basis of value during May gained 179 per cent over the same month of 1915, and no less than 24 per cent over the record total of April, 1916. Tonnage commodities in May gained 100 per cent over the same month a year ago, and 23 per cent over the unprecedented total of March, 1916. Exports of machinery rose 100 per cent as compared with May, 1915, and 25 per cent over those of April of this year, when high-water mark was reached.

Exports of machine tools took a great stride in May, gaining 167 per cent over the same month a year ago, and no less than 50 per cent over April last, when all previous totals were beaten.

	May,		Eleven Months,	
	1915	1916	1915	1916
Pig iron		293	108,[illegible]	[illegible]
Scrap	1,[illegible]	24,889	22,[illegible]	1[illegible]
Bar iron	[illegible]	[illegible]	1[illegible]	[illegible]
Wire rods	11,236	[illegible]	[illegible]	[illegible]
Steel bars	[illegible]	77,0[illegible]	176,[illegible]	[illegible]1,121
Billets, ingots and blooms	[illegible]	142,782	1,1[illegible]	[illegible]
Bolts and nuts	[illegible]	2,494	12,019	[illegible]
Hoops and bands	[illegible]	[illegible]	[illegible]	[illegible]
Horseshoes	[illegible]	[illegible]	[illegible]	[illegible]
Cut nails	[illegible]	1,051	10,061	[illegible]
Railroad spikes	[illegible]56	[illegible]	2,227	[illegible]
Wire nails	[illegible]	1,959	[illegible]	[illegible]
All other nails including tacks	[illegible]	[illegible]	1,189	[illegible]
Cast-iron pipes and fittings	[illegible]	[illegible]	57,334	46,738
Wrought pipes and fittings	[illegible]	[illegible]	[illegible]	[illegible]
Radiators and cast-iron house heating boilers	[illegible]	[illegible]	2,463	[illegible]
Steel rails	[illegible]	48,841	[illegible]	[illegible]
Galvanized iron sheets and plates	[illegible]	[illegible]	[illegible]	[illegible]
All other iron sheets and plates	[illegible]	5,239	[illegible]	[illegible]
Steel plates	[illegible]	22,679	[illegible]	[illegible]
Steel sheets	10,122	[illegible]	[illegible]	88,487
Structural iron and steel	14,072	22,938	[illegible]	251,832
Tin and terne plates	7,307	25,585	[illegible]	[illegible]
Barb wire	[illegible]	39,197	124,804	[illegible]
All other wire	19,165	22,665	119,047	[illegible]
Total	[illegible]	540,591	1,650,270	4,334,511

For the eleven months ended May the total exports of iron and steel products on a basis of value rose 180 per cent over the same period of 1915, and nearly 100 per cent over the high record of 1913. Tonnage commodities for the eleven months of 1916 exceeded by 167 per cent the figures for 1915, and by 126 per cent the record total for this period in 1914. Shipments of machinery rose nearly 100 per cent over 1915, and 35 per cent over the high-water mark in 1913. Exports of machine tools for the eleven months of 1916 surpassed by more than 100 per cent the record for the corre-

Exports of Machinery in May, 1915 and 1916, and for Eleven Months

	May,		Eleven Months,	
	1915	1916	1915	1916
Adding machines	[illegible]	[illegible]	[illegible]	[illegible]
Air-compressing machinery	[illegible]	[illegible]	[illegible]	190,042
Brewers' machinery	[illegible]	7,674	[illegible]	28,620
Cash registers	[illegible]	[illegible]	[illegible]	1,314,674
Parts of	[illegible]	[illegible]	[illegible]	[illegible]
Cotton gins	[illegible]	[illegible]	[illegible]	[illegible]
Cream separators	[illegible]	[illegible]	[illegible]	[illegible]
Elevators and elevator machinery	[illegible]	[illegible]	[illegible]	[illegible]
Electric locomotives	[illegible]	[illegible]	[illegible]	[illegible]
Gas engines, stationary	[illegible]	[illegible]	[illegible]	[illegible]
Gasoline engines	[illegible]	1,466,457	[illegible]	9,731,189
Steam engines	413,902	[illegible]	[illegible]	13,26[illegible]
All other engines	68,824	[illegible]	[illegible]	2,788,230
Parts of	[illegible]	[illegible]	[illegible]	[illegible]
Laundry machinery, power	[illegible]	[illegible]	[illegible]	[illegible]
All other	[illegible]	[illegible]	[illegible]	[illegible]
Lawn mowers	[illegible]	[illegible]	[illegible]	[illegible]
Metal-working machinery (including metal-working tools)	3,7[illegible]	[illegible]	[illegible]	[illegible]
Meters, gas and water	[illegible]	[illegible]	[illegible]	[illegible]
Milling machinery, flour and grist	[illegible]	[illegible]	[illegible]	[illegible]
Mining machinery, oil well	[illegible]	[illegible]	[illegible]	[illegible]
All other	[illegible]	[illegible]	[illegible]	[illegible]
Paper-mill machinery	[illegible]	[illegible]	[illegible]	[illegible]
Printing presses	[illegible]	[illegible]	[illegible]	4,22[illegible]
Pumps and pumping machinery	[illegible]	[illegible]	[illegible]	[illegible]
Refrigerating and ice-making machinery	[illegible]	[illegible]	[illegible]	[illegible]
Sewing machines	[illegible]	[illegible]	[illegible]	[illegible]
Shoe machinery	[illegible]	[illegible]	[illegible]	[illegible]
Sugar-mill machinery	[illegible]	[illegible]	[illegible]	[illegible]
Textile machinery	[illegible]	[illegible]	[illegible]	[illegible]
Typesetting machines	12,035	[illegible]	[illegible]	[illegible] 90,138
Typewriting machines	538,451	[illegible]	[illegible]	[illegible]
Windmills	[illegible]	[illegible]	[illegible]	[illegible]
Wood-working machinery, saw mill	[illegible]	[illegible]	[illegible]	1,020,196
All other	[illegible]	[illegible]	[illegible]	[illegible]
All other machinery, and parts of	[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]	[illegible]

sponding period of 1915, which in turn exceeded by an equal percentage any previous eleven months.

GREAT LEAP IN STEEL EXPORTS

The value of all shipments of iron and steel products in May, 1916, was $72,918,913, as compared with $26,536,612 for the same month of 1915; while for the eleven months the total was $545,418,533, as compared with $194,131,255 for the same period of 1915 and $279,377,451 in 1913, the record total for the first eleven months of the fiscal year.

The exports of iron and steel, for which quantities are given, aggregate 540,591 gross tons in May, 1916, as compared with 263,736 tons for the same month of 1915, and 138,565 tons in May, 1914. The record for such exports was made in March, 1916, with a total of 438,150 tons. The total for the eleven months ended May was 4,334,511 gross tons, as compared with 1,650,270 tons for the same period of 1915 and 1,939,300 tons for the eleven months of 1914.

The first table shows the exports of tonnage iron and steel in May and for the eleven months ended May, 1916, as compared with 1915.

METAL-WORKING MACHINERY 50 PER CENT MORE THAN IN APRIL

Exports of machinery in May, 1916, were valued at $21,984,961, as compared with $10,214,062 for the same month of 1915, and $9,780,752 in May, 1914. Shipments of metal-working machinery aggregated no less than $9,935,806, as compared with $3,762,567 for the same month a year ago, and $6,552,397, the high record of April of the present year. Exports of machinery of all kinds for the eleven months ended May, 1916, were valued at $162,135,926, as against $83,596,713 for the corresponding period of 1915.

Details of the exports of machinery for May, 1915 and 1916, and for the two eleven-months' periods are given in the preceding table.

IMPORTS OF IRON AND STEEL

Imports of tonnage iron and steel in May amounted to 32,113 gross tons, as compared with 28,917 tons in the same month of 1915. These imports have risen steadily of late, but are still below the record month's total in the current fiscal year. Imports for the eleven months ended May, 1916, were 362,265 gross tons, as against 218,413 tons for the same period of 1915.

The following table shows the imports of tonnage commodities for May and for the eleven months ended May, 1916, as compared with 1915.

Imports of Iron and Steel in May, 1915 and 1916, and for Eleven-Month Periods

	May		Eleven Months	
	1915 Gross Tons	1916 Gross Tons	1915 Gross Tons	1916 Gross Tons
Ferrosilicon	[illegible]	417	6,222	4,933
All other pig iron	10,816	9,650	93,860	99,358
Scrap	[illegible]	6,407	29,834	92,115
Bar iron	233	909	9,620	86,646	
Structural iron and steel	19	67	[illegible]	1,305
Hoop or band iron	[illegible]	[illegible]	648	470
Ingots, blooms and steel billets	813	[illegible]	22,060	[illegible]
Steel billets without alloys	195	2,624	1,767	11,071
All other steel billets	[illegible]	2,219	[illegible]	10,678
Steel rails	17,434	9,196	38,046	49,233
Sheets and plates	82	151	2,463	1,618
Tin and terne plates	24	39	1,676	712
Wire rods	487	434	4,340	4,126
Total	28,917	32,113	218,413	362,265

Reports received from the leading ports record heavy shipments during June, but while there is no apparent decrease in the output of iron and steel for foreign account, no prediction can be made as to the total exports of the month until the effect of the railroad embargo has been determined.

Mid-year contracts for mill cinder and rolling scale are being closed in eastern Pennsylvania. At the beginning of the year contracts for the ensuing 12 months are usually made unless prices are considered too high by consumers, as was the case last January. The prevailing prices are now about 50c. per ton under what they were six months ago.

Output of Women Workers in British Shops

The restrictive methods of trade unions came in for some attention in the address of the new president of the Iron and Steel Institute of Great Britain, Sir William Beardmore, Parkhead Rolling Mills, Glasgow, Scotland. Early in the war it was found at the Parkhead Forge that the output from the respective machines was not so great as what the machines were designed for, and one of the workers was induced to do his best to obtain the most out of a machine. He very greatly increased his output, notwithstanding his predilection for trade-union restrictions.

When it was found that the demands of the Government for a greatly accelerated production of shells required the employment of girls in the projectile factory owing to the scarcity of skilled workers, these girls in all cases produced more than double that by thoroughly trained mechanics—members of the trade unions—working the same machines under the same conditions.

Three representative cases may be quoted thus: In the turning of the shell body the actual output by girls with the same machines and working under exactly the same conditions and for an equal number of hours was quite double that by trained mechanics. In the boring of shells the output was also quite double, and in the curving, waving and finishing of shell bases quite 120 per cent more than that of experienced mechanics. These conditions applied to war time when the peril of the nation demanded unselfish, patriotic exertion by everyone, and the men who thus limited the output can only be regarded as unworthy of the privileges of citizenship. In peace time the same results, due to restrictive measures, must necessarily handicap severely all manufacturers in their aim to advance the prosperity of the nation by ensuring adequate employment for all.

Annual Meeting of Cramp Company

At the annual meeting on June 29 of the William Cramp Ship & Engine Building Company, Philadelphia, the net profits for the fiscal year ended April 30 were stated to be equal to 17.2 per cent on the capital stock, compared with 10.6 per cent in the previous year. Retiring directors were re-elected, and at a later organization meeting of the board Henry S. Grove was re-elected president. In his annual report President Grove says in part: "We have unfilled contracts which will occupy all our 'building ways' during the present year. Should the orderly progress of our work not be disturbed by labor difficulties or failure in delivery of material, we could accept orders for construction to begin in the spring of 1917."

The Otis Steel Company, Cleveland, Ohio, has completed rebuilding its 72-in. plate mill at its Riverside works into an 84-in. mill. This is a three-high mill with roughing and finishing stands. The change has been made to supply the demand for light plates in wider widths than the company was able to produce on its 72-in. mill.

NEGOTIABLE BILL OF LADING

Congress Will Finally Provide for It—Carriers' Liability Made Definite

WASHINGTON, D. C., July 11, 1916.—After four years of continuous effort, the shipping and banking interests of the country are about to secure at the hands of the present Congress the passage of a bill requiring the use in interstate and foreign commerce of a uniform negotiable bill of lading. This legislation, which will affect annually consignments of merchandise valued at the fabulous sum of $25,000,000,000, was first brought to the attention of Congress early in 1912 by the Commission on Uniform State Laws of the American Bar Association, the leading railroad systems, and the largest shippers' associations of the country. The measure is known as the Pomerene bill, having been strongly championed by the Senator from Ohio, and in a slightly modified form, covering intrastate transactions, has already become the law in Connecticut, Illinois, Iowa, Louisiana, Massachusetts, Maryland, Michigan, New York, Ohio, and Pennsylvania. The House leaders have given assurances that it will become a law at the present session.

Carefully prepared estimates submitted by the American Bankers' Association indicate that more than $5,000,000,000 in cash is annually advanced on bills of lading. Notwithstanding the great importance of these documents as security for large advances, the evidence before the Senate and House committees demonstrates that frauds aggregating many million dollars annually have been perpetrated through the duplication and alteration of bills of lading, through the use as collateral of bills on which the goods have already been delivered to the consignees, and through wholesale forgeries of bills. In many cases, also, bills of lading have been rendered almost valueless for banking and credit purposes by the arbitrary action of carriers in marking them "Shipper's weight, load and count."

The Pomerene bill prohibits carriers from issuing duplicate bills of lading, except in specified instances, and in those cases the two copies are to be identified by being plainly stamped "original" and "duplicate." The alteration of bills of lading by addition or erasure after issue, without authority from the carrier, either in writing or noted on the bill, is declared to be void, and the bill made enforcible according to its original tenor. The use of "spent" bills of lading—i. e., those on which the goods have already been delivered—is penalized by the pending measure, and all carriers are required, when delivering goods, either to indorse plainly upon the bill a statement that the delivery has been made in whole or in part, as the case may be.

To put an end to the wholesale forgeries which the evidence before the Congressional committees shows to have been practised, the bill provides a fine of $5,000 or imprisonment not exceeding five years, or both, for the alteration, forging, counterfeiting, or photographing of any bill of lading with intent to defraud. In order that bills of lading may faithfully represent the merchandise upon which they are issued, the bill provides that "when goods are loaded by a carrier, such carrier shall count the packages of goods, if package freight, and ascertain the kind and quantity, if bulk freight; and such carrier shall not, in such cases, insert in the bill of lading, or in any notice, receipt, contract, rule, regulation, or tariff, 'Shipper's weight, load and count,' or other words of like purport, indicating that the goods were loaded by the shipper and the description thereof made by him." This provision of the bill renders the carrier liable, without evasion, for the goods described in the bill of lading, which is thereby made sound collateral for bank loans.

In addition to correcting the abuses referred to, the Pomerene bill, according to the report of the House Committee, is a "codification of the law and principles now controlling, and which ought to control, interstate and foreign shipments; it defines the right and liabilities of the common carriers, consignors, consignees, and of the immediate owners or holders of bills of lading, and, if adopted, it will serve to make more uniform the commercial law of our country." W. L. C.

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Steel Ingots and Rolled Products in 1915

New High Records in Plates and Sheets, Wire Rods, Bars and Black Plates for Tinning

The American Iron and Steel Institute has just published its statistics of production in 1915 of steel ingots and castings, and of various forms of iron and steel rolled products. The total output of ingots and castings was 32,151,036 gross tons—31,284,212 tons of ingots and 866,824 tons of castings. The total of all forms of finished rolled iron and steel was 24,392,924 tons, including 650,545 tons of forging billets and 562,418 tons of exported billets and sheet bars.

Included in the 23,679,102 tons of basic open-hearth steel ingots and castings produced in 1915 is 1,781,491 tons of duplex steel, metal partly purified in converters against 835,690 tons in 1914.

Wire rods made a remarkable showing (partly from the foreign barb wire demand), the total output being 3,095,907 gross tons, against 2,431,714 tons in 1914 and a previous record of 2,653,553 tons in 1912. Sheets and plates reached a high mark at 6,077,694 tons; black plates for tinning went to 1,093,345 tons; merchant bars to 4,131,242 tons, against a record of 3,957,609 tons in 1913, and concrete bars to 353,408 tons, the previous record being 319,670 tons in 1913. The tables below give interesting details:

PRODUCTION OF STEEL INGOTS AND CASTINGS.

PRODUCTION OF STEEL INGOTS AND CASTINGS BY PROCESSES.

Years	Open-hearth. Basic.	Open-hearth. Acid.	Open-hearth. Total	Bessemer	Crucible.	Electric.	Miscellaneous	Total. Gross tons.
1901	3,618,993	1,037,316	4,656,309	8,713,302	[illegible]		5,471	13,473,595
1902	4,496,533	1,191,196	5,687,729	9,138,363	112,772	.	[illegible]	14,947,250
1903	4,734,913	1,094,998	5,829,911	8,592,829	102,434	.	9,804	14,534,978
1904	5,106,367	801,799	5,908,166	7,859,140	[illegible]	.	9,190	13,859,887
1905	7,815,728	1,155,648	8,971,376	10,941,375	102,233	.	8,963	20,023,947
1906	9,658,760	1,321,653	10,980,413	12,275,830	127,513		14,380	23,398,136
1907	10,279,315	1,270,421	11,549,736	11,667,549	131,234		14,075	23,362,594
1908	7,140,425	696,304	7,836,729	6,116,755	63,631		6,132	14,023,247
1909	13,417,472	1,076,464	14,493,936	9,330,783	107,355	13,762	9,185	23,955,021
1910	15,292,329	1,212,480	16,504,509	9,412,772	122,303	52,141	3,194	26,094,919
1911	14,[illegible]	912,718	15,[illegible]	7,947,854	97,653	29,105	2,844	23,676,106
1912	19,641,502	1,139,221	20,780,723	10,327,901	121,517	18,309	2,853	31,251,303
1913	[illegible]	1,255,305	21,599,931	9,545,700	121,226	30,180	3,831	31,300,874
1914	16,271,129	[illegible]	17,174,984	6,220,846	89,869	24,000	3,032	23,513,030
1915	22,308,715	1,370,377	23,679,102	8,287,213	113,782	69,412	1,527	32,151,036

PRODUCTION OF STEEL INGOTS.

1901	3,524,072	830,635	4,[illegible]	8,706,538	[illegible]		214	13,156,025
1902	4,384,129	935,721	5,[illegible]	9,125,815	[illegible]	.	[illegible]	14,556,315
1903	4,800,034	829,529	5,429,563	[illegible]	[illegible]		3,395	14,104,713
1904	5,007,448	597,884	5,605,332	[illegible]	[illegible]		2,172	13,529,676
1905	7,600,569	835,267	8,444,836	10,919,272	[illegible]		2,572	19,463,180
1906	9,345,212	915,310	[illegible]	12,243,229	[illegible]		3,510	22,624,431
1907	9,912,839	[illegible]	10,803,211	11,634,276	[illegible]		[illegible]	22,559,477
1908	[illegible]	539,532	7,524,952	[illegible]	[illegible]		[illegible]	13,677,027
1909	13,111,467	781,429	13,892,896	9,296,969	94,672	13,456	786	23,298,779
1910	14,[illegible]	[illegible]	15,641,158	9,354,437	[illegible]	[illegible]		25,154,087
1911	14,419,306	[illegible]	15,027,459	7,890,753	[illegible]	[illegible]	417	23,029,479
1912	19,197,504	712,371	[illegible]	10,259,151	100,967	14,147	542	30,284,682
1913	[illegible]	805,250	20,689,715	9,465,200	103,655	20,973	[illegible]	30,280,130
1914	15,936,985	[illegible]	16,570,367	6,154,964	78,693	15,458	312	22,819,784
1915	21,975,622	[illegible]	[illegible]	8,194,737	99,026	46,348	331	31,284,212

PRODUCTION OF STEEL CASTINGS.

1901	94,941	206,681	301,622	6,764	3,927	.	5,257	317,570
1902	112,404	255,475	367,879	[illegible]	4,955	. .	5,553	390,935
1903	134,879	265,469	[illegible]	18,099	5,409	. . . .	6,409	430,265
1904	98,919	[illegible]	302,834	16,051	[illegible]		7,018	330,211
1905	206,159	320,381	[illegible]	22,103	[illegible]		6,391	560,767
1906	313,548	406,343	719,891	32,601	10,343	. . .	[illegible]	773,705
1907	366,476	380,049	746,525	33,273	10,233	. .	13,086	803,117
1908	155,005	156,772	311,777	20,559	8,271	.	5,613	346,220
1909	306,005	295,035	601,040	33,814	[illegible]	[illegible]	8,399	[illegible]
1910	433,976	429,375	[illegible]	[illegible]	14,632	1,320	3,194	[illegible]
1911	266,626	304,565	571,191	57,101	14,030	1,878	2,427	646,627
1912	443,998	426,850	[illegible]	68,750	20,550	4,162	2,311	966,621
1913	460,161	450,055	910,216	[illegible]	17,571	9,207	3,244	1,020,744
1914	334,144	270,173	604,317	65,882	11,186	8,551	3,310	693,246
1915	333,103	[illegible]	735,332	[illegible]	14,756	23,064	1,196	866,824

ALLOY STEEL INGOTS AND CASTINGS.

PRODUCTION OF ALLOY STEEL INGOTS AND CASTINGS.

Years	Ingots	Castings	Total	Years	Ingots	Castings	Total
1909	158,978	23,002	181,980	1913	625,430	88,927	714,357
1910	538,462	29,357	567,819	1914	577,107	69,846	[illegible]
1911	425,169	56,290	481,459	1915	923,251	97,896	1,021,147
1912	689,392	103,109	792,501				

APPROXIMATE PRODUCTION OF ALLOY STEEL INGOTS AND CASTINGS, BY PROCESSES, GROSS TONS, 1915.

Processes	Ingots.	Castings.	Total.
Open-hearth steel—basic	641,995	1,796	643,791
Open-hearth steel—acid	196,090	71,263	267,353
Bessemer steel	17,211	23,900	41,111
Crucible steel	40,107	841	40,948
Electric steel	27,848	96	27,944
Total	923,251	97,896	1,021,147

In 1915, 134 works in 20 States and the District of Columbia made steel ingots, against 123 works in 17 States and the District of Columbia in 1914.

In 1915, 218 works in 27 States, the District of Columbia, and the Canal Zone, Panama, made steel castings, against 216 works in 1914.

ROLLED IRON AND STEEL.

In 1915, the production of all kinds of iron and steel rolled into finished forms (including blooms, billets, and axle blanks rolled for forging purposes and semi-finished products which were rolled for export in that year) shows an increase of 6,022,728 tons, or 32.8 per cent., as compared with the output in 1914.

TOTAL PRODUCTION OF ALL KINDS OF FINISHED ROLLED IRON AND STEEL, 1887–1915.

Years	Iron and steel rails	Plates and sheets	Nail plate	Wire rods.	Structural shapes.	All other finished rolled products	Total. Gross tons
1887	2,139,640	603,355	308,432	.	.	2,184,279	5,235,706
1888	1,403,700	609,827	289,891	279,769		2,034,162	4,617,349
1889	1,522,204	716,496	259,409	363,851	.	[illegible]	[illegible]
1890	1,885,307	809,981	251,828	457,099	.	2,618,660	6,022,875
1891	1,307,176	678,927	223,312	536,607		2,644,941	5,390,963
1892	1,551,844	751,460	201,242	627,829	453,957	2,579,482	6,165,814
1893	1,136,458	674,345	136,113	537,272	387,307	2,104,190	4,975,685
1894	1,021,772	682,900	108,262	673,402	360,305	1,795,570	4,642,211
1895	1,306,135	991,459	95,085	791,130	517,920	2,487,845	6,189,574
1896	1,122,010	965,776	72,137	623,986	495,571	2,236,361	5,515,841
1897	1,647,892	1,207,286	94,054	970,736	583,790	2,497,970	7,001,728
1898	1,981,241	1,448,301	70,188	1,071,683	702,197	3,239,760	8,513,370
1899	2,272,700	1,903,505	85,015	1,036,398	[illegible]	4,146,425	10,294,419
1900	2,385,682	1,794,528	70,245	846,291	815,161	3,575,536	9,487,443
1901	2,874,639	2,254,425	68,850	1,365,934	1,013,150	4,772,329	12,349,327
1902	2,947,933	2,665,409	72,936	1,574,293	1,300,326	5,383,219	13,944,116
1903	2,992,477	2,599,665	64,102	1,503,455	1,095,813	4,952,185	13,207,697
1904	2,284,711	2,421,[illegible]	61,601	1,699,028	949,146	[illegible]	12,013,381
1905	3,375,929	3,532,230	64,542	1,808,688	1,660,519	6,398,107	16,840,015
1906	3,977,887	4,182,156	54,211	1,871,614	2,118,772	[illegible]	19,588,468
1907	3,633,654	4,248,832	52,027	2,017,583	1,940,352	7,972,374	19,864,822
1908	1,921,015	2,649,693	45,747	1,816,949	1,083,181	4,311,608	11,828,193
1909	3,023,845	4,234,346	63,746	2,335,685	2,275,562	7,711,506	19,644,690
1910	3,636,031	4,955,484	45,294	2,241,830	2,266,890	[illegible]	21,621,279
1911	2,822,790	4,488,049	48,522	2,450,453	1,912,367	7,316,990	19,039,171
1912	3,327,915	5,875,080	45,331	2,653,553	2,846,487	9,908,475	24,656,841
1913	3,502,780	5,751,037	[illegible]	2,431,714	3,004,972	10,030,144	24,791,243
1914	1,945,095	4,719,246	38,573	2,431,714	2,031,124	[illegible]	18,370,196
1915	[illegible]	6,077,694	[illegible]	3,095,907	2,437,003	[illegible]	[illegible]

PRODUCTION OF PLATES AND SHEETS

PRODUCTION OF IRON AND STEEL PLATES AND SHEETS, 1888-1915.

Years	Gross tons.	Years	Gross tons.	Years	Gross tons.
1888	609,827	1898	1,347,301	1908	2,948,004
1889	716,496	1899	1,903,[illegible]	1909	4,234,346
1890	809,981	1900	1,764,528	1910	4,719,246
1891	678,927	1901	2,244,830	1911	4,355,[illegible]
1892	751,400	1902	2,665,409	1912	5,151,[illegible]
1893	674,345	1903	2,599,[illegible]	1913	5,751,037
1894	1,252,000	1904	2,431,398	1914	4,719,246
1895	991,459	1905	3,532,230	1915	6,077,694
1896	.965,776	1906	4,182,156		
1897	1,207,286	1907	4,[illegible]		

PRODUCTION OF PLATES AND SHEETS BY SIZE AND MODE OF MANUFACTURE, GROSS TONS, 1915.

Kinds of products	Iron.	Steel.	Total.
Universal plates, inc. flats over 6 in. wid:			
¼ of an inch and over in thickness	1,525	903,501	905,026
Under ¼ of an inch thick	..	49,826	49,826
Total universal plates	1,525	953,327	954,852
Sheared plates:			
¼ of an inch and over in thickness	562	1,458,860	1,459,422
Under ¼ of an inch thick	200	463,577	463,777
Total sheared plates	762	1,922,437	1,923,199
Black sheets, made on either sheet or job mills:			
No. 12 gauge and thicker	1,152	159,057	160,209
No. 13 gauge and thinner	14,776	1,661,801	1,676,577
Total black sheets	15,928	1,820,858	1,836,786
Black plates rolled on tin mills:			
Black plates for tinning	2,038	1,091,307	1,093,345
Other black plate specialties		269,512	269,512
Total black plates rolled on tin mills	2,038	1,360,819	1,362,857
Grand total of plates and sheets	20,253	6,057,441	6,077,694

In 1915, 32 works made black plates for tinning.

PRODUCTION OF WIRE RODS.

PRODUCTION OF WIRE RODS, GROSS TONS, 1888-1915.

Years.	Tons.	Years	Tons.	Years	Tons.	Years.	Tons
1888	279,769	1895	791,130	1902	1,[illegible]	1909	[illegible]
1889	363,851	1896	62[illegible]	1903	1,503,455	1910	2,241,830
1890	457,099	1897	970,736	1904	1,699,028	1911	2,450,453
1891	536,607	1898	1,071,[illegible]	1905	1,808,688	1912	2,653,553
1892	627,829	1899	1,036,398	1906	1,871,614	1913	2,[illegible]
1893	537,272	1900	846,291	1907	2,017,583	1914	2,431,714
1894	673,402	1901	1,365,934	1908	1,8[illegible]	1915	3,095,907

Small quantities of copper-clad steel wire rods are included in the totals for recent years. It was necessary to estimate the output of one wire-rod plant in 1915.

PRODUCTION OF STRUCTURAL SHAPES.

PRODUCTION OF STRUCTURAL SHAPES, GROSS TONS, 1892-1915.

Years.	Tons.	Years.	Tons.	Years.	Tons.
1892	453,957	1900	815,161	1908	1,083,181
1893	387,307	1901	1,013,150	1909	2,275,562
1894	360,305	1902	1,300,326	1910	2,266,890
1895	517,920	1903	1,095,813	1911	1,912,367
1896	495,571	1904	949,146	1912	2,846,487
1897	583,790	1905	1,660,519	1913	3,004,972
1898	702,197	1906	2,118,772	1914	2,031,124
1899	850,376	1907	1,940,352	1915	2,437,003

PRODUCTION OF HEAVY AND LIGHT STRUCTURAL SHAPES, GROSS TONS, 1912-1915.

Years	Heavy shapes	Light shapes	Total.
1912	2,470,415	376,072	2,846,487
1913	2,553,806	451,166	3,004,972
1914	1,787,281	243,843	2,031,124
1915	2,031,407	405,596	2,437,003

PRODUCTION OF MERCHANT BARS

PRODUCTION OF MERCHANT BARS, INCLUDING IRON AND STEEL [illegible] AND BAR IRON, 1905-1915.

Years.	Iron.	Steel.	Total	Years	Iron.	Steel.	Total
[illegible]	[illegible]	[illegible]	[illegible]	1912	[illegible]	[illegible]	3,047,362
1906	[illegible]	[illegible]	[illegible]	1913	[illegible]	[illegible]	[illegible]
1907	[illegible]	[illegible]	[illegible]	1914	[illegible]	[illegible]	[illegible]
1908	[illegible]	[illegible]	[illegible]	1915	[illegible]	[illegible]	[illegible]
1909	[illegible]	[illegible]	[illegible]				
1910	[illegible]	[illegible]	[illegible]				

PRODUCTION OF CONCRETE BARS

PRODUCTION OF CONCRETE BARS, SHOWING IRON AND STEEL CONCRETE BARS SEPARATELY, GROSS TONS, 1909-1915.

Years	Iron.	Steel.	Total.	Years.	Iron.	Steel.	Total
1909	[illegible]	159,352	159,352	1913.	113	319,557	319,670
1910	4,645	236,464	241,109	1914.	[illegible]	288,471	288,471
1911	2,388	256,353	258,741	1915.	[illegible]	353,408	353,408
1912	2,500	271,832	274,332				

Statistics are not available prior to 1909.

PRODUCTION OF SKELP

PRODUCTION OF SKELP, SHOWING IRON AND STEEL SKELP SEPARATELY, GROSS TONS, 1905-1915.

Years.	Iron.	Steel.	Total	Years	Iron.	Steel.	Total
1905	452,797	983,198	1,435,995	1911	322,397	1,658,276	1,980,673
1906	391,517	1,137,068	[illegible]	1912	327,012	2,119,804	2,446,816
1907	444,536	1,[illegible]	1,[illegible]	1913	312,746	[illegible]	501,964
1908	297,049	853,534	1,150,583	1914	[illegible]	1,718,091	[illegible]
1909	370,151	[illegible]	[illegible]	1915	262,198	2,037,[illegible]	[illegible]
1910	350,578	1,477,[illegible]	1,828,194				

In 1915, 45 plants in 5 States rolled iron or steel skelp, as compared with 46 works in 6 States in 1914.

PRODUCTION OF MISCELLANEOUS ROLLED PRODUCTS.

PRODUCTION OF MISCELLANEOUS ROLLED IRON AND STEEL PRODUCTS, GROSS TONS, 1915.

Miscellaneous rolled products	Iron	Steel	Total
Hoops	300	[illegible]	[illegible]
Bands and [illegible]	200	[illegible]	437,987
Long angle splice bars, fish-plate bars, tie-plate bars, and other rail joint shapes	54,678	[illegible]	[illegible]
Rolled sheet piling, not including fabricated		24,026	24,026
Railroad ties		[illegible]	42,269
Rolled forging blooms, forging billets, etc	570	649,975	650,545
Blooms, billets, sheet bars, etc., for export	1,231	[illegible]	562,418
Spike and chain rods, bolt and nut rods, horseshoe bars, strips, etc	[illegible]	938,237	1,227,455
Total	346,197	3,415,877	3,762,074

PRODUCTION OF FINISHED ROLLED IRON AND STEEL BY LEADING PRODUCTS, GROSS TONS, 1915.

Products.	Iron	Steel.	Total
Rails		2,204,203	2,204,203
Plates and sheets	20,253	6,057,441	6,077,694
Nail and spike plate	4,984	26,945	31,929
Wire rods	2,236	[illegible]	3,095,907
Structural shapes	1,858	2,435,145	2,437,003
Merchant bars	657,107	3,474,135	4,131,242
Bars for reinforced concrete work		353,408	353,408
Skelp, flue and pipe iron and steel	262,198	2,037,266	2,299,464
Long angle splice bars, fish-plate bars, etc	54,678	480,937	535,615
Hoops	300	281,459	281,759
Bands and [illegible]	200	437,787	437,987
Rolled sheet piling, not including fabricated		24,026	24,026
Railroad ties		42,269	42,269
Rolled forging blooms, forging billets, etc	570	649,975	650,545
Exports of blooms, billets, sheet bars, etc	1,231	561,187	562,418
[illegible]	289,218	938,237	1,227,455
[illegible]	[illegible]	[illegible]	24,392,924

Iron and Steel Markets

AGRICULTURAL BARS AT 2.35c

Foreign Steel Demand Is Still Heavy

Large Orders for Rails and Barb Wire—Allies Want 100,000 Tons More of the Latter

New foreign buying both for war and peace uses continues to be the mainstay of the steel market. In only one direction has domestic demand made itself felt in the past week; that was in the placing of orders for the first half of 1917 by a portion of the agricultural implement manufacturers. Of this business the Steel Corporation took 80,000 tons at 2.35c., Pittsburgh, for bars and 2.60c. for small shapes. For bars this is .15c. below what most mills have held out for on such contracts.

The buying of the Allied countries is heavy and promises to be so for months. Russia's tonnages are spectacular. Her much announced rail orders as now rounded up represent fully 365,000 tons and more rails are wanted. In fact, the question is how much our mills can guarantee to deliver by the middle of 1917. Lackawanna, Cambria and Bethlehem mills share these orders with the Steel Corporation. The French Government asks for 20,000 tons additional rails. Great Britain, after putting 50,000 tons on the Steel Corporation's books in the past three months, still seeks more, and with Canadian mills trying to buy rail blooms on this side it is a question how much they can take of the 30,000-ton inquiry that has just come from the Canadian Pacific. The Russian rails were high-priced, but the $52 widely published includes spikes and splice bars.

The other striking feature in export trade is 165,000 tons of barb wire for Russia, just closed by the Steel Corporation. This has long hung over the market. The Allies are still trying to place 100,000 tons of barb wire, in addition to a round lot wanted for Italy.

In exports apart from war is an inquiry for 30,000 tons of small bars. Indicating that the shell-steel orders have not given out, Pittsburgh was asked Wednesday to take on 70,000 tons of rounds for Great Britain, but mills there cannot make the deliveries wanted. Canadian buyers are in the market for shell forgings for the second quarter of 1917.

Indications are that the July output of the mills will fall below the June rate, as the 4th of July shut-down stretched out to 48 hours in some cases, and hot weather is now cutting down production. These factors are offsetting some of the new steel capacity scheduled to come in from time to time.

Prices have had little testing apart from the agricultural bar trade. In Bessemer billets there have been sales at $40, Pittsburgh, including one of 9000 tons, indicating some easing up, though for open-hearth $42 is paid. Third quarter Bessemer bars have sold at 2.50c., and there is some structural steel to be had at close to that figure. On plain wire the leading producer has advanced its price from $2.45 to $2.65, or $4 a ton, but other sellers have not followed as yet.

The plate market, after some irregularity lately, is tightening, and 3.5c. and 4c. sales are common. Three vessels just placed with Pacific Coast yards will require 10,000 tons. In the Eastern market inquiry for 25,000 to 30,000 tons has come out. There is some sounding of plate mills here by British interests in view of their government's willingness to permit some collier and refrigerator boat construction.

An export order out of the beaten track is for 7000 tons of line pipe for Borneo. At home Oklahoma oil interests have closed for 200 miles of 8-in. pipe, deliveries to start in August, and in another case 40 miles of 12-in. pipe has been taken.

In special steel work, inquiry for 5000 tons of nickel steel from automobile manufacturers and the sale of two 1000-ton lots of electric steel billets for export are of interest.

No little comment has been made on the offering of 300,000 boxes of tin plate by Pittsburgh dealers. It is understood that an Ohio mill, inactive for some time, will produce this material; it may also roll sheets.

A Cleveland furnace interest has sold 20,000 tons of Bessemer iron to Italy, for shipment in the third quarter, at $21.50. Two or three furnaces are being put on Bessemer iron, and more would follow but in view of the Mesaba situation ore dealers are chary of undertaking new contracts to deliver Bessemer grades.

Pittsburgh

PITTSBURGH, PA., July 11, 1916.

July is likely to show a large falling off in output of nearly all kinds of iron and steel products, as compared with June. July came in on Saturday, a short day; Sunday there was no output; Monday, many plants operated short handed, and Tuesday was a holiday. Thus in the first four days of the month output was at a low ebb. In addition, the hot weather is keeping down output, and this will offset to a large extent the falling off in new orders. The local market is stronger to-day than it was a month ago, and in Bessemer and open-hearth steel there is a heavy export demand. In some lines there is seasonable dullness, notably in wire products, for which new demand is quiet and specifications against contracts not very active. Pig iron is in better demand, and some export inquiry has come up lately for foundry iron. Bessemer and open-hearth billets have sold at $40 to $45, with the supply of the latter still short. Plates continue to be very active, with prices ruling strong. The low prices on spelter are likely to result before long in a lower market on galvanized products, particularly in wire and pipe. The scrap market has quieted down again, following the recent heavy purchases here and in Chicago of the Carnegie Steel Company. The hot weather is pulling down output of coke, and prompt furnace coke is scarce, readily bringing $2.75 per net ton at oven, or higher There is a strong belief that a buying movement in steel will develop late in August or early in September, as many consumers have not covered their needs for last quarter. The only change in prices during the week

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

	July 14, 1916.	June 14, 1916.	July 5, 1916.	July 12, 1915.
Pig Iron. Per Gross Ton:				
No. 2 X, Philadelphia				
No. 2, Valley furnace	18.25			
No. 2, Southern, Cin'ti	16.90			
No. 2, Birmingham, Ala				
No. 2, furnace, Chicago*				
Basic, del'd, eastern Pa				
Basic, Valley furnace				
Bessemer, Pittsburgh				
Malleable Bess., Chic'go*				13.00
Gray forge, Pittsburgh	18.70			
L. S. charcoal, Chicago				
Billets, etc., Per Gross Ton:				
Bess. billets, Pittsburgh				21.00
O.-h. billets, Pittsburgh				
O-h. sheet bars, P'gh				
Forging billets, base, P'gh	69.00			
O.-h. billets, Phila				
Wire rods, Pittsburgh	55.00		55.00	
Finished Iron and Steel, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill				
O.-h. rails, heavy, at mill				
Iron bars, Philadelphia				
Iron bars, Pittsburgh				
Iron bars, Chicago	2.35	2.35	2.35	1.20
Steel bars, Pittsburgh	2.75	2.75	2.75	1.25
Steel bars, New York				
Tank plates, Pittsburgh	3.50			
Tank plates, New York	3.669			
Beams, etc., Pittsburgh	2.50	2.50	2.50	1.25
Beams, etc., New York				
Skelp, grooved steel, P'gh				
Skelp, sheared steel, P'gh	2.45	2.45	2.45	1.25
Steel hoops, Pittsburgh	2.75	2.75	2.75	1.30

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

	July 12, 1916.	July 5, 1916.	June 14, 1916.	July 14, 1915.
Sheets, Nails and Wire.				Cents.
Cut nails, Pittsburgh				
				2.50
Old Material,				
	18.50			
				15.00
	12.00			11.00
	16.50			
	15.00			
				12.25
elphia	16.00		16.50	12.25
				9.25
Coke, Connellsville, Per Net Ton at Oven				
Furnace coke, prompt	$2.7		$2.40	$1.60
			2.50	1.75
Foundry coke, prompt	3.2			2.00
Foundry coke, future	3.50	3.50		2.25
Metals.				
Per Lb. to Large Buyers	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	26.00	27.00	28.00	22.00
Electrolytic copper, N. Y.				19.50
Spelter, St. L			13.25	21.75
Spelter, New York			13.50	22.00
Lead, St. Louis	6.25	6.65	6.70	5.50
Lead, New York			6.85	5.65
Tin, New York			43.25	
Antimony, Asiatic, N. Y.	15.50	16.00	20.00	36.00
Tin plate, 100-lb. box, P'gh.	$6.00	$6.00	$5.75	$3.10

was an advance of $4 a ton on plain annealed wire, made by the American Steel & Wire Company to manufacturers, effective July 8.

Pig Iron.—W. P. Snyder & Company report the average price of Bessemer iron in June to have been $21, and of basic, $18, at valley furnace. These were the figures quoted in this report all of last month. There is still a heavy export inquiry for Bessemer iron, and a sale of 10,000 tons for export to Italy is reported at $21, valley furnace, but it is not believed the iron will come from the valleys. On 2500 tons, also for export to Italy, but for prompt shipment, the boat being in New York waiting for it, $21.50 at valley furnace was paid. Some export inquiry has come up for foundry iron, but so far this amounts only to 3000 to 4000 tons. The Colonial Steel Company of this city bought only 3000 tons of basic on its inquiry for 10,000 tons, the business being taken by a local dealer at $18 at valley furnace. The United Steel Company at Canton, Ohio, bought 15,000 tons of basic, equal deliveries August, September and October, from a Mahoning Valley furnace that has a low rate of freight to Canton, at $18 at furnace. It is believed the low prices ruling on heavy steel scrap are keeping down prices of basic iron, which show no sign of advancing, although the available supply for the open market is limited. An inquiry is in the market for about 10,000 tons of Bessemer iron, silicon running 1.50 to 2.50 per cent, and we note a sale of 5000 tons of standard Bessemer at $21, valley furnace, for shipment to Midland, Pa., for ingot molds. We quote Bessemer iron at $21; basic, $18; gray forge, $17.75 to $18; malleable Bessemer, $18.50 to $19, and No. 2 foundry, $18.25 to $18.50, all at valley furnace, the freight rate to the Pittsburgh and Cleveland districts being 95c. per gross ton.

Ferroalloys.—Consumers of ferromanganese seem to be well covered for the near future, at least, and there is little new inquiry. Foreign 80 per cent is still held $175, seaboard, for 1917 delivery, but with no guarantee as to shipments. Domestic 80 per cent, with the supply getting larger, is quoted at $175 to $200 for delivery this year or into next year. There is still a scarcity in supply of prompt ferromanganese, and it is quoted at $200 to $225 in carload lots, probably with no trouble in buying at the lower figure. Spiegeleisen seems to be easier. We quote 18 to 22 per cent at $45 to $50, and 25 to 30 per cent at $60 to $70 at furnace. We quote 50 per cent ferrosilicon at $85 for lots up to 100 tons; over 100 tons and up to 600 tons, $84, and over 600 tons, $83, all per gross ton, f.o.b. Pittsburgh. Prices of Bessemer ferrosilicon for delivery over remainder of the year are now quoted as follows: 9 per cent, $32; 10 per cent, $33; 11 per cent, $34; 12 per cent, $35; 13 per cent, $36.50; 14 per cent, $38.50; 15 per cent, $40.50, and 16 per cent, $43. Seven per cent silvery for the same delivery is $28.50; 8 per cent, $29; 9 per cent, $29.50; 10 per cent, $30; 11 per cent, $31, and 12 per cent, $32. These prices are f.o.b. at furnace, Jackson or New Straitsville, Ohio, or Ashland, Ky., all having a freight rate of $2 per gross ton to Pittsburgh.

Billets and Sheet Bars.—There is a continued heavy export demand for soft Bessemer or open-hearth billets or sheet bars, but not much business is being closed up, as the supply is very limited. Two or three makers of billets and sheet bars that lately had some steel to spare for the open market, now say they are out of it and have no more steel to sell. We note a sale of 9000 tons of Bessemer billets at $40. There would be little trouble in getting $42, f.o.b. Pittsburgh, for open-hearth billets or sheet bars; the chief trouble would be to find the steel. Occasionally a consumer who has a contract for steel, and has to specify for certain shipments in a definite period, offers some billets and sheet bars at $40 or slightly less, but this steel is very quickly taken up. A sale of 500 tons of 4x4-in. open-hearth billets was made lately to a dealer at $41, and the dealer sold the steel at $42.50 to a consumer. A leading interest has adjusted its contracts for sheet bars for third quarter delivery at very close to $40 at maker's mill. We quote soft open-hearth billets and sheet bars at $42 to $45; Bessemer billets, $40 to $42, and Bessemer sheet bars, $40 to $42, maker's mill, Pittsburgh or Youngstown district. We quote forging billets at $69 for sizes up to but not including 10x10-in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take $1 extra.

Plates.—The situation in plates seems to be tightening up, and prompt plates are harder to obtain to-day than a month ago. One mill reports that it is getting 4c. per lb. for sheared plates for delivery in three to four months, and another mill is getting 3.50c. or higher

for slightly quicker delivery. New inquiries for steel cars are light. The Pressed Steel Car Company has taken an order for 60 steel ore cars, and the Baltimore & Ohio is reported in the market for 1000 steel cars. We quote sheared plates, ¼-in. and heavier, for delivery in six weeks to three months at 3.50c. to 4c., while the mill price remains at 2.75c., but probably not for delivery before first quarter or first half of 1917. Two leading mills have their entire output of plates practically sold up for remainder of this year, with considerable sales for first half of next year.

Structural Material.—New inquiry has been fairly heavy. The McClintic-Marshall Company has taken 9000 tons for a terminal building for the Northern Ohio Traction & Light Company, Akron, Ohio, 1600 tons for an extension to buildings of the Toledo Glass Company at Glassboro, N. J., and 1200 tons for plant extensions for the same company at Clarksburg, W. Va. The Blaw Structural Steel Company has aken 650 tons for an extension to the Ludlum Steel Company plant at Water Belt, N. Y.; the Cambria Steel Company 300 tons for the Worth Bros. Company plant at Coatesville, Pa., and the American Bridge Company about 3000 tons of bridge work for the Pennsylvania Railroad, 300 tons of bridge work for the Florida East Coast Railroad and 600 tons for a subway station for the Pennsylvania Railroad. The Jones & Laughlin Steel Company will furnish 100 tons for an addition to a foundry at Cortland, N. Y. We quote beams and channels up to 15 in. at 2.50c. to 2.75c. at mill for delivery in third and fourth quarters, while small lots from stock are held at 3.25c. up to 4c., prices depending entirely on the size of the order and how soon deliveries are wanted.

Steel Rails.—One of the Canadian roads is reported in the market for 25,000 tons of standard sections, but it is said the best delivery one interest could offer was third quarter of 1917. There is not much new demand. nearly all the railroads being covered on their needs of rails for next year. The Carnegie Steel Company is sold up on both standard sections and light rails to about Oct. 1, 1917. The new demand for light rails is only fair, and it is said a good deal of the business being placed is going to the rerolling rail mills, which have been naming lower prices for rerolled rails than are being quoted on new light rails. We quote 25 to 45-lb. sections at $47; 16 and 20-lb., $48; 12 and 14-lb., $49, and 8 and 10-lb., $50 in carload lots, f.o.b. at mill, the usual extras being charged for less than carload lots. We quote standard section rails of Bessemer stock at 1.47½c. and of open-hearth, 1.56½c., Pittsburgh.

Sheets.—There is an insistent heavy demand for electrical sheets, much beyond the capacity of the mills to supply. This is also largely true of blue annealed, but for light black and galvanized sheets new demand is quiet, prices on galvanized being weak, due to the recent heavy decline in spelter. Some mills that made contracts with their customers for galvanized sheets at around 5c. when spelter was 18c. to 20c. per lb. are insisting that these sheets be taken out. Deliveries of Bessemer and open-hearth sheet bars by the mills are better than for a long time. We quote blue annealed sheets, Nos. 9 and 10, at 3c. to 3.25c., for delivery at convenience of the mill, which would be late this year. We quote No. 28 Bessemer and open-hearth black sheets at 2.90c. to 3c.; No. 28 galvanized, Bessemer and open-hearth, 4.50c. to 4.60c.; Nos. 22 and 24 black plate, tin mill sizes, H. R. & A., 2.90c.; Nos. 25, 26 and 27, 3c. to 3.10c.; No 28, 3.10c. to 3.15c., and No. 29, 3.20c. to 3.25c. These prices are for carloads and larger lots, f.o.b. mill, Pittsburgh.

Tin Plate.—Some comment is being caused in the trade by the offering by a second-hand machinery concern of 300,000 boxes of terne plate, the question being whether this plate is already made up, or whether it is still to be made by some mill that has been idle for a good while. Domestic demand for tin plate is fairly heavy, some consumers wanting fairly large lots for delivery in the last quarter of this year. The export demand is only fairly active, nearly all the domestic mills having their output sold up for this year and not being able to quote on foreign inquiries. We quote wasters from stock at $5.75 and primes at $6 for the domestic trade, while for export $6.25 to $6.50 per base box at mill is quoted. We quote 8-lb. coated ternes at $8.50 to $8.75 for 200 lb. and $8.75 to $9 for 214 lb., all f.o.b. at maker's mill.

Skelp.—There is not much new inquiry, but the mills are well sold up over remainder of this year and prices are very firm. We quote grooved steel skelp at 2.35c. to 2.40c.; sheared steel skelp, 2.45c. to 2.50c.; grooved iron skelp, 2.70c. to 2.80c., and sheared iron skelp, 3c. to 3.10c., all delivered to consumers' mills in the Pittsburgh district.

Cold-Rolled Strip Steel.—Contract inquiry for remainder of this year has quieted down, nearly all consumers being covered, but there is a fair inquiry for small lots for shipment within the next two or three months. A contract for 350 tons has been made at $6 per 100 lb. for delivery over remainder of this year. On small lots for shipment in two to three months, the mills quote from $6.50 to $7, or higher, per 100 lb. On contracts we quote cold-rolled strip steel at $6 per 100 lb., base, and on small lots for fairly prompt delivery, from $6.50 to $7. Extras, standard with all the mills, were printed on page 810 of THE IRON AGE of March 30.

Railroad Spikes.—No new inquiry has come out lately, and the local spike market is very quiet. Specifications from railroads are not coming in very freely, and some makers of spikes who find they have not enough orders to run their spike mills full are diverting the steel to other products. Regular prices, but which have been shaded some recently, are as follows:

Standard railroad spikes, 4½ x ⅝ 16 in. and larger, $2.65 to $2.75; railroad spikes, ½ and 7/16 in., $2.75 base; railroad spikes, ⅜ x ⅝ and ⅜ 16 in., $3.05 base; boat spikes, $2.80 base, all per 100 lb., f.o.b. Pittsburgh.

Nuts and Bolts.—The domestic demand is only fair, but for export is quite heavy, and some contracts for shipment to the other side have lately been placed with local makers. Consumers are well covered for remainder of this year, and makers are sold up for the same period. Discounts in effect from May 19, which the makers state are for prompt acceptance only, are as follows, delivered in lots of 300 lb. or more where the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days:

Carriage bolts, small, rolled thread, 50 and 10 per cent; small, cut thread, 50; large, 40.

Machine bolts, h. p. nuts, small, rolled thread, 50, 10 and 5 per cent; small, cut thread, 50 and 5; large, 40 and 10.

Machine bolts, c. p. c. and t. nuts, small, 40, 10 and 5 per cent; large, 35 and 5. Blank bolts, 40 and 10 per cent; bolt ends with h. p. nuts, 40 and 10; with c. p. nuts, 35 and 5. Rough stud bolts 15. Lag screws (cone or gimlet point), 50 and 10.

Forged set screws and tap bolts, 10 per cent. Cut and round point set screws, case hardened, 60. Square and hexagon head cap screws, 55. Flat, button, round or fillister head cap screws, 30.

Nuts, h. p. sq., tapped or blank, $2.90 off list; hex., $2.90 off; c. p. c. and t. sq. tapped or blank, $2.60 off; hex., $3 off; semi-finished hex., 60 and 10 per cent; finished and case hardened, 60 and 10.

Rivets, 7/16 in. in diameter and smaller, 45, 10 and 10 per cent.

Wire Rods.—New demand for wire rods has been heavier in the past two or three weeks, and with the available supply very limited, prices are higher. We note a recent sale of 2000 tons of soft rods, either Bessemer or open-hearth at option of the mill, for delivery over third quarter at $55 at mill, and this is now said to be minimum of the market. We, therefore, quote soft Bessemer, open-hearth and chain rods at $55 to $60 per ton, f.o.b. Pittsburgh.

Wire Products.—Effective Saturday, July 8, the American Steel & Wire Company advanced prices on plain annealed wire for delivery to manufacturers in last quarter of the year $4 per ton, or from $2.45 to $2.65 per 100 lb. No change was made in prices of wire nails or in galvanized wire products. The heavy declines in prices of spelter lead some in the trade to believe that prices on galvanized wire products may be lowered in the near future, but nothing official has appeared on this. The new demand for wire nails and

wire is quiet, the usual summer dullness being felt in the trade, but shipments by the mills are fairly heavy. Regular prices are as follows: Wire nails, $2.50 to $2.60 per keg; galvanized, 1 in. and longer, taking an advance over this price of $2, and shorter than 1 in., $2.50. Plain annealed wire, $2.45 to $2.65 per 100 lb.; galvanized wire, $3.15; galvanized barb wire and fence staples, $3.35; painted barb wire, $2.65; polished fence staples, $2.65; cement coated nails, $2.50, base, all f.o.b., Pittsburgh, with freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing are now 61½ per cent off list for carload lots, 60½ per cent for 1000-rod lots and 59½ per cent for small lots, f.o.b., Pittsburgh.

Iron and Steel Bars.—While some contracts from implement makers for steel bars have been closed for delivery in first half of 1917, a number of the larger implement makers are still holding off, refusing to pay the 2.50c. price for which the mills are holding. Specifications against contracts for steel bars are very active, and it is claimed there have been no cancellations of contracts, but in a few cases consumers are not specifying as freely against contracts as they were some time ago. The two leading makers of steel bars report their output well sold up for remainder of this year. The new demand for iron bars is fairly active, but most consumers are covered over the next four or five months. Leading makers are quoting steel bars at 2.50c. at mill for such deliveries as they can make, which would not be before last quarter of this year, or first quarter of 1917. One large maker is quoting Bessemer steel bars at 2.50c. at mill for delivery in six weeks to three months from date of order. Small lots of steel bars for delivery from warehouse are held at 2.75c. to 3c., depending on quantity. We quote refined iron bars at 2.50c. to 2.60c. and railroad test bars at 2.70c. to 2.80c at mill.

Rivets.—The new demand has quieted down somewhat, most consumers being covered over remainder of the year, and specifications against contracts are reported active. There is a fair amount of export inquiry. Makers' prices, which are sometimes shaded by jobbers, are as follows: Buttonhead structural rivets, ½ in. in diameter and larger, at $4 per 100 lb., base, and conehead boiler rivets, same sizes, $4.10 per 100 lb., base, f.o.b., Pittsburgh. Terms are 30 days net, or one-half of 1 per cent for cash in 10 days.

Shafting.—Nearly all consumers are covered for the remainder of this year, and makers say they have specifications in hand to take their entire output over the next four or five months. Some contracts were made at 20 per cent off list, and on a few smaller ones, 15 per cent off list. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots for delivery in last quarter of this year and first quarter of 1917, and 10 per cent off in less than carload lots, f.o.b., Pittsburgh, freight added to point of delivery.

Cotton Ties.—Nearly all the cotton tie contracts for this year have already been placed at $1.35 per bundle of 45 lb., f.o.b., Pittsburgh. The price advances ¾c. per bundle for August and an additional ¾c. for September shipment.

Merchant Steel.—The new demand is fairly active, but nearly all consumers are covered ahead for the next four or five months. Prices on small lots are about as follows: Iron-finished tire, ½ x 1½ in. and larger, 2.50c., base; under ½ x 1½ in., 2.60c.; planished tire, 2.70c.; channel tire, ¾ to ⅞ and 1 in., 2.85c. to 2.95c.; 1⅛ in. and larger, 3.25c.; toe calk, 2.95c. to 3.05c., base; flat sleigh shoe, 2.70c.; concave and convex, 2.75c.; cutter shoe, tapered or bent, 3.25c. to 3.35c.; spring steel, 2.95c. to 3.05c.; machinery steel, smooth finish, 2.75c.

Hoops and Bands.—The market is quiet, as nearly all consumers are covered over remainder of this year. We quote steel hoops at 2.75c. and steel bands at 2.50c., with extras on the latter as per the steel-bar card.

Wrought Pipe.—It develops that the recent order placed by an Oklahoma oil interest with a Youngstown, Ohio, mill was for 200 miles of 8-in. line pipe, deliveries to start in August, and the same maker has taken another order for 40 miles of 12-in pipe. The current demand for oil country goods is very heavy and prices are firm. On lap weld pipe some mills report they are sold up through first quarter of 1917, but on butt weld sizes they can make prompt delivery. Jobbers are going slow in placing orders for black and galvanized pipe, particularly for the latter, owing to the heavy decline in prices of spelter. In a few cases some jobbers that have fairly heavy stocks of galvanized pipe have named lower discounts than the mills quote. However, discounts on both black and galvanized iron and steel pipe, printed on another page, are reported as being quite firmly held.

Boiler Tubes.—On both locomotive and merchant tubes the mills are sold up for the next eight or nine months on all the product they can possibly turn out, and premiums are asked over regular prices for fairly prompt shipment. Discounts on both iron and steel boiler tubes, printed on another page, are firm.

Old Material.—As near as can be learned, the purchases of heavy steel scrap, including borings and turnings, of the Carnegie Steel Company recently amounted to 40,000 to 50,000 tons, though last week they were estimated considerably higher. It is said that for part of the heavy steel scrap the company paid as high as $17 and $17.25, but a less price for the remainder. Another local interest has bought 4000 to 5000 tons of heavy steel scrap in the past week at $16.75 to $17, and a Shenango Valley furnace company has bought 3000 to 4000 tons of borings and turnings at about $8.50, delivered. The Carnegie Steel Company is said to have covered its needs of scrap and the situation has quieted down a good deal. Borings and turnings are slightly higher, but an embargo against these when routed to Brackenridge, Pa., where the leading consumer is located, will likely keep them from going any higher in the near future. Other consumers of scrap are not interested in the market, and there would be no trouble to-day in buying the best grades of heavy steel scrap at $16.25 to $16.50 per gross ton, delivered at consumer's mill. We have advanced prices slightly on heavy steel scrap, and also on borings and turnings. Reports of sales of low phosphorus melting stock in this market at $20.50 are not credited. Dealers are now quoting for delivery in the Pittsburgh and nearby districts that take the same rates of freight, per gross ton, as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	$16.50 to $16.75
No. 1 foundry cast	15.75 to 16.00
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	16.50 to 16.75
Hydraulic compressed sheet scrap	14.50 to 14.75
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	12.50 to 12.75
Bundled sheet stamping scrap	11.50 to 11.75
No. 1 railroad malleable stock	14.00 to 14.25
Railroad grate bars	11.00 to 11.25
Low phosphorus melting stock	19.00 to 19.50
Iron car axles	25.50 to 26.00
Steel car axles	26.00 to 26.50
Locomotive axles, steel	28.00 to 28.50
No. 1 busheling scrap	13.25 to 13.50
Machine shop turnings	8.50 to 8.75
Old carwheels	14.00 to 14.50
Cast-iron borings	8.50 to 8.75
*Shipping point. crop ends	16.00 to 16.50
No. 1 railroad wrought	15.75 to 16.00
Heavy breakable cast	14.00 to 14.25
Heavy axle turnings	14.00 to 14.25

*Shipping point.

Coke.—The hot weather has cut down very materially the output of coke and there is a scarcity of blast-furnace coke for prompt shipment. It readily brings $2.75 per net ton at oven, several makers asking higher prices. About all the contracts for blast-furnace coke for delivery in last half of 1917 have been closed up, a recent one being for about 8000 tons per month for last half of the year for an Eastern furnace at about $2.40 per net ton at oven. Furnace coke contracts for last half have ranged from $2.35 to $2.65 per net ton at oven. We quote prompt furnace coke at $2.75 per net ton at oven, and on contracts from $2.35 for some grades of coke up to $2.65 for two or three makes that have a very high reputation in the trade for quality. We quote 72-hr. foundry coke at $3 to $3.25.

prompt shipment and $3.25 to $3.50 on contracts for last half of the year. The Connellsville *Courier* gives the output of coke in the upper and lower Connellsville regions for the week ended July at 423,550 tons, an increase over the previous week of about 6000 tons. The output for the week ended July 8 is expected to show a material falling off as compared with the output given above for the previous week.

Chicago

CHICAGO, ILL., July 10, 1916.

The activity of domestic consumers is again incidental and export demand the determining factor affecting the mill situation. However, no significant changes are to be noted in the Western market. Rails for export are still under consideration. There is some new inquiry for cars and some buying of locomotives. Structural projects appear to be more numerous, but are confined to undertakings of small size. Recent quotations on plates have brought out a decided variation in prices, with premiums obtainable only for the very prompt delivery. For shipment no later than September 2.90c., Pittsburgh, has been quoted, while for deliveries in July 4c., Pittsburgh, has been done on a fair tonnage. Prices for sheets appear not to have been bolstered up either by the higher wage scale or the higher-priced sheet bars which must be reckoned with in the third quarter. Interest on the part of users of soft steel bars indicates that some business could be done at a price of 2.50c., for deliveries up to six weeks. Dullness in rail carbon steel has resulted in some concessions to take business at competitive points. A little better inquiry is noted for pig iron and sales of malleable and Southern foundry iron in small quantity have been made. Sellers of scrap appear to have been able to force some advances on the strength of recent buying of steel for Gary and sales of rolling mill grades the early part of the week were at higher prices. The advance was not long supported, however, through lack of sustained buying.

Pig Iron.—The established inaction in the market is broken only by occasional transactions, the week bringing out one purchase of malleable from a local interest, the tonnage involved being of moderate size. Northern furnaces have not yet shown any concessions from the prices that have ruled for some time. Sales of Southern iron were made last week on the basis of $14 for spot shipment from furnace and the same price for forward delivery of warrant iron. While it is understood that the larger part of the warrant iron, which has been undermining the strength of the Southern market, has been liquidated, enough remains to be a competitive element in such few transactions as are materializing. An inquiry for 500 to 1000 tons of Southern iron for delivery in central Illinois in the fourth and first quarters is reported, in which connection $14.50 Birmingham has been quoted. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of $1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5	$19.75
Lake Superior charcoal, No. 1	20.25
Lake Superior charcoal, No. 6 and Scotch	20.75
Northern coke foundry, No. 1	19.50
Northern coke foundry, No. 2	19.00
Northern coke foundry, No. 3	18.50
Southern coke, No. 1 [illegible]	to [illegible]
Southern coke, No. [illegible]	[illegible]
Malleable Bessemer	[illegible]
[illegible]	to [illegible]
Low phosphorus	to [illegible]
Silvery, 8 per cent	[illegible]
Bessemer ferrosilicon, 10 per cent	33.50 to [illegible]

Rails and Track Supplies.—About the only negotiations for new business in which the local mill is engaged are the several lots of rails for export, one or two of which were closed last week, resulting in the placing of some 5000 tons. The Burlington closed for 5000 tons of iron tie plates last week. While it is expected that a part of the recent Russian rail order will be rolled at Chicago, no definite assignment of tonnage has as yet been made. Quotations are as follows: Standard railroad spikes, 2.75c., base; track bolts with square nuts, 3.25c. to 3.50c., base, all in carload lots, Chicago; tie-plates, $50, f.o.b. mill, net ton; standard section, Bessemer rails, Chicago, $33, base; open-hearth, $35; light rails, 25 to 45 lb., $40; 16 to 20 lb., $41; 12 lb., $42; 8 lb., $43; angle bars, 2c., Chicago.

Structural Material.—The Omaha Structural Steel Company will furnish about 370 tons of fabricated steel for the Great Western Sugar Company's warehouse at Denver, and the American Bridge Company has taken a 325-ton bridge for erection in Stanislaus county, Cal. A number of small jobs of less than 200 tons are also reported placed. There is little inquiry for cars, new proposals including 500 refrigerator cars for the Illinois Central Railroad, 300 sub-sills for the Northern Pacific and 100 gondolas for the Texas & Pacific railroad. The buying of locomotives continues, but these purchases are important in the aggregate rather than individually. The mill situation with respect to the availability of plain material is unchanged. One interest is still offering Bessemer shapes for last half contracts at 2.50c. We quote for Chicago delivery of structural steel from mill 2.689c.

We quote for Chicago delivery of structural steel from jobbers' stock 3.10c.

Rivets and Bolts.—Very little is offered in the way of new business in bolts and nuts, the trade being well covered for the third quarter. Manufacturers report specifications ample to sustain operations at full capacity. Rivets are selling at a wide range of prices, depending upon deliveries desired. For early shipment 3.60c., Pittsburgh, can be done, while for contracts 4c. is commonly quoted. We quote carriage bolts up to ⅜x6 in., rolled thread, 50-10-5; cut thread, 50-5; larger sizes, 40-5; machine bolts up to ⅜x4-in., rolled thread, with hot pressed square nuts, 50-10-10; cut thread, 50-10; larger sizes, 40-10-5; gimlet point coach screws, 60; hot pressed nuts, square, $2.90 off per 100 lb.; hexagon, $2.90 off. Structural rivets, ¾ to 1¼-in., 4c. to 4.15c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

We quote out of store: Structural rivets, 3.50c.; boiler rivets, 3.60c.; machine bolts up to ⅜ x 4 in., 60-10; larger sizes, 50-10; carriage bolts up to ⅜ x 6 in., 60-5; larger sizes, 50 off; hot pressed nuts, square, $3.25, and hexagon, $3.25 off per 100 lb.; lag screws, 65.

Bars.—Recent heavy sales of Bessemer steel for export appear to have again restricted domestic offerings of Bessemer steel that have been appearing in various forms. For mild steel bars for delivery within six weeks, where 2.50c., Pittsburgh, had been generally quoted, 2.75c. is now being asked where the tonnage is of any size. The scarcity of rail carbon steel business is further shown by the keener competition in competitive territory, with the mills apparently willing to make the concessions necessary to secure the order. Under such circumstances 2.35c., f.o.b., mill, has been quoted. We quote, mill shipment, Chicago, as follows: Bar iron, 2.35c.; soft steel bars, 2.689c.; nominal on contracts, 3.18c. for prompt shipment; hard steel bars, 2.50c.; shafting, in carloads, 20 per cent off; less than carloads, 15 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 3.10c.; bar iron, 3.10c.; reinforcing bars, 3.10c. base with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting 10 per cent above list.

Sheets.—The weakness in sheets persists, despite the higher wage scale for the third quarter and the higher schedule of prices for sheet bars. The number of mills under necessity of marketing their product in the face of a limited demand and lacking jobbing mills to enable them to put their steel into blue annealed sheets are the responsible factor in the situation. While open-hearth first quality sheets continue to demand 3c., Pittsburgh, Bessemer and high-carbon roofing sheets are selling at 2.90c. and down to 2.75c. Galvanized sheets show the influence of the declining spelter market, but demand does not appreciably improve. We quote for Chicago delivery, blue annealed, No. 16 and heavier, 3.089c. to 3.339c.; box annealed, No. 17 and

lighter, 2.939c. to 3.039c.; No. 28 galvanized, 4.939c. to 5.039c.

We quote for Chicago [illegible] mum prices applicable [illegible]
No. 10 base annealed [illegible]
No. 28 galvanized [illegible]

Plates.—How far conditions have changed in the direction of more favorable terms for the purchase of plates is not clearly established. One interest, which has solicited contracts for third quarter at 3.50c., finds little interest on the part of users and it is reported that a competitive bid of 2.90c., with delivery prompt in September, failed to secure the business sought. For wide plates, to be delivered within the current month, 4c., Pittsburgh, was done last week, but another mill, asking the same price for third quarter, reports that it is taking practically no orders. We quote for Chicago delivery of plates from mill on contract 3.089c. and for prompt shipment 3.689c. to 4.189c.

We quote for Chicago [illegible] stock [illegible]

Cast Iron Pipe.—Pipe companies are taking a very good miscellaneous tonnage, one order of 1100 tons being booked last week. There is also some railroad buying, including 150 tons for the Milwaukee road. For municipal purposes, buying is very limited, current inquiry including 250 tons for Lima, Ohio, 200 tons for Berwyn, Ill., and 130 tons of special pipe for St. Louis. We quote as follows, per net ton, Chicago: Water pipe, 4-in., $33.50 to $34; 6-in. and larger, $30.50 to $31, with $1 extra for class A water pipe and gas pipe.

Wire Products.—The dull season in the domestic market, as usual, finds a minimum of sales activity in the farming districts. In the manufacturing trade there is still a scarcity and a sharp demand for rods. We quote as follows: Plain wire, Nos. 6 to 9, base, $2.639; wire nails, $2.689; painted barb wire, $2.839; galvanized barb wire, $3.539; polished staples, $2.839; galvanized staples, $3.539, all Chicago.

Old Material.—That the purchase of steel scrap for Gary, now known to have involved 30,000 tons, has not been entirely without a strengthening influence is shown in the slightly better prices asked for associated grades of scrap. No. 1 wrought is a little firmer and there is some demand for turnings and borings. Shoveling steel, which is accepted at Gary at the same price as heavy melting steel, is commanding 25c. to 50c. per ton more, and rerolling rails, which have been weak and are still very cheap as compared with the price of rail carbon bars, are firmer. Renewal of demand for steel axles for export has again jumped the price of that specialty to $26. In the home market, discard billets, obtainable at $28 a ton, are displacing axles for rolling mill use. Railroad offerings this week include 2000 tons from the Big Four, 1600 tons from the Milwaukee, 900 tons from the Omaha and 500 tons from the Monon railroad. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	[illegible]
Relaying rails	[illegible]
Old carwheels	[illegible]
Old steel rails, rerolling	15.25 to 15.50
Old steel rails, less than 3 ft.	[illegible]
Heavy melting steel scrap	[illegible]
Frogs, switches and guards, cut apart	[illegible]
Shoveling steel	[illegible]
Steel axle turnings	[illegible]

Per Net Ton

Iron angles and splice bars	[illegible]
Iron arch bars and transoms	[illegible]
Steel angle bars	[illegible]
Iron car axles	[illegible]
Steel car axles	[illegible]
No. 1 railroad wrought	[illegible]
No. 2 railroad wrought	[illegible]
Cut forge	[illegible]
Pipes and flues	[illegible]
No. 1 busheling	[illegible]
No. 2 busheling	[illegible]
Steel knuckles and couplers	[illegible]
Steel springs	[illegible]
No. 1 boilers, cut to sheets and rings	9.25 to 9
Boiler punchings	[illegible]
Locomotive tires, smooth	[illegible]
Machine shop turnings	[illegible]
Cast borings	[illegible]
No. 1 cast scrap	[illegible]
Stove plate and light cast scrap	9.25 to [illegible]
Grate bars	[illegible]
Brake shoes	[illegible]
Railroad malleable	[illegible]
Agricultural malleable	[illegible]

Philadelphia

PHILADELPHIA, PA., July 11, 1916.

Unquestionably there is a feeling on the part of consumers of steel products that keeping out of the market as much as possible will redound to their profit. They believe that by holding off they will be able to buy materials needed in the future at lower prices. Consequently, there is less tendency to contract. With the mills filled as they are, however, most producers regard the slackening of new business as a welcome relief. Some good-sized sales of rerolling billets have been made at $45, which is less than Eastern makers have been asking. In plates and shapes the spread of quotations is notable, and indicates that some mills are more anxious to take orders than others. The plates situation is the strongest of any, probably due to the demand from shipyards, both old and newly established. Structural shapes are quiet, so far as new business is concerned, labor difficulties tending to add to the dullness. The domestic demand for pig iron is lagging, but the market for low phosphorus for export is growing in activity. Old materials continue quiet owing to lack of interest on the part of the mills. Consumers appear to be little interested in ferromanganese.

Pig Iron.—Except for export inquiry, with increasing consequent sales, the market is dull. Italy is the chief purchaser, and is specifying for the most part iron containing 0.035 to 0.040 phosphorus for which $34 to $35, seaboard, is being paid. The anxiety to get the iron is indicated by a change of front by the buyers in respect to terms. Heretofore they have asked that these be c.i.f., Genoa, but now they are willing, at least in some cases, to pay cash, New York, on presentation of shipping documents, providing the weight and analyses have been attested. A shipment of Lebanon low-phosphorus is en route to Italy, and several thousand tons of non-copper bearing low-phosphorus has been contracted for. A sale of about 3000 tons has been made to a Canadian interest. The domestic demand for all grades is light, but deliveries are going forward at a good rate, and any delay in shipments is generally productive of immediate protest. An eastern Pennsylvania steel company has closed for 4000 tons of basic, for which about $19, delivered, was paid. Some sellers of basic continue to ask $20, Philadelphia. In foundry iron very little is doing, although one important agent reports that small inquiries have been slightly more numerous than in the preceding week. The larger producers are disposed to hold to their prices, leaving the granting of concessions to the smaller furnaces whose orders are rather lean. These smaller makers are making the market to a considerable extent, and are quoting $19 or less at furnace. Quotations for standard brands, delivered in buyers' yards, prompt shipment, range about as follows:

[illegible]	[illegible]
[illegible]	[illegible]
Virginia, No. 2 X foundry	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

Iron Ore.—In the week ended July 8 there were no arrivals of foreign ore at this port.

Ferroalloys.—The market for 80 per cent ferromanganese is quiet and easy. For prompt, $175, seaboard, would be considered by importers and domestic makers, though the quantity of spot material is limited. The arrival, last week, of 600 tons of English ferromanganese is reported by the customs authorities. Prompt spiegeleisen can be had at $50, furnace. Contract ferrosilicon, 50 per cent, is unchanged at $83 to $85, Pittsburgh, according to quantity, and 11 per cent at $[illegible].44.

Plates.—Quotations have a wider spread, but otherwise the situation is but little changed. Two large producers adhere to 4.159c., Philadelphia, as their minimum. One of these mills sees business enough to keep it busy until April next, taking into consideration the normal needs of regular customers. It continues to quote, and to get, 5.50c., mill, for such small lots as it

can squeeze out for prompt delivery. Another maker quotes 3.659c., Philadelphia, and would shade this price under some circumstances. The requirements of the shipyards lead the demand. Locomotive work is less active.

Bars.—Bessemer bars are unchanged at 2.659c., Philadelphia, and open-hearth bars are obtainable at about 2.909c. Two or three large bar makers are still out of the market. Iron bars are somewhat quieter, with the quotation unchanged at 2.659c., Philadelphia.

Structural Material.—Practically no new business worthy of note is coming out, and prices show a spread of at least ½c. One mill quotes 2.659c., Philadelphia, another 2.909c., and another 3.159c. Three conditions are mentioned as contributory to the inactivity, one of which is labor trouble. The local structural iron workers have made a demand for 68½c. per hour instead of 60c. Then there are the prevailing cost of material and the difficulty in getting prompt shipments.

Billets.—A fair-sized tonnage of open-hearth rerolling billets have been contracted for at $45, indicating an easier market for this district. Forging steel is unchanged at $65.

Sheets.—Premiums on blue annealed are disappearing, and No. 10 can be had for 3.659c., Philadelphia, prompt delivery. On contracts close to 3.159c. can be done.

Coke.—Furnace coke on contracts is being freely offered at $2.50, but not much is doing. Prompt furnace is quoted at $2.75 per net ton at oven. Prompt foundry is quoted at $3.25 to $3.50 per net ton at oven, and contract foundry at $3.50. Freight rates from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Old Material.—The mills are doing nothing and the market drags, although the recent buying at Pittsburgh imparted a better feeling to the trade. Brokers who are short have offered up to $15.75 for heavy melting steel. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania, and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$15.00 to $15.50
Old steel rails, rerolling	17.00 to 18.00
Low phos. heavy melting steel scrap	20.50 to 21.50
Old steel axles	26.00 to 27.00
Old iron axles	28.00 to 29.00
Old iron rails	20.00 to 20.50
Old carwheels	16.00 to 16.50
No. 1 railroad wrought	19.50 to 20.00
Wrought-iron pipe	12.50 to 13.00
No. 1 forge fire	13.00 to 13.50
Bundled sheets	13.00 to 13.50
No. 2 busheling	10.50 to 11.00
Machine shop turnings	8.50 to 9.00
Cast borings	10.00 to 10.50
No. 1 cast	16.00 to 16.50
Grate bars, railroad	11.75 to 12.25
Stove plate	11.75 to 12.25
Railroad malleable	13.50 to 14.00

Cincinnati

CINCINNATI, OHIO, July 12, 1916.—(*By Telegraph.*)

Pig Iron.—A few inquiries have come to light that are mainly for small tonnages and the majority of these is said to be from consumers who wish to keep in touch with the market. A sale of approximately 2000 tons of Southern iron and 1500 tons of Northern foundry was made to an Ohio consumer for this year's shipment, this being the largest transaction reported. It is stated on good authority that nearly all of the resale iron of the Southern Ohio iron is now off the market and the furnaces there are quoting $19, Ironton, for any shipment to July, 1917. Competition from different sources makes it difficult to establish this price. Southern foundry iron may be said to be a trifle firmer, as speculative iron in that district has been absorbed to an extent. Furnace iron is quoted all the way from $14 to $15, Birmingham basis. No firm offers on warrant iron have been reported lately, and the price at which some of this iron has changed hands lately is problematical. The consumption of foundry iron here is a little off, due principally to the hot weather, and in a few cases requests to hold up shipments on contracts have been made. Southern foundry iron stocks are slowly but steadily on the increase. A report that the Virginia furnaces were quietly trying to invade this market is without foundation; the present difference in delivered costs with other districts should set this rumor at rest. No business of note is reported in the Ohio silvery irons and the low prices in the South have not induced buyers in this territory to contract ahead. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b., Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	$17.40 to $18.40
Southern coke, No. 2 f'dry and 2 soft	16.90 to 17.90
Southern coke, No. 3 foundry	16.40 to 17.40
Southern coke, No. 4 foundry	15.90 to 16.90
Southern gray forge	15.40 to 16.40
Ohio silvery, 8 per cent silicon	28.26 to 28.76
Southern Ohio coke, No. 1	20.76 to 21.26
Southern Ohio coke, No. 2	19.76 to 20.26
Southern Ohio coke, No. 3	19.26 to 19.76
Southern Ohio malleable Bessemer	19.76 to 20.26
Basic, Northern	19.76 to 20.26
Lake Superior charcoal	21.20 to 22.20
Standard Southern carwheel	24.90 to 25.40

(By Mail)

Finished Material.—A slight improvement is noted in the warehouse business but mainly confined to specialties, such as reinforcing concrete bars, wire nails and blue annealed sheets. No changes have been made, and we quote from stock as follows: No. 10 blue annealed sheets at 3.50c.; steel bars and small structural shapes 3.20c.; wire nails, $2.75 per keg base; barb wire, $3.60 per 100 lbs.; plates, 3.50c.; smaller sizes machine bolts, 60 per cent off list; larger sizes, 40 and 10 and 5 per cent off list; hot pressed square and hexagon nuts, 2.70c. off list; malleable washers, 5½c. per lb.; cast iron washers, 3c. per lb., and cold rolled rounds 10 per cent plus list. A little better demand is noted for galvanized sheets. No. 28 galvanized sheets are quoted at 4.90c., f.o.b. Cincinnati or Newport, Ky., and No. 28 black sheets around 3c. to 3.10c.

Coke.—Contracting for both furnace and foundry coke is at a standstill. The foundries here have bought ahead and there is practically little demand from any source even for carload lots to fill in. Weather conditions and a shortage in labor are said to be retarding factors in the production in the three fields here, but as far as is known no premiums have been obtained for spot shipmnt coke in this territory. We quote Connellsville 48-hr. coke from $2.25 to $2.50 per net ton at oven, for nearby shipment, and as high as $2.65 per net ton at oven on contract business. Foundry coke in the Connellsville, Wise County and Pocahontas fields are from $3.25 to $3.75 and New River foundry coke is unchanged at $4.

Old Material.—The market is in a somewhat disturbed condition and the absence of general buying renders it difficult to arrive at average selling prices. On firm offers and for prompt shipment regular quoted prices can be shaded, in some cases as much as $1 a ton, it is said. Sellers of scrap are holding back, anticipating a recovery in values. The following are dealers' prices to consumers, f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton	
Bundled sheet scrap	$11.25 to $11.75
Old iron rails	15.50 to 16.00
Relaying rails, 50 lb. and up	21.00 to 21.50
Rerolling steel rails	14.50 to 15.00
Heavy melting steel scrap	14.00 to 14.50
Steel rails for melting	13.00 to 13.50
Per Net Ton	
No. 1 railroad wrought	$13.25 to $13.75
Cast borings	4.75 to 5.25
Steel turnings	5.25 to 5.75
Railroad cast scrap	11.00 to 11.50
No. 1 machinery cast scrap	12.75 to 13.25
Burnt scrap	8.25 to 8.75
Iron axles	21.00 to 22.00
Locomotive tires (smooth inside)	19.50 to 20.00
Pipes and flues	9.50 to 10.00
Malleable and steel scrap	10.75 to 11.25
Railroad tank and sheet scrap	8.50 to 9.00

The Sulphide Corporation (British) has been allowed to retain half of the excess profits earned from the sale of spelter, and the works at Seaton Carew, of the Central Zinc Company, controlled by the Sulphide Corporation, are to be doubled. The enlargement of the works will enable the company to treat 30,000 tons of zinc concentrates per year. The Central Zinc Company was formed in 1906 by the Sulphide Corporation to provide a British outlet for part of the zinc concentrates from Broken Hill, Australia, so as no longer to be entirely in the hands of German buyers.

Cleveland

CLEVELAND, OHIO, July 11, 1916.

Iron Ore.—The strike situation on the Mesaba range appears to have improved, in that there has been no further spread of the trouble and some men have returned to work. However, operations in underground mines are practically suspended. The Steel Corporation appears to be making up for this loss by increased shipments from its open pit properties, but independent mining companies that confine their operations wholly or largely to underground mines are unable to do this. Labor is reported to have left the range in train loads to seek employment elsewhere and a considerable shortage in the labor supply is probable when the strike ends. There is a possibility of a shortage of Bessemer ore because of the tieing up of the Mesaba underground mines. While it may be possible to keep up the tonnage from this range by increasing the output of the open pits, these are not able to supply the deficiency in the Bessemer output of the underground mines. The European demand for Bessemer pig iron has caused considerable increase in the demand for Bessemer ore, and some furnaces that had covered with ore requirements for other grades have had their ore contracts switched to Bessemer. There were large stockpiles of Bessemer ore on the old range early in the season, but as a result of the late demand these are said to have been well cleaned up. Some of the old range mines have not sold their entire Bessemer output for the season, but in view of the vessel and labor situation will probably be unwilling to take on additional contracts at the present time. More furnaces would doubtless run on Bessemer iron were they able to change their ore contracts to Bessemer grades. We quote prices as follows, delivered lower lake ports: Old range Bessemer, $4.45; Mesaba Bessemer, $4.20; Old range Bessemer, $3.70; Mesaba non-Bessemer, $3.55.

Pig Iron.—A Cleveland interest has sold 20,000 tons of Bessemer iron for shipment to Italy from its Valley furnace during third quarter at $21.50. The United Steel Company, Canton, Ohio, has purchased a round lot of basic iron for the last half. This iron, or at least the greater part of it, will be furnished by a Cleveland furnace. The market is dull, with the exception of the foreign demand for Bessemer iron, for which considerable inquiry continues to come out. The Struthers Furnace Company expects to blow in within a week its stack at Struthers, Ohio, which has been out for relining and repairs. This furnace, which usually produces basic iron, will run on Bessemer. The local price on foundry grades is unchanged at $18.50, at furnace, for No. 2. Furnace prices on Southern iron for early shipment are somewhat easier, No. 2 being offered at $14, Birmingham, for prompt shipment and third quarter. Quotations are $14.50 for the fourth quarter and $14.50 to $15 for first half. It is claimed that Southern resale iron that has been offered at $14 or less has been mostly cleaned up. We quote delivered Cleveland as follows:

Bessemer	$21.45
Basic	18.95
Northern No. 2 foundry	$18.70 to 19.00
Southern No. 2 foundry	18.50 to 18.75
Gray forge	18.00
Jackson Co. silvery, 8 per cent silicon	25.00
Standard low phos., Valley furnace	32.00

Coke.—The market continues very dull. Standard Connellsville foundry coke is quoted at $3 to $3.25, per net ton at oven, for prompt shipment and $3.25 to $3.50 for contracts. Furnace coke is held at $2.70 for prompt shipment.

Finished Iron and Steel.—Specifications continue fairly good, but new demand for finished steel has quieted down somewhat, with the exception of plates, the call for which continues heavy. Considerable plate business for rather early delivery is being placed at 4c., Pittsburgh, some coming from consumers who have been holding off in the expectation of lower prices. Plate quotations range from 3.50c. to 4c., Pittsburgh. Some contracts are being closed at 2.50c., Pittsburgh, for steel bars and 2.50c. to 2.75c. for structural material for the third quarter. There is little new demand for steel for building work, but some stock orders are coming from fabricators. Alloy steels are in good demand and several inquiries for nickel steel, aggregating over 5000 tons, are pending from automobile manufacturers. There is a fair demand for bar iron, and an Ohio manufacturer has taken 1000 tons on the basis of 2.36c., Chicago mill. The local price is unchanged at 2.50c., Cleveland. A Cleveland mill has just closed for its sheet bar requirements for the third quarter. Galvanized sheets have declined to 4.40c., at mill, for No. 28, owing to lower spelter prices. There is considerable inquiry, but, with the falling prices, buying is only in small lots for immediate needs. Mills look for a heavy demand when the prices become staple. Black and blue annealed sheets are in fair demand, with prices unchanged at 2.90c. to 3c. for No. 28 and 3c. to 3.25c. for blue annealed. We quote warehouse prices at 3.25c. for steel bars and structural material, 3.65c. for plates and 3.20c. for iron bars.

Bolts, Nuts and Rivets.—The new demand for bolts and nuts has fallen off, but specifications are heavy. Mill prices are firm, but some of the jobbers with large stocks are making price concessions. There is a good demand for rivet contracts for the last half, which are being made at regular prices, but specifications are not as heavy as they have been. We quote rivets at 4c., Pittsburgh, for structural and 4.10c. for boiler rivets. Bolt and nut discounts are as follows:

Coach screws, ⅜ x 6 in. and smaller or shorter and ½ x 4 in. and smaller or shorter, cut thread, 70 per cent; cut thread, longer or larger than ⅜ x 6 in. and ½ x 4 in., 60 per cent; sheet iron screws, 70 per cent; machine screws, 70 per cent; stove bolts, 70 per cent; carriage bolts, ⅜ x 6 in. and smaller or shorter, rolled thread, 70 per cent; cut thread, 60 per cent; rolled thread, longer or larger than ⅜ x 6 in., 60 per cent; cut thread, longer or larger than ⅜ x 6 in., 40 per cent; lag bolts, gimlet or cone point, 70 per cent; plow bolts, black or tapped, 50 per cent; hexagon, h. p. nuts, blank or tapped, $2.90 off; c. p. c. and t. nuts, blank or tapped, $3.10 off the list; hexagon, h. p. nuts, blank or tapped, $2.90 off; c. p. c. and t. nuts, blank or tapped, $3.10 off the list; hexagon, h. p. nuts, all sizes, 6 cents off list; hexagon, h. p. jam nuts, all sizes, 6 cents off list.

Old Material.—Local prices on heavy melting steel have advanced fully 50c. a ton as a result of the heavy buying by the leading interest. Cleveland dealers are understood to have sold about 20,000 tons of melting steel scrap for shipment to Munhall at $16 to $16.50, delivered, which is equivalent to about $14.75, delivered to local mills. Car wheels are firmer as a result of some new demand, but prices on other grades except old steel rails have not been affected. All mills are now taking shipments of heavy melting steel scrap freely, and dealers have been given shipping orders on round tonnages sold some time ago at higher prices. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton

Steel rails	$14.75 to $15.00
Iron rails	18.50 to 19.00
Steel car axles	28.00 to 29.00
Heavy melting steel	14.75 to 15.00
Carwheels	12.75 to 13.00
Relaying rails, 50 lb. and over	22.50
Agricultural malleable	12.50 to 12.75
Railroad malleable	14.00 to 14.25
Steel axle turnings	12.00 to 12.25
Light bundled sheet scrap	12.00 to 12.25

Per Net Ton

Iron car axles	$23.00 to $24.00
Cast borings	5.75 to 6.00
Iron and steel turnings and drillings	5.75 to 6.00
No. 1 busheling	11.00 to 11.50
No. 1 railroad wrought (nominal)	15.00 to 15.50
No. 1 cast	14.00 to 14.25
Railroad grate bars	9.00 to 9.50
Stove plate	10.00 to 10.25

Birmingham

BIRMINGHAM, ALA., July 10, 1916.

Pig Iron.—There has been little or no change in the stagnant condition, excepting a more brisk inquiry which has lately sprung up, without, however, producing an appreciable amount of business. The most reassuring feature is that stocks have not increased to any extent. June was as gratifying as May in this respect. Considering that the manufacture of iron has been on a record-breaking basis for nine months, the almost even break between make and movements during the stagnant period has been a source of optimism. Quotations of $15.50 for the last half and first half of next year on a round lot did not bring the business. Makers, as a rule, quote $15 for the remainder of the year, and that price is the basis of the usual small order that comes in for fill-in purposes. Southern foundry makers

are banking somewhat on the expected scarcity of Lake ores and the large demand for basic. No activity is expected for a month to come. The Woodward Iron Company is operating its five stacks, one on basic. A stack that was blown out in June resumed after relining in 22 days. Other furnace operators show a like disposition to continue the maximum output. Operations in furnaces, steel mills and rolling mill plants were considerably hampered during the holiday week by high water caused by the excessive rainfall. There has been talk of $14 furnace iron coming this way from competitive fields, but there is no evidence of any such transaction in Birmingham. We quote per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	$15.25 to $15.50
No. 2 foundry and soft	14.50 to 14.75
No. 3 foundry	14.25 to 14.50
No. 4 foundry	14.00 to 14.25
Gray forge	13.75 to 14.00
Basic	15.00 to 15.25
Charcoal	22.00 to 22.50

Cast-Iron Pipe.—The pipe market is dull, but gas and waterpipe foundries had good orders on books before the lull set in. Operations continue at the pace of the past several months. We quote, per net ton, f.o.b. pipe-shop yards, as follows: 4-in., $28; 6-in. and upward, $25, with $1 added for gas pipe and 16-ft. lengths.

Coal and Coke.—The coal trade has rallied somewhat owing to contract renewals, larger takings by the railroads and the stocking of domestic yards. The river business has been a heavy sufferer from the gulf storms and heavy rainfall all over Alabama. The Pratt Consolidated lost a steamer and two barges on the Warrior River. Prices rule a little higher than last year owing to less keenness of competition. The demand for coke is insistent and the supply for the open market is small. The ruling price for standard beehive foundry is $4.25 to $4.50 and for furnace coke $3.25 to $3.50.

Old Material.—It is believed that old material has reached rock-bottom and that in a short time, owing to large consumption, advances will set in; but it is still soft. Foundries are using a large amount of scrap in place of pig iron on account of the price. Even lower levels have been marked in some instances. We quote, per gross ton, f.o.b. Birmingham dealers' yards, as follows:

Old steel axles	$22.00 to $23.00
Old steel rails	10.00 to 10.50
No. 1 steel scrap	9.00 to 9.50
No. 1 wrought scrap	12.50 to 13.00
No. 1 cast scrap	10.50 to 11.00
Extra heavy cast scrap	9.50 to 10.00
Stove plate and light	9.00 to 9.50
Old carwheels	9.00 to 10.00
Tram carwheels	9.00 to 10.00

Buffalo

BUFFALO, N. Y., July 11, 1916.

Pig Iron.—Although, generally speaking, the market is showing midsummer quiet, some furnaces report slightly increased inquiry for the week, principally in 200 to 500-ton lots. The total of orders placed was somewhat larger than for two or three weeks past, aggregating about 10,000 tons of all grades, including an order for 3000 tons of basic and another of a smaller amount of basic. Furnacemen have orders in hand covering capacity for a long period ahead and are centering their efforts on shipping out product—shipments being limited only by railroad equipment obtainable and mechanical and man power for loading. With no change in prices, we quote as follows for last half delivery, f.o.b. furnace, Buffalo:

No. 1 foundry	[illegible]
No. 2 X foundry	[illegible]
No. 2 plain	[illegible]
No. 2 foundry	[illegible]
Gray forge	[illegible]
Mill iron	[illegible]
Basic	[illegible]
Bessemer	[illegible]
Charcoal, regular brands and analysis	21.00 to 22.00

Finished Iron and Steel.—Specifications are coming along against contracts closed earlier in the year; but because of inability of most of the larger mills to make shipment short of the first quarter of next year, the buying is for relatively prompt shipment from smaller mills, which seem to be reducing their premium prices to a basis more nearly in line with those of the large mills. The consumption of steel seems to be fully as great as at any time in the past several months. All of the machine shops in this territory are well filled up with work for months ahead and there are no indications of abatement in the volume of business they are receiving. Warehouse prices have been reduced slightly, bars under 2-in. and structural shapes now ruling at 3.25c. base; bars 2-in. and larger, 3.90c., and plates, 4c., all delivered Buffalo. Bids are being taken for structural steel for factory and machine shop to be erected by the C. A. Simons Machine Company, Albany, about 100 tons. The Buffalo Structural Steel Company has a contract for 350 tons for the Pomeroy & Wright store and office building, Buffalo; the Kellogg Structural Steel Company, a contract for steel for St. Bonaventure College, Olean, N. Y., 100 tons, and the Lackawanna Bridge Company an order for a small tonnage for machinery and pipe supports at the new coke oven plant of the Semet Solvay Company, Buffalo.

Old Material.—The market is firmer than a week ago and freer buying of some commodities has tended to strengthen it all along the line. This firmer tendency is based principally on good-sized sales of heavy melting steel for shipment to points outside of this district. An optimistic feeling prevails that conditions will continue to grow better, although prices are not expected to advance materially in the near future. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	$15.50 to $16.00
Low phosphorus steel	20.00 to 20.50
No. 1 railroad wrought scrap	17.25 to 17.75
No. 1 railroad and machinery cast scrap	15.50 to 16.00
Steel axles	24.00 to 24.50
Iron axles	24.00 to 24.50
Carwheels	13.00 to 13.50
Railroad malleable	15.00 to 15.50
Machine shop turnings	6.25 to 6.75
Heavy axle turnings	12.00
Clean cast borings	7.25 to 7.75
Iron rails	18.00 to 18.50
Locomotive grate bars	11.50 to 12.00
Stove plate (net ton)	11.00 to 11.50
Wrought pipe	12.00 to 12.50
Bundled sheet scrap	11.50 to 12.00
No. 1 busheling	13.00 to 13.50
No. 2 busheling	11.00 to 11.50
Bundled tin scrap	15.00 to 15.50

St. Louis

ST. LOUIS, MO., July 10, 1916.

Pig Iron.—Resale iron offered has unsettled the market. Consumers do not need material and are inclined to wait further developments. Furnace representatives maintain that there is not enough resale iron to worry about and no occasion to reduce prices. Transactions have been entirely in small lots for immediate needs.

Coke.—No large transactions in coke have taken place and the 36,000-ton furnace coke inquiry is still pending.

Finished Iron and Steel.—Finished products are quiet, but specifications are fully up to contract allotments, while consumers' yards are reported as provided only with the necessary stock ahead. Movement out of warehouse continues practically up to capacity. We quote for stock out of warehouse as follows: Soft steel bars, 3.15c; soft iron bars, 3.05c; structural material, 3.15c; tank plates, 3.55c; No. 10 blue annealed sheets, 3.45c; No. 28 black sheets, cold rolled, one pass, 3.30c; No. 28 galvanized sheets, black sheet gage, 5.10c to 5.40c, according to quantities and delivery, being largely affected by spelter conditions and prices.

Old Material.—There has been no trading except a little among the dealers. All the local industries are refusing to buy and most of them are either refusing to receive material or are making it so hard to effect delivery that the same result is accomplished. No relaying rails are being offered, and the inquiries, especially for light section rails, are pressing the dealers. Lists out during the week include these: The Wabash, 4000 tons; Missouri, Kansas & Texas, 2000 tons; Chicago, Peoria & St. Louis, 300 tons; Kansas

City Southern, 300 tons; Union Pacific, 2000 tons; Southern Railway, 3000 tons; Chicago, St. Paul, M... apolis & Omaha, 1000 tons; St. Louis Southwestern, 300 tons, and some minor lots from local industries. Quotations are largely nominal. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district as follows:

Per Gross Ton

Old iron rails	[illegible]
Old steel rails [illegible]	[illegible]
Old steel rails, less [illegible]	[illegible]
Relaying rails, standard section, subject to inspection	[illegible]
Old carwheels	[illegible]
No. 1 railroad heavy [illegible] scrap	[illegible]
Heavy shoveling steel	[illegible]
Frogs, switches and guards cut apart	14.00 to [illegible]
Bundled sheet scrap	[illegible]

Per Net Ton

Iron angle bars	[illegible]
Steel angle bars	[illegible]
Iron car axles	[illegible]
Steel car axles	[illegible]
Wrought arch bars and transoms	18.50 to 19.00
No. 1 railroad wrought	[illegible]
No. 2 railroad wrought	[illegible]
Railroad springs	[illegible]
Steel couplers and knuckles	13.25 to 13
Locomotive tires, 42 in. and over smooth inside	19.00 to 19.50
No. 1 dealers' forge	[illegible]
Cast iron borings	[illegible]
No. 1 bushelling	[illegible]
No. 1 boilers, cut to [illegible]	[illegible]
No. 1 railroad cast scrap	10.50 to 11
Stove plate and light cast [illegible]	[illegible]
Railroad malleable	10.50 to 11.00
Agricultural malleable	[illegible]
Pipes and flues	9.50 to 10.00
Railroad sheet and tank [illegible]	[illegible]
Railroad grate bars	[illegible]
Machine shop turnings	[illegible]

New York

NEW YORK, July 12, 1916.

Pig Iron.—The New York pig iron trade is more occupied in figuring out how much Bessemer iron has been taken for Italy than with domestic inquiries for foundries or any other kind of iron. A Central Pennsylvania furnace will go on to Bessemer to fill an order for 10,000 tons for export, at a price considerably better than the present level for foundry iron. A western Pennsylvania furnace has taken 4000 tons of standard Bessemer for Italy and another furnace has closed for 2000 tons, in which the phosphorus requirement is 0.06 per cent. The purchases for Holland amount to at least 2500 tons, one lot of 1500 tons and another of 1000 tons. Some of this iron was high silicon, high phosphorus and high manganese, 3.50 per cent of manganese being asked for. There has been some export inquiry for high phosphorus basic iron—phosphorus up to 1.50 per cent—and France recently asked for Bessemer iron with silicon 2 per cent or upward. The melt of foundry iron continues light on account of foundry labor shortage and strikes at a number of foundries. Foundrymen seem to be in no need of pig iron and the market may drift as at present through the summer. The low prices of Southern resale iron and of warrants still have an unfavorable effect on the general market. We quote at tidewater for early delivery: No. 1 foundry, $20.50 to $21; No. 2X, $19.75 to $20.25; No. 2 plain, $19.50 to $20; Southern iron at tidewater, $20 to $20.50 for No. 1 and $19.50 to $20 for No. 2 foundry and No. 2 soft.

Ferroalloys.—Ferromanganese is obtainable now for any delivery up to the end of 1917 at $175, seaboard, but demand is insignificant. Early in April spot material was selling at $450 per ton. One or two steel companies are inquiring for a few hundred tons for early delivery because of a larger consumption than originally provided for by contracts. The Government has bought for the Brooklyn and Washington navy yards 15,000 and 10,000 lb., respectively, for consumption in converter steel casting plants. Press reports have given these figures as tons instead of pounds. Export inquiry amounts to several thousand tons, but no sales have resulted. Arrivals from England are fully equal to the rate maintained for the first five months of this year; a large cargo is expected this month by special steamer for delivery to large con... on contract. Spiegeleisen is quiet at $50, fur... on contract. A sale to Italy of 500 tons is reported at the prevailing quotation. Ferrosilicon, 50 per cent, is strong and specifications on contract very [illegible]

Finished Iron and Steel.—Chief interest continues to lie in export business, with the closing for upward of 450,000 tons of rails for Russia occupying the leading place. Plate inquiries are frequent, many, however, representing the one buyer with different brokers striving to complete the deal. One large offering in bars comprises 30,000 tons of ¾-in. size and smaller. In domestic business the structural field is dull. It is expected that the report of the Bridge Builders and Structural Society will show a marked falling off from May for the tonnage of fabricated steel work put under contract in June. About the only large job closed since last week's review covers 1200 tons for the General Chemical Company at Marcus Hook, Delaware County, Pa., awarded to the Hedden Iron Construction Company. Innumerable projects have been planned and where necessary layouts have been filed, but general building material and labor costs are regarded as too high to push the work at the present time. In railroad cars a few new feelers have been put out, as by the Delaware & Hudson for coal cars and the Baltimore & Ohio for box cars, but no immediate business is expected, also because of high prices. Owing to the building and car situation, universal plates are not hard to get, but sheared plates are scarce at less than 4c., Pittsburgh, and small lots for prompt delivery command 5c. regularly, when warehouses cannot supply the size. Bessemer steel bars are obtainable for fairly prompt shipment at 2.50c., Pittsburgh. A large tonnage of spikes will, of course, be needed for the Russian rails and at least one of the rail makers will not supply the track accessories. We quote mill shipments of plain structural material at 2.669c. to 2.919c., New York; steel plates at 2.919c. to 4.169c., New York, according to the time of delivery, with universal plates at 3.669c. to 3.919c.; steel bars at 2.669c. to 2.919c., and iron bars at 2.669c. New York. Out of warehouse, we quote iron and steel bars and structural material at 3.10c. to 3.30c., New York, and plates at 4c. to 4.25c.

Cast Iron Pipe.—Bids were taken July 12 for a pipe-laying job for Perth Amboy, N. J., involving 15,320 ft. of 30-in. pipe, 11,000 ft. of class B and the remainder of class C pipe and totaling about 2700 tons. Prices are unchanged and carload lots of 6-in., class B and heavier, are quoted at $30.50 per net ton, tidewater, class A and gas pipe taking an extra of $1 per ton.

Old Material.—The recent heavy buying for Pittsburgh has had no effect on scrap prices. Indeed, the few transactions noted in the past week were not calculated to point to a stiffening in quotations. In the case of borings and turnings a marked drop must be registered, owing to the increasing quantities available. Brokers quote buying prices about as follows to local dealers and producers, per gross ton, New York:

[illegible] specifications)	$11.75 to $12.25
[illegible]	[illegible]
Rerolling rails	15.50 to 16.00
[illegible]	[illegible]
[illegible] car axles (for domestic use)	28.50 to 29.00
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	11.75 to [illegible]
[illegible]	[illegible]
[illegible]	[illegible]
Machine shop turnings (nominal)	5.00 to 5.50
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible] (railroad)	12.25 to 12.75

Foundries are not buying. In some cases, with reduced operations, partly on account of labor conditions, cars are piled up awaiting unloading. Some inquiry from abroad, notably Italy, is noted, but the specifications are indefinite and the buyer needs a representative to secure desired co-operation from the dealers.

Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

No. 1 cast [illegible]	$16.00
No. 2 cast [illegible]	15.00
Stove plate	14.00
Locomotive grate bars	12.00

British Steel Market

Better Inquiry for American Billets—Large Cast Iron Pipe Order to Argentina

(*By Cable.*)

LONDON, ENGLAND, July 12, 1916.

Pig iron is quieter and consumers are well covered. Export business is narrow and licenses, except for shipment to France, are difficult to obtain. There is a better inquiry for American billets. Tin plates are depressed at 29s. to 30s. Argentina has booked 26,000 tons of cast-iron pipe with British foundries. Quotations, mostly nominal, are as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lbs. f.o.b. Wales, 29s. to 30s., against 33s. to 35s. a week ago.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £20, compared with £20 5s. last week.

Steel ship plates, Scotch, delivered local yards, £13 17s. 6d.

Steel rails, export, f.o.b. works port, £10 17s. 6d.

Hematite pig iron, f.o.b. Tees, about [illegible]

Sheet bars (Welsh) delivered at works in Swansea Valley, £14 10s., against £14 5s. a week ago.

Steel bars, export, f.o.b. Clyde, £18 5s.

Ferromanganese, c.i.f., nominal.

Ferrosilicon, 50 per cent, c.i.f., £29.

Iron and Industrial Stocks

NEW YORK, July 12, 1916.

Some liquidation appeared in industrial stocks in the past week, due in part to higher rates for money, but more apparently to the fact that the market is now drifting with no stimulus from announcements of new munitions orders. The United States Steel Corporation's statement of unfilled orders, showing a falling off of nearly 300,000 tons, had some part in the decline.

Allis-Chal., com..	19 - 20	Ry. Stl. Spring, pref.	7
Allis-Chal., pref.	70 - 70½	Republic, com...	43⅝ - 46
Am. Can, com...	51 - [illegible]	Republic, pref..	[illegible]
Am. Can, pref...	108¾ - 109½	Sloss, com.	45 - 47½
Am. Car & Fdy., com.	52 - 54½	Sloss, pref.	[illegible]
Am. Car & Fdy., pref.	115½ - 116½	Tenn. Cop.	[illegible]
Am. Loco., com..	63 - 65	Tenn. Cop., pref.	[illegible]
Am. Loco., pref..	99 - 100	U. S. Steel, com.	57¾ - 57¾
Am. Steel Fdries	49 - 50½	U. S. Steel, pref.	117¼ - 117¾
Bald. Loco., com.	68¼ - 73⅞	Va. I. C. & Coke	48
Bald. Loco., pref...	107½	Westing. Elec...	55¼ - 57¾
Beth. Steel, com.	440 - 445	Am. Rad., com...	395 - 400
Colorado Fuel...	42 - 44⅞	Am. Rad., pref.....	134½
Deere & Co., pref...	90	Am. Ship, com..	41¾ - 43
Gen. Electric....	166 - 167	Am. Ship, pref...	88¾ - 90
Gt. No. Ore Cert.	34¾ - 35¼	Cambria Steel...	82 - 83½
Int. Harv. of N. J., com.	112½ - 118	Lake Sup. Corp.	10¾ - 11⅜
Int. Harv. Corp., com.	80 - 82	Warwick	5½
Lackawanna Stl	68 - 70¾	Cruc. Steel, com.	73½
Nat. En. & Stm., com.	23½ - 24¼	Cruc. Steel, pref.	114 - 114⅞
Nat. En. & Stm., pref	94½	Harb.-Walk. Refrac., com.	95
N. Y. Air Brake	172½ - 175	Harb.-Walk. Refrac., pref.	102½ - 103
Pitts. Steel, pref	97 - 97½	La Belle Iron, com.	51½
Pressed Stl., com	44¼ - 45¼	La Belle Iron, pref.	128½
Pressed Stl., pref...	99½	Can. Car & Fdy., com.	80 - 82
Ry. Stl. Spring, com.	42½ - 45¼	Driggs-Seabury ..	95 - 127
		Midvale Steel ...	64¼ - 64⅞

Dividends

The Union Steel Casting Company, regular quarterly 2 per cent., and an extra 2 per cent., payable July 1.

The Canada Foundries & Forging Company, regular quarterly 3 per cent. will, on extra 1 per cent. on the common stock and 1¾ per cent on the preferred stock, payable Aug. 15.

The American Shipbuilding Company, regular quarterly, 1¾ per cent on the preferred stock, payable July 1.

The Harbison-Walker Refractories Company, regular quarterly, 1½ per cent on the preferred stock, payable July 20.

The Atlantic Steel Company, regular quarterly, 1½ per cent, payable July 10.

The Curtiss Aeroplane & Motor Company, 3½ per cent on the preferred stock, payable July 15.

MESABA STRIKE SITUATION

Strikers Returning and Several Underground Mines Now in Operation

DULUTH, MINN., July 12—(*By Telegraph*).—The reconstruction period is now at hand on the Mesaba Range. Many of the strikers have returned to work and several of the underground miners have resumed operations. The pit properties are working to capacity but the underground mines have small forces. Men are returning to their former places every day, but the crews will not be as large as formerly, as hundreds of workers have left the district since the trouble started. Some of them will return but many are now working in other mining districts and will not go back. A few of the small independent operators will not reopen their mines until all of the trouble is over.

There was no violence of any sort in the past week. The sheriff has several hundred deputies and has the situation well in hand. There is practically no picketing now. Those who are endeavoring to keep men from their work are not very enthusiastic and are not getting results.

The miners seem to be discouraged. A meeting was called this week to try and settle the differences of the operators and men but the operators did not send a single representative. The villages and unions were represented. The operators have stated frequently that they absolutely refuse to have any dealings with any representative of the I. W. W. They will never accord that organization the smallest amount of recognition. There has been some talk that the I. W. W. would invade other parts of the Lake Superior district but this is not likely to happen with the failure of the Mesaba strike. Six of the strike leaders and four others are still in jail in Duluth, charged with the murders at Biwabik last week. No other outsiders have arrived to take their places.

A Ryerson Warehouse at Detroit

Evidence of Detroit's increasing importance as a center of steel consumption is given in the announcement that Joseph T. Ryerson & Son have prepared the way for a Detroit warehouse by the purchase of a suitable site. The property consists of about three acres in the Milwaukee Junction district, and is one of the few remaining vacant sites having the facilites of both Grand Trunk and Michigan Central Railroad direct trackage. It is the expectation that a modern warerouse unit, similar to this company's Chicago, New York and St. Louis plants, will be erected in the near future.

German Steel Shipments Large in May

Shipments of the German Steel Works Union for May were 311,620 metric tons, the largest this year, those for March having been 310,646 tons, and for April 271,756 tons. The May shipments embraced 80,765 tons of semi-finished steel, 142,327 tons of railroad material, and 88,528 tons of shapes. The total for 5 months to June 1, 1916, was 1,462,075 tons, against 1,466,162 tons to June 1, 1915.

A New Carnegie Steel Bar Card

The Carnegie Steel Company of Pittsburgh has recently issued a new card of standard classification of extras on steel bars and small shapes. Extras on tees, half rounds, half ovals and ovals have been slightly advanced in some cases and also for cutting to specified lengths.

Iron amalgam, in the shape of lamp or chandelier articles, as a substitute for copper, brass and bronze goods, was demonstrated at a recent fair at Leipzig, Germany. Certain toys were shown made from papier-mâché and from a number of new alloys which appeared as excellent as those formerly made of various metals.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, effective from April 10, 1916, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c.; Pacific coast (by rail only), 65c.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 2.50c. to 2.75c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 15 in.	.10
Angles over 6 in., on one or both legs	.10
Angles, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except engineer, heat-head, car truck and conductor bar)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55
No charge for cutting to lengths 3 ft. and over.	

Plates.—Tank plates, ¼ in. thick, 6 in. up to 100 in. wide, 2.90c. to 4c., base, net cash, 30 days, or ½ of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras

	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for locomotives)	.10
Boiler and flange steel plates	.10
"A. B. M. A." and ordinary firebox steel plates	.10
Still bottom steel	.10
Locomotive firebox steel	.20

Marine steel, special extras and prices on application

Gage Extras

Rectangular, ¼ in. thick, over 6 in. wide to 100 in. wide	Base
Lighter than ¼ in., to 3/16 in., up to 72 in. wide	.10
*Lighter than ¼ in., including 3/16 in., over 72 in. to 84 in.	.20
*Lighter than ¼ in., including 3/16 in., over 84 in. to 90 in.	.30
*Lighter than ¼ in., including 3/16 in., over 90 in. to 100 in.	.40
*Lighter than ¼ in., including No. 10, over 100 in. to 110 in.	.50
Lighter than 3/16 in., including No. 8, up to 72 in. wide	.10
*Lighter than 3/16 in., including No. 8, over 72 in. to 84 in.	.20
*Lighter than 3/16 in., including No. 8, over 84 in. to 90 in.	.30
Lighter than No. 8, including No. 10, up to 72 in. wide	.20
Lighter than No. 8, including No. 10, over 60 in. to 64 in., up to 72 in., not less than 14 lb. per sq. ft. will be considered ¼ in.	.30
Over 72 in. must be ordered ¼ in. thick or over, or not less than 11 lb. per sq. ft. to 100 in. wide	.40
Over 72 in. wide, ordered less than 11 lb. per sq. ft. and up to weight of 3/16 in., take price of 3/16 in.	.50
Over 72 in., ordered weight 3/16 in., take No. 8 price	.50
Over 72 in., ordered weight No. 8, take No. 10 price	.60

Width Extras

Over 100 in. to 110 in. inclusive	.10
Over 110 in. to 115 in. inclusive	.10
Over 115 in. to 120 in. inclusive	.15
Over 120 in. to 125 in. inclusive	.25
Over 125 in. to 130 in. inclusive	.50
Over 130 in.	1.00

Length Extras

Universal plates 80 ft. long up to 90 ft. long	.10
Universal plates 90 ft. long up to 100 ft. long	.15
Universal plates 100 ft. long up to 110 ft. long	.20

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over	
Lengths under 3 ft. to 2 ft. inclusive	.25
Lengths under 2 ft. to 1 ft. inclusive	.50
Lengths under 1 ft.	1.55
Circles 3 ft. in diameter to 100 in.	.30
Circles over 100 to 110 in. (width extra)	.10
Circles over 110 to 115 in. (width extra)	.10
Circles over 115 to 120 in. (width extra)	.15
Circles over 120 to 125 in. (width extra)	.25
Circles over 125 to 130 in. (width extra)	.50
Circles over 130 in. (width extra)	1.00
Circles under 3 ft. to 2 ft. inclusive	.30
Circles under 2 ft. to 1 ft. inclusive	.50
Circles under 1 ft.	.75
Half circles take circle extras	
Sketches, not over four straight cuts, inc. straight taper	.10
Sketches having more than four straight cuts	.20
Plates sheared to a radius take complete circle extras.	

*Including extra for width.

Wire Rods.—Including chain rods, $55 to $60.

Wire Products.—Prices to jobbers, effective May 1: Fence wire, Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, $2.45; galvanized, $3.15. Galvanized barb wire and staples, $3.35; painted, $2.65. Wire nails, $2.50 to $2.60. Galvanized nails, 1 in. and longer, $2 advance over base price; shorter than 1 in., $2.50 advance over base price. Cement-coated nails, $2.50. Woven wire fencing, 61½ per cent off list for carloads, 60½ off for 1000-rod lots, 59½ off for less than 1000-rod lots.

The following table gives the price per 100 lb. to retail merchants on fence wire in less than carloads, with [illegible] added to the base price:

| | | |

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin,	Lead		Spelter	
		Electro-	New	New	St.	New	St.
July	Lake	lytic	York	York	Louis	York	Louis
5	26.75	26.50	39.00	6.50	6.40	10.50	10.25
6	26.50	26.25	39.00	6.45	6.30	10.00	9.75
7	26.50	26.25	39.00	6.45	6.30	9.50	9.25
8	26.50	26.25		6.45	6.30	9.50	9.25
10	26.25	26.00	38.75	6.45	6.25	9.25	9.00
11	26.00	25.75	38.50	6.45	6.25	9.00	8.75

NEW YORK, July 12, 1916.

The reaction in the metals continues. Copper is dull, with second-hand offerings making the market. Tin is quiet and lower. Lead has shown a little activity, but prices are lower. Consumers continue to neglect spelter, except for inquiry, and it has declined steadily. Antimony is nominally lower.

New York

Copper.—The market has continued extremely dull in the past week, and the nominal quotations are based entirely on offerings by second hands. While prompt electrolytic may nominally be called 25.75c., cash, New York, it is probable that 25.50c. would be accepted, although some sellers quote up to 26c. Lake is around 26c., cash. At these prices, however, not a great deal of metal can be obtained. Most of the larger producers, all of whom are well sold up, are quoting 28c. to 29c. for publication, but it is known that they are willing to make substantial concessions for future deliveries; and it is furthermore intimated that some of the metal now being offered by brokers really belongs to producers. If the market is to be sustained, war orders must be forthcoming. The one supporting influence at present is the fact that the producers are so comfortably booked. The London quotation for electrolytic is down to £128. The exports this month, including yesterday, total 4913 tons.

Tin.—In the week ended July 8, probably not more than 250 tons was dealt in, and this week the market has been dull to the point of stagnation. The explanation lies in the heavy June deliveries. Yesterday, the price of spot Straits was 38.50c., with spot Banca at 37.75c. The London market and that of Singapore is weak, with Straits at London down to £169 15s. The arrivals this month total 725 tons, and there is afloat 2234 tons.

Lead.—This metal has been the most active on the list, but this is not saying much. While some interests did very little last week, others say their sales amounted to a fair aggregate. Late on July 5 the American Smelting & Refining Company reduced its price ½c. to 6.50c., New York, and 6.42½c., St. Louis, a drop of $10 per ton. It is assumed that the leading interest was not getting its share of what little business was stirring and therefore lowered its quotations. The move did little good, however, as the independents immediately cut the new price from $1 to $2 per ton. Following the reduction there was a fair amount of buying by consumers who had allowed their stocks to become low, but it only lasted one day and since then quiet has prevailed. Independents yesterday quoted 6.45c., New York, and 6.25c., St. Louis. The exports this month total 1037 tons, including those of yesterday.

Spelter.—The downward course of the market has continued without a break and a point has been reached where the producers are not anxious to sell, especially for future delivery. Yesterday there was a good volume of inquiry from galvanizers, indicating that the level of prices is beginning to arouse interest on their part. As yet, however, little or no business has resulted. Prompt spelter was to be had yesterday at 9c., New York, and 8.75c., St. Louis. August delivery is around 8.25c., St. Louis, and September at about 8c. In London the market has been declining, and yesterday spot metal stood at £44. The dull and easy market is ascribed to big stocks and over production. Reports from the West say that mines are closing down and the production of ore already shows a substantial decrease. Interest is taken in offerings of Japanese spelter in this market, but the quantities are too small to have any great effect on conditions. The exports this month, including yesterday, total 2124 tons. Sheet zinc is now quoted at 15c., carload lots f.o.b. smelter, 8 per cent off for cash.

Antimony.—Prompt metal is offered at 15.50c. and that in bond at 12c., but there is no business.

Aluminum.—No. 1 virgin aluminum, 98 to 99 per cent pure, spot delivery, is quoted at 58c. to 60c. per lb.

Old Metals.—The market is very unsettled and still declining. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible	23.00 to 24.00
Copper, heavy and wire	22.00 to 23.00
Copper, light and bottoms	17.50 to 18.50
Brass, heavy	13.00 to 14.00
Brass, light	10.50 to 11.00
Heavy machine compositions	17.00 to 18.00
No. 1 yellow rod brass turnings	13.50 to 14.50
No. 1 red brass or composition turnings	14.50 to 15.50
Lead, heavy	6.00
Lead, tea	5.50
Zinc	7.00 to 8.00

Chicago

JULY 10.—With trading light in all of the metals, concessions and a lower level of prices are the rule. Another substantial reduction in spelter prices is noted. We quote: Casting copper, 24.25c.; Lake copper, 26.75c.; tin, carloads, 39.25c., and small lots, 42c.; lead, 6.45c.; spelter, 9c.; sheet zinc, 17c.; Cookson's antimony, 50c.; other grades, 18.50c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 18c.; copper bottoms, 16c.; copper clips, 17c.; red brass, 16c.; yellow brass, 12c.; lead pipe, 4.75c.; zinc, 5.50c.; pewter, No. 1, 27c.; tinfoil, 27.50c.; block tin pipe, 32.50c.

St. Louis

JULY 10.—Weakness predominates with quotations at the close to-day as follows: Lead, 6.25c.; spelter, 9.50c. to 10c.; tin, 39c.; Lake copper, 27c.; electrolytic copper, 26.50c.; antimony, Asiatic, 22c. In the Joplin district prices declined further as a result of conditions in the spelter market so that the range of prices for zinc blende, basis of 60 per cent zinc, was from $80 for first grade ores down to $60, with the average for the week $70. Calamine sold at $40 to $55, with the average for the week $44. Lead ore decreased $2.50 per ton to $75, basis of 80 per cent metal, with the district average at $73. The district production continues very heavy and the market is not strong enough to consume all the ore made. It is estimated that about 25,000 tons of ore are now stored in the district with every prospect of an increase. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 8.50c.; heavy yellow brass, 11.50c.; heavy red brass and light copper, 15c.; heavy copper and copper wire, 18c.; pewter, 25c.; tinfoil, 32c.; zinc, 7.50c.; lead, 5c.; tea lead, 4c.

Creditors and bondholders of the Dayton Coal & Iron Company, at a meeting in Chattanooga, Tenn., agreed to a private sale of the property of the bankrupt company. Besides two blast furnaces at Dayton, Tenn., one 80 ft. x 18 ft. 3 in., and the other 75 x 17 ft., partly dismantled, the property includes 357 beehive coke ovens. S. M. Chambliss represented the Central Trust Company, New York, and other bondholders.

The Stowell Mfg. & Foundry Company, South Milwaukee, Wis., operating malleable, gray iron and brass foundries and a machine shop specializing in the production of stamped products and the manufacturing of complete articles for the market, has changed its name to the Stowell Company.

The offices of the C. Newman Wire Company, Inc., maker of tempered and untempered cast steel wire and round, flat and special shapes of cold-rolled steel, have been removed from 143 Liberty Street, New York, to 25 Church Street.

BETHLEHEM CHANGES

Acquisition of Pennsylvania Steel Company Properties Formally Completed

The following announcement was made on July 6, signed by the Bethlehem Steel Company, E. G. Grace, president, and the Pennsylvania Steel Company, E. C. Felton, president:

"All of the properties and businesses as going concerns of the Pennsylvania Steel Company and Maryland Steel Company have this day been acquired by Penn-Mary Steel Company, a subsidiary of Bethlehem Steel Company, and such properties and businesses will hereafter be operated under lease by Bethlehem Steel Company, which has taken over all contracts, has acquired all current accounts and is prepared to meet all outstanding obligations of such companies when due.

"All unfinished contracts of these companies will be carried out and performed by Bethlehem Steel Company without interruption.

"The books of account will be kept at, and all payments will be made from, South Bethlehem, Pa., and checks for accounts due to the Pennsylvania Steel Company or Maryland Steel Company should be drawn to the order of Bethlehem Steel Company and mailed to South Bethlehem, Pa.

"The executive, treasury, accounting, sales and purchasing departments will have their headquarters at South Bethlehem, Pa., to which letters intended for their attention should be addressed."

As was indicated some time ago, the procedure in connection with the Bethlehem acquisition of the Pennsylvania and Maryland properties means the complete disappearance of these companies, their places being taken by the new corporation, known as the Penn-Mary Steel Company. Among the legal procedures marking the change was the filing at Harrisburg on July 6 of a deed transferring the Pennsylvania Steel Company's holdings to the Penn-Mary Steel Company, South Bethlehem, Pa. The consideration was $10,167,297. At the same time a mortgage for $60,000,000 was recorded against the property, with the Bankers' Trust Company, trustee, of New York, as holder. The Penn-Mary Steel Company was incorporated at Harrisburg about two weeks ago.

New Operating Appointments

Many changes in the operating and selling organizations result from the merger, and formal announcement of most of these was made on July 6.

L. W. Adams was appointed superintendent of Saucon plant, South Bethlehem; vice R. F. Randolph, general superintendent, resigned. R. M. Bird becomes superintendent of the rolling mills of the Lehigh plant, succeeding L. W. Adams, and William Bangser succeeds R. M. Bird as superintendent of the treatment department, Lehigh plant.

W. J. Thomas, who has been superintendent of the roll shops, has now been made superintendent of mills, Saucon plant. W. H. Clark of Bethlehem has resigned as superintendent of the Grey mill at the Saucon plant, and has accepted a position at Duluth, Minn.

Frank D. Carney, superintendent of the Steelton plant, becomes general metallurgist for the Bethlehem Steel Company and will be stationed at Bethlehem.

William S. Rutherford of the order department at Steelton becomes head of the order department at Bethlehem and will have charge of the distribution of all orders to the various plants.

Frank A. Robbins, Jr., confidential advisor to the former vice-president and general manager, J. V. W. Reynders, is retained in a similar capacity by General Manager Quincy Bent at Steelton.

Thomas O. Earle, superintendent of the bridge and construction department at Steelton; Charles H. Mercer, chief engineer, and Lewis E. Johnson, assistant to Mr. Earle, are transferred to South Bethlehem, where they will become part of the sales and engineering staff in charge of designing and field erection of work in connection with the bridge shop.

Carl B. Ely, assistant to the superintendent of the bridge and construction department of the Steelton, Pa., [illegible] has been appointed superintendent of transportation for the Pennsylvania Steel Company, at Steelton, Pa., has been appointed supervisor of yards on the Erie Railroad system, between Jersey City and Chicago, with headquarters at Jersey City.

John L. Howard has been made assistant general yardmaster of the Steelton, Pa., plant.

Changes in the Sales Organization

The general sales offices of the Pennsylvania Steel Company, the Maryland Steel Company and the Titusville Forge Company have been consolidated with the general sales office of the Bethlehem Steel Company. R. W. Gillispie, general manager of sales for the Pennsylvania and Maryland Steel companies at Philadelphia and Paul Mackall, sales agent for the Bethlehem Steel Company in the district of Pittsburgh and west, both go to Bethlehem as assistant general sales agents. Edward S. Knisely is general sales agent.

The following are sales agents of the combined branch offices and of the warehouses:

[illegible]

J. M. Price has been Chicago district sales agent of the Bethlehem company and his successor, R. E. Belknap, was formerly in charge of the Chicago office of the Pennsylvania Steel Company and more recently in charge of that company's New York office. S. H. Smith, who has been in charge of the Chicago office of the Pennsylvania Steel Company, will handle the Chicago district sales in the frog and switch department of the Bethlehem Steel Company. Neil S. Salsich of the Philadelphia office becomes sales agent in charge of the frog and switch department at Bethlehem. The New York office will occupy all of the fourteenth floor of 111 Broadway, the present quarters on the eleventh floor not being large enough to accommodate the enlarged staff through the consolidation of New York sales offices.

Robert W. Reed, district sales manager for the central and western Pennsylvania districts, with office at Steelton, has resigned and will go into business at Philadelphia.

Large Outlays for Improvements

Following an inspection of the works at Steelton, Pa., Tuesday, July 11, Charles M. Schwab, chairman of the Bethlehem Steel Corporation, announced contemplated expenditures of $15,000,000 on improvements at the Steelton plant. He added that the improvements in the blast furnace and power departments will be pushed to early completion. The new work contemplated is said to be additional coking plants, new rolling mills, including a plate mill, and general electrification.

For the works at Sparrows Point, Md., it is understood that plans have been made in a general way involving the expenditure of about $20,000,000. In the inspection party accompanying Mr. Schwab were E. G. Grace, president; H. S. Snyder, C. A. Buck and F. W. Roberts, vice-presidents; F. A. Schick, comptroller, and Quincy Bent, general manager at Steelton. The inspection of the Sparrows Point plant took place Wednesday.

A South Bethlehem, Pa., telegram of July 10 refers to the announcement there on July 10 of a $1,000,000 outlay at the Saucon plant, covering three 20-ton converters, a 1500-ton mixer and two 200-ton tilting open-hearth furnaces.

PERSONAL

George E. Emmons, who has been plant manager of the General Electric Company at Schenectady, N. Y., for twenty years, was recently elected a vice-president of the company.

The Sun Shipbuilding Company, Chester, Pa., announces the following elections and appointments: J. Howard Pew, Joseph N. Pew, Jr.; William C. Sproul, Robert Haig and J. A. Sim, members of the executive committee; Robert Haig, formerly chief engineer for Lloyd's, general manager of the shipbuilding company and president of Robert Wetherill & Co., Inc., owned by the shipbuilding concern; Henry J. Klaer, assistant to Mr. Haig and stationed at the Wetherill plant; James H. Garthwaite, general manager of the Wetherill plant; J. A. Sim, formerly of the Fore River Shipbuilding Company, Quincy, Mass., general manager of hull construction and shipyard departments; A. A. Howitz, chief engineer; W. Cunliff, assistant chief engineer; A. B. Saunders, chief naval architect. The last three have been connected with the New York Shipbuilding Company, Camden, N. J.

Oscar Hedstrom, from 1901 to 1912 chief designer of the Hendee Mfg. Company, Springfield, Mass., has again become connected with the company as mechanical engineer.

A. J. Lindemann, president of the A. J. Lindemann & Hoverson Company, Milwaukee, has been elected vice-president of the newly organized Wisconsin branch of the World Peace Court League.

John Bennett Bissell, formerly president of John Bennett Bissell, Inc., exporter, has been appointed manager of the export and Eastern structural sales departments of the Blaw Steel Construction Company, Pittsburgh. He will be located at the company's office, 165 Broadway, New York.

F. D. Halstead, who has been secretary and treasurer of the Mount Union Refractories Company, Mount Union, Pa., since its incorporation in 1911, has retired. For 11 years prior to that time he was secretary and treasurer and general manager of the Queen's Run Fire Brick Company.

J. A. Eden, Jr., resigned his connection with the Bausch Machine Tool Company, Springfield, Mass., on June 24. He has no plans for the future.

Dean Emerson, in charge of the Detroit office of the Wagner Electric Mfg. Company, St. Louis, has moved the office to 1291 Woodward Avenue.

C. B. Woticky has been appointed electrical engineer and D. J. Cartwright assistant electrical engineer of the Lehigh Valley Railroad to standardize the electrical equipment and operation in shops and elsewhere. Both officials will have their offices in South Bethlehem, Pa.

James Brennan, who has been chief engineer and also in direct charge of the extensive improvements of the Crucible Steel Company of America, Pittsburgh, at its various plants for over six years, has resigned to go West. He expects to engage in engineering practice with headquarters in Chicago. J. H. Burgwin has been appointed to succeed him.

James B. Luttrell has been appointed district engineer of the Crucible Steel Company of America, with headquarters at Pittsburgh. This is a newly created position.

Albert J. Soden has been appointed mechanical engineer for the Pittsburgh district of the Crucible Steel Company of America.

Williard Wilson has been appointed manager of sales in the Birmingham, Ala., district for the Carnegie Steel Company, the Tennessee Coal, Iron & Railroad Company and the Illinois Steel Company, succeeding F. A. Burr, who resigned on July 1.

Lyon Smith has been appointed a metallurgist for the Snyder Electric Furnace Company, Chicago, Ill.

A. F. Huston, president Lukens Iron & Steel Company, and H. I. Schotter, general manager Worth Brothers Company, have been elected president and vice-president respectively of the Chamber of Commerce of Coatesville, Pa., recently organized.

Robert J. Anderson has accepted a position as metallurgist with the American Rolling Mill Company, Middletown, Ohio.

Tracy W. Guthrie, formerly president of the Republic Iron & Steel Company, has been elected president and director of the reorganized United Coal Company.

Dr. William O'Neil Sherman, Pittsburgh, will represent the United States Steel Corporation and subsidiaries in research work outlined by the Rockefeller Institute at the base of the European field hospitals.

Unfilled Steel Orders Decrease

The monthly statement of the United States Steel Corporation for June showed a decrease in unfilled orders on its books of 297,340 tons, which is the first decrease since August, 1915. The total of unfilled orders at the close of business, June 30, was 9,640,458 tons. The following table shows the unfilled tonnage for each month, beginning Dec. 31, 1912:

June 30, 1916	9,640,458	Aug. 31, 1914	4,213,331
May 31, 1916	9,937,798	July 31, 1914	4,148,589
April 30, 1916	9,829,771	June 30, 1914	4,052,857
Mar. 31, 1916	9,331,601	May 31, 1914	4,298,160
Feb. 29, 1916	8,568,966	April 30, 1914	4,277,068
Jan. 31, 1916	7,922,767	Mar. 31, 1914	4,653,825
Dec. 31, 1915	7,800,220	Feb. 28, 1914	5,026,440
Nov. 30, 1915	7,189,489	Jan. 31, 1914	4,613,680
Oct. 31, 1915	6,165,452	Dec. 31, 1913	4,282,108
Sept. 30, 1915	5,317,618	Nov. 30, 1913	4,396,347
Aug. 31, 1915	4,708,445	Oct. 31, 1913	4,714,767
July 31, 1915	4,428,500	Sept. 30, 1913	5,003,785
June 30, 1915	4,678,196	Aug. 31, 1913	5,223,468
May 31, 1915	4,264,498	July 31, 1913	5,399,356
April 30, 1915	4,162,244	June 30, 1913	5,807,317
Mar. 31, 1915	4,257,749	May 31, 1913	6,324,322
Feb. 28, 1915	4,345,374	April 30, 1913	6,978,762
Jan. 31, 1915	4,248,571	Mar. 31, 1913	7,468,956
Dec. 31, 1914	3,836,843	Feb. 28, 1913	7,656,714
Nov. 30, 1914	3,324,592	Jan. 31, 1913	7,827,368
Oct. 31, 1914	3,461,097	Dec. 31, 1912	7,932,164
Sept. 30, 1914	3,787,667		

Plant Extensions of American Steel & Wire Co.

The 127-in. plate mill in the Shoenberger works of the American Steel & Wire Company at Pittsburgh, which has been operated only for short periods since 1907, is being made ready to start up. A good part of the equipment of this mill has been dismantled in the last few years and moved to other works of the company, and will have to be replaced. It is expected the mill will start about Sept. 1, and will have a monthly output of 4000 tons or more of sheared plates up to 120 in. wide.

Eight out of 10 furnaces in the zinc plant of the American Steel & Wire Company, at Donora, Pa., are in operation, and are turning out nearly their maximum output of zinc.

This company is also putting up a Koppers by-product coke plant at Cleveland, which will be ready for operation late in the year.

Italian Iron and Steel Imports in 1915

Italian imports of important steel products in 1915, as compared with those of 1913 and 1914, are given by the Board of Trade as follows, in metric tons:

	1913	1914	1915
Pig iron	[illegible]	[illegible]	[illegible]
Scrap	[illegible]	[illegible]	[illegible]
Steel ingots and blooms	7,287	17,416	[illegible]
Bars	[illegible]	[illegible]	[illegible]
Billets	[illegible]	[illegible]	[illegible]

Total imports of iron and steel were 690,499 tons in 1915, against 669,412 tons in 1914, and 741,847 tons in 1913.

The Mississippi Valley Transportation Company has been formed at St. Louis by Thomas S. Maffitt, J. D. Dana, and Edward F. Goltra, all interested in the new Mississippi Valley Iron Company, whose blast furnace at St. Louis will blow in about Aug. 1, for the purpose of establishing a barge system which will transport ore from the Waukon, Iowa, fields and elsewhere for the new furnace.

Pittsburgh and Nearby Districts

The leaders of the riot at the Edgar Thomson works of the Carnegie Steel Company at Bessemer, and the McClintic-Marshall Company works at Rankin, Pa., on May 1 and 2, were given severe sentences by the court in Pittsburgh last week. Fred W. Merrick, who is regarded as the leader of the strike, was sentenced to three years and six months in the workhouse. John H. Hall, who was president of the American Industrial Union, and whose discharge from the employ of the Westinghouse Company led to the strike, turned State's evidence, and was given one year in jail. Rudolph Bloom, one of the leading figures in the strike, was sent to jail for 18 months; and Anna Goldberg, the only woman convicted of participating in the riot, was sent to jail for one year.

The American Reduction Company, which now operates a plant in Pittsburgh, detinning the pig tin on old cans, finds that the quantity of cans that is offered is much larger than it can handle, and will build a new plant on the Baltimore & Ohio Railroad, in the Pittsburgh district, capable of taking care of 50 to 75 tons of tin cans per day.

The Carnegie Steel Company of Pittsburgh is adding a third unit to its Schoen steel wheel works at McKees Rocks, Pittsburgh. The present plant contains two units, turning out 1000 to 1200 solid forged and rolled-steel carwheels, and when the third unit is finished the capacity will be 1500 to 1800 carwheels per day. The new unit will be electrically driven, and is expected to be finished about Jan. 1, 1917.

The Ohio Steel Foundry Company, Lima, Ohio, is increasing its capital stock from $600,000 to $800,000.

The Mahoning Valley Steel Company, Niles, Ohio, has been incorporated under the laws of Ohio, with a capital stock of $600,000. The incorporators are Thomas E. Thomas, W. Aubrey Thomas, Jacob D. Waddell, John T. Harrington, and J. W. Blockburn. This is the company that is building a new six-mill sheet plant at Niles, Ohio, of which Jacob D. Waddell will likely be elected president. He was formerly manager of sales of the Brier Hill Steel Company, and W. A. Thomas is president of that concern.

The Schlieper Engineering Company, Ferguson Building, Pittsburgh, is acting as consulting engineer for the new plant of the Witherow Steel Company, to be built on Neville Island, Pittsburgh, referred to on page 1584 of THE IRON AGE of June 29. All operations in each department of the new plant, including mill drives and tools, will be electrical and automatic. Roller and conveying tables will be used, doing away with all hand work as much as possible. The equipment includes a 15-in. slitting stand, two complete trains of 14-in. mills, and one complete train of 9-in. mills, all driven individually by a 500-hp. motor each. Besides being well equipped with extra rolls for changing, there will be supplied two complete stands of 14-in. mill housings, always ready for making complete changes in rolling material.

A. Rasner, who has been president of the Standard Gauge Steel Company, Beaver Falls, Pa., since it was organized, has, with several of the directors, sold his stock in the company, largely to parties identified with the Union Drawn Steel Company, Beaver Falls. They will retire. On Tuesday, July 18, the directors will hold a meeting, at which a successor to Mr. Rasner will be elected, and also new directors to take the places vacated.

The Union Switch & Signal Company, Swissvale, Pittsburgh, will supply automatic block signals and other signal and safety devices for 35 miles of the Atlanta & West Point Railroad.

The Carnegie Steel Company, Pittsburgh, has completed a census of employees who recently enlisted for army service, the results being as follows: General office, 6; Homestead works, 25; Edgar Thomson works, 20; upper and lower Union mills, Pittsburgh, 3; Ohio works, Youngstown, 15; upper and lower Union mills, Youngstown, 2; New Castle plant, 15; Columbus works, 3; Waverly, N. J., warehouse, 3; Baltimore warehouse, 2; Philadelphia offices, 3; Duquesne works, Clark's [illegible], Newville [illegible], and the New Orleans sales office, one each. All these men are to be paid full time while in service, and their positions will be held for them until they return to work.

A Pennsylvania charter has been granted to the Clairton By-Product Coke Company, which will be a subsidiary of the Carnegie Steel Company, and will handle its by-product coke operations at Clairton, Pa., and possibly at other points. As yet, no officials have been elected, nor has the capital stock been determined upon.

A special meeting of the stockholders of the Ohio Fuel Supply Company will be held in its offices in the Farmers Bank Building, Pittsburgh, on Tuesday, July 18, to authorize an increase in the capital stock from $15,000,000 to $20,000,000. It is said the increased capital will be used by the company for acquiring 51 per cent of stock of the United Fuel Gas Company now held by the Columbia Gas & Electric Company.

The Westinghouse Air Brake Company, Wilmerding, Pa., has completed an order for 1,250,000 18-lb. shells for the Allies, and has discontinued the manufacture of shells. The company has let out from its service about 2000 men and women. Reports that the munition-making plants of the company would be dismantled are incorrect. The equipment will be retained, against the possibility of need by the United States Government. The airbrake department has sufficient orders for time fuses to keep that department running until about Jan. 1, 1917.

Julian Kennedy, Bessemer Building, Pittsburgh, has been retained as consulting engineer for four blast furnaces and other manufacturing plant to be erected by Henry Ford, Ford Motor Company, Detroit. The present program includes four blast furnaces, two to be erected at once, and a steel works and a plant for making tractors.

The usual annual conference of salesmen of the Colonial Steel Company, whose works are at Colona, Pa., was held in Pittsburgh last week. A total of 33 salesmen from the various large cities were in attendance. Plans and policies for the coming business year were discussed, and the salesmen were guests of the company at a dinner at the Fort Pitt Hotel, Friday night, July 7.

The commissioners of water works, Erie, Pa., are receiving sealed proposals for a 20,000,000-gal. turbine-driven, centrifugal condensing pumping unit. Plans are being prepared by Chester & Fleming, hydraulic engineers, Pittsburgh.

The Ball Engine Company, Erie, Pa., has let a contract for a 65 x 182-ft. factory addition.

The Whitaker-Glessner Company, Wheeling, W. Va., is placing contracts for its 500-ton blast furnace at Portsmouth, Ohio. The furnace and stoves are to be built by the William B. Pollock Company, Youngstown, Ohio. The Ingersoll-Rand Company, New York, will furnish the turboblowers; the General Electric Company, the turbines and motor-generator sets, and the Sheridan-Kirk Contract Company, the foundations. The stack will not likely be completed before the late summer of 1917.

The Westinghouse Electric & Mfg. Company, East Pittsburgh, is furnishing the electrical equipment and the Westinghouse Air Brake Company, Wilmerding, Pa., the airbrakes, for 240 all-steel cars to be delivered shortly to the Pittsburgh Railways Company.

The corner stone of the new Chamber of Commerce Building, to be located at Seventh Avenue and Smithfield Street, Pittsburgh, was laid on July 8. The first Pittsburgh Chamber of Commerce was organized just 40 years before the corner stone was laid for the new building. The new building is being erected by George T. Oliver, formerly prominently identified with the Oliver Iron & Steel Company and the Oliver Wire Company.

Follansbee Brothers Company, Pittsburgh, which operates a steel plant at Follansbee, W. Va., containing three open-hearth furnaces and seven sheet and tin mills, has been considering the building of a new

sheet mill, probably in some other location. A number of sites have been looked over. In the event that a site should be chosen it is not likely anything will be done this year on account of the high prices ruling for structural steel and labor. The company will not, in any event, add to its tin-plate capacity.

In June, out of 118 suggestions given by employees of the Cambria Steel Company, Johnstown, Pa., for betterment in service or in methods of manufacture, ten were adopted and awarded prizes. The boxes are placed at the exits of the different plants, and the workmen write out their suggestions and sign their names.

Owing to various delays in deliveries of materials and for other causes, the Youngstown Sheet & Tube Company does not expect to make coke in its new by-product coke plant at East Youngstown, Ohio, before September. It was expected to have the plant of 204 ovens completed in July.

A. M. Byers Company, Inc., of Pittsburgh, which operates a large puddling plant at Girard, Ohio, announces that its puddlers will be paid $8.40 per gross ton during July and August. This is an advance of about $1 over the rate paid in May and June, and is the highest rate paid for puddling since November, 1866, when it is said $9 per ton was paid for about one month under a sliding scale in force then.

New Heroult Electric Furnaces

Licenses for the installation of nine more Heroult electric furnaces have been issued by the United States Steel Corporation as follows:

The Lunkenheimer Company, Cincinnati, Ohio, will install a 1-ton furnace for making steel castings.

The Warren Steel Casting Company, Los Angeles, Cal., is operating a 1-ton furnace for making steel castings from cold scrap.

The Damascus Crucible Steel Casting Company, New Brighton, Pa., will install a 2-ton furnace for making manganese steel castings, using cold scrap.

The Timken Roller Bearing Company, Canton, Ohio, has ordered two more 6-ton furnaces for making steel for seamless tubes. These are in addition to the two 6-ton furnaces already provided for.

The Armstrong Whitworth Company of Canada at Longueil, Que., will install two 6-ton furnaces for making forged tires, wheels and axles from cold scrap. These are in addition to the one 6-ton furnace used for making tool steel.

Henry Disston & Sons, Inc., Tacony, Philadelphia, is to install one 3-ton furnace for making saw and tool steel from cold scrap.

The Tennessee Coal, Iron & Railroad Company, Ensley, Ala., is to install a 6-ton furnace for melting ferromanganese.

The building of the above will bring the number of Heroult furnaces in operation or contracted for in the United States and Canada to 72. Inquiry for new installations is reported to continue spirited. It is interesting to note that two American companies producing electric steel ingots from Heroult furnaces have recently sold 1000 tons each of steel billets for export to Italy.

A Blast Furnace for British Columbia

A movement is on foot to establish a blast-furnace plant in British Columbia. At a recent meeting of representatives of the Vancouver Chamber of Mines and the Intermunicipal Industries Committee, and others, a resolution was passed for the employment of a staff of engineers to report in four months on the supplies of iron ores accessible to the coast, and on the feasibility of establishing a smelter for such ores on the coast. At present there is only one small Bessemer-steel casting plant in British Columbia, but there are a number of copper smelters.

G. Hartmann, Ltd., machinery dealer, Christiania, Norway, has opened an office at room 729, Tribune Building, New York City. Catalogs and price lists of machinery, iron and steel products and copper and brass specialties are desired.

STRIKES AND SETTLEMENTS

Eight-Hour Demand at Milwaukee

MILWAUKEE, WIS., July 11—(*By Telegraph*).—The feeling is general in the metal trades that the local controversy over hours of labor will not result in a strike. Mass meetings of machinists, pattern-makers and molders were held Friday night, July 7, and union officials were authorized to present the demand for an eight-hour day at the present nine-hour wage and to declare a strike if the demand was not granted.

Only a small percentage of the local machine shops and foundries had received any communication from the machinists and patternmakers up to Tuesday night. The letter sent to some companies does not mention the eight-hour day, but says "the time has come when we must with firmness and resolution insist upon a substantial reduction of the hours worked per day without a reduction of the daily pay." The employers have issued a statement saying that while no formal demand for an eight-hour day has been put before them, their information being informal and unofficial, they will not change present conditions, as they are convinced they are dealing fairly with their employees. As proof of this they cite the fact that on July 1 they voluntarily reduced the weekly working schedule from 55 hours to 52½ hours.

Conditions in Ohio

The William Tod Company, Youngstown, Ohio, whose machinists have been on a strike since May 1, and whose machine shops have been practically closed since that date, has reopened them with new men secured from other places. These men were brought to Youngstown under the direction of the Mahoning Valley Employers' Association and the National Metal Trades Association. The new machinists will be housed and fed by the company. The Youngstown Foundry & Machine Company, Youngstown, Ohio, has likewise reopened its shop. A number of its former employees have returned to work and others are expected soon to follow.

Labor conditions in Cincinnati are about normal, with only a very few shops working less than the usual force. Some plants are employing more men now than at this time last year. Reports from nearly all sources indicate that employers have been surprisingly successful in training green help to take the places of striking workmen, and the output in a few shops is considerably above normal.

At Hamilton, Ohio, one large shop is still having trouble, but new men are being employed to take the places of the strikers, and this company expects to be operating normally at an early date. At Dayton, Springfield and Columbus, Ohio, no changes are reported, with only a few shops affected at any of these points.

Other Localities

The five-months' strike of the boilermakers, iron shipbuilder journeymen and apprentices of the Seattle Construction & Dry Dock Company, Seattle, has been settled, and the men have returned to work. The strike involved nearly 400 mechanics, and practically all of the men will be reinstated.

The John E. Thropps' Sons Company, maker of machinery and appliances for the manufacture of automobile tires, Trenton, N. J., is now operating under open shop conditions. The molders have been on strike for the past five months.

Bonus Wage Payments

The National Machinery Company, Tiffin, Ohio, has adopted a bonus plan under the terms of which the employees will be given 20 per cent bonus of their wages for the six months starting July 1. Payments will be made on the first pay-day in January.

The employees of the Carpenter Steel Works, Reading, Pa., who have been on the payroll since the first of the year received a bonus out of the company's earnings for the past six months.

New Menace of Higher Manufacturing Costs

(*Continued from page 89*)

the last condition because he has declined an offer of employment in a situation vacant in consequence of a stoppage of work due to, and forming part of, a labor dispute (strikebreaking); an offer of employment in the district (the law would divide the State into districts) where he was last ordinarily employed, such offer being at a rate of wage lower, or on conditions less favorable than those which he habitually obtained in his usual employment in that district; or an offer of employment in another district at a rate of wages lower, or on conditions less favorable than those generally observed in such district in the industry to which the offer relates.

The workman is disqualified while a resident outside of the State; if his unemployment is due to sickness or disablement; if he has lost his employment through his own fault or voluntarily leaves his employment without reasonable cause, such disqualification to last for six weeks. Furthermore, he is disqualified

if he has lost his employment in consequence of the stoppage of work which was due to, or forms part of a labor dispute at the factory, workshop or other premises where he is employed, and in such event disqualification continues during the stoppage unless such part of such dispute ceased to operate where he has, during the stoppage of the work, become *bona fide* employed elsewhere in an insured trade for at least three weeks.

Such disqualification shall not extend to workmen employed wholly in an occupation carried on in the same premises which the dispute occurred, whether carried on in a separate building or not, provided that the workmen in such different occupation have not become a party to the labor dispute either directly or sympathetically.

STRIKEBREAKING RULED OUT

These provisions regarding employment and labor troubles appear to mean that a workman would not be required to accept employment as a strikebreaker, nor would he be deprived of insurance benefits if he had been thrown out of work because of a strike in other trades. But as a striker, directly or sympathetically, he would not be entitled to benefits unless meanwhile he should go to work elsewhere.

Provisions are made for refunding contributions under certain conditions. Workmen who had contributed for twenty-six weeks or more if they had left the State for more than a year would receive back the amount of the premiums they had paid in, less the amount of whatever benefits they had received.

The old-age pension idea creeps into the measure in the provision that if a workman had paid contributions for 500 weeks and had reached the age of 60, his contributions, minus what he had received in benefits, would be refunded, with compound interest at 3 per cent. The same provision is made for the case of a man who was over 50 when the act went into effect, although the 500 payments had not been made.

The unskillful and ignorant workman in a trade is provided for. If it should appear to the insurance commissioners that repeated failure to obtain and retain employment was due wholly or partly to defective skill and knowledge, arrangement might be made for a test in order that it might be determined what was suitable employment for this particular man. If it were found that the defect could be remedied by technical instruction, the insurance fund might be drawn upon to provide it, if by so doing the charge on the fund might be decreased.

Some employers may look askance at the section providing that the commissioners "on application of any association of workmen in an insured trade, which provides payment to unemployed members, shall arrange, instead of paying benefits under the general provisions of the act, to pay into the treasury of such association periodically out of the unemployment fund such sum as shall be equivalent to the aggregate amount which such workmen would have received in the way of benefit under the act during periods of unemployment. But in no case shall this amount exceed three-fourths of the amount of the payments made by that association during that period to its unemployed members resident in the State."

Potash Manufacture at Buffalo

In further reference to the article in THE IRON AGE, June 29, 1916, on "A Potash Plant at Buffalo," the following description of the process will be of interest:

The raw materials used are feldspar rock, calcium chloride, limestone, and coke. These are charged into a water-jacketed blast furnace of the standard copper-smelting type, having a 42 x 120-in. hearth. Two products are obtained: Potassium chloride, averaging over 80 per cent KCl, commonly known as muriate of potash, and a slag from which a hydraulic cement is made. The feldspar rock used is a silicate of alumina and potash, averaging 12 per cent K_2O. The chlorine of the calcium chloride combines with the potassium at a temperature of 1100 to 1400 deg. C., and passes out at the top of the furnace as a fume, which is collected in cyclone dust collectors and a gas washer. The limestone is added to flux the silica and alumina in the feldspar rock, and also the ash of the coke, forming a slag which is tapped from the furnace, granulated and manufactured into hydraulic cement. Over 90 per cent of the potash in the charge is recovered in the form of potassium chloride, and of that amount 80 per cent is collected in the dry collectors and 20 per cent in the washer.

Highest Puddling Rate Since 1866

The examination of sales sheets of bar iron mills working under the Amalgamated scale, made at Youngstown, July 11, showed that the average price on shipments of iron bars in May and June was 1.85c. At mills under the Amalgamated sliding scale this price entitles puddlers to a rate of $8.40 per ton for July and August, against $7.42½ per ton in May and June. Finishers will receive an advance of about 10 per cent. These are the highest wage ever paid for puddling and finishing since November, 1866, when $9 was received for puddling for a period of 30 days under the sliding scale. At that time bar iron sold at $112 a ton.

It was announced Monday that the adjourned bar iron conference will be held next week in Detroit. The union puddlers ask that the base rate be increased 15 per cent over the 1915-1916 agreement. James H. Nutt of Youngstown, secretary of the Western Bar Iron Association, will represent the manufacturers, while John Williams of Pittsburgh will head the Amalgamated Association conferees.

A person unknown to Barker, Chadsey & Co., 38-40 Westminster Street, Providence, R. I., jobbers in mill supplies and hardware, is representing himself as Mr. Barker of that firm, and has obtained money under this false pretense from firms in Brooklyn, N. Y., and Columbus, Ohio.

Recent surveys of the iron deposits in the basin of the river Telbess, and of those in the so-called Temir-Tau district in Siberia, indicate the presence of 27,000,000 tons of iron ore, averaging from 54 to 58 per cent iron for a large part of it.

OBITUARY

HOLLINSHEAD W. TAYLOR, senior member of the firm of N. & G. Taylor Company, manufacturer of tin plate, Philadelphia, Pa., died suddenly of heart disease Friday, July 7, 1916, at his residence, Chestnut Hill, Philadelphia. He was born in Philadelphia in 1850 and is survived by his widow and two children. He was a member of the Union League of Philadelphia, the Down Town Club and the Philadelphia Cricket Club. He was the last of the third generation of Taylors connected with this old company, established in 1810 by his grandfather, William Taylor, and his great uncles, George and Tracy Taylor. He began his connection with the firm under his father, and his business activity in this line falls just short of half a century. It is an interesting fact that the art of tinning was introduced into England about the year 1720 by one of Mr. Taylor's ancestors, Major John Hanbury, of the Hanbury-Tracy family, at Pontypool, Wales, who established the first permanent plant for the production of tin plate on British soil. When the McKinley tariff made possible the production of tin plate in this country about 1891, the firm of N. & G. Taylor Company, composed of Hollinshead W. Taylor, his brother Nathan A. Taylor and his second cousin George W. B. Taylor, immediately made the necessary arrangements to manufacture high grade tin plate, the equipment and processes being transplanted bodily from Wales, thus affording a rather striking historical parallel—their forebear Major Hanbury having been the pioneer of the industry in the mother country. The business will be continued under the same name by the surviving partners, Hollinshead N. Taylor, his son and William W. Justice.

GEORGE BOULTON, a pioneer steel manufacturer of Pittsburgh, died at the residence of his daughter at Ardsley-on-the-Hudson, N. Y., early Sunday morning, July 9. He was 82 years of age, and his death was caused by heart failure. Mr. Boulton was a boyhood friend of Andrew Carnegie, and the two worked together for the Pennsylvania Railroad in their youth. When the Pittsburgh & Connellsville Railroad, which subsequently became the Baltimore & Ohio, was completed, Mr. Boulton was the first agent in Pittsburgh. In 1865 Mr. Carnegie, David A. Stewart and others organized a company to develop oil lands in Venango County and sent Mr. Boulton to the field as superintendent. For 16 years following he was in the oil country. In 1885 he returned to Pittsburgh, and with his brothers, Alexander and Daniel Boulton, brought the first natural gas to the Pittsburgh district, supplying the Edgar Thomson steel works at Bessemer. He was president of the Acme Gas Company until, with Park Brother Company, Ltd., and others, he financed and built the works of the Allegheny Bessemer Steel Company at Duquesne, Pa., now the Duquesne works of the Carnegie Steel Company, of which he was president. When reorganization of the corporation was effected, and the Duquesne steel works succeeded the first-named concern, he was made vice-president and superintendent, which position he held until his retirement from active business in 1895. Mr. Boulton leaves a widow, two daughters and one brother.

DANIEL EDMUND GARRISON, president of the Corrugated Bar Company, St. Louis and Buffalo, N. Y., and also interested in the Columbia Incandescent Lamp Company, died Tuesday, July 4, at St. Louis, Mo., at the age of 76 years after a short illness. He was born at Sharpsburg, Pa., but removed with his parents to St. Louis. In 1869 he took charge of the Kingsland Iron Company, which was later merged with the Vulcan Steel Company, becoming vice-president and general manager. He leaves one son, Arthur C. Garrison.

CHARLES L. F. ROBINSON, president of the Colt's Patent Fire Arms Mfg. Company, Hartford, Conn., died suddenly during the night of July 5 on board his yacht near Newport, R. I. He had not enjoyed good health since 1913, in which year he was severely injured in an automobile accident, suffering a dislocation of the vertebrae of the spine. Mr. Robinson was born July 9, 1874, in Sayville, Long Island, N. Y., and was graduated from Sheffield Scientific School, Yale University, in 1895. He had been a resident of Hartford for ten years. He was a director of the American Hardware Corporation, New Britain; the Standard Wrench Company, Providence, and of many financial institutions and insurance companies of his home city.

HARRY E. FLEWELLIN, who was connected with the sales department of the International Nickel Company for twelve years, died in Caldwell, N. J., June 26. He had been in ill health for nearly two years.

Lackawanna Steel Company's Earnings

The rate of profit earned by the Lackawanna Steel Company and subsidiary companies for the second quarter of this year was 35.31 per cent on the $34,750,000 of common stock outstanding. For the half year the rate of profit is 30.61 per cent. The unfilled orders on June 30 amounted to 932,857 gross tons, against 283,979 gross tons one year ago. A comparative statement of the income account is as follows:

Income Account, Second Quarter

	1916	1915	Increase
Total net earnings after deducting all expenses, including ordinary repairs and maintenance	$4,051,033 47	$1,152,044 84	$2,898,988.63
Deduct:			
Interest on bonds, debentures and notes:			
Lackawanna Steel Company	368,833 34	402,500 00	
Subsidiary companies	75,829 18	77,475 00	
Rentals and royalties	25,359.00	25,359.00	
	470,021.52	505,334.00	
Balance	3,581,011.95	646,710.84	2,934,301.11
Less:			
Appropriations:			
For extinguishment of mines and mining investments	82,597.51	74,654.43	7,943.08
For depreciation and accruing renewals	431,140 74	303,672 17	127,468 57
	513,738 25	378,326 60	135,411.65
Profit for second quarter	3,067,273 70	268,384 24	2,798,889 46

Income Account, First Half

	1916	1915	Increase
Total net earnings after deducting all expenses, including ordinary repairs and maintenance	$7,298,626 77	$1,351,888 48	$5,946,738.29
Deduct:			
Interest on bonds, debentures and notes:			
Lackawanna steel Company	771,333 34	828,283 34	
Subsidiary companies	152,491.68	154,950.00	
Rentals and royalties	50,818 00	50,818 00	
	974,643.02	1,034,051.34	
Balance	6,323,983.75	317,837.14	6,006,146.61
Less:			
Appropriations:			
For extinguishment of mines and mining investments	154,389.83	107,160.07	47,229.76
For depreciation and accruing renewals	851,251 79	508,051 60	343,200.19
	1,005,641 62	615,211 67	390,429.95
Profit for first half	5,318,342.13	*297,374.53	5,615,716.66

*Loss

Phenol or carbolic-acid manufacturers in the United States now number 19, turning out an estimated total of 12,000 tons per year. One-quarter is understood to be made by the Barrett Company at Philadelphia. Before the war, the acid used in this country was mostly imported, but the large increase in the benzol output has aided materially in the expansion of the industry.

Atkinson & Utech, Inc., 111 Broadway, New York, have been appointed Eastern sales agents for J. R. Johnson & Co., Richmond, Va., manufacturers of open-hearth steel car axles.

Machinery Markets and News of the Works

MARKET CHANGES EASILY

Resale Machines Causing Little Worry

Makers of Standard Engine Lathes Can Give Fairly Prompt Deliveries—Boring Mills Are Active

With deliveries drawing nearer, and used tools beginning to appear in greater numbers, the transition of the machinery markets from war activity to conditions normal in character continues to go on smoothly. Tool builders are busy on orders yet to be filled, and generally are receiving a satisfactory volume of business, most of which consists of scattered requirements of single machines. From several directions come reports of easiness in engine lathes. Long-established makers are reaching a point where they can make fairly prompt deliveries, and newcomers in the lathe field do not find it so easy to dispose of their output.

The offerings of second-hand tools by munitions makers is not causing much worriment. Dealers are inclined to be conservative, in view of these resale machines; but it is yet too early to say just what the effect will be. Some tool builders feel protected against the remarketing of tools which they built and sold, for the reason that they had this contingency in mind when they fixed the war prices for their machines.

Boring mills and grinding machines have moved well in New York. In this city, dealers have been getting considerable export business.

Boring mills have been active in Cincinnati also, while large engine lathes have been in fair demand for large shell work.

Cleveland reports a good demand for single tools and for forging, bolt-and-nut machinery, twenty-five of which were taken for shipment to South America.

The demand in Milwaukee is mostly limited to standard tools.

The lathe situation is a problem with the Chicago trade, as elsewhere. It is pointed out that the supply, including used machines, exceeds the demand.

While the Pacific Northwest is enjoying a period of prosperity, the San Francisco district is harassed by a water-front strike, which it is feared will be followed by more serious labor troubles.

Canada has more millions to spend for munitions.

New York

NEW YORK, July 12, 1916.

Business in the past week was more active than in the preceding one, and the aggregate done by all sellers was satisfactory. One or two selling offices report one of the best weeks since the heavy war buying of a few months ago. Boring mills and grinding machines have been especially active, together with smaller sizes of turret lathes. Conditions are regarded as healthy in view of practically all the domestic demand coming from industrial sources.

The foreign demand continues good, and many orders are being received by dealers who ordinarily do not do much with foreign buyers. The latter continue to look mostly for machines suitable for munitions work. Deals involving shipments to Italy, Russia, France, Spain and Sweden have been made. A cable inquiry concerned six planers on which shipment cannot be made until December or January.

In the past week [illegible] of the number of new names [illegible] Deliveries cannot be had on [illegible] before November, while [illegible] Some newcomers in the machine tool field are not finding it easy to dispose of their output, largely because they began to manufacture at too late a day. With standard tools deliveries continue to [illegible]

Some sellers of machine tools are conservative with regard to the future in view of the offerings of used machines by firms who [illegible] war orders, the possibility of cancellations, etc. Where there have been cancellations, and altogether there have been but a few, no difficulty was had in reselling the machines and the only loss was the extra work involved in the second sale. Prices continue firm. Certain firms are not much worried over resales of machines which they disposed of in the days of buying work, come with the placing of munitions orders, for the reason that they made prices which insured them against the appearance of their machines on the second-hand market.

The Weil Machinery & Engineering Company, 30 Church Street, New York, has placed additional orders for machinery to equip a ball bearing plant at Sweden. Not all the tools required have been purchased.

The Intertype Corporation, manufacturer of typesetting machines, foot of Montague Street, Brooklyn, N. Y., recently incorporated with $2,650,000 working capital, has purchased for $1,640,000 the assets of the International Typesetting Machine Company, thereby effecting a reorganization. Charles D. Palmer is president, A. F. J. Wheatley, secretary, H. R. Swartz, treasurer, and H. W. Cozzens and H. W. Miller are assistants to the president. W. S. Scudder is superintendent. The board of directors is composed of Charles D. Palmer, Edward D. Adams, Wellington E. Bull, George C. Haigh, Erskine Hewitt, Marsden J. Perry, Henry Ruhlender, William Shilhaber and Richard H. Swartwout. It takes over the new and well-equipped plant of its predecessor and the former technical staff.

The Victor Electric Corporation has been incorporated in New York with a capital of $3,500,000 to consolidate the business and properties of the Victor Electric Company of Chicago and New York, the Scheidel-Western X-Ray Company of Chicago and New York, the Macalaster-Wiggin Company of Cambridge, Mass., and the Snook-Roentgen Mfg. Company of Philadelphia, manufacturers of x-ray apparatus. The details of organization have been managed by Herbert S. Blake & Co., 30 Church Street, New York. The permanent officers will be Charles F. Samms, president; Clinton W. Howe, vice-president, H. Clyde Snook, vice-president, Frank H. Swett, vice-president; Fred A. Wiggin, treasurer; Theodore B. McClintock, secretary and manager of sales; Julius B. Wantz, manager of production, G. Herbert White, assistant treasurer; Edwin W. Kelly, assistant secretary; Herbert S. Blake, chairman of the board of directors. The board of directors will be J. Frederick Hartz, Charles F. Samms, Clinton W. Howe, H. Clyde Snook, Frank H. Swett, Fred A. Wiggin, Theodore B. McClintock, G. Herbert White and Herbert S. Blake.

The Unimac Tool Company, recently incorporated with a capital stock of $6,000 by D. H. MacBeth, R. J. Bentel, L. E. Matty, has established a plant at 18 Dunham Place, Brooklyn, N. Y. for the manufacture of special automatic machinery, tools, jigs, fixtures, etc.

The C. T. Coe Company, manufacturer of turbine blowers and sectional grates, 10 Johnson Street, Newark, N. J., is increasing its manufacturing space to provide for a needed increase in capacity.

The Eastman Kodak Company, Rochester, N. Y., has purchased 85 acres of land adjoining its plant for $107,000. Arrangements have been made to connect all the plants at Kodak Park with double-track railways. The property now covers 720 acres.

Samuel W. Moore & Sons, Inc., recently incorporated with a capital stock of $50,000, has leased a plant at Mulberry and Scott streets, Newark, N. J., for the manufacture of fiber and wood pulp food product containers; but it anticipates building a plant. E. J. Schwarz is president; Samuel W. Moore, vice-president; William Matthews, treasurer, and Arlington Moore, secretary and general manager.

The Cunningham Foundry Corporation, Boonton, N. J., [illegible] incorporated with a capital [illegible] of $15,000, and

has taken over the plant and business of James S. Cunningham, manufacturer of grate bars, furnace equipment and turbine blowers.

The Pathe Freres Phonograph Company, 29 West Thirty-eighth Street, New York, has increased its capital stock from $900,000 to $1,300,000 to provide for the erection of its new plant in Brooklyn.

The Fancher Furniture Company, Salamanca, N. Y., is erecting a three-story addition, 50 x 100 ft. A. T. Fancher is president and John Walrath treasurer and manager. Most of the equipmeent to be installed has been purchased.

The Bath Harness Company, Bath, N. Y., will rebuild its factory, which was destroyed by fire June 30. New machinery will be installed, which will be operated by individual electric motors. E. K. Derrick is manager.

The National Air Cell & Covering Company, 212 Van Brunt Street, Brooklyn, N. Y., has awarded contract to James Mitchell, 76 Montgomery Street, Jersey City, N. J., for a four-story reinforced concrete factory, 80 x 306 ft., to be erected in South Cove from plans by John T. Rowland, Jr., 100 Sip Avenue, Jersey City, to cost about $100,000. It is in the market for engines, boilers and hydraulic presses.

The Morrow Mfg. Company, Elmira, N. Y., has let contract to the William R. Compton Realty & Construction Company, 201 Lake Street, Elmira, for the construction of unit No. 49 at its plant, one story, 370 x 1000 ft., to cost about $150,000. Rhines & Bellman & Nordoff, Ohio Building, Toledo, Ohio, are the architects and engineers. J. E. Morrow is secretary.

The Adriance Machine Works, Inc., 254 Van Brunt Street, Brooklyn, N. Y., manufacturer of can-making machinery, presses, etc., has purchased a block fronting 200 ft. on Richards Street and 400 ft. on Verona and Delevan streets. The company originally intended to erect an eight-story unit with a one-story erecting shop 50 ft. wide through the center; but owing to the high cost of labor and materials, it will probably modify this plan and construct a one-story building, 100 x 200 ft., on Richards Street, with a one-story erecting shop, 50 x 100 ft., in the center at the rear. It will concentrate its several scattered plants in this new building. All equipment will be individually motor driven. F. H. Morse is secretary and treasurer.

The Jersey City Metal Treating Company, recently incorporated with a capital stock of $100,000, has established headquarters at 210 Randolph Street, Jersey City, N. J. H. J. Whittaker, Philadelphia, Pa., is president and J. C. Sandmeyer, Jr., Newark, N. J., is secretary and treasurer. It will do annealing, case hardening, hardening and tempering, and heat treating.

The Reliance Architectural Iron Works, 251 Monitor Street, Brooklyn, N. Y., plans to build a new shop, 40 x 60 ft., to constitute a new structural bay in its present plant. It is installing several structural machines. O. J. Bloss is proprietor.

The Mica Insulator Company, Schenectady, N. Y., suffered a loss by fire of about $3,000, which put about half of its equipment temporarily out of use. C. W. Jefferson is manager.

William Bartley & Sons, Inc., manufacturer of portable sawmills, gray-iron castings, etc., contemplates building a one-story stone machine and pattern shop, 27 x 87 ft., to replace its two-story plant which was recently burned down. J. F. Parliment is treasurer.

The H. & N. Carburetor Company, recently incorporated with a nominal capital of $1,500, has established its office at 1790 Broadway, New York City, and has located its factory at Loraine, N. J. It maintains a service station at 38 West Sixty-second Street, New York. W. H. de Fontaine is president and treasurer; A. Ross Jarman, vice-president, and Elmer Pontin, secretary.

New England

BOSTON, MASS., July 10, 1916.

The New Haven Lines have been obliged to extend the partial embargo, which was put in force at the time of the heavy troop movements, until July 12. Most manufacturers are now so well stocked that no serious trouble is expected from the enforcement of the embargo.

Landers, Frary & Clark, New Britain, Conn., have had plans drawn for an addition, 60 x 150 ft., two stories, which will be devoted to the sell-heat work, used in connection with their extensive line of cutlery and other products.

Work has been begun on a factory, 110 x 200 ft., to be erected on Freight Street for the American Brass Company, Waterbury, Conn.

The Chapman Mfg. Company, Boston, Mass., has been incorporated with capital stock of $400,000 to manufacture mill machinery. The directors are Daniel J. Shea, president; Alton F. Tupper, Arlington, treasurer, and D. L. Wilson.

The Automatic Advertising Machine Company, Boston, Mass., has been incorporated with capital stock of $50,000. The directors are S. D. Brown, president; J. Colby Stevens, Malden, treasurer; and George E. Smith.

The Graton & Knight Mfg. Company, Worcester, Mass., has bought land adjoining its present property to provide for future plant expansion.

The Bryant Electric Company, Bridgeport, Conn., has reduced its capital stock from $2,500,000 to $2,000,000.

Philadelphia

PHILADELPHIA, PA., July 10, 1916.

The Rogers Construction Company, Gloucester City, N. J., is erecting a plant for the manufacture of aeroplanes. The first unit, which will have a floor area of 18,000 sq. ft. with a frontage on the Delaware River opposite League Island Navy Yard of 165 ft., will be of steel and concrete and is to be completed by Sept. 1. It will be used exclusively as an erecting shop. All necessary machine work will be subcontracted for by the John M. Rogers Works, Inc., whose machine shops adjoin the aeroplane plant. F. C. Rogers is in charge.

The Bonney Vise & Tool Works, Allentown, Pa., is erecting the first building on its new site. It will be of brick and stone, one story, 65 x 160 ft., and will cost about $15,000. It is to be used as a drop forge shop. The old plant will be continued for some time, although ultimately the company may move its entire business to the new site. Fred S. Durham is vice-president.

The Chester Shipbuilding Company, Front and Kerlin Streets, Chester, Pa., is understood to be planning the construction of two additional shipways, which will bring the total number up to seven and a 40 x 200-ft fitting-up wharf. The company may also bulkhead the property.

The foundations for the fabricating plant of the new Sun Shipbuilding Company, Third Street and Delaware River, Chester, Pa., have been completed and the main structure started. The Raymond Concrete Pile Company is working on the five shipways which will extend to the pier-head line. Announcement has been made that in addition to the buildings already planned, a boiler-shop will be erected and the plant of Robert Wetherill & Co., Inc., which is owned by the shipbuilding company, and which will be used for the manufacture of machinery and engines, will be considerably enlarged.

The Pyrites Company, Ltd., Wilmington, Del., will erect a pumphouse at the foot of Christiana Street and an office and storeroom.

The New York Shipbuilding Company, Camden, N. J., is building an extension to its machine shop, 131 x 169 ft., one story. It has awarded the structural contract to the McClintic-Marshall Company, Oliver Building, Pittsburgh. Work will be started shortly. L. D. Lovekin, Broadway and Fairview Street, Camden, is chief engineer. H. A. Magoun is vice-president.

The B. F. Boyer Company, Camden, N. J., has had plans drawn by Ballinger & Perrot, architects, Philadelphia, for factory alterations and additions.

John Rich & Bros., Woolrick, Pa., have awarded contract to the Hughes & Foulkrod Company, Philadelphia, for the erection of a four-story brick and concrete factory, 81 x 160 ft.

Directors of the Harrisburg Foundry & Machine Works, Harrisburg, Pa., have called a meeting of stockholders for July 18 to vote on a proposed increase in debt of from $300,000 to $600,000.

The Covell Belting Co., Pittsburgh, with a capital stock of $5,000, has been incorporated by W. B. Covell, 41 North Seventh Street, Philadelphia; W. J. Fisher, 2543 North Corless Street, Philadelphia, and Thomas M. Scott, 4934 Cedar Avenue, Pittsburgh, to manufacture transmission belting.

The Philadelphia Brass Company, Philadelphia, has been incorporated with a capital stock of $6,000 by Walter Scott Johnson, Bryn Mawr, Pa.; Charles E. Anthong, Wayne, Pa., and F. Cooper Pullman, Wyncottem, Pa., to manufacture brass, copper, zinc and nickel. William E. Chickering, 3213 Clifford Street, Philadelphia, is treasurer.

The Neolithic Products Company, Philadelphia, has been incorporated with a capital stock of $25,000 by Agostino Barber, 5414 Parkside Avenue, to manufacture pavements, ceilings, etc., from minerals and metal.

The Kay Jewelry Company, Reading, Pa., has been in-

corporated with a capital stock of $10,000 by Saul Kaufmann, Edmund I. Kaufmann and Warren H. Rothermel to manufacture jewelry.

The Philadelphia Table Company, Philadelphia, has been incorporated with a capital stock of $6,500 by Frank Chabrow and Abraham Foyer, 3221 Turner Street; Charles Zolot, 1318 North Sixth Street, and Morris Zolot, 1002 North Marshall Street, to manufacture tables and other furniture.

The Nyphen Furniture Company, Warren, Pa., has been incorporated with a capital stock of $25,000 by Oscar R. Pang, 234 Falconer Street, Jamestown, N. Y.; Theodore Shellberg, 430 Winsor Street, Jamestown, N. Y., and R. Z. Morrison, Hickory Street, Warren Pa., to manufacture wood and metal furniture.

The Lancaster Piano Company, Lancaster, Pa., has been incorporated with a capital stock of $10,000 by John Wirth, 118 Ruby Street, Lancaster; C. H. Brubaker, 720 First Street, Lancaster, and J. E. Shaub, Millersville, Pa., to manufacture musical instruments.

Baltimore

BALTIMORE, MD., July 10, 1916.

The Chesapeake Mfg. Company, Light and Poultney streets, Baltimore, manufacturer of furniture, will install motors at 429 to 439 South Sharp Street and use the property as a wood-working establishment.

The business of John Hubert, coppersmith, 1714 Thames Street, Baltimore, has been incorporated with $15,000 capital under the name of the John Hubert Coppersmith & Plumbing Company.

Plans are being prepared for a hotbed foundation at the plant of the Hess Steel Corporation, Biddle Street and Loney's Lane, Baltimore.

Work is progressing rapidly on the new buildings of the Baltimore Car & Foundry Company, Curtis Bay, Md., subsidiary of the Standard Steel Car Company, Pittsburgh. The rolling mill will be 220 x 700 ft. There will be large machine and pattern shops.

Chicago

CHICAGO, ILL., July 10, 1916.

The machine-tool trade is chiefly concerned with the problems to be faced as conditions begin to reverse themselves in the relations of demand to the production of machinery. This is particularly and already true with respect to lathes. The very largest increased production of lathes has been continued after the period of greatest demand, and not only is there now in prospect a return of these lathes to the market, but new lathes are being offered for very early delivery, in some instances, at practically standard prices. As for the special purpose tools, of which there has been such a large production and which are now being released from service by the completion of ammunition contracts, it already seems probable that their marketable value will not greatly exceed their valuation as scrap. A marked shortage of other forms of standard tools, such as milling machines, is still general.

A feeling of caution has developed in the trade in second-hand machinery, and some dealers are making purchases and trades involving the acceptance of steel tools only on the basis of the prices of two years ago. The prospect of the release of equipment of standard character in the closing up of some ammunition plants is bringing out inquiry from manufacturers who hope to find single tools of which they have need. Among the railroads recent buying has been limited to the closing by the Santa Fe of orders for a number of power and steam hammers and the purchase of a large lathe by the Monon.

The Monmouth Plow Factory, Monmouth, Ill., is in the market for a 200-lb. helve hammer.

The Chippewa Foundry & Machine Company, Chippewa Falls, Wis., has increased its capital stock from $25,000 to $100,000 and will build a factory at Chippewa Falls, 60 x 230 ft. The company was not reorganized as has been stated. It manufactures a steady stream pump.

The Sulzberger & Sons Company, Forty-first Street and Ashland Avenue, Chicago, will build a five-story box factory, 67 x 141 ft., of mill construction, to cost $75,000. Bids are being received by C. T. Barnett, chief engineer.

W. J. Bryson, 747 Buenna Avenue, Chicago, will build a two-story garage, 200 x 295 ft., to cost $5,500.

The Humboldt Stair Works, 1616 North Richmond Street, Chicago, will build a one-story factory, 32 x 113 ft., in North Crawford Avenue, at a cost of $5,000.

The Regal Model & Tool Works, 122 South Clark Street, Chicago, J. T. H. Patterson, proprietor, advises that its new plant at 1143 Diversey Parkway, will open about Aug. 1. It will be equipped to manufacture special machinery, dies, tools and automobile parts.

The Electric Alloy Steel Company, Thirty-fourth Street and Hoyne Avenue, Chicago, Ill., has changed its name to the Trojan Electric Steel Company.

The Moore Brothers Company, Joliet, Ill., is adding to its plant a one-story brick shop, 50 x 320 ft., to provide necessary increase in manufacturing capacity.

The Comet Automobile Company, Rockford, Ill., is planning the erection of a factory building. Harry R. Sackett is president.

The Hayes Pump & Planter Company, Galva, Ill., has placed contracts for the erection of an addition to its factory which will add 50,000 sq. ft. of floor space.

The M. & N. Automatic Spark Plug Company, Cedar Rapids, Iowa, has been organized with a capital of $100,000 to manufacture automobile spark plugs. A factory site has been obtained. A. E. McDaniel is president.

The Cooper Foundry Company, Atchison, Kan., recently organized by Charles Cooper of St. Joseph, plans to build a foundry.

The Moline Plow Company, Moline, Ill., has contracted with the Stone & Webster Corporation for the immediate construction of a large foundry and tractor works on its premises in Rock Island, Ill., where its wood shop is located. The foundry will be 180 x 360 ft., besides a room for cleaning castings, a coreroom, pattern vault and cupola. A machine shop, 100 x 800 ft., is also to be completed as soon as possible, to meet the heavy demand for tractors, which is overtaxing its present tractor shop capacity. Frank Gates Allen is vice-president and general manager.

Cleveland

CLEVELAND, OHIO, July 10, 1916.

Deliveries on some lines of machine tools continue to improve, particularly on lathes, some manufacturers now being able to make fairly prompt shipment. A fair volume of business is coming out for standard machines; but orders are almost wholly for single tools. The buying is very scattered. The demand for forging machinery continues active. A Cleveland manufacturer recently took an order for about 25 forging and bolt and nut machines for railroad shops in South America. The demand for cranes has eased off somewhat on account of delayed deliveries and the falling-off in factory building construction. Crane builders are from six to twelve months behind on deliveries.

The Taylor Machine Company, Carnegie Avenue, Cleveland, maker of automobile parts, will enlarge its plant by the erection of an extension, 40 x 130 ft., two stories. Some additional equipment will probably be required.

Arthur G. McKee & Co., Cleveland, will erect a two-story brick and steel warehouse and factory building, 75 x 200 ft., on St. Clair Avenue, near the Belt Line Railroad.

The General Model & Pattern Company, Cleveland, has been incorporated with a capital stock of $10,000 by C. H. Jansen, Henry Kaiser, and others.

The Ohio Steel Foundry Company, Lima, Ohio, is having plans prepared for extensions that will double the capacity of the plant. It recently purchased the foundry of the Bucyrus Steel Castings Company, Bucyrus, but in spite of these increased facilities finds that it needs additional factory space. The capital stock has just been increased from $600,000 to $800,000.

The Hester Tire & Rubber Company, Cleveland, will build a plant in Lima, Ohio, where it has been provided with a 3-acre site. The plans call for a two-story brick building, 50 x 100 ft., and a powerhouse, 60 x 60 ft.

The Wolf-Lanning Clay Company, Uhrichsville, Ohio, recently incorporated with a capital stock of $15,000, will build a plant to manufacture sewer pipe and brick. The plans call for a three-story brick drying house, 112 x 256 ft., an annex in which the machinery will be located and a power house.

The plant of the Kressler Auto Company, Fostoria, Ohio, was burned a few days ago at an estimated loss, including machinery, of $25,000.

The Gschwind Furnace Company, Youngstown, Ohio, manufacturer of warm-air furnaces and ventilating systems, will move to Warren, Ohio, where it has purchased a part of the Day-Ward plant.

The Chevrolet Motor Company, Flint, Mich., has purchased the plant of the Wagner Mfg. Company, Toledo, Ohio, and will use it to manufacture transmissions and gears.

The Denison Foundry & Machine Company, Denison, Ohio, is being operated under new management. The officers

sec., W. K. Eckfeld, president; E. R. Van Ostran, vice-president; Thomas Wright, treasurer, and F. E. Latto, secretary.

The Advance Machinery Company, Defiance, Ohio, has partly completed plans for the establishment of a plant at Sheboygan, Wis., to manufacture its line of wood-working machinery.

Cincinnati

CINCINNATI, OHIO, July 10, 1916.

Rubber tire manufacturers have lately bought a number of boring and turning mills. The larger-sized lathes are also in demand; but only single purchases are being made. The call for these machines is from munitions manufacturers who are figuring on taking extra contracts for finishing a large quantity of high-explosive shells for the British Government; the forging contracts for these were let to nearby companies two weeks ago. The activity of the auto-truck manufacturers has to a considerable extent affected makers of accessories. The Highland Body Mfg. Company, of Cincinnati, reports the receipt of a rush order for 100 truck bodies, with other business pending, while the Troy Wagon Works, Troy, Ohio, is working on two orders that will total 400 bodies for 1½-ton trucks.

Light electrical equipment of all kinds is in excellent demand. This applies especially to portable electric tools and to small motors. Foreign orders for portable drilling machines continue to come in and domestic business is also good. The boiler and tank business is somewhat handicapped on account of the present high prices of plates.

The Cincinnati Planer Company, Oakley, Cincinnati, Ohio, will require a number of small electric motors, one electric traveling crane and case-hardening outfits. Its proposed building will be used mainly for warehouse purposes.

It is currently reported that the Sayers & Scoville Company, Cincinnati, vehicle manufacturer, has taken a lease on a building at Bank and Patterson streets. Its former plant on Colerain Avenue was destroyed by fire several months ago.

The Ault & Wiborg Company, Cincinnati, ink manufacturer, has decided to erect two additional structures to its chemical plant in St. Barnard, so that the total number of buildings will be at least eight, not including the power plant.

The Cincinnati Iron & Steel Company, Cincinnati, has taken out a permit for a garage to be erected near its plant on Freeman Avenue. A small repair shop will be provided.

The Union Gas & Electric Company, Cincinnati, has let contract for a power plant to be constructed on Fourth Street.

The Dietz Mfg. Company, Cincinnati, has been incorporated by William C. F. Dietz, Fred Dietz, and others, with $10,000 capital stock. Later on the company expects to establish a plant for the manufacture of a patent washing machine.

The Davis Sewing Machine Company, Dayton, Ohio, is having plans prepared for an addition to its plant, most of which will be used as a drop forging department. Details as to the size of the plant contemplated and equipment wanted are not yet available.

The Hooven, Owens, Rentschler Company, Hamilton, Ohio, recently received an order from the Cambria Steel Company for a 3500-hp. low-pressure steam engine.

The Swantz Mfg. Company, Hamilton, Ohio, recently suffered a fire loss of approximately $3,000 to its cotton felt plant. Rebuilding operations will begin immediately.

Work is progressing rapidly on the plant of the Central Ohio Paper Company, Columbus, Ohio. The new building will be 140 x 200 ft., five stories, of reinforced concrete.

The Excelsior Seat Company, Columbus, Ohio, has made an addition to its factory that will be used for the manufacture of motor ambulance bodies.

Plans have been completed for an addition to the plant of the Mohrlite Company, Urbana, Ohio, 65 x 100 ft., two stories, of brick and concrete.

A bond issue of $43,000 has been recommended by the town council of St. Marys, Ohio, to be used in the construction of a water and electric lighting plant.

The Ironton, Ohio, plant of the Standard Slag Company, Youngstown, Ohio, was almost completely destroyed by fire July 7. It will be rebuilt at an early date.

The Shanklin Mfg. Company, Springfield, Ohio, advises that the construction of its new building is under way and some of the machinery equipment purchased. It does metal stamping and makes screw machine products.

Milwaukee

MILWAUKEE, WIS., July 10, 1916.

The past week showed smaller production than usual because of the holiday, which in some cases was extended from Saturday noon until Wednesday morning. A lull in transactions was also noted and not much new business was placed, which is not unusual for this season. Production, however, has not felt any appreciable effect of a slackening demand, as capacity is still well taken up on old orders, in the machine tool line especially. Practically all of the business done is for standard types, and the call for special tools has dwindled to almost nothing. Deliveries have been easy, as the high pressure is no longer evident and the average is rapidly being reached.

The Rotary Gas Engine & Pulverizer Company, Antigo, Wis., has filed articles of incorporation with a capital stock of $25,000 to manufacture power implements for farm use. The incorporators are Charles Frieders, Clarence Rishel and W. A. Maertz.

The Hugh Agner Auto Company, Burlington, Wis., will build a new garage and machine shop, costing $15,000, of solid brick, one-story and basement, 59 x 165 ft. The present garage has been sold to the Cunningham Brothers Company, Burlington, who will use it for garage purposes after Jan. 1, 1917.

The G. A. Kraemer Company, Elkhart Lake, Wis., is building a machine shop addition, 60 x 40 ft., to its garage, to be ready July 31.

The Robert Rom Company, manufacturer of plumbing supplies, 1023 St. Paul Avenue, Milwaukee, is the company which will build the new foundry at Sixty-third Avenue and Burnham Street, West Allis, now being planned by Carl Barkhausen, architect, 408 Iron Block, as noted recently.

The sheet-metal works operated at Fond du Lac, Wis., for several years by Edward MacIntyre and Nelson A. McDonald has been incorporated under the style of MacIntyre-McDonald Company, with a capital stock of $5,000.

The Turbine Sewer Machine Renovating Company, Eleventh and Wells streets, Milwaukee, has awarded contracts for the erection of a machine shop addition, 30 x 65 ft. Philip A. Fuchs is president.

E. A. Hammes, Madison, Minn., has purchased the machine shop of Emil Koehler at Bangor, Wis., and will take immediate possession.

The Updike Grain Company, Omaha, Neb., has leased the grain elevator now being erected by the Chicago & North Western Railroad Company at the foot of Kinnickinnic Avenue, Milwaukee, at a cost of $850,000. Considerable equipment will be purchased later. The capacity of the elevator is from 1,500,000 to 2,500,000 bu.

Dodd & Churchill, Osceola, Wis., have broken ground for a garage and machine shop to cost about $6,500.

The Corliss Motor Truck Company, organized recently at Corliss, Wis., with $100,000 capital, has re-equipped part of the former plant of the Wisconsin Engine Company, and is now producing a light delivery truck, selling for $650 and $665, depending upon the body style. Harry Mohr, formerly of Chicago, is in charge.

The Advance Machinery Company, Toledo, Ohio, manufacturing wood-working machinery, has accepted the proposition of the Industrial Building Association, Sheboygan, Wis., and will establish a plant consisting of three new buildings at Union Avenue and Nineteenth Street. Plans are being prepared by Juul & Sixta, architects, Imig Building, Sheboygan.

Grover McGeehan and H. L. Everson, proprietors of R. J. McGeehan & Son Company, DePere, Wis., machinery and implement jobbers and dealers, have sold the business to Elmer McGeehan, who will continue the business without any change.

George H. Ridell, Sheboygan, Wis., until recently superintendent of the American Mfg. Company, Sheboygan, Wis., is organizing a $25,000 corporation to establish a plant for the manufacture of fiber furniture and similar goods from waste paper.

O. A. Young, Stevens Point, Wis., who erected a garage and service station on Strongs Avenue last spring, has awarded contracts for the erection of a machine-shop addition, 24 x 70 ft.

The Wisconsin Seating Company, New London, Wis., has taken a large contract for the manufacture of phonograph cabinets from the Edison interests and will discontinue the manufacture of chairs, with the exception of theater and school equipment. The order will require capacity operations for more than one year and the erection of additional assembling and finishing facilities.

Indianapolis

INDIANAPOLIS, IND., July 10, 1916.

The Indiana Die Casting Company, Indianapolis, will build a reinforced concrete addition to its plant, 45 x 85 ft. Die casting machinery will be purchased.

The Warner Implement Company, Hammond, Ind., has been organized with a capital of $35,000 by Frank Hammond, Giles Warner and W. F. Bridge, to build agricultural machinery.

The Lavelle Foundry Company, Anderson, Ind., has taken over the buildings of the Star Machine Company and plans to operate the plant as a foundry, installing equipment to the value of $10,000.

The Dearborn Concretile Company, Aurora, Ind., has been incorporated with $5,000 capital stock to manufacture tools, machinery and electrical devices. The directors are Edward Sutton, James H. Truitt and Harry L. Nowlin.

The Studebaker Municipal Utilities Company, South Bend, Ind., has been incorporated with $100,000 capital stock to manufacture street sweepers, cleaners, etc. The directors are Frederick S. Fish, A. R. Erskine and A. B. Thielens.

The Evansville Edge Tool Works, Evansville, Ind., is working on contracts to supply the British Government with large shears for cutting wire entanglements.

The R. H. Maple Company, Indianapolis, has been incorporated with $50,000 capital stock to manufacture electrical goods. The directors are Virgil H. Lockwood, Ralph G. Lockwood and Roy H. Maple.

The Ideal Veneer & Lumber Company, Franklin, Ind., has been incorporated with $40,000 capital stock to manufacture lumber. The directors are James H. McCrea, Minor W. Davis and Wilford Hill.

The St. Joseph Heating Company, South Bend, Ind., has increased its capital stock from $100,000 to $200,000.

The Great Western Mfg. Company, Laporte, Ind., has been incorporated with $500,000 capital stock to manufacture automobiles and aeroplanes. The directors are C. A. and E. J. Lonn.

Detroit

DETROIT, MICH., July 10, 1916.

The Detroit Insulated Wire Company, Detroit, has increased its capital stock from $500,000 to $1,000,000.

The plant of the William Horner Flooring Company, Reed City, Mich., was recently damaged by fire to the extent of $20,000. It will be rehabilitated at once.

The Michigan Electrochemical Company, Menominee, Mich., has been incorporated with $150,000 capital stock to manufacture chemicals. The incorporators are Edward Daniell, R. T. Goodman and C. W. Gram. Plans for a plant are being prepared.

The L. O. Gordon Mfg. Company, Muskegon, Mich., has been organized by a syndicate of Cleveland and Muskegon capitalists to manufacture automobile parts. The erection of a plant to cost $100,000 will begin at once.

The Morton Salt Company, Port Huron, Mich., is erecting an addition to its plant, 160 x 300 ft., to be used as a grainer.

The Home Furnace Company, Holland, Mich., has awarded a contract for its plant. The main building will be 100 x 250 ft., and cost $17,000.

The Central South

LOUISVILLE, KY., July 10, 1916.

Business requirements continue large in the Louisville territory and the manufacturing and distributing trades report no indication of a let down. Increased demands for construction machinery are noted. Electrical needs are equally generous and deliveries are invariably set ahead from two to three months. Requirements in the way of flouring mill equipment and repairs have been large and contractor's equipment is in large demand.

Major Theodore B. Hacker, in charge of the United States Quartermaster's depot at Jeffersonville, Ind., is receiving bids on large quantities of hand tools until July 14 and for parts for escort wagons until July 13. Contracts for escort wagons have been given the Kentucky Wagon Mfg. Company, Louisville, the Thornhill Wagon Company, Lynchburg, Va.; the John Deere Company, Moline, Ill., and for ambulances to the Studebaker Corporation, South Bend, Ind. The Dow Wire & Iron Works, Louisville, and the Mesger Iron Company, St. Louis, Mo., divided a contract for 10 army field bakeries, valued at $27,000.

Proposing to engage in the manufacture of oxygen, hydrogen and other gases, the Kentucky Oxygen Hydrogen Company, Louisville, has been incorporated with $50,000 capital by H. G. Offut, F. H. Goodridge and Walter H. Girdler.

C. R. Mengel, C. C. Mengel and C. C. Mengel, Jr., are incorporators of the Axim Transportation Company, with $5,000 capital listed, debt limit $750,000, to build and operate coal-carrying freight steamers.

The National Foundry & Machine Company, headed by Adam Vogt, will largely increase its plant at Fifteenth and Main streets, including erection and equipment of three additional buildings, at an estimated cost of $200,000.

The Nashville Machine Company, Nashville, Tenn., represented by C. C. Holt, is installing machinery in the new axe handle factory at Bowling Green, Ky. A new 200-hp. Corliss engine is included.

The Louvera Cotton Mills Company, Trenton, Tenn., is building a cotton gin, to have four 70-saw ginheads, a hydraulic press with automatic tampers, operated by steam.

J. G. Crumbliss of the City Commission, Knoxville, Tenn., has been authorized to ascertain costs and prepare plans for a second pump for the municipal water plant. It is proposed to install a 15,000,000 gal. per day pump, and it is estimated that the cost will exceed $100,000.

D. C. Hodgson, Halston National Bank Building, Knoxville, Tenn., is in the market for a saddle-tank locomotive of 20-in. gage.

A cottonseed oilmill is to be erected in Alton Park, Chattanooga, Tenn., at a cost of $200,000, by the Sulzberger & Sons Company, New York butterine manufacturers. C. W. Howard, director of the Chattanooga Chamber of Commerce, may be addressed.

The G. W. Stout & Sons Company, Owensboro, Ky., cooperage manufacturer, is considering equipping its hand cooperage plant with machinery. W. B. Stout is in charge.

Both the electric and ice plants of the Perryville Electric Lighting & Ice Company, Perryville, Ky., were destroyed by fire with an estimated loss of $15,000. Bagsell Brothers recently purchased the property.

The property of the Frankfort Chair Company, Frankfort, Ky., was damaged by fire with a loss estimated at $30,000.

Construction under supervision of Louis B. Herrington, Richmond, Ky., has begun on the hydroelectric plant on the Dix River, near Lancaster, Ky. The plant is estimated to cost upward of $3,000,000 and will furnish power to various cities.

The Goodyear Tire & Rubber Company, Akron, Ohio, will erect additions to its mechanical goods and chemical plant at Nashville, Tenn., and is changing the course of the Little Cuyahoga River to provide the site.

A loss of $75,000 was suffered by the Little River Lumber Company, Townsend, Tenn., by fire which destroyed its sawmill, powerhouse, ice factory, etc. W. B. Townsend is one of the principal owners and George B. Townsend, Knoxville, is a stockholder.

Two plants for the manufacture of cotton linters are projected by the Mississippi Hull Fiber Company, Memphis, Tenn., one at Memphis, with 25 bales daily capacity, and the other at Marianna, Ark. Joseph Newburger is president and J. H. McNeil is secretary-treasurer.

For the manufacture of a special type of farming implement patented by G. W. Wester of Harriman, Tenn., the Wester Hook & Hoe Company, Harriman, has been organized with W. C. Anderson, president; G. W. Wester, vice-president; J. A. Manley, secretary-treasurer, and George W. Chandler, general manager.

The Nashville Bridge Company, Nashville, Tenn., is in the market for 3-in. centrifugal pumps, gasoline engine driven, short drive or direct-connected.

H. M. Reed, John C. Vance, Charles Hardie, and others, have incorporated the Velvet Edge Iron Company, Chattanooga, Tenn., with $5,000 capitalization.

The One Fire Asphalt Company, Chattanooga, Tenn., is in the market for a second-hand 25-hp. boiler in good condition.

Texas

AUSTIN, TEX., July 8, 1916.

The demand for irrigation pumping machinery and engine equipment is unusually good for this time of year. The small-tool trade is in satisfactory condition.

The Houston Car Wheel & Machine Company, founder and machinist, Houston, Tex., lost its brass foundry, which was destroyed by fire with a loss of about $43,000. It was owned by the Kettler Brass Company and operated by the Car Wheel Company. It also lost its pattern shop at the same time with damage of about $6,000. The latter will be repaired, but the brass foundry will remain out for future development. J. H. Dore is manager.

Earl C. Cleaveland has completed a survey for a proposed hydroelectric plant that is to be constructed near Mogollon, N. M., to provide power for operating the machinery of mines in that district. About 1500 hp. will be generated

It is reported that the United States war department plans to build automobile repair shops at Fort Bliss and at El Paso. Among the equipment needed will be 52 lathes.

The Farmers' & Merchants' Gin Company, Irene, will build a cotton gin at a cost of about $8,000.

The Nacona Cotton-seed Oil Company, Nacona, will build a cotton-seed oil mill to cost about $50,000. P. R. Brazleton is in charge.

The Dixie Oil & Refining Company, San Antonio, which has increased its capital stock from $65,000 to $100,000, will enlarge its oil refinery

The Power Multi Machine Company, Silver City, N. M., which has a capital stock of $300,000, will build a factory for manufacturing multiplying machines. Oscar Francke, San Antonio, is a stockholder.

An oil-burning engine will be installed at the municipal electric light plant at Hallettsville at a cost of $7,000.

The Farmers & Ginners' Cotton Oil Company, which recently increased its capital stock from $3,000 to $100,000, will enlarge and improve its cotton-seed oil mill at Sulphur Springs.

The Southern Ice & Utilities Company, Dallas, which was recently incorporated with a capital stock of $650,000, plans to construct and acquire public utility plants. C. W. Dawley, W. L. Martin and John L. Booty are stockholders.

St. Louis

ST. LOUIS, MO., July 10, 1916.

Machine tool dealers find less difficulty in meeting demands for equipment. Business is keeping up at a high level and is in a much more satisfactory state than when deliveries were uncertain. Practically no equipment was bought in this section for war munitions purposes and little difficulty over resale tools is anticipated. While no large lists are appearing a steady call for single tools is noted for extension and replacement as well as new industries.

The National Art Bronze Works, St. Louis, Mo., has been incorporated with a capital stock of $100,000 by Frederick C., John C., and Frederick B. Schmidt to equip a foundry at 1537 Pope Avenue

The Safety Car Devices Company, St. Louis, Mo., has been incorporated with a capital stock of $10,000 by Christopher P. Cass, Robert E. Adreon of the American Brake Company; John H. Trent, Arthur Digby and George E. Howard to manufacture safety devices

The Santa Barbara Mining & Milling Company, St. Louis, Mo., has been incorporated with a capital stock of $12,000 by G. E. and A. H. Donnewald, St. Louis, and H. J. Lynch, Joplin, Mo., and is in the market for pneumatic drilling equipment, power machinery, etc.

Wells, Fargo & Co., St. Louis, Mo., will erect and equip a garage at a cost of about $50,000, including machine and repair shop equipment.

The P. & R. Mining Company, Webb City, Mo., has been incorporated with a capital stock of $12,000 by P. R. Rackley, W. R. Smith, and others, and will buy mining machinery, pneumatic drills, power equipment, etc.

The Kansas City Sand Company, Kansas City, Mo., has been incorporated with a capital stock of $60,000 by Charles Meirhoffer, Godfrey Swenson and George H. Cope and will equip for sand recovery, including dredging machinery, etc.

Marshall, Mo., has voted $70,000 for the equipment of a municipal electric light and power plant. Henrice, Kent & Lowry, Reserve Bank Building, Kansas City, Mo., are consulting engineers.

The St. Joseph Weeding Hoe Company, St. Joseph, Mo., has been incorporated with a capital stock of $10,000 by Leroy Settle, John McClure, and others, and will equip a plant.

Chaffee, Mo., will receive bids until July 28 for an oil engine driven triplex pump and other waterworks equipment. Frank L. Wilcox, Syndicate Trust Building, St. Louis, Mo., is engineer.

The Farmers' Gin Company, Watson, Ark., has been incorporated with a capital stock of $[illegible] by S. W. Ivey, F. A. Mewlin, J. R. Ferguson and E. M. Vaughn and is in the market for ginning machinery and power plant equipment.

The Texarkana Ice Company, Texarkana, Ark., has been reorganized by C. W. Dawley as president, C. M. Cleaveland vice-president, Stuart Wilson, secretary and J. E. Dudley, treasurer, and will enlarge its plant for the manufacture of ice. The capital has been increased to $150,000.

The Missouri Pacific Railway Company, St. Louis, Mo., E. A. Hadley, chief engineer, will equip a mechanically operated coaling station at Paragould, Ark.

The Aluminum Ore Company of America, East St. Louis, Ill., will equip a terminal at West Memphis, Ark., to include electrically operated mechanical loading apparatus, etc.

The Kern Drilling Company, Tulsa, Okla., has been incorporated with a capital stock of $15,000 by T. J. Kern, T. and M. C. O'Keefe and will purchase portable power plant and drilling machinery.

The Cosden Oil & Gas Company, Tulsa, Okla., will increase its capital from $5,000,000 to $9,000,000 and issue $6,000,000 of notes to add to equipment of its refineries, oil pumping stations, etc., for which plans are in preparation.

The Nabors Cooperage Company Corinth, Miss., is in the market for new equipment for the plant which it has acquired and is remodeling. A blower system is wanted.

The St. Louis & San Francisco Railroad Company, V. K. Hendricks, chief engineer, St. Louis, Mo., will equip a mechanically operated coaling station at Pottscamp, Miss.

Limestone crushing plants are to be equipped by Mississippi State penitentiary officials. E. J. O'Keefe, Parchman, Miss., is superintendent, and J. J. Coman, Jackson, Miss., secretary. About $25,000 is available for machinery.

Felix Borden, Audubon Building, New Orleans, La., engineer for the Gretna Gas Light & Fuel Company, is in the market for gas manufacturing equipment. A plant to cost about $40,000 will be installed.

Oakdale, La., will install about $40,000 of waterworks equipment, including two 500-gal. per min. pumps, two 60-hp. oil engines, etc.

The Pacific Coast

SEATTLE, WASH., July 3, 1916.

The foreign commerce for Washington district during the month of May has set a new record, aggregating the enormous sum of $40,022,415, thus outstripping every district on the Pacific seaboard. Seattle headed all the ports in the district with more than $28,000,000 worth of goods handled in thirty-one days. In the matter of exports, Asiatic Russia through Vladivostock was by far the best customer, taking $14,429,063 worth of goods. As usual, an excellent business was done with Alaska for the period.

Recent tests by leading railways of England have resulted in the placing of several large orders recently in the Pacific Northwest to supply fir for British railroad purposes. The British Admiralty has diverted vessels of large capacity to handle this business.

The Eccles Lumber Company's plant at Banks, Ore., was completely destroyed in a recent fire, with a loss of $100,000. H. M. Eccles, president, states that the plant will probably be rebuilt. It had been operating only a few months.

The Montana & Utah Sugar Refining Company, which is building a sugar factory at Grants Pass, Ore., has announced that a beet-sugar factory will be constructed at Hamilton, Mont. The two installations will require the expenditure of $500,000.

A fisheries building to cost $25,000 is to be erected in Tacoma by the Glacier Fish Company. It will be 100 x 120 ft., and will be equipped with a cold-storage plant.

The Winslow Marine Railway & Shipbuilding Company, Seattle, newly organized with a capital stock of $600,000, has taken over the pioneer shipbuilding plant of the Hall Brothers Marine Railway & Shipbuilding Company at Winslow, Wash., for $300,000. The company will make improvements and will engage in wooden shipbuilding and ship repairing. C. C. Lacey, Seattle, will be manager.

The Washington Iron Works, Seattle, announces that improvements costing $100,000 will be made to its plant. Work will include another furnace and other new equipment.

Following upon the taking over of the Seattle Construction & Dry Dock Company by the Todd Shipyards Corporation of New York comes the statement that the present capacity of the Seattle plant is to be doubled. A new steel floating drydock costing $1,000,000 is to be built, and five new shipways are to be constructed. The company has recently secured contracts for two new steel freighters for foreign service.

The plant of the Raymond Foundry & Machine Company, Raymond, Wash., was damaged to the extent of $18,000 in a recent fire. The blacksmith building, foundry and pattern room were completely destroyed; but the machine shop was saved. R. Gerber, manager, states that it will be replaced at once.

A corporation has been formed by D. A. Morrison, W. J. Price, W. S. Trueblood, L. L. Callaway and J. C. E. Barker, of Great Falls, Mont., to construct a cement plant in the vicinity of Great Falls, estimated to cost $500,000. W. J. Price will be manager.

The Russell Beet Harvester Company has been incorporated at Provo, Utah, with John R. Stewart as president, to manufacture special machinery for sugar-beet cultivation.

It is reported at Salt Lake City, Utah, that the Utah Copper Company will make large additions to the Magna and Arthur mills.

The Hawaii Motor Supply Company, Ltd., has been incorporated at Honolulu, T. H., with a capital stock of $100,000, with J. F. C. Hagens as president.

San Francisco

SAN FRANCISCO, CAL., July 3, 1916.

The waterfront strike is interfering with business and men are apprehensive of more serious labor troubles. The situation tends to retard buying. Despite these adverse influences most classes of machinery are moving better than usual for this time of year. Shops are working at more than their normal scale, and many are making important additions. Merchants and agents who can offer a fair assortment of tools for prompt or early delivery have little difficulty in making sales, while many buyers still take their time in hope of an easier market. In the miscellaneous machinery markets, oil-well and mining equipment, including gold dredges, are among the most important lines at present. Pumps and hydroelectric machinery are also quite active. The placing of new orders for wood-working machinery is for the time being generally suspended.

A. T. Coe, formerly of Chino, Cal., has opened a new machine shop at Ontario, Cal., specializing on pump and engine work.

The Yuba Construction Company, Marysville, Cal., which specializes on gold dredge work, is starting work on an addition to its plant.

The General Roofing Mfg. Company, Richmond, Cal., is equipping the first unit of a plant.

The Monarch Engineering & Machinery Company, San Francisco, announces that it has perfected a new type of Chilean ore mill.

The National Ice Company has secured a site at Turlock, Cal., and plans to put in an ice-making outfit of 75 tons daily capacity.

The Mammoth Copper Company, Kennett, Cal., will build a plant for recovering zinc and other metals by an electrolytic process.

The Diamond Match Company has let contracts at San Pedro, Cal., for the construction of a towboat, barges and a kelp-harvesting outfit, with the object of manufacturing chemicals from kelp.

The Pacific Tank & Pipe Company, San Francisco, has about completed plans for a plant for the manufacture of wooden tanks, pipe, boxes, millwork, etc., at High Street and the Tidal Canal, Oakland.

Canada

TORONTO, July 10, 1916.

A further credit of $25,000,000 for the purchase of war munitions and supplies in Canada is now available as a result of the conference between Thomas White, Minister of Finance, and the Canadian Bankers' Association. On account of their exceptionally strong position the banks have been able with ease to make their advances, which, as the money is spent, reverts to them in increased deposits. The transaction has been facilitated by the offer of the Minister of Finance to re-discount at any time the Imperial Treasury bills held as collateral for the advances. Available bank funds are so large that it is not probable that such rediscounting will be at all necessary; but the fact that these facilities have been provided has made possible the transaction on so large a scale. Re-discount facilities will again be adopted this fall in the financing of the Western crop movement. It worked most successfully last year.

It is reported that preliminary work in connection with the establishment of shipbuilding yards on Poplar Island in the Fraser River, B. C., has been commenced by the Westminster Marine Railway Company, New Westminster, B. C., which has started to clear the site. The company proposes to build a plant on the island to cost $70,000 and to install $15,000 worth of machinery. Ways will be built capable of handling the largest coastwise vessels.

The Wabash Railroad proposes to build a repair shop at St. Thomas, Ont., and will commence work soon.

The Dominion Steel Corporation, of Wallaceburg, Ont., is building a [illegible] at Chatham, Ont., which will cost when completed [illegible]. The plant will be erected on a tract of [illegible] acres. A [illegible] will also be erected for the [illegible] plant. A [illegible] also be built, [illegible] 30 x 150 ft., which will contain 10 boilers with a capacity of 4000 hp.

The Brothers & Co., Ltd., Montreal, will add a new unit to its news print paper mill and will also make [illegible] tions to other of its plants which will increase its production of sulphite and ground wood pulp to [illegible] tons of ground wood pulp a year and [illegible] tons of sulphite pulp. This undertaking will cost approximately [illegible]. A considerable amount of this expenditure will be for machinery and equipment.

The General Car & Machinery Works, Montreal, has rebuilt its plant, recently damaged by fire. The plant consists of steel, iron and brass foundries, forging and machine shops, with a total floor area of 117,000 sq. ft. A power plant has also been installed having a capacity of 1000 hp.

The Cameron & Gerow Company, Ltd., shipbuilders, Victoria, B. C., has received a contract from H. W. Brown & Co., Vancouver, B. C., for the construction of two auxiliary schooners. It is making extensive improvements to its plant.

The International Land & Lumber Company, Ltd., Ottawa, Ont., will shortly commence the erection of a pulp mill on the Ashuapmauchan River to have a capacity of 100 tons per day. Elaborate plans are also being prepared for a model town site. J. L. Bates is president and R. N. Bates, vice-president.

Calgary, Alberta, proposes to install a sewage disposal plant at a cost of $300,000. J. M. Miller is clerk.

Marcoux & Porier's foundry at Beauceville, Que., which was recently destroyed by fire with a loss of $12,000, will be rebuilt and new machinery installed.

The Sick Children's Hospital has received a permit for the erection of a one-story brick and concrete powerhouse on Laplante Avenue, Toronto, to cost $9,000. J. Ross Robertson is in charge.

The Canadian Pacific Railway Company will spend $100,000 on improvements to its yards at St. John, N. B., including the erection of a coal-handling plant, a new water tank of 20,000 gal. capacity, etc. J. M. R. Fairbairn, Montreal, is assistant engineer.

Crotty & Elliott, Bothwell, Ont., are having plans prepared for an oil powerhouse to cost $5,000.

Machinery will be required for the machine shop to be erected at Galt, Ont., for E. C. Roelofson. The plant will cost $10,000. Plans for the building are being prepared by John Evans, 30 Water Street North, Galt.

The Du Pont Fabrikoid Company, 864 Dufferin Street, Toronto, proposes to build a factory at Toronto and is carrying on negotiations for a site of 11½ acres. W. A. Cotton is manager.

The Oliver Chilled Plow Works, Ltd., has received a permit for the erection of an addition to its plant on Burlington Street, Hamilton, Ont., to cost $2,000.

The Motor Products Corporation, Walkerville, Ont., will build a factory. W. C. Rand, president of the Rand Mfg. Company, Detroit, Mich., is president of the Canadian company.

A contract has been awarded to the Thor Iron Works, Toronto, for the construction of a 261-ft. steel boat for the Great Lakes Transportation Company.

The Corbett Foundry & Machine Company, Ltd., Owen Sound, Ont., is in the market for a 2-in. bolt cutter.

The general contract for the rebuilding of the Northumberland Paper & Electric Company at Campbellford, Ont., has been awarded to T. McManus, of Campbellford. The plant will cost $60,000.

The contract for the erection of an addition to the plant of the Victor Saw Works, Hamilton, Ont., has been let to H. C. Gummo, Tuckett Street, Hamilton, at a cost of $6,000.

T. L. Church, chairman of the Board of Control, Toronto, is calling for tenders until July 18 for an overhead hand-operated traveling crane.

The Western Canada Marble & Tile Company will establish a plant at Winnipeg, Man., having taken over the premises of the Lewis Carriage Company, West Portage Avenue, Winnipeg. About $20,000 worth of machinery will be installed in the building. W. B. Purtell is president and J. C. Purtell is secretary.

It is reported that the Federal Foodstuff & Chemical Corporation, 30 Pine Street, New York, with a plant located at Kingsport, Tenn., proposes to establish another in Western Ontario, in conjunction with some Toronto capitalists, for the

manufacture of dyestuffs, etc. Walter A. Guile, Jr., vice-president of the Federal Dye Corporation, is in charge.

The Canadian Allis-Chalmers, Ltd., Toronto, will build an addition to its plant to cost $6,000.

The Alberta Foundry & Machine Company, Ltd., Medicine Hat, Alberta, will build an addition to its plant, 120 x 160 ft., to include an iron foundry and machine shop, and to cost $20,000.

The Thor Iron Works, Toronto, Ont., is in the market for an electric traveling gantry crane, span about 47 ft., clearance 50 ft., overhanging at one end, load about 15 tons.

The Bowes Jamieson, Ltd., Hamilton, Ont., is in the market for Bertram waving attachment for 4.5-in. shells, with or without lathe; also 18 or 20-in. turret lathe.

The Leaside Munitions Company, Ltd., Toronto, has been incorporated with a capital stock of $2,500,000, by W. L. H. A. J. Case, 801 Dominion Bank Building; James B. Taylor, 78 Bellwood Road; Charles L. Vokins, 516 Brunswick Avenue, and others, to manufacture time fuses, guns, shells, bombs, etc.

The Turner Wheel & Machine Company, Ltd., Windsor, Ont., has been incorporated with a capital stock of $20,000 by Harry E. Guppy, William T. Turner, George E. Turner, and others, to manufacture automobile wire wheels, motors, accessories, etc.

The Remington UMC of Canada, Ltd., Windsor, Ont., has been incorporated with a capital stock of $25,000 by John A. Worrell, 76 Adelaide Street West; William D. Gwynne, 27 Dunbar Road; John S. Smith, 47-a Pearson Avenue, and others, to manufacture firearms, ordnance, ammunition, weapons, military equipment and special machinery.

The Metals Coating Company of Canada, Ltd., Montreal, has been incorporated with a capital stock of $200,000 by Arthur R. W. Plimsoll, Reigner Brodeur of Montreal; Linton H. Ballantyne of Westmount, Que.; Jean V. Cartier of St. John, Que., and others.

Grant & Horne, St. John, N. B., contractors, are making rapid progress with the construction of the new machine works for T. McAvity & Sons, Ltd., on the Marsh Road. The plant will be ready for the manufacture of munitions and general machinery Aug. 1. It is the intention to concentrate all the firm's brass and steel plants in the city on the new site.

The Ruddock Cut Glass Company, Ltd., Toronto, has been incorporated with a capital stock of $50,000 by David Henderson, 60 Victoria Street; William H. McGuire, 17 Hawthorne Avenue; George F. Rooney, 121 Carlton Street, and others.

Government Purchases

WASHINGTON, D. C., July 10, 1916.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until date not set, schedule 9870, three 500-kw. transformers for Norfolk; schedule 9872, for four turning gear motors and four fireroom hoist engines, all for Brooklyn; schedule 9874, for miscellaneous condenser, circulating and other pumps for Boston; schedule 9875, for two induction motors for Mare Island.

Women in German Locomotive Works

German manufacturers of locomotives are unable at present to fill orders, according to a review of the German locomotive industry, under war conditions, in *Die Lokomotive*. During the war year 1915 the Royal Prussian Railroads ordered 1502 locomotives, 26,000 freight cars, 2363 passenger cars, and 418 baggage cars, but on Oct. 1 205 locomotives and 5503 freight cars were still to be delivered, so great is the war pressure on the railroads. The *Railway Review* of Chicago, in giving an abstract of the German review, says that manufacturers are unable to fill such an order as the above in a year's time. For 1916 the Royal Prussian Railroads have ordered 1600 locomotives, 1700 passenger cars, 400 baggage cars and 38,000 freight cars. Every locomotive and car builder has received orders up to capacity, but operations are seriously curtailed because of a shortage of workmen. French and Belgian prisoners of war are working in many plants, under military supervision, many of them being skilled laborers from their own plants. Normally the German locomotive industry can produce 3,000 locomotives annually. Workmen called to war are, in many cases, replaced by women, 1600 being employed at present in the locomotive plant, Hanomag.

NEW TRADE PUBLICATIONS

Propeller Fans.—B. F. Sturtevant Company, Hyde Park, Boston, Mass. Folder. Treats of the uses of a propeller fan for ventilating engine and boiler rooms, workrooms and offices and for use in the home. Sketches showing some of the uses to which the fans may be put are included.

Sensitive Drilling Machines.—Johnson Machine Tool Company, Gouverneur, N. Y. Circular. Shows a 14-in. sensitive drilling machine of the belt-driven type. A brief description of the machine is given, together with a condensed table of specifications. One of the features is the use of a square table with a slotted apron that can be swung around the column or tipped at any angle and a round table having a vertical adjustment on the column and capable of being removed for the substitution of a cup or crotch center.

Friction Clutches and Hoists.—Brown Clutch Company, Sandusky, Ohio. Catalog C. Contains illustrations and brief descriptions of a line of friction clutches for use on line and short shafts and flywheels, and with couplings. Tables of the various sizes of each that can be supplied are included, together with diagrams showing the construction. Mention is made of a line of hoists and sprockets and chains that can also be furnished.

Soot Cleaners.—Vulcan Soot Cleaner Company, DuBois, Pa. Pamphlet. Size, 6 x 9 in.; pages, 91. Devoted to the application of soot cleaning apparatus to boilers, superheaters, economizers, garbage destructor boilers, waste heat boilers and similar apparatus. The questions of what soot really is, why clean heating surface pays and how soot cleaning can be accomplished are discussed in some detail, after which the design of the soot cleaners as applied to the various types of boilers and economizers is gone into at some length. Details of the construction of the cleaner are presented with particular reference to the design of the nozzles, anti-corrosion air relief valves and automatic telltale drain valves.

Concrete Roads.—Trussed Concrete Steel Company, Youngstown, Ohio. Pamphlet. Illustrates and describes the application of mesh for reinforcement, armor plates for joints, curb bars and edge protectors for concrete roads and pavements, culverts, sewers and bridge floors. Illustrations and descriptions of a number of roads built using the company's material are presented and a set of standard specifications for roads is included. A number of views of roads in course of construction are presented.

Pulleys.—American Pulley Company, 4200 Wissahickon Avenue, Philadelphia, Pa. Two booklets. The first, which is a reprint of a paper presented before the Engineers' Club of Philadelphia, points out the advantages of using pulleys equipped with cork inserts for the transmission of power. The results of a number of tests made on iron, wood and steel pulleys with and without cork inserts are presented and a number of diagrams showing the increase in power transmitted by pulleys having these inserts are included. The other booklet contains reports of tests that were made on belt pulleys for slip and the results secured are presented both in tabular and graphic form.

Autogenous Welding and Cutting.—General Welding & Equipment Company, 107 Massachusetts Avenue, Boston, Mass. Pamphlet. Points out the advantages of using the autogenous process for welding and cutting metal. General instructions for the use of the process are given and the text is supplemented by a number of engravings of different operations that have been performed and drawings of the torches and other apparatus employed.

Atomizer for Liquid Fuel.—H. B. Stilz, 1938 North Marvine Street, Philadelphia, Pa. Leaflet. Illustrations and descriptive matter explain the operation of an atomizer for use in connection with the burning of gas, liquid and powdered fuels. Among the points upon which special emphasis is laid is that the atomizer produces a flameless and non-oxidizing fire, the atomization taking place at the nozzle. The pressure on the oil is utilized directly to secure its atomization, the air from the blower being used merely to reduce the atomized film of oil to a fog and thus increase the efficiency of combustion.

Grab Bucket.—Pawling & Harnischfeger Company, Milwaukee, Wis. Folder. Mentions the advantage to be derived from the use of a single-line bucket as a solution of the labor problem in the foundry. Among the work which the bucket will do is the digging of pits, cleaning of floors, the unloading of cars of loose material and the distribution of it. An illustration of one of the buckets in use and a partial list of users with the number of buckets installed in each case are included.

THE IRON AGE

New York, July 20, 1916

ESTABLISHED 1855 VOL. 98: No. 3

A Machine Shop With Notable Features

New Six-Story Plant of the National Acme Mfg. Company, Cleveland—Electric Attachments, Novel Workbench Location and Space-Saving Floor Entrances

An interesting type of a modern machine shop, having various features that are regarded of unusual merit in shop arrangement and in the methods of routing and handling material and finished products, as well as along the lines of safety, has recently been built by the National Acme Mfg. Company, Cleveland, Ohio. The company's entire department for building automatic machinery, with the exception of the spindle department, is located in this building.



A View of the Well Arranged Erecting Shop Directly Adjoining the Main Building Used for Erecting the Large Size Automatic Machinery and Having a Crane Runway that Provides Ample Room for Handling this Large Machinery

The shop occupies a fireproof structure constructed according to the latest factory design, 218 ft. long, 51 ft. 7 in. wide and six stories in height. The building has a steel frame reinforced with concrete and faced with red shale brick. Adjoining the main building as an extension to the first floor is a one-story erecting shop of the same length and 55 ft. wide, the roof of which extends above the ceiling of the second floor of the main building. The balcony extends around this shop connecting with and being on the same level as the second floor of the main building. This makes the erecting shop a continuation of the first floor of the main building and the balcony above the former a continuation of the second floor.

The convenient and space saving arrangement of the building in respect to the entrances to the various floors and to toilet-room facilities, etc., are interesting. There is a departure from the practice of having a centrally located time clock that must serve all employees on entering and leaving the plant, and which usually causes delay and crowd-



A View of the Assembly Floor Showing One of the Electric Conduits Suspended from the Ceiling with Outlets for Current for Portable Electric Drills and Lamps, Taking the Place of the Usual Column Outlets

ing. Instead, a time clock is provided on each floor for the men on that floor. There is an extension on one side of the building near one end to provide space for a wide inclosed iron stairway used by the workmen and given over to the toilet rooms on each floor, to an electric passenger elevator for the foremen, office employees and visitors, to a 5-ton, 8 x 12-ft. freight elevator and to a pipe shaft.

The time clocks, lavatories and steel lockers are located on each floor at the top of the stairs or close to points of entering and leaving the shop, the lavatories directly adjoining the toilet rooms located in the extension. A double row of white enameled iron wash basins is provided on each floor, fourteen bowls to the floor. A concrete floor is provided in the lavatories and toilet rooms and the units in the latter are divided by slate partitions. Another enclosed iron stairway is provided at the opposite end of the building for the convenience of the workmen in going from floor to floor. The shop is joined with the main factory building across the street by a covered concrete bridge which connects the two buildings at the third floor.

The building is provided with steel fireproof doors that shut off all stairways, and with Kinnear curtain type of doors at the entrances to the passenger and freight elevators, and is equipped with the General Fire Extinguisher sprinkling system, and also with an auto call system. All wiring is placed in conduits. A skylight is provided in the greater part of the roof surface of the erecting floor, and there is another skylight in the monitor section that extends the length of the main building above the top floor.

The ceilings are 15 ft. high on the first floor, 10 ft. high on the top floor and 12 ft. high on the intermediate floors. The building is divided into three 16-ft. 10-in. bays by two rows of 15-in. concrete columns spaced 12 ft. on centers lengthways. The lower parts of the columns are protected at the corners with steel. The floors are concrete slabs, the first floor ceiling being a 9½-in. slab and those above 8-in. slabs, designed to carry a dead load of 139 and 120 lb. per square foot respectively. The ground floor, including the erecting floor, and the second floor are covered with creosoted wood blocks, and the other floors with matched maple flooring. The erecting shop floor has a 10-in. concrete foundation, so that it is possible to install heavy machinery

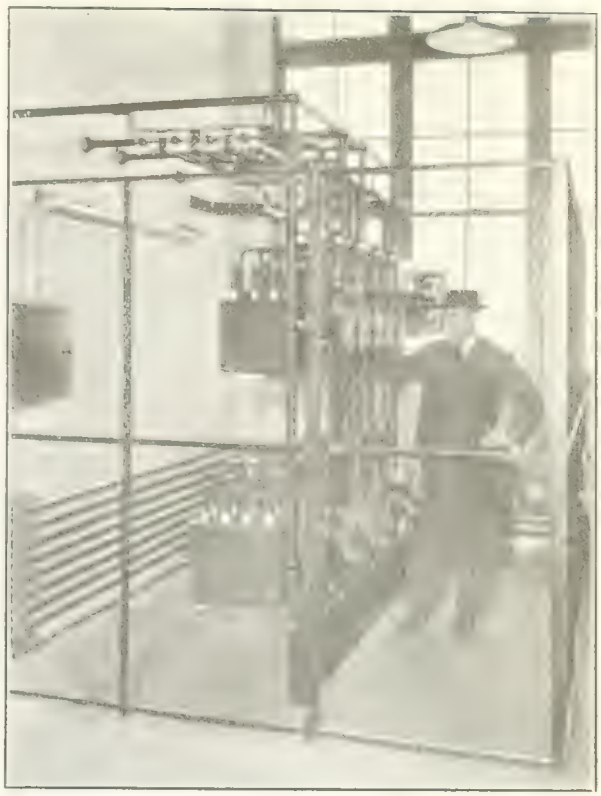


Benches Are Placed Between the Columns on the Erecting Floor, Providing Twice the Amount of Space that Would Be Available Were the Benches Located Along the Side Walls

anywhere on this floor by removing the wooden blocks and without providing additional foundation for the machines. The ceilings and upper part of the walls are white enameled, and the columns and side walls to a height of 5 ft. are gray. These were recently adopted as standard colors throughout the entire plant, the bins and other equipment usually painted being in the slate color. The paint is a special preparation designed to bear washing when the walls become dirty, and was furnished by the Trun-Con Laboratories, Detroit, Mich.

Material being routed through the shop for the various machine and assembling operations starts on the top floor and is moved downward. The chuck department and tool rooms are located on the sixth floor, lathe and grinding work is done on the fifth floor, milling on the fourth floor, small planer work and boring on the third floor, sub-assembling on the second floor, and erecting, final assembling and testing on the first floor. An up-to-date shop hospital is also located on the first floor, with a physician and nurse in attendance.

The erecting shop is a large well-lighted and well-arranged building. Its roof of concrete slabs and wired prism glass is supported by steel trusses. It is served by a 15-ton Pawling & Harnischfeger electric crane with a 3-ton auxiliary. The crane has a 40-ft. span, and its runway is 26 ft. above the floor, or about on a level with the second story ceiling of the main building. The balcony that extends around the erecting floor is 11 ft. wide and is inclosed with a wire railing or screen. Scraping and fitting are done on this balcony floor. The erecting floor is used largely for erecting the company's new 3¾-in. automatic machines, that weigh complete about 25,000 lb. At the side of this floor at the edge of the balcony are located a number of heavy machines, including a 54-in. Colburn vertical boring mill, a 48-in. x 8-ft. Lucas precision horizontal boring mill, two 42-in. x 48-in. x 12-ft. and a 48-in. x 72-in. x 14-ft. Cincinnati planing machines. This machinery is all motor driven by direct-connected individual motors, all belt drive being eliminated on the floor except a few small lathes and shapers at one end beyond the crane runway.



The Switchboard, Showing Automatic Circuit Breakers that Take the Place of the Usual Switchboard with Knife Switches



The Testing Department on the Third Floor, Showing the Monorail Trolley and Track for Conveying Machinery from the Testing Floor to the Shipping Department and a Machine Suspended from the Hoist in a Sling Ready to go to the Shipping Room. Two lines of shafting in this bay for testing machinery are also shown

The machinery in the main building is driven from two motors on each floor, one for each line shaft. The motors are hung from the ceiling, and the line shafts are supported on post hangers attached to the sides of the building columns. Silent chain drive is provided, with metal guards around the chain.

A departure from the usual shop arrangment is found in the bench room on the first floor, where the benches, instead of being located along the wall, are placed between the rows of concrete posts. This arrangement solved the problem of having sufficient bench space which otherwise would not have been available. These benches are placed between alternate columns along two rows of columns, leaving the alternate spaces clear. Each bench, 12 ft. long, is built around the columns to which it connects, and provides bench space for three men on each side. The benches are supported by iron legs with a vise above each leg, insuring solid support for the vises. The legs and vises are placed in staggered positions, so that men on opposite sides doing such work as filing will not interfere with each other. It is figured that this arrangement provides twice as much space as would have been available had the benches been located along the side wall.

A machine shop novelty is provided in a circular steel tank about 36 in. in diameter, located on each floor near the wall adjoining the lavatory, in which is dumped the pails of water and pumice stone used in wet rubbing the machines and parts. In the old building this refuse was dumped into the plumbing water closets, which were frequently clogged by the large amount of solid matter contained in the pails. This material is dumped into a hopper at the top of the tank, the sides of the hopper extending down to nearly the bottom of the tank. The solid matter settles in the bottom and the liquid passes out

(*Continued on page* 129)

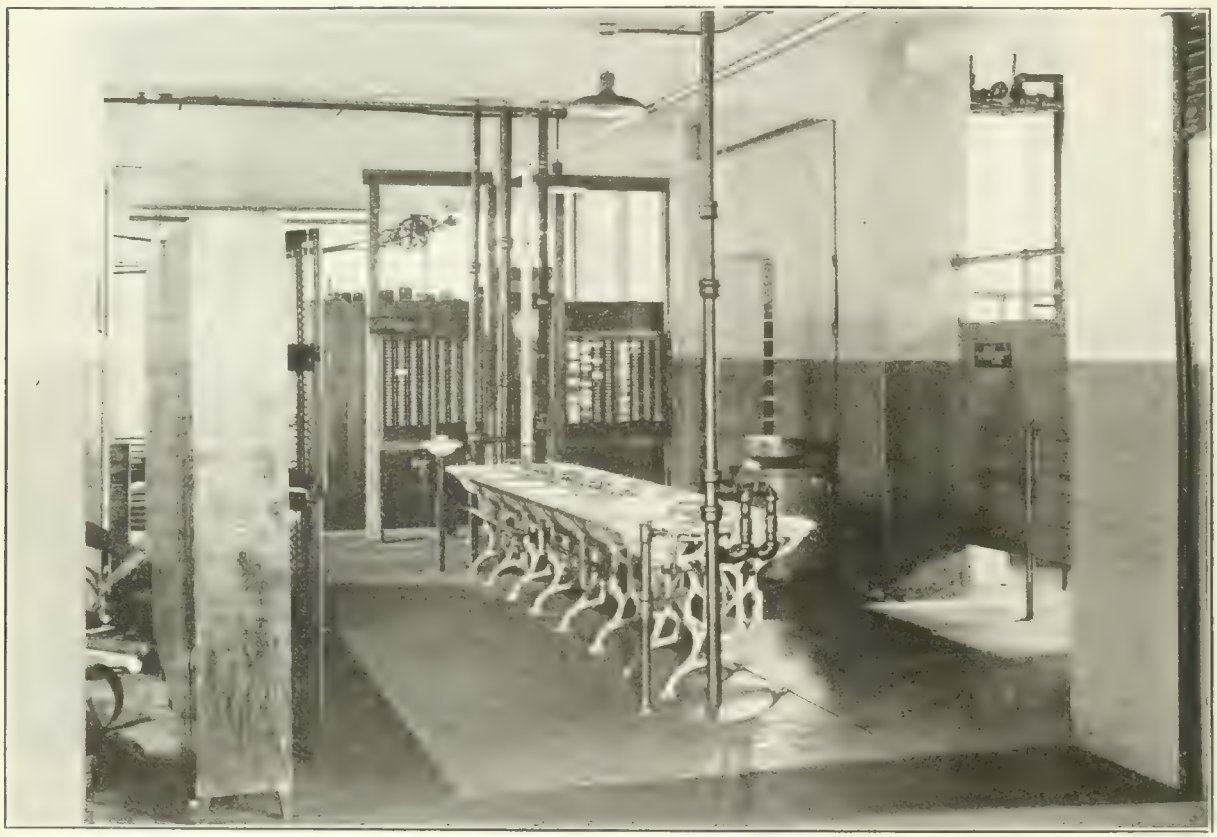
A Comparison of Steel Prices and Wages of Common Labor

(*With Supplement*)

THE IRON AGE is permitted to reproduce a chart recently prepared by the Republic Iron & Steel Company in which the fluctuations in prices of leading steel products in the years 1899 to 1915, inclusive, and in the first four months of 1916 are compared with wages of common labor at steel works in the same period. The steel prices used in plotting the diagram are the monthly averages taken from THE IRON AGE'S quotations. The rates for common labor are those paid at steel works in the Middle West.

In connection with the chart, which is reproduced in the accompanying supplement, a curve is plotted from a recent issue of the New York Times *Annalist*, showing the purchasing power of a $10 bill in the years 1890 to 1915, inclusive. This purchasing power curve is significant in that it shows the almost uninterrupted decline in the period 1899-1915 covered by the price and wages chart.

It is interesting to note that in the period from April, 1899, to April, 1916, the wages of common labor were reduced but twice; namely, in June, 1904, and April, 1909. The first of these reductions lasted until May, 1905, or nearly eighteen months, while the second was only of sixty days' duration. It may be remembered that in April, 1909, the independent steel companies reduced wages 10 per cent, but this 10 per cent was restored within sixty days. The striking feature of the heavy line on the chart, representing wages, is that the curve based upon it would show a strong upward sweep from a level of $1.25 in 1899 to $2.42 in 1916. Thus the wages of common labor have almost doubled. In the meantime the purchasing power of a dollar has declined from about 104 to 70, or about one-third.



Typical Entrance to One of Shop Floors, Showing at the Head of the Staircase the Time-Clock, Lockers, Lavatory and Door to Toilet Room. Along the side wall back of the wash-stand is a steel tank supplied on each floor in which to dump liquid refuse

A Machine Shop With Notable Features

(*Continued from page* 128)

through an overflow pipe at the top and is discharged into a 5-in. waste pipe extending from the top of the building to the sewer system and independent of the lavatory and toilet-room waste lines. The tanks have hinged covers and vents so that odors from them will not escape. When the tanks become filled with solid material the tops are lifted off and the material is removed.

An efficient arrangement is provided for handling the finished machines from the final assembling and testing department to the shipping department, the latter a room, 70 x 100 ft. that extends from one end of the erecting floor. A monorail trolley track extends the length of the building near the outer wall of the assembly floor adjoining the final testing department. On this side of the assembly floor two rows of hangers are provided all complete for testing. This monorail curves around through the end of the erecting floor and out into the shipping room. The track is provided with two 2-ton Yale triplex hoists hooked in multiple. Slings are placed around the machines, and they are run out on these hoists to scales in the erecting shop, where they are weighed, and from there to the shipping floor, where they are crated. Large machines on the erecting floor after being crated are handled by a steel grapple placed over the crates. Headless screws on the bottom of the grapple grip into the bottom of the wooden crates, preventing slipping. This method of handling not only saves time, but the danger of accident resulting from the machine getting out of balance when lifted with chains is eliminated.

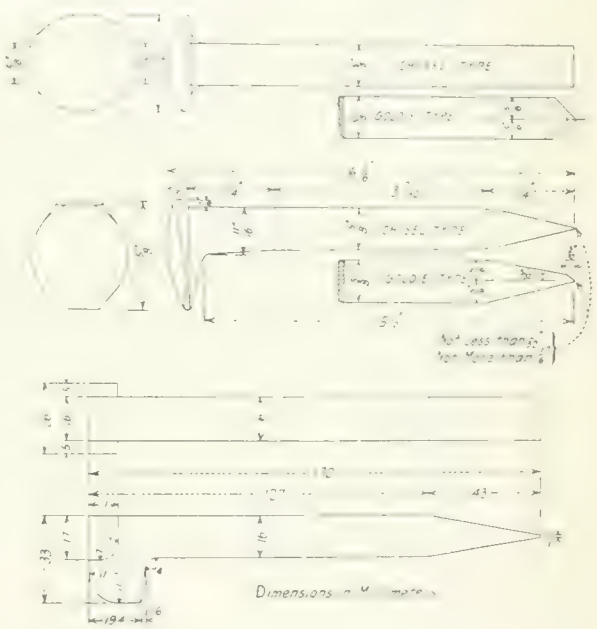
The electric control equipment is interesting in that instead of using ordinary knife switches, oil circuit breakers, more generally used for high-voltage lines, are provided for the low-voltage current, and each circuit has its own circuit breaker. The alternating current used enters the plant substation at a pressure of 11,000 volts, and is transformed to 440 volts. There are nine of these circuit breakers, of the Westinghouse type, on the oil-switch panel, one being provided for each floor, one for the crane and elevators and one for the lighting circuit, the current for the latter being stepped down to 110 volts through a secondary converter. The arrangement eliminates open switches, busbars and fuses. The panel is provided with a polyphase wattmeter. The switchboard, enclosed in a wire cage, is located at one corner of the erecting floor. Each motor has its own starting box and all switching off is at the motor. Starting boxes have no-voltage release attachments, so that no-voltage release relays are not required on the circuit breakers.

By having sufficient general overhead artificial lighting, drop lights are eliminated. The artificial lighting is provided for the most part by 100-watt lamps in 18-in. dome Abolite reflectors. These are placed in a row in the center of the balcony floor on a level with the roof trusses on 12-ft. centers, along the outside bays of the main building and in the center bay as needed. An original method of providing outlets for local lighting and for electric drills is found on the assembly floor. Instead of using plugs in the columns, metal electrical conduits are provided that extend from the ceiling to about 7 ft. above the floor or in easy reach of the workmen. These conduits have two outlets, so that a portable electric drill and lamp can be connected to the outlets at the same time. These overhead outlets for the electric current are found much more convenient for the men on the assembly floor than a column outlet, and they permit the use of shorter cords and keep the aisles free of cords over which workmen are apt to stumble. Outlets are also provided in the alternate building columns for use if needed. Similar overhead conduits with one outlet for lights are provided above the planers on one of the upper floors.

The Russian Dog-Eared Railroad Spike

The dog-eared railroad spike in standard use on the Russian railways, and now being manufactured in large quantities in this country for export to Russia, is being tried out by the New York Central Railroad, which has distributed over 150 kegs to five divisions on its lines. The only instruction given to the supervisors was to use them. Reports from the track maintenance corps have in nearly every case been favorable, and the indications are that with certain variations this type of spike may replace the standard now universally used.

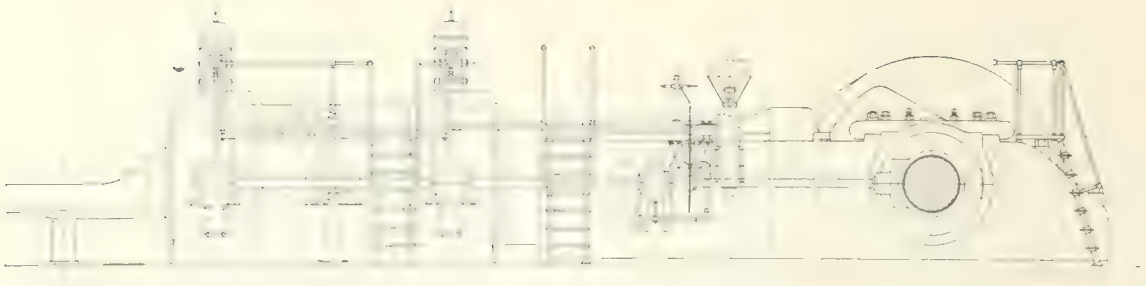
The standard track spike is 6 1/16 in. long, ⅝ in. square and has a flat, rounded head, offset to give a bearing surface on the rail base of about ⅞ in. It



The Standard American Track Spike of the Chisel Type and the Russian Spike, Showing the Radical Difference in the Design of the Spikehead

weighs about 12½ oz. The Russian spike has the same-sized shaft as the American, and is about ⅝ in. longer. Both are of the chisel type, but the Russian spike has nearly ½ in. longer taper, as the foreign specification requires that the spike can be driven and pulled six times each way in an oak tie. Both have about the same weight, but the Russian spike has a bearing surface on the rail of only about ⅝ in. It has, however, a depth of head of over ¾ in. as against that on the American spike which varies from 11/32 to 9/16 in.

The head of the dog-eared spike has two distinct advantages that have appealed to American railroad men. The first is that its shape enables it to resist corrosion, as from brine, much better than the thinner head on the American standard spike. It is also much easier to pull, as the ears are at the top of the head, which is much higher than the American spike head, and therefore stands out above the shoulder of the tie plate, enabling the track man to pull it more quickly and readily. Some complaint has been made that the flat top is not a good surface to take the blow in driving, which tends to break off the ears. These objections are considered well founded, but it is believed that by putting a bulge upon the top and with one or two other minor changes the new type of spike will prove superior.



Elevation of a Uniflow Steam Engine Built to Drive a Rod Mill at the Plant of the Youngstown Sheet & Tube Co.

UNIFLOW ENGINE FOR ROD MILL

First American Installation for This Service to Be Made at Youngstown

BY O. J. ABELL

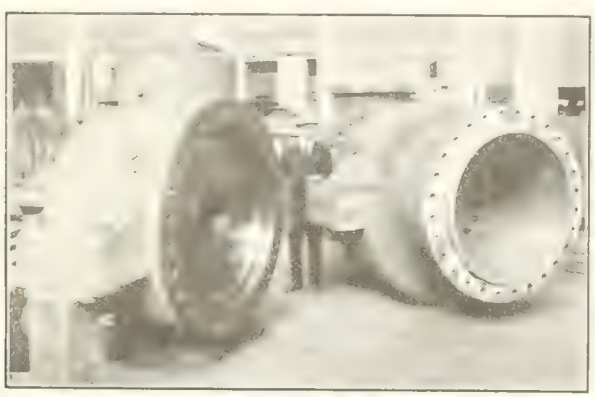
In the adaptation of the uniflow engine to rolling mill drive, practice in this country has followed that of Germany, as it has in numerous other respects. The first engines of this type to be built for rolling mill service in this country have just been completed and shipped by the Nordberg Mfg. Company, Milwaukee, for the Youngstown Sheet & Tube Company. The larger of the two engines will drive a 12-in. Morgan continuous rod mill and the smaller a 9-in. rod mill. At the Röchling Steel & Iron Works, Völklingen, a 30-in. three-high mill is being driven by a unit of this type, the engine operating under an average load of 4000 hp. but having a maximum continuous capacity of 6300 hp. and a short duration peak load capacity of 8000 hp. Under wide variations of load, as in that German installation and also under extreme overloads, a minimum increase in steam consumption, as indicated in the characteristic flat steam consumption curve, is the prominent feature of advantage which renders the uniflow engine so suitable to mill drive where sharpest fluctuations of load are almost continuous. Tests have shown that a 200 per cent load can be carried with a 10 per cent increase in steam consumption.

As is now very generally appreciated, this type of engine is highly efficient, the peculiar design of the cylinder contributing to a minimum loss of steam from initial condensation. As indicated in the accompanying cross-section, the exhaust steam ports are located centrally in the cylinder, the one row of ports alternately exhausting at either end of the cylinder as the piston uncovers the ports at one or the other end of its travel. The cylinder heads, therefore, are in contact only with live steam and are farthest removed from the steam at its low temperature point so that they are not cooled down prior to the admission of the high-pressure steam, and condensation is a minimum. It also follows that this type of cylinder is adapted to a maximum range of temperature between the admission and exhaust, or, in other words, admits of a maximum expansion of the steam. In this respect this engine is comparable with the tandem-compound type and has the important added advantage of requiring much less piping in the way of connections and much less floor space per horsepower.

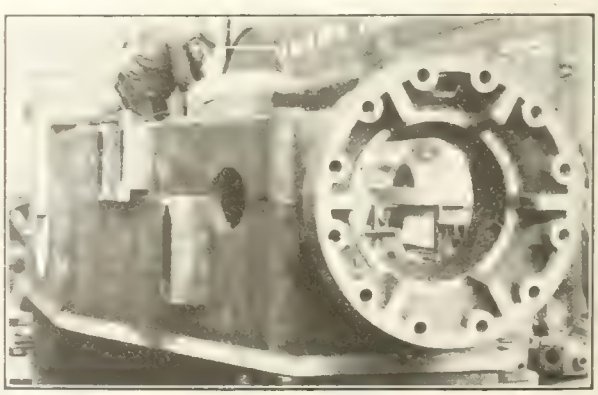
This Nordberg engine is a horizontal Tangye frame, single poppet valve, uniflow cylinder type with side crank and flywheel arranged to run under. Its design is entirely that of a heavy-duty unit, the general sizes and specifications of the two engines being as follows:

	Large Engine	Small Engine
Brake horsepower at 20-in. vacuum:		
Average	1,400	600
Maximum	2,100	1,600
Speed, r.p.m.	65–110	55–110
Diameter of cylinder, in.	44	37
Stroke, in.	50	48
Shipping weight, lb.	480,000	360,000
Weight of frame, lb.	108,085	74,340
Weight of cylinder, lb.	19,005	
Weight of front cylinder head, lb.	14,240	
Weight of rear cylinder head, lb.	14,155	
Normal steam pressure, lb.	170	170
Normal superheat, deg. Fahr.	75	75
Maximum steam pressure, lb.	200	200
Maximum superheat, deg. Fahr.	100	100
Diameter of main and outboard bearings, in.	25	20
Length of main and outboard bearings, in.	40	36
Size of crank pin, in.	14 x 15	12 x 12
Size of crosshead pin, in.	10 x 16	8½ x 14
Diameter of hollow piston rod, in.	13	10
Diameter of flywheel, ft.	16	10
Weight of flywheel, lb.	110,000	90,000

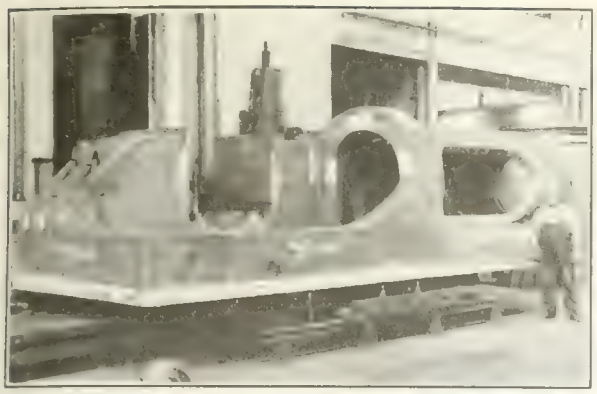
The general design of the cylinders is shown by the longitudinal section of the cylinder and in the view of the cylinder and cylinder head. The cylinder is a plain cylindrical casting, all valve chambers and steam passages being contained in the heads, which are bolted to the cylinder. This prevents distortion and strains due to expansion and contraction with the use of high pressures and super-



View of the Cylinder Head and the Cylinder of the Largest Engine before Assembling, Which Illustrates the Massive Design of the Castings

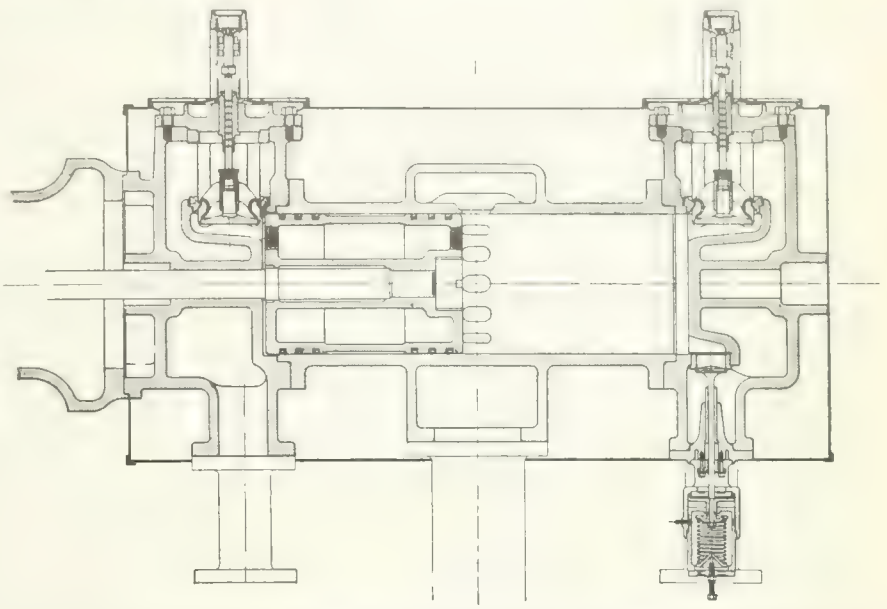


End View of the Large Frame Showing the Heavy Reinforcement of the Flange to Which the Rear Cylinder Head Is Bolted



The Bed of the Larger Engine Mounted on the Table of a Large Combination Drilling and Facing Machine

heats. The cylinder walls are of a thickness sufficient to reserve ample strength after all necessary reboring during the life of the engine. The steam valves are of the double beat, balanced poppet type, the valve cages being separate castings which are ground into the heads with a steam-tight joint. No packing is required for the valve stems, which are accurately ground and polished and work in ground and lapped bushings. The valves are operated from a lay shaft by a releasing valve gear with spring dashpots, the cut-off being under control of the governor through the wide range of loads. The speed regulation controls within a 4 per cent fluctuation at full load.



Cross-Section of Uniflow Type Engine Cylinder Showing the Large Heads and the Centrally Located Exhaust Ports and Exhaust Belt

The steam enters the cylinder heads at the bottom, all piping being carried under the engine room floor, sweeping up over the heads and jacketing them before entering the valve at the top. The exhaust is through the ports in the center of the cylinder, uncovered by the piston near the end of its stroke, an encircling exhaust belt delivering to the sub-floor pipe. Relief valves of the poppet type with a cataract dampening device are located near the bottom of the heads. In case of loss of vacuum and overcompression these valves automatically open and connect the clearance space of the cylinder with the steam space in the head and the communicating steam piping.

The casting of the principal parts of these engines, the frames, cylinders and cylinder heads, involved unusually exacting requirements in the matter of core work. The castings were poured in dry sand. All ribbing and reinforcing of the frame was done with cores on the inside of the casting and the segmental flywheels were cast entirely in cores.

Tests of the web strains in I-beams and girders have been conducted at the Engineering Experiment Station of the University of Illinois on a number of 12-in. beams and 24-in. built-up girders. The investigations were conducted by Prof. H. F. Moore and Prof. W. M. Wilson, and the results are described in bulletin No. 86, copies of which may be obtained upon application to W. F. M. Goss, director, Urbana, Ill.

Steel Wheels for Army Trucks

In a paper on "Automobile Experiences in the Great War," presented at the semi-annual meeting of the Society of Automobile Engineers, June 12 to 16, W. F. Bradley, European correspondent for the Class Journal Company, New York, discusses as follows the extent to which metal wheels for automobiles are being adopted in place of wooden ones:

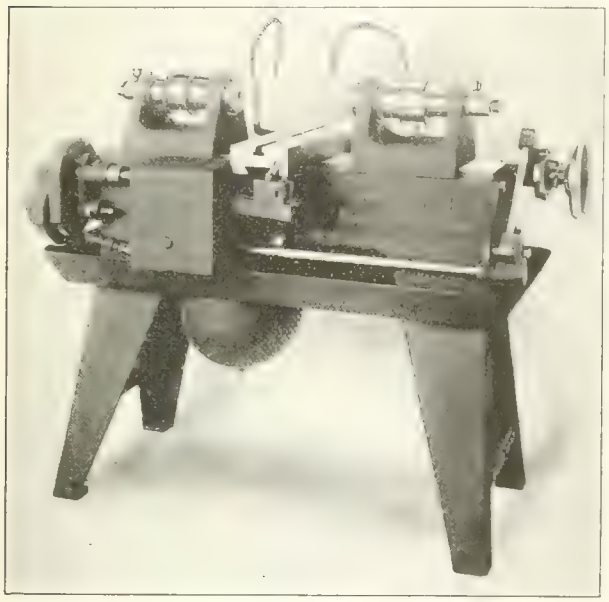
One of the most important developments of the war is the adoption of the all-metal in place of the wood wheel. Although the wood wheel may continue in use for some years on commercial trucks, and possibly will not be abandoned for touring-car purposes, it is already doomed for army trucks. The primary objection to the wood wheel is that, even if well made of good material, in the first instance, it requires attention from time to time to keep it in proper condition. This defect is most apparent when the trucks have to remain out of doors day and night, indeed on all occasions except when in the repair shop. Another objection is that if the vehicle catches fire—and the enemy's guns are constantly on the search for convoys working back of the lines—the wheels are liable to be destroyed, and it becomes a difficult matter, if not an impossibility, to get the truck away. With metal wheels it is nearly always possible, when the fire has burned itself out, to tow the vehicle home. Apart from the body, it is surprising how little a burned-out truck will suffer in its essential organs.

Practically no army trucks are now being built in Europe with wood wheels. All the Austin and other trucks supplied to the Royal Naval Air Service for use in France in a short time had their wood wheels changed for those of the steel-disk type. Generally, when replacements become necessary, cast-steel or disk wheels are substituted for wood. A small number of American trucks have been changed in this way.

For trucks of 3½-ton capacity and upward the cast-steel wheel of the spoke variety is extensively employed by French and Italian makers, and also by the British. The latter, however, are also partisans of the disk type. For the lighter units, such as light trucks on twin pneumatic tires, and motor ambulances, the steel-disk wheel has made a remarkable jump into favor. These pneumatic-shod wheels can be detached by removing four to six nuts. Incidentally, four studs and nuts, adopted by some makers, are considered an insufficient attachment. Six should be a minimum. The detachable wire-spoke wheel has not been given a more extended application, although it has held its own on touring cars used by staff officers.

Automatic Duplex Slot Milling Machine

A recent addition to the line of machine tools built by the Garvin Machine Company, Spring and Varick Streets, New York, is a duplex slotting machine. It is entirely automatic in operation, and once the piece to be machined is put in place no further attention is required on the part of the operator, the machine stopping as soon as a slot has been cut. Among the work that can be handled is the milling of drift slots in spindles and elongated holes in toolpost slots, the cutting of keyways, the slotting of castings, tools, etc., the making of mortise cuts and open fork ends and taking cuts in both ends of a single piece of work where it is necessary that the slots be in line. As the work can be done from both sides at once, the time required is, of course, correspondingly reduced and it is also possible to handle two separate pieces at once automatically and without effort on the part of the operator. As compared with the old method of jig drilling and slotting out, partial sawing out or butt milling, the new machine is said to effect a material saving in time.



A Full Automatic Duplex Machine for Milling Slots in Spindles and Tool Posts, Making Mortise Cuts and Simultaneously Taking Cuts in Both Ends of a Piece

A cam and adjustable lever provide for the movement of the table at a uniform speed, and the length of stroke can be varied between ¼ and 4 in. conveniently and quickly. Speed changes are provided by a cone pulley and a set of change gears, short slots being reciprocated quickly and longer ones at a slower rate. The cam has a large sized groove in which a hardened roller rests and is driven by a worm gear.

The spindle heads are designed for high-speed work and the spindles taper at both ends. They run in solid bronze boxes having an adjustment for wear and a hardened step bearing to take the thrust. Each head can be adjusted independently on the bed to take care of different lengths and conditions of cutters, the position of the work on the table, etc. Simultaneous movement of the headstocks is provided by a handwheel, and it can be adjusted in or out to any distance without interfering with the setting of the machine. The heads are fed into the cut simultaneously and automatically by a right and left pitch screw controlled by a ratchet wheel. When the work of milling a through slot is almost completed one of the heads is backed away automatically, thus enabling the other to continue to advance and complete the slot. In this way, it is pointed out, no partition is left in the bottom. The feed is by a pawl and ratchet and can be adjusted, as well as arranged to lift out automatically and stop feeding when the required depth of cut is reached. Feeding takes place at each end of the stroke and it is emphasized that uniformity of the product is secured without depending on the operator. The work can be set at any angle on the table to produce a taper end of the slot. Two-prong fishtail cutters are used to produce slots ranging from ¼ to 1½ in. in width, and the changes of speed for different sizes of cutter are provided by a friction cone pulley on the countershaft.

All the working parts of the machine are located outside of the bed and are readily accessible. The equipment regularly furnished with the machine includes a steel oil pan with tank and strainer and pump and piping. Adjustable fixtures for holding round work up to 4 in. in diameter can be supplied at a slight extra cost.

Crompton & Knowles Pension Plan

The Crompton & Knowles Loom Works, employing 2,000 hands in its plant at Worcester, Mass., and 600 in its factory at Providence, R. I., has issued notice of a pension plan effective from July 1, based on the average monthly wages and length of service of the employees. As the company lost many old employees at the time of the general machinists' strike in Worcester last September, one portion of the text of the notice extends the benefits of the pension plan to these men if they are again in the company's employ by Aug. 15. As the business has been long established, and many men old in years and long in service are in its employ, the text of the notice, as given below, is of interest as showing the conditions which have actuated the company in instituting the pension system.

"Many of the largest labor employing concerns of the country will not hire a new employee over 45 years of age, no matter how experienced he may be, and while there may be occasions when experienced men beyond this age may get temporary employment, in normal times many avenues of employment will be closed because of age. Furthermore, with the necessity of physical examination as a condition of employment, as now required by many employers, it will be increasingly difficult to obtain employment.

"In view of the above, the company feels it is especially fitting at this time to establish a liberal pension plan for its employees, and trusts that it will furnish them an added incentive for faithful and efficient service.

"An idea of the material benefit of this pension plan will be apparent when it is considered that a retired employee who obtains the minimum pension will receive each year an amount equal to the income from $4,500 at the usual savings bank rate of interest, namely, 4 per cent.

"A retired employee who has had an average wage, prior to retirement, of $60 per month, will receive on this basis an amount equal to the income from $4,500, if he has had 25 years of service; if 30 years of service, an amount equal to the income from $5,400; if 35 years of service, an amount equal to the income from $6,300; if 40 years of service, an amount equal to the income from $7,200.

"If the average wage of the employee who is retired has been more than $60 per month, the principal represented by his pension income is correspondingly increased.

"In consideration of the fact that, due to the abnormal conditions of the past year, many former employees to whom this pension plan would be of vital consequence are now in other fields, and in further view of the fact that it is the desire of the company that this recognition of our employees be as comprehensive as possible, it has been decided to reinstate such former employees for whom places can be found, and give them full credit for their former service in their pension records, providing such reinstatement be made before Aug. 15, 1916."

The Brown Hoisting Machinery Company, Cleveland, is erecting for the Donner Steel Company, Buffalo, two 251-ft. electric ore handling bridge cranes equipped with man trolleys, and is extending a crane now in use in the steel plant to the same length as the two new cranes. The company also has a contract for trestles and coke bins. In addition it has recently taken orders for a rotating cantilever electric crane to be shipped to Japan, an ore bridge for the Dominion Iron & Steel Company, Sidney, N. S., and a bridge for the General Chemical Company, Chicago.

New Extras on Steel Bars and Small Shapes

The standard classification of extras on steel bars and small shapes, issued on July 1 by the Carnegie Steel Company, gives a new classification for channels, with an increase in the extras, and also a new classification for tees and for ovals. It divides the former table of half ovals and half rounds into separate tables. The hexagons now include a 3-in. hexagon at the top and ¼-in. hexagon at the bottom of the range of sizes. New extras are also asked for machine cutting. The extras for rounds and squares, for flats, for angles and for bands remain as they have been. Some of the new classifications, which are the first since the classifications issued Sept. 1, 1909, are as follows:

Channels

1½ in. and wider, but under 3 in. wide x 3/16 in and heavier	0.15c. extra
1½ in. and wider, but under 3 in. wide x ⅛ in.	0.25c. extra
1 to 1¼ in. x 3/16 in. and heavier	0.25c. extra
1 to 1¼ in. x ⅛ in.	0.35c. extra
1 to 1¼ in. x 7/64 in.	0.50c. extra
¾ and ⅞ in. x 3/16 in. and heavier	0.30c. extra
¾ and ⅞ in. x ⅛ in.	0.40c. extra
¾ and ⅞ in. x 7/64 in.	0.55c. extra
¾ x ⅛ in. and heavier	1.20c. extra
⅝ x 3/32 in.	1.40c. extra
½ x 7/64 in. and heavier	1.80c. extra
½ x 5/64 in.	2.00c. extra

For intermediate sizes, the next higher extra to be charged in all cases.

Tees

1½ x 1½ in. and wider, but under 3 in. wide x 3/16 in. and heavier	0.20c. extra
1 x 1 to 1¼ x 1¼ x 3/16 in. and heavier	0.40c. extra
1 x 1 to 1¼ x 1¼ x ⅛ in.	0.50c. extra
⅞ x ⅞ x 3/16 in.	0.50c. extra
⅞ x ⅞ x ⅛ in.	0.60c. extra
¾ x ¾ x 3/16 in.	0.60c. extra
¾ x ¾ x ⅛ in.	0.70c. extra
⅝ x ⅝ x ⅛ in.	1.30c extra
½ x ½ x ⅛ in.	1.80c. extra

Unequal leg tees are subject to special prices, which will be furnished on application.

For intermediate sizes, the next higher extra to be charged in all cases.

Hexagons

¾ to 3 in.	0.15c. extra
⅝ to 11/16 in.	0.25c. extra
½ to 9/16 in.	0.35c. extra
7/16 in.	0.55c. extra
⅜ in.	0.65c. extra
5/16 in.	0.75c. extra
¼ in.	1.00c. extra

For intermediate sizes, the next higher extra to be charged in all cases.

Half Rounds

1 to 3 in.	0.20c. extra
¾ to 15/16 in.	0.35c. extra
⅝ to 11/16 in.	0.50c. extra
½ to 9/16 in.	0.70c. extra
⅜ to 7/16 in.	1.10c. extra

For intermediate sizes, the next higher extra to be charged in all cases.

Half Ovals

Gauges shown are Birmingham Wire Gauge.

1 to 4 in. x ¼ in. and thicker	0.25c. extra
1 to 4 in. x Nos. 7, 8, 9 and 3/16 in.	0.35c. extra
1 to 4 in. x Nos. 10, 11, 12 and ⅛ in.	0.50c. extra
¾ to 15/16 in. x 3/16 in. and thicker	0.50c. extra
¾ to 15/16 in. x Nos. 10, 11, 12 and ⅛ in.	0.65c. extra
¾ to 15/16 in. x Nos. 13, 14 and 15	0.80c. extra
⅝ to 11/16 in. x 5/32 in. and thicker	0.60c. extra
⅝ to 11/16 in. x Nos. 10, 11, 12 and ⅛ in.	0.75c. extra
⅝ to 11/16 in. x Nos. 13, 14 and 15	0.90c. extra
½ to 9/16 in. x ⅛ in. and thicker	0.80c. extra
½ to 9/16 in. x Nos. 13, 14 and 15	1.05c. extra
⅜ to 7/16 in. x 3/32 in. and thicker	1.35c. extra
⅜ to 7/16 in. x Nos. 14 and 15	1.60c. extra

For intermediate sizes, the next higher extra to be charged in all cases.

Ovals

¾ to 2½ in. x ⅜ in. and thicker	0.20c. extra
⅝ to 2½ in. x ½ in. to 5/16 in.	0.30c. extra
⅝ to 2½ in. x 5/32 in. to 3/16 in.	0.45c. extra
⅝ to 11/16 in. x 5/16 in. and thicker	0.35c. extra
⅝ to 11/16 in. x 3/16 in. to ¼ in.	0.50c. extra
⅝ to 11/16 in. x ⅛ in. to 5/32 in.	0.65c. extra
½ to 9/16 in. x ¼ in. and thicker	0.55c. extra
½ to 9/16 in. x ⅛ in. to 3/16 in.	0.70c. extra
½ to 9/16 in. x 5/32 in.	0.90c. extra
⅜ to 7/16 in. x 3/16 in. and thicker	0.95c. extra
⅜ to 7/16 in. x ⅛ in. to 5/32 in.	1.20c. extra
⅜ to 7/16 in. x 3/32 in.	1.45c. extra

For intermediate sizes, the next higher extra to be charged in all cases.

Machine Cutting Rounds and Squares 1½ In. and Larger to Specified Lengths

Machine cutting to lengths over 18 in.	0.15c. extra
Machine cutting to lengths over 24 in. to 48 in., inclusive	0.25c. extra

[illegible] 0.35c. extra

Machine cutting to lengths of 12 in. and less, extra will be furnished on application, but will not be less than 0.45c.

The above extras apply only to carbon steel under .50 carbon.

Extras for machine cutting over .50 carbon will be furnished on application.

Extras for machine cutting rounds and squares under 1½ in., flats, etc., will be furnished on application.

Cutting to Specified Lengths

Other than Machine Cutting

Cutting to lengths of 60 in. and over	No charge
Cutting to lengths over 18 in. to 24 in., inclusive	0.05c. extra
Cutting to lengths over 24 in. to 48 in., inclusive	0.10c. extra
Cutting to lengths over 12 in. to 24 in., inclusive	0.20c. extra
Cutting to lengths of 12 in. and less, extra will be furnished on application, but will not be less than	0.30c.

Increasing the Yield of Gasoline

The late increase in the price of gasoline is ascribed in a paper by W. R. Hamilton, to be presented at the Arizona meeting of the American Institute of Mining Engineers in September, to the following causes: 1. A decrease in the production of refinable oil of about 6,000,000 gal. in 1915. 2. Steadily increasing consumption. 3. Discontinuance of gasoline imports. 4. Heavy exports to Europe.

An increase in the production of gasoline may come possibly from the following sources: 1. Increased production of light oil. This promises nothing more than temporary relief. 2. Increased production of casing-head gasoline, or the recovery of the lighter hydrocarbons usually lost in oil production by volatilization. New production of gasoline from these sources is limited and cannot be expected to have any marked effect. 3. Lowering the grade of market gasoline, by which is meant the including of high point fractions in gasoline as the cut is made at the refinery. Before the demand for gasoline increased, the gravity of market gasoline was 65 or 70 deg. Baumé. The boiling point of "last over," or "end point" of the distillation of such gasoline was little higher than 200 deg. Fahr. The present standard is now over 59 to 61 deg. Baumé with an end point of 320 to 380 deg. Fahr. The production of marketable gasoline has thereby been increased. This cut can be still further widened and the production thereby probably increased from 30 to 50 per cent. 4. Innovations in refining methods such as the Rittman, Burton, Snelling and other processes. The Burton process, controlled by the Standard Oil Co., has not been successfully applied to California asphaltic oils, where the presence of a large proportion of saturated hydrocarbon has introduced problems not found in Eastern oils.

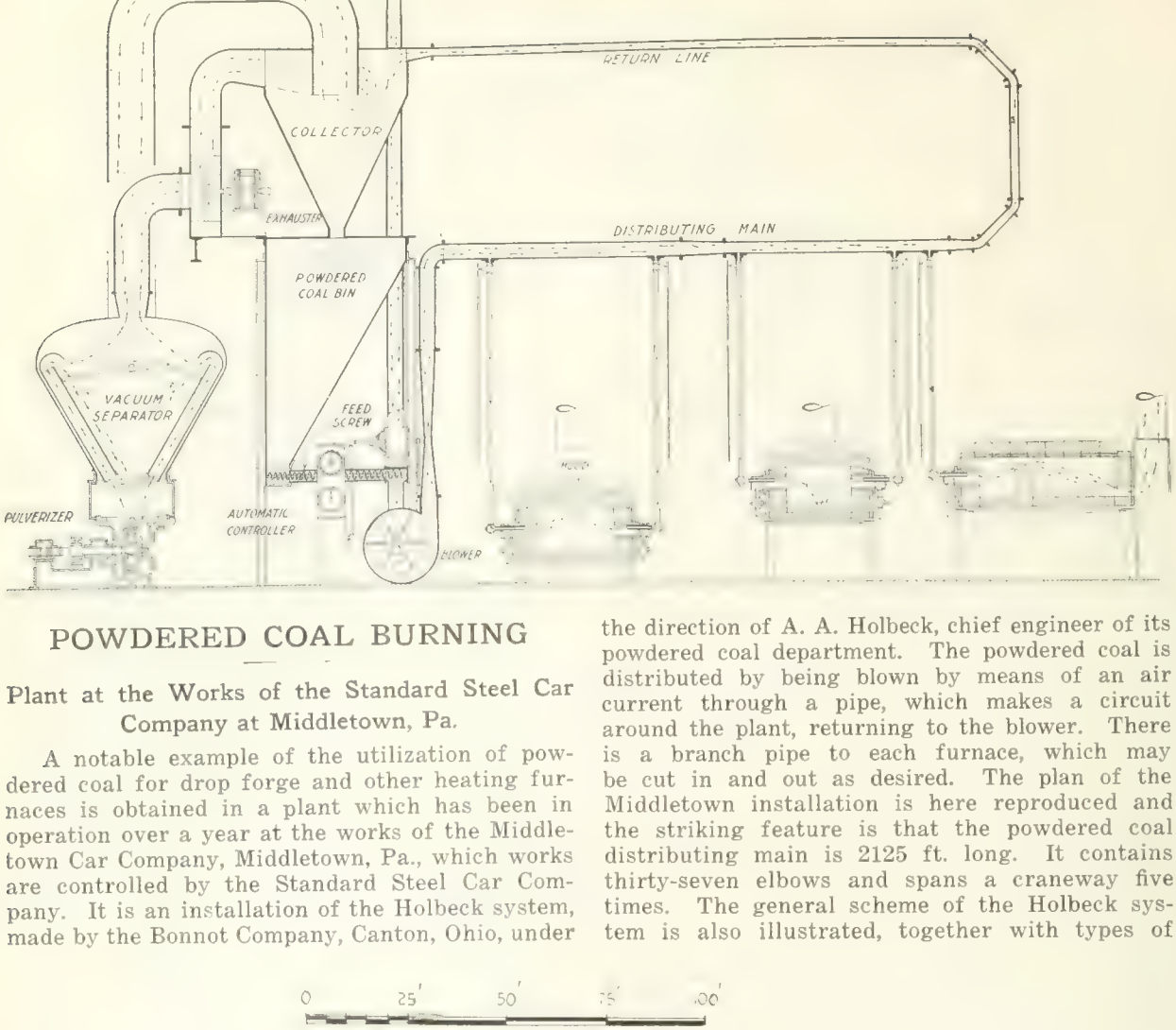
The Rittman process differs from the others in that the action takes place after the liquid has been vaporized. By subjecting the vapor to pressure and heat, a rearrangement of the molecules is effected, liberating the carbon which is removed from the plant without difficulty.

Of the processes making use of a catalytic agent, the McAfee process, controlled by the Gulf Refining Company, is the most promising. The catalytic agent used is aluminum sulphate and results from experimental work are said to be excellent.

Structural Business in June

The records of the Bridge Builders & Structural Society, as collected by its secretary, George E. Gifford, 50 Church Street, New York, show that in June 58 per cent of the entire capacity of the bridge and structural shops of the country was put under contract.

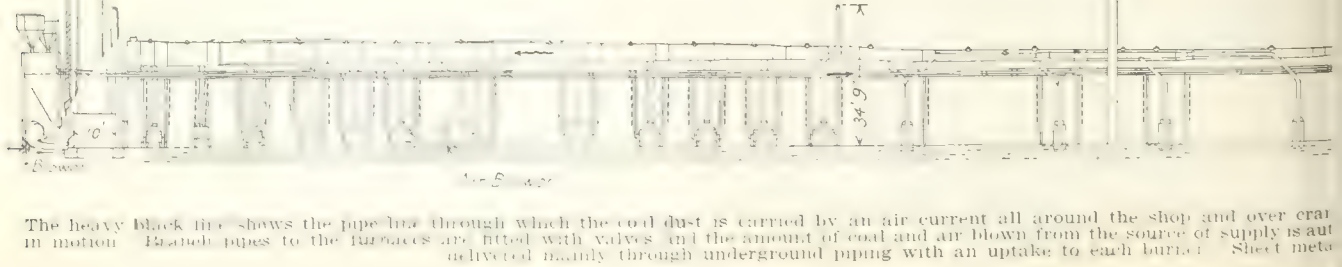
This makes June the leanest month in new fabricated projects since February, 1915. In the fifteen months intervening business has been closed at the rate of about 138,000 tons monthly, while June's total is about 100,000 tons. In March, April and May of 1915, as plant extensions under the influence of war business were getting under way, the amount of fabricated work contracted for averaged 107,000 to 108,000 tons per month, while for the seven months preceding, those following immediately on the outbreak of the European war, the monthly average hardly exceeded 5100 tons—December, 1915, was the high month with about 208,000 tons.



POWDERED COAL BURNING

Plant at the Works of the Standard Steel Car Company at Middletown, Pa.

A notable example of the utilization of powdered coal for drop forge and other heating furnaces is obtained in a plant which has been in operation over a year at the works of the Middletown Car Company, Middletown, Pa., which works are controlled by the Standard Steel Car Company. It is an installation of the Holbeck system, made by the Bonnot Company, Canton, Ohio, under the direction of A. A. Holbeck, chief engineer of its powdered coal department. The powdered coal is distributed by being blown by means of an air current through a pipe, which makes a circuit around the plant, returning to the blower. There is a branch pipe to each furnace, which may be cut in and out as desired. The plan of the Middletown installation is here reproduced and the striking feature is that the powdered coal distributing main is 2125 ft. long. It contains thirty-seven elbows and spans a craneway five times. The general scheme of the Holbeck system is also illustrated, together with types of



The heavy black line shows the pipe line through which the coal dust is carried by an air current all around the shop and over crai in motion. Branch pipes to the furnaces are fitted with valves and the amount of coal and air blown from the source of supply is aut delivered mainly through underground piping with an uptake to each burner. Sheet meta

furnaces to which it has been satisfactorily applied.

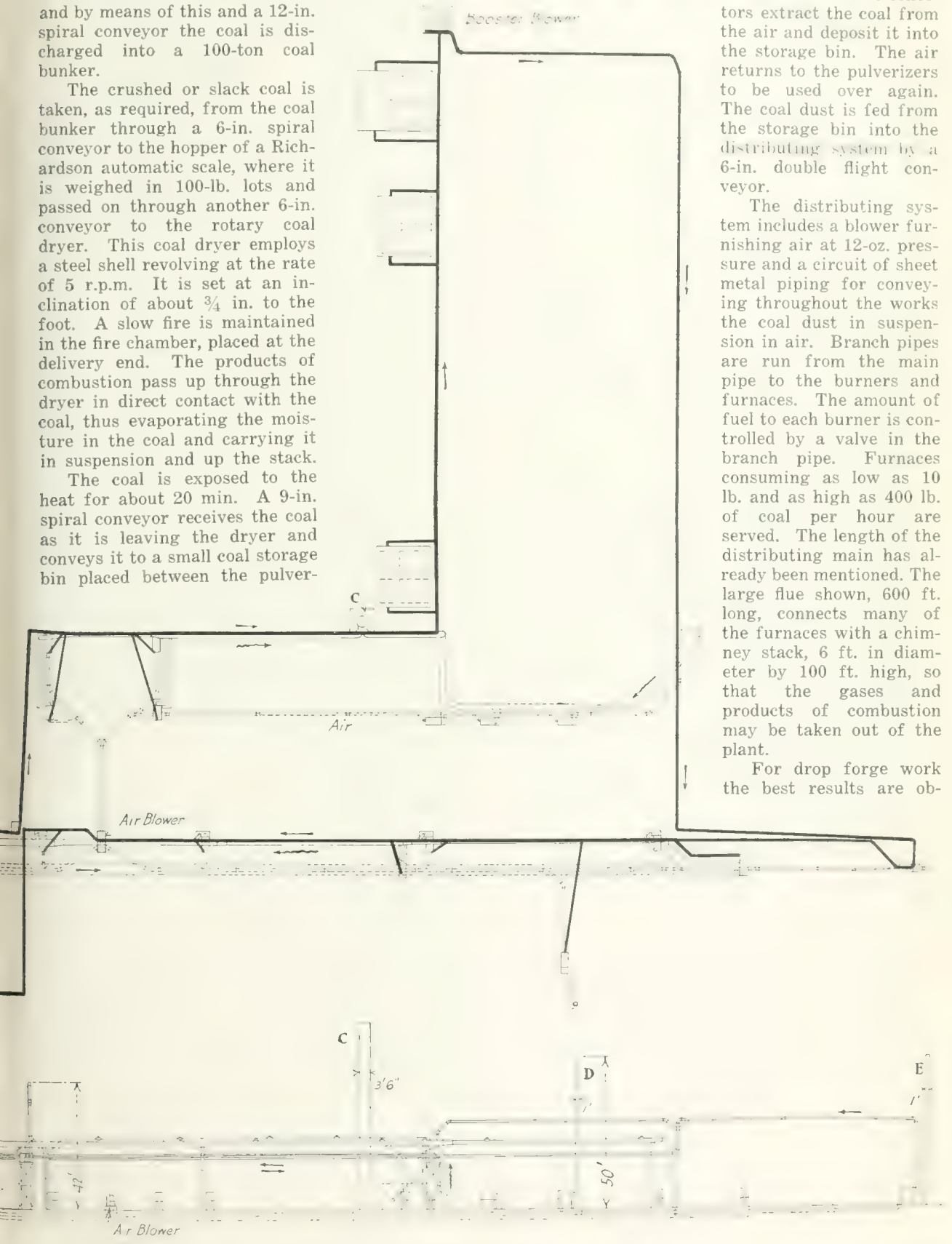
The plan drawing covers part of the pulverizing or coal preparing plant. Bituminous run of mine or slack coal is deposited in the track hopper and a reciprocating feeder feeds the coal into the hopper of a two-roll coal crusher. This delivers to a 24-in. belt conveyor, which carries the coal to the boat of a bucket elevator, and by means of this and a 12-in. spiral conveyor the coal is discharged into a 100-ton coal bunker.

The crushed or slack coal is taken, as required, from the coal bunker through a 6-in. spiral conveyor to the hopper of a Richardson automatic scale, where it is weighed in 100-lb. lots and passed on through another 6-in. conveyor to the rotary coal dryer. This coal dryer employs a steel shell revolving at the rate of 5 r.p.m. It is set at an inclination of about ¾ in. to the foot. A slow fire is maintained in the fire chamber, placed at the delivery end. The products of combustion pass up through the dryer in direct contact with the coal, thus evaporating the moisture in the coal and carrying it in suspension and up the stack.

The coal is exposed to the heat for about 20 min. A 9-in. spiral conveyor receives the coal as it is leaving the dryer and conveys it to a small coal storage bin placed between the pulverizers. The pulverizers are equipped with vacuum separators so that it is necessary for the coal to be pulverized to a fineness where it will float in a partial vacuum before it can leave the pulverizers. The exhausters, indicated on the platform in the diagram, bring about the partial vacuum in the separators and exhaust the powdered coal from the separators and blow it into the collectors. The collectors extract the coal from the air and deposit it into the storage bin. The air returns to the pulverizers to be used over again. The coal dust is fed from the storage bin into the distributing system by a 6-in. double flight conveyor.

The distributing system includes a blower furnishing air at 12-oz. pressure and a circuit of sheet metal piping for conveying throughout the works the coal dust in suspension in air. Branch pipes are run from the main pipe to the burners and furnaces. The amount of fuel to each burner is controlled by a valve in the branch pipe. Furnaces consuming as low as 10 lb. and as high as 400 lb. of coal per hour are served. The length of the distributing main has already been mentioned. The large flue shown, 600 ft. long, connects many of the furnaces with a chimney stack, 6 ft. in diameter by 100 ft. high, so that the gases and products of combustion may be taken out of the plant.

For drop forge work the best results are ob-



...ays and back to the pulverized coal bin. So long is the line that a booster blower, as indicated, is employed to keep the coal dust ...atically controlled according to the number of branch pipes, and that is furnaces, in operation. Air to support combustion is ...ets take care of the products of combustion, leading to chimneys, as at A, B, C, D and E.

tained by using a furnace with a combustion chamber, as shown in one of the sketches in the diagram cut. This chamber acts as a gas producer. The pulverized coal is almost instantly converted into a fixed gas and passes over the bridge wall, in the hot state, into the heating chamber where it meets additional air, thus burning and developing a high temperature. Forging heats, it is stated, are obtained inside of 20 min. from the time of starting the fire, which is started by igniting a small piece of oiled waste and placing it in the burner and turning on the coal dust.

Another type of furnace shown is the underfired furnace. In this case the combustion chamber is dispensed with and the stock introduced into the furnace from the top.

For some work, such as drawing out or heating on the end only, this style of furnace gives very good service, but where it is necessary to heat the stock all over the combustion chamber furnace, it is stated, will give the best satisfaction.

Mr. Holbeck has found that 10 lb. of pulverized coal is equivalent to 1 gal. of fuel oil. With coal at a cost of $3 per ton pulverized, this would be equivalent to fuel oil at 1½c. per gallon. He says that 75 lb. of coal dust is equivalent to 1000 cu. ft. of natural gas, or with powdered coal at a cost of $3 per ton the coal dust for equal conditions requires natural gas to be 11¼c. per 1000 cu. ft.

Vertical Sand Belt Machine in a Pattern Shop

Vertical sand belt machines have been used in box factories and other plants for a number of years, but very few of them in wood pattern shops. The Modern Pattern Company, Springfield, Ohio, installed one of these machines several months ago and the resultant saving effected in its use is said to be somewhat surprising.

Recently the firm completed a rush order of a pattern for a large strainer body. This pattern was in two pieces, the parting line being near the center and requiring a height of nearly 14 in. on each half. It was built up in the usual way. The cut was laid out on the parting line and the table set at the required angle to give the necessary draft to the pattern. This job was completed in 22 min., whereas if the work had been laid off on both sides it would have required from 2 to 3 hr. to complete the job. This is only one of a number of jobs that has been done on the machine since it has been in use.

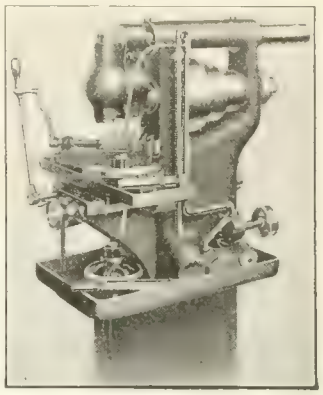
The machine was made by the J. A. Fay & Egan Company, and has a No. 2 garnet cloth belt, 14 in. wide and 10 ft. long, which gives a total cutting surface of nearly 12 sq. ft. The top sand belt platen, or pulley, is 24 in. above the table, thus giving 336 sq. in of total cutting surface that can be utilized.

Carlsruhe Cleanser Made in United States

A preparation for cleaning metal surfaces preparatory to plating, for example, has been placed on the market by James H. Rhodes & Co., 162 William Street, New York. It consists of a combination of sodium, aluminum, silicon and oxygen in the form of a double salt which combines chemically with the grease and oil on the surface of the work to form an insoluble basic salt that is thrown out of the solution. In this way, it is explained, the surface of the metal is left chemically clean and free from the soapy mixture that sometimes remains in the hair lines and irregularities of the surface. The material, which is known as the Carlsruhe cleanser, was formerly made in Germany, but is now being manufactured in the United States. While readily soluble in water, the material is not deliquescent. The cleaner is alkaline, but not caustic nor corrosive, and another point upon which emphasis is laid is the absence of poisonous or irritating fumes from a boiling solution.

New Combined Type Milling Machine

The Bickford Machine Company, Greenfield, Mass., has recently placed a combined horizontal and vertical milling machine on the market. The machine, which is intended for the production of duplicate medium-sized parts, is of the standard horizontal type and an attachment is provided to enable vertical work to be done. In the design an effort has been made to eliminate backlash and chatter in the table feed mechanism and to do away with the possibility of the cutter marking the work at the end of the cut.



A Combined Horizontal and Vertical Milling Machine for the Production of Duplicate Parts of Medium Size

The vertical attachment has a crucible steel spindle which is driven through steel gears by a driving shaft that enters the main spindle of the machine. When the attachment is in place, it is pointed out that it becomes a part of the machine, the spindle receiving the full power of the main driving belt. This spindle runs in phosphor bronze bearings and is bored for a No. 9 Brown & Sharpe taper. The change from horizontal to vertical work, it is pointed out, is made readily as the attachment slips into place easily.

A quarter section of a screw is used as the rack for the table feed. It is driven from a worm gear, an arrangement which is relied upon to do away with practically all backlash and chatter. To return the table when the feed is stopped a weight is provided, thus preventing the cutter from marking the work at the end of the cut. A lever can be placed on an extension of the feed shaft to provide hand feed and thus enable the machine to be used as either a hand or power feed type. Lever clamping screws and adjustable graduated collars on both the elevating and cross-feed screws are provided to add to the convenience of the operator.

A geared pump attached to the rear of the machine is employed to keep the cutters from becoming overheated. The supply tank for the cooling compound used is located in the base of the machine. The swivel vise furnished is a plain vise to which a circular plate and ring have been added.

Detecting Defects in Castings by Magnets

Detecting the presence of internal defects in iron and steel castings is accomplished by a current which is supplied from a small alternator to the primary winding of an induction coil and which induces in the secondary winding a current which is passed through the coils of two horse-shoe magnets, mounted at a fixed distance apart and movable to and fro over the surface of the casting, according to a writer in *Giesserei Zeitung*. The fields of both magnets will be affected uniformly if the structure is homogeneous. Defects, however, will disturb the lines of force from the nearest magnet. In a vibrating sounder, connected to a secondary coil on the magnet, the tone produced will differ in pitch from that given out from the corresponding sounder connected to the other magnet. Amplification of sound is secured by microphone attachments enabling the observer, by means of telephone receivers, to detect the locality of hidden flaws as the magnets are moved over the casting.

As a result of labor difficulties, which it has proved impossible to adjust, the Heine Safety Boiler Company has transferred practically all of its work from St. Louis to its Philadelphia plant, while the Joseph Wangler Boiler & Sheet Iron Company has opened a plant at Litchfield, Mo., and is doing most of its work there. The John O'Brien Boiler Works has under consideration propositions to locate in other cities.

PROPOSED COPPER TAX

An Industry Singled Out for a Heavy Burden Under the Revenue Act

WASHINGTON, D. C., July 18, 1916.—The omnibus revenue bill, passed by the House July 10, and referred to the Senate Finance Committee, is in the hands of three subcommittees and every effort is being made to report it to the Senate before the end of next week in order that it may be passed and signed by the President in time to take effect on or before Aug. 1.

PROTEST OF COPPER INDUSTRY

The chief contest has been waged concerning the provision of the munitions tax section requiring those engaged in the smelting, refining or alloying of copper to pay taxes ranging from 1 per cent of their receipts in excess of $25,000 and not exceeding $1,000,000 up to 3 per cent of the amount by which their receipts exceed $10,000,000. Senator Stone's subcommittee has been appealed to by the Montana and Michigan Senators to strike out this provision of the revenue bill and mine owners, smelters and refiners throughout the industry have sent to Washington large numbers of urgent protests against the proposed legislation. The effect of the tax on the industry and the reasons for opposing it are thus set forth in a statement made by Representative Hayden, of Arizona, which has been placed before the Finance Committee:

It is true that the bulk of this tax will be collected from the refiners and alloyers of copper, but I trust that no one will insist that the revenue thus obtained will actually come out of the pockets of those who "manufacture" copper, as the bill describes it. The refiners and alloyers cannot pass the burden on to the consumers by adding the tax to the price of their products, because refined copper and brass are sold in a world market, where the price is regulated by supply and demand. But the refiner can, and will, recoup himself by either increasing the refining charges or by reducing the price paid for unrefined copper. Therefore, this is a tax upon production that must ultimately be paid by those who mine copper ores.

This tax dates back to Jan. 1, 1916, and the amount due for this calendar year must be paid on or before April 1, 1917. The United States Geological Survey recently estimated that at the present rate of production over 600,000,000 lb. of copper will be produced in Arizona in 1916. This is nearly twice the output of any other State, and represents over one-third of the copper produced in the United States. Six hundred million pounds of copper, at an average price of 25c. a pound equals gross receipts aggregating $150,000,000 that will be subjected to taxation. The maximum tax under this bill is 3 per cent, but presuming that advantage is taken of that other provision of the bill which allows a net profit of 10 per cent on the amount actually invested in the "manufacture" of copper, still it is safe to assume that this tax will yield a return of 2 per cent on the gross output. In that event, at least $3,000,000 will be collected from the copper produced in my State.

Now, those who mine copper in Arizona are as patriotic as any other body of Americans. They are willing to pay a fair share of the cost of preparedness, but they do object to having copper singled out for double taxation while no such discrimination is practised against any other metallurgical industry. As a matter of fact, this bill provides for triple taxation of large quantities of copper. First, the refiner must pay a tax on the gross receipts of his business. Then the alloyer, who purchases the refined copper that has once been the basis of a tax, is taxed on his gross receipts. The alloyer sells brass to a munition maker, who must pay a tax on the gross amount he receives for the cartridges and other war material he has sold. A pound of copper that follows this course will, in all probability, be used as a basis for at least a 2 per cent tax paid by the refiner, another 2 per cent tax paid the alloyer, and still another tax of at least 4 per cent paid by the munition manufacturer. I am sure that the Committee on Ways and Means could not have given much study to the effect of this double and triple taxation of copper or certainly they would not have included this form of raising revenue in the bill.

WHY COPPER AND NOT OTHER METALS?

Mr. Hayden admits that the producers of copper are now enjoying great prosperity, but declares that they have justly earned this reward by passing through a period of depression as the result of embargoes and unfriendly legislation like the English orders in council declaring copper to be contraband. Continuing, Mr. Hayden says:

[illegible] It copper is to be taxed because it enters into the manufacture of munitions, [illegible] ingots or billets in this bill. If there is to be double taxation [illegible] not steel also be twice taxed? Everyone knows that vastly more steel and iron is used in modern warfare than any other [illegible]

[illegible] advanced in price owing to the demand created by the European war. Lead and antimony are used to make bullets and shrapnel. Aluminum is required for aeroplanes, Zeppelins and automobiles. The manufacture of projectiles and armor plate makes a market for nickel, and quicksilver is used to make priming explosives. A vast quantity of zinc is consumed in the form of brass and to galvanize barbed wire. If copper is to be taxed, why ignore these metals? There is no double taxation on any of these articles in this bill.

On behalf of the Ways and Means Committee an unofficial statement has been made by one of its members as to the basis of the copper tax and in explanation of the apparent discrimination against that metal in favor of iron and steel, lead, etc. The investigations of the committee convinced its members that practically all the lead employed in the manufacture of munitions would be taxed under section 201 of the proposed act at rates ranging from 2 to 5 per cent and that manufacturers of iron and steel employed as war material would pay similar rates. The fact that copper is used in connection with other materials in the manufacture of munitions rendered it difficult, in the opinion of the committee, to impose a tax that would rest where it was desired or that would fall upon the large quantity of copper exported in an unmanufactured condition for the production of munitions abroad. It was, therefore, decided to levy the tax on the entire industry but at a rate only about one-half as great as that assessed upon other munitions, upon the assumption that about 50 per cent of the production of copper during the calendar year 1916 will be consumed in the manufacture of war material.

This statement is far from convincing to those interested in the production of copper, but it is quite as logical as the contentions of the Ways and Means Committee with respect to certain other features of the bill, notably, the anti-dumping clause and the system of tariff duties for the dyestuff industry which proposes to develop a new business in this country by imposing rates of duty asserted by the most experienced manufacturers in the industry to be wholly inadequate and which the bill stipulates shall be reduced 20 per cent per annum until, in the short period of five years, they are entirely wiped out.

W. L. C.

A Chicago association has had printed in pamphlet form an exhaustive list of surplus and inactive stocks of a wide variety of materials, including iron, steel, brass, copper, and other metals held by manufacturers in and about Chicago. The pamphlet also includes a corresponding list of supplies for which there is inquiry in the market. Copies of this pamphlet can be had from the Civic Industrial Committee of the Chicago Association of Commerce, 10 South LaSalle Street, by whom it was published.

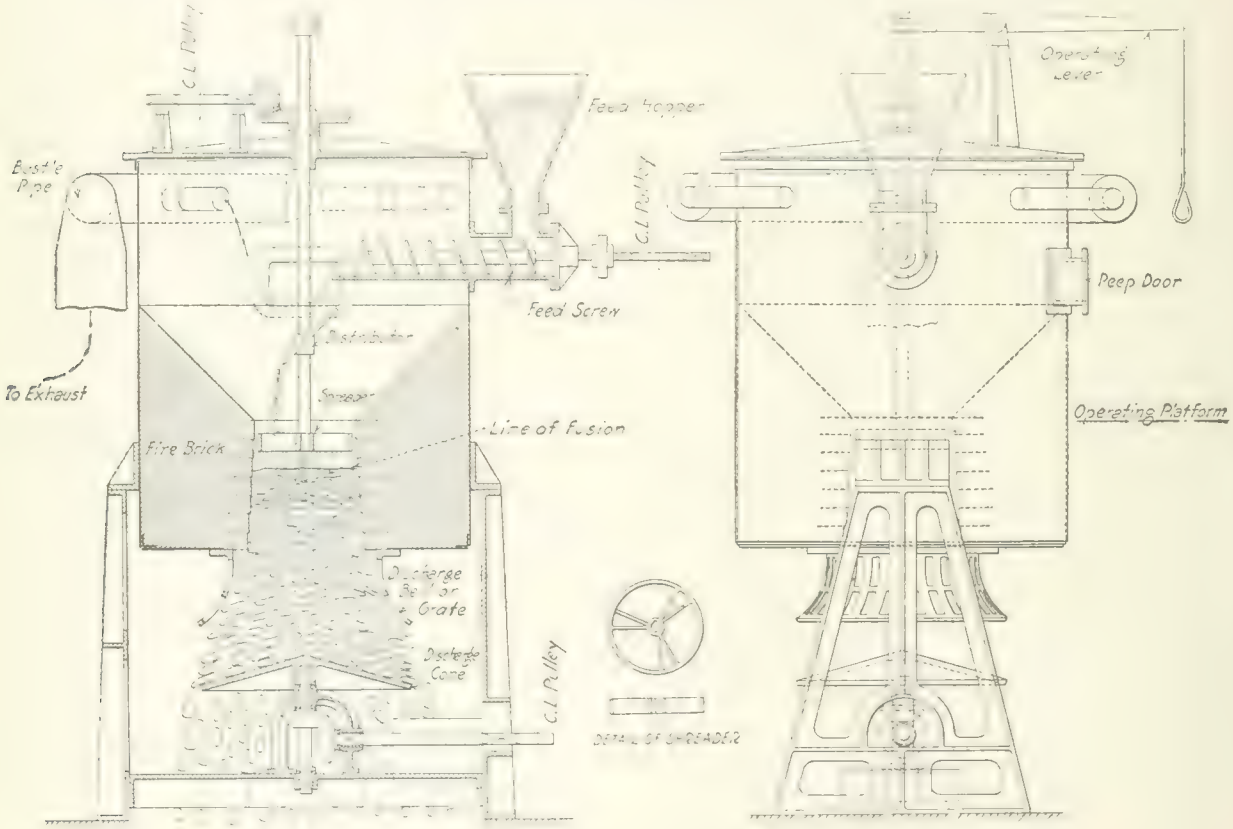
The Decatur Malleable Iron Company, Decatur, Ill., expects to have its malleable plant in operation by Aug. 1. A. W. Wagner, formerly president and general manager of the Terre Haute Malleable & Mfg. Company, Terre Haute, Ind., is president; Donald E. Willard, formerly treasurer and engineer of the Allith-Prouty Company, Danville, Ill., is vice-president, and Irving A. Sibley, Jr., formerly secretary and general sales manager of the Allith-Prouty Company, is secretary-treasurer.

A Continuous Ore Sintering Machine*

Protection of All Parts Subjected to Heat a Feature—Advantage of the Flaring Tube—Use of a Spreader as a Ram

BY P. O. HARDING

THE Harding continuous sintering machine was especially designed to treat iron ores, and is the product of a study to avoid the burning and the clogging of the grate, which occur with some sintering methods, and to overcome the operating difficulties and the expense of igniting successive charges. Other features developed are the tapering tube and the protection of all parts subjected to heat.



Details of the Harding Continuous Ore Sintering Machine

From the illustration it will be noted that the machine is screw fed. The mixture falls to the distributor and is in turn further distributed by the spreader and pusher. Air is drawn up through the tube to the bustle pipe by an exhauster. The clinkered material descends and is discharged by the extractor to waiting cars or storage pit below.

The burning of grates in the down-draft machines is caused by the line fusion progressing in waves. This may be caused by poor mixing or segregation afterwards, and by uneven moisture content of the mixture. When the peak of such a wave reaches the grate, the operator has his choice of a burned grate or dumping the charge before the mass is entirely sintered. He generally decides on part of both. It is the general practice to protect the grate by a layer of limestone.

Unfortunately this method acts as a barrier for only a short time. The heated gases from the combustion above dehydrates it, and where the hot masses of clinker come in contact insulation is broken down very rapidly, resulting in a burned grate. To effect a screening action of the air, preventing the fine ore from being drawn through the grate, finely broken limestone is used. This readily dehydrates, as mentioned above, and powders; the grate in this way becomes clogged. In large sintering pans it is customary to "dig out" the grates after each charge and to place bricks or large chunks of sintered ore over the burned spots. This is continued until the grate is burned in a sufficient number of spots to cut the effective area to a point requiring replacement.

As to the ignition, this is continuous in this machine after the operation is once started. No oil is used and the burner difficulties are obviated. The cost of oil and the expensive equipment of handling it are thus saved.

The flaring tube not only facilitates the downward passage of the clinkered material, but opens up channels for the passage of air. The clinkered ore is scoured of its dust and small globules of unfused ore are thus swept back to the zone of fusion. This is important, since experience on unscreened sintered ore in one instance yielded 5 per cent flue dust at the blast furnaces, the untreated ore only 2.95 per cent.

The pan equipment of the down-draft process is subjected to wide variations of temperature. This is extreme, as the volatile content of the flue dust is

*Mr. Harding, the inventor of this machine, is now in South America, working on the smelter problems of the Braden Copper Company. Christy & Christy, Farmers Bank Bldg., Pittsburgh, Pa., have been appointed his agents.

carbon. This, together with the fact that one of the favorite methods of cleaning the grate is by violent hammering, causes the pans to crack. This is applicable to the small pans. The grates of the larger units are "dug out," as mentioned, but contraction and expansion difficulties of the pans have been encountered that have not successfully been met.

In this machine the fire body is enclosed by firebrick. After the discharge bell and cone reach their working temperature, this is maintained. They are circular, and therefore admit expansion with minimum internal stresses. The spreader is bathed in the green entering mixture. If the line of fusion should become uneven and burning through the mixture necessary, the spreader can be raised. One feature not to be forgotten is the use of the spreader as a ram when the tube becomes skulled or the clinkered material arches.

While thorough mixing of the ore and flue dust are essential for the best operation of the machine, this need not be carried to an extreme, as is necessary with the down-draft equipment. However, a batch concrete mixer is recommended. The flue dust addition to the ore varies, but 20 per cent of the 25 per cent carbon content dust has been found to give good sinter. The dust, however, can be increased, but care must be taken to keep the dilution to a point that excessive skulling does not occur. Sufficient water should be added in the mixing to make the ore take the shape of the hand when squeezed. The diameter of the tube should be 6 ft., height of column 3 ft., and estimated output 125 tons of sintered ore per day.

Desulphurization in the Blast Furnace

Desulphurization in the blast furnace proceeds as follows, according to an article by B. Ossann in *Stahl und Eisen*, which has been abstracted by the London *Ironmonger:*

In the final stages of the reduction process, mixed crystals of iron and slag are present, with nearly all the sulphur combined with iron as iron sulphide, because of the great affinity of these two elements. Only when all the ferrous oxide has been eliminated by reduction does desulphurization begin, the reducing atmosphere leading to the deposition of carbon on the crystals and to a reaction in which iron sulphide is reduced to metal, the sulphur combining with the lime and manganese, and the carbon transformed into CO. The more manganese present, the more is desulphurization promoted. An excess of lime raises the fusing temperature of the slag, and as a thoroughly fluid slag is essential, the reaction temperature must be raised by using a large coke charge and a very hot blast, the coke retarding the working of the furnace and thus affording the necessary time for desulphurization. An excessive amount of lime is unfavorable, and it is significant that in making ferrosilicon, where slags of low basicity are produced, no difficulty is ever experienced from sulphur. A large slag proportion is beneficial, and so it is possible to convert minette ore, rich in sulphur, into basic pig low in that element.

Supplies of silica brick in Great Britain are so inadequate for renewing and maintaining the open-hearth steel furnaces of the country that the government has prohibited their exportation. As a result, Sweden is feeling the pinch, for considerable quantities on the way to Sweden have been stopped at the port of shipment. As Sweden depends on Great Britain for most of its supplies of these brick, her steelmakers are appealing to England to relax the restrictions, fearing that many of their steel plants will soon have to close. These appeals have been refused, but it is hoped that the British silica brick output can be increased soon. The great drawback is a shortage of labor.

BUFFALO-NIAGARA INDUSTRIES

New Industrial Development in Niagara River District Involving $10,000,000

The Niagara frontier has shown a remarkable degree of industrial expansion during the past year. Many new industries have been established and existing plants enlarged along the Niagara River, between Buffalo and Tonawanda and at Niagara Falls and in the city of Buffalo. The total outlay is estimated at over $20,000,000.

A considerable portion of the new development along Niagara River, just north of Buffalo, is attributable to the establishment on the river front, near the Grand Island Ferry, of the steam-generated electric power plant of the Buffalo General Electric Company, which will have an ultimate capacity of no less than 200,000 hp. This power station is to supplement the power developed at Niagara Falls. The first section of this power plant, which will generate 80,000 hp., will be completed this fall. The initial equipment will comprise two 20,000 and one 30,000 kw. Curtiss steam turbo-generators. The construction and equipment of the plant complete will involve the expenditure of $3,000,000.

The Wickwire Steel Company is at present engaged in making additions to its plant on the Niagara River, one-half mile north of the new power plant. This new construction, involving $3,000,000, includes three 60-ton open-hearth furnaces, with necessary gas producers and one 500-ton metal mixer; a blooming mill, a rod mill, a wire mill for the production of all sizes of wire, a galvanizing department, a tinning and copperas plant, a wire nail mill, a keg-making factory, a barbed wire mill, additional entrance buildings and workingmen's houses, etc. New boilers of 3000-hp. rating, besides equipment for developing 3000 hp. not heretofore utilized, are included. The company has also contracted for 3000 hp. electric power from the Buffalo General Electric Company.

The Semet-Solvay Company, which has recently purchased a site of 50 acres on the River Road, adjoining the Wickwire Steel Company, is constructing 60 by-product coke ovens at a cost of about $2,000,000. The plant will produce 750 to 800 tons of coke (furnace and foundry), besides gas, ammonia, tar and benzol. All of the gas and all of the furnace coke (about 650 tons daily) are to be used by the Wickwire Steel Company.

The Acheson Graphite Company, Niagara Falls, is about to build a large branch plant, to be known as Plant No. 3, costing $500,000, to be erected on a site just purchased adjoining the Buffalo General Electric power plant on the Niagara River.

The New York Graphite Mfg. Company, New York, has also bought 20 acres of land on the River Road, near the new Electric power plant, and will construct a large plant.

EXPANSION AT NIAGARA FALLS

The Hooker Electro-Chemical Company, Niagara Falls, is this summer completing extensive additions which double its capacity and involve about $1,000,000.

The Niagara Alkali Company has let the contract for additions to its plant at Buffalo Avenue and Union Street, to cost $750,000, and the Electro-Bleaching Gas Company, an auxiliary, or allied, company, is doubling its capacity.

The Aluminum Company of America has contracted for the erection of a six-story addition on Buffalo Avenue and Nineteenth Street, to cost $100,000, and Wm. A. Rogers, Ltd., has under way a $100,000 addition to its factory for the manufacture of silverware, at Main Street and the Hydraulic Forebay.

The Niagara Electro-Chemical Company, Buffalo Avenue and Adams Street, has contracted for a three-story addition, 50 x 172 ft.; and the Star Electric Company, formerly the Electrode Company of America, has completed a 100 x 500-ft. addition.

The Castner Electrolytic Alkali Company has just completed an addition to be known as Plant No. 8.

Bids are being taken for a large addition to the Titanium Alloy Mfg. Company's plant. The Isco Chemical Company, recently incorporated, is building a plant at Union Street and Royal Avenue for the manufacture of caustic soda and bleach. Six buildings will be erected, to cost $300,000. The Hydol Company, recently organized, is building an oil plant at Buffalo Avenue and Union Street.

Another new industry recently established at Niagara Falls, the Niagara Smelting Company, has in course of construction a plant of 15 buildings, to cost about $750,000.

The Du Pont De Nemours Powder Company has completed its new plant of eight buildings at Niagara River and the Niagara Junction Railroad. This plant is to make artificial leather and products involving the use of chlorinating gas, which will be supplied by the Hooker Electro-Chemical Company.

Large additions have recently been made to the Oxolite wheel plant of the Carborundum Company, Niagara Falls, consisting of a three-story building, and further additions are under way. Included are the grinding building and kiln and puddle buildings, to cost $150,000. The company recently organized the Canadian Oxolite Company, Ltd., as its Canadian branch, with a capital stock of $100,000. A plant using 7000 hp. is being established on a site of eight acres recently acquired from the Canadian Niagara Falls Power Company at Stamford, near Niagara Falls, Ont.

The Norton Company, manufacturer of abrasives, has established at Chippewa, near Niagara Falls, Ont., a Canadian branch plant, which will be about three times the size of its plant on the New York State side of the Falls. The product will be shipped in bulk to the company's main works at Worcester, Mass. The company is also building at the Canadian plant a village of homes for its employees.

IN VICINITY OF BUFFALO

Just north of Buffalo, in the Riverside section, J. H. Williams & Co., manufacturers of drop forgings, are adding three large buildings to their plant and have plans completed for seven additional buildings to be put up later. The Beaver Company, manufacturer of Beaver board, has plans out for further extensions in this section.

Within the city of Buffalo the Buffalo Copper & Brass Rolling Mill has completed additions covering 10 acres and costing $1,000,000, and has purchased 45 acres more for further extensions. This company now employs 4300 men.

The Donner Steel Company is building at its blast-furnace and billet-mill plant additions comprising ore dock, bar and finishing mills and by-product coke oven plant, to cost several million dollars.

The Schoellkopf Aniline & Chemical Works is constructing additions to cost $1,000,000, and the Contact Process Company and the Buffalo Potash & Cement Corporation are each erecting large plant additions, and many other Buffalo industries are making large additions to productive capacity.

The Cloverleaf Milling Company has erected a 13-story elevator at its feed-mill plant in the Riverside section, and Buffalo has added four other huge grain elevators of modern type to its grain handling facilities.

The British Shell Output

The British weekly output of heavy shells by firms which up to a year ago had not engaged in munition work was reported recently by Dr. Addison, parliamentary secretary of the Ministry of Munitions, to be 16 times as many as were being turned out a year ago by all the large armament firms and Woolwich Arsenal combined. The latter, of course, have undergone vast extensions in the year. Another authority states that Great Britain stands better to-day in stocks of ammunitions, machine guns, heavy guns of the highest standard and shells of the highest caliber than ever before. This has all been accomplished largely by the introduction of women and other new workers and the removal of trade union restrictions.

Manganese Ore from Brazil

Manganese ore exports from Brazil in the last three years, and their destination, are given as follows by U. S. Consul Alfred L. M. Gottschalk, Rio de Janeiro. The figures are, in metric tons:

Exported to	1913	1914	1915
United States	39,100	87,630	266,871
Great Britain	16,800	23,500	10,100
Germany	5,000	.....	.....
Belgium	11,800	10,600	.....
France	.....	11,400	.....
Total exported	122,300	183,630	288,671
Valuation	$880,572	$1,380,453	$2,632,427

It will be seen that each year has shown an increase of 50 per cent in the total exports. In 1915 the United States took over 92 per cent of the total exports, Great Britain's share being only 10,100 tons. From the valuations given, the price per ton has risen from $7.20 and $7.50, in 1913 and 1914, to $9.10 per ton in 1915.

The report also states that since the establishment of the Steel Corporation's United States and Brazil Steamship Line, trade in manganese ore has increased greatly. The line seems not only to have solved the problem of securing return cargoes, which in past years had been the difficulty of all shipping ventures between the United States and this coast, but it has built a substantial trade for the Brizilian State of Minas Geraes, and furnished much freight to the government-owned Central Railway of Brazil.

Swedish Steel Industry in 1916

Sweden's production of pig iron and puddled iron and of steel ingots in the first quarter of this year was 381,200 tons, against 325,600 tons to April 1, 1915, and 359,300 tons to April 1, 1914. The pig-iron output was 197,600 tons, against 162,300 and 186,100 tons to April 1, 1914 and 1913 respectively. There were 97 blast furnaces in operation (104 in 1915); 151 puddling furnaces (160); 12 Bessemer converters (12) and 57 open-hearth furnaces (63).

Exports of iron ore to April 1, 1916, were 772,000 tons, against 711,000 and 934,000 tons in the same periods in 1915 and 1914 respectively. Pig-iron exports were 45,200 tons in the first quarter of this year, against 43,300 tons to April 1, 1915, and 19,600 tons to April 1, 1914. Iron and steel exports, including ferro-silicon and spiegeleisen, were 69,400 tons to April 1, 1916, as compared with 48,500 tons and 54,600 tons for the same periods in 1915 and 1914 respectively.

Electric Furnace with Rotating Hearth

An electric steel furnace, the crucible or hearth of which is made rotatable, is the feature of an invention of Peter Eyermann, a citizen of the United States, living at Witkowitz, Austria. It is covered by U. S. patent 1,189,356, July 4, 1916. The furnace is of the arc type, the electrodes passing through the roof, but the crucible and roof are so arranged that one is rotatable relative to the other, so as to permit the current from the electrodes to act on different portions of the hearth during the operation of the furnace. The furnace may be tilted.

The twenty-second annual convention of the National Hardware Association of the United States will be held at Atlantic City, Oct. 17 to 20, 1916, inclusive. The sessions will be held at the Marlborough-Blenheim Hotel and the convention of the American Hardware Manufacturers Association will be held at the same time and place, as is the custom. On account of the establishment of the automobile accessories branch, the convention this year will be four days instead of three and the opening day will be devoted to a meeting of this new branch. The general convention will open on Oct. 18, and a meeting of the metal branch will be held on the afternoon of the following day.

The Susquehanna Iron Company's Union Street mill at Columbia, Pa., recently leased by the A. M. Byers Company, Inc., Pittsburgh, has been put in operation after an idleness of about six years.

NEW SHEET ASSOCIATION

Sheet and Tin Plate Manufacturers Organize to Make Contracts Strictly Binding

After several years of effort, a new association, embracing about 90 per cent of all the manufacturers of black and galvanized sheets and tin plate, has been organized. It will be known as the National Association of Sheet and Tin Plate Manufacturers. The initial meeting for organization and other purposes was held in the William Penn Hotel, Pittsburgh, on Tuesday, July 18, and was attended by about 30 of the leading makers of sheets and tin plate in the United States. W. S. Horner of W. S. Horner & Co., Ltd., Oliver Building, Pittsburgh, who is also vice-president of the American Rolling Mill Company, Middletown, Ohio, was elected president. James B. Andrews, Andrews Steel Company, Newport, Ky., was elected vice-president. The positions of secretary and treasurer have not yet been filled. The executive committee consists of W. S. Horner, chairman; Ed Langenbaugh, Berger Mfg. Company, Canton, Ohio; W. A. Thomas, Brier Hill Steel Company, Youngstown, Ohio; John O. Pew, Youngstown Iron & Steel Company, Youngstown; G. H. Jones, Inland Steel Company, Chicago, and W. H. Abbott, Wheeling Corrugating Company, Wheeling, W. Va. The new organization will absorb the association of sheet and tin plate manufacturers which has existed for several years largely for statistical purposes, and of which B. E. V. Luty, Pittsburgh, was commissioner. The purposes of the new organization are set forth by the association in part as follows:

To preserve the standards of quality of sheet and kindred products as manufactured by the members and to make uniform changes in such fixed standards of quality from time to time as may best meet the demands of the trade. To place this, one of the most important industries in the United States, on such a broad and sound basis that its business as a whole must necessarily be transacted within the limits of the highest standards known to the business world.

To preserve friendly relations between producers and insure such co-operation as will effect uniformity of goods in quality, sizes and finish; to secure the benefit of a free discussion on cost systems with the view to lowering the cost of production; to bring out into the open full and free discussion of trade conditions, volume of trade and the needs of the trade; and generally to develop, for the benefit of all concerned, sound commercial conditions throughout the country, in the hope that the possession of accurate information with respect to the conduct of the business and actual trade conditions will benefit the industry, the trade and the public.

For the consideration of matters relating to welfare work, safety first problems, wages, hours of labor, profit sharing and bonus plans; and generally, all questions affecting the industry in its relation to labor, capital and the public.

It shall be thoroughly understood by members of the association that all information reported to the association or distributed by it, is purely statistical, and pertains only to past and closed transactions, and that no part of the machinery of this association will be permitted to be used to fix prices for the sale of goods, or to divide the territory, or to limit the production or manufacture, or limit or control competition; and no information shall be collected or distributed respecting any prices which any member intends or expects to ask.

At the meeting held in Pittsburgh, the appended resolution was unanimously adopted. The headquarters of the association will be in the Oliver Building, Pittsburgh, rooms 420 and 421 having already been secured.

WHEREAS, one of the greatest evils, and most disturbing and hurtful to trade in general, is that of guaranteeing contract prices against market decline; and,

WHEREAS, the manufacturers of sheet and tin plate during the last four or five years, through association and otherwise, have been conducting a campaign of education against this evil; and,

WHEREAS, with the view to correcting this wrong, the American Iron & Steel Institute, through its contract committee, after several years of consideration and effort, is about to submit and recommend for the adoption by manufacturers in all lines of iron and steel industry, a new form of contract, binding both parties mutually, in which the price guarantee feature and other unsound and unfair provisions are eliminated.

NOW, THEREFORE, BE IT RESOLVED, that we hereby recommend the adoption and enforcement of such a contract, or a

[illegible]

The members of the new association are as follows: Inland Steel Company, Allegheny Steel Company, American Rolling Mill Company, Apollo Steel Company, Brier Hill Steel Company, Canton Sheet Steel Company, Carnahan Sheet & Tin Plate Company, Trumbull Steel Company, De Forest Sheet & Tin Plate Company, La Belle Iron Works, Newport Rolling Mill Company, Parkersburg Iron & Steel Company, Reeves Mfg. Company, Seneca Iron & Steel Company, Whitaker-Glessner Company, Portsmouth Steel Company, Wheeling Corrugating Company, Youngstown Iron & Steel Company, Youngstown Sheet & Tube Company, Mansfield Sheet & Tin Plate Company, Western Reserve Steel Company, Alan Wood Iron & Steel Company, Stark Rolling Mill Company and Berger Mfg. Company.

Rail Exports Still at a High Rate

Rail exports from the United States were at the greatest rate on record in the first five months of this year. The following table is from government data:

Rail Exports from the United States, Gross Tons

		Per Month
January, 1916	48,122	
February, 1916	51,630	
March, 1916	49,931	38,594
April, 1916	22,316	
May, 1916	18,841	
11 months ended May 31, 1915	122,946	11,094
11 months ended May 31, 1916	492,038	44,730
Year 1915	391,491	32,624
Year 1914	171,680	14,306
Year 1913	460,753	38,379

The five months' average of 38,594 tons this year compares closely with 38,379 tons per month in 1913, the record year. For the eleven months ended May 31, 1916, the average was 44,730 tons per month. Of the total exports of 443,197 tons for the ten months ended April 30, 1916, Russia took 262,772 tons, or over 50 per cent, while the West Indies and Bermuda received 44,696 tons, and 57,729 tons went to various countries.

Rail imports in May were 9196 gross tons, but less than 500 tons for each of the preceding four months. In 1915 they were 78,525 tons, and 10,408 tons in 1913.

Great Britain's exports of rails for the five months ended May 31, 1916, were only 25,035 gross tons, or 5007 tons per month.

German Steel Prices Go Up Sharply

The German Steel Works Union at its regular meeting May 4, 1916, raised the quotation on semi-finished steel and shapes 20 marks per ton each, bringing them to the highest prices for the war period. No similar advance has been known to take place in peace times. The following table shows the various steps in the advance in quotations during the war:

	Ingots. Marks per Ton	Billets. Marks per Ton	Plates. Marks per Ton	Shapes. Marks per Ton
At beginning of war..	[illegible]	87.50	97.50	110
Third quarter, 1914	[illegible]	95.00	105.00	110
Second quarter, 1915.	97.50	102.50	112.50	120
Third quarter, 1915..	102.50	107.50	117.50	130
Second quarter, 1916	[illegible]	[illegible]	[illegible]	[illegible]
Third quarter, 1916..	127.50	132.50	147.50	160

The last increase is due, says a report of the meeting, to the constant increase in the cost of manufacture.

It is further stated that the Prussian State Railways have placed final orders for material for 1916 which fall short of those for 1915. Some extensive sales at favorable prices have been made to neutral countries. There is very little demand for structural material for ordinary building purposes, but a good demand from engineering and car works. The increased prices are a source of dissatisfaction to consumers as profits are known to have been large lately.

ESTABLISHED 1855

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A Delusive Anti-Dumping Measure

The anti-dumping section of the omnibus revenue bill passed by the House at Washington last week, if finally enacted in its present shape, will probably prove wholly ineffective. To prevent or punish dumping it will be necessary under its terms for the complainant to prove affirmatively that it has been "commonly and systematically" resorted to "with the intent of destroying or injuring an industry in the United States or preventing the establishment of an industry in the United States, or of restraining or monopolizing any part of trade and commerce in such articles in the United States."

It is a well-known fact that only in rare instances is dumping "commonly and systematically" pursued, and that in the nature of things it cannot be. A familiar illustration is the sale at less than the usual price in a country foreign to the producer, of a surplus quantity of his product, which for various trade reasons may have accumulated on his hands, or which under peculiar conditions he may have turned out for the purpose of reducing his unit of cost. No manufacturer who "commonly and systematically" sold any considerable proportion of his output below cost could survive long enough to make a recognized record of his system.

The condition of the proviso that any act to be illegal must be done with the intent of destroying or injuring an industry of the United States immediately erects an impassable barrier against the prosecution of the offender. To prove such intent on the part of the foreign manufacturer, from whom alone the evidence can come—for there is nothing in the proposed law providing a presumption of guilt or transferring the burden of proof to the producer—would be an utter impossibility.

The dumping provision of the bill stipulates that a sale to be illegal must be made "within the United States." Such a statute might prohibit the American agent of a foreign manufacturer from importing and selling in this country undervalued merchandise, but it certainly could not be invoked to prevent an American consumer from going, or sending an agent, to Germany to buy German goods at any price the manufacturer might be willing to take and ship them to the United States invoiced at the price actually paid therefor. Under the general customs laws in force for many years the Government might advance the invoice value of such an importation and require the importer to pay duty on the increased valuation, but this would not deprive the American consumer of the big advantage secured in the low cost price. Upon the whole, it is quite obvious that the Kitchin anti-dumping clause is a delusion and a snare.

Notes on Steel Production

The publication last week of the 1915 statistics of production of steel ingots and castings as well as of most finished iron and steel products prompts a discussion of the details. Some general deductions as to the relations between the production of ingots and finished steel were given in this department a week ago, the difference between ingot and rolled steel production being unusually large and reflecting the heavy discards involved in the manufacture of shell steel.

A comparison of the Steel Corporation's production with that of the total is always interesting. The corporation's proportionate production has a way of decreasing in "off" years, hence comparison of 1915 figures may well be made with those of 1913, the years having been in substantially the same category as to total tonnage. The Steel Corporation's proportion of the total pig iron increased from 45.47 per cent in 1913 to 45.60 per cent in 1915; in other words the proportion was practically unchanged. The proportion of steel ingots produced (excluding steel castings) decreased from 54.96 per cent to 52.35 per cent, quite a material decline. The Minnesota steel plant contributes to production this year. With the additional duplexing plants at the South Works and the Gary plant, together with the Bessemer plant at Gary and various smaller additions elsewhere, the corporation may easily in future reach as high a proportion as in any recent year. Its proportion of the rail tonnage decreased from 55.51 per cent in 1913 to 51.26 per cent in 1915.

There was a remarkable decrease in the country's production of rolled iron in 1915. While the rolled steel output was the same as in 1913, within 15,000 tons, the rolled iron production decreased from 1,678,257 tons in 1913 to 1,294,833 tons in 1915, or 22.8 per cent. Barring the decidedly "off" years 1914 and 1908, the rolled iron production in 1915 was the smallest since the gathering of statistics of rolled iron was resumed in 1904. The largest

production in the past 12 years was 2,200,086 tons, in 1907. There has been a particularly heavy decrease in the production of bar iron.

Comparing 1913 and 1915, with substantially the same total of rolled iron and steel production, the following percentage changes occurred in individual products:

	Per cent
Rails	—27.4
Rods	+25.7
Skelp, etc.	— 8.0
Shapes	—18.9
Plates	— 6.8
Merchant bars	+ 4.5
Sheets and black plate	+21.8

These changes were signs of the times. There was relatively little structural work or car building, reflected by the decline in structural shape production, but not by any material decrease in plate production because there was a heavy demand for ship plates. The very large gain in wire rod production was due to heavy export demand for both rods and wire products, particularly barb wire. In a year of light construction work generally, there was naturally a decline in rail production. The increase in the production of sheets, including black plates for tinning, is somewhat remarkable, but those lines are a law to themselves. The sheet production in 1913 was light, much below that of 1912, although on the hole 1913 was the better year for iron and steel production. Tinplate production in 1915 was exceptionally heavy, due to large demand both domestic and export, and a new production record was made by about 12 per cent.

It is instructive to observe that two lines for which much had been expected, railroad ties and rolled sheet piling, have not been tonnage producers as expected. Neither line has yet shown an output of even 50,000 tons in a year.

While the production of wire rods in 1915 was abnormally large and not representative of what may be expected in a normal year in future, it is interesting to compare the production with that of other commodities. In 1906 and a number of preceding years the production of rods was about one-half that of rails. In 1915 the rod production exceeded the rail production by 40 per cent. In 1906, 1910, 1912 and 1913 the production of rods was less than that of shapes, but in 1915 it was 27 per cent in excess. It is one of the interesting things in steel statistics that the light products, such as wire, sheets and tin plates, have become such tonnage producers.

A New Pace in Steel Exports

Iron and steel exports in May broke the previous record for a month by 23 or 24 per cent, both as to the weight of the tonnage items reported and as to the value of all iron and steel reported as such. Comparing May with the average of the preceding ten months the increase in tonnage is 42 per cent and the increase in value is 54 per cent.

Inasmuch as the export market has been particularly active in the past two or three months, or since the orders were booked that resulted in these May exports, it is in order to make fresh estimates of the proportion of our steel that is going abroad.

For various reasons the most illuminating and conclusive estimate is one based upon our finished steel production, rather than upon pig-iron production. The appearance of statistics of rolled steel output in 1915 makes it possible to estimate closely the present rate of production, for it is safe to assume that the finished rolled steel production is in proportion to the pig-iron production. That was 30,000,000 tons last year while the present rate is 39,500,000 tons, and when last year's production of rolled steel was 23,098,091 tons the present rate of production is presumably about 30,400,000 tons a year.

The total weight of the tonnage exports in May was 540,591 tons. Deducting pig iron, scrap, iron castings, bar iron, etc., and allowing for the fact that some of the tonnage was unfinished steel while the wire products were more finished than the rolled steel the statistics report, the May tonnage exports may be taken to represent 5,600,000 tons a year of our rolled steel. That is 18.4 per cent of the rolled steel we are producing.

It is difficult to estimate the amount of rolled steel consumed in the production of the steel manufactures that are exported, but approximations can be made which on the whole would probably be fairly representative. It is not the weight exported that is to be estimated, of course, but the weight of the steel that is bought from the steel mill by the makers of machinery, railroad cars, automobiles, shells, etc.

In May there was machinery exported to the value of $21,984,961. At 10 cents a pound this would represent 1,200,000 gross tons a year. There was about $15,000,000 value in unloaded shells and about $30,000,000 in loaded shells. Together these should represent, in steel as shipped from the mills, a rate of about a million tons a year, and the following estimates are made for certain other commodities: Agricultural implements, 50,000 tons a year; railroad cars, 200,000 tons; automobiles, 25,000 tons. The various items would total 8,075,000 tons a year, although many minor items involving steel in their manufacture are omitted. Apparently it would be quite conservative to take the total, based on the May record, at 8,000,000 tons of finished steel a year, in the form in which shipped from the mills. That would be 26.4 per cent of our present rate of steel production. Appearances are that the exports will increase rather than decrease, as compared with the pace set in May.

The decrease, present and prospective, in shell manufacture reported from so many points, does not necessarily take business away from the steel mills. England and France have been largely increasing their facilities for making shells. That is well known, and there is confirmation in the statistics showing that the May exports of metal working machinery were 130 per cent greater than the average in the ten months preceding. There could easily have been a decrease, on the basis of the foreign munition factories being already well equipped. There is in progress a transfer of shell manufacture from the United States to the allied countries. There is correspondingly more rolled steel required from the United States. While the total tonnage exports in May were 42 per cent greater than the average of the ten months preceding, the exports

of billets, blooms, etc., increased 103 per cent, while the exports of steel bars increased 63 per cent. Not all the unfinished steel, of course, is of shell quality, but when more soft steel is exported there is room for inference that the foreign mills are making more shell steel and less soft steel, eking out their production of the latter by greater imports from the United States. Thus there is good ground for assuming that any transfer of shell-making from the United States to the foreign countries is accompanied by correspondingly greater exports of the less finished steel. The American steel mills sell their steel abroad instead of to shell makers in the United States.

The export trade is now reaching a position in which it represents a really formidable part of our steel production. Hitherto the gains have been in percentages, in proportion to our export trade before the war, a trade that was really of almost insignificant proportions. The export business will probably have an important bearing on the course of the steel market during the remainder of the year.

The Reaction in Metals

Most memories are so short that it is not surprising to hear men marvel at the turn the metals have taken, despite the fact that for months they sagely predicted a reaction as well as "a day of reckoning." A few students of the market—usually those most interested, financially and otherwise—are not greatly disturbed. Some of them, in fact, consider it is better for all concerned if prices recede to a point somewhere near "normal" values, instead of figures war contractors were willing to pay because their need was imperative and the price would be paid in turn by buyers of munitions.

Despite the inactivity of recent weeks, copper has held up well, being now around 25.50 cents against 29 cents to 30 cents in May. The explanation of the dullness, as with the halt in steel buying, is that when prices began to advance consumers bought at a tremendous rate for the future, and they are believed to be covered for most of the year. Munitions makers bought as they booked contracts. A corollary of this buying is that the copper producers are in a comfortable position and see no need to create new activity in view of the highly profitable contracts on their books. Of late, it is true, certain producers have shaded their quotations to sell metal not under contract, but without avail, as lower prices have been made on resale metal.

Spelter has declined from 17 cents, New York, in May to about 9 cents. It sold at 21.50 cents, New York, in February. In the past few days galvanizers have begun to show interest, and if they could obtain future deliveries at prices proportionate to those for spot they would undoubtedly contract heavily. It has been noticed, however, that sellers, while willing to dispose of some metal for early shipment, show no enthusiasm when it comes to contracts. Meanwhile they must be content with large stocks, heavy production and the lack of new war business. An influence against foreign buying is an increased production in France, while Japanese spelter is being offered in Europe.

Lead commands a good price, but new war orders are essential if it is to be maintained. It has slumped under the efforts of independent producers to take business. The leading interest maintained its New York quotation at 7 cents for several weeks, but two weeks ago dropped to 6.50 cents, which the smaller producers at once proceeded to cut. In March lead touched 8 cents.

The decline in antimony has been spectacular. Chinese and Japanese grades were quoted at 45 cents to 46 cents in March, but since then have dropped to 15.50 cents, and are unsalable at this figure. The demand created by shrapnel requirements has passed. It is an open secret that money has been lost in antimony. Certain new smelters cannot operate at present prices except at a loss, despite the fact that the present price is three times that of normal times.

Straits tin, which a week ago was quoted at 38.50 cents, for spot, against 54 cents for a short time in March, has declined despite the oft-repeated emphasis on the British stringency in regard to shipping licenses. For a considerable time the resultant alarm tended to hold prices up, but the deliveries into consumption in June reached the large total of 6398 tons, proof that the metal is being consumed on a record scale. It is interesting to note that American deliveries in six months of this year totaled 28,621 tons, against 22,217 tons in the same period of 1915. These heavy shipments indicate a quiet market for the next few weeks, at least. Banca tin, which undersells Straits, has been a factor in the decline.

Consumers to whom buying from hand to mouth does not commend itself, besides being frequently impossible, will welcome the decline to more normal levels. To buy or not to buy has been the racking question, particularly with those whose requirements are for peaceful purposes. The situation created by the war unstrung the nerves of more than one.

It is probable that renewed buying will cause metal prices to rebound, but not to the levels which certain English purchasers have called "ridiculous." In London the declines have been so marked as to indicate the working of powerful influences. When the rebound does come, it is likely to be due to war demand, and thus the issue, like many another in industry and finance, runs into the endlessly recurring question of the war's duration.

Ferrosilicon Imports Larger

Imports of ferrosilicon have been increasing. Up to June 1 they were 3019 gross tons, or at the rate of 7248 tons per year. In 1915 they were 5226 tons, and in 1914, 6146 tons. The present import rate is the highest on record. Consumption has increased because of the demand for munition steel and the partial substitution of ferrosilicon for ferromanganese. The normal consumption has been estimated at 13,000 to 15,000 tons yearly. It is probably at least 50 per cent larger now.

A report on the tariff systems of South American countries has been issued by the Bureau of Foreign and Domestic Commerce, and a copy may be obtained for 25c. by applying to the Superintendent of Documents, Washington, D. C. It has been prepared primarily for the use of exporters and aims to cover not merely present tariff conditions, but their causes and the current tendencies.

CORRESPONDENCE

Buying Material on Scientific Basis

To the Editor: I cannot refrain from expressing to you my hearty approval of the excellent advice which H. B. Twyford has given to purchasers and sellers in general in his very able article, entitled "Buying Material on a Scientific Basis," as published in THE IRON AGE, July 6.

Purchasers are losing thousands of dollars annually through their failure to take proper advantage of market conditions. Inefficient systems and inadequate records, either in the purchasing or manufacturing or selling end of a business sometimes go far toward impairing the profits which would naturally accrue from economies maintained in any or all of the other branches or departments.

Both the purchaser and the seller can help each other in many little ways by having a better understanding of the requirements of the one and the abilities of the other and by being accurate, explicit, and brief in all interchanges of correspondence. Unnecessary or useless correspondence is frequent, owing, in the first place, to the purchasers not having a clear idea of the commodity manufactured by the seller, or owing to his failure to describe specifically the article he desires. On the other hand, some manufacturers are inexcusably ignorant regarding the quality of product required for a certain class of work and, therefore, must necessarily experiment by making trial shipments, etc.

A getting together of purchasers and sellers, either individually or collectively and discussing ways and means for mutual helpfulness, would effect much good, as each would then have a better understanding of the problems of the other, and intelligent co-operation would result.

The willingness to co-operate, even in the little ways, is not lacking, but the knowledge of how to co-operate, how to insure an order being filled properly and promptly and how to make it easier for the purchasing department to keep track of tonnage bought and shipping schedules and, shipment having been made, to approve easily and promptly the invoices for payment, is not so thoroughly understood and appreciated as it might be.

I sincerely trust that every subscriber to THE IRON AGE will read Mr. Twyford's article and believe that those who do read it will get much good from it.

C. I. SPROWL,
Mgr. Order Dept. American Rolling Mill Company.

Middletown, Ohio,
July 13, 1916.

Canadian Cars for Russia

Canadian advices are that representatives of the Canadian Car & Foundry Company and the National Steel Car Company have been conferring with the Imperial Munitions Board at Ottawa, and it is expected that announcement of car contracts will be made within a few days. The cars are for the Russian Government, but the placing of the contracts and the financial arrangements are in the hands of the Imperial Munitions Board. The only question to be settled is whether the car companies will be in a position to make deliveries within the time limit.

The purchase of the Thomas B. Jeffery Company, Kenosha, Wis., manufacturer of automobiles and motor trucks, by Charles A. Nash, Flint, Mich., Lee, Higginson & Co., Boston, and allied interests, is confirmed by the Kenosha company. The formal transfer will take place August 1. Mr. Nash retires as head of the General Motors Company on that date, and will then undertake the management of the Kenosha company.

THE YEAR'S SHIPBUILDING

Increase of 61 Per Cent in Tonnage at Seaboard and Great Lakes Yards

WASHINGTON, D. C., July 18, 1916.—Shipbuilding in American yards scored an important gain during the fiscal year ended June 30, 1916, according to advance figures prepared by the Bureau of Navigation of the Department of Commerce. The output of the year was 1030 vessels of 347,847 gross tons, as compared with 1266 vessels of 215,711 tons during the fiscal year 1915. While this was a decrease of 19 per cent in the number of vessels built, it was an increase of 61 per cent in tonnage, the average of the vessels constructed having increased from 170 tons in 1915 to 338 tons in 1916.

The following statement shows the year's output according to material and power (gasoline included under steam) as compared with 1915:

	1916,		1915,	
	No.	Gross Tons	No.	Gross Tons
Wood				
Sailing	47	6,987	1	1,741
Steam	91	18,781	71	27,095
Unrigged	287	62,844	2	60,185
Total	426	87,712	1,100	91,411
Metal				
Sailing	..	.....	1	27
Steam	86	250,112	68	120,618
Unrigged	18	1,423	7	785
Total	104	259,135	76	121,200
Totals				
Sailing	47	16,987	1	1,768
Steam	680	268,893	811	147,713
Unrigged	303	67,767	364	60,970
Grand total	1,030	347,847	1,266	215,711

The seaboard yards have built 35 large steel merchant steamers aggregating 191,859 gross tons, the largest merchant steel output in their history. Of these, 21 steamers are each over 5000 gross tons, the largest being the steamship H. H. Rogers, of 10,050 gross tons, and 14 are between 3000 and 5000 gross tons each. The Newport News Shipbuilding & Dry Dock Company built 6 of 40,329 gross; the Maryland Steel Company, Sparrows Point, Md., 8 of 35,665 gross; Union Iron Works, San Francisco, Cal., 5 of 32,665 gross; New York Shipbuilding Company, Camden, N. J., 7 of 32,164 gross; and Fore River Shipbuilding Company, Quincy, Mass., 4 of 24,932 gross. The Newport News, Camden, and Quincy yards were also engaged in naval construction.

Of these steel ocean steamers, 24 of 138,858 gross tons have been registered for foreign trade, 8 of 34,386 gross tons enrolled for the coasting trade, one, the steamship Pacific, of 6034 gross tons, was sold to Norwegians, and up to June 30 the two remaining had not been documented.

Of the relatively small output of the Great Lakes, 8 vessels of 14,775 gross tons are each under 2,500 tons, built for the ocean trade, of which 4 are for foreign trade, and one (Morris Adler, 2481 gross) has been sold to Norwegians.

Steel Castings in 1915

Acid open-hearth steel castings constituted 54.7 per cent of the total output of basic and acid open-hearth castings in 1915, or 402,229 gross tons in a total of 735,332 tons. This is the largest proportion since 1906, when acid castings made up 56.5 per cent of the total open-hearth output. In 1910, acid castings comprised 53.3 per cent of the acid and basic open-hearth output.

The production of electric steel castings in the United States in 1915 was the largest ever recorded—23,064 gross tons—or about one-third of the total output of electric steel, which was 69,412 tons. The extent to which the demand for this grade of castings has grown is shown by the fact that the output for 1915 is only 2360 tons less than the total production of the country in the preceding six years, electric steel castings having been first made in 1909. In that year the output was 306 tons. In 1914 it was 8551 tons.

Twelve New Bethlehem Blast Furnaces

Four at Each of the Three Plants—Large Additions to Steel Capacity, with Important New Finishing Lines

The inspection of the newly acquired properties of the Pennsylvania Steel Company made by officers of the Bethlehem Steel Company last week, was, for some of them, the first thorough view of the improvements made at these plants in recent years. Much satisfaction was expressed with the condition of the properties. Very extensive improvements are to be made, which will represent an outlay of $10,000,000 or $12,000,000, at Steelton, Pa.; $30,000,000 at the Sparrows Point plant, including the shipyards, and probably $30,000,000 in a program extending over several years at the South Bethlehem works. The two new properties will be known hereafter as the Steelton plant and the Maryland plant of the Bethlehem Steel Company.

At Steelton, the new construction, which has thus far been only generally outlined, takes in the following: The rebuilding of the entire blast-furnace plant, giving four new furnaces in addition to the modern one which the Pennsylvania Steel Company completed last year. There will be entirely new power installations, based on blast-furnace gas engines—new electric, hydraulic, and steam plants. Work on two of the four new blast furnaces is already under way. An extensive by-product coke plant will be built. An additional 200-ton tilting open-hearth furnace will be provided, giving, with the existing six 100-ton stationary furnaces and two tilting furnaces, a capacity of 75,000 tons a month of finished material. There will be a new blooming and billet mill layout, and one or two small finishing mills will be added.

At Sparrows Point there are at present four large blast furnaces, all having been rebuilt in the past few years. Four additional blast furnaces will be built, and a new coke-oven plant to take care of them. A material increase will be made in the facilities for handling and treating the company's Cuban ores. This has not been fully worked out, but there may be a partial removal of moisture at the Felton plant in Cuba, and the finishing of nodulizing operations at Sparrows Point. Entirely new steel works will be built, consisting of three or four 200-ton tilting furnaces. The finishing capacity to be provided will consist of merchant bar mills, a tin plate and sheet plant, a plate mill, and a rod mill. The Bessemer plant at Sparrows Point will supply steel for the lines of lighter products which will be added, and it will also be operated in part in duplexing, in connection with the open-hearth furnaces. On the shipyards, about $3,000,000 will be expended.

In the program for South Bethlehem, the important item is four new blast furnaces at the Saucon plant. Additional open-hearth steel capacity will be provided, also additional structural mills. A large capacity will be provided for the manufacture of ingot molds, and the sale of such molds to Eastern steel works will be entered upon actively. Car building is also a possibility at South Bethlehem.

STAFF CHANGES

Mention was made in THE IRON AGE of July 13 of a number of changes in the organization, resulting from the acquisition of the Steelton and Sparrows Point plants. The dissolution of the Pennsylvania Steel Company and the Maryland Steel Company carries with it the executives of the two companies. President E. C. Felton, who has been for many years prominent in the Eastern steel trade, and has borne so important a part in the enlargement of the Pennsylvania Steel Company's operations and prestige, retires from the business, as he has for some time contemplated. One of the most conspicuous performances of Mr. Felton's administration was in the development of the Mayari ore deposits in Cuba, and previously in the taking over of the Spanish-American Iron Company, insuring an ore supply for many years to come.

The withdrawal is also announced of Frank Tenney, long well known in the Eastern steel trade as secretary of the company and asistant to the president. F. W. Wood, who has been at the head of the Sparrows Point enterprise from its inception, will be general manager of the Maryland plant, which, with the expenditures contemplated, assumes an importance both in shipbuilding and steel making it has not had before. M. J. Scannell becomes general superintendent of the steel plant at Sparrows Point, and S. Anderson continues as manager of the shipyards.

In connection with the taking over of the bridge department at Steelton, there will be organized the Bethlehem Steel Bridge Company of Delaware. G. H. Blakely, who is in charge of the structural department of the Bethlehem Steel Company, becomes president of the bridge company, and Thomas O. Earle will be vice-president. It is the intention of the bridge company to operate as heretofore on bridge work, and there will be no competition in steel structural work between the bridge company and the various fabricating interests to which the Bethlehem Steel Company has long supplied material.

J. H. Myers becomes assistant superintendent of the bridge and construction department of the Steelton plant, succeeding Carl B. Ely, who has been made superintendent. W. J. Collier has been made plant engineer in the bridge and construction department. Reinhard Heern, civil engineer in the same department at Steelton, will be connected with the sales and engineering force at South Bethlehem, Pa. Richard M. Kreutz, civil engineer, has been similarly transferred.

Car and Locomotive Orders in 1916

A comparison of orders for locomotives and freight and passenger cars for the first half of 1916 and 1915 is given as follows by the *Railway Review:*

	Locomotives		Freight Cars		Passenger Cars	
	1916	1915	1916	1915	1916	1915
[illegible]	164	137	12,500	2,600	59	29
[illegible]	[illegible]	77	12,833	1,067	148	251
[illegible]	179	109	13,791	1,026	170	55
[illegible]	253	25	8,628	1,065	103	145
[illegible]	272	109	7,191	30,029	34	191
[illegible]	247	454	3,441	7,164	163	74
Total	[illegible]	891	57,984	46,151	677	745

The principal foreign orders are included. Excluding all foreign orders except those of Canada, locomotives ordered to July 1 were 1580, against 384 to July 1, 1915, and 1500 domestic locomotives ordered in all of 1915. About one-third of the freight cars ordered in the first half of 1915 were foreign, Russia alone ordering 13,160.

In THE IRON AGE of July 6, 1916, it was stated that the New York Central Lines had placed an order for 25 Mallet locomotives with the Baldwin Locomotive Works. This order was given to the American Locomotive Company.

Specifications for Spikes and Tie Plates

Among the specifications which the American Society for Testing Materials approved at its annual meeting in Atlantic City, June 28, were three specifications, one on steel track spikes, one on steel screw spikes, and one on steel tie plates. These are all to be published in the forthcoming year book of the society as tentative specifications. They are, accordingly, subject to modifications, and are to come up at the annual meeting next June for final consideration, when, in their approved form, they are likely to be submitted to the membership for a mail ballot before becoming the standard A. S. T. M. specifications.

TRACK AND SCREW SPIKES

The spikes may be made of Bessemer or open-hearth steel.

The track spikes must be made of steel showing a minimum tensile strength of 55,000 lb. per square inch, while the steel for the screw spikes must have a tensile strength of 60,000 lb. per square inch. The yield point of the steel in the two cases must be equivalent to one-half the tensile strength, and the elongation 25 per cent in 2 in. for the track spikes, and 20 per cent in 2 in. for the screw spikes.

Bend tests are specified as follows: The body of the full-sized finished track spike shall bend cold through 180 deg. flat on itself, without cracking on the outside of the bent portion. The head of the full-sized finished spike shall bend backward to the line of the face of the spike without cracking on the outside of the bent portion. A tension and bend test is required from each lot of 10 tons, or fraction thereof.

For the screw spikes, the bend test requires that the full-sized finished spike shall bend cold through 90 deg. around a pin the diameter of which is equal to three times the diameter of the spike, without cracking on the outside of the bent portion. A tension and a bend test is to be made from each lot of 100 kegs, or fraction thereof.

A variation of 1/64 in. under the specified dimension of the body of the track spike, measured from the face to the back, and a variation of 1/32 in. over the specified dimension of the body of the spike, measured across the face, will be permitted. A variation of 3/32 in. over and 1/32 in. under the specified dimensions of the head of the spike will be permitted.

A variation of 1/32 in. over and under the specified diameter of the unthreaded portion of the body of the screw spike, and a variation of 1/32 in. over the specified diameter of the threaded portion of the spike will be permitted.

STEEL TIE PLATES

For tie plates, the open-hearth steel shall have not over 0.05 per cent phosphorus. The tensile strength shall be 64,000 lb. per square inch, as a minimum, the yield point one-half of the tensile strength, and the elongation 18 per cent in 2 in., except for tie plates, in which the material to be punched is over ⅝ in. in thickness, in which case the allowable tensile strength is 55,000 to 65,000 lb. per square inch; the yield point one-half of the tensile strength, and the elongation 25 per cent in 2 in.

The bend test requires bending cold through 180 deg. around a pin the diameter of which is equal to twice the thickness of the specimen. The different test specimens must be taken from finished tie plates, and in a direction parallel to that in which the tie plates have been rolled. The bend-test specimens must be rectangular in section, and not less than ½ in. in width between the planed sides, with two parallel bases as rolled, with the corners rounded to a radius not over 1/16 in. When the tie plates are of such a design that the rectangular specimens cannot be obtained without projecting ribs, these shall be planed off before the tests are made.

A variation in thickness of 1/32 in. and in width and length of ⅛ in., is permitted in the case of plates with shoulders parallel to the direction of rolling. The variation in length allowed in the case of plates with shoulders perpendicular to the direction of rolling is ¼ in.

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Iron and Steel Markets

EXPORT SALES GROWING

The Main Source of Market Strength

Steel Output Affected by Heat—Allies' Requirements Are Still Large

The increasing tonnage of export sales and of foreign inquiry overhanging the steel market is strengthening the position of the steel works in respect to this year's deliveries. Most domestic consumers, having bought what they will require in the next four or five months, are not actively competing for steel with foreign buyers as they were earlier in the year. But with light home buying, each week is increasing the proportion of export steel on the makers' books, and the question of the amount available for home use in the first quarter of 1917 will soon be of live interest.

There is more emphasis this week on the reduced output of steel mills due to the heat, particularly in the middle west. In the Connellsville region production has suffered enough from the same cause to advance prices for prompt coke. In Alabama, steel works operations have been greatly interfered with by storms, one large plant having its output cut down about 50 per cent.

The week has brought out a fresh installment of foreign requirements, in which 100,000 tons of shell steel for France is prominent and about 50,000 tons of 6-in. to 12-in. beams, to be shipped at the rate of 8000 tons a month through this year. Russia has made some redistribution of barb wire business, by which 50,000 tons goes to three independent makers. A Russian spike purchase of 50,000 kegs is pending. There is also active inquiry from Canada for shell steel and it is known that Great Britain is still seeking to place 6-in. to 12-in. shells and the steel for them, with deliveries extending to April. Russia is expected to place large car orders in this country and Canada and has just bought from two American makers 28,000 axles, with cast iron wheels mounted, for repair purposes.

An important Chicago district contract just closed is for 50,000 tons of forging billets for delivery in fourth and first quarters. The semi-finished steel market at Pittsburgh is stronger than in recent weeks.

Rail mills are adding to their bookings for 1917, and several large lots are up for this year. France has just placed 14,000 tons. South Africa is inquiring for 12,000 tons. The Canadian Pacific is expected to buy much more than the 30,000 tons on which bids are asked, in view of its large sale of rails from its sidings to the British Government.

A Canadian mill, unable to buy blooms on this side to fill its rail orders from American roads, is now seeking to place the rails here.

A late increase in premium business, coming in connection with larger foreign demand, has caused some producers to look for an early renewal of domestic buying of plates, shapes and bars, but in most lines the indications are rather for the continuance of present conditions into fall.

The continued declines in metals, most pronounced in spelter, are having their effect on certain rolled steel products. Galvanized sheets have sold down to 4.25c., Pittsburgh, for heavier gages, and the galvanized pipe market has been disturbed by jobbers selling below manufacturers' prices. Some sheet mills are disposed to insist on consumers taking out the 5-c. galvanized sheets placed when spelter was high. At the same time galvanized sheet production promises to run up, as the dangers of the spelter market have disappeared.

Steady buying of Bessemer pig iron for export has been practically without effect on prices, and the foundry iron market is at low ebb for the year in point of activity.

Several Mesaba underground mines have resumed operations, and the strike is breaking, but enough miners have left the district to make it quite certain the scheduled output at some properties will not be reached. Deeper water in Great Lakes channels will help the vessel situation materially, so that a 60,000,000-ton ore movement is more confidently looked for to-day.

Pittsburgh

PITTSBURGH, PA., July 18, 1916.

The feature of the market is the continued export demand for Bessemer iron, mostly for Italy; for small billets, 4 x 4-in. billets and sheet bars, either Bessemer or open-hearth; for beams for shipment to France, also for other lines of finished steel. Already a good deal of foreign business has been done in Bessemer pig iron and in open-hearth and Bessemer steel, with a large amount still pending. Semi-finished steel appears harder to obtain and is higher in price than was the case late in May and early June. In the early part of June there were three or four sources of supply of steel for nearby delivery, but these are now closed, and it is very hard to obtain either Bessemer or open-hearth steel in any large quantities for export shipment. Output of nearly all kinds of finished steel has been materially cut down so far in July by the very hot weather. Coke output, for the same reason, has gone down a good deal and furnace coke for prompt shipment is scarce and bringing high prices. Sales are reported at $2.75 per net ton at oven for the best grades. The rapid decline in spelter has upset the market on galvanized products, and lower prices are looked for on galvanized iron and steel pipe and probably also on wire products on or before Aug. 1. Prices on galvanized sheets have declined sharply and several mills that have not turned out any for some time are likely to be making them again if prices of spelter should go any lower. The

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

	July 19, 1916.	July 12, 1916.	June 21, 1916.	July 21, 1915.
Pig Iron, Per Gross Ton				
No. 2 X, Philadelphia	$19.75	$19.75	$19.75	$14.25
No. 2, Valley furnace	18.25	18.25	18.25	12.75
No. 2 Southern, Cin'ti	16.90	16.90	17.40	12.65
No. 2, Birmingham, Ala.	14.00	14.00	14.50	9.75
No. 2, furnace, Chicago*	19.00	19.00	19.00	13.00
Basic, delivered, eastern Pa.	19.00	19.00	19.50	14.00
Basic, Valley furnace	18.00	18.00	18.00	13.00
Bessemer, Pittsburgh	21.95	21.95	21.95	14.95
Malleable Bess., Ch'go*	19.50	19.50	19.00	13.00
Gray forge, Pittsburgh	18.70	18.70	18.70	13.45
L. S. charcoal, Chicago	19.75	19.75	19.75	15.75
Billets, etc., Per Gross Ton				
Bess. billets, Pittsburgh	40.00	40.00	42.00	22.00
O.-h. billets, Pittsburgh	42.00	42.00	42.00	22.00
O.-h. sheet bars, P'gh	42.00	42.00	42.00	23.00
Forging billets, base, P'gh	69.00	69.00	69.00	28.00
O.-h. billets, Phila.	47.00	47.00	50.00	24.50
Wire rods, Pittsburgh	55.00	55.00	55.00	25.50
Finished Iron and Steel,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.47½	1.47½	1.47½	1.25
O.-h. rails, heavy, at mill	1.56½	1.56½	1.56½	1.34
Iron bars, Philadelphia	2.659	2.659	2.659	1.22½
Iron bars, Pittsburgh	2.50	2.50	2.50	1.25
Iron bars, Chicago	2.50	2.50	2.50	1.20
Steel bars, Pittsburgh	2.50	2.75	2.75	1.25
Steel bars, New York	2.669	2.669	2.919	1.419
Tank plates, Pittsburgh	3.50	3.50	3.50	1.25
Tank plates, New York	3.669	3.669	3.919	1.369
Beams, etc., Pittsburgh	2.50	2.50	2.50	1.25
Beams, etc., New York	2.669	2.669	2.669	1.419
Skelp, grooved steel, P'gh	2.35	2.35	2.35	1.20
Skelp, sheared steel, P'gh	2.45	2.45	2.45	1.25
Steel hoops, Pittsburgh	2.75	2.75	2.75	1.30

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

	July 19, 1916.	July 12, 1916.	June 21, 1916.	July 21, 1915.
Sheets, Nails and Wire,	Cents.	Cents.	Cents.	Cents.
Iron sheets, Nos. 10 to 14	3.00	3.00	2.90	1.90
Galv. sheets, No. 28, P'gh.	4.60	4.60	4.60	4.50
Wire nails, Pittsburgh	2.50	2.50	2.60	1.60
Cut nails, Pittsburgh	2.60	2.60	2.60	1.55
Fence wire, base, P'gh	2.45	2.45	2.45	1.40
Barb wire, galv., P'gh	3.35	3.35	3.35	2.40
Old Material, Per Gross Ton:				
Iron rails, Chicago	15.00	15.00	15.00	11.00
Iron rails, Philadelphia	20.00	20.00	20.00	15.50
Carwheels, Chicago	12.00	12.00	12.25	11.25
Carwheels, Philadelphia	16.00	16.00	16.50	12.50
Heavy steel scrap, P'gh	16.50	16.50	17.00	12.75
Heavy steel scrap, Phila.	15.00	15.00	15.00	12.25
Heavy steel scrap, Chicago	11.00	11.00	11.00	10.50
No. 1 cast, Pittsburgh	17.00	17.00	17.00	12.25
No. 1 cast, Philadelphia	16.00	16.00	16.00	12.50
No. 1 cast, Chicago (net ton)	11.00	11.00	11.00	9.25
Coke, Connellsville, Per Net Ton at Ovens				
Furnace coke, prompt	$2.75	$2.75	$2.40	$1.60
Furnace coke, future	2.75	2.75	2.40	1.75
Foundry coke, prompt	3.25	3.25	3.25	2.00
Foundry coke, future	3.50	3.50	3.50	2.25
Metals,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	23.00	23.00	23.00	22.00
Electrolytic copper, N. Y.	23.00	23.00	23.00	19.00
Spelter, St. Louis	9.00	8.75	12.25	20.00
Spelter, New York	9.25	9.00	12.50	20.25
Lead, St. Louis	6.10	6.20	6.47	5.50
Lead, New York	6.25	6.45	6.62½	5.55
Tin, New York	38.50	38.50	40.75	36.62½
Antimony, Asiatic, N. Y.	17.00	17.00	18.00	35.50
Tin plate, 100-lb. box, P'gh	$6.00	$6.00	$6.75	$3.10

usual mid-summer dullness has settled down over the steel trade, and there will be little snap to it this month and August, but there is likely to be a buying movement early in September to cover needs of consumers for last quarter of this year and first quarter of 1917. The scrap market has settled down after the recent purchases of heavy melting steel.

Pig Iron.—The domestic trade is very quiet, but the export inquiry for Bessemer iron is estimated to be from 40,000 to 50,000 tons. One lot of 10,000 tons has been sold and smaller lots have aggregated as much more, with the demand still insistent. Italy is using this iron in making steel for shrapnel and other purposes. Nearly all the Bessemer iron for export has been sold at $21, at Valley furnace, but on one lot of 500 tons for quick shipment $21.15 at furnace was paid. Ella furnace of Pickands, Mather & Co., at Sharpsville, Pa., has had an accident and will be out of blast for a month or more. It was running on Bessemer iron and its going out will add to the shortage of Bessemer iron for early shipment. In spite of the heavy demand for Bessemer, and to some extent for basic, prices show no signs of being higher. Shippers report consumers are taking their iron freely and there is little in stock at any of the furnaces. We quote Bessemer iron at $21; basic, $18; gray forge, $17.75 to $18; malleable Bessemer, $18.50 to $19, and No. 2 foundry, $18.25 to $18.50, all at Valley furnace, the freight rate to the Pittsburgh and Cleveland districts being 95c. per gross ton.

Ferroalloys.—With little new inquiry for ferromanganese for prompt shipment or on contract, prices are soft. Domestic 80 per cent is being offered freely for shipment over the remainder of the year at $175 at maker's furnace, and for prompt shipment at about $200 at furnace. English 80 per cent on contract for next year is unchanged at $175, seaboard. Spiegeleisen is easier, 18 to 22 per cent ranging from $45 to $50, and 25 to 30 per cent from $60 to $70 at furnace. We quote 50 per cent ferrosilicon at $85 in lots up to 100 tons; over 100 tons and up to 600 tons, $84, and over 600 tons, $83, all per gross ton, f.o.b., Pittsburgh. For some time one furnace making Bessemer ferrosilicon has been naming a price $2 per ton less than others, and one or two other makers are now meeting this price. We quote Bessemer ferrosilicon as follows: 9 per cent, $30; 10 per cent, $31; 11 per cent, $32; 12 per cent, $33; 13 per cent, $34.50; 14 per cent, $36.50; 15 per cent, $38.50, and 16 per cent, $41. Seven per cent silvery is $28.50; 8 per cent, $29; 9 per cent, $29.50; 10 per cent, $30; 11 per cent, $31, and 12 per cent, $32. These prices are f.o.b. at furnace, Jackson or New Straitsville, Ohio, or Ashland, Ky., all having a freight rate of $2 per gross ton to Pittsburgh.

Billets and Sheet Bars.—There is insistent foreign inquiry for Bessemer and open-hearth steel in the form of 2-in. billets, 4 x 4-in. billets and sheet bars, and in some cases ingots have been shipped abroad to be bloomed on the other side. Nearly all this inquiry is for prompt shipment, and it is estimated that at present there are inquiries in this market for 75,000 to 100,000 tons of Bessemer and open-hearth steel in the various forms noted above. Sales reported for export include 6000 tons of Bessemer sheet bars at $43.50, 2000 tons of small open-hearth billets at about $43, and 5000 to 6000 tons of billets and slabs at about $45, f.o.b., Pittsburgh. There is also a heavy domestic demand for semi-finished steel, shipments to sheet and tin plate mills being heavier now than for several months. Prices are very strong and it is hard to find any soft open-hearth steel at much less than $45 at mill. One Youngstown, Ohio, open-hearth plant has been a heavy buyer of steel lately in the open market to help out on its contracts for sheets and other products. We quote soft open-hearth billets and sheet bars at $42 to $45; Bessemer billets, $40 to $42, and Bessemer sheet bars, $40 to $42, maker's mill, Pittsburgh or Youngstown district. We quote forging billets at $69 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take $1 extra.

Plates.—Early deliveries of plates are harder to obtain now than a month or more ago, and higher prices are being paid. The demand for plates from the shipyards is enormously heavy and promises to be for the next year or more. From steel car builders the demand is still very urgent, but unless more orders for steel cars are placed, the steel car companies will be short of work by September or before. The Delaware & Hudson Railroad is in the market for 1000 70-ton steel hop-

per cars, similar in design to those bought by the Pennsylvania Railroad several months ago. The Steel Corporation has placed orders for 448 steel cars for subsidiary interests, most of these going to the Pressed Steel Car Company. Prices on plates are very strong, and we quote ¼-in. and heavier plates for delivery in two to four months at 3.50c. to 4c. at mill. One maker reports sales of about 4000 tons of ¼-in. sheared plates at the higher price for delivery in two to three months. The mill contract price remains at 2.75c., but when this price is quoted the mill could probably not ship out under five to six months. The Carnegie Steel Company is well sold up on plates into first half of 1917, and two other mills report they have very few plates to spare for delivery before first quarter of next year.

Structural Material.—In the past week, inquiries have come in this market from France for 40,000 to 50,000 tons of 5-in. to 12-in. beams, for 3000 to 4000 tons of structural steel for a sugar plant in Cuba, for 1000 tons for a sugar mill in Hayti and for about 1000 tons for pulp and paper mills in Canada. The Jones & Laughlin Steel Company has taken 1000 tons for an addition to Mercy Hospital, in this city, and 200 tons for a restaurant building at the Panama Canal, and the McClintic-Marshall Company will furnish 500 tons for a bridge for the Southern Railway over the James River, in Virginia. Work in the market includes a bridge for the New York Central near Youngstown, Ohio, 700 tons; about 500 tons for new building for the United States Aluminum Company at Massena Springs, N. Y. We quote beams and channels up to 15 in. at 2.50c. to 2.75c. at mill, for delivery in third and fourth quarters, while small lots from stock are held at 3.25c. up to 4c., prices depending entirely on the size of the order and how soon deliveries are wanted.

Steel Rails.—The Carnegie Steel Company is sold up on standard sections into third quarter of 1917, and for almost the same extent on light rails. The new demand for light rails is only fair, the traction and lumber interests buying very few, but the coal-mining interests are placing fair-sized orders. We quote 25 to 45-lb. sections at $47; 16 and 20-lb., $48; 12 and 14-lb., $49; and 8 and 10-lb., $50 in carload lots, f.o.b. at mill, the usual extras being charged for less than carload lots. We quote standard section rails of Bessemer stock at 1.47½c., and of open-hearth, 1.56½c., Pittsburgh.

Sheets.—Some of the larger sheet mills are insisting that customers who placed contracts some months ago for galvanized sheets, on the basis of 5c. for No. 28 gage, must take out these sheets, and in one or two cases litigation may result. Prices on galvanized sheets are weak and lower, due to the heavy decline in spelter, but the new demand is reported a little better. On electrical sheets, mills are sold up for eight to ten months, on blue annealed five to six months, but on light black and galvanized some mills can make fairly prompt deliveries. We quote blue annealed sheets, Nos. 9 and 10, at 3c. to 3.25c., for delivery at convenience of the mill, which would be late this year. We quote No. 28 Bessemer and open-hearth black sheets at 2.90c. to 3c.; No. 28 galvanized, Bessemer, and open-hearth, 4.25c. to 4.35c.; Nos. 22 and 24 black plate, tin-mill sizes, H. R. & A., 2.90c.; Nos. 25, 26, and 27, 3c. to 3.10c.; No. 28, 3.10c. to 3.15c.; and No. 29, 3.20c. to 3.25c. These prices are for carloads and larger lots, f.o.b. mill, Pittsburgh.

Tin Plate.—It develops that the advertisement of a second-hand machinery interest, offering 300,000 boxes of tin and terne plate for this year delivery, probably refers to product which is expected to be made in a mill at Marietta, Ohio, which has been inactive for a long time. Some new interests have secured control of this mill, and, if arrangements can be made for sheet bars, will start it up on bright and terne plate. The domestic demand for tin plate is fairly heavy, but export demand has quieted down. Some of the larger makers have their output sold up for this year, and are not quoting on any new foreign or domestic inquiry. We quote wasters from stock at $5.75 to $6, and primes at $6 to $6.25 to the domestic trade, while for export, $6.25 per base box, and higher, is quoted. We quote 8-lb. coated ternes at $8.50 to $8.75 for 200 lb., and $8.75 to $9 for 214 lb., all f.o.b. Pittsburgh.

Skelp.—The Jones & Laughlin Steel Company expects to start one of its new skelp mills at Aliquippa, Pa., in August and the other later in the year. Very wide plates for large sizes of pipe will be rolled in the South Side mills of this company and shipped to Aliquippa. The new demand for skelp is quiet, but mills have their output sold up for three or four months ahead. We quote grooved steel skelp at 2.35c. to 2.40c.; sheared steel skelp, 2.45c. to 2.50c.; grooved iron skelp, 2.70c. to 2.80c., and sheared iron skelp, 3c. to 3.10c., all delivered to consumers' mills in the Pittsburgh district.

Cold-Rolled Strip Steel.—Contracts for 500 to 600 tons of cold rolled strip steel were made recently for delivery over remainder of this year at $6 per 100 lb. Most consumers are covered for five or six months ahead and some mills have their output sold up for all of this year. On small lots for shipment in two to three months, the mills quote from $6.50 to $7, or higher, per 100 lb. On contracts we quote cold-rolled strip steel at $6 per 100 lb., base, and on small lots for fairly prompt delivery, from $6.50 to $7. Extras, standard with all the mills, were printed on page 810 of The Iron Age of March 30.

Railroad Spikes.—The new demand is quiet and specifications are dull. Two makers of spikes that do not have enough orders to run their spike departments full are now diverting the steel to other products. Regular prices, which are not always strictly observed, are as follows:

Standard railroad spikes, 4½ x 9/16 in. and larger, $2.65 to $2.75; railroad spikes, ½ and 7/16 in., $2.75 base; railroad spikes, ⅜ in. and 5/16 in., $3.05 base; boat spikes, $2.80 base, all per 100 lb., f.o.b. Pittsburgh.

Nuts and Bolts.—Makers report domestic demand fairly heavy, but most consumers are covered for this year. The export demand has quieted down a good deal. Discounts in effect from May 19, which the makers state are for prompt acceptance only, are as follows, delivered in lots of 300 lb. or more where the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days:

Carriage bolts, small, rolled thread, 50 and 10 per cent; small, cut thread, 50; large, 40.

Machine bolts, h. p. nuts, small, rolled thread, 50, 10 and 5 per cent; small, cut thread, 50 and 5; large, 40 and 10.

Machine bolts, c. p. c. and t. nuts, small, 40, 10 and 5 per cent; large, 35 and 5. Blank bolts, 40 and 10 per cent; bolt ends with h. p. nuts, 40 and 10; with c. p. nuts, 35 and 5. Rough stud bolts, 15. Lag screws (cone or gimlet point), 50 and 10.

Forged set screws and tap bolts, 10 per cent. Cut and round point set screws, case hardened, 60. Square and hexagon head cap screws, 55. Flat, button, round or fillister head cap screws, 30.

Nuts, h. p. sq., tapped or blank, $2.90 off list; hex., $2.90 off; c. p. c. and t. sq. tapped or blank, $2.60 off; hex., $3 off; semi-finished hex., 60 and 10 per cent; finished and case hardened, 60 and 10.

Rivets, 7/16 in. in diameter and smaller, 45, 10 and 10 per cent.

Wire Rods.—The quotation of $50 to $55 in the Pittsburgh market report in the issue of THE IRON AGE of July 6, on soft Bessemer, open-hearth and chain rods was a typographical error; it should have been $55 to $60 per ton. Local makers who have been shipping rods into Canada have been declaring a value on these of $55 and $60 for some time. The demand for rods is reported fairly heavy and consumers are specifying very freely against their contracts. We quote soft Bessemer, open-hearth and chain rods at $55 to $60 per ton, f.o.b. Pittsburgh.

Wire Products.—Summer dullness has settled down on the wire trade and mills report specifications only fair. It is said an advance in wire products may be made early in August, or about as the trade starts to cover for its fall requirements. The situation in galvanized wire is complicated, due to the heavy decline in prices of spelter, and it is possible a readjustment in prices on galvanized wire may be made before long

to a somewhat lower basis. Regular prices are as follows: Wire nails, $2.50 to $2.60 per keg; galvanized, 1 in. and longer, taking an advance over this price of $2, and shorter than 1 in., $2.50. Plain annealed wire, $2.45 to $2.65 per 100 lb.; galvanized wire, $3.15; galvanized barb wire and fence staples, $3.35; painted barb wire, $2.65; polished fence staples, $2.65; cement coated nails, $2.50, base, all f.o.b. Pittsburgh, with freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing are now 61½ per cent off list for carload lots, 60½ per cent for 1000-rod lots and 59½ per cent for small lots, f.o.b. Pittsburgh.

Iron and Steel Bars.—A local interest is reported to have taken a contract for 30,000 to 35,000 tons of steel rounds for the Allies at 3.50c. per pound for shipment over remainder of this year. Local makers of steel bars say they have not taken agricultural contracts recently. One local maker of steel bars is holding firmly for 2.50c. on contracts with implement makers for first half of next year. The general bar market remains at 2.50c. for such deliveries as the mills can make, which would not be before last quarter and possibly not before first quarter of next year. One mill is quoting Bessemer steel bars for delivery in two to three months at 2.50c.

Rivets.—Makers report the new demand only fairly heavy, consumers being covered and makers sold up for most of the year. Some jobbers who have stocks of rivets on hand bought when prices were lower than they are now are shading makers' prices to some extent. We quote buttonhead structural rivets, ½ in. in diameter and larger, at $4 per 100 lb., base, and conehead boiler rivets, same sizes, $4.10 per 100 lb., base, f.o.b. Pittsburgh. Terms are 30 days net, or one-half of 1 per cent for cash in 10 days.

Shafting.—The consuming trade is well covered over remainder of this year and is specifying freely against contracts, some of which were made at 20 per cent off list and a few at 15 per cent off list. For early shipment and small lots, sales of shafting have been made at very close to base price. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots for delivery in last quarter of this year and first quarter of 1917, and 10 per cent off in less than carload lots, f.o.b. Pittsburgh, freight added to point of delivery.

Cotton Ties.—The cotton tie business for this year is pretty well closed up, the consumption having been estimated at 2,800,000 bundles, of which 2,000,000 bundles will be rolled by the mills for this season's trade, the remaining 800,000 bundles being in stock carried over from last year. We quote cotton ties at $1.35 per bundle of 45 lb., f.o.b. Pittsburgh, for July shipment, with an advance of ¾c. per pound for August and an additional ¾c. for September delivery.

Merchant Steel.—The new demand is mostly for small lots, leading consumers being covered over remainder of the year, and shipments by the mills are heavy. Prices on small lots are about as follows: Iron-finished tire, ½ x 1½ in. and larger, 2.50c., base; under ½ x 1½ in., 2.60c.; planished tire, 2.70c.; channel tire, ¾ to ⅞ and 1 in., 2.85c. to 2.95c.; 1⅛ in. and larger, 3.25c.; toe calk, 2.95c. to 3.05c., base; flat sleigh shoe, 2.70c.; concave and convex, 2.75c.; cutter shoe, tapered or bent, 3.25c. to 3.35c.; spring steel, 2.95c. to 3.05c.; machinery steel, smooth finish, 2.75c.

Hoops and Bands.—Demand is quiet and specifications against contracts are reported heavy. We quote steel hoops at 2.75c. and steel bands at 2.50c., extras on the latter as per the steel-bar card.

Wrought Pipe.—The present situation as to prices on galvanized iron and steel pipe is giving the makers some concern. A few jobbers who have fairly large stocks bought at favorable prices are anxious to move these, and are naming better discounts in some cases than the mills. It is expected, therefore, that a readjustment in prices of galvanized pipe to a lower basis will be made within the next two or three weeks. On lap weld pipe the mills are sold up for five to six months, but on butt weld sizes there is no trouble in getting prompt delivery. There is a very heavy demand for oil country goods and prices are firm. Discounts on black and galvanized pipe are given on another page.

Boiler Tubes.—Demand is active, in spite of the fact that on both locomotive and merchant tubes makers are sold up for five or six months and are much behind in deliveries. Discounts on iron and steel boiler tubes are holding very firm and are given on another page.

Old Material.—It is intimated that in the recent purchases of steel scrap higher prices were paid than were generally reported, due to the fact that the important companies in the market wanted large lots and the scrap centers had to be scoured thoroughly to get enough scrap to fill their contracts. To-day there is only a fair demand, with prices ruling steady. A sale of 500 tons of low-phosphorus melting stock is reported at $19.25, delivered at buyer's mill, and we note sales of 2000 to 2500 tons of borings and turnings at about $8.50, delivered. It is said that heavy steel scrap can be obtained to-day at about $1.50 per ton less than was paid on the heavy purchases of two weeks ago. Dealers are now quoting for delivery in the Pittsburgh and nearby districts that take the same rates of freight, per gross ton, as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	$16.50 to $16.75
No. 1 foundry cast	15.75 to 16.00
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	16.50 to 16.75
Hydraulic compressed sheet scrap	14.50 to 14.75
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	12.50 to 12.75
Bundled sheet stamping scrap	11.50 to 11.75
No. 1 railroad malleable stock	14.00 to 14.25
Railroad grate bars	11.00 to 11.25
Low phosphorus melting stock	19.00 to 19.50
Iron car axles	25.50 to 26.00
Steel car axles	26.00 to 26.50
Locomotive axles, steel	28.00 to 28.50
No. 1 busheling scrap	13.25 to 13.50
Machine-shop turnings	8.50
Old carwheels	14.00 to 14.50
Cast-iron borings	8.50
*Sheet bar crop ends	16.00 to 16.50
No. 1 railroad wrought scrap	18.75 to 19.00
Heavy steel axle turnings	12.00 to 12.25
Heavy breakable cast scrap	13.50 to 13.75

*Shipping point.

Coke.—The excessively hot weather of the past two weeks has cut down output of coke very materially, and furnace coke for prompt shipment is scarce and is bringing relatively high prices. Last week there were sales of 200 to 300 cars of blast furnace coke at prices ranging from $2.40 up to $2.65 per net ton at oven, but on Monday and Tuesday of this week there were sales of upward of 100 cars at $2.75 per net ton at oven, and a few makers asking as high as $2.85. The demand for furnace coke on contracts has quieted down, as nearly all furnaces are covered. We quote high grade blast furnace coke for prompt shipment at $2.75 per net ton at oven, and on contracts over remainder of the year from $2.35 to $2.65 per net ton at oven. We quote best grades of 72-hr. foundry coke for prompt shipment at $3 to $3.25 and on contracts from $3.25 to $3.50 over remainder of the year. The Connellsville *Courier* gives the output of coke for the week ending July 8 as 359,530 tons, a decrease from the previous week of 64,020 tons. This is the largest decrease in any one week for some months, and was due to the hot weather and a scarcity of labor supply, which is being severely felt.

The Baltimore & Ohio Railroad has donated to the Industrial Commission of Ohio a steel car to be used in demonstrating modern safety devices. The car will be equipped early in September by various manufacturing companies, as well as by the commission, with models of safety devices and exhibits illustrating proper sanitation and ventilation. It will be sent into the yards of industrial plants throughout the State, so that employers and workmen may inspect the exhibits. The Industrial Commission of Ohio is also preparing a motion-picture film showing the working of the compensation law in Ohio, and particularly the causes of accidents as reported to the commission.

Chicago

CHICAGO, ILL., July 17, 1916.

The actual placing on the books of new export business, running into large figures, has added perceptibly to the strength of the mill situation. The further probability of rails and forging steel being closed here in the next few days to the amount of at least 50,000 tons each, also emphasizes the important bearing of the activity of foreign buyers on first-half protection for domestic consumers. In a number of instances buyers from the general manufacturing trade have been seeking assurances from the mills that their first half needs will be taken care of, and business so reserved now aggregates a large total. As an indication that they expect history to repeat itself in that the present activity in export sales will be followed by a period of domestic buying, steel manufacturers note an increase in the amount of premium business in the past week. Of the Russian rail order 90,000 tons has been placed here, together with the track fastenings. Local mills have also quoted on large requirements which Canadian railroads are seeking to cover. In the general run of domestic business inquiry is very light, notwithstanding the fact that a large proportion of first-half needs remain to be placed under contract. The revival of two large structural projects, which are expected to take approximately 20,000 tons of steel, with a possibility of their being closed in the near future, is taken to indicate a belief that the present level of high prices will continue longer than this work can be delayed. A substantial reduction in the price of galvanized sheets has been brought about and as low as 4.25c., Pittsburgh, has been done for heavier gages. In the pig iron market, aside from foreign inquiry, there is little or nothing to engage the attention of producers.

Pig Iron.—Although this market is perhaps the least favorably situated for the consideration of export business, except for shipment via New Orleans, the almost complete absence of domestic inquiry has turned attention almost exclusively in that direction. Some of the furnaces that rarely make Bessemer iron have been quoting with the expectation of turning their stacks to making as much such iron as they may be able to sell. Some sales of high-silicon foundry iron, for which there has been a demand from abroad, have been negotiated for shipment from the South. As for buying by local consumers, seldom has less business been under consideration, but prices for Northern iron have, as yet, shown no indication of weakening. Reports of the selling of Southern warrant iron at various prices between $13 and $14, at Birmingham, are continually appearing, but they compare with transactions known to have been made in this market at prices in no instance less than $14, Birmingham. It seems likely that the discrepancy may be accounted for by differences in analysis. The agricultural implement interests have as yet shown no inclination to consider their further requirements, either of malleable or foundry iron. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of $1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to [illegible]	$19.75
Lake Superior charcoal, No. 1	20.25
Lake Superior charcoal, No. 1 and Silver Scale	20.75
Northern coke foundry, No. 1	19.50
Northern coke foundry, No. 2	19.00
Northern coke foundry, No. 3	18.50
Southern coke, No. 1 fdry and 1 soft	$18.00 to 19.00
Southern coke, No. 2 fdry and 2 soft	18.00 to 18.50
Malleable Bessemer	19.50
Basic	19.00 to 19.50
Low phosphorus	$34.00 to 36.00
Silvery, 8 per cent	31.50
Bessemer ferrosilicon, 10 per cent	35.00 to 35.50

Rails and Track Supplies.—The allotment of a portion of the recent Russian rail order to Chicago mills brings some 90,000 tons to be rolled here, and, in addition to the track fastenings for this particular part of the total order, all of the fastenings for the rails taken by the corporation on that order will be made in this district. One specification calls for 750 tons of spikes. Inquiry for rails for Canada also totals a large figure, and, if such delivery as local mills can make is acceptable, that business is also likely to be placed in this market. The Harriman lines last week bought about 6000 tons of tie-plates, paying $50 a ton, delivery to be made at mill convenience. Quotations are as follows: Standard railroad spikes, 2.75c., base; track bolts with square nuts, 3.25c. to 3.50c., base, all in carload lots, Chicago; tie-plates, $50, f.o.b. mill, net ton; standard section, Bessemer rails, Chicago, $33, base; open-hearth, $35; light rails, 25 to 45 lb., $40; 16 to 20 lb., $41; 12 lb., $42; 8 lb., $43; angle bars, 2c., Chicago.

Structural Material.—A renewal of interest is reported in connection with the building of the Butler Brothers' warehouse, and also the proposed factory for James S. Kirk & Co., each expected to take about 10,000 tons. Both projects have been ready for placing for some time, but were indefinitely postponed because of high prices. The asking of tenders covering one of the viaducts to be built in connection with the new Union Depot terminal is expected within the next forty-five days. Of contracts reported placed last week, the American Bridge Company took 465 tons for Illinois Central railroad track elevation, 219 tons for Chicago & Western Indiana railroad bridges, 210 tons for the General Electric Company's Ft. Wayne factory, and 120 tons for a bridge at Gary, Ind. The Milwaukee Structural Steel Company will fabricate 150 tons for a church at Chicago. There is a little new car business, including 750 box cars placed by the Canadian Northern Railroad with the Haskell & Barker Car Company, and 1100 cars which the Milwaukee road has ordered built at its own shops. We quote for Chicago delivery of structural steel from mill, 2.689c.

We quote for Chicago delivery of structural steel from jobbers' stock 3.10c.

Wire Products.—The exceptional demand for plain wire, even as compared with other wire products for which there has been a large export demand, is reflected in the advance of $4 a ton, made without corresponding change of prices in other forms of wire. The mills report some scattered orders for wire, but in general the situation is very quiet. We quote as follows: Plain wire, Nos. 6 to 9, base, $2.839; wire nails, $2.689; painted barb wire, $2.839; galvanized barb wire, $3.539; polished staples, $2.839; galvanized staples, $3.539; all Chicago.

Plates.—Participation in current business by the larger mills, where deliveries are desired in three or four months, is noted in several instances, but in each case the mills have quoted on the basis of working the new business in with similar orders, the rolling of which is scheduled within that period. One such sale of a few hundred tons of tank plate is noted at 3.25c., Pittsburgh, for delivery beginning in September. The quotation of 2.90c., Pittsburgh, for similar delivery, mentioned a week ago, appears to have been made in only one instance. The most common quotation for delivery up to 90 days is 3.50c., Pittsburgh, but 4c. appears to be obtainable for the very promptest shipment and for wide plates, of which business there is very little. We quote for Chicago delivery of plates from mill.

We quote for Chicago delivery of plates out of jobbers' stock, 3.50c.

Bars.—While the trade seems disposed to accept the fact that recently reported sales of implement bars at 2.35c. would establish the market for this material for first half delivery, no sales are quoted in the district at less than 2.50c., Pittsburgh. With respect to mild open-hearth bars, the market is undoubtedly stronger than in any other direction, but reports of easier deliveries are current here, as elsewhere. And some foundation is had in the sales of Bessemer bars and high-carbon open-hearth bars at 2.50c., Pittsburgh, for delivery in from two to six weeks. Quotations of standard open-hearth bars at 2.50c. for sixty days' delivery are reported, but lack substantiation. Rail-carbon steel is easier, but the open quotation continues at 2.50c., f.o.b., mill. Bar-iron conditions are unchanged. We quote, mill shipment, Chicago, as follows: Bar iron, 2.35c.;

soft steel bars, 2.689c. to 2.939c.; hard steel bars, 2.50c.; shafting, in carloads, 25 per cent off; less than carloads, 20 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 3.10c.; bar iron, 3.10c.; reinforcing bars, 3.10c., base, with 0.10c. extra for twisting in sizes 1 in. and over and 0.20c. extra for smaller sizes; shafting 10 per cent off.

Sheets.—Prices for galvanized sheets are moving rapidly downward, but without result in increasing the volume of inquiry or specifications. Sales of heavy gage sheets are noted at prices as low as 4.25c., Pittsburgh, and lighter gages at 4.35c. and 4.40c. For black and blue annealed sheets, the leading interest is understood to be quoting 3.05c., Pittsburgh, as a minimum, but the market is quotable as low as 2.90c., with additional concessions for black sheets where quality is not subject to rigid specifications. We quote for Chicago delivery, blue annealed, No. 16 and heavier, 3.089c. to 3.339c.; box annealed, No. 17 and lighter, 2.939c. to 3.039c.; No. 28 galvanized, 4.439c. to 4.589c.

We quote for Chicago delivery of sheets out of stock, minimum prices applying on bundles of 25 or more, as follows: No. 10 blue annealed, 3.40c.; No. 28 black, 3.10c. to 3.20c.; No. 28 galvanized, 5c. to 5.10c.

Rivets and Bolts.—Local jobbers are making a stronger bid for bolt business, and at the relatively favorable prices quoted, mill quotations are suffering and mill sales are falling off. A similar situation obtains in the matter of rivets and makers' prices as quoted herewith are in a measure nominal except for contracts. We quote carriage bolts up to ⅜ x 6 in., rolled thread, 50-10-5; cut thread, 50-5; larger sizes, 40-5; machine bolts up to ⅜ x 4-in., rolled thread, with hot pressed square nuts, 50-10-10; cut thread, 50-10; larger sizes, 40-10-5; gimlet point coach screws, 60; hot pressed nuts, square, $2.90 off per 100 lb.; hexagon, $2.90 off. Structural rivets, ¾ to 1¼ in., 4c. to 4.15c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

We quote out of store: Structural rivets, 3.50c.; boiler rivets, 3.60c.; machine bolts up to ⅞ x 4 in., 60-10; larger sizes, 50-10; carriage bolts up to ⅞ x 6 in., 60-5; larger sizes, 50 off; hot pressed nuts, square, $3.25, and hexagon, $3.25 off per 100 lb.; lag screws, 65.

Old Material.—Following the temporary, and in a degree artificial, strengthening of prices which attended the buying of steel scrap by the Steel Corporation, the market is again apathetic. Trading is limited to the small lots with which consumers are filling in their stocks, but there is little or no buying, even for short future periods. Prices have changed scarcely at all since last reported. The Illinois Central Railroad sold 1800 tons of scrap last week and other offers include 2700 tons from the Michigan Central, 2900 tons from the Great Northern and 500 tons from the Chicago & Alton. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	$18.50 to $19.00
Relaying rails	19.50 to 20.50
Old carwheels	12.00 to 12.25
Old steel rails, rerolling	15.25 to 15.50
Old steel rails, less than 3 ft.	15.00 to 15.25
Heavy melting steel scrap	14.25 to 14.50
Frogs, switching and guards, cut apart	14.25 to 14.50
Shoveling steel	13.75 to 14.25
Steel axle turnings	9.25 to 9.75

Per Net Ton

Iron angles and splice bars	$18.25 to $18.75
Iron arch bars and transoms	19.50 to 20.00
Steel angle bars	13.50 to 14.00
Iron car axles	25.50 to 26.25
Steel car axles	25.75 to 26.25
No. 1 railroad wrought	15.00 to 15.50
No. 2 railroad wrought	14.00 to 14.25
Cut forge	14.00 to 14.25
Pipes and flues	10.75 to 11.00
No. 1 busheling	12.00 to 12.50
No. 2 busheling	8.50 to 9.00
Steel knuckles and couplers	13.50 to 14.00
Steel springs	14.00 to 14.50
No. 1 boilers, cut to sheets and rings	9.25 to 9.75
Boiler punchings	13.50 to 14.00
Locomotive tires, smooth	20.00 to 20.50
Machine shop turnings	5.50 to 6.00
Cast borings	5.75 to 6.25
No. 1 cast scrap	11.50 to 12.00
Stove plate and light cast scrap	9.25 to 9.75
Grate bars	10.00 to 10.25
Brake shoes	9.75 to 10.25
Railroad malleable	11.75 to 12.25
Agricultural malleable	10.75 to 11.25

Cast Iron Pipe.—Pipe business continues very light, particularly from municipal sources. The American Cast Iron Pipe Company has taken 200 tons at Springfield, Ohio; James B. Clow & Son, a small order at Michigan City, Ind., and the leading interest 130 tons of special pipe at St. Louis. Specifications against contracts are fair and there is a scattering of railroad business. We quote as follows, per net ton, Chicago: Water pipe, 4-in., $33.50 to $34; 6-in. and larger, $30.50 to $31, with $1 extra for class A water pipe and gas pipe.

Philadelphia

PHILADELPHIA, PA., July 18, 1916.

In all lines, new business continues to show a tendency toward quiet, which might cause uneasiness were the makers not so well filled with orders. Most of them could use more labor were it obtainable. As matters are, several large producers of steel products are glad of the opportunity to shorten their deliveries, as they have steadily held that it is not wise to sell too far ahead. The prices of some steel products, notably those for structural shapes, are being disturbed by offerings under mill prices by jobbers. Export inquiry for plates continues heavy, but not all the mills will consider it. The export demand is greater for Bessemer and low-phosphorus pig iron. Export shipments of pig iron, combined with the great consumption here, are expected by producers to carry the market through the midsummer quiet. Old material is very dull, with embargoes still affecting some important points. Ferromanganese is arriving freely from Great Britain and is easier.

Pig Iron.—The one feature continues to be the export call for Bessemer and low-phosphorus. Of the latter, several thousand tons have been placed, including 2000 tons for Italy and 1000 tons for Canada. Domestic consumers have also taken about 4000 tons of this grade. Low phosphorus for export is quoted at $34 to $35, Philadelphia. Basic has been quiet since two eastern Pennsylvania steel companies took round lots at $19, delivered, a price on which sellers have commented with some disappointment. A lot of 500 tons was sold at the same price to a small interest near Chester, Pa., in the past week. Foundry iron inquiry and sales are limited to small lots needed to fill in or maintain mixtures, and of this sort of demand there is hardly enough to establish a market. The trade is still basing its hope for the future on the heavy production of steel, which may help foundry iron producers indirectly, as some capacity is being turned from the production of foundry grades to Bessemer. Meanwhile, the larger producers of foundry iron are well sold beyond the present quarter. Quotations for standard brands, delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa., No. 2 X foundry	$19.75 to $20.25
Eastern Pa., No. 2 plain	19.50 to 20.00
Virginia, No. 2 X foundry	21.25
Virginia, No. 2 plain	20.75
Gray forge	18.00 to 19.00
Basic	19.00 to 19.50
Standard low phosphorus	33.00 to 34.00

Ferroalloys.—Except for two or three small inquiries, the market is inactive, with both foreign and domestic 80 per cent ferromanganese quoted at $175, seaboard, prompt delivery. Promp spiegeleisen is obtainable at $50, furnace. In the week ended July 15, arrivals of English ferromanganese at this port aggregated 1129 tons. Recent arrivals have been liberal in quantity. Another arrival of the week consisted of 500 lb. of ferrotantalum from England. Contract ferrosilicon, 50 per cent, is unchanged at $83 to $85, Pittsburgh, and 11 per cent at $35.44.

Iron Ore.—In the week ended July 15 the arrival of 11,324 tons from Sweden was reported.

Plates.—Export inquiries are more numerous, but some makers take the stand that their first duty is to care for domestic consumers, and they are not selling for export. Plates are wanted for export to England, Italy, China and Japan, mostly for shipbuilding. Quo-

tations continue to range from 3.659c. to 4.159c., Philadelphia. To a limited degree fairly prompt shipments can be made, even at the lower price, though the sizes are restricted. The mills quoting the higher price stipulated that deliveries must be at their convenience, or in about five to seven months. For 1917 delivery one maker quotes 3.25c., Pittsburgh, or 3.409c., Philadelphia.

Bars.—Bessemer steel bars can be had at 2.659c., Philadelphia, delivery in two or three months, and more promptly in some cases. A mill that will sell Bessemer stock at this price quotes 3.409c., Philadelphia, and over for open-hearth bars. Iron bars are unchanged at 2.659c., Philadelphia, with a continued good demand

Structural Material.—The market is admitted on all sides to be quiet so far as new business goes. Since July 1, when consumers' contracts became effective at higher prices, a disinclination to specify has become apparent while a further feature is the extent to which certain jobbers are underselling the mills, offering material which was contracted for at considerably lower levels than now prevail. Ordinarily this situation would be read to mean a weaker market, but mills are understood to be maintaining prices. An eastern Pennsylvania maker quotes 3.159c., Philadelphia, for the most part, though on large business it would accept 2.909c. Another maker has named the latter price on Bessemer shapes, but asks up to 3.659c. for open-hearth material, delivery in 30 to 60 days. Threatened labor trouble in this district has been at least partly adjusted. Some small lots of shapes required by a Canadian shipyard have been offered to mills unsuccessfully, partly because of the prompt delivery required, also because they must conform with Lloyd's specifications. These require the presence of an inspector when the shapes are rolled. The Eastern Steel Company will supply 300 tons for the construction of a building for the Carpenter Steel Company, Reading, Pa.

Billets.—The demand is good, in that contracts are being freely specified against, while considerable new inquiry is before the makers. The quotation for open-hearth rerolling billets is at about $45, and that for forging steel about $65.

Sheets.—For No. 10 blue annealed sheets, 3.659c., Philadelphia, is quoted for third quarter delivery, but this price is susceptible of shading on contracts.

Coke.—The market is quiet, and the producers are looking for business. Spot furnace is quoted at about $3.75 per net ton at furnace, and contract at $2.50, with a probability that lower than the latter price might be done. Spot and contract foundry both range from $3.25 to $3.50 per net ton at oven. Freight rates from the principal producing districts follow: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Old Material.—The only activity reported is in steel axles for export. The railroad freight embargoes are still effective at Burnham and Coatesville, Pa., but are expected to be lifted at the latter place very soon. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania, and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$15.00 to $15.50
Old steel rails, rerolling	1[illegible] to 18.00
Low phos. heavy melting steel scrap	[illegible] to 21.50
[illegible]	[illegible] to 27.00
[illegible]	[illegible] to 29.00
Old iron rails	20.00 to 20.50
[illegible]	1[illegible] to 15.50
[illegible]	[illegible] to 20.00
[illegible]	1[illegible] to 13.00
[illegible]	[illegible] to 13.50
Bundled sheets	13.00 to 13.50
[illegible]	[illegible] to 11.00
[illegible]	[illegible] to 9.00
[illegible]	[illegible] to 10.50
[illegible]	[illegible] to 16.50
[illegible]	[illegible] to [illegible]
[illegible]	[illegible] to 12.25
[illegible]	[illegible] to 14.00

The Carnegie Steel Company is to use pulverized coal in connection with open-hearth furnaces. It has placed an order for 17 pulverizing mills with the Raymond Brothers Impact Pulverizer Company, Chicago.

Cleveland

CLEVELAND, OHIO, July 18, 1916.

Iron Ore.—Reports from the Mesaba Range indicate a further improvement in the strike situation. Several of the underground mines have resumed operations. Various estimates are made of the number of men who have left the district since the strike started, and it is evident that even if all who have remained in the district return to work there will be a labor shortage during the remainder of the season. Shipments continue heavy, being affected little by the strike. We quote ore prices as follows, delivered lower lake ports: Old-range Bessemer, $4.45; Mesaba Bessemer, $4.20; old-range non-Bessemer, $3.70; Mesaba non-Bessemer, $3.55.

Pig Iron.—The market is unusually dull. A northern Ohio consumer has taken 500 tons of foundry iron from a Cleveland furnace at $18.50 for No. 2, for last half, and a few sales in smaller lots are reported. Few foundries are being operated at full capacity because of the scarcity of labor, and most consumers are under contract for their full requirements for the remainder of the year. A few small-lot sales of Southern foundry iron are reported for third and fourth quarter delivery at $14, Birmingham, for No. 2. Some of the furnaces are asking $14.50 for this delivery. The quotation for the first half is unchanged at $14.50 to $15. We quote, delivered Cleveland, as follows:

Bessemer	$21.95
Basic	18.95
Northern No. 2 foundry	$18.70 to 18.80
Southern No. 2 foundry	18.00 to 18.50
Gray forge	18.50
Jackson County silvery, 8 per cent silicon	28.63 to 30.62
Standard low phos., Valley furnace	32.00

Coke.—Shipments are good, but there is little new demand. Deliveries of furnace coke, which has been scarce, are somewhat easier. We quote standard Connellsville foundry coke at $3 to $3.25, per net ton at oven, for prompt shipment, and $3.25 to $3.50 for contracts. Connellsville furnace coke is held at $2.75 for prompt shipment.

Bolts, Nuts and Rivets.—Bolt and nut specifications have fallen off somewhat this month, due probably to the heavy volume of orders in June on expiring first-half contracts. Manufacturers' prices are firm, but there is some shading by jobbers for prompt delivery. Rivet specifications are fair, but not much new business is coming out, as consumers are mostly under contract. We quote rivets at 4c., Pittsburgh, for structural and 4.10c. for boiler rivets. Bolt and nut discounts are as follows:

Common carriage bolts, ⅜ x 6 in., smaller or shorter, rolled thread, 50 and 10; cut thread, 50; larger or longer, [illegible] bolts with h. p. nuts, ⅜ x 4 in., smaller and shorter, rolled thread, 50, 10 and 5; cut thread, 50 and 5; [illegible] longer, 40 and 10; lag bolts, gimlet or cone point, 50 and 10; square h. p. nuts, blank or tapped, $2.90 off the list; hexagon, h. p. nuts, blank or tapped, $2.90 off; c. p. c. and t. sq. nuts, blank or tapped, $2.60; hexagon nuts, all sizes, $3 off; cold pressed semi-finished hexagon nuts, all sizes, 60 and 10.

Finished Iron and Steel.—New demand is slightly more active, both for early shipment and for future delivery. Considerable business is being placed in Bessemer steel bars for prompt shipment, orders during the week including one from an Ohio manufacturer for 2000 tons. Some last-half contracts for steel bars and structural material are being placed at 2.50c., Pittsburgh, and one independent mill has opened its books for the first quarter of next year at 2.50c. for steel bars and 2.90c. for plates. Although sales of considerable amounts of steel bars to the implement trade are reported at 2.35c., Pittsburgh, local mill agencies have not been authorized to quote less than 2.50c. to this trade. There is considerable inquiry for billets and sheet bars for export, and some of the Ohio mills are trying to stock additional tonnage of sheet bars for third quarter, but the supply is quite limited. The structural situation is very quiet. There is a great deal of inquiry for contract rods, wire and nails. Bar iron is unchanged at 2.50c., Cleveland. Inquiry for sheets for third and fourth quarter is heavy, and considerable business is being placed for black and blue annealed sheets in the

heavier gages. Prices on galvanized sheets are slightly easier. We quote black sheets at 2.90c. to 3c., Ohio mill, for No. 28; blue annealed at 3c. to 3.10c. for No. 10; galvanized at 4.35c. to 4.40c. for No. 28. The volume of warehouse business, which has been quiet for several weeks, has again become heavy. We quote warehouse prices at 3.25c. for steel bars and structural material, 3.65c. for plates and 3.20c. for iron bars.

Old Material.—Sentiment has improved and a fair volume of business is being placed for steel-making scrap. Other grades are quiet, although there is a better demand for cast scrap, which has been inactive for some time. Dealers generally are not inclined to sell much material for future delivery at present prices. Slightly higher prices are being quoted for heavy melting steel, borings, busheling, car wheels and grate bars. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton

Steel rails	$14.75 to $15.00
Iron rails	18.50 to 19.00
Steel car axles	28.00 to 29.00
Heavy melting steel	15.00 to 15.25
Carwheels	12.75 to 13.00
Relaying rails, 50 lb. and over	22.50
Agricultural malleable	12.50 to 12.75
Railroad malleable	14.00 to 14.25
Steel axle turnings	12.00 to 12.25
Light bundled sheet scrap	12.00 to 12.25

Per Net Ton

Iron car axles	$23.00 to $24.00
Cast borings	6.00 to 6.25
Iron and steel turnings and drillings	5.75 to 6.00
No. 1 busheling	11.75 to 12.00
No. 1 railroad wrought (nominal)	15.00 to 15.50
No. 1 cast	14.00 to 14.25
Railroad grate bars	10.00 to 10.50
Stove plate	10.00 to 10.25

Cincinnati

CINCINNATI, OHIO, July 19, 1916—(*By Telegraph*).

Pig Iron.—Circulated reports of large export sales have sentimentally helped the Southern market, but there are no changes in prices, and $14, Birmingham basis, can be done for this year's shipment on both resale and some furnace iron, but most makers are asking from $14.50 to $15, which also represent their quotations for the first half of 1917. A sale of 400 tons of Southern iron for July-August shipment was made in St. Louis territory, but business in this vicinity was confined to very small lots. Only a comparatively few consumers have neglected to close for this year's requirements, and at the present time they are indifferent as to contracting into next year. The Northern furnaces are holding foundry, malleable and basic, at $19, Ironton, for any shipment until July 1, 1917, but have lately closed no business of note at this quotation. Some complaint is noted of shipments of foundry iron being held up, which is attributed to the decreased consumption on account of labor shortage in the hot weather. A general inquiry is out for approximately 700 tons of Bessemer ferrosilicon for a West Virginia consumer. As a rule, sellers are not now trying to force the market, and have adopted the same waiting attitude assumed by buyers. Based on freight rates of $2.90 from Birmingham, and $1.26 from Ironton, we quote, f.o.b., Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft.	$17.40 to $18.40
Southern coke, No. 2 f'dry and 2 soft.	16.90 to 17.90
Southern coke, No. 3 foundry	16.40 to 17.40
Southern coke, No. 4 foundry	15.90 to 16.90
Southern gray forge	15.40 to 16.40
Ohio silvery, 8 per cent silicon	28.26 to 28.76
Southern Ohio coke, No. 1	20.76 to 21.26
Southern Ohio coke, No. 2	19.76 to 20.26
Southern Ohio coke, No. 3	19.26 to 19.76
Southern Ohio malleable Bessemer	19.76 to 20.26
Basic, Northern	19.76 to 20.26
Lake Superior charcoal	21.20 to 22.20
Standard Southern carwheel	24.90 to 25.40

(By Mail)

Finished Material.—Quotations on galvanized sheets are somewhat disturbed at the present time, due to fluctuations in prices on spelter. The near-by mills are only willing to take on business to fill customers' urgent requirements, and are not soliciting any large and long-time contracts. To-day's minimum quotation on No. 28 galvanized sheets is 4.50c., f.o.b., Cincinnati or Newport, Ky., and 2.90c. on No. 28 black sheets. The following are jobbers' prices, that have not been changed in the past three weeks: No. 10 blue annealed sheets at 3.50c.; steel bars and small structural shapes, 3.20c.; wire nails, $2.75 per keg base; barb wire, $3.60 per 100 lb.; plates, 3.50c.; smaller sizes machine bolts, 60 per cent off list; larger sizes, 40 and 10 and 5 per cent off list; hot presses square and hexagon nuts, 2.70c. off list; malleable washers, 5½c. per lb.; cast-iron washers, 3c. per lb.; and cold-rolled rounds, 10 per cent plus list. More business for hoops and bands could be obtained if shipments could be made to meet the wishes of consumers.

Coke.—Business is still very dull, and only a few contracts for foundry coke are being made in this territory. A small amount of furnace coke for domestic use is contracted for from time to time, but the total tonnage is hardly worthy of mention. The consumption of foundry coke has been cut down to some extent on account of the hot weather, although shipments have been going forward at about the usual rate. We quote Connellsville furnace coke around $2.25 to $2.50 per net ton at oven, with approximately 10c. a ton added for contract business. Foundry coke is unchanged at $3.25 to $3.75 in the Connellsville, Wise County, and Pocahontas fields, and New River foundry coke is held around $4 at oven.

Old Material.—Prices on all grades are still soft, and quotations from different dealers vary to a larger extent than for a long time, so that it is difficult to arrive at general averages. Cast borings and steel turnings still seem to be a drug on the market, and there are no staple buying or selling prices on these two grades. The following are dealers' prices to consumers, f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton

Bundled sheet scrap	$11.25 to $11.75
Old iron rails	15.50 to 16.00
Relaying rails, 50 lb. and up	21.00 to 21.50
Rerolling steel rails	14.50 to 15.00
Heavy melting steel scrap	14.00 to 14.50
Steel rails for melting	13.00 to 13.50

Per Net Ton

No. 1 railroad wrought	$13.25 to $13.75
Cast borings	4.75 to 5.25
Steel turnings	5.25 to 5.75
Railroad cast scrap	11.00 to 11.50
No. 1 machinery cast scrap	12.75 to 13.25
Burnt scrap	8.25 to 8.75
Iron axles	21.00 to 22.00
Locomotive tires (smooth inside)	19.50 to 20.00
Pipes and flues	9.50 to 10.00
Malleable and steel scrap	10.75 to 11.25
Railroad tank and sheet scrap	8.50 to 9.00

Buffalo

BUFFALO, N. Y., July 17, 1916.

Pig Iron.—The improvement in inquiry noted last week, and which appears to have been but temporary, has subsided. The bulk of the tonnage inquired for has evidently gone to furnaces outside of the Buffalo district more eager for orders. Buffalo interests are in a fairly strong position as regards sold-up conditions and orders, and are not inclined to reduce quotations to meet outside competition. We quote as follows for last half delivery, f.o.b. furnace, Buffalo:

No. 1 foundry	$19.00 to $19.25
No. 2 X foundry	18.50 to 19.00
No. 2 plain	18.00 to 18.75
No. 3 foundry	18.50 to 18.75
Gray forge	18.25 to 18.50
Malleable	18.50 to 19.00
Basic	19.00 to 20.00
Bessemer	21.00 to 22.00
Charcoal, regular brands and analysis	24.00 to 25.00

Finished Iron and Steel.—Aside from a few inquiries from Canadian agricultural implement makers, which have not yet taken definite shape, the market has been bare of interest, current orders being very light. There are no evidences in this market of concession prices for agricultural implement bars. Some large contract customers are making insistent endeavor to get in larger contracts on order books for next year, but mills are not willing to take on increased allotments on forward orders. Bids are soon to be taken for about 120 tons of reinforcing bars, and also for considerable structural steel for the Niagara Alkali Company's factory at Niagara Falls, N. Y. The John W. Cowper Company, Buffalo, has been awarded the general contract for the

erection of a new building for the Bank of Buffalo, 400 tons. The Buffalo Structural Steel Company has taken 250 tons for the foundry extension for the Pratt & Letchworth Company, Buffalo; 100 tons for plant extensions of the Excelsior Steel Ball Company, Buffalo, and 100 tons for the Delaware Avenue residence for Mrs. Seymour H. Knox.

Old Material.—The market continues to show practically as firm a tone as a week ago. The stiffening effect of the buying movement in heavy melting steel remains, but is not of sufficient force to change schedules. Generally, the list is somewhat firmer. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	$15.00 to $16.00
Low phosphorus steel	20.00 to 20.50
No. 1 railroad wrought scrap	17.25 to 17.75
No. 1 railroad cast machinery cast scrap	15.50 to 16.00
Steel axles	24.00 to 24.50
Iron axles	24.00 to 24.50
Carwheels	13.00 to 13.50
Railroad malleable	15.00 to 15.50
Machine shop turnings	6.25 to 6.75
Heavy axle turnings	12.00
Clean cast borings	7.25 to 7.75
Iron rails	18.00 to 18.50
Locomotive grate bars	11.00 to 12.00
Stove plate (net ton)	11.00 to 11.50
Wrought pipe	12.00 to 12.50
Bundled sheet scrap	11.50 to 12.00
No. 1 busheling	13.00 to 13.50
No. 2 busheling	11.00 to 11.50
Bundled tin scrap	16.00 to 17.50

St. Louis

ST. LOUIS, MO., July 17, 1916.

Pig Iron.—The only transaction of consequence during the week was 400 tons of No. 2 Southern, the price not being made public. Indications are that it was very close to $14 per ton. Furnace representatives, however, continue to hold their prices at the old figures, declining to recognize the quotations resulting from resale iron. The Mississippi Valley Iron Company's furnace has not been lighted because the ore, which is coming from the Mesaba range, is not moving forward in sufficient quantities.

Old Material.—A better tone is noted, especially in steel products, which are firmer and in some cases higher. No large buying was reported, but enough was done to confirm the optimism of most sellers in holding for better figures than have been prevailing. Lists out during the week included: Chicago & Alton, 500 tons; Great Northern, 3000 tons; St. Joseph & Grand Island, 2000 tons; Vandalia, 1000 tons. Relayers continue very firm, particularly light rails, and hard to get. We quote dealers' prices, f.o.b., customers' works, St. Louis industrial district, as follows:

Per Gross Ton	
Old iron rails	$17.75 to $18.25
Old steel rails, rerolling	17.75 to 18.50
Old steel rails, less than 3 ft.	16.00 to 16.25
Relaying rails, standard section, subject to inspection	22.00 to 23.00
Old carwheels	11.50 to 11.75
No. 1 railroad heavy melting steel scrap	14.25 to 14.50
Heavy shoveling steel	12.25 to 12.50
Frogs, switches and guards cut apart	14.25 to 14.50
Bundled sheet scrap	8.00 to 8.50
Per Net Ton	
Iron angle bars	$17.25 to $17.75
Steel angle bars	13.00 to 13.25
Iron car axles	22.00 to 22.50
Steel car axles	17.00 to 17.50
Wrought arch bars and transoms	18.00 to 19.00
No. 1 railroad wrought	14.00 to 14.50
No. 2 railroad wrought	13.75 to 14.25
Railroad springs	13.50 to 13.75
Steel couplers and knuckles	13.50 to 13.75
Locomotive tires, 42 in. and over, smooth inside	19.25 to 19.50
No. 1 dealers' forge	10.25 to 10.75
Cast iron borings	6.00 to 6.25
No. 1 busheling	11.50 to 12.00
No. 1 boilers cut to sheets and rings	8.75 to 8.90
No. 1 railroad cast scrap	10.75 to 11.00
Stove plate and light cast scrap	8.25 to 8.75
Railroad malleable	10.50 to 11.00
Agricultural malleable	9.50 to 10.00
Pipes and flues	5.25 to 10.00
Railroad sheet and tank scrap	9.00 to 9.50
Railroad grate bars	8.50 to 8.75
Machine shop turnings	6.75 to 7.25

Coke.—Aside from the closing of the annual contract for the needs of the St. Joe Lead Company's smelter, transactions in coke were on small lots, establishing no market quotation. The contract of the St. Joe company aggregated something in excess of 30,000 tons and was all for by-product coke, part going to the local gas company and part to outside by-product plants, including the plant under construction at Terre Haute, Ind., which will begin delivery about Oct. 1. The price was withheld.

Finished Iron and Steel.—Some strengthening of specifications is noted, but no new business of consequence has appeared, though the aggregate of new orders was quite satisfactory. Movement out of warehouse continues very active and the only price change of consequence is that on galvanized plates caused by the easier spelter market. We quote for stock out of warehouse as follows: Soft steel bars, 3.15c.; iron bars, 3.05c. to 3.10c.; structural material, 3.15c.; tank plates, 3.55c.; No. 10 blue annealed sheets, 3.45c.; No. 28 black sheets, cold rolled, one pass, 3.20c. to 3.30c.; No. 28 galvanized sheets, black sheet gage, 5c. to 5.10c.

Birmingham

BIRMINGHAM, ALA., July 17, 1916.

Pig Iron.—The market is still without a price basis. There have been inquiries for lots of from 250 tons up to 2000 tons, but quotations, which the makers say have been on a basis of $15 furnace, appear to have failed to get business. Consumers have not offered, for large tonnages, under $15. In fact, there have been no firm offers at any figure. Resale metal having had its day, the confusing of warrant prices with those of f. o. b. furnaces will probably cease. Bookings have been for small lots and $15, furnace, is still obtained, but $14.50 could be done on a large tonnage. Makers are inclined to believe that active buying is several weeks off. Prompt shipment remains the custom rather than otherwise. The iron is going out as ordered, but large consumers in several instances still have stocks of metal purchased months ago and some of that bought at low prices has not yet been used up. The output for July will be considerably curtailed owing to trouble with furnaces, mines and quarries incident to the unexampled rainfall from July 5 to 11. During the past week there was a movement of 8000 tons of spot iron for export out of the ports of Charleston, Savannah and New Orleans, delivery being principally in the Mediterranean. Ocean freight rates, lower than they have been, were obtained and that they were secured in three different ports at the same time has served to encourage prospect of further export business. The last open ocean rate quotation was $27 per ton. Yard stocks have increased only 25,000 tons since March 1, although manufacture has been steadily breaking records by 40 per cent. That only 6000 tons additional went to the yards during June is taken as indication that the consumer needs the metal. We quote per gross ton, f. o. b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	$15.00 to $15.50
No. 2 foundry and soft	14.50 to 15.00
No. 3 foundry	14.00 to 14.50
No. 4 foundry	13.75 to 14.25
Gray forge	13.50 to 14.00
Basic	14.50 to 15.00
Charcoal	22.00 to 22.50

Cast-Iron Pipe.—Several export inquiries are under consideration by the Birmingham water pipe manufacturers and they expect to get the orders. New business in small lots both from the south and the middle west has aggregated a good volume. The disposition to go slowly in contracting for forward delivery is still manifested by municipalities. Prices are unchanged, and we quote per net ton, f. o. b. pipe shop yards, as follows: 4-in., $28; 6-in. and upwards, $25 with $1 added for gas pipe and 16-ft. lengths.

Coal and Coke.—Standard foundry coke is scarce. Makers could sell more if they had it. The price is strong at $4.25 to $4.50 per ton. Furnace coke rules at $3.25 to $3.50. Independent coal mines have experienced a recent demand from furnace companies, whose mines were flooded. The Republic Iron & Steel Company was forced to close down at Palos on account of high water and to get coal elsewhere. On the other hand, the independent mines were for the most part

equal sufferers. Prices obtained on recent contracts rule higher than last year, when they were remarkably low. It will take some time to recover from the effects of high water.

Old Material.—Belief that prices will not go lower has been strengthened by the firmness of recent quotations. They are low, but they now appear to mark the bottom, and indications point to an early tendency to improvement. Consumers' stocks are working lower. We quote per gross ton, f. o. b. Birmingham dealers' yards, as follows:

Old steel axles	$22.00 to $23.00
Old steel rails	10.00 to 10.50
No. 1 steel scrap	9.25 to 9.75
No. 1 wrought scrap	12.50 to 13.00
No. 1 cast scrap	10.50 to 11.00
Extra heavy cast scrap	9.50 to 10.00
Stove plate and light	9.00 to 9.50
Old carwheels	9.50 to 10.00
Tram carwheels	9.50 to 10.00

San Francisco

SAN FRANCISCO, CAL., July 11, 1916.

The local trade remains quiet as regards new business. The tonnage moving on old contracts is still heavy, and specifications show little if any decrease. While the complaint of shortage of supplies is less general, material available for early delivery is apparently about as firm as ever, and prices from store are fully maintained. Routine requirements in some quarters are hardly up to expectations, but the general distributive movement is satisfactory, while the demand for special purposes is well maintained. Labor disturbances cause some apprehension, as the waterfront strike is as bad as ever, some of the automobile machinists are still out, and the structural iron workers went out this week, demanding an 8-hr. day.

Bars.—Reinforced-concrete is being used for building more extensively than usual, and a number of substantial orders for reinforcing bars have been placed in the last few weeks, a good share going to local mills, and conditions apparently favor an increase. The general country and coastwise trade is slow, but mining interests are constantly in the market, and liberal specifications continue to come from many manufacturers, most of whom have contracts extending for several months in the future. The jobbing price on small lots is 4c., and mills quote 3.50c. for prompt, or 3c. for extended delivery in large lots to the trade.

Structural Material.—Up to this week local shops have been very busy, and they still have a substantial tonnage on their books, but the labor situation causes some uncertainty. New business has been coming out more freely lately, and builders in many cases seem less disposed to hold off, although some plans have been changed to reinforced concrete. Recent lettings include several factory jobs of some importance; and the largest job now being figured is the Portland, Ore., post office, about 2000 tons. A large bridge in Sonoma County, Cal., is also up. A general contract has been let for a nine-story bank at Stockton, Cal. Plans are expected shortly for a number of State buildings at various points.

Plates.—Shipbuilding firms in this district are apparently unable to take any more steel ship contracts for some time to come. Most of the work in hand is covered by contracts, on which deliveries are coming in fairly well, though there is still occasional buying from store to cover shortages. Important tank and pipe inquiries continue to appear. The Lindsay-Stratamore irrigation system has just taken figures on a lot of riveted pipe. The general demand from small shops is fairly active, but current arrivals cover routine needs fairly well. The local jobbing price on small lots is steadily held at 4.75c.

Sheets.—Buying of galvanized sheets has been very conservative, and the present easiness tends to augment the feeling of caution. The consuming demand is light in most lines, though there is a fair movement for special purposes. Black sheets are quiet, though less so than might be expected at this season. The movement of blue annealed on contracts continues heavy, and there is some new inquiry, with few mill agents in a position to take additional business.

Wrought Pipe.—Bookings by mill representatives in the last few weeks have been disappointing, especially in the oil fields, where the new development from which much was expected is found to be limited to a few large companies. In merchant pipe, jobbing stocks are not yet moving out as rapidly as could be wished and little replenishment is required.

Cast-Iron Pipe.—With prospects of a $2 per ton advance in freight Sept. 1, and nothing to indicate a recession of foundry prices, many consumers are disposed to anticipate requirements, and small orders are quite numerous. No new important municipal inquiries have appeared in the last fortnight, however, and no great tonnage from such sources is in sight. The town of Lovelock, Nev., will shortly take alternate bids for a lot of cast-iron or steel pipe. Woodland, Cal., has sold a $71,000 bond issue for waterworks.

Pig Iron.—With liberal arrivals on old contracts, new business is rather quiet, either for prompt or extended shipment. Some additional contracting is expected before long, but the principal requirements are believed to be covered through the remainder of the year. The quantity melted continues unusually heavy. Most local agents are holding rather steadily to a quotation of $26 per gross ton for No. 1 Southern foundry iron.

Coke.—Current requirements are well covered by arrivals on old contracts, and little new business in foundry coke has been closed for some time. Prices show a wide range Offerings from some Southern points are available around $15 per net ton, while some buyers demand special brands of Virginia coke, which is held here at $17 to $17.50.

Ferroalloys.—Shipments of ferromanganese are coming through well, and supplies are ample for local needs. The price is easier, being quoted here at about $212. The output in California is increasing, but so far most of it is going East. Ferrosilicon has stiffened up again, being now held at $105 in carload lots, or $125 in smaller sales.

Old Material.—New business in steel melting scrap is somewhat less active than for some time past, as practically all the melters have bought a heavy tonnage, and this is now being shipped in as required. Prices for the various grades of steel scrap range from $8 to $12 per gross ton. Cast-iron scrap is moving freely, and while there is considerable available, values are fairly well maintained at $16 to $18 per net ton.

New York

NEW YORK, July 19, 1916.

Pig Iron.—The local market can be very briefly reviewed, for there has been little to it in the past week. Buyers seem to take the view that they will get lower prices by waiting. Meantime, the effect of foreign business is being closely watched by both producers and consumers. Southern resale iron apparently has been pretty well taken up. At some blast furnaces labor conditions seem to be slightly improved. Here and there a shortage of labor for loading cars has been reported. The New Haven Railroad inforced a pig-iron embargo in the week ending July 12, but shipments are now freely made. One Crane stack at Catasauqua, Pa., has gone out for relining. We quote at tidewater for early delivery: No. 1 foundry, $20.50 to $21; No. 2X, $19.75 to $20.25; No. 2 plain, $19.50 to $20; Southern iron at tidewater, $20 to $20.50 for No. 1 and $19.50 to $20 for No. 2 foundry and No. 2 soft.

Ferroalloys.—Specifications on contracts for ferromanganese are very strong and consumers are freely taking all that they can get. Deliveries from England are increasing with each month and those for June will probably exceed any previous month in two years when official data are all reported. One broker states that his principals in England cable him that 5000 tons are in transit or about to be shipped to this country. Inquiries are exceedingly scarce and new buying is at a low ebb, consumers being apparently well covered.

Standard ferromanganese can be obtained for any delivery now at $175, seaboard. A sale of 500 tons to Italy is noted and there are several inquiries from foreign consumers. Spiegeleisen is quiet at $50 to $55, furnace. Foreign inquiries total 1000 to 1200 tons. Ferrosilicon is strong at $90 to $100 for early delivery. A strike at the plant of the largest domestic producer is causing some anxiety among consumers, and inquiries are in the market from users whose shipments are thus cut off. Ferrosilicon, 10 to 12 per cent, is quoted at $28 to $30, furnace, and the demand is strong.

Structural Material.—Little hope is expressed that much of the numerous building projects in New York territory will be settled until plain material, and doubtless other building materials also, are lower in price. Such a contingency is not yet regarded as likely before the last weeks of the year. Then scarcity of orders with structural mills not attached to other steel rolling plants might, it is thought, result in concessions in price with fairly prompt delivery, but the general continued strength in both semi-finished and finished steel, it is believed, will act to prevent at that time any marked differences in price. Meanwhile aside from industrial plant extension work, not much is regarded as urgent except operations of speculative builders, who must keep the wheels of their organizations going. The floods in the South will of course demand bridge replacement of some magnitude in the aggregate. The fresh bridge offerings independent of this emergency work include 500 tons for three bridges for the Baltimore & Ohio; about 200 tons for the Boston & Maine and 500 tons for a highway over the Susquehanna. Among the new active jobs may be mentioned two apartment houses for the Edgar A. Levy Construction Company, one at Seventy-eighth Street and Park Avenue and the other at 140 West Fifty-eighth Street, and each involving 500 tons; 3000 to 4000 tons at Toledo for the La Salle-Koch department store; 600 tons for an addition to the Harrington Hotel, Washington, D. C.; 1200 tons for a storehouse for New York on Blackwell's Island; 600 tons for the Gilbert & Barker Mfg. Company, Springfield, Mass., and 1000 tons for the Sprague Electric Works at Watsessing, N. J. Bids have been taken for the general contract for the Fifty-ninth Street and East River section of the New York subway system, taking 1700 tons. Recent awards of buildings embrace the following: 300 tons for a Hearn apartment, Fifty-fifth Street near Sixth Avenue, to Levering & Garrigues Company; 450 tons for buildings for the Consolidated Rendering Company, Lowell, Mass., to the New England Structural Company, and 200 tons for the Amherst College library, and 1800 tons for a power house at Dayton, Ohio, both to the American Bridge Company. The bridge lettings include 250 tons for a highway bridge at Philadelphia to the McClintic-Marshall Company and 2300 tons for the Pennsylvania to the American Bridge Company, besides the 600 tons to that company for the subway connection to the station in New York and 1200 tons awarded to the Pennsylvania Steel Company. The Erie Railroad has let the contract for the 600-ton bridge over the Erie barge canal at Rochester, N. Y. Of the Midvale Steel Company's recent lettings it appears that the Eastern Steel Company will supply 1800 tons for the blacksmith shop and crane runway at Coatesville and the Cambria Steel Company 250 tons for furnace construction, while for the ordnance shops at Nicetown, the 3000 tons will be erected by the Levering & Garrigues Company. We quote mill shipments of plain material at 2.669c. to 2.919c. New York, and out of warehouse at 3.25c. to 3.30c., New York.

Plates and Bars.—Besides universal plates being easier than sheared plates, in point of price and delivery, the narrower plates are not so strong as the wide plates. Mills in a position to roll material for ships and boilers are overwhelmed with orders and inquiries, while other plate mills have occasionally sought business. The result is that for narrower widths 2.75c. to 3c., Pittsburgh, is obtainable in 3 months delivery, while for wide plates considerable new business, particularly for the railroads, is being placed without hesitation at 4c., Pittsburgh, for no better delivery. Export inquiry is large, even discounting the obvious duplication of offers, while boiler steel orders, especially when requiring a Lloyd specification, find few takers. One inquiry for 10,000 tons and another for 700 tons, both for Japan, are noted. In iron and steel bars few notable developments have occurred. One definite inquiry for a round tonnage of bars for Greece recognizes the American mill situation in agreeing to accept Bessemer steel. We quote mill shipments of steel plates at 2.919c. to 4.169c., New York, depending on width of plate as much as on delivery; steel bars at 2.669c. to 2.919c., the lower price for Bessemer product fairly promptly and for open-hearth steel at the convenience of the mill and little if any this year; bar iron at 2.669c., New York. Out of New York warehouse we quote iron and steel bars at 3.25c. to 3.30c. and plates at 4c. to 4.25c.

Cast-Iron Pipe.—On July 20 Atlantic City will receive bids for 1700 tons of 6, 8, 12 and 20-in. pipe, and on July 25 New York City will take bids on 120 tons of 6 and 8-in. pipe and fittings. The Standard Cast Iron Pipe Company was low on the 300 tons for Jersey City. Makers are catching up slightly on delivery dates on 4 and 6-in. pipe but competition is severe for the large sizes. Prices are unchanged and carload lots of 6-in., class B and heavier, are quoted as $30.50 per net ton, tidewater, class A and gas pipe taking an extra of $1 per ton.

Old Material.—The market is so dull that prices are not tested and many are largely nominal. Based mainly on offerings in the Pittsburgh district, borings and turnings have again been lowered. It is believed that scrap buying there of two weeks ago was greatly exaggerated and the contribution from local sources was hardly more than a few carloads. Brokers quote buying prices about as follows to local dealers and producers, per gross ton, New York:

Heavy melting steel scrap (eastern Pennsylvania specifications)	$11.75 to $12.25
Old steel rails (short lengths) or equivalent	12.75 to 13.25
Relaying rails	28.00 to 30.00
Rerolling rails	15.50 to 16.00
Iron car axles	26.00 to 27.00
Steel car axles (for domestic use)	28.50 to 29.00
Steel car axles (for export)	30.00 to 31.00
No. 1 railroad wrought	18.00 to 18.50
Wrought-iron track scrap	15.00 to 15.50
No. 1 yard wrought, long	14.50 to 15.00
No. 1 yard wrought, short	11.75 to 12.25
Light iron (nominal)	4.00
Cast borings (clean)	7.50
Machine shop turnings (nominal)	4.50 to 5.00
Mixed borings and turnings	4.50 to 5.00
Wrought pipe	10.00 to 10.50
Cast iron wheels (nominal)	15.00 to 15.50
Malleable cast (railroad)	12.25

Foundries are not yet buying and cast scrap is at a standstill. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

No. 1 cast (machinery)	$16.00
No. 1 cast (light)	15.00
Stove plate	12.00
Grate bars	12.00

British Steel Market

Rubio Ore Dearer—Maximum Prices on Steel Strictly Enforced

(By Cable.)

LONDON, ENGLAND, July 19, 1916.

Pig-iron bookings for France are freer. The tightness in hematic iron is still acute and Rubio ore is dearer, due to the Bilbao strike. Maximum prices for domestic semi-finished and finished steel are now strictly enforced. Tin plates are lifeless at 30s. to 31s. American billets are quoted at $63 to $61, c.i.f. Quotations, mostly nominal, are as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, [illegible] week ago.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £20, [illegible] last week.

Steel ship plates, Scotch, delivered local yards, £13 17s. 6d.

Steel rails, export, f.o.b. works port, £10 17s. 6d.

Hematite pig iron, f.o.b. Tees, about 140s.

Sheet bars (Welsh) delivered at works at Swansea Valley, £16 5s. 6d. against £14 10s. a week ago.

Steel bars, export, f.o.b. Clyde, £18, as compared with £18 5s. last week.

Ferromanganese [illegible] nominal.

Ferrosilicon 50 per cent., £[illegible].

The Ferromanganese Makers Well Sold Up—Maximum Prices Unchanged Yet

(By Mail)

LONDON, ENGLAND, July 4, 1916.—There is no sign of any relaxation in the stringent conditions. Contrary to expectations, no fresh official announcement has been made of any revision of maximum prices in spite of enhanced working costs, chiefly due to dearer fuel and further advances in wages. So far, attempts to impress upon the authorities the need for a general adjustment of the maxima have proved useless. The tightness will become more acute, although the authorities are undoubtedly doing the best they can to protect the progress of operations where relief is urgently needed.

The home trade price for Cleveland common foundry iron, recently raised to 87s. 6d., will probably remain in force for the last half. The demand continues brisk, but makers are not inclined to increase their bookings for delivery beyond September. Export quotations have ruled a little easier at 95s., but business is restricted by the few permits issued. Regular deliveries are being made to consumers engaged on war contracts. The number of furnaces in blast on the East Coast is 70, of which 28 are on Cleveland iron, 29 on hematite and 13 on special brands, while 5 additional furnaces should be operating by the end of July. The position of hematite is very tight, the export price remaining at about 140s. There has been a material falling off in the exports for June, due to the suspension of shipments to neutrals.

THE MANGANESE SITUATION

Owing to the ferromanganese combination being very fully sold up for all of this year, business has been quiet, although independent works have still a little to sell at prices ranging from £35 upward for loose basis, f.o.b. The tone, however, is firm, supplies of manganese ores being none too plentiful, though stocks at Bombay have been accumulating to some extent, owing to the scarcity of freight room.

Difficulty in securing semi-finished steel is as great as ever because requirements for munitions continue to swallow up most of the output. The shortage is causing considerable uneasiness among the tin-plate and black sheet mills, although the deliveries of American steel afford a little relief.

New business in finished steel has been very light with the turn of the half year, but the works are running full, chiefly on government orders. There is likely to be an extension of operations provided a better supply of raw material becomes available. A fair business has been done for some time past in shell discards at about £14 10s. for bars and angles and £15 net, f.o.b., for tees. Welsh sheet bars are still practically unobtainable. the nominal quotation being about £14 10s. delivered to local consumers.

The demand for tin plates is dull, the market being very erratic and weaker since merchants have shown some eagerness to realize profits, precipitating some competition on the part of some makers who are rather short of orders and pressing for specifications.

The Lumen Bearing Company, Buffalo, started its new electric furnace on the manufacture of Lumen metal July 14. The company has increased its pattern storage vault 50 per cent and erected a garage for its motor trucks. In September the molding capacity will be increased 50 per cent. The semi-annual sales meeting of the company was held at Buffalo July 17 and 18.

The Charleston Steel Company, Charleston, W. Va., expects to start one of its two Rennerfelt electric furnaces, which it states will have a capacity of 30 tons per day, about Sept. 15.

Iron and Industrial Stocks

Average prices for industrial stocks in the past week were somewhat lower than in the weeks preceding, munitions shares in particular showing weakness. There is increasing discussion in Wall Street of the extent to which the financial exhaustion of the belligerents will affect conditions in this country. The volume of transactions is little changed. The United States Steel stocks showed better resistance than some others, in view of the excellent showing expected from next week's statement. The range of prices on active iron and industrial stocks from Wednesday of last week to Monday of this week was as follows:

Allis-Chal., com.	19½ - 20¾	Int. Steel, com.	42 - 43¾
Allis-Chal., pref.	57½ - 59	Int. Steel, pref.	97
Am. Can, com.	47 - 48¾	Republic, com.	42 - 43¾
Am. Can, pref.	103½ - 104	Republic, pref.	103½ - 104
Am. Car & Fdy., com.	53¼ - 54¼	Sloss, com.	41 - 41½
Am. Car & Fdy., pref.	116	Tenn. Coal	153½ - 154¼
Am. Loco., com.	58 - 63	Tenn. Coal, pref.	97 - 97½
Am. Loco., pref.	99½ - 100	U. S. Steel, com.	83½ - 84
Am. Steel Fdries.	44½ - 46	U. S. Steel, pref.	113½ - 114
Bald. Loco., com.	69½ - 71¾	Westinghouse	59¾ - 61¾
Bald. Loco., pref.	104½	Am. Rad., com.	397
Beth. Steel, com.	413¾ - 470	Am. Ship, com.	40 - 41
Beth. Steel, pref.	127	Am. Ship, pref.	86½ - 87
Colorado Fuel	44½ - 45¾	Cleve. Pneu. Tool	66 - 68
Gen. Electric	163¼ - 165¾	Cambria Steel	52¾
Gt. No. Ore Cert.	34½ - 35¾	Lake Sup. Corp.	10¾ - 10⅞
Int. Harv. of N. J., com.	113 - 114¼	Warwick	61½
Int. Harv. Corp., pref.	106¼	Crucible Steel, com.	69¾ - 71⅝
Lackawanna Stl.	69 - 69¾	Crucible Steel, pref.	113 - 114¼
Nat. En. & Stm., com.	21½ - 23¼	Hoth Walk Refrac., com.	95
Nat. En. & Stm., pref.	97	Hoth Walk Refrac., pref.	102
N. Y. Air Brake	118 - 126¾	La Belle Iron, com.	51 - 51½
Pitts. Steel, pref.	97½	Carbon Stl. com.	70 - 72
Pressed Stl., com.	42½ - 45¼	Driggs-Seabury	100 - 105
Pressed Stl., pref.	99½	Midvale Steel	58¾ - 62

Dividends

The J. G. Brill Company, regular quarterly 1 per cent on the preferred stock, payable Aug. 1.

The Crocker-Wheeler Company, regular quarterly 1½ per cent on the common stock, and 1¾ per cent on the preferred stock, payable July 15.

The Dominion Steel Corporation, Ltd., regular quarterly 1½ per cent on the preferred stock, payable Aug. 1.

The Taylor-Wharton Iron & Steel Company, regular quarterly 1¾ per cent on the preferred stock, payable Aug. 1.

Weight of Steel Passenger Coaches

The relative weight of steel passenger coaches of some of the leading railroads is given as follows by the *Railway Age Gazette:*

Railroad	Weight of car, lb.	Seating capacity	Lb. per passenger	Mounted on
Pennsylvania	120,000	88	1,364	4-wheel truck
Boston & Maine	120,000	88	1,364	4-wheel truck
New York Central	142,000	84	1,690	6-wheel truck
Central Railroad of New Jersey	117,360	78	1,480	4-wheel truck
New York, New Haven & Hartford	124,000	88	1,480	6-wheel truck

There does not seem to be any car of recent design now in service, says this journal, which improves on the figures for dead weight given above for the Pennsylvania and Boston & Maine railroads.

The total value of the abrasive materials used in the United States increased about 22 per cent in 1915, as compared with 1914. There was an increase in domestic production of natural and artificial abrasives, but a decrease in imports. The value of natural abrasives produced increased about 33 per cent, and of artificial abrasives, about 32 per cent; imports decreased about 26 per cent.

The Baldwin Locomotive Works has just purchased a tract of 71 acres of land adjoining the company's present property at Eddystone, Pa., and extending north of it and partly into Ridley Township.

The plant of the Empire Rolling Mill Company, Cleveland, Ohio, was shut down July 13 as a result of the blowing up of the flywheel and will probably have to remain idle for about thirty days.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, effective from April 10, 1916, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c.; Pacific coast (by rail only), 65c.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 2.50c. to 2.75c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in. on one or both legs	.10
Angles, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive.	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive.	.50
Cutting to lengths under 1 ft.	1.75

No charge for cutting to lengths 3 ft. and over.

Plates.—Tank plates, ¼ in. thick, 6 in. up to 100 in. wide, 2.90c. to 4c., base, net cash, 30 days, or ½ of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras

	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers)	.10
Boiler and flange steel plates	.15
"A. B. M. A." and ordinary firebox steel plates	.20
Still bottom steel	.30
Locomotive firebox steel	.50

Marine steel, special extras and prices on application.

Gage Extras

Rectangular, ¼ in. thick, over 6 in. wide to 100 in. wide	Base
Lighter than ¼ in. to 3/16 in., up to 72 in. wide	.10
*Lighter than ¼ in., including 3/16 in., over 72 in. to 84	.20
*Lighter than ¼ in. including 3/16 in., over 84 in. to 96	.30
*Lighter than ¼ in. including 3/16 in. over 96 in. to 100	.40
*Lighter than ¼ in. including 3/16 in. over 100 in. to 102	.45
Lighter than 3/16 in., including No. 8, up to 72 in. wide	.15
*Lighter than 3/16 in., including No. 8, over 72 in. to 84	.25
*Lighter than 3/16 in., including No. 8, over 84 in. to 96	.35
Lighter than No. 8, including No. 10, up to 60 in. wide.	.30
Lighter than No. 8, including No. 10, over 60 in. to 64	.35

Up to 72 in., not less than 10.2 lb. per sq. ft. will be considered ¼ in.

Over 72 in. must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.

Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.

Over 72 in., ordered weight 3/16 in., take No. 8 price

Over 72 in., ordered weight No. 8, take No. 10 price.

Width Extras

Over 100 in. to 110 in. inclusive	.05
Over 110 in. to 115 in. inclusive	.10
Over 115 in. to 120 in. inclusive	.15
Over 120 in. to 125 in. inclusive	.25
Over 125 in. to 130 in. inclusive	.50
Over 130 in.	1.00

Length Extras

Universal plates 80 ft. long up to 90 ft. long	.05
Universal plates 90 ft. long up to 100 ft. long	.10
Universal plates 100 ft. long up to 110 ft. long	.20

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over	
Lengths under 3 ft. to 2 ft. inclusive	.25
Lengths under 2 ft. to 1 ft. inclusive	.50
Lengths under 1 ft.	1.55
Circles 3 ft. in diameter to 100 in.	.50
Circles over 100 to 110 in. (width extra)	.55
Circles over 110 to 115 in. (width extra)	.40
Circles over 115 to 120 in. (width extra)	.45
Circles over 120 to 125 in. (width extra)	.75
Circles over 125 to 130 in. (width extra)	.80
Circles over 130 in. (width extra)	1.30
Circles under 3 ft. to 2 ft. inclusive	.55
Circles under 2 ft. to 1 ft. inclusive	.85
Circles under 1 ft.	1.85
Half circles (see circle extras)	
Sketches, not over four straight cuts, inc. straight taper	.10
Sketches having more than four straight cuts	.20

Plates sheared to a radius take complete circle extras.

*Including extra for width.

Wire Rods.—Including chain rods, $55 to $60.

Wire Products.—Prices to jobbers effective May 1: Fence wire, Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, $2.45; galvanized, $3.15. Galvanized barb wire and staples, $3.35; painted, $2.65. Wire nails, $2.50 to $2.60. Galvanized nails, 1 in. and longer, $2 advance over base price; shorter than 1 in., $2.50 advance over base price. Cement-coated nails, $2.50. Woven wire fencing, 61½ per cent off list for carloads, 60½ off for 1000-rod lots. 59½ off for less than 1000-rod lots.

The following table gives the price per 100 lb. to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	6 to 9	10	11	12&12½	13	14	15	16
Annealed	$2.50	$2.55	$2.60	$2.65	$2.75	$2.85	$2.95	$3.05
Galvanized	3.20	3.25	3.30	3.35	3.45	3.55	4.00	4.10

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from April 21, 1916, all full weight pipe:

Butt Weld

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
⅛, ¼ and ⅜	63	30½	⅛ and ¼	52	19
½	67	46½	⅜	53	20
¾ to 2	70	50½	½	57	33
			¾ to 1½	60	38

Lap Weld

2	65	45½	1¼	48	26
2½ to 6	68	48½	1½	54	33
7 to 12	65	44½	2	55	34
13 and 14	53½	..	2½ to 4	57	37
15	51	..	4½ to 6	57	37
			7 to 12	56	36

Reamed and Drifted

1 to 3, butt	68	48½	¾ to 1½ butt	55	32
2, lap	66	43½	1¼, lap	43	20
2½ to 6, lap	66	46½	1½, lap	49	27
			2, lap	50	28
			2½ to 4, lap	52	31

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	59	35½	⅛, ¼ and ⅜	52	29
½	64	45½	½	57	38
¾ to 1½	68	49½	¾ to 1½	61	40
2 to 3	69	50½			

Lap Weld, extra strong, plain ends

2	63	44½	1¼	50	28
2½ to 4	66	47½	1½	55	34
4½ to 6	65	46½	2	57	37
7 to 8	61	40½	2½ to 4	59	40
9 to 12	56	35½	4½ to 6	58	39
			7 to 8	52	33
			9 to 12	47	28

Butt Weld, double extra strong, plain ends

¼	55	38½	½	44	26
⅜ to 1½	58	41½	¾ to 1½	47	29
2 to 2½	60	43½			

Lap Weld, double extra strong, plain ends

2	55	38½	1½	44	25
2½ to 4	55	40½	2	44	25
4½ to 6	56	39½	2½ to 4	46	30
7 to 8	51	30½	4½ to 6	45	29

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Sheets.—Makers' prices for mill shipments on sheets of U. S. standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Blue Annealed Sheets

	Cents per lb.
Nos. 3 to 8	2.95 to 3.20
Nos. 9 to 10	3.00 to 3.25
Nos. 11 and 12	3.05 to 3.30
Nos. 13 and 14	3.10 to 3.35
Nos. 15 and 16	3.20 to 3.45

Box Annealed Sheets, Cold Rolled

Nos. 17 to 21	2.70 to 2.80
Nos. 22 and 24	2.75 to 2.85
Nos. 25 and 26	2.80 to 2.90
No. 27	2.85 to 2.95
No. 28	2.90 to 3.00
No. 29	2.95 to 3.05
No. 30	3.15 to 3.25

Galvanized Sheets of Black Sheet Gage

Nos. 10 and 11	3.25 to 3.35
No. 12	3.35 to 3.45
Nos. 13 and 14	3.35 to 3.45
Nos. 15 and 16	3.45 to 3.55
Nos. 17 to 21	3.60 to 3.70
Nos. 22 and 24	3.70 to 3.80
Nos. 25 and 26	3.85 to 3.95
No. 27	4.10 to 4.20
No. 28	4.25 to 4.35
No. 29	4.40 to 4.50

Boiler Tubes.—Discounts on less than carloads, freight to destination added, effective from April 15, 1916, are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1¼ in.	35	1¼ in.	27
1½ and 2 in.	47	1½ and 2 in.	39
2¼ in.	44	2¼ in.	36
2½ and 2¾ in.	50	2½ and 2¾ in.	42
3 and 3½ in.	55	3 and 3½ in.	47
3¾ to 4½ in.	56	3¾ to 4½ in.	48
5 and 6 in.	49	5 and 6 in.	41
7 to 13 in.	46	7 to 13 in.	38

Locomotive and steamship special charcoal grades bring higher prices

1¾ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra

2 in. and larger, over 22 ft., 10 per cent net extra.

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin,	— Lead —		— Spelter —	
July	Lake	Electro-lytic	New York	New York	St Louis	New York	St Louis
12	25.75	25.50	38 62½	6.45	6.30	9.00	8.75
13	25.75	25.50	38.75	6.40	6.25	9.00	8.75
14	25.75	25.50	38.50	6.35	6.20	9.00	8.75
15	25.50	25.25		6.35	6.20	9.25	9.00
17	25.50	25.00	38.00	6.35	6.20	9.12½	8.87½
18	25.25	25.00	37.25	6.25	6.10	9.25	9.00

NEW YORK, July 19, 1916.

Copper continues dull, and nominal prices are lower. Tin is over 1c. lower, and consumers are beginning to show interest. Lead is quiet, and a further reduction by the leading interest is looked for. Spelter is a little firmer following buying by galvanizers. Antimony shows no life, and is lower.

New York

Copper.—Practically the only business in copper is in resale lots, which are offered at substantial concessions, but there is not much trading of this character. As a rule, consumers are indifferent to the market. Opinions differ as to how much prompt metal would be available should demand arise. On some sides it is said that there would be no difficulty in securing round lots at the bottom of the market, while others say comparatively little could be had. It is asserted that the producers are sold up to September, while it also is said that they have prompt metal to offer, and that, as a matter of fact, they are beginning to solicit orders. Electrolytic for July delivery can be had easily for 25c., cash, New York, and it is probable that this price can be shaded. For future delivery, second-hands are asking 23c. to 24c. The producers are asking around 26c. for July and August. Lake is quotable around 25.25c., cash, New York. Electrolytic at London is weak at £122, having declined £6 in a week. The exports this month, including yesterday, total 15,235 lb.

Tin.—In the past week there has been almost nothing doing, but the steady decline in price has aroused the interest of consumers and the trade would not be surprised if a moderate amount of activity ensued. Some quiet buying of small lots is reported. Yesterday there were a few sales for future delivery. The supply of Banca tin, which sells at less than Straits, is larger than usual, and more is on the way. The quotation for spot Straits yesterday was 37.25c. The arrivals this month total 1580 tons, and there is afloat 2109 tons. The London market is weak, with spot Straits standing yesterday at £164 10s.

Lead.—A few export sales comprise the activity in this metal. The domestic demand is light, and it is expected daily that the leading interest will lower its quotation of 6.50c., New York, and 6.42½c., St. Louis. Independent producers are asking 6.25c., New York, and 6.10c., St. Louis, but it is safe to assert that they are not getting many orders, even at these prices. Consumers are maintaining a waiting attitude. Influences tending to support the market are very few. One is a railroad strike in Spain, which may make it a little difficult for the warring powers to buy Spanish lead, in which event they may turn to this market. The exports this month, including yesterday, total 2046 tons.

Spelter.—With prompt spelter at 9c., New York; September around 8c., and October at 7.75c., prices which prevailed late last week, the galvanizing interests became active and a good tonnage for all positions was taken. The buying caused quotations to go up a few points, but they since have dropped to 9.25c., New York, and 9c., St. Louis. The London quotation for spot is stronger at £48. The deliveries this month, including yesterday, total 4407 tons.

Aluminum.—The market is unchanged at 58c. to 60c. for No. 1 virgin aluminum, 98 to 99 per cent pure.

Antimony.—Although one sale of a round lot to a munitions maker is reported, the market in general has continued sluggish and the spot quotation is lower at 14c., duty paid. Antimony in bond is quoted at from 11 to 11.50c.

Old Metals.—The market is still somewhat unsettled, with copper weak but zinc showing signs of strength. Dealers' selling prices are as follows:

	Cents per lb.
[illegible]	[illegible]

Chicago

JULY 17.—With the market generally sluggish, prices have been subject to concessions. Copper in this market has held better than elsewhere and sales have brought relatively higher prices. Lead has been sold by independent interests at substantial reductions. The spelter quotation is now a little above the low point. We quote: Casting copper, 24c. to 24.25c.; Lake copper, 26.50c.; tin, carloads, 38.50c., and small lots, 40.50c.; lead, 6.25c. to 6.45c.; spelter, 9c.; sheet zinc, 15c.; Cookson's antimony, 50c.; other grades, 16c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 17.75c.; copper bottoms, 15.75c.; copper clips, 16.75c.; red brass, 15.50c.; yellow brass, 11.50c.; lead pipe, 4.50c.; zinc, 5c.; pewter, No. 1, 27c.; tinfoil, 27c.; block tin pipe, 32c.

St. Louis

JULY 17.—Non-ferrous metals continue to ease off, particularly the Missouri products, lead and spelter. Quotations at the close to-day were as follows: Lead, 6.20c. to 6.30c.; spelter, 8.25c. to 8.75c.; tin, 41c.; Lake copper, 26c.; electrolytic copper, 25.75c.; Asiatic antimony, 16c. In the Joplin ore district prices declined still further, as a result of the slump in spelter, so that the basis price for 60 per cent zinc was from $50 to $70 per ton for zinc blende, with the average for the week $65. A number of mines shut down as a result of the lower prices, while an accident to one of the central electric power plants still further contracted production, so that the output was curtailed at least 1000 tons for the week. Calamine sold at $40 to $50, with the week's average $45. Lead ore brought $72.50, basis of 80 per cent metal, with the district average at $75, as a result of high assays developing premiums and also of higher prices early in the week. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 7.50c.; heavy yellow brass, 10.50c.; heavy red brass and light copper, 14.50c.; heavy copper and copper wire, 17c.; pewter, 25c.; tinfoil, 30c.; lead, 5c.; zinc, 4.50c.; tea lead, 3.50c.

The importance of developing a skeleton plan of an industrial establishment so that the proper arrangement of the various units can be worked out before the buildings themselves are designed is brought out in an article on "Skeletonizing an Industry" which appears in the initial number of *Development*, published by Day & Zimmermann, consulting and operating engineers and architects, 611 Chestnut Street, Philadelphia.

The Urschel Drop Forge Company, Bowling Green, Ohio, recently incorporated with a capital stock of $100,000, has elected P. H. Urschel, president and general manager; W. D. Rockwell, first vice-president; Alfred W. Place, second vice-president; B. C. Harding, treasurer, and Clyde V. Urschel, secretary.

The copper, brass, iron tank and machinery business of George F. Ott has been incorporated as the George F. Ott Company, 213 Buttonwood Street, Philadelphia. Mr. Ott is president and treasurer; John Limprun, vice-president and manager, and Otto Guessefeldt, secretary and superintendent.

The Newman-Andrew Company, American agent for the Toledo Steel Works, Sheffield, England, has removed from 107 West Street, New York, to new and larger offices at 26 Cortlandt Street.

OBITUARY

JAMES HOBART MOORE of Santa Barbara, Cal., brother of Judge W. H. Moore of New York, with whom he formed four great corporations in the steel trade, known as the Moore group, died at Lake Geneva, Wis., July 18. The Moore brothers were Chicago attorneys and their first exploit in corporation ownership was the control of the Diamond Match Company. An attempt to corner this company's stock led to a panic on the Chicago Stock Exchange. Later the Moore brothers made a fortune in the National Biscuit Company and with others obtained control of the Rock Island Railroad. In 1899 and 1900 they organized the American Tin Plate Company, the American Sheet Steel Company, the National Steel Company and the American Steel Hoop Company. All of these corporations afterward entered into the United States Steel Corporation.

FRANZ HANIEL died at Düsseldorf, Germany, in the last week of June, aged 74 years. He was one of the leading figures in the West German coal and iron industries, having been a director of the Gütehoffnungshütte, a partner in the engineering works of Haniel & Lueg of Düsseldorf, and the ship-owning firm, Franz Haniel & Co., of Ruhrort. He was also a member of the council of the Rhenish-Westphalian Coal Syndicate.

PERSONAL

Col. William C. Skinner, vice-president and chairman of the board of directors, was elected president of the Colt's Patent Fire Arms Mfg. Company, Hartford, Conn., at a meeting of the directors held July 13, succeeding Charles L. F. Robinson, who died suddenly two weeks ago. Lewis Sperry was elected a director to fill the place of Mr. Robinson.

Z. G. Simmons, president of the Simmons Company, Kenosha, Wis., producer of steel beds and springs, has been elected president of the recently organized Chamber of Commerce of Kenosha.

George Rhines, formerly general superintendent of Stanley G. Flagg & Co., at Stowe, Pa., and thereafter connected with the Allith-Prouty Company in Danville, Ill., was appointed secretary of that company on July 1.

Emile J. Bayle has resigned as production manager of the Aluminum Castings Company, Detroit, Mich.

J. H. Regan, assistant secretary and treasurer of the Pressed Steel Car Company, New York, who left this country for Petrograd early in June, 1915, and spent part of the time at Vladivostok, supervising the erection of the car assembling plant at that point, is expected back in the United States by July 28.

Henry M. Sonnenthal, and Frederick M. Sonnenthal, two of the directors of the Selson Engineering Company, Ltd., 78 Broad Street, New York, have changed their surname and will in the future be known as Henry M. Selson and Frederick M. Selson.

Earl McIntire, for several years civil engineer at the mills of the Republic Iron & Steel Company, Youngstown, Ohio, has resigned to take a similar position at Ojibway, Ontario, at the Steel Corporation's new operation.

A. F. S. Blackwood, lately vice-president of the Michigan Steel Castings Company and vice-president and general manager of the Monarch Steel Castings Company, has resigned from the latter to become president and general manager of the Blackwood Steel Foundry Company at Springfield, Ohio. The Blackwood company expects to be in full operation by the middle of August as the largest producer of small steel castings in the West.

Herman Nieter, formerly manager of the New York office of the Blaw Steel Construction Company, Pittsburgh, is now sales engineer of the American Spray Company, New York City.

William J. Sullivan, secretary to President Farrell of the United States Steel Corporation, has gone on an extended trip to Alaska.

Frederic Allart, of the New York sales office of Lukens Iron & Steel Company, is spending the month of July in England.

American Industrial Commission to France

An American Industrial Commission, composed of a dozen to twenty men of national reputation, is to go to France in August. Its object is, primarily, to make a technical investigation of present conditions in France looking to the reconstruction and reorganization of her communities and industries, which will take place now and after the war, and to determine the manner in which the United States may contribute, and to arrange for largely increased purchases of French products. The undertaking is based upon cordial proposals which came unsolicited to the American Manufacturers Export Association. Extraordinary facilities have been granted by the French government to aid the commission, and an account of the commission's visit will be published for general distribution under the authority of the association.

It is intended to include in the representation all the industries of the United States concerned in French trade under the following classifications:

I. Prime movers. (Steam, gas and oil engines; pumping engines, steam and hydraulic turbines, condensers, Generators and all other adjuncts.) Heavy machinery: (Rolling mills, iron and steel products, etc.)

II. Machine tools, wire, transmission and textile machinery.

III. Milling machinery. (Flour and saw mills, cement, mining, smelting, agricultural and road machinery.)

IV. Electrical apparatus.

V. Transportation: (Locomotives, cars, naval vessels, etc.)

VI. Importers: (Textiles, including laces; dry-goods of all kinds; porcelains, groceries and wines; toys.)

VII. Synthetic products based on chemical processes; chemicals, explosives, etc.

VIII. Bankers.

IX. Factory architects, engineers and contractors.

W. W. Nichols, Allis Chalmers Mfg. Company, is chairman of the commission, but its entire makeup is not yet settled, as difficulty is experienced in getting men of broad experience in their respective lines who find themselves free to go and who will lend dignity and standing to the enterprise and guarantee a result both conclusive and effective.

The itinerary, with transportation throughout France provided by the government, includes visits to the following cities: Bordeaux, Limoges, Aubusson, Le Mont-Dore, Clermont-Ferrand, Vichy, St. Etienne, St. Chamond, Lyon, Arles, Marseilles, Grenoble, Chambery, Aix-Les-Bains, Annecy, Chamonix, Evian, Nantua, Oyonnax, St. Claude, Morez, Malbuisson, Besançon, Montbeliard, and Belfort.

The Penn Seaboard Steel Corporation

The Penn Seaboard Steel Corporation is the name of a company, recently formed, resulting from the consolidation of the Seaboard Steel Casting Company of Chester, Pa., with the Penn Marine & Ordnance Castings Company, the latter being a consolidation of the Penn Steel Castings & Machine Company of Chester and the Baldt Steel Company of Newcastle, Del. The new corporation therefore has three large acid, open-hearth steel casting plants making all grades of steel castings. The main offices of the company are at 132 South Fifteenth Street, Philadelphia, and the officers of the corporation are Rodney Thayer, president; Walter S. Bickley, vice-president; C. F. Jemison, secretary, and Ivers S. Adams, treasurer. These, with the following persons, constitute the board of directors: H. D. Gibson, H. J. Fuller, J. E. Richards, E. Du Pont, F. W. Pritchett, L. L. Durham, A. L. Corey, H. F. Hansell, Jr., Charles Day, W. C. Sproul and E. E. Bennett.

Pittsburgh and Nearby Districts

The output of sheets in the sheet mills in the Youngstown, Ohio, district since July 1 has been reduced to some extent by the excessively hot weather, and also because of inventories under way at a number of the plants. Owing to the lower prices on galvanized sheets, due to the heavy decline in spelter, sheet manufacturers in the Youngstown district report a heavier demand for galvanized sheets, orders from the roofing trade being better than for some time.

Homer D. Williams, president of the Carnegie Steel Company, and Charles E. Dinkey, general superintendent of the Edgar Thomson steel works of the company, have taken an active interest in the advancement of the community welfare movement at Braddock and other mill towns in western Pennsylvania, and a series of educational motion pictures is being given this summer in Braddock and North Braddock, Pa.

The Youngstown Sheet & Tube Company, Youngstown, Ohio, will pay its puddlers for July and August $8.40 per ton, against $7.42 per ton, which was the rate in May and June. This company does not sign the Amalgamated scale, but pays the Amalgamated rate for puddling, or more.

At the bi-monthly examination of sales of sheets in May and June, held in Youngstown, Ohio, last week, it was found the average price of shipments of Nos. 26, 27 and 28 gage black sheets was 2.60c. The base of the wage scale is 2.15c. and the advance of 45c. over the base price entitles sheet mill hands working in mills that sign the Amalgamated scale to an advance of 13½ per cent in wages for July and August over May and June. In the tin-plate scale it was found that the average base price on shipments of tin plate in May and June was $3.90 per base box. The minimum of the scale is $3.50 per base box, and for each 5c. advance in the selling price per base box, there is an advance of 1 per cent in wages of tin-plate workers. The wage rate, therefore, for tin-plate workers in July and August will show an advance of 8 per cent over the rates paid for May and June. The mills directly affected by the bi-monthly examinations of sheet and tin-mill prices are as follows: Brier Hill Steel Company, Youngstown; Youngstown Iron & Steel Company, Youngstown; Trumbull Steel Company, Warren; Western Reserve Steel Company, Warren; De Forest Sheet & Tinplate Company, Niles, Ohio; Newport Rolling Mill Company, Newport, Ky.; National Enameling & Stamping Company, Granite City, Ill.; Follansbee Brothers Company, Follansbee, W. Va.; American Rolling Mill Company, Middletown, Ohio; Canton Sheet Steel Company, Canton, Ohio, and the Massillon Rolling Mill Company, Massillon, Ohio.

The blast furnace of the Struthers Furnace Company at Struthers, Ohio, will blow in this week on Bessemer iron. A new skip hoist has been added and other improvements made, and the furnace is expected to make from 400 to 450 tons of iron per day. It is said a contract for 10,000 tons of Bessemer iron for foreign shipment will be filled by the Struthers furnace.

At a meeting of stockholders of the Petroleum Iron Works Company, held at Sharon, Pa., on Friday, July 14, it was decided to increase the capital stock from $1,000,000 to $3,000,000. The additional capital of $2.000,000 will be used by the company in making extensions and adding new equipment. Definite plans have not yet been fully made. On Saturday, July 15, a meeting of stockholders of the Pennsylvania Tank Car Company, an identified interest of the Petroleum Iron Works Company, was also held; it was decided to increase the capital stock of this concern from $500,000 to $1,000,000 for additions to its plant.

It is stated that the 300,000 boxes of tin and terne plate, which have been advertised for sale extensively in the past two weeks by a machinery interest at Pittsburgh, is the proposed output of the Pittsburgh Sheet & Tin Plate Company, which, it is understood, has secured control of the plant of the Union Sheet & Tin Plate Company at Marietta, Ohio, and which was declared bankrupt in 1910. The plant was acquired by the Commonwealth Title Insurance & Trust Company, Philadelphia, as trustee for the bondholders, and was later sold to the Pittsburgh Sheet & Tin Plate Company. It is said the plant, which has long been inactive, may be started before long if the sale of the 300,000 boxes of tin and terne plate is consummated and satisfactory arrangements made for securing a supply of sheet bars.

The Milwaukee Gas Coal Company, Milwaukee, has recently purchased in Fayette County, W. Va., about 1000 acres of coal lands. The coal will be mined by a company known as the St. Clair Coal Mining Company. The property purchased was that of the St. Clair Colleries Company, and acquired by lease of the Mecca Collieries Company, the M. B. Coal & Coke Company and the Gordon Coal & Coke Company.

Persistent reports in Pittsburgh are that the United States Steel Corporation, through its subsidiary interest, the H. C. Frick Coke Company, will secure control before long of the Pittsburgh Coal Company.

The H. C. Frick Coke Company of Pittsburgh, Pa., has blown out about 250 coke ovens for operating reasons only.

Last week the United States Government sent inquiries to Pittsburgh for nearly 950,000 projectiles. The proposals for these will be received at the Bureau of Ordnance, Navy Department, Washington, D. C., J. Strauss, chief, until noon, Aug. 23, for supplying projectiles as follows: 9000 14-in. armor-piercing; 2800 14-in. Class B; 31,500 6-in. common; 185,600 5-in. common; 139,529 4-in. common; 300,000 3-in. common; 87,500 1-lb. anti-aircraft and 187,500 1-lb. common projectiles, a total of 943,429 projectiles.

The American Tar Products Company will make extensions to its plant on Crab Creek, Youngstown, Ohio, to consist of a 10,000-gal. tar still, condensers and coolers, as well as a small naphthalene plant. The company will also erect a new laboratory and wash room and lockers for employees. Proposed extensions will give a 40 per cent increase to the still capacity of the plant.

The Westinghouse Electric & Mfg. Company, East Pittsburgh, has started the sixth annual summer course in electrical engineering, which is open to college and high school instructors desirous of engaging in practical electrical work.

James H. Beans, Martins Ferry, W. Va., has taken bids for the construction of a foundry addition, 50 x 100 ft., to be erected to the north of its present plant and contain two lean-to wings, 30 x 100 ft. each. It will increase its melt from 15 to 35 tons. The improvements are estimated to cost $25,000.

The C. E. Carter Company, manufacturer of mechanical toys, Erie, Pa., has purchased a site and is erecting a two-story factory. It has orders for delivery into 1918.

The Wheeling Can Company is remodeling the factory in South Warwood, near Wheeling, W. Va., formerly occupied by the Packard Motor Truck Company, and is installing new machinery to make tin cans.

The Baltimore & Ohio has appropriated $500,000 for improvements and additions to its docks at Lorain, Ohio. A coal loading machine will be installed.

The Brier Hill Steel Company, Youngstown, Ohio, as a part of its welfare work, will erect a restaurant for the benefit of its employees. The new structure will be 30 x 75 ft. and will be erected as near as possible to the center of operations at its steel plant for the convenience of the men. Hot and cold drinks, according to the season, will be served at nominal cost.

National Tube Company's Gary Plant

Sites for the various buildings of the $25,000,000 plant of the National Tube Company, at Gary, Ind., are being laid out, and announcement of construction is expected to be made at an early date. It is understood that the company will build between 800 and 1000 houses to take care of its additional employees.

Seizure and Operation of Industrial Plants

The Provision Stricken from the Naval Bill—War Department Censor on the Mobilization of Europe's Industries for the War

WASHINGTON, D. C., July 18.—A sharp controversy has arisen in Congress over the proposition incorporated in the so-called National Defense Act of June 3, 1916, which empowers the President in time of war or when war is imminent to compel manufacturers to furnish war material at prices satisfactory to the Government and to give preference to such orders, and further authorizes the taking over by the Government of any plant the owners of which shall refuse to furnish material ordered by the Ordnance Bureau of the War Department. This extraordinary provision was adopted in spite of the opposition of a considerable number of the members of both Houses. It was not practicable to cause it to be stricken out on a point of order as new legislation, for the reason that the National Defense bill was not a budget measure, but in all its most important provisions was itself new legislation.

Notice has now been given by certain senators that the objectionable provision shall not be expanded through its incorporation in the pending naval and military appropriation bills and the presiding officer of the Senate has already sustained a point of order raised by Senator Borah of Idaho eliminating from the Naval bill a section which followed verbatim the so-called "seizure and operation" provision of the National Defense Act. As a result, the anomalous condition has developed that the President has the right to enforce by the most drastic means orders that may be placed by the War Department while he has no authority whatever as to similar orders given to manufacturers by the Navy Department. The Army appropriation bill has not yet been acted upon by the Senate, but if, as the result of the activity of Senator Borah and certain of his colleagues, it is provided therein, either directly or inferentially, that the appropriations carried by the measure shall not be available for the purchase of goods ordered in accordance with the provisions of the National Defense Act an exceedingly nice and highly important question of law will be raised with a strong probability that the courts will hold this feature of the Defense Act to have been repealed.

NAVAL SECRETARY'S "JUDICIAL" MIND

In moving to strike from the Naval bill the "seizure and operation" provision, Senator Borah said in part:

"I have no objection at all to the Government going into the manufacture of munitions of war, but to give the head of a department the right to go in at his own discretion and upon his own view as to what constitutes a right price and so forth, take possession and make people who disagree with him as to the value or price punishable by fine and the penitentiary is something that is so obnoxious to me that I would not consent to its going in, and I would not vote for the bill if it was in. I think there is a way to democratize preparedness just the same as there is to democratize government, and I do not think we should ape absolute or monarchical governments in the way of preparing ourselves. There is no necessity for those things. Does anybody suppose that if war actually existed in this country or was imminent the manufacturing establishments of the country would not give their plants over to the Government if they were unable themselves to operate them effectively, or that they would not put their plants at the service of the Government to the fullest capacity? If, on the other hand, war did exist and they should fail to aid the Government, we could pass a resolution or a bill here in an hour for the purpose of taking possession of them."

Senator Weeks of Massachusetts called the Senate's attention to the fact that the Secretary of the Navy is on record in the hearings before the House Committee on Naval Affairs as saying that he would not buy armor of the existing armor plate plants if they would furnish it for nothing and inquired whether the Senate would favor leaving to a secretary who made such a broad statement the important question as to what constitutes a "reasonable price." Senator Weeks also pointed out that if the secretary should determine that the present price was unreasonable he would be able to bring about the prosecution and fining of the armor manufacturers simply because they did not happen to agree with his views as to values.

Senator Borah's point of order was thereupon renewed by Senator Oliver of Pennsylvania and was sustained by the chairman, who stated that he was "clearly of the opinion that the amendment is not connected in any way with the rest of the bill."

HOW EUROPE MOBILIZED INDUSTRY

Notwithstanding the interesting and important questions raised by the action of the Senate, the War Department, through the newly created office of censor, has just promulgated an official statement for the information of manufacturers in which are incorporated the "seizure and operation" provisions of the Natioanl Defense Act, the text of which appeared in THE IRON AGE of May 25. With a view to emphasizing the necessity for the enactment and enforcement of these provisions, the censor gives the following summary of the industrial mobilization work of the European countries now at war:

The mobilization of industries has been undertaken in all the countries that are at present at war. Reports from abroad are incomplete on this subject, but all indicate that a more or less perfected scheme has been adopted in all countries. An enabling act is the first requisite, and the details of its exercise vary in each of the countries.

In Russia a committee was appointed to supervise the manufacture and supply of war munitions, making use of all civilian plants. The president of the duma, an ex-minister of commerce, and two prominent army officials were also made members of this committee for purposes of consultation in regard to technical matters.

In England the government control of all engineering industries was taken over under an act called the "mobilization of industry act." This was passed with ease and rapidity by the House of Commons. The original act provided for the taking over and control of any works where war munitions were being made. Later, the act was amended to include all industries that could be utilized if modified. Power to cancel existing contracts with private parties was also made a part of the law.

In France an act called the "Dalbiez act" was passed under which all commercial manufacturing plants used in whole or in part for making supplies for the army were taken over by the government. Originally all skilled workmen, heads of departments and superintendents were excused from military service. It was found that this exemption was abused, and a large number of men suitable for military services, but not absolutely necessary in the manufacturing plants, avoided military service.

The civilian superintendents of the works taken over report that they have no trouble with strikes or labor discords while under military control, for as soon as a workman by his act shows he is not necessary in the plant itself he is available to go to military service in the field, which acts as a deterrent against strikes.

In Italy all the larger automobile factories or garages have been taken over for the manufacture of war munitions.

Similar provisions have been made in Austria and Germany. In most of these countries this mobilization of industries is carried down to the smaller industries in minute detail. For example, in both Austria and France all the horses and wagons suitable for military service are listed, and the record is kept by area officers, so that the government at any time can ascertain how many horses and wagons are available, and their condition, in any stated district. There

is a price fixed by law at which owners shall be reimbursed for their teams and wagons used for military purposes.

In view of the action of the Senate on the Naval bill it is possible that the Senate Committee on Military Affairs will omit from the Army appropriation bill all references to the seizure and operation of plants, relying upon what has already been incorporated in the National Defense Act. If this course is followed much ingenuity will be required to be shown by the opponents of this drastic legislation to secure the insertion in the Army bill of a provision of some kind designed to repeal or modify the objectionable feature of the National Defense Act. W. L. C.

Equipment for Thirty-three Motor Truck Companies

The War Department at Washington has ordered 231 trucks from the Kelly-Springfield Motor Truck Company, Springfield, Ohio. Of these, 165 will be 3½-ton and 66 will be 1½-ton chassis. The order is for seven motor truck companies, all fully equipped, and each comprising 33 trucks. The Kelly-Springfield Company is not only furnishing the trucks complete, bodies and chassis, but agrees to recruit and train the members of the companies and turn fully prepared and organized motor truck units, or companies, of 33 trucks each, over to the Government. Each company consists of a truck master and three assistants, a chief mechanic and two assistants, forty-four drivers and two cooks.

The Packard Motor Car Company has received an order from the United States War Department for 198 additional Packard motor trucks, which order brings the total of this make of truck purchased by the Government since March 20 to 716 vehicles, representing an investment of more than $2,000,000. The War Department has invoked the aid of the new army bill, which became a law on June 3, 1916, and which provides that in an emergency such as the present one manufacturers must give precedence over all their other work to army orders. Shipments of truck trains, consisting of 33 vehicles each, are going forward as rapidly as possible. Outside cities are beginning to produce volunteers for the companies of drivers and mechanics to operate and care for the trucks in the army service.

New England Founders Meet at Athol

Members of the New England Foundrymen's Association to the number of 124 assembled in Athol, Mass., for their July meeting as the guests of the Athol Machine Company and the L. S. Starrett Company. Stephen E. French, president of the association, showed the visitors through the plant of the Athol Machine Company and served a bountiful lunch following the inspection of the foundry and machine shop. The members were then conveyed in automobiles to the plant of the L. S. Starrett Comany, where an inspection was made of the processes and machines used in the production of mechanics' fine tools. The party was then carried to the summer camp of Mr. French at "The Pines," where swimming, sports and a shore dinner kept everyone busy. The August meeting will be held in Providence, R. I.

Concessions for 24 years have been granted for the extraction of iron ore in the basin of the Yellow River in the Bent Horn (Krivoi Rog) District, Russia, near Zelionaya on the Kharkof-Nikolaief railroad. The land comprises 16,000 acres and the holders must guarantee to mine enough ore to make the annual rent amount to $3,000, on a royalty of $0.17 per net ton mined. Assays have shown very good deposits.

The 1-in. screw machine of the Pierce Machine Tool Company, 617 West Jackson Boulevard, Chicago, Ill., which was illustrated in THE IRON AGE of June 22, has an internal thread in the spindle, this arrangement, it is explained, tending to give the machine additional rigidity.

MORE MESABA MINES WORKING

Deeper Water Makes Shipment of 60,000,000 Tons of Ore Probable

DULUTH, MINN., July 19. (By Telegraph). Several more underground mines were opened on the Mesaba range this week and the working forces are being increased daily. The union seems to be in a bad way right now, as there are few leaders to keep the men in line and there are many desertions. Eight leaders are still in the Duluth jail, but it is reported that another set will soon be on the range to take their places. If this is true there will probably be further trouble. There was little excitement this week, with the exception of strikers being arrested for picketing and the placing of dynamite in a switch on one of the ore roads. This was discovered before any damage was done. Twenty men were arrested in one lot in Nashwauk for picketing and a small number were picked up at other places in the district.

It is estimated that the strike has cost over $2,000,000 to date, when the loss in wages to the men and the loss of the operators are figured, together with the cost to the county. There are now about 2000 men doing police duty in the strike zone, including the force employed by the mining companies and the cities, in addition to the Sheriff's force.

Ore is still going forward at a steady rate. Government officials announced this week that boats with a draft of 20 ft. 10 in. can now get down the lakes. This gives an increase of 11 in. and will mean that the average size freighter can carry about 800 tons more of iron ore per trip. This will increase the lake shipments for this month and as long as the water is high. It is now believed that over 60,000,000 tons can be handled during the season.

A few agitators have been at work on the Gogebic range and some of the other Michigan ranges, but they are unable to make any progress. Most of the miners throughout the Lake Superior district realize that they cannot hope to benefit themselves by affiliating with the I. W. W.

Taylor-Wharton Iron & Steel Company

In connection with an offer of $800,000 in five-year 5 per cent convertible gold bonds, President Knox Taylor of the Taylor-Wharton Iron & Steel Company, recently outlined the earnings record of the company. For the three years ended Dec. 31, 1915, the annual net earnings, after deducting expenses, including more than $750,000 charged for maintenance and depreciation, averaged over $250,000, and interest charges and sinking fund requirements have averaged less than $115,000. The earnings for the current fiscal year to June 1, 1916, charging regular depreciation and with increased allowance for maintenance, warrant, he says, an estimate of net earnings for the present year of over $400,000, and interest and sinking fund charges on all bonds, including the issue of convertible bonds, amount to less than $215,000.

The bond issue mentioned is to retire the temporary financing occasioned largely by the building of the new plant at Easton, Pa., and to provide additional working capital and funds for improvements to be made to the Philadelphia property of the company, which includes the Philadelphia Roll & Machine Company and the Tioga Steel & Iron Company. The new Easton plant has not yet contributed to earnings, as it is now only being equipped. Its cost is upward of $1,600,000 and when completed will represent an investment of approximately $2,000,000.

The L. C. Blancke Company, 10 Thomas Street, New York, recently incorporated with a capital stock of $100,000, has taken over the small-tool business formerly conducted by Boker & Co., Inc. It deals in high-speed and carbon tool steel, chisel and die steel, drills, etc. L. C. Blancke is president; A. J. Talley, secretary, and C. Ter Meer, treasurer.

STRIKES AND SETTLEMENTS

Machinists' Strike On at Milwaukee

MILWAUKEE, WIS., July 18. (*By Telegraph.*)—The long expected strike of organized machinists in the Milwaukee district began at 10 o'clock this morning, when 1000 to 1250 men walked out at the main works of the Allis-Chalmers Mfg. Commpany in West Allis, 190 at the Reliance works in Milwaukee and 287 at the Pawling & Harnischfeger crane works. There was no disorder. Wednesday morning men in at least two more big shops will be called out. The strike was originally scheduled for Monday morning, but owing to the intervention of Gov. E. L. Phillips, who used every effort to bring about arbitration, the initial walkout was delayed one day. The Metal Trades and Founders' Association has maintained a firm attitude, insisting that the July 1 reduction of the weekly work schedule was a reasonable concession and that it had nothing further to arbitrate. The machinists demanded an eight-hour day without reduction of the present nine-hour pay, but appear eager to arbitrate. The following statement was issued to-day from the Allis-Chalmers works: "The Allis-Chalmers Mfg. Company employs a total of 7000 men in Milwaukee County. Of these about 2400 are classed as machinists. Of these machinists approximately 1000 went out on strike Tuesday morning."

Sheet and Tin Plate Wage Advance

The American Sheet & Tin Plate Company, Pittsburgh, has granted an advance of about 13½ per cent in wages to employees of its sheet mills and about 8 per cent to employees of its tin plate mills, effective from July 1. These are the same wage advances granted recently in sheet and tin plate mills that signed the Amalgamated scale.

No Sympathetic Foundry Strike in Youngstown

Officials of the International Molders' Union in Youngstown, Ohio, deny the report that this organization will order its molders to go out on a sympathy strike with the machinists who have been on strike since May 1. They say that this organization has a contract with the foundry operators in the Youngstown district that continues until July 1, 1917, and that they intend to keep the contract.

The Mahoning Valley Employers' Association, Youngstown, Ohio, states that good progress is being made in securing machinists to work in the shops of the various concerns in the Youngstown district.

The machine shop of the Lloyd-Booth department of the United Engineering & Foundry Company at Youngstown, Ohio, is now operating at more than 50 per cent of capacity, the company having recently secured machinists from other cities and taking them to Youngstown to work in its shops. The William Tod Company, whose machinists have also been out on strike since May 1 for an 8-hr. day, is steadily increasing the number of machinists at work, and it is believed that in a short time the shops of both these concerns will be in full operation. Already a number of the old employees have returned to work, and others are expected.

Molders on Strike in Bridgeport

Trouble has broken out among the molders in Bridgeport, Conn., and more than 200 men are on strike at the foundries of the Coulter & McKenzie Company, the Joseph A. Taylor Company and the Automatic Machine Company. The demand is for a minimum wage of $3.75 per day. Present wages run from $3 to $5 a day and the shops are not unionized.

The night shift of laborers at the North Side plant of the H. B. Smith Company, Westfield, Mass., has struck for a wage of $2.50 in place of the present $2.25.

About forty employees of the Cowan Truck Company, Holyoke, Mass., have walked out after their demand for a 48-hr. week and 10 per cent increase in wages has been refused. Officials state that the pay of the machinists had been increased 16 per cent and the working schedule reduced 3 per cent within the past year and that conditions do not warrant further concessions at this time.

Meeting an Emergency at Steelton

A transportation feat of some magnitude was accomplished by officials of the Steelton plant of the Bethlehem Steel Company, July 17, when employees of the Harrisburg Railways Company suddenly went on a strike, badly crippling transportation facilities. With only a few hours' notice officials arranged with the Philadelphia & Reading Railroad to operate several special trains between Harrisburg and Steelton and a number of motor trucks were pressed into service to towns within a radius of eight miles. The haul between Harrisburg and the Steelton plant is about four miles and more than 6000 employees were brought to their places almost without exception on their regular time. Later an adequate schedule of trains was arranged to operate between the various towns until the strike ends.

Conditions in Toronto Munitions Plants

A detailed report of labor conditions in Toronto munitions plants has been submitted at a meeting of the Resources Committee held at the Parliament Buildings. The investigation confirms the opinion that there is a considerable shortage of labor, particularly tool makers and skilled mechanics, but an almost equal need is felt for general laborers. The shortage has given rise to many minor labor troubles and a constant shifting of men from one establishment to another, which lessens the production. The labor stringency is being met by training men and women and by definite attempts to secure labor from outside points. Every man who offers himself and is competent to work in these plants is being taken on. It was found that in plants visited approximately 200 women are at present employed and that this number will be more than doubled in the near future. Manufacturers state their willingness to pay women as much as men if they measure up in efficiency and general satisfaction.

Other Localities

Employees of the Eastern Steel Company, Pottsville, Pa., have demanded an increase in wages.

Employees of the McClintic-Marshall Company, Pottstown, Pa., after being out for nearly two months, have returned to work.

Having completed its orders for shrapnel shells, the J. L. Mott Company, Trenton, N. J., has closed down its munition plant and laid off a large number of men.

The structural steel employers of San Francisco and the Bay cities issued a statement July 10 covering the labor and industrial situation which has led them to refuse an 8-hr. day for the employees. They declare that they are now paying 35 per cent higher wages than Eastern competitors and that any further increase in operating expense will end in shutting down the plants here.

Sale of the Florence Iron Works

The Florence Iron Works, Florence, N. J., a cast-iron pipe interest of R. D. Wood & Co., has been sold at receivers' sale to Walter Wood of Philadelphia. The sale followed the decisions of the courts in the action brought by certain creditors, and it is stated realized only enough to insure a 50 per cent dividend. Mr. Wood, desiring that all creditors be paid, has made an offer to see that all who are willing to give him time to do so will have their claims paid in full. Under the receivership the Florence Iron Works property has been operated at a profit. The application for receivers was made on behalf of the company to conserve the property pending the settlement of an estate.

An inspection of the Wilmington Steel Company plant, Wilmington, Del. [formerly Diamond State Steel Works], was made on July 11 by William E. Corey, president of the Midvale Steel & Ordnance Company, A. C. Dinkey, vice-president of the company, and others.

Machinery Markets and News of the Works

INDIVIDUAL ORDERS SMALL

Standard Tools Are in Steady Demand

No Harmful Influence Yet Exerted by Resale Offerings—New York Firm to Build Small Arms Plant in Canada

New demand is nearer normal than it has been since the outbreak of the war, but there is a steady influx of orders for standard machine tools, though individually they are not large. It is notable that while comment is general on the offerings of second-hand tools, most of which have been used on munitions contracts, no actual injury to the trade in new machines is reported. At the same time, the existence in the market of much second-hand equipment makes dealers in both new and old tools incline toward caution in future commitments. On many types of tools, deliveries are still well off toward the end of the year.

The New York trade had a good week, although no large propositions are reported. In this market, munitions makers have made one or two purchases, as they have done elsewhere. It is announced that the Foreign Motors of America, Inc., will establish a factory within 100 miles of New York for the manufacture of an automobile formerly made in Belfast, Ireland.

Steel plants have placed several orders in Cleveland for heavy machines, but the market generally is quieter in that city.

Manufacturing plants in Cincinnati are busier than ever, and there is a good demand for standard tools. They are wanted quickly. Resale tools have not proved harmful. Similar conditions prevail in Milwaukee.

Chicago reports high building costs have not entirely caused a discontinuance of plant extensions or the building of new factories in that vicinity, all of which will require equipment.

In the Pacific Northwest, the shortage of ocean freight space is again becoming acute.

The Canadian Government will erect a small-arms plant at Lindsay, Ont., for which it has placed a contract with Westinghouse, Church, Kerr & Co., New York. It also is reported from Canada that the Imperial Munitions Board is negotiating with car builders in the Dominion for steel cars to be shipped to Russia, a move which is considered a step toward closer trade relations between Russia and Canada.

New York

NEW YORK, July 19, 1916.

The machine tool trade has enjoyed an active week, some very good orders having been placed, along with a large number of small ones, while a considerable amount of inquiry is still pending. Among the companies which have placed orders in the week are the Ashcroft Mfg. Company, New York, the New Departure Mfg. Company, Bristol, Conn., the Pennsylvania Railroad and Bartlett, Hayward & Co., Baltimore.

The Ashcroft Mfg. Company purchased 20 turret screw machines and is in the market for more. Bartlett, Hayward & Co. purchased 24 1-in. screw machines for their fuse de-

[illegible] of the larger turret lathes and of planers, boring mills, automatic screw machines and mill-[illegible] ... end of the year. ... [illegible] ... [illegible] ... about one year old.

... the [illegible] ... healthy one, prominent members of the trade are inclined to proceed conservatively in view of the many second offerings. It is a subject of comment that new purchasers have seized pretext, which, in their minds, justified them in refusing to accept deliveries. The same thing a few months ago would have ... to secure ... them, bearing minor defects or injuries received in transit, especially if it could be shown that the tool was perfect when it left the custody of the [illegible]. Cases of the kind have lately come to light.

The Foreign Motors of America, Inc., 80 Maiden Lane, New York, recently incorporated with a capital stock of $500,000 [illegible] manufactured by J. B. Ferguson, Ltd., Belfast, Ireland, which stopped its production there on account of war conditions. The English design will be considerably modified to meet American practice and it will be some six months before the company is in a position to begin manufacture. No factory has yet been decided on, but it will probably be located within 100 miles of New York City, and it is very likely that the company will erect its own plant. The company is not now ready to discuss machine tool needs and will not be for some time; but when ready will need considerable equipment. J. B. Ferguson, late managing director and principal stockholder of J. B. Ferguson, Ltd., Belfast, is president of the new company. W. H. Campbell, president of the Chas. Cummings Company, 80 Maiden Lane, is vice-president, and S. T. Perrin, of W. E. Perrin & Son, 73 Maiden Lane, is treasurer.

The Scientific Machine & Tool Corporation, 210 Canal Street, New York, recently incorporated with a capital stock of $5,000, has installed a new plant for the manufacture of special and labor-saving machinery, small tools, dies, etc. S. B. Beliaeff is president; F. Evertson is vice-president; G. A. Siff, secretary and C. Lewis, treasurer.

The Bound Brook Oil-less Bearing Company has taken over the Graphite Lubricating Company, manufacturer of bushings, bearings and washers, etc., Bound Brook, N. J. It has incorporated its former name in order to protect its business. G. O. Smalley is assistant general manager.

The Will & Baumer Company, candle maker, Syracuse, N. Y., plans an additional building, 75 x 175 ft., three stories, to cost about $200,000 with equipment.

The Hanson & Van Winkle Company, manufacturer of electroplating materials, Newark, N. J., is building a four-story brick addition, 45 x 49 ft., to increase the capacity of its department for the manufacture of polishing compositions. It will install a number of labor-saving devices in the department. R. D. Foster is vice-president.

The Westchester Machine Company has been incorporated with a capital stock of $10,000 by J. A. Bernstein, J. Peyser and J. Blank, and will take over the business of J. Peyser, machine designer, 448 Dunham Avenue, Mount Vernon, N. Y., doing a general machine-shop business, and also designing and building special machinery for sheet-metal, paper, wood, etc. It is in the market for a plain milling machine equal to a No. 2 Cincinnati. J. Blank is president and J. Peyser, secretary and treasurer.

The Buffalo Foundry & Machine Company, manufacturer of steam hammers, Buffalo, N. Y., decided on July 14 to delay construction of the proposed addition to its machine shop until next spring, and to go ahead with it at that time, if business remains as active as it is at present. The company cannot go ahead now, as it will interfere too much with its present operations. D. Bell is the company's engineer.

The plant of the Wilson Brothers Iron Works, [illegible] Grand Street, Hoboken, N. J., was damaged by fire recently, destroying its foundry.

The Peerless Tube Company, manufacturer of [illegible] tubes, which recently moved to Bath from New York [illegible]

[illegible] N. J., has dissolved its corporation in New York State and reincorporated in New Jersey. It retains its office at 1 Broadway, New York. George H. Neblinger is president.

The Duryea Mfg. Company, foot of Chapel Avenue, Jersey City, N. J., manufacturer of woven belting, boiler compound, etc., has purchased several parcels of land on which it will erect factory buildings aggregating 50,000 sq. ft. of floor space, which will increase its manufacturing capacity about [illegible] per cent. It is planned to have the additions ready for [illegible]ation May 1, 1917. The company has increased its capitalization from $100,000 to $500,000. B. L. Duryea is general manager.

The Goodman Machine & Tool Company, 50 Church Street, New York, has increased its capital stock from $10,000 to $25,000. It has obtained the manufacturing rights of the Scriven speed regulator for transmission work. The company requires no machinery at present, as its product is now being manufactured under contract. Louis Goodman is president and treasurer and Sigmund Muenz is secretary.

The plant of Weddingen & Meyer, manufacturers of farm implements, Throopsville, N. Y., recently badly damaged by fire, is to be rebuilt.

The Sintered Ore Company, Buffalo, is building an addition to its plant at the foot of Hamburg Street for a fan-room.

The Buffalo Metal Goods Company, Winchester and Northland avenues, Buffalo, N. Y., is taking bids for a two-story addition, 40 x 65 ft. W. F. Emerson is president.

A. A. Walrath & Son, machinists, Fort Plain, N. Y., have let contract for the construction of a two-story factory, 68 x 80 ft., to cost $20,000.

The Empire Products Company, 316 Carroll Street, Elmira, N. Y., has let contracts for a cold-storage building, 70 x 70 ft., three stories, to cost $25,000. T. W. Cleveland is president.

The New York Graphite Company, Niagara Falls, N. Y., has purchased a site of 20 acres, near the new electric power plant of the Buffalo General Electric Company on the Niagara River, just north of Buffalo, and will erect an extensive manufacturing plant.

The Reversible Trigger Lock Company, Gluck Building, Niagara Falls, N. Y., has let contract for a factory building, 50 x 100 ft., at Bath Street and Whirlpool Avenue. L. W. Bennett is manager.

The Coles Tools & Machine Company, Oneida, N. Y., will build a machine shop and garage, 60 x 140 ft., one story, to cost $16,000.

The General Electric Company, Schenectady, N. Y., will erect from private plans a one-story building for the manufacture of turbines, at an estimated cost of $60,000. C. G. Hulth is in charge of construction.

The C. A. Simons Machine Company, Albany, will erect a [illegible] and brick.

The Coles Tool & Machine Company, Cedar Street, Oneida, N. Y., is having plans drawn for a one-story machine shop and garage, 60 x 140 ft., estimated to cost $16,000. I. V. Van Buzor, Cazenovia, N. Y., architect, is taking bids.

The F. G. Schaefer Iron Works, Eighteenth Street and Hackensack Avenue, Weehawken, N. J., has established a structural steel shop consisting of a building 40 x 125 ft., on a site 200 x 400 ft., with railroad siding and adjacent to the docks. F. G. Schaefer, the proprietor, was formerly connected with the Hinkle Iron Company.

The report that the John A. Roebling's Sons Company, Trenton, N. J., has made plans for the rebuilding of its wire-rope shop, which was destroyed by fire in November, 1915, is incorrect. The company advises that it has not made any plans as yet.

The department of water supply, gas and electricity, Municipal Building, New York City, is having plans drawn for a three-story repair shop, tool shop and garage, 50 x 100 ft. William Williams is commissioner.

It is reported that bids are being asked for the construction of a six-story reinforced-concrete and stone factory building, 125 x 550 ft., to be erected at Watsessing Station, Bloomfield, N. J., for the Sprague Electrical Works of the General Electric Company.

J. G. White & Co., 43 Exchange Place, New York, are placing orders against an extensive list of machine tools for export for which they made inquiry some months ago.

Intimations are heard of contracts to be placed by the United States Government for shells in one case with an industrial company which may enlarge its facilities for the purpose.

Catalogs Wanted

The Scott Elevator Company, Getty Square, Yonkers, N. Y., has been incorporated with a capital stock of $1,000,000 to manufacture electric elevators. It plans to build a factory in Yonkers; but the construction will not be undertaken for several months. In the meantime it will be pleased to receive printed matter from those in position to design and equip factory buildings and from machine-tool manufacturers. Campbell Scott is president, Louis Spreckels, vice-president and Elmer E. Gorton, secretary and treasurer. Anson Baldwin, Charles P. Easton, Daniel M. Hopping and Dan C. Nolan, with the officers, compose the board of directors.

Philadelphia

PHILADELPHIA, PA., July 17, 1916.

An appropriation has been granted for the erection at the Frankford Arsenal, Philadelphia, of an ammunition factory to cost about $100,000, and for an extension to the fuse shop to cost about $123,300. Col. George Montgomery is the commanding officer.

A tank steamship will be launched at the plant of the Chester Shipbuilding Company, Chester, Pa., about the last of July. It is estimated that between Aug. 1, 1916, and Aug. 1, 1917, ten steamships, 375 ft. in length or over, will be constructed at the plant. The Chester and the Sun Shipbuilding companies have work for about 4000 men for the next two years.

In spite of the easier deliveries of machine tools, it is reported that the non-arrival of machinery is interfering with industrial development in Delaware County. The munitions factories in Eddystone have not received all their machinery, despite a year's effort in assembling thousands of machines. The Thurlow Steel Company, of Chester, on July 15, laid off 75 men of its day shift, and almost as many night workers, because of a lack of much-needed machinery. This is only temporary, for the company is booked with orders, the most notable of which is a sub-contract for machining shells for the French Government.

The property of the Philadelphia Electric Company, Philadelphia, is under appraisement to enable Drexel & Co. to finance its reorganization. Reports indicate plans to expand its facilities and the initiation of a progressive policy. While the new capitalization will not be known until after the Stone & Webster Engineering Corporation has submitted a report to Drexel & Co., it is rumored that the stock issue of $25,000,000 will be doubled, with a readjustment of existing mortgage obligations. In this way funds will be provided to [illegible] the efficiency of the plants by scrapping unnecessary units and constructing other plants.

The pattern storage building of the John E. Thropp's Sons Company, manufacturer of tire-making machinery, presses, etc., Trenton, N. J., was damaged by an incendiary fire July 7, with a loss of $2,500 to the building and $10,000 to the patterns.

Joseph Kopperman & Son, coppersmiths, 307 Florist Street, Philadelphia, have about completed plans for a two-story addition to their workshop, 57 x 95 ft., from plans by Frank E. Hahn, 1112 Chestnut Street.

The Hamilton Watch Company, Lancaster, Pa., has started the construction of a four-story addition, 52 x 153 ft., to cost about $50,000. Charles F. Miller is president.

The Coopersburg Casket Company, Coopersburg, Pa., is reported to contemplate the erection of an addition to its plant to cost about $10,000. W. L. Weirbach, South Bethlehem, Pa., is president.

The Salem & Penns Grove Traction Company, 378 Main Street, Pennsgrove, Pa., is awarding contracts for the construction of a one-story car shop and office, 32 x 127 ft., to be erected at Pennsville, N. J. Stern & Silverman, Land Title Building, Philadelphia, are the engineers.

Baltimore

BALTIMORE, MD., July 17, 1916.

The Ford Motor Company, Detroit, has leased the property of the Colonial Motor Company, 10 East North Avenue, Baltimore, and will probably build a new building for its local assembling plant.

Improvements to cost about $250,000 are being contemplated at the plant of the Scott Paper Company, foot of Market Street, Chester, Pa. They will consist of the installation of additional machinery, the construction of a new building, the erection of an addition to the heater house and the construction of a bulkhead.

It is understood the International Steel Treating Company has taken over the property formerly used by the Tidewater Soap Company, Darby, Pa., and will establish a plant.

The Colonial Glass Company, Petersburg, Va., has been organized with $100,000 capital stock. D. W. Jacobs, Petersburg, is a stockholder.

A one-story mill building, 38 x 58 ft., will be built by the Baltimore Tube Company, Wicomico and Ostend streets, Baltimore.

Announcement has been made that a company formed in Wilmington, Del., will shortly begin the manufacture of a heater to be installed in automobiles. The patents have been transferred to David Reyam, of Wilmington.

New England

BOSTON, MASS., July 17, 1916.

In order to gain room for quick expansion pending the completion of permanent buildings, the Maxim Silencer Company, Hartford, Conn., is housing its welding department in a large tent. The addition now under way will give 18,000 ft. of additional floor space and later another building will be erected where the tent now stands. The offices have been removed from the main factory to a remodeled dwelling house at 81 and 83 Homestead Avenue.

The Boston Woven Hose & Rubber Company, Cambridge, Mass., has awarded a contract for the erection of an addition, 85 x 322 ft., four stories.

The Salem Iron Foundry, Salem, Mass., has been incorporated with capital stock of $10,000. The directors are William S. McIntire, Salem, president and treasurer; P. F. Leonard and A. W. McIntire.

The American Brass Company, Waterbury, Conn., has awarded a contract for two additions to be erected on Washington Avenue, one 60 x 160 ft., the other 80 x 240 ft.

The Spray Engineering Company, Boston, Mass., has been incorporated with capital stock of $100,000 by Lee H. Parker, John T. Clark, Bertrand R. T. Collins, Eastwood P. Thompson, Frederick F. Foster.

The Standard Auto Horn Company, Somerville, Mass., has been incorporated with capital stock of $10,000 by E. Charles Prouet, Frederick W. Storack and Horace C. Hoskyns.

The Bantam Anti-Friction Company, Bantam, Conn., is having plans drawn by Fletcher-Thompson, Inc., Bridgeport, Conn., for an addition, 50 x 100 ft., two stories.

The Norton Company, Worcester, Mass., has awarded a contract for a service locker building, 40 x 118 ft., two stories.

The Remington Arms Union Metallic Cartridge Company, Bridgeport, Conn., has awarded a contract for an oil storage building, 40 x 64 ft., one story.

The Clark Brothers Bolt Company, Southington, Conn., has awarded a contract for an addition, 40 x 300 ft., one story.

The American Emery Wheel Works, Providence, R. I., is beginning the erection of a three-story addition, 50 x 90 ft.

The Hope Machine Company, Worcester, Mass., has been incorporated with capital stock of $5,000. The directors are James V. Critchley, president; Edward L. Smith, 27 Victor Avenue, treasurer, and W. A. May.

The Worcester Pressed Steel Company, Worcester, Mass., is to build an addition, 34 x 36 ft., one story.

The North & Judd Mfg. Company, New Britain, Conn., has awarded contracts for a new power plant, including a powerhouse, 45 x 55 ft., and a turbine room 37 x 83 ft., each about 45 ft. high. The boilerhouse will have suspended bunkers, automatic coal handling apparatus and stokers. The turbine room will have a traveling crane.

The Bristol Brass Company, Bristol, Conn., has awarded to the Austin Company, Bridgeport, Conn., the contract for a foundry, 62 x 250 ft. The company has also begun the construction of 35 houses for its workmen.

Work has been begun on the new electric power plant of the Coe Branch of the American Brass Company, Torrington, Conn., which will be completed in the early fall. It is reported that the additions to this plant in the past year have doubled its production. It is running night and day.

The D. & W. Fuse Company, Auburn, R. I., has awarded a contract for an addition, to cost about $15,000.

The Worcester Brass Company, Worcester, Mass., has been incorporated with capital stock of $10,000. The directors are James P. Doule, president; Patrick Doyle, treasurer, and A. E. Doyle.

Chicago

CHICAGO, ILL., July 17, 1916.

The higher cost of [illegible] seems not to have altogether discouraged the extension of business, as the machinery trade reports a fair quota of sales, not least encouraged by such business as appears [illegible] of a kind that in most instances these manufacturers who sell various tools of various kinds, believe that will be able to [illegible] in the expected free offering of used machinery. Already inquiries have appeared, in connection with which the expectation is being largely relied upon. Offerings of second-hand tools which have been used in munitions operations are reported, however, to have been made thus far only in one or two instances. Except for the continuing search of milling machines and grinders little interest centered in second-hand tools.

The Albright-Nell Company, manufacturer of packing-house machinery, 1649 Wentworth Avenue, Chicago, has purchased property at Western Avenue and West Fifty-second Street, on which it will erect a building, which will be extensively equipped and will cost about $80,000. The company will be in the market for a large lathe, and two smaller lathes, a boring mill, planing machine and radial drilling machine and will install a 10-ton traveling crane of 40 ft. span.

The Hughes Electric Heating Company, 215 West Schiller Street, Chicago, George A. Hughes, president, is having plans prepared for a three-story factory to cost $100,000.

The Holmes-Pyatt Company, 159 North Jefferson Street, Chicago, is letting the contracts for its new machine shop and factory, to be 125 x 216 ft.

The Herschfield-Piper Foundry & Machine Company, Chicago, has been organized by J. E. Lee, R. L. Wenstrand and Joseph Solari, 332 South Michigan Avenue.

The Interstate Oil & Pump Mfg. Company, Good Hope, Ill., has been incorporated with a capital stock of $20,000 by J. E. Lowe, Frank Smith and others and will manufacture gasoline and other petroleum products.

The American Pole Protective Company, Freeport, Ill., has been incorporated with a capital stock of $50,000 by S. M. Mulnix, W. M. Arnold and J. W. Stocks to manufacture iron and sheet-metal appliances.

The M. & N. Automatic Spark Plug Company, Cedar Rapids, Iowa, has been incorporated with a capital stock of $100,000 to manufacture a self-cleaning spark plug. It states that it has received orders for more than 150,000 plugs. A. E. McDaniel is president; A. M. Bodwell, vice-president; H. F. Paar, secretary, and Valentine Nees, treasurer. It plans to manufacture its plugs at Cedar Rapids and is in the market for a second-hand automatic screw machine.

The Four S Razor Company will move to Hutchinson, Kan., from Ness City, and will erect a factory at Avenue A and Lorain Street, of concrete and steel, 80 x 260 ft., one story, to have about 14,000 sq. ft. of floor space. It is in the market for electric motors, punch presses and lathes. It maintains an office at 608 Rorabaugh-Wiley Building, Hutchinson. V. T. Miller is president.

The Specialty Mfg. Company, St. Paul, Minn., will build a two-story factory, 60 x 114 ft., to cost $20,000. It can be reached in care of William Boss, 1049 Raymond Street.

The Fireproof Shingle Company, St. Paul, Minn., has been incorporated with a capital of $50,000 by Henry Struchen, Edward Yunish and F. M. Kendrick. It will erect a plant as soon as a suitable site can be obtained.

The American Machine Products Company, Marshalltown, Iowa, has been incorporated with a capital of $100,000 by E. A. Francis, J. W. Hook and J. Sidney Johnson.

Detroit

DETROIT, MICH., July 17, 1916.

The Brown & Sehler Company, manufacturer of harness, Grand Rapids, Mich., will erect a five-story factory, 80 x 116 ft., of mill construction.

J. D. Chubb, 109 North Dearborn Street, Chicago, is preparing plans for a school and manual training institute at Calumet, Mich., 62 x 168 ft., three stories and basement, to cost $100,000.

The Herrmann Mfg. Company, South Haven, Mich., is erecting a foundry in connection with its machine shop.

The Home Furnace Company, Holland, Mich., has awarded contract to Ten Broeke & Sterenberg for the erection of a one-story factory, 100 x 260 ft., to cost about $17,000.

The Acme Universal Joint Company, Kalamazoo, Mich., is having plans prepared for a new factory, 75 x 200 ft. E. D. Van Valkenburg is the architect.

The Plymouth Motor Castings Company, Plymouth, Mich., has increased its capital stock from $10,000 to $75,000.

The Reliance Engineering Company, Lansing, Mich., has purchased the equipment of the Hercules Forge Company of Indianapolis. This equipment will be taken to Lansing, where the company is fitting up a drop forging department with the intention of gradually taking on heavier work in steel.

Milwaukee

MILWAUKEE, WIS., July 17, 1916.

Milwaukee machine tool builders report a steady run of orders for standard equipment, and an almost total absence of special types for work such as that required by munition makers. Up to this time there seems to have been no bad results from the marketing of large lots of used tools by munitions contractors who have finished shell contracts. The demand is practically normal, and consists mainly of requirements for a general line of tools. Implement and automobile manufacturers are the principal source of business.

The Fish Oven Company, Walworth, Wis., manufacturing bakery supplies, has incorporated its business under the same style with a capital stock of $7,500. The incorporators are C. G. Curless, W. D. Church and F. K. Blakely. For the present it will contract for its castings and do only assembling work; but later it is intended to erect a complete plant.

The Milwaukee Stamping Company, Sixty-fourth Street and Pullen Avenue, West Allis, Wis., has awarded all contracts for the erection of an addition to its plant, 72 x 122 ft. The work is well under way. The structural iron work has been let to the Ferdinand Pietsch Company, Milwaukee. The company recently increased its capital stock from $115,000 to $150,000.

The Geuder, Paeschke & Frey Company, Sixteenth and Canal streets, Milwaukee, maker of steel and sheet-metal stampings and specialties, is building an addition, 55 x 130 ft., to its plant.

The General Welding & Mfg. Company, 330 Oregon Street, Milwaukee, is taking bids for a brick addition, 35 x 70 ft. Charles J. Keller is the architect.

The Haysen Mfg. Company, Sheboygan, Wis., manufacturing bread-wrapping and bakers' machinery, will build a new plant on Winter Court, between Calumet Road and Thirteenth Street. The company has been crowded for room for several months.

The Bucyrus Company, South Milwaukee, Wis., is erecting an addition to its administration building, of brick and concrete, two stories.

The Wisconsin State Board of Control, Madison, Wis., will take bids until Aug. 16 for the construction of a sprinkler system for the State hospital for the insane at Oshkosh, Wis. The work includes a steam fire pump and auxiliary pump.

Wallace Poe, 905 Copeland Avenue, Beloit, Wis., has opened a garage and machine shop.

Stauffacher & Kiel, owners of the Monroe Auto Company, Monroe, Wis., suffered heavy damage by fire July 7. Repairs are now being made. The company will purchase a list of small tools.

Indianapolis

INDIANAPOLIS, IND., July 17, 1916.

The Oakes Company, Indianapolis, manufacturer of metal stampings and automobile accessories, has increased its capital stock from $[illegible] to $250,000.

The American High Speed Chain Company, Indianapolis, has increased its capital stock from $25,000 to $100,000.

The Hamilton Mfg. Company, Indianapolis, has been incorporated with $15,000 capital stock to manufacture fuel feed systems. The directors are H. F. Rust, Charles O. Roemler and Bert C. Brown.

The Woodcraft Mfg. Company, Indianapolis, has been incorporated with $10,000 capital stock to manufacture picture frames, wooden novelties, etc. The directors are Walter J. Kane, Reason D. Sanders and James A. Ross.

The Link-Belt Company, Indianapolis, has taken out a building permit for an extension to its plant, to cost $20,000.

The Indiana Power & Water Company, Bloomfield, Ind., has been incorporated with $200,000 capital stock to supply light, heat and power. The directors are A. Keene, C. E. Gregg and A. R. Coaker.

The American Motor Vehicle Company, Lafayette, Ind., has been incorporated with $25,000 capital stock, to manufacture gasoline, electric and hand-propelled vehicles. Louis Marx, William M. Crockett and Jacob Wiesenthal are the directors.

King C. Gillette, of the Gillette Safety Razor Company, has bought the property of the Amplex Motor & Machine Works, South Bend, Ind. The plant will manufacture the Wilmo automobile manifold.

The Jay-Vee Differential Company, Indianapolis, has been incorporated with $110,000 capital stock, to manufacture differentials. The directors are Harry B., William N. and Edward E. Gates.

The Remy Electric Company, Anderson, Ind., has plans for a three-story factory, 50 x 240 ft., to cost about $30,000. F. L. Atwood is manager.

The Fort Wayne Engineering & Construction Company has been awarded the contract for erecting the new plant of the Fort Wayne Rendering Company, Fort Wayne, Ind., the building and equipment to cost about $55,000.

The Evansville Veneer Company, Evansville, Ind., is erecting a plant, 125 x 170 ft., to replace one recently destroyed by fire. The latest machinery for this work is to be installed.

The International India Rubber Company, South Bend, Ind., has purchased property in that city on which it will erect a plant for the manufacture of automobile tires.

Cleveland

CLEVELAND, OHIO, July 17, 1916.

The demand for heavy machine tools has improved. Several inquiries for from two to three large machines have come from steel plants. Generally the market is rather quiet, although doubtless more active than usual at this time of the year. The buying of standard machines is mostly for early requirements. The demand for turret lathes has eased off so that makers have caught up slightly on deliveries, but cannot promise shipment within from two to six months. The demand for locomotive cranes is very heavy and some builders are three months or more behind on deliveries. A very active demand is noted for trolleys, hoists and other small types of handling equipment.

The Elyria Iron & Steel Company, Cleveland, will enlarge its local plant by the erection of a one-story steel frame and brick building, 158 x 208 ft. The new building will be used to increase the company's product of oxy-acetylene welded steel tubing. The building contract has been placed with the Austin Company, Cleveland.

The Torbenson Gear & Axle Company, Cleveland, has established a plant to manufacture internal gear drive truck axles in the buildings formerly occupied by the Austin Company, 152nd Street. The officers are V. V. Torbenson, president; W. J. Baxter, vice-president and J. D. Eaton, secretary and treasurer. The company will require lathes and drilling, milling and special machinery.

The W. S. Biddle Company, Cleveland, is enlarging its plant for the commercial heat treating of steel with an extension 40 x 55 ft. One new heat treating furnace 4 x 12 ft. 6 in. is being built by the company and a furnace of the same size now in use will be lengthened to 22 ft.

The Wire Products Company, Cleveland, has been incorporated with a capital stock of $150,000 by W. W. Myers, J. S. Hurd, and others.

The American Automatic Connector Company, Cleveland, has been incorporated with a capital stock of $100,000 by W. S. Russell, C. C. Townes, M. C. Portmann, and others, to manufacture hose couplers.

The Houghton Elevator & Machine Company, Toledo, which will build a one-story plant, 210 x 266 ft., will require some machinery.

The Firestone Tire & Rubber Company, Akron, has an inquiry out for nine electric travelling cranes for a plant extension. These include a 20-ton, a 10-ton, a 5-ton and six 2-ton cranes.

The Peerless Drawn Steel Company, Massillon, has about completed an extension to its plant, 88 x 120 ft., which will be used as a coil stock and annealing room.

The Trumbull Public Service Corporation, Warren, Ohio, plans an expenditure of $250,000 in enlarging and rebuilding its water and power plants.

The Wilson Rubber Company, Canton, Ohio, has been incorporated with a capital stock of $40,000 to manufacture rubber products and will establish a plant at 1320 Fifth Street. Fred J. Wilson and others are stockholders.

W. Bleckner and others are interested in a project to build a steel foundry at Canton, Ohio. It is stated a deal has practically been closed for a site.

The Canton Foundry & Machine Company, Canton, Ohio, has practically completed a brick addition, 25 x 60 ft., to its machine shop.

Cincinnati

CINCINNATI, OHIO, July 17, 1916.

Local manufacturing plants are said to be busier than at any previous midsummer period. It is stated that only a very small percentage of workmen are taking their usual vacations during the hot weather season, doubtless due to the satisfactory wages paid at the present time.

A few more second-hand machine tools are appearing, but the demand for new large lathes has not been affected in any manner, as only a few used machines of the larger sizes are available. Additional orders have been received lately from Canada, mostly for lathes, but orders now coming in are generally for single machines for rush shipment. Munition manufacturers in this country have not yet suspended purchases, while automobile and auto-truck manufacturers prove steady customers.

Corliss engine manufacturers, as well as makers of sugar machinery, are all very busy. The demand for sugar machinery from Cuba is especially good, and several large contracts were recently made. Some improvement is noted in the boiler and tank business.

The F. H. Lawson Company, Cincinnati, sheet-metal specialty manufacturer, will make an addition to its plant on Evans Street that will be 193 x 200 ft., three stories, of reinforced concrete construction. Considerable metal-working machinery will be installed.

The Ahrens-Fox Fire Engine Company, Cincinnati, will make an addition to its plant; but will require little additional equipment.

It is reported that the Dayton Irrigation Company, Dayton, Ohio, will erect a plant for the manufacture of sprayers.

The Westcott Motor Car Company, Springfield, Ohio, has commenced the installation of machinery in its new plant that is expected to be in operation at an early date.

The National Mortar & Supply Company, Pittsburgh, Pa., is reported to have bought the stone quarries of the Strunk-Meyer Company, located near Springfield, Ohio, and that it will expend a large sum for new equipment.

The Blackwood Foundry Company, Springfield, Ohio, announces that it expects to have its new plant in operation soon after Aug. 1. The company will make a specialty of steel castings.

The Shaw Wire Fence Company, Columbus, Ohio, is installing machinery in its new plant on Reynolds Avenue. Nearly all necessary equipment has been purchased.

The Phelps Mfg. Company, Columbus, Ohio, recently mentioned as being incorporated with $100,000 capital stock, is fitting up a plant on South High Street for the manufacture of wire automobile wheels.

The Peters Buggy Company, Columbus, Ohio, is fitting up a new plant at Spruce Street and Dennison Avenue.

The Columbus Bread Company, Columbus, Ohio, will rebuild its large plant recently destroyed by fire with an estimated loss of $25,000.

The B. C. Poston Mfg. Company, Chillicothe, Ohio, anticipates moving to more commodious quarters. Some woodworking equipment will be required.

Birmingham

BIRMINGHAM, ALA., July 17, 1916.

The high price of gasoline has had the effect of reducing the demand for gasoline engines. The lower prices for lumber have lessened the inquiry for sawmill supplies. Holidays and stock-taking have tended to curtail the wholesale machinery business during the past two weeks. The slack has been considerable. Wholesale machinery houses have, however, done a tremendous business in pumps following the floods in Alabama and adjacent territory. The quicker delivery of equipment is an encouraging factor. Hydroelectric apparatus is continuously active.

Noe-Axton Graphite Company, Pyriton, Ala., organized by A. D. Noe, plans to build a 100-ton graphite mill.

Birmingham Ice & Cold Storage Company, Birmingham, Ala., will add three stories and expend $50,000 in additional cold storage capacity.

The Warrant Warehouse Company, Birmingham, will build a cotton compress at Ensley at a cost of $75,000.

The Tucker Implement Company, Greensboro, Ala., has been incorporated with a capital stock of $100,000 by J. C. Tucker, A. B. and F. M. Evins.

The Mutual Light & Water Company, Brunswick, Ga., plans to issue $162,000 of additional capital for plant addition, etc.

The Johnson Boiler Works, Jacksonville, Fla., has been incorporated with a capital stock of $10,000 by C. P. Kendall, L. J. Johnson and A. C. Poole.

The D. B. Sharp Machinery Company, Jacksonville, Fla., has been incorporated with a capital stock of $5,000 by D. B. Sharp, F. J. Brock and E. H. Tupper.

The Southern Sewer Pipe Company, Birmingham, will rebuild its plant, burned in 1914, and will manufacture double-strength shale highway culvert pipe, vitrified sewer pipe, etc. Walter S. Dickey is president and F. L. Dickey, general manager.

The Madras Marble Company, of New York, capitalized at $1,000,000, has been incorporated and has bought 91 acres of marble land near Sylacauga, Ala., which it will quarry.

St. Louis

ST. LOUIS, MO., July 17, 1916.

Machine-tool dealers report business good, although the market is receiving no list of any size. The transactions are altogether in single tools, mostly standard equipment. A little inquiry for special machinery has come forth. Inasmuch none of the business in the past two years has been on war munitions equipment, but altogether tools for domestic industries this market is not feeling, except indirectly, the effect of offers of resale machinery. The fall outlook indicates good business in all lines throughout this territory.

The Prewett Addometer Mfg. Company, St. Louis, Mo., has been incorporated with a capital stock of $75,000 by C. W. Prewett, John M. Harris and H. P. Mueller to manufacture adding machines.

The Robinson Motor Car Garage Company's plant at 3730 Sullivan Avenue, was destroyed by fire with a loss of $50,000. A considerable portion of this was on machine shop equipment, which will be replaced.

The Jenkins Vulcan Springs Company, St. Louis, has increased its capital stock by $56,000 to increase its manufacturing capacity.

The Busch-Sulzer Brothers Diesel Engine Company, St. Louis, has completed plans for the construction of an addition to its plant.

The Western Stamping Company, St. Louis, has been incorporated with a capital stock of $25,000 and has purchased a plant, but will install additional machinery. Victor H. Handschug is president and A. Sabor, manager.

The Kansas City Weed Exterminator Company, Kansas City, Mo., has been incorporated with a capital stock of $12,000 by U. Epperson, Lee Haney and H. A. Thompson to manufacture weed exterminating equipment.

The Gibson Motor Car Company, Webster Groves, Mo., has increased its capital by $5,000 to add to its repair shop and machine shop equipment.

The Western Chandelier Company, Kansas City, Mo., has increased its capital to increase its manufacturing capacity and equipment.

Chaffee, Mo., will equip a waterworks plant to cost about $34,000, and will receive bids for machinery until July 28. A pumping station with oil-driven triplex pumps is specified.

The plant of the Rogers Foundry & Machine Company, at Tenth and Pearl streets, Joplin, Mo., has been burned with a loss of $65,000. The plant will be rebuilt and the equipment replaced.

The Mid West Iron Company, Commerce Building, Kansas City, Mo., is reported in the market for a 15-ton bucket-handling crane, a clam shell bucket, a double truck locomotive, movable towers, etc.

A. Smith, Pine Bluff, Ark., is reported in the market for machinery for the manufacture of collapsible metal tubing.

The Machine Service Company, Oklahoma City, Okla., has been incorporated with a capital stock of $50,000 by Charles A. Tappan, H. E. Kanaga and Ed. M. Semans, and will equip a machine shop and repair plant.

J. F. Pitt, Tulsa, Okla., will erect and equip a machine shop and repair paint for automobiles to cost about $10,000.

The St. Louis & San Francisco Railroad Company, V. K. Hendricks, engineer, St. Louis, Mo., plans machine-shop and roundhouse improvements at Oklahoma City, Okla., to cost about $250,000. Electrically-operated coal chutes are specified.

C. O. Wilkins, Jackson, Miss., will equip a garage, machine and repair shop, 50 x 140 ft., and is in the market for machinery.

Clinton, Miss., is in the market for a pump for its water works plant. R. R. Hardy is town clerk.

The McNary Lumber Company's sawmill at McNary, La., has been burned with a loss of about $200,000, of which $50,000 was on equipment which will be replaced.

The Port Costa [illegible] Co., New Orleans, La., will [illegible] boat [illegible] and will install additional equipment.

The Central South

LOUISVILLE, KY., July 17, 1916.

No diminution in the volume of machinery business offered in the Louisville trade is noted. Some business, withdrawn prevously because of inability to handle it, is now coming back. Contractors' machinery and supplies continue good. Electrical motors, generators, etc., are sold ahead for two months and the machine-tool requirement seems to show no sign of slackening.

A garage to cost $15,000 is to be erected at 909 South Third Street by the Thierman Realty Company, 219 West Main Street.

The Louisville Fire Brick Company is increasing the capacity of its plant at Grahn, Ky., installing boiler, grinding pans, dry blower and brick machine.

The Kentucky Distilleries & Warehouse Company, Mellwood and Gregory streets, Louisville, will build a boiler room at its plant, at an estimated cost of $10,965.

Albert Kraetzer, Louisville, and F. M. and C. E. Platter, North Vernon, Ind., have incorporated the American Preparator Company, with $5,000 capitalization, to manufacture equipment for lumber mills, etc. The debt limit is $50,000.

The Frankfort Milling Company, Frankfort, Ky., is considering changing over to electric drive. The existing steam plant is inadequate. J. N. Moreland is proprietor.

Additional equipment for the plant of the Lexington Utilities Company, Lexington, Ky., will be purchased after the company buys the new franchise, probably on Aug. 1. The boiler room is being extended 50 per cent and a new 500-hp. boiler being added. F. W. Bacon is vice-president and general manager.

Harry Wallace, E. C. Phelps, and others, have incorporated with $10,000 capital the Equi-Light Company, Paducah, Ky., to make automobile accessories. Capital is $10,000.

Sherley Maston has purchased the interest of Leonard Bridges in the Dixie Highway Motor Company, Georgetown, Ky.

New equipment estimated to cost $250,000 will be installed in the proposed plant of the Cumberland Mountain Minerals Company, Cumberland Gap, Tenn., for manufacturing cement. Equipment to be purchased includes three 1000-hp. steam engines; eight 300-hp. water-tube boilers; three 600-kw. sixty-cycle generators; 160 of sixty-cycle type and 5 to 200 hp. motors, coal-burning equipment for kilns, etc. Victor Buetner, Knoxville, Tenn. is president.

The American Metallic Packing Company, Lexington, Ky., is in the market for a used 1000 to 1200 cu. ft. air compressor, steam-driven.

Roundhouse, shops and yard extensions are included in the plans of the Pennsylvania Railroad in connection with bridge reconstruction at Jeffersonville, Ind., and Louisville. H. E. Newcomet is superintendent of the Louisville division.

A new pumping station and powerhouse are being constructed at the Indiana State Penal Farm, Putnamville, Ind.

Extensive improvements are to be undertaken by the Aluminum Ore Company of America at Memphis, Tenn., where a site for a terminal shipping and ore-handling plant has been purchased. C. B. Fox, general superintendent, East St. Louis, Ill., negotiated the purchase.

Texas

AUSTIN, TEX., July 15, 1916.

An increase in the demand for machinery and equipment for cotton-seed oil mills and gins is one of the features of the week's trade. Crop conditions remain about as promising as they could be.

The Davis Milk Machinery Company, Dallas, plans to build an assembling plant. L. S. Davis is Southwestern manager.

The Texas Power & Light Company, Dallas, which recently increased its capital stock from $13,000,000 to $14,000,000, plans to build an additional generating station at Austin. Fred Slater, New York City, has been elected vice-president and general manager.

The Texas Electric Railway Company, Dallas, has been incorporated with a capital stock of $10,500,000 to take over the holdings of the Texas Traction Company, now operating an interurban electric railway from Dallas to Denison, and of the Southern Traction Company, now operating an interurban line between Dallas and Waco, and between Dallas and Corsicana. The new company is authorized in its new charter to extend the merged system over 525 miles. It will take over the street railway systems of Denison, Sherman, McKinney, Waxahachie, Corsicana and Waco. The incorporators are J. F. Strickland, M. B. Templeton and Osce Goodwin, all of Dallas. The Texas Electric Company is a subsidiary of the General Electric Company.

The Ballinger Cotton Company, Ballinger, has increased its capital stock from $50,000 to $75,000 for the purpose of enlarging its cotton-seed oilmill.

The Wichita Cotton Oil Company, Wichita, which has increased its capital stock from $64,000 to $75,000, will enlarge its cotton-seed oilmill.

The People's Cotton Oil Company, Sweetwater, will build a cotton-seed oilmill at a cost of about $50,000. F. J. Phillips is a stockholder.

The United States Indestructible Tile Mfg. Company will construct a plant at Eagle Pass for the manufacture of tile and clay products at a cost of about $100,000. W. F. Foust is a stockholder.

The Wichita Falls Motor Company, Wichita Falls, will enlarge its motor truck factory at a cost of about $300,000.

The Chevrolet Motor Company of Texas has purchased a site at Fort Worth for its proposed assembling plant. A. B. Hardy is president.

The Pacific Northwest

SEATTLE, WASH., July 11, 1916.

Once again the shortage in ocean tonnage is being strongly felt by Northwest shippers. This is particularly true in the Puget Sound-West Coast trade. W. R. Grace & Co., with offices in Seattle, have practically handled this entire business since the outbreak of the European war; but charters on some of their vessels have expired, and they find it impossible to replace the ships.

According to statistical figures prepared by the West Coast Lumbermen's Association, the Allies of Europe have spent, in the last fiscal year, more than $1,500,000 in the purchase of Washington and Oregon spruce for the manufacture of aeroplanes. In this time the timber for aeroplanes has advanced in price between 46 and 65 per cent. The total amount of lumber logged to fill the above orders has been 500,000,000 ft., as it is necessary to log six to ten times as much spruce as the amount shipped, and the pieces used must be 60 to 70 ft. long without a branch.

The lumber mills in western Oregon and Washington, shut down for about ten days at the beginning of this month, are now resuming operations. Considerable replacement of machinery is going on during this slack period, as renewed activity is expected in the fall; but mill and logging equipment is in much less demand than a few months ago. In other lines, however, there has been little curtailment, and some industries continue to expand. The construction of new shipbuilding plants is being rushed and result in numerous inquiries for machine tools. Many small shops have had more work than usual of late, and are coming out with many single-tool orders. Increasing business from these shops is expected as deliveries close up.

The Seattle Construction & Drydock Company plans improvements amounting to about $1,000,000, including construction of a floating drydock and the enlargement of the present drydock. J. V. Peterson is president.

The Seaborn Company, Tacoma, Wash., is starting work on two lumber vessels, both to be equipped with oil or gas engines.

The Silver Steel Tie Company, recently incorporated at Salt Lake City, Utah, with Joseph Silver as president, proposes to manufacture steel railroad ties.

The Huffschmidt & Dugan Iron Works, Bend, Ore., was burned out recently.

The Ragged Top tungsten claims near Lovelock, Nev., have been taken over by H. M. Byllesby & Co., Chicago, Ill., who are preparing to build a new ore mill at a cost of about $100,000.

The Hammond Lumber Company is putting in lumber-handling equipment at its yards on Humboldt Bay, Cal., to increase the capacity by 25 per cent, increasing its rail shipments by using the new Northwestern Pacific line.

Bids have been taken for the construction of the Lindsay-Strathmore irrigation system, Lindsay, Cal., requiring two high-head pumping plants of 2250 aggregate hp. The units will consist of motors direct-connected with centrifugal pumps.

John Fox, owner of the Seattle-Astoria Iron Works, Seattle, Wash., who recently purchased the plant of the Astoria Iron Works in Astoria, Ore., has also purchased the plant and equipment of Frederickson & Brown Iron Works in Astoria. The two plants will be combined, and placed in operation, after a number of improvements have been made.

The Portland Stove Works, Portland, Ore., contemplates the construction of a new plant. Plans are now in course of preparation.

The Willamette Iron & Steel Works, Portland, will erect a boiler shop at North Seventeenth and Front streets to cost $12,000.

The Great Falls Portland Cement Company, Great Falls, Mont., has recently been incorporated with a board of directors consisting of D. A. Morrison, Whitehall, Mont.; W. J. Price, Dillon, Ill.; W. S. Trueblood, York, Pa., and L. L. Callaway and J. C. E. Barker of Great Falls. It has acquired 500 acres of land near Great Falls for quarry purposes and plans the construction of a cement plant costing $500,000, to be ready for use in 1917. The plant will be electrically operated, and will have an output of 1000 bbl. daily.

The Boise Cold Storage Company, Boise, Idaho, has announced that it will begin construction of an ice plant to replace the plant destroyed by fire some weeks ago. The new plant will have an increased capacity, the storehouse to contain 7500 tons, and will cost approximately $60,000.

Capt. Ennis Dobbins, Seattle, is considering the construction of a factory in Medford, Ore., for the construction of mining dredges.

The Red Collar Line, Coeur d'Alene, Idaho, plans to immediately construct a passenger boat for lake operation, to be equipped with two 200-hp. Winton marine engines.

The John Wilson Shipyard, Seattle, has been awarded contract by the Tacoma Dredging Company for the construction of a 110-ft. dredger, to cost $70,000. It will replace one recently lost off Grays Harbor.

The Excelsior Mfg. Company, Eugene, Ore., plans the installation of additional machinery to be used in manufacturing excelsior pads for wrapping furniture, etc. Charles O. Peterson is president.

The Roundup Brick & Tile Company, Roundup, Mont., has purchased 80 acres of land and will erect there a brick and tile plant, with a daily capacity of 25,000 bricks. It will cost over $50,000. M. M. Klein is president.

Canada

TORONTO, July 17, 1916.

The Imperial Munitions Board is negotiating with Canadian car makers for the manufacture of steel cars for Russia. This is the first time, as far as is known, that Russian orders for cars have been handled by the Imperial Munitions Board, and, it is understood, they mark the commencement of the practice. This change promises to prove a stepping stone in the development of trade between Canada and Russia. The extension of a further credit of $25,000,000 is likely to be followed by another credit of similar amount at an early date. It has been reported that the Imperial Munitions Board has been placing contracts for war munitions amounting to upward of $1,000,000 a day.

The Canadian Government will erect a new small arms ammunition plant at Lindsay, Ont., and has awarded the contract to Westinghouse Church Kerr & Co., New York.

The Canadian trade commissioner at Melbourne, Australia, has forwarded specifications to the Department of Trade and Commerce, Ottawa, for three-phase crane motors and controllers, single-phase shop motors and starter, 3 dry grinding machines, 2 beading and coping rolling machines, 2 tube swaging machines and other equipment required by the Victorian Railway at Melbourne and the New South Wales Railways, Sydney, Australia.

Brandon, Man., will purchase a 4,000,000-gal. high-duty pump. A. W. Shaw is superintendent of waterworks.

The William Davies Company, Ltd., 521 Front Street East, Toronto, is having plans prepared by Max Dunning of Chicago for the erection of an abattoir, cold storage plant, etc. It will include eight or ten buildings and will cost about $1,250,000.

The St. Lawrence Wagon Company, 34 King Street, Montreal, will build a factory on King Street at a cost of $7,000.

New equipment, including machine tools, will be installed in the plant being erected at Medicine Hat, Alberta, for the Dominion Harvester Company, to replace the one destroyed by fire.

The Queen City Oil Company, Notre Dame Street East, Montreal East, is in the market for a new 90 to 100-hp. locomotive boiler, completely equipped.

The R. & L. Mfg. Company, Ltd., Sherbrooke, Que., is in the market for a 3 to 5-hp., 550-volt, 60-cycle, three-phase motor.

Assiniboia, Sask., is in the market for an air compressor, a motor, a 150-hp. internal combustion engine, a generator, a switchboard, two pneumatic storage tanks and one oil tank. The erection of a power station, installation of a heating plant, construction of reinforced concrete reservoir, etc., are planned. Bids need be in by Aug. 8. J. R. Nolan is secretary.

London, Ont., contemplates the construction of a sewage disposal plant to cost $200,000.

The Edmonton, Dunvegan & British Columbia Railway, Edmonton, Alberta, will build a roundhouse at McLennan, Alberta, to replace the one recently destroyed by fire.

The Imperial Oil Company, 918 St. Patrick Street, Montreal, is considering the erection of an oil plant at Dartmouth, N. S., to cost $5,000,000. It has secured a site of 160 acres, with 1300 ft. on the harbor front.

C. F. Smith will build a planing mill at Harrow, Ont., to cost $10,000, and will install electrically-driven machinery.

Brown's Copper & Brass Rolling Mills, Ltd., Stop 21, Lake Shore Road, Mimico, Ont., is building a new mill to cost $25,000.

Bids are being received by George D. Redmond, care the Chevrolet Motor Company, Oshawa, Ont., for a three-story, mill-construction factory. The estimated cost is $50,000.

Alfred A. Viau, St. Jerome, Que., will build a foundry to cost $6,000. L. T. J. Decary, 245 Centre Street, Montreal, is the architect.

The Pathe Freres Phonograph Company of Canada, Ltd., Toronto, has been incorporated with a capital stock of $100,000 by Henry Pratt, John D. Bissett, 36 Toronto Street, Thomas H. Peine and others to manufacture phonographs, disks, etc.

Kingsville, Ont., will install a new pump at its waterworks. George Pearse is clerk.

Almonte, Ont., proposes to build a hydroelectric plant at a cost of $18,000. J. T. Kirkland is clerk.

The plant of the Dominion Hardwood, Ltd., at Deseronto, Ont., which was totally destroyed by fire July 9, with a loss of $100,000, will be rebuilt.

The Western Dry Dock & Shipbuilding Company, Port Arthur, Ont., is building a pattern and electrical shop to replace one destroyed by fire. The buildings will cost $25,000.

The Giberson Stone Company is building a new plant at Point Edward, near Sarnia, Ont., in which new machinery will be installed.

The Sydney Foundry & Machine Company proposes to build drydocks and a ship repairing plant at Sydney, N. S.

The Alberta Lumber Company, Vancouver, B. C., has received a permit to erect a 50 x 210-ft., two-story mill building at Sixth and Willow streets, to cost $100,000.

The Canadian Conley Frog & Switch Company, Ltd., Port Arthur, Ont., has been incorporated with a capital stock of $150,000 by William F. Langworthy, Gerald A. McTeigue, Jarvis L. McComber and others to manufacture frogs, switches, tools, machinery, etc.

The Thunder Bay Terminal Elevator Company, Ltd., Winnipeg, Man., has been incorporated with a capital stock of $1,000,000, by Clarence B. Piper, Hugh Phillips, Charles S. A. Rogers and others to build and operate elevators, storage plants, cleaning plants, etc.

The Canadian Comstock Company, Ltd., Montreal, mechanical and hydraulic engineers, has been incorporated with a capital stock of $40,000 by Arnold Wainwright, Aubrey H. Elder, Felix W. Hackett and others to build factories, plants, machinery, bridges, etc.

The Algoma Construction & Engineering Company, Ltd., Sault Ste. Marie, Ont., has been incorporated with a capital stock of $100,000 by Alexander Taylor, 63 Kendal Avenue, Toronto; Rex E. Nicholson, Joseph G. Gibson, 36 Prospect Avenue, and others, to manufacture iron, steel, nickel, metals, etc.

Government Purchases

WASHINGTON, D. C., July 17, 1916.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until date not set, schedule 9894, for one buffing lathe for Brooklyn; schedule 9898, for one 18-in. x 8 ft. engine lathe for Puget Sound; schedule 9902, for one boring, drilling and milling machine for Washington; schedule 9903, for six air compressors, f.o.b. works; schedule 9904, for one 12-ft. 6-in. power brake for Philadelphia; schedule 9905, for one screw cutting lathe for Brooklyn.

The purchasing agent of the Alaskan Engineering Commission, Seattle, Wash., will receive sealed proposals until July 28, under circular 198, for furnishing one 40-ton shop crane, one saw table complete, one adjustable bevel band

saw, one four-sided molder, one jointer or buss planer and one patternmaker's lathe.

Bids were received by the Bureau of Supplies and Accounts, Navy Department, Washington, July 11, for supplies for the naval service as follows:

Schedule 9752, Construction and Repair.

Class 1, Mare Island—One set of plate-bending rolls—Bid 77, $75,900.

Alternate—Same, f.o.b. works—Bid 18, $83,850 and $74,777; 77, $65,750.

Schedule 9801, Construction and Repair.

Class 71, Charleston—One 4-ft radial drilling machine—Bid 70, $2,290; 77, $1,480.

Class 72, Charleston—One 7-ton jib crane, with electric hoist—Bid 78, $1,315.

Schedule 9803, Steam Engineering.

Class 81, Portsmouth—Two gasoline engines—Bid 42, $12,000.90; 75, $5,368.50; 111, $11,464.50; 121, $10,298.90.

The names of the bidders and the numbers under which they are designated in the above list are as follows:

Bid 18, Bethlehem Steel Company; 42, Gas Engine & Power Company and Charles L. Seabury & Co.; 70, Manning, Maxwell & Moore, Inc.; 75, Mason Machine Works; 77, Niles-Bement-Pond Company; 111, Sterling Engine Company; 121, Van Blerck Motor Company.

NEW TRADE PUBLICATIONS

Manganese Steel Products.—American Steel Foundries, McCormick Building, Chicago, Ill. Calendar hanger, measuring 12½ x 26½ in. Refers to the various products of the company, which include steel carwheels and locomotive, rolling mill, marine and railroad castings, etc. An illustration of one of these lines is given in the upper quarter of each sheet, while the remaining three quarters contains the calendars for the current, preceding and succeeding months.

Portable Electric Tools.—Chicago Pneumatic Tool Company, Fisher Building, Chicago, Ill. Bulletin No. E-41 superseding No. E-32. Calls attention to a line of portable electric tools designed especially for use on railroad work. These include track and side and center spindle drilling machines, grinding machines and machines for driving spikes. Brief descriptions of the various ones are given, the text being supplemented in some cases by engravings of the machines in actual use and condensed specification tables. A partial list of users of the tools completes the bulletin.

Wet Tool Grinding Machines.—Diamond Machine Company, P. O. Box 1188, Providence, R. I. Bulletin. Lists a line of wet tool grinding machines which are built in both the floor and bench types in 16 different sizes and styles. A general description of the two classes of machines is given, the text being supplemented by a number of engravings of different machines arranged for belt or motor drive. Condensed specification tables and a diagram of emery wheels and cross-sections of flanges are included.

Bolt Pointing, Threading and Tapping Machines.—Webster & Perks Tool Company, Springfield, Ohio. Catalog. Lists a line of pointing, threading and special tapping machines for bolts. The machines are of the horizontal type and in every case two pages are given to each, an engraving of the particular machine being presented on one page with a brief statement on the output, equipment and specifications on the facing one. Mention is made of a line of accessories, including dies, holders for stock, a rotary oil pump and automatic gripping and self-centering vise holders. A few samples of work threaded and tapped on the machines are shown, and a table of speeds recommended for cutting bolts and tapping nuts is included.

Special Shovels.—Conneaut Shovel Company, Conneaut, Ohio. Pamphlet. Pertains to a line of shovels that have been developed for special purposes and are made only on order. Among the special tools mentioned are concrete, ore, contractors' and excavating shovels with long or short handles, coal scoops, etc. A number of views of the shovels in use and of the plant in which they are made are presented, together with a general description of the various operations involved in their manufacture.

Lathes.—Phoenix Mfg. Company, Eau Claire, Wis. Catalog. Relates to a line of lathes which includes standard, geared head and duplex helical drive engine lathes and a projectile lathe. All of the different machines are illustrated and the only descriptive matter included is some condensed specifications in the case of two or three of the lathes. A drawing of the duplex helical drive is presented, together with an erecting diagram for one of the lathes.

Scales.—Standard Scale & Supply Company, Pittsburgh. Catalog No. 15. Presents illustrations and brief descriptions of an extensive line of scales that are built in a number of sizes and styles for all purposes. Lists of the various sizes in which each type can be supplied are given and a complete telegraph code is included.

Powdered Coal Equipment.—Bonnot Company, Canton, Ohio. Catalog. Covers the various pulverizing, crushing and drying machines required for use in connection with the Holbeck system for burning powdered coal. The uses of powdered coal and a brief description of the system are given, together with illustrations and brief descriptions of the various machines. A number of views of heating furnaces for plates, ingots, billets and rivets using this system of fuel are included.

Metal Cleaner.—J. B. Ford Company, Wyandotte, Mich. Booklet entitled "Metal and Other Cleaning Problems—Their Solution." Concerned with the cleaning of metals and metal articles for plating, japanning, galvanizing, painting, handling, assembling and inspection and also for the removal of japan, lacquer, etc. After a brief discussion of the metal cleaning problem, directions for cleaning metal articles of various kinds are presented and a number of suggestions on the use of the company's metal cleaner are presented. Mention is made of a number of other cleaners that can be supplied.

Forging Furnace.—Metals Production Equipment Company, 105 West Fortieth Street, New York. Bulletin No. 35. Describes a line of stationary forging furnaces, using gas or oil fuel, for heating material for forging with steam and drop hammers, hydraulic presses and bulldozers. Illustrations of both the single and double door types of furnace are presented with brief specifications of the different sizes of each that can be supplied. A drawing of a typical installation for operation with a steel fan pressure blower and an engraving showing an installation of two-door furnaces are included.

Heat Resisting Metal.—Diamond Power Specialty Company, Detroit. Bulletin No. 118. Concerned with Insuluminum which is a new metal that has been developed by the General Electric Company in its research laboratories and will withstand a continuous temperature of 1800 deg. Fahr. A number of photomicrographs and photographs and records of a series of comparative high-temperature tests of pipes made from this new metal and from iron that were conducted by a number of well-known companies are included. The properties of the metal are described and the application of it to the company's mechanical soot blower system for which it has secured the sole right in the United States, is briefly touched upon.

Locomotive Cranes.—Brown Hoisting Machinery Company, Cleveland. Catalog I. Gives a brief description of the use and construction of a line of locomotive cranes and the special attachments that can be furnished for use with them. The bulk of the catalog is given over to engravings of various types of cranes in actual use, the caption in each case giving a brief statement of the work that is being done and any features of interest concerning it.

Factors of Safety in Automobiles

The factors of safety in the various parts of motor cars of different design vary from 1.2 in the case of the rear axle shaft of a certain car to 90.0 in the clutch shaft of another type, according to an investigation conducted on fourteen different types of cars by Russell Huff, consulting engineer, Packard Motor Car Company, Detroit. The results of the investigation are reported in a paper presented at the semi-annual meeting of the Society of Automobile Engineers, June 12, 1916. Studies were made on the front axles, front axle spindles, clutch shafts, transmission shafts, propeller shafts and rear axle shafts of these cars which ranged from a 1,900-lb., four-cylinder car to a three-ton truck.

In calculating the factors of safety, it was assumed that the steel in the various parts had been heat treated to give the same hardness, namely 210 Brinell. In studying front axles, the actual dead load resulting from a full complement of passengers, full gasoline, oil and water systems and spare tire equipment was used in making the calculations. In the study of the power transmission parts, the maximum engine torque, direct or geared up, irrespective of friction or gear losses, was used.

THE IRON AGE

New York, July 27, 1916

ESTABLISHED 1855 VOL. 98: No. 4

Pacific Coast Steel Company's Plants

Open-Hearth Equipment and Bar and Structural Steel Rolling Mills at South San Francisco and Seattle

WITH a steel-making capacity of over 125,000 tons of ingots per year, and rolling mills at both San Francisco and Seattle, Wash., the Pacific Coast Steel Company has made the steel-producing industry of the Western slope of the United States of considerable importance. Since the outbreak of the European war, it built the steel plant at Seattle, up to that time operating a bar iron rolling mill, and it has doubled the capacity of its San Francisco works, besides going into the rolling of structural shapes in addition to merchant and reinforcing concrete bars. It has done a very considerable business with the Orient, particularly since the war, and has contributed largely to the development of concrete structures on the Coast. For raw materials Chinese pig iron has been used for some time, and the considerable quantity of old iron and steel collected on the Pacific Coast has, of course, been a factor. Prior to the war Scotch coke, running less than ½ per cent in sulphur and 6 to 7 per cent ash, was imported, but for fuel, oil, running not over 1 per cent in sulphur, is the heat source for the open-hearth furnaces.

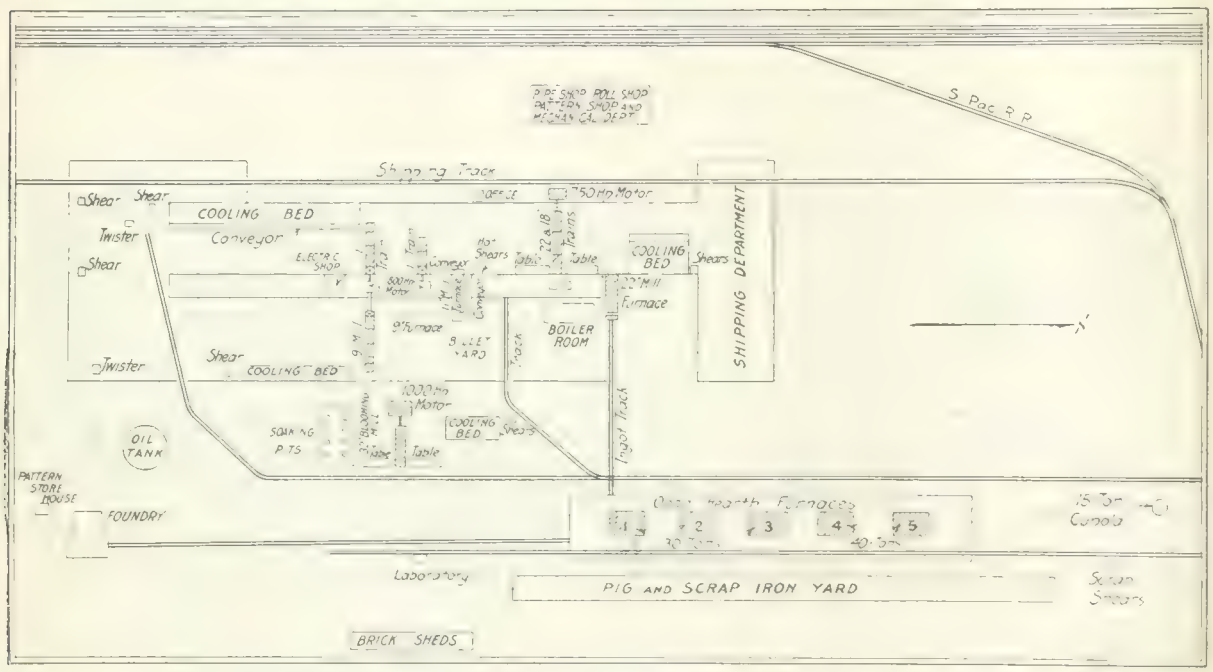
The San Francisco plant is at South San Francisco, 9 miles south of the city on the coast line of the Southern Pacific Railroad. It has now three 30-ton basic open-hearth furnaces and two of 40 tons capacity, and it is understood that contracts have already been closed for two 60-ton furnaces. The plant was built in 1911 and the first steel was made Jan. 2, 1912.

The charging floor of the open-hearth building is 30 ft. wide and the pouring aisle 45 ft. wide. The open-hearth charging machine was built by the Wellman-Seaver-Morgan Company, Cleveland, and 50-ton pouring ladles are used, handled by a 40-ton Niles electric crane and a 75-ton Morgan crane. The smaller size ingots are commonly broken down in a 22-in. mill, being discharged by means of a hydraulic mechanism to a reheating furnace, which is oil-burning, and which delivers upon the approach table of the 22-in. mill. For the larger ingots soaking pits have been provided, and a 32-in. blooming



At Present There Are Five Oil-Burning Open-Hearth Furnaces at the South San Francisco Plant and Bottom Pouring of Ingots in Groups is the Regular Practice





General Plan and Charging Side of Open-Hearth Furnaces of South San Francisco Plant

mill represents one of the late developments of the South San Francisco plant.

The 22-in., the 18-in. and the 11-in. mills are contained in a steel building 40 x 500 ft. in size. The 22-in. mill is a one-stand mill driven by an 800-hp. Corliss compound engine. Alongside of it is the 18-in. mill in two stands, also of three high rolls, and these three stands are commanded by a traveling tilting table. The 18-in. mill is designed to roll large angles, rounds, squares and flats, and the continuous furnace is 71 ft. long with a heating capacity in 10 hr. of 250 ingots 10 in. square. The two stands of the 18-in. mill are driven from a 750-hp. Allis-Chalmers motor. Angles 6 x 4 in. and flats 1 in. thick are about the largest sizes rolled.

The 11-in. mill is in five stands, in the Belgian arrangement, motor driven with the roughing and first stand coupled to an 800-hp. Crocker-Wheeler motor and the remaining stands coupled to a 750-hp. Allis-Chalmers motor. A continuous furnace 41 ft. long supplies this mill. It is rated at 450,000 lb. of 1-in. square bars in 9 hr., and the cooling bed is 200 ft. long.

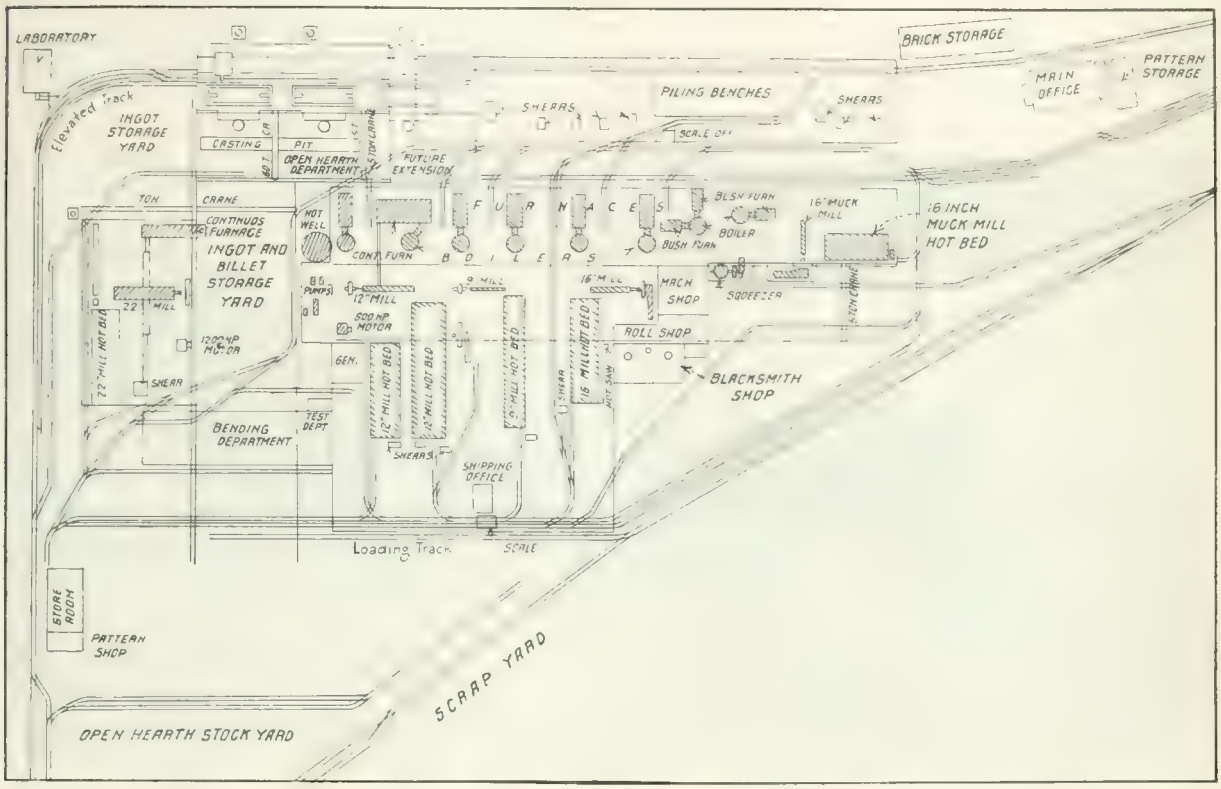
The 9-in. mill shown in the general plan of the South San Francisco works is of five stands and was built by the Lewis Foundry & Machine Company. A 30-ft. four-door heating furnace is provided and 120 ft. of cooling bed. This mill is driven by a 750-hp. Allis-Chalmers motor and is rated at 60,000 lb. per turn.

With the new blooming mill the plan is to roll steel beams and channels up to 15 in. in depth, and in general all types of beams and channels. In the smaller sizes of bars, the plant has, of course, specialized for some time in corrugated square and round bars and in twisted square bars, largely for reinforced concrete construction. That there is a considerable demand for reinforced concrete work is indicated by some recent statistics. In 1914 100

concrete bridges were built by the counties of California against 10 bridges 10 years previous. The cement industries in California in 1891 produced some 5000 bbl., while in 1912 the production mounted to 6,198,624 bbl.

The works of the Seattle plant are located on a 40-acre plat of Seattle tide land with a 500-ft. frontage on the west waterway of Seattle harbor and with switch spurs from the Northern Pacific, the Chicago, Milwaukee & St. Paul, the Great Northern and the Union Pacific railroads. The works are located at what is known as the Youngstown station of Seattle.

As indicated by the accompanying plan, which shows also the equipment for making bar iron, the plant has two 40-ton basic open-hearth furnaces, one 22-in. structural and billet mill, one 16-in. bar mill, one 16-in. muck bar mill, one 12-in. merchant mill, one 9-in. guide mill and one 14-in. merchant mill in the course of construction. The first mill at this site was built in 1904-5 but as a steel plant the first cast was made Sept. 30, 1915. The plant has an iron-bar mill which was formerly owned by the Seattle Steel Company, which operated it up to Jan. 1, 1912, and its conversion to an open-hearth plant was undertaken by the Pacific Coast Steel Company, which had also acquired the Irondale Works at Irondale, Wash., formerly owned by the Western Steel Corporation. From the Irondale plant some of the open-hearth equipment and the





General Plan and Charging Side of Open-Hearth Furnaces of Youngstown Plant, Seattle, Wash.

22-in. mill were obtained. Besides merchant steel bars and structural shapes, the plant is capable of turning out T-rails up to 20 lb. per yard.

The open-hearth building of the Seattle works is constructed of steel and reinforced concrete. The furnaces were designed by Alex Laughlin & Co., Pittsburgh, and they are served by a Shaw electric 60-ton ladle crane with 5-ton 50-ft. span auxiliary hoist and one 5-ton 50-ft. span Shaw electric crane operating on the same track for taking care of the ladle work and the pouring pits. The charging floor is equipped with a Wellman-Seaver-Morgan charging machine.

The 22-in. structural mill is a three-stand three-high mill, rope driven from a 1200-hp. Allis-Chalmers 3-phase, 2300-volt alternating-current motor operating at 440 r.p.m., 23⅞-in. Jupiter ropes driving the mill at 82 r.p.m. being used. A Laughlin design continuous furnace and an 8 x 8-in. Lewis Foundry & Machine Company's shear for the hot billets are included in the equipment. The mill building is of structural steel and reinforced concrete also, and is equipped with a 7½-ton Shaw 80-ft. span electric crane. Parallel, with a 70-ft. span 7½-ton Shaw crane with a lifting magnet, is the mill billet yard; this second crane puts ingots into the 22-in. mill furnace and handles the billets coming from the mill.

The 16-in. mill is a three-stand three-high bar mill operated from a 700-hp. Corliss engine and equipped with two heating furnaces, each with a 150-hp. Cooke waste heat boiler utilized to supply steam for operating the engine.

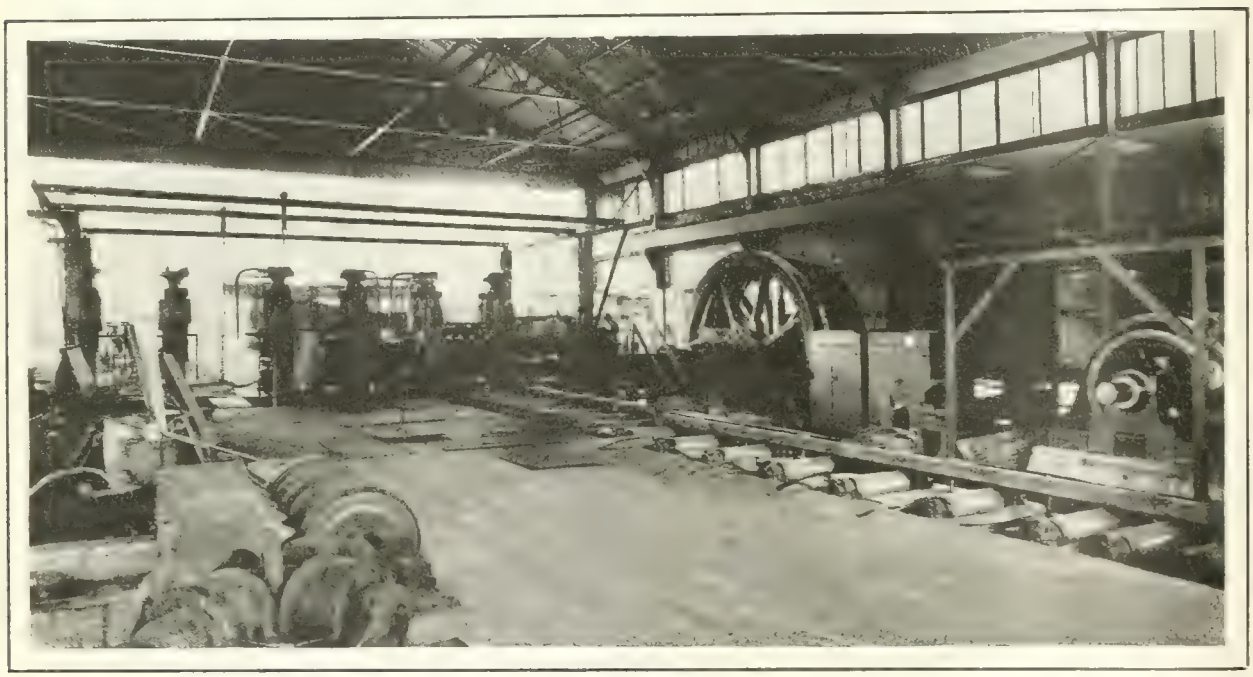
The 9-in. guide mill is composed of three stands of three-high rolls and two stands of two-high rolls, belt-driven from a 300-hp. Corliss engine operating at 100 r.p.m., but driving the mill at 240 to 260 r.p.m. The heating furnaces for this mill have a 250-hp. Cooke waste heat boiler.

The 16-in. muck bar mill comprises five stands of three-high rolls and is driven at 180 r.p.m. by an 800-hp. alternating-current motor from 16 strands of ⅞-in. rope. One continuous heating furnace serves this mill, having a 150-hp. waste-heat boiler to operate steam pumps and auxiliary machinery.

Serving the entire length of the three mills described is a 5-ton, 60-ft. span Shaw electric crane used for changing rolls and handling all the work incidental. The roll turning shop is equipped with three-roll turning lathes and the machine shop with two engine lathes, two drilling machines, two shaping machines and one planing machine. The blacksmith shop has four fires. There is a complete laboratory included in the equipment of the plant, and the yards are traversed by a Brown hoist traveling yard crane with electric magnet for handling scrap and other materials and two narrow-gage yard locomotives for hauling material to and from the open-hearth furnaces.

The Pacific Coast Steel Company also owns works at Portland, Ore., for making bar and band iron, and has a 60 x 11-ft. blast furnace at Irondale, which has not been in operation for some time.

Judge E. M. Wilson is president and treasurer of the company. D. P. Doak and William Pigott are vice-presidents. Mr. Pigott is in charge of the Seattle plant, with T. S. Clingan general manager at Seattle, and George W. Foraker general superintendent at Seattle. W. S. Burt is secretary of the company and located at Seattle. E. S. Houdlette is auditor and assistant secretary at the headquarters, in the Rialto Building, San Francisco, and some of the other officials are J. C. Wallace, Jr, purchasing agent; John B. Leonard, district general sales manager; D. E. McLaughlin, southern general sales manager at Los Angeles, and S. S. Lawrence, formerly with the Pennsylvania Steel Company, foreign general sales manager.



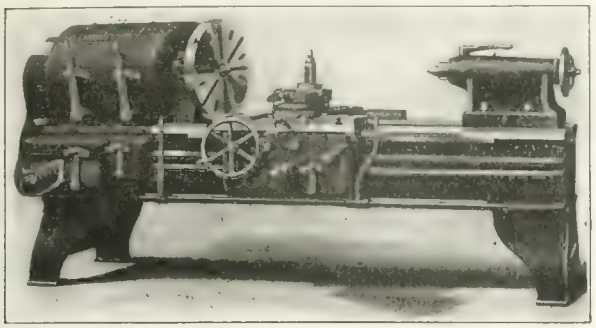
The Three Stands of the 22-In. Structural Mill at the Seattle Works Are Rope Driven from a 1200-Hp. Motor Shown at Extreme Right

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The Laursen Automatic Pump Company, Menomonie, Wis., manufacturing pumping engines for mining, irrigation, drainage, etc., has reorganized, following the resignation of L. A. Laursen, president and chief engineer. The new officers are: President, C. A. Straubel, Green Bay, Wis.; vice-president, J. R. Myers, Green Bay; secretary, W. J. Eberwein, Menomonie, Wis.; treasurer, A. J. Edminister, Holcomb, Wis. The company recently moved from leased quarters at Chippewa Falls, Wis., to a plant purchased at Menomonie. The new quarters were inadequate, and a branch factory was established at Green Bay. Both plants are now running at full capacity.

Heavy-Duty Single-Pulley Drive Lathes

A new line of heavy-duty, single-pulley drive, all geared head, quick change gear, engine lathes is being brought out by the Cleveland Machinery & Supply Company, Cleveland. The machine that is illustrated is the 20-in. size, but it will also be built in 18, 22, 24, 26, 28, 30, 32 and 34 in. swings, in



A 20-In. Heavy-Duty Single-Pulley Drive Lathe for Automobile and Forge Shops

any length of bed required. This lathe is of heavy construction, being designed for all classes of heavy work and is claimed to be particularly well adapted for automobile and forge shops. The bed is unusually wide and heavy and is of the box-section type. It has a large compensating V in front and a flat way in the rear.

The headstock is of improved geared construction, having a single-pulley drive with nine mechanical speed changes operated by two levers. All gears are of steel. The single pulley is equipped with a powerful friction clutch operated from the front of the machine either at the headstock or apron as may be desired. The bearings, including those for the spindle, are bronze bushed and the spindle is provided with a ball thrust bearing with lock nut adjusted for wear.

The carriage has an exceptionally long bearing on the shears, is equipped with a wide compound rest bridge and is gibbed both in the front and back. It also has a solid bearing on the bed throughout its entire length. The cross-slide and compound rest are provided with taper gibs for taking up the wear. Both the front and back wings of the carriage are provided with felt wipers to protect the V's. The apron is of the heavy box type and has steel gears throughout. The bearings are bronze bushed. The bearings in the back wall of the apron are all oiled from one oil reservoir which is reached from the top of the carriage.

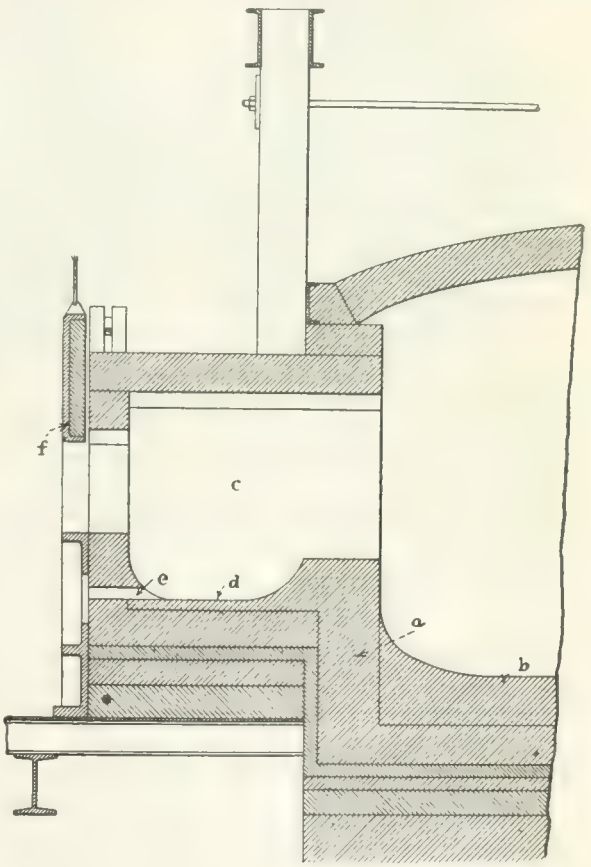
Only one friction is used for operating both the longitudinal and the power cross feeds. Automatic stops and reverse for the feeds are furnished. The apron is equipped with a safety device which prevents the engaging of the half nut without first throwing the feed lever in the central position. The operator is, therefore, unable to engage both the screw and rod feeds at the same time. The quick change gear box is of the cone type construction and provides for a wide feed and thread range. It is equipped with steel gears and the bearings are bronze bushed. The driving mechanism for the lead screw and feed rod is arranged so that both cannot be revolved at the same time, thereby doing away with any unnecessary wear on the lead screw when the machine is used only for turning.

The lathe in any of its sizes will be furnished equipped with any attachments required, such as taper attachment, four tool turret tool post, heavy hexagon carriage turret and power feed bed turret. It will also be furnished for motor drive with either direct or alternating current. The motor drive will be provided either with direct gear or silent chain drive as desired. Reverse to the spindle will be supplied either for belt drive or motor drive.

New Device to Premelt Ferroalloys

What is claimed to be an improvement in open-hearth furnaces is covered by a patent (U. S. 1,188,867, June 27, 1916) granted to Bradley P. Wheeler of Duluth, Minn., with one-half assigned to Thomas S. Blair, Jr., of Chicago. It comprises a melting compartment, built as an extension to the back wall of the furnace, in which ferromanganese and other final additions are melted by the heat of the furnace.

The illustration shows the design in which *a* is the back wall of a furnace of which *b* is the hearth, with cross-section from front to back. Against the back wall and preferably adjacent to the tap hole is the chamber *c* open to the interior of the furnace. It has a melting hearth, *d*, and a tap hole, *e*, and is closed by a door, *f*. The finals, such as ferromanganese, ferrosilicon, spiegeleisen, ferrochrome, etc., are



Cross-Section, Front to Back, of an Open-Hearth Furnace, Showing the Additional Chamber for Premelting Ferroalloys

charged through this door and are melted by the heat of the furnace. They are tapped and added to the heat as needed, doing away with any special melting or delay caused by their preparation.

The Sullivan Machinery Company, 122 South Michigan Avenue, Chicago, and Salisbury House, London, England, has established an agency in Holland with Petrie & Co., Heerengracht, 141-145 Amsterdam, as its special representatives. Petrie & Co. will sell the Sullivan air compressors, rock drills, hammer drills, diamond core drills, quarrying and coal mining machinery in the Netherlands. This new arrangement replaces the Sullivan Machinery Company agency previously at the Hague.

Detecting Alumina Inclusions in Steel

An Investigation as to Their Occurrence and Appearance—Distinguishable Under the Microscope from Other Impurities

BY ALBERT SAUVEUR*

INCLUSIONS in steel, as commonly described, comprise silicates, chiefly of manganese and of iron (frequently called slag), and manganese sulphide (often associated with iron sulphide). The use of titanium as a deoxidizer may introduce some titanium nitride inclusions, while the use of aluminum for the same purpose may result in the formation of alumina inclusions through the oxidation of some of the aluminum.

The present investigation was undertaken for the purpose of ascertaining whether the occurrence of alumina inclusions in steel could be detected under the microscope and of studying the characteristics by which these inclusions can be distinguished from other inclusions.

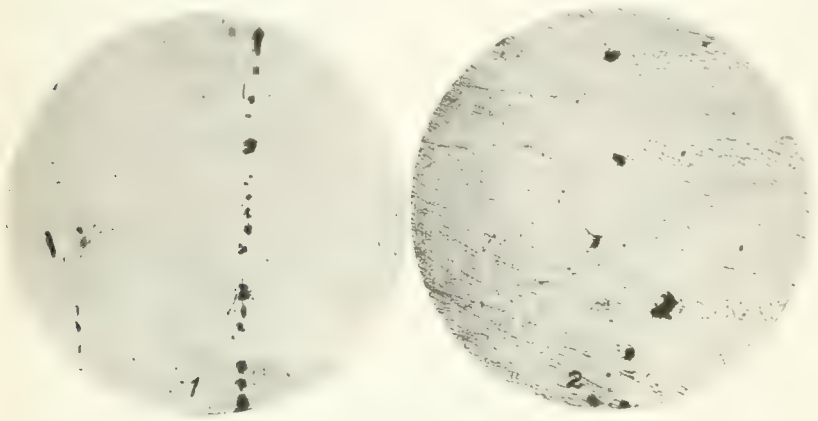


Fig. 1 is a Photomicrograph of the Longitudinal Section of a Bar, Forged from a Steel Ingot to Which 0.144 Per Cent Aluminum Was Added. Fig. 2 is a Photomicrograph of the Polished Unetched Surface of the Longitudinal Section of a Forged Bar of Thermit Iron Treated with Alumina. Both have been reduced about one-fourth from an original magnification of 300 diameters

PAST LITERATURE

Barring one or two unimportant exceptions, I am unable to find in the literature dealing with inclusions any reference to the occurrence of alumina antedating the article presently to be referred to. Previous to this, alumina had not generally been considered as a distinct, or, at least, as a distinguishable inclusion.

Referring to the use of aluminum as a deoxidizer, however, and to the resulting formation of alumina, Walter Rosenheim, in his book, "An Introduction to the Study of Physical Metallurgy," writes:

> A more powerful deoxidizing agent than manganese is furnished by aluminum, but this differs from manganese in two vitally important respects. In the first place, the oxidation product of aluminum is a particularly refractory substance—alumina—which has a strong tendency to remain in the molten metal in suspension as fine particles.

In a paper before the American Institute of Mining Engineers, entitled "The Solid Non-Metallic Impurities in Steel," Henry D. Hibbard writes:

> If other elements have been added, such as Al, W, Cr, Ti or Va, their oxides and silicates may be present. The too plentiful use of Al in steel may have been condemned, partly at least, because it forms oxides or silicates in the metal, which, being insoluble and infusible, exist in the solid steel as very harmful sonims. Of course, to form the oxide there must still be some oxide of iron or manganese in the steel. If the metal were free from O perhaps the weakening effect of Al, when added in greater quantity than a few hundredths of 1 per cent, would not occur. So a part of the Al added in the ladle would form sonims which might be fluxed and floated out, while that added in the molds, if the steel were free from O, would not be oxidized, but would all be left to exercise its full effect in preventing the formation of gas bubbles and the resulting blowholes in the steel.

GEORGE F. COMSTOCK ON ALUMINA IN STEEL

In an article entitled "A Study of Alumina in Steel," published in *Metallurgical and Chemical Engineering* for Dec. 1, 1915, George F. Comstock, metallurgist, Titanium Alloy Mfg. Company, Niagara Falls, N. Y., describes the occurrence and appearance of alumina inclusions in steel as follows:

> These inclusions are in the form of small rounded spots, arranged close together in one elongated streak. They are of a very dark bluish-gray color, when examined with the white light of an electric arc, appearing black unless highly magnified, and it is practically impossible to polish them without forming little pits around each inclusion. If the polishing is done very carefully, these pits may be kept very small; but with certain methods of polishing, the pits are made so large that the original inclusions cannot be seen at all. . . .
>
> . . . If the specimen is not rotated constantly during the final polishing, the pits take the form of short scratches, and each inclusion will have a little tail, like a comet. It will be noticed in Fig. 1 that although this shows a longitudinal view of a bar, the individual inclusions have not been elongated by the forging at all, but merely the group as a whole has been drawn out into a streak. . . .
>
> The difference between inclusions of alumina and ordinary slag or silicates in steel may then be summarized as follows:
>
> (1) Silicate inclusions will generally take a fairly smooth polish in a section prepared for microscopic examination, while alumina is very hard to polish without pitting. (2) Silicate inclusions are always elongated in the direction of rolling or forging, while alumina particles are not (the *groups* of particles are, of course, elongated but not the particles themselves). (3) Silicate inclusions are often found of quite large size (as well as very small), while particles of alumina are always small, and do not seem to coalesce into large bodies even when closely grouped together. These characteristics of alumina inclusions agree with what is known of the properties of alumina. Its great hardness and brittleness would account for the pitting effect; its infusibility would account for the small size of the particles and the tendency not to coalesce; and both of these properties together would account for

*From a report by the author, who is professor of metallurgy in Harvard University, Cambridge, Mass.

the particles not being elongated by forging or rolling of the steel in which they were embedded. . . .

All samples in which more than the merest trace of alumina was found by analysis were seen to contain the typical inclusions as described above, and those in which alumina was not found by analysis, did not contain these inclusions. Furthermore, those in which more alumina was found by analysis contained more of these inclusions than those in which only a very little was found. These facts have been considered as a good confirmation of the theory that the typical small inclusions, as described above, found in so many commercial steels, are chiefly, if not wholly, alumina.

THE PRESENT INVESTIGATION

As a preliminary step I took photomicrographs at a magnification of 300 diameters of five samples that Mr. Comstock used in his work, and a comparison of these photomicrographs with those taken by him showed that both sets were very similar and that they confirmed his description of the appearance of the inclusions.

In Fig. 1 is shown, under a magnification of 300 diameters the appearance of the longitudinal section of a bar forged from a steel ingot to which 0.144 per cent aluminum had been added during the teeming from the ladle to the molds. The steel was made at the Watertown Arsenal, Watertown, Mass., in a Tropenas converter. Both ferromanganese and ferrosilicon were used in recarburizing and deoxidizing. The inclusions shown in the photomicrograph present the characteristics described by Mr. Comstock as pertaining to alumina inclusions, namely, small dimensions of the individual particles, dark coloration, string formation in the direction of the forging but non-elongation of the particles themselves.

Attempts were made as follows to produce molten iron under such conditions as to preclude the occurrence in the solidified metal of any inclusions but alumina:

1. Thermit iron produced with an excess of aluminum.
2. Ingot iron melted with aluminum.
3. Ingot iron melted with alumina.

The results obtained are briefly described as follows:

THERMIT IRON

A small mass of thermit iron was produced in the usual way in a graphite crucible with the addition of a small amount of finely powdered aluminum to the thermit mixture as commercially supplied. The small ingot was forged into a bar about ¼ x ¼ in. in cross section.

It is believed that the thermit mixture practically consists of pure iron oxide and pure aluminum, and that any inclusions present must of necessity be alumina resulting from the oxidation of some aluminum.

A longitudinal section of the forged bar was prepared for microscopical examination and the polished but unetched surface photographed under a magnification of 300 diameters (Fig. 2). It will be seen to contain many small, dark and roughly rounded particles scattered through the iron. It should also be noted that there is no indication whatever of these inclusions having been elongated by the forging. Although they do not occur in clusters or in strings, they present the chief features described by Mr. Comstock as characteristic of alumina inclusions, the most significant of which is the absence of elongation in the direction of the forging.

INGOT IRON MELTED WITH ALUMINUM AND ALUMINA

A small amount of ingot iron was melted in an alundum crucible with the addition of aluminum. The expectation was that enough oxygen would be present to cause the oxidation of some aluminum and, therefore, the occurrence of alumina inclusions to the exclusion of all other inclusions. The resulting mass was forged into a bar measuring about ¼ x ¼ in. in cross section. A longitudinal section of the bar was polished and photographed under a magnification of 300 diameters. The presence of a number of small dark particles was clearly revealed (Fig. 3). They exhibit the characteristics previously described as pertaining to alumina inclusions, being small in size, dark in color, and non-elongated in the direction of the forging.

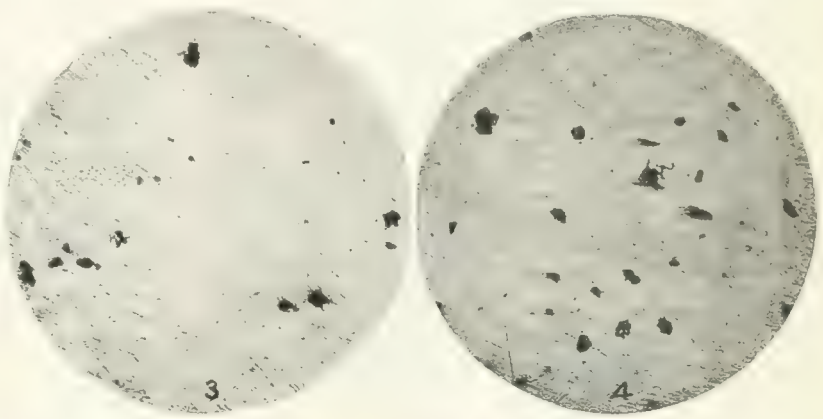


Fig. 3 is a Photomicrograph of the Longitudinal Section of a Bar Forged from Ingot Iron Treated with Aluminum. Fig. 4 is the Same from Ingot Iron Treated with Alumina. Both have been reduced about one-fourth from an original magnification of 300 diameters

Some ingot iron was melted in an alundum crucible with finely powdered alumina. It was assumed that while most of the alumina might float to the top of the molten bath, some of the finest particles at least would be retained in the solified metal as alumina inclusions. The small ingot was forged into a bar ¼ x ¼ in. in cross section, and the appearance of a longitudinal section polished and magnified 300 diameters is shown in Fig. 4. Here again we note the occurrence of small dark inclusions scattered through the mass and devoid of any tendency to elongate in the direction of the forging.

CONCLUSIONS

From the results published by Mr. Comstock and confirmed by my examination of some of his samples, and from the results obtained in my own experiments as reported in the foregoing pages, it seems justifiable to conclude that alumina inclusions may be distinguished under the microscope from the other inclusions generally occurring in steel, being characterized by their small size, their dark coloration and more especially by a complete absence of elongation in the direction of the rolling or forging.

About 600,000 automobiles were built in the United States in the year ended June 30, 1915, as compared with 445,000 on the preceding year. The output for the year ended June 30, 1916, is estimated at 900,000.

ACID RESISTING ALLOYS*

Composition and Properties of Duriron, Tantiron and Others—Substitutes for Stoneware

BY W. C. CARNELL

For many years various metals and alloys have been offered for which more or less acid resisting properties were claimed. They had their uses but as complete acid resisting materials they were not successful. With the advent of fused silica a decided advance was made, and it successfully replaced platinum in a number of processes.

FUSED SILICA, FERALUN AND FERROCHROME

In 1911 a basin of fused silica was tried out at the factory with which the writer was connected; so successful were the results that a 10-ton cascade concentrating plant for sulphuric acid was erected to replace a platinum outfit. The results were all that could be desired. The acid made was even better than that made in platinum. Fused silica is brittle and costly and must be handled with as much care as glass.

In 1913 a material under the trade name of Feralun was tried out. This was a mixture of cast iron and an abrasive, the abrasive being an alloy of aluminum and silicon. The surface of the iron was covered with the abrasive. The abrasive was acid resisting, but the acid soon destroyed the iron, leaving a porous mass. We, however, found Feralun useful for nipples on acid tank cars.

Fused silicon has acid resisting properties that are all that could be desired for sulphuric acid, but it is more brittle than fused silica, and its use has not been very extensive. Ferrochrome is a very promising product. Glacial acetic acid does not attack it; 56 and 28 per cent acetic acid attacks it slightly. Strong and weak nitric and sulphuric acids have practically no effect on the alloy. Hydrochloric acid attacks it readily. The experiments were carried out in a bowl 18 in. in diameter and 6 in. deep.

SILICON-IRON ALLOYS

The materials thus far mentioned are valuable for specific purposes. The real dawn of acid resisting alloy came with the use of silicon-iron alloys. The beginning of the use of these alloys was about six years ago. The first advertisement the writer observed of this alloy was in the *Journal* of the Society of Chemical Industry, Jan. 15, 1912. This was a silicon-iron alloy, Tantiron, introduced by the Lennox Foundry Company, Ltd., of London, England.

In May, 1912, after a year of experimenting, the first silicon-iron alloy in the United States was put on the market under the name of Duriron, by the Duriron Casting Company of Dayton, Ohio. Ironac is another trade name for a silicon-iron alloy made by the Houghton Company, Ltd., of London, England. While these are all alloys of iron and silicon, their composition is not the same.

Silicon-iron alloys, as put out under the above names, are very resisting to all strengths of sulphuric acid, and apparatus made of this alloy is used in all forms of concentrating vessels and cooling devices for the concentration of this acid. By the use of the so-called cascade basins, set in a proper furnace, full strength oil of vitriol is made from 50 deg. acid. If all the fittings and coolers are made from this alloy the resulting oil of vitriol is practically free of iron after the plant has been in operation a few weeks. Where brimstone acid is used the resulting oil of vitriol should not contain over 0.0002 per cent iron. For sulphuric acid concentration, the alloy is durable and the breakage is very small. A plant properly handled will run for months without a shut down. The success of the modern tower system for concentrating sulphuric acid has been due largely to the use of pipes and fittings made of this alloy.

*From a paper read before the eighth semi-annual meeting of the American Institute of Chemical Engineers at Cleveland, Ohio, June 16. Mr. Carnell is with Harrison Brothers Company, Philadelphia, Pa.

AS A SUBSTITUTE FOR STONEWARE

Silicon-iron alloy castings have extensively replaced stoneware parts for the manufacture of nitric acid. Early in 1915 the demand for nitric acid increased to enormous proportions; extensions to old nitric acid plants and the erection of new and larger plants was immediately demanded. The capacities of the stoneware factories of the country were soon taxed to their limit. Deliveries could not be made under six months, if at all; had the production of nitric acid been dependent upon stoneware as it was a few years ago, the production of nitric acid would have been greatly curtailed and the story of the great war would probably be different.

The silicon-iron alloy is resistant to nitric acid of various strengths. It can be cast into all the various forms required for nitric acid apparatus. Castings can be made as readily and as quickly as can those made of cast iron. Here was the ideal substitute for stoneware. Necessity compelled its use and to-day it has largely superseded stoneware for nitric acid production.

DURIRON IN A NITRIC ACID PLANT

A large nitric acid plant equipped entirely with this alloy in the form of Duriron was in service for eight months; the alloy showed no indications of corrosion or deterioration. There was practically no breakage. Fire destroyed the building housing of the plant and most of the supports for the apparatus. It did not harm the castings, though they were exposed to intense heat, and 80 per cent were recovered, put into service and are in use at the present time. Ninety per cent nitric acid, made in a plant equipped with Duriron castings showed an average iron content of 0.0014 per cent iron, while 36 deg. nitric acid (52.30 per cent) showed 0.0042 per cent iron.

The silicon-iron alloy was developed to resist acid. It not only resists acid, but it is resistant to corrosion and to rust. Ground surfaces, representing the true alloy, are practically immune from rust. The rough casting may show some rust on exposure, but this is due to impurities in the surface, caused by contact of the alloy with the molding sand; this is a surface rust only and will not penetrate. The alloy is also heat resisting, when made of suitable design. The walls must not be too thick for very high temperatures. Castings do not distort on heating, but hold their form up to the melting point. The composition properties of Duriron are as follows:

Silicon	14.00 to 14.50 per cent
Manganese	0.25 to 0.35 per cent
Total carbon	0.20 to 0.60 per cent
Phosphorus	0.16 to 0.20 per cent
Sulphur	Under 0.05 per cent
Melting point	2500 to 2550 deg. Fahr.
Specific gravity	7.00
Compression strength	70,000 lb. per sq. in.
Tensile strength	25 per cent less than cast iron

A bar of Duriron was compared with a bar of equal size of the best grade of chemical pottery, under equal conditions, the earthenware test bar broke so quickly that the testing machine gage did not record any pressure. The Duriron bar broke under a load of 1000 lb. By using a suspended vessel on an earthenware bar and gradually loading it with small pieces of metal and sand, a breaking test of 100 lb. was obtained for the earthenware bar.

TANTIRON AND ITS PROPERTIES

Tantiron was first produced by Robert W. Lennox of the Lennox Foundry Company of London, England, about 1908. In 1913 the rights for the use of this alloy in the United States, Canada and Mexico were acquired by the Bethlehem Foundry & Machine Company of South Bethlehem, Pa. An approximate analysis of the properties of Tantiron is as follows:

Silicon	14.00 to 15.00 per cent
Sulphur	0.05 to 0.15 per cent
Phosphorus	0.05 to 0.10 per cent
Manganese	2.00 to 2.50 per cent
Carbon (graphite)	0.75 to 1.25 per cent
Melting point about	2550 deg. Fahr.
Specific gravity	6.8
Tensile strength	6 to 7 tons per sq. in.

In general silicon-iron alloys cannot be cast in rectangular shapes or flat surfaces. The chemical engineer should collaborate with the foundryman in order to design shapes which can be produced in the foundry and still serve the purpose of the operating conditions required.

The alloy is not suitable for apparatus in which high internal pressures are to be used unless it is protected by a protecting jacket. Forty to fifty pounds is given as the maximum pressure for an autoclave made of Tantiron.

CONCLUSIONS

While there is still opportunity for improvement and while there is much more to be desired in an acid resisting material out of which to construct apparatus for the acid industry, yet the silicon-iron alloy or silicide of iron, as it has been called, has proved a boon to the acid industry, and without which many things could not have been accomplished.

It is more efficient than stoneware. At best, chemical stoneware, if made properly, should take 10 to 12 weeks for its production. Castings of this alloy can be made and delivered in the same time it takes to make castings out of cast iron.

The limitation to castings of this alloy are shop and foundry limitations only. One company has a foundry with a furnace capacity of 72 tons per day. To-day thousands of tons of castings made of this alloy are in use. It is finding its way into all branches of the chemical industry. Since its introduction new chemical processes have been started which were impossible before because of lack of suitable apparatus.

Silicon-iron alloys are being improved rapidly and the time does not seem far distant when all sorts of vessels will be made of this or a similar alloy that will give to the chemical industry the ideal non-corrosive material that may be fabricated into all the shapes peculiar to the needs of the industry.

Two-Speed Alternating-Current Elevator Motor

A car speed of 400 ft. per minute is made possible by the use of a new alternating-current motor for elevator service that has been developed by the Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa. Formerly the speed limit for this type of equipment was 200 to 250 ft., it is explained, due to the fact that a single-speed motor which was stopped by a mechanical brake had to be used. The special feature of the new two-speed motor is the employment of two separate windings in both the stator and the rotor. For starting a 24-pole connection is used which gives a motor speed of 250 r.p.m. As soon as this is reached the connections are changed automatically to give eight poles and the motor then comes up to a speed of approximately 850 r.p.m.

In slowing down the 24-pole connection is again brought into service and advantage is taken of the fact that an induction motor driven above synchronism acts as a generator to produce an electrical braking action that reduces the speed. The car is finally brought to rest by an electrically-operated mechanical brake which is applied after the motor is disconnected from the supply line. The controller used consists of a number of magnetically-operated switches and relays which cut the resistance out of the circuit automatically and shift the line connections from one winding to the other at the proper time.

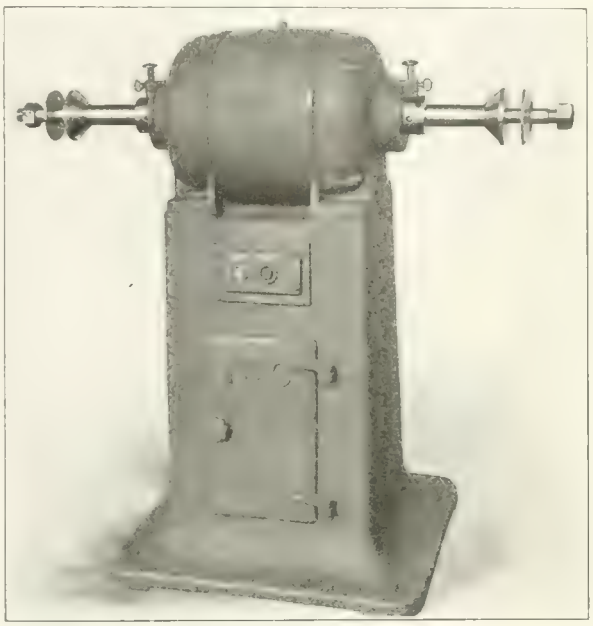
The D. Wilcox Company, Mechanicsburg, Pa., manufacturer of drop forgings, etc., at its recent annual meeting elected officers as follows: President and general manager, Frank E. Wilcox; vice-president, Samuel T. Houck; secretary and treasurer, Mervin E. Anderson.

Manufacturers of Chattanooga, in an effort to cope with the labor shortage, have organized an employment bureau. Offices have been opened in the Manufacturers' Building, 815 Broad Street, with A. D. Kirby in charge.

Push-Button Controlled Polishing Lathe

A new design of motor-driven polishing and buffing lathe has been added to the line built by the Gardner Machine Company, Beloit, Wis. This new machine, which is built in several sizes, is provided with push-button control and a fan is mounted on the armature shaft to supply forced ventilation for the driving motor, which is of the inclosed type. Special end frames containing the ball bearings for the armature are used for the motors. Either direct or alternating current motors are used, and it is possible to provide adjustable speed for the wheels when desired.

The push-button control panel is conveniently located on the front of the machine pedestal. The button at the right is used for starting and is sunk below



Motor-Driven Polishing and Buffing Lathe Equipped with a Push Button Control Panel Recessed to Prevent Accidental Starting and a Fan Mounted on the Motor Armature to Provide Forced Ventilation for the Inclosed Driving Motor

the face of the plate with a view to preventing unintentional starting. A further precaution against accidental closing of the circuit is supplied by a simple locking device provided for the stopping button at the left of the panel. Either alternating or direct current motors are used and it is possible to vary the speed of the machine spindle. When an adjustable-speed drive is desired direct-current motors having a speed range or operating at a constant rate are used, a lever within the base being moved to the desired rate. Pressing the starting button then causes the motor to come up to the speed at which the adjusting device in the base is set. With the alternating-current motor, it is not possible to obtain as fine an adjustment, as only certain speeds are available.

The motor used for driving the machine is fully inclosed, an arrangement which is relied upon to make them both dust and dirt proof. A fan attached to the motor shaft inside of the cover draws air up from the base on the right, forces it through the motor and down into the pedestal at the left. In this way it is emphasized a thorough circulation of air is obtained under normal operating conditions and the motor is prevented from overheating.

When it is desired to change the wheels a special locking device is employed. This consists of a button head pin acting over a coil spring. One of these devices is provided for each spindle, and in use they are pushed down into one of the four holes which are placed at equal distances around the spindle collar. It is thus possible to lock either one or both spindles as may be desired.

The Minneapolis Crucible Steel Company, Minneapolis, has purchased a small Snyder electric furnace.

The Oxygen Content of Iron and Steel*

Its Effect on Their Properties—The Johnson Irons Discussed—The Presence of Oxygen in Ingot Iron

BY J. ALLEN PICKARD

THE following report is a continuation of previous work on the same subject carried out by the author, and also jointly with F. M. Potter, and published in *Carnegie Scholarship Memoirs*, 1912, page 52, and *Journal of the Iron and Steel Institute*, 1914, No. II, page 181. The results already published refer almost entirely to open-hearth steel, and the present paper deals with other varieties of steel and with cast iron and wrought iron.

OXYGEN IN BESSEMER STEEL

The specimens examined were supplied through the courtesy of Samuel Fox & Co., Ltd., of Sheffield, and C. H. Ridsdale of Middlesbrough. The specimens were chosen as being representative of their class, and good, average quality material, so that the results may be taken as indicative of the amount of oxygen normally occurring in this class of steel. For convenience of reference the samples are arranged in the various tables in ascending carbon order.

It is possible to notice in the Bessemer steels some correspondence between silicon and oxygen content, but the relation is too ill marked and irregular for much importance to be attached thereto. The very striking exception (No. 11) which has 0.015 oxygen with 0.255

Oxygen in Acid Bessemer Steel

No.	Carbon, Per Cent	Manganese, Per Cent	Silicon, Per Cent	Sulphur, Per Cent	Phosphorus, Per Cent	Oxygen, Per Cent
1	0.42	0.61	0.066	0.049	0.057	0.014
2	0.45	0.85	0.080	0.056	0.048	0.017
3	0.49	0.90	0.098	0.048	0.054	0.014
4	0.51	0.83	0.048	0.046	0.056	0.018
5	0.53	1.07	0.060	0.045	0.050	0.007
6	0.75	1.01	0.082	0.049	0.049	0.014
7	0.80	0.85	0.090	0.046	0.050	0.006
					Mean	0.013

Oxygen in Basic Bessemer Steel

8	0.01	0.175	nil	0.055	0.05	0.077
9	0.09	0.475	nil	0.055	0.05	0.031
10	0.475	1.0	0.085	0.06	0.05	0.010
11	0.49	1.0	0.255	0.06	0.07	0.015
					Mean.....	0.019[1]

[1]Omitting No. 8, which was not deoxidized.

silicon strengthens a suggestion expressed in a former paper that oxygen content is not dependent on the actual percentages of other elements present, but rather on details of procedure in manufacture. Thus it may well be that with a firm regularly making steel of one general composition and observing the same procedure from day to day, the oxygen may be found to vary inversely with the silicon content; while with another maker, steel of approximately the same analysis may contain quite a different amount of oxygen. If this opinion were ultimately substantiated, then the oxygen content of the finished metal would appear to be one trustworthy criterion of the excellence of the works practice.

CRUCIBLE STEEL

The samples examined were supplied by Samuel Fox & Co. and Sir Robert Hadfield. Their analyses and oxygen contents are given in one of the tables.

WROUGHT IRON

Swedish wrought iron, purchased wrought iron of unknown make, and specimens of best Yorkshire iron were examined. The Swedish iron was in the form of a thin flat bar, and drillings were taken along the whole length. The purchased iron in the form of plates was drilled at various points in the surface. The best Yorkshire iron was supplied as a round bar and the samples for analysis were taken by mounting in the lathe and turning off the end face completely from the circumference to the center and thoroughly mixing the turnings. The Yorkshire iron is lowest in oxygen, the Swedish slightly higher, and the purchased samples very much higher.

An interesting, and at first sight rather puzzling, matter is the difference between the loss in weight of the samples due to abstraction of the oxygen and the total loss in weight, which is especially noticeable in the case of the Yorkshire iron. When a determination of oxygen is made the difference in the weight of the sample before and after treatment is always determined, as a precaution which might serve to detect errors. For instance, if the total loss in weight of the sample were less than the percentage of oxygen found it would be evident that the latter must have been erroneous. In the case of steels it is found in practically every case that the loss in weight, as would be expected, is slightly greater than the percentage of oxygen found, but not very much so. This might readily be explained by loss of moisture from the surface of the drillings in the first operation of the method of analysis, by loss of carbon, of sulphur, and perhaps nitrogen.

It had been anticipated that in the case of wrought iron, in which there was no reason to expect that total loss in weight from these causes would be greater than in steel, the oxygen percentage would check fairly well with the loss, but this is not the case. The difference is explainable, however, even with the Yorkshire iron, on the assumption that oxygen is extracted in combination with carbon; and determinations of carbon before and after the oxygen determination were made, with the result that about 80 per cent of the difference between oxygen percentage and total loss was found to be due to carbon. In both cases the difference between oxygen and loss is nearly the same for samples of the same material, although the oxygen percentage is not so:

	Oxygen, Per Cent	Loss, Per Cent	Difference, Per Cent	Carbon, Before, Per Cent	Carbon, After, Per Cent
Wrought iron (1)...	0.510	0.565	[illegible]	[illegible]	...
Wrought iron (2)...	0.603	0.657	[illegible]	[illegible]	...
Yorkshire iron (1)...	0.161	0.268	0.107	[illegible]	...
Yorkshire Iron (2)...	0.110	0.208	0.098	0.122	0.042

This result is particularly interesting, since it suggests that oxygen is first eliminated from iron (and presumably also from steel) chiefly in the form of carbon monoxide produced by the initial action of carbon on iron oxide, and that the water formed and weighed only results from the decomposition of this intermediate product, and not directly from the oxide itself. The possibility that all oxygen may be originally present as carbon monoxide is excluded by microscopic evidence adduced by Law, by Matweieff and Steinberg. Law finds that oxide specks were visible under the microscope if the specimen had received a high polish and a magnification of 1000 diameters. When the polished specimen was heated in hydrogen, pits resulted which occupied a greater area than the original spots. The results of Matweieff are corroborative. Steinberg finds that open-hearth steel before deoxidation shows characteristic streaks and cracks in the ferrite crystals.

These results show definitely that some oxygen is present as oxides of iron and manganese. Simple decarburization owing to the heating in hydrogen, irre-

*From a paper which was granted a Carnegie Scholarship memoir by the Iron and Steel Institute in May 1913.

spective of oxygen in the metal, is excluded by the fact that decarburization does not take place to anything like the same degree with steel, which contains more carbon but less oxygen; and also because the decarburization does not proceed beyond this limit if heating be longer continued.

In passing it may be remarked that this behavior furnishes corroborative evidence that the objection to the author's method of estimation, based on the assumption that carbon monoxide will not be extracted from steel except in a high vacuum, is quite unfounded. Considerable support is also given to the view, which has gradually been gaining weight, that carbon

Oxygen in Acid Open Hearth Steel

No.	Carbon, Per Cent	Manganese, Per Cent	Silicon, Per Cent	Sulphur, Per Cent	Phosphorus, Per Cent	Oxygen, Per Cent
12	0.67	0.73	0.05	0.035	0.025	0.004
13	0.79	0.65	0.21	0.030	0.030	0.021
14	0.93	0.68	0.035	0.031	0.027	0.007
15	1.08	0.62	0.024	0.033	0.022	0.014
16	1.18	0.65	0.056	0.027	0.025	0.006
17	1.33	0.42	0.140	0.030	0.024	0.004
18	1.55	0.49	0.100	0.027	0.026	0.011
				Mean		0.010

Oxygen in Basic Open-Hearth Steel

19	0.10	...	0.05	...	...	0.037
20	0.14	0.35	0.020	0.033	0.018	0.011
21	0.20	...	0.04	...	...	0.030
22	0.23	0.70	0.1–.15	0.060	0.026	0.014
23	0.26	0.49	0.120	0.030	0.031	0.005
24	0.30	...	0.05	...	...	0.029
25	0.32	0.62	0.1–.15	0.051	0.020	0.041
26	0.33	0.62	0.1–.15	0.047	0.025	0.023
27	0.35	0.56	0.182	0.027	0.020	0.007
28	0.41	0.52	0.026	0.032	0.023	0.017
29	0.44	...	0.04	...	...	0.027
30	0.54	0.69	0.085	0.022	0.024	0.003
31	0.55	0.97	0.1–.15	0.035	0.011	0.017
32	0.55	...	0.05	...	...	0.020
33	0.61	0.74	0.1–.15	0.053	0.021	0.041
34	0.66	0.65	0.100	0.033	0.052	0.006
35	0.75	0.38	0.025	0.025	0.022	0.026
36	0.82	0.67	0.096	0.030	0.028	0.006
37	1.00	0.67	0.036	0.016	0.025	0.007
				Mean...	...	0.019

monoxide, and even dioxide, extracted from steel by heating *in vacuo*, do not exist as such in the steel, but are formed as a result of the action of carbon on oxides present. There is clear evidence that oxygen, originally present as a metallic oxide, parts company with the steel in combination with carbon even when the metal is heated in an atmosphere of hydrogen.

OXYGEN IN INGOT IRON

A sample of this material supplied from America, guaranteed 99.86 per cent iron, was found by the author to contain 0.092 per cent oxygen. The American analysis showed 0.009 per cent oxygen. Dr. Stead has informed the author that for another ingot iron he has obtained before deoxidation 0.07 per cent oxygen and after deoxidation 0.02 per cent oxygen.

A specimen of iron which had remained under a highly oxidizing slag for many hours in a basic open-hearth furnace was sent to the author by W. J. Brooke, of the Shelton Iron, Steel & Coal Company. In this case all impurities had been practically eliminated by the strong oxidation, and assuming that sufficient time had been allowed for the oxide added to dissolve to saturation in the bath, and for the excess to float up and enter the slag, the metal probably contained as much oxide as it could hold without the presence of suspended globules of oxide. The sample, on analysis, yielded:

	Per Cent
Carbon	0.022
Manganese	0.024
Sulphur	0.028
Phosphorus	0.008
Oxygen	0.092

If it be assumed that in this case the bath was saturated with oxide and contained no oxide in suspension, then, calculating oxygen as FeO, the figure 0.405 per cent FeO is obtained for the solubility of oxide of iron in liquid metal. In this place it may be interesting to recall the blown Bessemer metal, No. 8, which contained 0.077 per cent of oxygen and was probably not completely saturated.

The foregoing figures for ingot iron may be considered definitely to prove that oxide of iron is soluble to a moderate extent in liquid iron, and permit of an approximate estimate of the extent of this solubility being made. They cannot, however, be taken to show that the oxide remains dissolved when the steel solidifies, although the microscopical evidence already cited permits the belief that a considerable part also remains in solid solution.

OXYGEN IN CAST IRON

Some attention having been drawn by J. E. Johnson, Jr., claiming the most remarkably beneficial results from the presence of oxygen in cast iron, some specimens of gray and of white irons were examined.

When the exceedingly complex nature of iron is borne in mind, and the very considerable percentage of carbon, silicon, and manganese often present, it seems *prima facie* extremely unlikely that oxygen can coexist therein, and it was consequently with considerable surprise that unmistakable indications of its presence in white iron were found. Two specimens of chilled iron were kindly supplied by W. M. Frank Schneider, of the British Griffin Chilled Iron & Steel Company. Specimen No. 1 was stated to be of excellent quality for the special purposes of the makers, and No. 2 not quite so good. The analyses of the two samples were as follows:

	No. 1, Per Cent	No. 2, Per Cent
Combined carbon	2.56	0.797
Graphite	0.70	2.450
Silicon	0.61	0.699
Sulphur	0.067	0.126
Phosphorus	0.198	0.207
Manganese	0.987	0.532
Oxygen	0.017	0.021

This material being particularly hard and tough, and consequently difficult to disintegrate, it may not be out of place to state here that the samples for analysis were obtained by drilling with a specially tempered flat drill. The outside of the samples was carefully cleaned on an emery wheel and the outer skin drilled well through before any material was collected for analysis. The samples never became more than warm to the touch during drilling, and closely agreeing results for oxygen were obtained on 30-gram samples.

From the above figures it is impossible to doubt that small amounts of oxygen occur in white iron. What the state of combination may be, and what effect, if any, its presence may have on the quality of the

Oxygen in Crucible Steel

No.	Carbon, Per Cent	Manganese, Per Cent	Silicon, Per Cent	Sulphur, Per Cent	Phosphorus, Per Cent	Oxygen, Per Cent
38*	0.58	0.44	4.71	0.034	0.022	0.001
39	1.14	0.38	0.068	0.020	0.023	0.017
40	1.20	0.36	0.108	0.020	0.021	0.001
41	1.48	0.67	0.072	0.020	0.021	0.008

*Aluminum = 1.55 per cent.

Oxygen in Wrought Iron

	Carbon, Per Cent	Manganese, Per Cent	Silicon, Per Cent	Sulphur, Per Cent	Phosphorus, Per Cent	Oxygen, Per Cent
Swedish	0.05	0.07	0.02	0.01	0.02	0.214
Unknown	0.022	0.071	0.112	0.026	0.234	0.510
Unknown	0.026	0.066	0.115	0.023	0.226	0.663
Best Yorkshire	0.122	0.02	0.05	0.010	0.05	0.136

Oxygen in Ingot Iron

	Carbon, Per Cent	Manganese, Per Cent	Silicon, Per Cent	Sulphur, Per Cent	Phosphorus, Per Cent	Oxygen, Per Cent
American	0.040	0.040	nil	0.020	0.004	0.092
English—						
Before deoxidation						0.092
Before deoxidation (Dr. Stead)						0.07
After deoxidation (Dr. Stead)						0.02

metal it is impossible to state. Taken in conjunction with the fact that no sample of gray iron examined by the author, or by other investigators, except Johnson's special irons, has been found to contain oxygen even up to 0.01 per cent, it is reasonable to conclude that the rapid chilling has the effect of locking up carbon monoxide which would otherwise escape. It is obvious that the slight difference in oxygen percentage is incapable of explaining the difference between the quality of these two specimens—indeed the difference

between the respective percentages in the two samples of the other constituents is incomparably more significant. The chief interest attaching to the results is that they show that oxygen is present in material from which it has hitherto usually been assumed to be absent; and that an amount of oxygen which would be important if found in steel may exist in material containing even such, comparatively, large amounts of silicon, carbon, and manganese, as commercial cast irons.

The influence of oxygen on the properties of steel has so far been chiefly a matter of conjecture. Cushman and also Law consider that oxygen has a marked effect in increasing the corrosion of the metal through rusting. Law found that plates of ordinary steel were corroded in London atmosphere at a rate 24 per cent greater than were plates of similar steel deoxidized by adding fair amounts of ferrosilicon.

Campbell states that since the ductility of open-hearth steel increases as the composition of pure iron is approached, oxygen cannot have a very great deleterious effect, since it will be high in the purer and more ductile irons. He even speculates that oxide of iron may confer abnormal adhesive power. Bradley Stoughton, on the other hand, takes an opposite view. In his "Metallurgy of Iron and Steel" he states: "Oxygen occurs in iron and steel as FeO and Fe_2O_3. In either form its presence is very harmful, producing brittleness in both hot and cold steel, besides causing liability to blowholes. . . . There is probably no constituent more harmful to steel than oxygen. . . . the effect of oxygen is somewhat similar to that of sulphur, and, in common parlance, makes the steel 'rotten.'"

It is evident from these opinions that the effect of oxygen on steel is a matter of dispute, and while endeavoring to keep an open mind on the subject we may consider here a few examples of materials which have proved unsatisfactory in use, for whose failure no obvious reason offered itself except the presence of oxygen.

STEEL FAILURES DUE TO OXYGEN

In some cases it has been possible to obtain specimens of satisfactory material similar to those which have failed, and when these have been found to contain less oxygen than the unsatisfactory material there is ground for supposing oxygen to be connected with the cause of failure. In many cases, however, no noteworthy difference could be found between oxygen percentages in good and bad material, and accordingly these failures could not be taken as evidence of the harmful effects of oxygen, and have not been included here.

A specimen of steel which had given rise to "non-sizing" in wire-drawing, together with another steel practically identical in composition but perfectly satisfactory in this respect, was referred to the author with the following results:

	Oxygen, Per Cent
"Non-sizing" specimen	0.021
Normal specimen	0.012

Analysis and numerous mechanical tests of a searching character had been carried out on the specimens before the determination of oxygen, but had failed to bring to light any difference to which the defect could reasonably be attributed.

In several machines in which a certain part was subjected to jarring strain, and occasional rapid and irregular alterations of stress, one of these parts fractured unexpectedly. The material from which it was manufactured had the following analysis:

	Per Cent		Per Cent
Carbon	0.35	Phosphorus	0.035
Manganese	0.64	Sulphur	0.035
Silicon	0.29	Nitrogen	3.30

and the fractured part agreed almost exactly in composition with similar members which did not break. On carrying out estimations of oxygen in the broken piece, and also in the satisfactory material, the following results were found:

	Oxygen, Per Cent
Broken part	0.02
Satisfactory part	0.015

The figures suggest strongly that oxygen was to blame in this case.

The author was favored by the North-East Coast Institution of Engineers and Shipbuilders with a specimen from a consignment of ship plates which had failed mysteriously. On analysis the specimen gave the following figures:

	Per Cent		Per Cent
Graphite	trace	Sulphur	0.108
Combined carbon	0.06	Phosphorus	0.091
Manganese	0.611	Arsenic	trace
Silicon	0.008	Oxygen	0.035

Unfortunately a comparison specimen of good material was not available. In the author's opinion the oxygen percentage is dangerously high and likely to produce bad effects, but in view of the rest of the analysis, particularly as regards sulphur and phosphorus, it would be unwise to attribute the failure to this cause alone.

The analysis of another sample of ship plate, sent by S. A. Houghton, which failed unaccountably, has already been published, but is not out of place to refer to it again here. In this case the general analysis was much better and the oxygen lower:

	Carbon, Per Cent	Silicon, Per Cent	Manganese, Per Cent	Sulphur, Per Cent	Phosphorus, Per Cent	Oxygen, Per Cent
Outside	0.225	0.082	0.598	0.04	0.054	0.017
Inside	0.22	0.094	0.594	0.029	0.052	

Here again, since it is evident from the many results given that oxygen need not exceed 0.01 per cent. in first quality material, this element is at least suspect.

A specimen of acid open-hearth steel which was required to withstand very heavy sudden blows soon after putting into service broke suddenly into a number of pieces. Analysis showed:

	Per Cent		Per Cent
Carbon	0.45	Sulphur	0.032
Silicon	0.20	Phosphorus	0.038
Manganese	0.77	Oxygen	0.050

The oxygen is seen to be exceedingly high for this class of material, while the remainder of the analysis is irreproachable. Microscopic examination failed to detect any error in heat treatment. The conclusion that oxygen was accountable for this failure seems therefore justified.

SUMMARY AND CONCLUSIONS

The results from ingot iron indicate 0.405 per cent FeO for the solubility of ferrous oxide in liquid steel nearly free from other elements.

The results obtained all point in one direction—that oxygen in steel, if exceeding 0.01 per cent, tends to produce brittleness under shock. The problem is one of unusual difficulty since the straightforward method of making a direct comparison between steels similar in every respect except oxygen content, and mechanically and microscopically testing them to discover in what respects they differ, is practically impossible. The only method available appears to be to test actual failures and compare them with normal material of the same class, the solution of the problem being consequently a slow matter.

Against the above conclusion it may be urged that many wrought irons and "ingot" irons are not at all brittle under shock. But here it must be borne in mind that the practical absence of carbon from these materials produces a profound difference in character, and it is very likely that the effect of oxygen on nearly pure iron will differ from its effect on steel.

Non-Corrosive Alloy for Valves and Fittings

A special non-corrosive alloy suitable for valves and fittings where sulphuric acid or sulphurous compounds are used, as well as on fireline standpipe equipment, has been placed on the market by the M H-Aterite Company, 55 John Street, New York. One of the special advantages claimed for the use of this material in the latter case is that fittings made from it do not require polishing as is the case with those made of brass or bronze or plated with nickel. Three standard finishes are supplied which resemble cast iron, burnished steel and nickel plating, although almost any surface finish desired can be supplied.

Cooled Drinking Water for Shops

One method of supplying cold drinking water in the shop, particularly by means of the bubbling type of fountain, is to pass the water as needed through a coil of the water-supply pipe submerged in melting ice. Apparatus has been built for this purpose, arranged under the floor level, or in the more or less portable type above the floor. The construction of these water coolers was recently illustrated in *Metal Worker, Plumber and Steam Fitter* and from that journal the following notes have been taken:

Where conditions require the placing of the water cooler underground so that it will be out of the way and not interfere with the shop equipment, it can be ar-

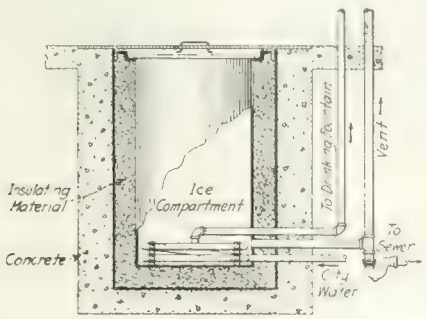


Fig. 1—Type of Water Cooler for Use Underground

ranged as shown in Fig. 1. For an ice capacity of 100 lb., which is a size commonly used and found satisfactory, an ice compartment of 20 x 36 in., which is the inner tank or can, is required. The outfit consists of two No. 20 to 18 gage galvanized tanks set inside of each other and separated with an insulating material which may be hair-felt or mineral wool but preferably granulated cork. This insulation should be from 4 to 6 in. thick in order to effectively retain the cold given off by the ice which cools the water passing through the coil. Double covers are also necessary. The outside cover may be of cast-iron or wood and is set in a curbing fixed in the floor. A loose handle should be provided as shown so that it may be dropped into position to be level with the floor when not in use.

The ice compartment of the cooler shown in Fig. 1 is provided with two or three turns of brass pipe coil formed in a spiral so that the whole bottom is practically covered. The pipe is supported vertically on stands or clamps made of strap iron. If water is allowed to penetrate the insulation, it will lose its value and in time rot away. For this reason the outfit should be in a concrete pit which has been waterproofed. A pit having 6-in. sides and a 4-in. bottom will be found satisfactory.

Instead of the underground cooler, a portable type water cooler for use in the factory or shop as shown in Fig. 2 may be found more desirable in a good many cases. This cooler is usually made with an ice compartment of 12 x 16 in. so that it will not be bulky and will present a neat appearance. It is built in a manner similar to the underground cooler, having two galvanized tanks separated with 4 to 6 in. of insulating material, and the top covered with a removable lid. Inside the ice compartment a spiral coil as before may be used but preferably a coil encircling the inside part close to the walls of the inner tank and wound the full height should be employed. While block tin coils are sometimes used with a screen around them for protection against damage, a brass pipe cooling coil will be found more serviceable.

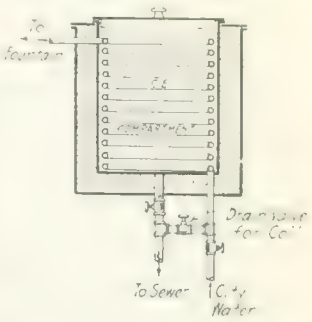


Fig. 2—Portable Type of Water Cooler Suitable for Many Conditions

While iron pipe coils are more substantial their transmitting value at the relatively low temperatures handled in cooling drinking water is very low. For this reason brass pipe is used extensively. To approximately determine the amount of coil required for a given service, it may be readily determined by dividing the gallons used during an hour by two, which will give the square feet of brass coil surface or ½ sq. ft. of brass coil surface is necessary for 1 gal. an hour. Thus, for 100 gal. an hour 50 sq. ft. of coil will be necessary.

Some typical installations in which the portable cooler may be employed are shown in Fig. 3, in which the outfits illustrated represent standard fixtures made by the Manufacturing Equipment & Engineering Company, Boston, Mass.

Razing a Village for Manganiferous Ore

U. S. Consul Talbot J. Albert, of the Brunswick district in Germany, reports that one of the greatest difficulties of German steel manufacturers has been the scarcity of manganese ore. The ore used by the Ilseder Hütte blast furnaces in that district near Peine is sufficiently high in manganese to be shipped to other plants in Germany as a substitute for imported manganese ore. The demand has been so great that a part of the village of Adenstedt with its church has had to be demolished. The Ilseder company has recently declared a dividend of 33 1/3 per cent, which the annual report states is due principally to the sale of this ore.

The Providence Engineering Society will occupy new rooms at 29 Waterman Street, Providence, R. I., when it opens up for the fall and winter activities next September. The whole second floor of the building has been taken and is to be remodeled. Albert E. Thornley, P. O. Box 796, is corresponding secretary.

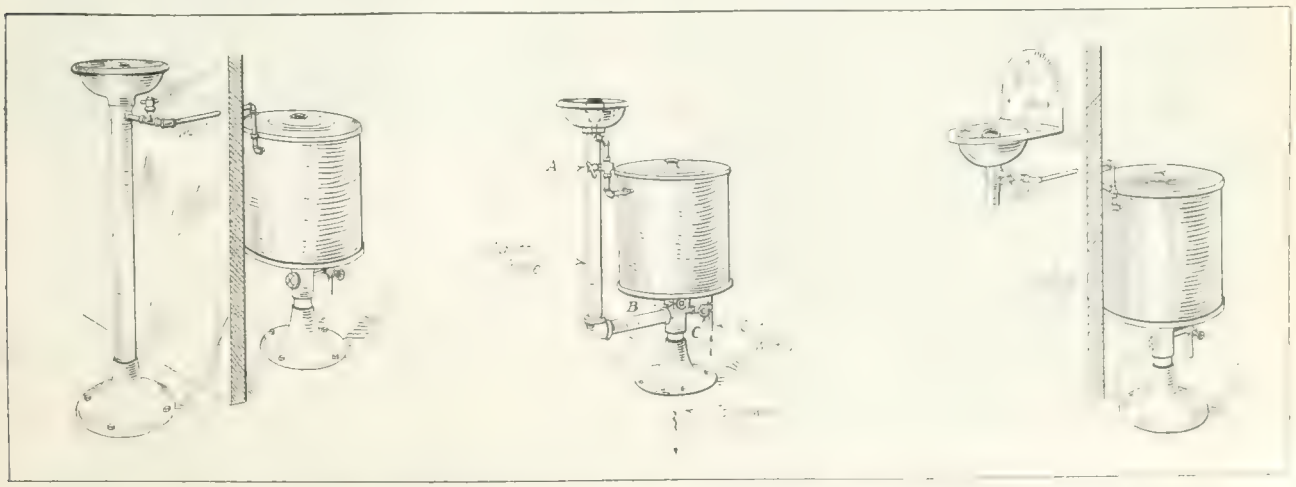
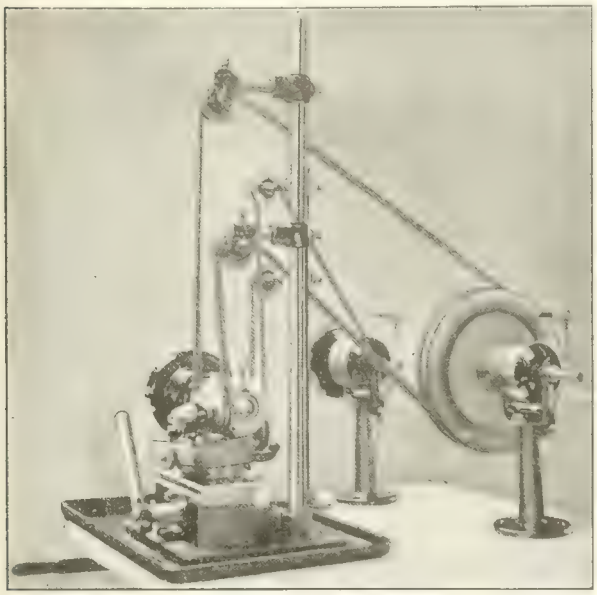


Fig. 3—Three Typical Arrangements Showing How a Portable Type Water Cooler May Be Employed

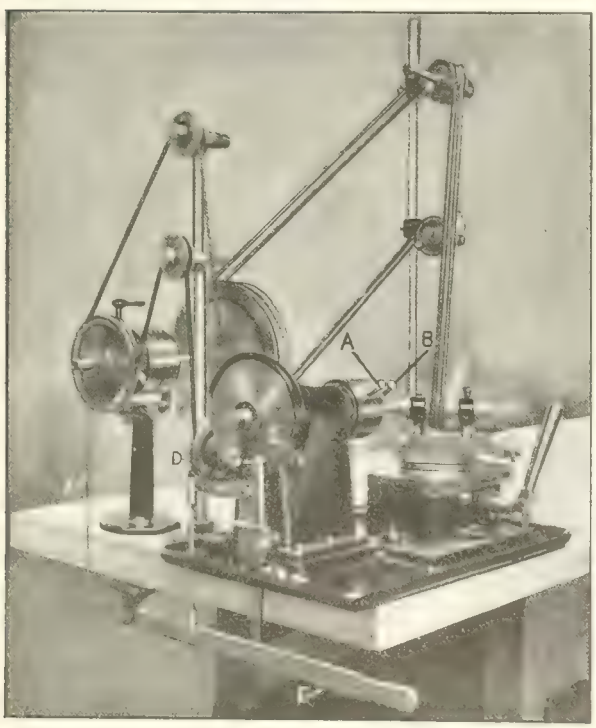
Machines for Routing Powder Grooves

Two machines for routing powder grooves in the time train rings for 80 and 85 fuses have been recently completed by the American Machine & Foundry Company, 346 Carroll Street, Brooklyn, N. Y. These machines were designed by E. A. Lundwall

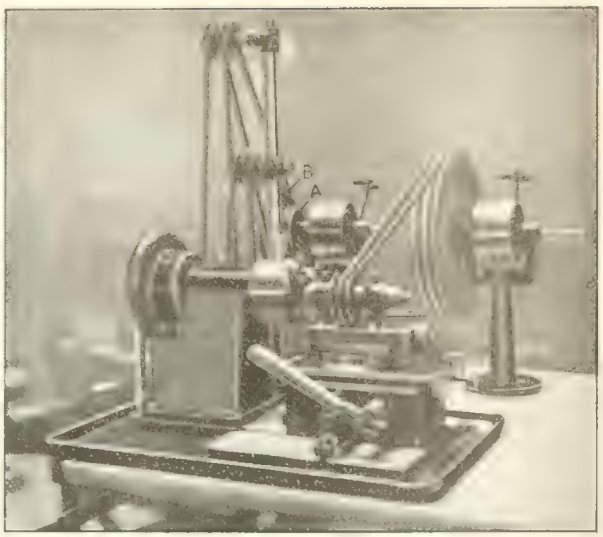


The Roughing Machine in Which the Groove Is Cut Out with a Circular Milling Cutter Mounted on a Spindle Set at an Angle with the Work

for the International Arms & Fuze Company and were built under his supervision. The two machines operating together will produce a completely grooved ring every 20 sec. The first machine is designed to take the brass ring and rough out the groove, while the other is intended to complete the work of the first machine and turn out a smoothly finished groove. Although this is the general scheme of operation, it is possible in some cases to do the entire operation on the roughing machine.

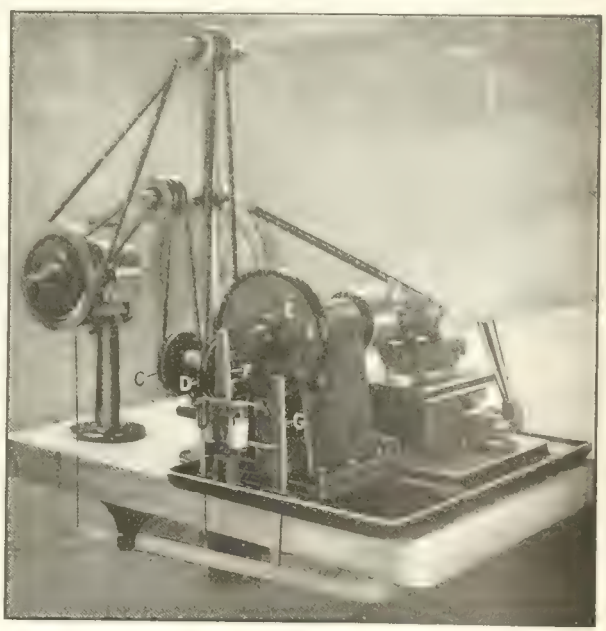


The Index Plate and Starting Lever of the Roughing Machine in the Foreground with the Cutter Spindle Set at an Angle to the Right behind the Chuck



The Finishing Machine with the Double Belt Drive for the Cutter Spindle Which Operates at 8000 R.p.m.

The roughing machine has the cutter spindle mounted at an angle and employs a circular cutter running at 4500 r.p.m., which removes stock so that the roughing operation is completed in 10 sec. In operation the ring is placed in the chuck, the jaws of which close against the work and also move back to hold it firmly in place when the chuck closing handle *A* is pulled. The handle *E* below the table is raised to shift the driving belt from the loose to the tight pulley through the action of the rod *F*. This operation also releases the locking bolt from a slot in the periphery of the index plate *C*. The spindle, which is driven by a friction worm, is now free to



The Special Index Plate Used on the Finishing Machine to Stop and Start the Work and Provide Two Different Rates of Work Speed

revolve. The machine is stopped by a pin in the index plate striking the lever *G*, which seats the locking bolt in the other notch in the index plate.

The finishing machine is practically the same in construction as the one employed for roughing, except that the cutter spindle which rotates at 8000 r.p.m. is not set at an angle with the face of the work and has a special type of index plate for automatically controlling the engagement of the fast speed provided. This machine removes the circular

corner left in the groove by the roughing cutter, the work traveling during this operation at a slow speed, and when this has been accomplished the speed of the work is automatically doubled for finishing the central portion of the groove. As the cutter approaches the other end of the groove the work automatically slows down for the removal of the corner at that end and stops when the pin *E* strikes the lever *G*. The different rates of speed are provided by two clutches controlled by pins on the index plate. The stopping and starting of the work is controlled in the same way as in the roughing machine, but the operation of the clutches, one of which can be seen above *D*, is controlled by the contact made by the speed lever *E* with the other set of pins on the index plate.

The machines are designed for bench mounting, and are arranged so that one operator can attend to either two roughing or two finishing machines. Each machine will turn out a complete ring every 10 sec., which gives a completed ring every 20 sec.

Book Reviews

Mechanical Technology. By G. F. Charnock. Pages x+635, 6 x 8½ in. Illustrations, 503. Published by D. Van Nostrand Company, New York. Price $3.

The sub-title, which comes nearer giving a definite idea of the scope of the book than does the title itself, is "Materials and Preparatory Processes of the Mechanical Industries." But even this is vague, for the book deals with iron, steel and the non-ferrous metals. The author set out to contrast mechanical with chemical technology and has tried to bring together in one volume a connected and systematic account of the chief operations underlying mechanical trades and handicrafts.

One-fourth of the contents deals with the production and properties of the metals and alloys, another section with their molding and casting, and a third with various mechanical operations involving their change of shape by forging, stamping, rolling, drawing, spinning, pressing, etc. Besides there are chapters on timber, stone, lubricants, abrasives, rubber, leather, rope, etc.

The part of the work appealing most to metallurgists and chemists is that on mechanical working which is a creditable and condensed statement. As to mechanical practice, that described is mostly English, which lessens its practical value to American readers.

Poor's Manual of Public Utilities. Text pages, 2500, 5¾ x 8¾ in. Published by Poor's Railroad Manual Company, New York. Price, $7.50.

This is the fourth of these annual volumes and is the largest yet published. It gives complete and recent financial statements of practically all the public utility companies in the United States and Canada in which there is public interest. A new feature is the "margin of safety" over interest or dividend requirements of individual stocks and bonds. This margin is a practical rating of securities based on facts. It answers the question, "What is the risk involved?" The general information is revised to June 15, 1916; income accounts and balance sheets are as of Dec. 31, 1915, and some as late as April 30, 1916. Illustrating the completeness of the work, it devotes 39 pages to the American Water Works & Electric Company; 34 pages to the United Gas & Electric system; 67 pages to the United Light & Railways system; 30 pages to the Middle West Utilities system; and 33 pages to the National Properties Company.

Steel and Its Heat Treatment. By D. K. Bullens. Pages VII+431, 6 x 9¼ in. Published by John Wiley & Sons, New York. Price $3.75 net.

The author has dealt with the theoretical and practical sides of the subject of steel and its heat treatment so as to make it clear and easily understood. Seventeen chapters are devoted to a "heat talk," rather than a "furnace talk," as the author expresses it—to heat application rather than details of construction. Charts and photomicrographs, 223 in all, are supplied. Besides the testing and structure of steel, annealing, hardening, tempering and carburizing, there are chapters on heat generation and application, and the important alloy and tool steels. The book concludes with a chapter on pyrometers and critical range temperatures. The work is systematically put together and is valuable both as a text book and a book of reference.

Questions and Answers Relating to Modern Automobile Design, Construction, Driving and Repair. By Victor W. Page. Pages, 701, 5¼ x 7½ in.; illustrations, 387. Published by the Norman W. Henley Publishing Company, 132 Nassau Street, New York. Price $1.50.

With each revision of this book, which is now in its fourth edition, the size has been increased until it now contains 39 lessons, consisting of over 2000 questions and answers dealing with the automobile, its construction, operation and repair. It is written for the practical, non-technical man. All of the latest 1916 developments are included, with a complete discussion of electric starting and lighting systems.

The arrangement is practically the same as in the former editions, dealing first with the motor, its parts and their functions, the fuel used and its explosion in the cylinders to produce power followed by a discussion of ignition, lubrication and cooling. The various types of transmission are touched upon and descriptions of the frame, steering gear, wheels and bearings follow. Instructions on the operation of a car and a description of the troubles frequently encountered, their symptoms and the remedies, are given. The development of the 1916 automobile design is described briefly and information on winter driving is contained in the final lesson.

The Titanium Alloy Mfg. Company, Niagara Falls, N. Y., has published a book of 105 pages, 5½ x 8½ in., with the title "Titanium in Steel Making," the object of which is to show the benefits of titanium additions to various steel products. After an introductory chapter on the use of the alloy in steel making there are chapters on steel castings, forging steels, structural steels, rails, sheet and plate steels, wire steels, pipe and tube sheets, bronze castings and titanium-aluminum bronze castings. A section is devoted to a study of alumina in steel and its determination, as well as the preparation of wire samples for microscopic examination. The book is well illustrated with photomicrographs.

The "Use of the Slide Rule" is the title of a book of 36 pages by Allan R. Cullimore, published by the Keuffel & Esser Company, 127 Fulton Street, New York. The book is the result of sets of notes issued by the author in his work at the College of Industrial Science, Toledo University, in teaching the use of the slide rule to engineering students, and men of more or less practical experience. Directions are included covering the use of the slide rule in equivalent ratios, multiplication and division, the use of the inverted slide, general involution and evolution and trigonometric computations. Particular attention is also paid to the solution of special formulæ.

The Carnegie Steel Company, Pittsburgh, has issued the third edition of its pamphlet entitled, "Gear Blanks and Miscellaneous Circular Sections." It covers the solid rolled-steel circular sections made at the Slick steel plant of the company for use as gear blanks, automobile flywheels, piston blanks, pipe flanges, shaft couplings and mine locomotive, industrial and railroad car and crane track wheels. Standard specifications covering the manufacture of the several products are given and the text is supplemented by numerous drawings and tables of the various sizes of each that can be supplied.

An exhaustive account of peat development in Canada is found in Bulletin No. 11, "Investigation of the Peat Bogs and Peat Industry of Canada, 1913-1914," by Aleph Anrep and published by the Canadian Department of Mines.

MAKING FLANGED SHAPES

A New Method to Secure a Slabbing Action, Patented by E. E. Slick

A new method of rolling flanged shapes, such as I-beams, has been patented by Edwin E. Slick, vice-president and general manager of the Cambria Steel Company, Johnstown, Pa. In the process of rolling, the web is bent in more or less of a curve away from the central straight axis which it is finally to

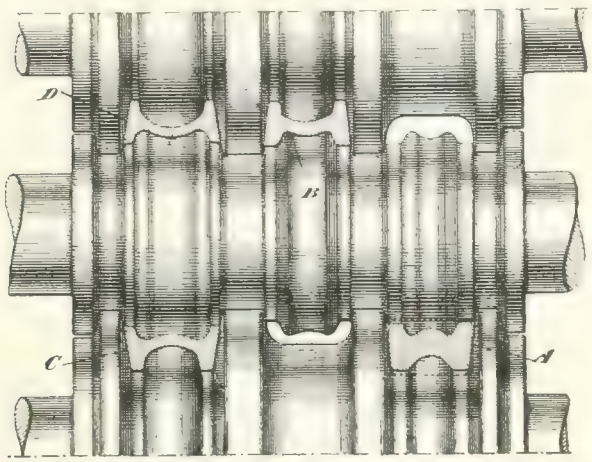


Fig. 1—Rolling May Start with a Rectangular Bloom, as at A, the First Roughing Pass. In the three succeeding roughing passes the bar is not turned over

have, and in each successive pass it is bent in the opposite direction from that which it had in the preceding pass. In other words, the plan is that the bar is not turned between passes, but the web is first bent in one direction and then in the other. The flanges are likewise inclined in opposite directions from pass to pass, as compared with their previous positions, as is indicated in the illustrations, and in thus bending the web, the bending of the flanges is allowed for without local distortion. The particular and novel feature of the invention is that the method allows for drawing or reducing the thickness of the flanges by a slabbing action owing to the fact that the pressure on these flanges is in a direction inclined to the roll axes. Thus the flanges

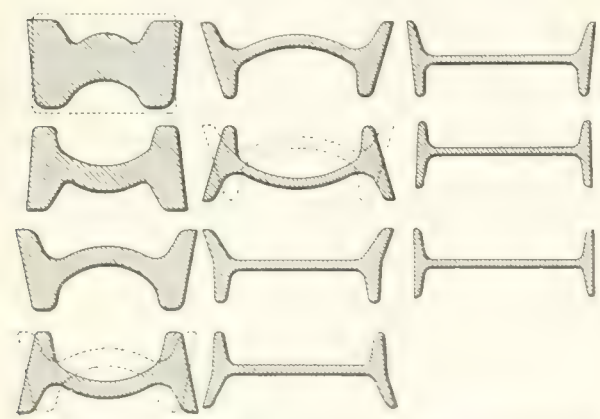


Fig. 2—The Steps in Rolling an I-Beam from a Rectangular Bloom. The bar is not turned over between passes, and the dotted lines indicate the shape as received, for example, at different passes

are maintained at the length desired, as otherwise they would be pulled down by wire-drawing action as the web is reduced in thickness and would not give the final cross-section form desired. The patent was granted June 22 and is No. 1,143,735.

For the purposes of illustration, an elevation of a sketch of three-high rolls, say the roughing set, is shown with the first four passes or grooves therein. One may note the first pass, which receives a rectangular bloom, indicated in dotted lines. The bloom is reduced to the general form of the shape to be rolled, with rudimentary webs and flanges. The web is of course thick and the flanges likewise. The web also takes on the bend and the rudimentary flanges are inclined as regards the position which they will finally take. The second, third and fourth passes are indicated, and the point to be remembered is that the bar is not turned over between the passes, so that the web is bent in the opposite direction from the curve which it took in the preceding pass, and likewise the flanges are allowed to take on the inclination corresponding to the bend of the web and are accordingly subjected to the slabbing pressure.

In Fig. 2 may be seen the passes from the time the steel reaches the rolls in the shape of a bloom to the finished I-beam. The dotted lines in the three cases show the section of the piece as received in those passes.

A structural mill equipped with rolls for this method requires only rectangular blooms which can be supplied from a standard slabbing or blooming mill without making roll changes, and without carrying the usual large supply of shaped rolls for blooming mill. This also eliminates the delay of roll changing and a large investment in blooming mill rolls. This method of rolling shapes has an advantage, when additional blooms are required for new orders or a shortage, that they can quickly be secured without change of blooming mill rolls.

Kerosene as a Substitute for Gasoline

That the development of new processes for making gasoline is not a solution of the problem of the high price of fuel or internal combustion engines is the belief of Prof. Charles E. Lucke, Columbia University, expressed in a paper read at the semi-annual meeting of the Society of Automobile Engineers, June 16. The solution of the problem will be found, he holds, in the development of an apparatus which will enable kerosene to replace gasoline as an internal combustion engine fuel.

The development of satisfactory means of utilizing kerosene will entirely change the situation from every standpoint. It will produce results satisfactory to everybody, which is impossible by any other procedure. The new cracking processes for the manufacture of gasoline do not constitute a satisfactory solution for three principal reasons: 1. Kerosene cannot be removed from the market because it is an old commodity and the most perfectly distributed oil product in the world's market. 2. The cost of installing new plants involves millions of dollars, which must be carried by the new product. 3. All new cracking processes are patented and the rights are not available to everybody. Therefore, some refineries must continue as they are or be forced out of business by those commanding both the capital and patent rights for the new processes.

Kerosene utilization appliances are more worthy of development than are new oil cracking processes. Their perfection will constitute a true and sound solution of the present automobile fuel price. The use of kerosene in standard gasoline equipment does not produce what can be regarded as satisfactory results from the operating standpoint because even in addition to the requirement of gasoline for starting purposes the kerosene is vaporized to so small an extent. No particular knowledge of the properties of vapors or of vapor-air mixtures is required to realize that the sort of corrective needed is heat, but it makes all the difference in the world just how that heat is applied.

George T. Johnson & Co., dealers in iron, steel, coal and coke, have moved their offices from the Commercial Trust Building, Philadelphia, to the new Widener Building, Chestnut and Juniper streets.

IMPORTANT CUSTOMS DECISION

Protective Feature of Tariff Law Upheld in a Castings Case

Changes in the tariff law at the last revision, and intended apparently to give some protection to American products, were made effective in a decision rendered last week by the Board of United States General Appraisers in the protest case of Simon, Buhler & Baumann, Inc., New York. The appraiser's report described the merchandise, the subject of protest, as brewing mash filtering machines, complete with the exception of brass, bronze and rubber fittings and filtering cloths. They were composed of iron castings, molded, drilled and machined.

The machines were returned for duty under the present tariff at the rate of 20 per cent as "manufactures of metal not specially provided for," although the appraising officer said in his report to the board that the importations, which were from Germany, were of the same character as those held by the United States Court of Customs Appeals in the Lang case to be properly dutiable at 10 per cent. The importers asked entry at 10 per cent under paragraph 125 of the act of 1913, which among other things enumerates "castings, including all castings of iron or cast-iron plates which have been chiseled, drilled, machined, or otherwise advanced in condition by processes or operations subsequent to the casting process but not made up into articles or finished machine parts."

Judge Fischer, in his decision for the board, approved by the other members of the tribunal, found against the claim of the importers for duty lower than assessed. The general appraiser pointed out, to begin with, that the decision referred to in the report of the New York appraiser, and upon which that officer apparently based his conclusion that the articles in question would now be properly dutiable as castings under paragraph 125, was rendered in a case arising under the tariff act of 1909. That case, known as Lang vs. United States, brought before the court for judicial interpretation the language of paragraph 147 of that act—the immediate predecessor of the present paragraph 125. Judge Fischer said the wording of the old and new paragraphs—at least, in so far as the provisions in any way pertinent hereto are concerned—is substantially if not literally the same, save for the additional exception from the operation of the present provision which Congress evidently saw fit to make when it added thereto the words "or finished machine parts." This language is new and not found in the corresponding provision in paragraph 149 of the last preceding act.

"In so doing," continues the decision, "the conclusion is inevitable that Congress, having in mind the decision of the United States Court of Customs Appeals in the case of United States vs. Leigh & Butler, cited in the case of Lang vs. United States, intended to meet and overcome the effect thereof, in so far as iron or steel castings of the kind therein passed upon by the court were concerned, by adding to the new provision language which deliberately and specifically excluded from the scope of such provision not only such castings as were made up into articles, but also such castings as were shown to consist of finished machined parts. Hence, it follows that not only is the case cited by the appraiser as an authority herein wholly inapplicable to the present merchandise, but as a result of the change in the new provision the merchandise which the court held to be properly within the purview of paragraph 147 of the act of 1909 would now be excluded from the present castings provision by virtue of the very terms thereof."

Another point, however, was raised by the importers at the hearing. They insisted that the articles in question, being parts of a brewing mash filter, are more accurately described as parts of an apparatus than as parts of a machine, and that consequently the words of exclusion added to the provision of paragraph 125 can have no possible application to the shipment involved in the controversy. In reply to this contention the board's decision said it would be seen that the court in the Lang case considered and treated articles admittedly the same as those here under consideration as finished machine parts. In addition, the decision held that for the board to hold that the article for which the parts under consideration are intended is an apparatus and not a machine "would certainly be drawing a very fine line of demarcation, especially since the common and ordinary meaning of the word 'apparatus,' as set forth in the dictionaries, is unquestionably broad enough in scope to include a machine."

The decision concluded: "We therefore find as a fact that the articles in question are castings of iron which have been advanced to the point where they have become finished machine parts. This finding necessarily requires that they be excluded from the provisions of paragraph 125; and inasmuch as they are not elsewhere specifically provided for, we hold that said articles are properly relegated for tariff classification to the general provision in paragraph 167 for manufactures of metal not specially provided for, and as such dutiable thereunder at the rate of 20 per cent ad valorem, as classified by the collector."

Officials of the Department of Justice gave it as their view that the board's decision would be affirmed by the Customs Court, thereby laying down the principle of classification for a wide variety of imported goods.

TANTIRON

The board has laid down the rule to govern importations of so-called Tantiron, a special foundry product. The question of classification under the present tariff was raised in appeals made by John H. Faunce and Koons, Wilson & Co., who made importations at Philadelphia. The Government contended that the product was ferrosilicon. The collector's assessment objected to was at the rate of 15 per cent as "ferrosilicon and other alloys used in the manufacture of steel not specially provided for." The protestants claimed the merchandise to be free of duty under paragraph 518 specifying "iron in pigs." The proof submitted in support of the contention for duty exemption showed that the imported merchandise consisted of a species of iron with high silicon content, and that it was known as Tantiron and not as ferrosilicon.

It was also brought out that the alloy in controversy was prepared for the special purpose of casting into bowls and like articles suitable for commercial chemical uses, the silicon, manganese and other constituents giving it the necessary power of resistance to fit it for those particular uses. It was also established at the hearing that ferrosilicon, by reason of the absence of appreciable quantities of manganese, was very brittle and therefore incapable of being manufactured into articles, and that its only use was in the production of certain grades and qualities of steel by admixture. The collector was reversed and a reliquidation ordered on the basis of free entry.

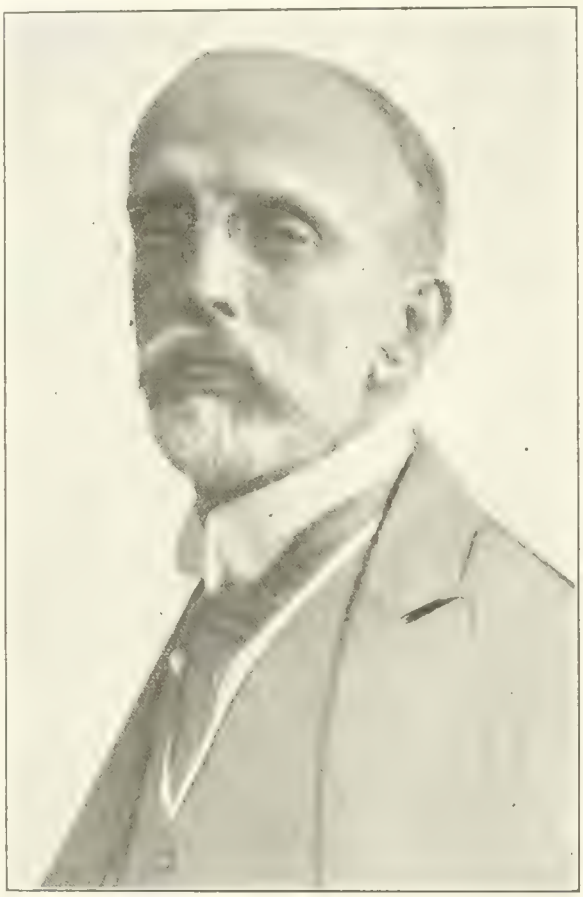
SCRAP ZINC

Bouza, Potts & Co., Havana, shipped scrap zinc to New York, which the customs officials advanced on the ground that the entered prices were below market value. According to the official papers in the case, old scrap zinc was entered as having a value of $8 per 100 lb. and new scrap zinc, $9 per 100 lb. The customs examiner was dissatisfied with these prices and raised them for duty purposes. At the hearing the importers presented convincing proof that the values as entered represented Havana market prices on the date of shipment. The general appraiser who heard the case reversed the New York officials and allowed the merchandise to enter at the prices mentioned above.

A plant for the manufacture of ferroalloys is to be established at Highlandtown, Md. The name under which it will be operated has not been decided upon, but probably will be the Electro Metallurgical Company. Konstantin Jouvraleff, New York, heads the enterprise. The plant will cover about an acre. Otto G. Simonson, architect, Maryland Casualty Building, Baltimore, is preparing the plans. Work is to be rushed.

Death of Charles Kirchhoff

After a long period of ill-health Charles Kirchhoff, for many years editor in chief of THE IRON AGE, died July 22 at his summer home at Wannamassa, near Asbury Park, N. J., aged 63 years. The immediate cause of his death was a complication of ailments following an attack of the grip. He leaves his widow but no children. He was born in San Francisco, Cal., where his father was established at that time in the German consular service. The family a few years later removed to Hoboken, N. J., where Charles attended the public schools, continuing his education at the Royal School of Mines, Clausthal, Germany, from which he was graduated as mining engineer and metallurgist in 1874. After serving three years as chemist with the Delaware Lead Refinery, Philadelphia, he joined the editorial staff of the *Metallurgical Review* upon its establishment in 1877 by David Williams, publisher of THE IRON AGE. This periodical had only a brief existence. For a few years subsequently he alternated editorial connection with THE IRON AGE and the *Engineering and Mining Journal*. He was managing editor of the latter paper from 1881 to 1884, when he permanently returned to THE IRON AGE staff as associate editor, becoming editor in chief in 1889, on the retirement of Dr. James C. Bayles. On the death of John S. King, business manager, in 1904, Mr. Kirchhoff added to his editorial duties those of general manager of the David Williams Company, continuing to discharge the responsibilities of both positions until the change of ownership of the company in 1909.



CHARLES KIRCHHOFF

Although Mr. Kirchhoff was assiduous in the conduct of his task as editor of the world's greatest trade paper, and under his direction its growth expanded and its power and influence greatly increased, his achievements in this direction brought to him other duties which were discharged with equal credit to himself. He was elected president of the American Institute of Mining Engineers in 1898, and his fellow members thought so well of what he had done for them in that period that in 1911 they for a second time bestowed upon him the honor of the presidency. He was called upon by the United States Geological Survey to collect the annual statistics of the production of copper, lead and zinc and acted as special agent in this work for a period extending from 1883 to 1906. He served in an official capacity on committees organized to receive and entertain the members of the Iron and Steel Institute and of the Verein Deutscher Eisenhuettenluette in visits to this country made in 1890 and 1904. He was secretary of the American committee in 1890 and chairman of the committee in 1904, and on both occasions his efficiency in looking after the details was the subject of high encomiums by the visitors. He made quite frequent trips to Great Britain, Germany and France for the purpose of studying developments in the iron and steel industries abroad and contributed numerous articles to THE IRON AGE while engaged in this work. One of the most extensive series of articles of this character entitled "Notes on Some European Iron Making Districts," was republished in 1900 in book form and had a wide circulation.

Mr. Kirchhoff spared neither time nor labor in keeping himself in touch with developments in all sections of this country. If some new enterprise was started which promised further progress in metallurgy or mechanics, he endeavored to make a personal inspection or investigation of it. His acquaintanceship with men and processes thus steadily broadened, and in the progress of years his reputation grew as an authority on practically everything connected with the manufacture of iron and steel. His name was a familiar one in the iron trade of Europe as well as America. He had an important advantage over many others in conducting international correspondence and in visiting foreign countries as he was an accomplished linguist, speaking and writing several languages fluently.

His retirement from active business life, which occurred in 1910, was regarded with much regret by his numerous friends, as he apparently had before him many further years of usefulness. On the afternoon of Jan. 16, 1910, a luncheon was given to him at the Engineers' Club, New York, by a large number of his friends who in that manner sought to pay him a tribute of their admiration and regard. Members of the iron and steel trade from all over the United States gathered to show their esteem and to speak in praise of him. Numerous letters abounding in eulogies were read from others who were unable to attend. Among those present was the late

John Fritz of Bethlehem, who was at that time 87 years old, yet had made the journey from his home to New York City for the special purpose of showing his admiration for the retiring editor. He spoke with emphasis of the part contributed by Mr. Kirchhoff to the advancement of the American iron trade. On this occasion a bronze statue was presented to Mr. Kirchhoff by his associates in the David Williams Company.

Mr. Kirchhoff made an important contribution to the columns of THE IRON AGE after his retirement, in reviewing the work of the International Metallurgical Congress at Duesseldorf, Germany, which he attended in the spring of 1910. In October of that year he read a paper before the American Iron and Steel Institute in New York dealing with the recent progress in iron and steel metallurgy in the leading countries of Europe, particularly in Germany, as this progress had been represented in the papers read at the Duesseldorf Congress. This meeting of the American Iron and Steel Institute was attended by a delegation of the leading steel masters of Great Britain, Germany, France and Belgium. In the discussion of Mr. Kirchhoff's admirable paper, which was a leading feature of the meeting, Prof. Henry M. Howe congratulated the institute on such a contribution to its proceedings and particularly on having as a member one so well qualified to appraise the European advance in the manufacture of steel.

Reference to Mr. Kirchhoff's activities in other than editorial fields of usefulness would not be complete without mentioning the deep interest he took in the later years of his life in the work of the American Museum of Safety Devices and Industrial Hygiene. The character of this work appealed strongly to Mr. Kirchhoff, whose heart overflowed with sympathy toward his fellowmen, and for several years he served as chairman of the committee of direction. His services in behalf of the institution and its worthy purposes attracted attention abroad as well as at home, and in 1908 Mr. Kirchhoff and T. Commerford Martin and Percy Stickney Grant, fellow-workers in the cause, were recipients of decorations bestowed by the French Republic through the Minister of Public Instruction and Fine Arts and were made Officiers d'Académie, the ceremony of decoration being conferred by Monsieur Bonzom, acting French Consul General, on the evening of Jan. 15 at the rooms of the Aldine Association, New York City.

Although THE IRON AGE was well established when Mr. Kirchhoff became connected with it, the prestige of the paper grew steadily under his direction, and its reputation became more thoroughly established for enterprise, accuracy and progressiveness. He spared no pains either for himself or his associates in endeavoring to reach and maintain the highest standard. Thoroughly impartial in his own dealings with others, he inculcated independence in all who were in the least responsible for the editorial utterances of the paper. Honest himself, and absolutely free from double dealing, he could not tolerate subservience in others. As a writer, Mr. Kirchhoff had a style peculiar to himself. His expressions were clear cut, and he had the unusual qualification of being a good phrase maker. Few writers could so well express an idea so strongly in as few words. May the impress he has left upon this paper long continue to be felt.

The Milton Iron Company, Wellston, Ohio, has been incorporated with $200,000 capital stock by H. S. Willard, W. R. Davis, J. H. Browne, H. S. Willard, Jr., and A. A. Ferree. The new company will operate Milton furnace, which has been idle for some time.

REPUBLIC SEMI-ANNUAL REPORT

Best Financial Showing Ever Made by the Republic Iron & Steel Company

The Republic Iron & Steel Company's report for the six months ended June 30, 1916, presents the following comparative statement of income:

	Six Months Ended		
	June 30, 1916	Dec. 31, 1915	June 30, 1915
Net earnings after deducting cost of manufacture and sales	$6,[illegible]04.21	$3,[illegible]96.76	$1,771,696.86
Interest and dividends received	43,[illegible]22.41	1,[illegible]79.14	28,356.54
Total profit for six months	$6,[illegible]26.62	$3,[illegible]75.90	$1,800,053.40
Less:			
Provision for depreciation and renewal	$[illegible]27.77	$[illegible]49.00	$267,838.75
For extraordinary depreciation	[illegible]00.00	400,000.00	. .
For exhaustion of minerals	118,171.82	13,[illegible]70.14	101,127.51
	$618,499.59	$872,219.54	$364,966.30
Net profit for the six months	$6,204,527.03	$2,[illegible]56.36	$1,435,087.10
Deduct:			
Interest on bonds and notes	436,450.93	442,329.70	427,583.25
Net profit applicable to dividend	$5,768,076.10	$2,[illegible]31.32	$1,007,503.85
Add surplus			
Dec. 31, 1914.....			$6,615,289.56
June 30, 1915		$7,[illegible]93.41	
Dec. 31, 1915.....	$8,354,953.66		
Total	$14,123,029.76	$1,[illegible]08.73	$7,622,793.41
Deduct:			
Special appropriations from surplus account		388,675.07	. .
Dividends on preferred stock	1,624,000.00	1,187,500.00	. .
Net surplus carried to balance sheet	$12,499,029.76	$8,354,953.66	$7,622,793.41

Accompanying remarks to stockholders by Chairman John A. Topping are as follows:

"The extraordinary domestic and foreign demand for iron and steel referred to in our annual report under date of Dec. 31, 1915, continued without abatement throughout the six months ended June 30, 1916, present conditions suggesting that demands have not been fully satisfied. Prices, under the stimulus of these unusual conditions, have made substantial advances, present rates closely approximating the record prices established during the year 1899. Labor rates, however, are generally approximately double the 1899 rates, whereas the purchasing power of the dollar has been authoritatively stated as being one-third less than during 1899; yet notwithstanding these favorable conditions, labor unrest is prevalent, our principal works at Youngstown, Ohio, having suffered serious financial loss from a strike shutdown of several weeks during January, 1916, and at the present time operations in the Northwestern iron ranges are somewhat disturbed.

"Notwithstanding the difficulty of conducting operations under the conditions noted, the results have been most satisfactory, the aggregate net profits for the six months ended June 30, 1916, being $6,204,527.03 and the net profits applicable to dividends, after making the usual deductions for depreciation and maintenance, also provision for *depreciation extraordinary*, were $5,768,076.10. While price improvement has contributed largely to the great increase in earnings realized, improvement to property and process, of an economic character, has contributed no small part, and the executive committee of the company, in recognition of this fact, will continue its policy of strengthening operations by further improvements, when expedient or advisable. At the present time various improvements and extensions of an economic character are under way which will call for an expenditure of approximately $3,000,000. Orders on hand are sufficient to promise full operations at profitable prices during the remainder of the year, but in this connection, it may be of interest to state that only insignificant quan-

tities of this company's steel products have been sold for munition purposes, and no investments have been made by the company in munition equipment. The net quick assets as of June 30, 1916, aggregate $15,560,413.09."

Judicial Decisions

ABSTRACTED BY A. L. H. STREET

WARRANTY OF EFFICIENCY OF MACHINERY SOLD.—In a suit to recover damages for claimed breach of warranty by a seller of induced-draft apparatus as to the sufficiency of draft to be furnished, the seller was not entitled to rely upon inaccuracy of information as to existing draft, furnished by the plaintiff buyer, unless such information influenced the making of a plant of the warranted power. The measure of damages for such breach of warranty is the excess of the value of the apparatus as warranted above its value as installed. An experienced consulting engineer was qualified to testify as to such value, where he had bought 16 similar apparatuses, although he had not bought one of the precise kind, and although he did not know the quantity of structural steel utilized in the manufacture. (United States Circuit Court of Appeals, Sixth Circuit, B. F. Sturtevant Company vs. Champion Fibre Company, 232 Federal Reporter, 1.)

RIGHTS OF CONDITIONAL SELLERS OF BOILERS.—A boiler manufacturing company which sold boilers to a contractor, knowing that they were to be permanently installed on municipal property, is not entitled to reclaim them after installation, although they were sold under a contract reserving title in the company until payment of the price; the city having paid the contractor for the boilers and installation without notice of the reservation of title. Notice given city officials after the installation, or to officials not concerned in the work, is not binding upon the city. (New York Supreme Court, Appellate Division, Fitzgibbon Boiler Company vs. City of New York, 159 New York Supplement, 357.)

CONTRIBUTORY NEGLIGENCE CONCERNING FREIGHT ELEVATORS.—There can be no recovery for injury to a machine shop employee attributable to his own negligence in protruding his head into a freight elevator shaft to call down to the operator to bring the platform to his floor, resulting in his being struck by the descending elevator; the injured man having failed to first ascertain whether the car was above or below. (Connecticut Supreme Court of Errors, Jacko vs. American Tube & Stamping Company, 97 Atlantic Reporter, 755.)

VALIDITY OF KENTUCKY COMPENSATION ACT.—The workmen's compensation act enacted in Kentucky in 1916 is not unconstitutional as infringing the clause of the State constitution which forbids laws limiting the amount recoverable for injuries, since the act is elective as to all employees. Inasmuch as no employer has a vested legal right in the defenses of contributory negligence, negligence of a fellow servant, and assumption of risk, the act is not invalid because it deprives employers of the benefit of these defenses on non-acceptance of the provisions of the law. The act is sustained as against other constitutional objections. (Kentucky Court of Appeals, Greene vs. Caldwell, 186 Southwestern Reporter, 648.)

VALIDITY OF PATENT AS AFFECTED BY PREVIOUS CONTRACTS FOR SALE OF DEVICE.—A patent for a motor was not invalidated because the patentee contracted for the sale of the first 100 more than two years before the patent was applied for, the contract being subject to the buyer's approval of a sample to be subsequently submitted, which was not done until within the two-year period. (United States Circuit Court of Appeals, Second Circuit, Burke Electric Company vs. Independent Pneumatic Tool Company, 232 Federal Reporter, 145.)

ACCIDENTS AT UNGUARDED MACHINERY.—In a suit to recover damages for injury to an operator of a stamping machine, claimed to have been left unguarded in violation of a statute, it is for the jury to determine whether it was reasonably necessary to equip the machine with a safeguard, considering the use to which it was put and the dangers attendant upon its use by the operator, as reasonably to be foreseen. Such statutes as the provision of the New York labor law, requiring dangerous machinery to be safeguarded, are designed to protect against inadvertent acts of the operator, as well as other dangers. The fact that no previous injury occurred at the particular machine may be considered by the jury in determining whether the employer was negligent in failing to safeguard it, but affords no conclusive evidence of due care. (New York Supreme Court, Appellate Division, Flynn vs. McLoughlin, 159 New York Supplement, 442.)

FUNCTIONAL FEATURES NO PART OF TRADEMARK.—Useful or functional features of a patented article cannot be made the basis of an exclusive trademark on expiration of the patent so as to prevent all manufacturers of the article from using it. (United States Circuit Court of Appeals, Third Circuit, Daniel vs. Electric Hose & Rubber Company, 231 Federal Reporter, 827.)

CONCLUSIVENESS OF WRITTEN CONTRACT.—A party to a written contract signed by him cannot avoid its effect by claiming ignorance of its terms, unless he was induced to sign it through fraud or mistake. Merely representing to one about to sign a contract that it embodies a previous oral understanding cannot constitute such fraud as will relieve him from his obligations under it, if he is in possession of his faculties and able to read. (Oklahoma Supreme Court, Ames vs. Milam, 157 Pacific Reporter, 941.)

ASPECT OF CONTRACTS FOR SHIPMENTS TO BELLIGERENT COUNTRIES.—Unforseen difficulties confronting one who has contracted to charter a vessel to carry a cargo to a foreign country, in the matter of securing marine insurance and payment for the goods, due to war declared between such country and a third nation after the contract was made, but before the time for loading arrived, do not release the chartering shipper from the contract, and the owner of the vessel is entitled to recover damages flowing from breach of the contract. This decision would not apply, however, if the port to which the cargo was to be carried were blockaded after the contract was entered into. (United States District Court, District of Maryland, Furness, Withy & Co. vs. Louis Muller & Co., 232 Federal Reporter, 186.)

WHEN SALES CONTRACTS ARE UNENFORCEABLE.—When there has been no definite agreement upon the identity of goods to be delivered by a seller, there is no agreement which he can legally enforce against the buyer. And when a buyer is given the choice of selecting a given quantity of goods from four certain kinds, the seller is not entitled, on the buyer refusing to make a selection, to make it for him, and then sue to recover the agreed price. Again, when a seller elects to sell goods for the buyer's account, on the latter's refusal to accept delivery, notice of intention to make the resale must first be given the buyer. (Georgia Court of Appeals, United Roofing Company vs. Albany Mill Supply Company, 89 Southeastern Reporter, 177.)

MISTAKE AS EXCUSE FOR BREAKING CONTRACT.—A steel company's customer telephoned an order for 50 tons of steel bars of specified sizes and lengths, and confirmed the order by letter. The company accepted and proceeded with the cutting, but after 10 tons had been delivered the buyer stated that he had all he needed, and that if more was intended to be shipped there was a mistake in the order, which he asked canceled. This the company refused to do, having cut the material to special lengths to fill the order. In awarding judgment in the company's favor for the full contract price, the New Jersey Supreme Court said: "Having declared the provisions of this contract, and thus induced the plaintiff to perform it according to the terms exhibited in this letter, the defendant cannot thereafter set up as a defense to his breach of it that the letter was written under a mistaken understanding of what the real contract was, or that it contained statements which he had not intended to make." (Carnegie Steel Company vs. Connelly, 97 Atlantic Reporter, 774.)

Silicon Steel for Bridges

Silicon steel has been incorporated as a special feature in the trusses of the new Ohio River bridge at Metropolis, Ill., says the *Engineering News*. The silicon in the steel, it is claimed, gives a higher yield point and ultimate tensile strength without sacrificing the reduction of area and elongation. The silicon averages 0.30 to 0.40 per cent in steel containing 0.30 to 0.35 per cent carbon. This steel is used for the top chords, main posts, main diagonals, and end panels of the bottom chords, all other rolled structural material being of medium steel, except the eyebars and piers, which are nickel steel. An increase of strength is claimed to be obtained in the silicon steel without the metal becoming hard or brittle.

The table shows the physical and chemical properties of the steels as made from actual specimens of steel furnished by the American Bridge Company. These steels are to be used in the new bridge of the Chicago, Burlington & Quincy Railroad at Kansas City, Mo.

Tests of Silicon Steel and Other Steel for the Ohio River Bridge at Metropolis, Ill

Grade of Steel	Piece	Size, In.	Length, In.	Elastic Limit, Lb. per Sq. In.	Tensile Strength, Lb. per Sq. In.	Elongation in 8 In., Per Cent	Reduction of Area, Per Cent	Fracture	Carbon, Per Cent	Manganese, Per Cent	Phosphorus, Per Cent	Sulphur, Per Cent	Silicon, Per Cent
Silicon....	Plate ...	42 x 1 3/4	437 1/2	53,870	86,000	18.5	30 8	1/2 cup.....	0.34	0.74	0.016	0.036	0.320
Silicon....	Plate ...	42 x 1 3/4	437 1/2	50,160	81,350	19.7	37.1	1/2 cup.....	0.31	0.68	0.016	0.031	0.350
Silicon....	Plate ...	42 x 1 3/8	608	47,450	86,780	18.5	40.2	1/2 cup.....	0.29	0.70	0.020	0.037	0.400
Silicon....	Plate ...	42 x 1 3/8	703	49,660	83,640	19.7	43 7	Angular ...	0.30	0.65	0.016	0.034	0.350
Silicon....	Angle ..	8 x 8 x 1 1/8	608	51,400	89,280	19.7	41.9	Silky, 1/2 cup..	0.32	0.52	0.023	0.030	0.300
Silicon....	Angle ..	8 x 8 x 1 1/8	595	48,000	82,640	16.6	31.7	.....	0.35	0.57	0.024	0.040	0.274
Silicon....	Angle ..	8 x 8 x 1 1/8	690	50,720	84,220	19.2	46.3	Silky, ang. ...	0.35	0.52	0.029	0.040	0.300
Medium ..	Plate ..	33 x 3/4	348	38,620	63,400	27.5	57 4	Cup	0.22	0.35	0.014	0.028	...
Medium .	Plate ...	21 x 1 1/2	110	38,000	62.390	26 7	52.9	1/2 cup.....	0.25	0.54	0.014	0.047	...
Medium ..	Angle ..	8 x 8 x 7/8	390	38,100	60,600	28.5	54 0	Cup	0.20	0.59	0.020	0.026	...
Nickel*...	Eyebar..	12 x 1 3/8	436	57,000	92,640	13.1 (in 18 ft.)	40.2	100%, silky cup	0.34	0.60	0.016	0.026	0.060

*Note. Full size test of nickel-steel eyebar; elongation in 18 ft.; nickel, 3.27 per cent.

Dreadnaught Tennessee to Be Propelled by Electricity

The United States super-dreadnaught Tennessee, now under construction, is to be equipped for electric propulsion with apparatus built by the Westinghouse Electric & Mfg. Company, East Pittsburgh. Instead of the propellers being mechanically connected to driving engines or steam turbines, two steam turbines developing over 33,000 hp. will drive electric generators which in turn will furnish current for four 6700-hp. motors, each motor coupled to a propeller. By this arrangement the steam turbines may be located in any desired part of the ship and the propelling machinery is thus better protected from injury than otherwise; and full power is available for reversing, besides great rapidity in maneuvering being possible. The contract includes the auxiliaries for the main turbine generator sets and smaller auxiliary turbine generators supplying light and power throughout the ship. Several hundred electric motors will be required and electricity is to be used for cooking, ice-making, refrigerating and other purposes. In all about 37,500 hp. of electricity will be needed, an amount sufficing for a city of about 100,000 inhabitants.

Manganese Ore Imports Increasing

Manganese ore imports into the United States for May, 1916, were 74,825 gross tons, against 48,413 tons in April. The May imports are the largest this year, those for April having been the previous record. The total for the five months of the year is now 174,783 tons, an average of 34,956 tons per month, comparing with 26,731 tons per month in 1915 and 28,757 tons per month in 1913, the record year. For the 11 months ended May 31, 1916, the imports were 430,620 tons against 175,843 tons and 266,245 tons for the corresponding periods in 1915 and 1914 respectively.

German Nitrates from the Air

What Germany is accomplishing in producing nitrates from the air is outlined in an article in the *Frankfurter Zeitung*. Particular reference is made to the extraordinary rapidity with which the Haber process for the synthetic production of ammonia by the union of hydrogen with atmospheric nitrogen has been developed by the Badische Company. The article states that

The production rose from 30,000 tons in 1913 to 60,000 tons in 1914, and by about the middle of last year it was about 150,000 tons. From the present year onward it is reckoned at 300,000 tons, while it is mentioned that the Badische Company has begun to put up further large plants in another part of Germany, so that the capacity for production will shortly be considerably increased.

Assuming that the production will in the near future reach 700,000 tons, the Haber process alone will represent a production of nitrogen very nearly equal to the quantity of Chile saltpetre formerly imported by Germany. But in addition, with State aid, large quantities of nitrogen have been produced as of nitrate of lime, and the whole tendency in the coal industry has been toward increasing the development of by-products. Up to the outbreak of war it is stated that about one-fifth of the coal was coked, but the war has brought about a great increase in coking, and the indications are that in the near future the direct combustion of coal will be replaced by by-product processes. Assuming that the quantity of coal used for the recovery of ammonia is only doubled, the increase in sulphate of ammonia production would amount to 450,000 tons.

On the basis of the above statements the following comparison is given between 1913 and 1917:

German Consumption of Nitrogen, 1913

	Tons	Nitrogen, Tons
Sulphate of ammonia	460,000 =	92,000
Norwegian nitrate of lime	35,000 =	4,500
Nitrate of lime	30,000 =	6,000
Ammonia—Haber process	20,000 =	4,000
Total		106,500
Plus Chile saltpetre	750,000 =	116,000
Grand total		222,500

German Production of Nitrogen, 1917

Sulphate of ammonia	700,000 =	140,000
Norwegian nitrate of lime		
Nitrate of lime	400,000 =	80,000
Ammonia—Haber process	500,000 =	100,000
Total		320,000

Thus the German domestic production of ammonia next year will be greater than the German consumption in 1913, even if no Chile saltpetre be imported.

The production of bituminous and anthracite coal in the United States in 1915 was 531,619,487 net tons, an increase over 1914 of 18,094,010 tons or 3.5 per cent, according to C. E. Lesher of the U. S. Geological Survey. Of this total, 442,624,426 tons was bituminous coal and lignite and 88,995,061 tons was Pennsylvania anthracite. The coal mines employed 734,008 men an average of 209 days.

ESTABLISHED 1855

THE IRON AGE

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Prospective Pig-Iron Capacity

The announcement that the Bethlehem Steel Company's new construction program will involve a total of 12 blast furnaces suggests a fresh estimate of our prospective pig-iron capacity. The number is relatively large, seeing that only five strictly new furnaces have been completed since the end of 1913, while only 14 stacks, apart from the Bethlehem furnaces, are in course of erection or are definitely projected.

It should be premised that there has been a large increase in pig-iron production of late through better operation of the old furnaces rather than through the addition of new stacks. Early in 1913 a production rate of about 30,000,000 tons a year was reached, with substantially all the physically and commercially fit furnaces in blast. It was doubtful if the existing furnaces could maintain such a rate. After production had begun to decline, but still in 1913, four new furnaces were blown in—two of the Pittsburgh Steel Company and one each of the Oriskany Ore & Iron Corporation and the Youngstown Sheet & Tube Company. In 1914 no strictly new furnaces were completed, while in 1915 three new stacks appeared—one of the Pennsylvania Steel Company, No. 5, and two of the Minnesota Steel Company. With these relatively slight additions the pig-iron production closely approached a 40,000,000-ton rate last spring, whereby the average capacity might be estimated at 39,500,000 tons, by the commercially fit furnaces. The above named new stacks completed in the past three years would add only about a million tons, so that there appears to have been an increase in capacity from the spring of 1913 to the spring of 1916 of a million tons from new furnaces and of about 4,500,000 tons from harder driving and rebuilding and improving the old stacks.

To determine our prospective capacity it is convenient to adopt a standard rating, as the new stacks being built vary but little in size and equipment. The great majority of furnaces built in the past ten years now easily average 500 tons a day, and 500 tons a day with six weeks of complete idleness every three years would make an average of 175,000 tons a year per furnace. As furnaces are frequently relined or repaired when commercial conditions would have them idle anyhow, 175,000 tons a year seems to be a conservatively low estimate when the object is to determine the maximum possible output.

The two new stacks recently blown in—River No. 3 at Cleveland on May 13 and Cambria No. 9 at Johnstown on June 5— may conveniently be grouped with the prospective furnaces, as additions to the 39,500,000 tons productive capacity developed last spring. Then there are six independent stacks to arrive, Midvale, River No. 4, Haselton No. 5 of Republic, United at Canton, Ohio, Inland No. 3 and Whitaker-Glessner, also eight stacks at Gary, four of the Indiana Steel Company and four of the National Tube Company, making 14 apart from Bethlehem. The four Bethlehem stacks and the four Maryland stacks are to be entirely new, while the four Steelton are to replace four old Steelton stacks, to which the large No. 5 was added last year. The Steelton construction may be taken as the equivalent of two new stacks, making with the furnaces recently blown in an equivalent total of 26 stacks at 175,000 tons a year, or 4,500,000 tons to be added to 39,500,000 tons, giving a prospective total capacity of 44,000,000 tons. But a small part of this increase will occur this year and it is not certain that all of it will have been attained by the end of next year.

An output of 44,000,000 tons of pig iron in 1918 would not represent nearly as large a proportionate increase in ten years as has occurred in previous ten-year periods. Even assuming 44,000,000 tons for 1917, something which is obviously impossible, the comparison would be with a rate of 27,000,000 tons maintained during the greater part of 1907, ten years earlier, representing an increase of only 63 per cent, whereas through 1907 pig-iron production was doubling quite consistently at an average rate of once every ten years. We certainly expect to make a large part of the world's pig iron in future, and in 1913 the world outside the United States actually produced about 47,000,000 gross tons of pig iron.

Only a very small percentage of the new blast furnace construction is destined to increase the supply of merchant iron, almost all of it being mated with steel works erection. While the iron foundry industry grows much more slowly than the steel making industry, it does grow. Such increase in its requirements as may have occurred since 1913 has doubtless been taken care of by the better performance noted on the part of individual merchant

stacks; but very little definite provision is made by the present new blast furnace program for further increase in the demand for merchant iron.

Europe's Coming Economic Struggle

What amounts to a boycott of the products of the Central European powers is being seriously considered by the other belligerent governments. The so-called economic conference of the Allies in Paris, on the four days beginning June 14, drew up a set of recommendations which must now receive the approval of the respective governments. The resolutions cover measures to be followed during the war period, measures to hold while reconstruction of Belgium, northern France and Servia is under way, and measures to be enforced for indefinite periods after reconstruction.

The war-period conditions have prevailed for some time. This country has felt their influence in the restriction, for example, that English ferromanganese will be supplied only on the promise that the steel in which it is used does not reach Great Britain's enemies. The like restrictions as to tin are well known and in the last ten days the British Government has laid its hand on the trade of Americans who are charged with dealing with its enemies. The measures of the reconstruction period aim to prevent dumping from Germany and Austria and

> to fix by agreement a period of time during which the commerce of the Enemy Powers shall be submitted to special treatment and the goods originating in their countries shall be subjected either to prohibitions or to a special *régime* of an effective character. The Allies will determine by agreement through diplomatic channels the special conditions to be imposed during the above mentioned period on the ships of the Enemy Powers.

It is further stipulated that

> the Allies will devise the measures to be taken jointly or severally for preventing enemy subjects from exercising, in their territories, certain industries or professions which concern national defense or economic independence.

When it comes to permanent measures, the Allies are to take steps to render themselves independent of the enemy countries as regards raw materials and manufactured articles; to establish low rates for speedy land and water intercommunication and transportation, and to reform the patent laws.

National interest is sure to come to the front as the bearing of each measure is studied. The nearer the end of the war seems to be, the more definite shape will each nation's views assume. In each nation's self-interest will lie the difficulty of a general concert. The conference itself is clearly the expression of a belief that war has entered on its last stage and that it means victory for the Entente Allies. If this proves true, but the cessation of fighting is long delayed, the several governments may then get together on some basis; otherwise they will find themselves at variance with regard to one or more of the recommendations, and international trade will again flow on without this gigantic barrier against Central Europe. In all this the United States is assumed to be a spectator. In discussions of international trade this country has not been and is rarely yet considered in Europe's calculations. In the Allies' plans to check Germany's foreign business, it is not clear how far American interests are injuriously affected. It might be expected that the two belligerent groups would crowd each other and likewise the United States in going after the trade of neutral countries, also that each group would try to unload on the United States as much as possible of the products it had previously marketed in the countries of the other groups. What will actually happen is likely to be quite different from any program, however carefully worked out. The trade currents of generations are not to be turned out of their courses by conclave edicts. Moreover, any scheme based on the idea that one great nation will sell largely to another without at the same time buying largely from it—in other words, putting international trade on any other basis for the long pull than the old-time basis of barter—will break down sooner or later. The Paris conference will doubtless have far-reaching results, but there has been too great a tendency to the view that its resolutions have permanently amended old-fashioned economic laws.

Contracts for Finished Steel

In the hearings in the dissolution suit against the United States Steel Corporation a great deal of time was spent in cross-examining witnesses who asserted that contracts for the sale of finished steel products were as a rule merely options, to be exercised or not at the pleasure of the buyer. The effort to break down the testimony was unsuccessful and it was established that contracts purporting to control the sale of hundreds of millions of dollars' worth of steel annually were valueless to the ostensible seller in case of a market decline, but were frequently worth many tens of millions of dollars to the buyers, in case of a market advance. To change the so-called contracts from virtual options into real obligations, binding upon both parties, would not necessarily be to the disadvantage of the one party and the corresponding advantage of the other. The essence of such a change would be the change from an utterly unbusinesslike practice to a strictly rational system, and the whole practice of making purchases and sales would be altered, through buyers and sellers alike being moved to a different procedure by the knowledge that the obligation undertaken would have to be carried out or a penalty suffered.

For years this "contract evil" in the finished steel trade has been discussed, its absurdities pointed out and its elimination urged, but until now no direct and formidable effort has been made to improve the situation. It was left for the sheet trade to undertake in a serious way the correction of the evil, though it may be doubted whether the conditions in the sheet trade have been markedly worse than those in several other branches of the finished steel trade. As reported last week in the news columns of THE IRON AGE there was formally organized on July 18 the National Association of Sheet and Tin Plate Manufacturers, comprising, it appears, more than 90 per cent of the independent sheet-producing capacity of the country, and having for its chief though by no means its sole object the correction of the contract evil. A strong resolution

was adopted against the making of contracts with an expressed or implied guarantee against decline in the market price and recommending the adoption by all sheet mills of the contract form recently devised by the contract committee of the American Iron and Steel Institute, or a similar form. The association's committee has since adopted the institute form with inconsequential modifications.

The ordinary contract in the finished steel trade has hitherto not been enforced for three reasons: 1. There was doubt as to its legality, inasmuch as a strict interpretation would show it to lack the mutual feature which is necessary to make a contract legal. 2. No clear method was provided for showing the amount of injury in case of violation. 3. No mill was disposed to attempt to enforce the contract when violations were so general.

The gathering together of the sheet mills and the adoption of the new contract form are expected to remove these difficulties. It is expected that the individual sheet manufacturer will have confidence that all sellers will undertake to enforce their contracts. The contract form itself, passed upon by eminent legal talent, provides liquidating damages for either party, to be determined in the same manner, provided the other party violates the contract. The buyer may fail to specify or the seller may fail to ship, and in either instance the liquidating damages are to be measured by the difference between the contract price and the market price at the time of such failure, with the further proviso that in no event are the damages to be measured by less than 10 per cent of the stated contract price.

There is no occasion to regard the proposed contract form from the viewpoint of what would occur if contracts of the present nature, as to tonnage, time of delivery, etc., were written upon that form. Often, usually indeed, it is a financial or physical impossibility for the one party or the other to carry out the contracts now written. In a falling market it would usually be a financial impossibility for the buyer to take all the material he has contracted for, when he may have contracted for one-half more tonnage than he could use in the most favorable business conditions, while on a rising market it would be physically impossible for the mill to furnish on time all the material it has sold. for as the buyer overbuys so the mill oversells. The adoption of this new contract, therefore, cannot be regarded as representing any effort to make enforceable contracts of the character of those now made. Rather the change in contract form, if effected, would result in a complete change in the obligations undertaken by buyer and seller respectively, as to price, tonnage and period of delivery.

One may expect, therefore, that if the movement succeeds it will result in both buyer and seller undertaking obligations for smaller tonnages than formerly, and presumably for shorter periods of delivery also. Faced with the prospect of liquidating damages in case of a failure to live up to the contract, the buyer will contract for no more steel than he reasonably expects to be able to take to advantage, and the seller will contract to ship no more than he can reasonably expect to be able to make. Being promised liquidating damages if the other party fails to carry out his part, the mill need not oversell, in order to be insured enough business to run, and the buyer need not overbuy in order to be insured sufficient material with which to conduct his business. Whether market advances would be stimulated and declines retarded, or the reverse, is a question which might admit of considerable discussion, and very probably to no good purpose. The object of those who have undertaken the reform is chiefly to establish businesslike methods in place of utterly unbusinesslike methods, to establish the selling of sheets upon the same basis as obtains in billets, pig iron, spelter and other commodities with which usually they have more or less to do.

The thorough and earnest manner in which the sheet mills have now taken up this subject of reform raises the question whether other branches of the finished steel trade in which the "contract evil" has been a crying one for years will take similar steps. Thus far the other branches have not been heard from, although it is understood that the tin plate manufacturers, without a regular organization, have been very seriously considering the same subject.

CORRESPONDENCE

Purchasing Railroad Equipment

To the Editor: In October of this year section 10 of the Clayton anti-trust act becomes effective. It provides for the regulation of equipment purchasing by railroads. The rules are to be established by the Interstate Commerce Commission. It will be necessary for the roads to prepare numerous specifications and drawings, as any prospective bidder can demand full information, even though he may have no serious intention of competing for the business. This will cause not only annoyance but considerable expense from which there seems to be no escape.

The commission, however, can help to eliminate much of this expense by including in its rules permission to follow the practice of many municipalities, also of many architects, when large contracts are involved. Prospective bidders are informed that copies of plans and specifications can be obtained upon depositing a specified amount—say $10 or more. Of course, as far as the railroads are concerned, the deposit in many cases would be much smaller. The practice will serve, however, not only to offset some of the expense which will be saddled on the roads, but limit the bidding to those who are really desirous of obtaining orders.

D. M.

Foundry Safety and Sanitation

The American Foundrymen's Association committee on safety and sanitation had a meeting at Rochester, N. Y., July 20 and 21, presided over by the chairman, Victor P. Noonan, director of safety of the Industrial Commission of Ohio. The committee prepared a new code which will be presented at the foundry convention at Cleveland in September. It embodies the best features of the various codes that have been prepared by State organizations and is expected to form the basis for State legislative action.

The contract for the new blast furnace to be erected at Coatesville, Pa., for the Worth Brothers Department of the Midvale Steel & Ordnance Company, has been awarded to the W. B. Pollock Company, Youngstown, Ohio. It will make the third blast furnace at that plant and will have a capacity of 500 tons a day.

A HUGE NAVAL PROGRAM

Senate Appropriations for 157 Vessels to Cost $588,000,000

WASHINGTON, D. C., July 25.—The Senate on July 21 passed the largest naval appropriation bill in the history of the country, and in a special resolution gave notice to the House of Representatives that it will insist upon all of the provisions of the measure, thus foreshadowing one of the most notable parliamentary contests of the session. The bill, which passed the Senate by a vote of 71 to 8, appropriates $315,826,843, or $45,857,588 more than was authorized by the House. The bill as passed carries the Senate committee's amendment appropriating $11,000,000 for the construction or purchase of a Government armor factory and, notwithstanding the earnest appeals of some of the most experienced members of the Senate, a proposition to strike out the provision prohibiting scientific shop management in Government establishments inserted by the House was rejected without the formality of a roll call.

TO BUILD 157 VESSELS IN THREE YEARS

The building program as provided by the Senate bill contemplates the construction of no less than 157 vessels, including 16 capital fighting ships, within three years, at an estimated cost of $588,180,576, of which $110,726,160 will be expended during the first year. The following table presents the House and Senate building programs upon the basis of which the conference committee must work out the final compromise, which it is believed will include the principal features of the Senate bill:

	House	Senate, Three Years	Senate, First Year
Battleships		10	4
Battle cruisers	5	6	4
Scout cruisers	4	10	4
Destroyers	10	[illegible]	20
Fleet submarines	..	9	
Coast submarines	10	[illegible]	30
Submarine (Neff)		1	
Fuel ships	1	3	1
Ammunition ships	1		1
Hospital ships	1	1	1
Repair ships			
Transports		1	
Destroyer tenders	..	2	
Submarine tenders		1	
Gunboats	..	2	1
Totals	72	157	66

In addition to the building program and the government armor factory the Senate bill carries $19,485,500 to provide ammunition for ships to be built in the next two years; $3,300,000 for batteries for merchant auxiliaries; $3,500,000 for aviation; $1,500,000 for the naval experimental and research laboratory, suggested by Mr. Edison; $1,411,000 for a Government projectile plant; $10,335,915 for the maintenance and enlargement of naval stations, navy yards and docks; $50,226,912 for pay of the Navy and $1,270,000 for arming and equipping the naval militia.

BETHLEHEM OFFER REJECTED

The discussion of the Senate Naval committee's amendment providing for a Government armor factory was exceedingly acrimonious, and at times descended to personalities rarely indulged within the dignified precincts of the Senate. Senator Oliver, who led the movement to strike out the Government armor factory provision, laid before the Senate the definite offer of the Bethlehem Steel Company to make for the Government any quantity of armor within the capacity of its plant for an indefinite length of time at any price which might be fixed by the Federal Trade Commission after a careful investigation of the company's books and manufacturing processes. In support of this proposition Senator Oliver emphasized the importance, in the light of the experience of the warring nations of Europe, of maintaining all the private facilities for the manufacture of war material now in existence with a view to enabling the Government to meet any emergency that might arise. Should the Government armor factory be constructed, Senator Oliver said, the plants of the private manufacturers would be rendered useless and would have to be scrapped, thus depriving the Government of a valuable reserve factor of safety in national defense.

Senator Oliver's amendment, though unopposed by any member of the Senate, was defeated by a vote of 51 to 17, 27 members of the Senate not voting. The Pennsylvania Senator thereupon submitted a substitute for the armor factory provision as follows:

[illegible] conditions, to wit:

[illegible]

This substitute was lost by a vote of 49 to 16, 30 Senators not voting.

Senator Penrose, of Pennsylvania, subsequently obtained unanimous consent to have printed as a public document a series of propositions addressed to Congress by the Bethlehem Steel Company with reference to the manufacture of armor which have been published from time to time as advertisements in the daily press, but after a sharp attack on the proposal by Senator Reed of Missouri, Senator Penrose declared that he would withdraw his request for the printing of the document in question. But before taking his seat he read to the Senate a long list of Congressmen's speeches, addresses, newspaper articles, etc., attacking the Bethlehem Steel Company and other manufacturers of war material, which from time to time have been printed as public documents at the request of various Senators and Representatives. Incidentally Senator Penrose gave notice that henceforth he will object to the publication as a Congressional document of any such matter. W. L. C.

Non-Recoil Guns for Aeroplanes

Some particulars regarding the non-recoil guns for aeroplanes made by the General Ordnance Company, Derby, Conn., have been obtained from E. W. Strong, of the American Vanadium Company, Pittsburgh. To minimize weight without sacrifice of strength, chrome-vanadium steel is used for the barrels; and to take up the recoil, a supplementary barrel, placed end to end with the main barrel, is provided to discharge a quantity of fine shot toward the rear equal in weight to the projectile shot from the front. A 6-pounder gun complete weighs 103 lb. and has an over-all length of 10 ft. The barrel is 0.47 in. in thickness over the chamber, while near the muzzle the thickness is 0.102 in. A 2-pounder weighs 65 lb., and has a bore of 1.575 in. and a maximum thickness of the barrel of 0.315 in. over the chamber and 0.078 in. near the muzzle.

The German Projectile Output

Referring to the manufacture of projectiles, the general manager of the Gelsenkirchen Company, in Germany, in discussing iron and steel conditions in a Vienna journal, stated that besides 150 steel works in Germany, large and small, which were at work on munitions, no fewer than 82 concerns had been organized within a short time for the production of steel shells.

FEDERAL SHIPPING BOARD

The Main Feature of the Government Ownership Bill—Agreement Reached

WASHINGTON, D. C., July 25.—As the result of conferences extending over many weeks between the majority leaders of the two houses, an agreement has been reached by which the so-called Administration shipping bill will probably become a law within the next fortnight. There has been so much controversial discussion of the Government ownership feature of this bill that the public appears to have lost sight entirely of the fact that the purchase and operation of merchant vessels under the supervision of an official shipping board created by the measure is really but an incidental and more or less temporary feature of a comprehensive statute, the primary object of which is to extend the authority of the Federal Government over the operations of all vessels in the American merchant marine along lines parallel with those which fix the jurisdiction of the Interstate Commerce Commission over the railroads of the country. That the latter feature of the measure is far more important than the former in its practical effect upon the business of the country does not appear to be adequately understood.

THE SHIPPING PURCHASE FEATURE

The United States Shipping Board, created by the pending bill and composed of five commissioners to be appointed by the President—the provision of the original House measure making the Secretaries of the Navy and of Commerce members of the board having been stricken out by the Senate—is authorized within a limit of expenditure of $50,000,000 "to have constructed and equipped, in American ship yards and navy yards or elsewhere, giving preference, other things being equal, to domestic yards, to purchase, lease, or charter vessels suitable, as far as the commercial requirements of the marine trade of the United States may permit, for use as naval auxiliaries, for army transports, or for other naval or military purposes." The board is forbidden to purchase, lease or charter any vessel engaged in the foreign or domestic commerce of the United States, unless it is about to be withdrawn from such commerce, or which is under the flag of a foreign country then engaged in war or which is not adapted, or cannot by reasonable alterations be adapted, to the purpose specified in the act, or which is not at least 75 per cent as efficient as when originally put in commission.

After acquiring vessels in the manner prescribed the board is authorized "upon terms and conditions prescribed by and approved by the President" to charter, lease or sell to any person, a citizen of the United States, any vessel purchased, constructed or transferred. In the event of its inability to charter, lease or sell the vessels under its control, but not otherwise, the board is authorized to form corporations for the maintenance and operation of such vessels, the Government to purchase and vote not less than a majority of the capital stock of any such corporation. In time of war all the vessels under the control of the shipping board may be taken over and used as naval auxiliaries.

SHIPPING REGULATIONS

The features of the shipping bill which provide for the Federal regulation of the American merchant marine are patterned closely upon the Interstate Commerce law, modified in accordance with suggestions obtained by the House Committee on the Merchant Marine and Fisheries during an extended investigation of practices of vessel owners on the Atlantic and Pacific coasts and upon the Great Lakes. Special attention was given by the committee to conditions on the lakes, particularly in the ore-carrying trade, and several important recommendations based upon methods pursued therein and regarded by the committee with disfavor have been incorporated in the bill.

Section 15 of the measure, as perfected by the Senate Committee on Commerce, forbids deferred rebates; prohibits the use of "fighting" ships; forbids retaliation against the shipper because such shipper has patronized another carrier; and prohibits any unfair or discriminatory contract with any shipper based on volume of freight offered. Under the terms of section 16, every common carrier by water is required to file immediately with the board a true copy of every agreement with another carrier fixing or regulating transportation rates or fares, etc.; and the board is authorized by formal order to disapprove, cancel or modify any such agreement that it finds unjustly discriminatory or unfair as between carriers.

Section 17 forbids any common carrier by water to give any undue or unreasonable preference or advantage to any particular person or locality and forbids any person to obtain transportation for property for less than the regular rates, or to resort to certain unfair methods and devices, or to induce any marine insurance company or underwriter not to give a competing carrier by water as favorable a rate of insurance on vessels and cargo as is granted to the carrier subject to this act. Carriers by water in foreign commerce are prohibited by section 18 from charging or collecting any fare or rate which is unjustly discriminatory between shippers or ports and specifically empowers the board to correct such unjust discrimination. Carriers are also required by this section to establish and observe just and reasonable regulations and practices. Section 19 authorizes the board to set aside a rate or fare found to be unreasonable and to prescribe a reasonable maximum rate or fare and carriers are required to file with the board and to keep open to public inspection all freight and passenger tariffs.

Cut-throat competition is provided against by section 20 of the bill which stipulates that when a carrier by water reduces its rate below a fair and remunerative basis, with the intention to injure a competitor, it shall not increase such rates until the board, after hearing, finds that such increase rests upon changed conditions. A practice found to exist in various parts of the country is prohibited by section 21 of the bill which makes it unlawful for a common carrier by water to disclose to anyone except the consignee or shipper, without their consent, information as to nature, kind, quantity, destination, consignee or routing of any property. Periodical reports of all common carriers by water are required by section 22 of the bill. Other sections of the measure describe in detail the procedure before the board and confer upon the United States courts authority to enforce, suspend or set aside any order of the board.

It is expected that the Senate debate on the measure will occupy not more than four or five days. W. L. C.

Morse Chain Company Still Growing

The capital stock of the Morse Chain Company, Ithaca, N. Y., has been increased from $400,000 to $1,500,000 for expansive purposes in the shape of new buildings and additions to old ones already under way. The remarkable growth of this company is well illustrated by the successive building operations made necessary by the demand for its single product—Morse rocker-joint power transmission. From a fair sized factory at Trumansburg, N. Y., in 1904, about the time when electric motors came into broad commercial use, the business commenced to spurt, and in 1906 was removed to Ithaca to a new factory built specially for the purpose and twice as large as the former one. In 1912 it again became necessary to enlarge and the floor space was more than doubled. Present plans contemplate again doubling the size of the plant. A large storage building is about completed, additions to the steel and wire mills and a new gas producer building are well under way, and another addition to the main building, increasing its total length to more than 900 ft., is soon to be started. When these buildings are completed, the Morse Chain Company will have a total floor space of approximately seven acres, all of which will be devoted exclusively to the manufacture of Morse rocker-joint power transmission.

It is expected that the rebuilt Meily furnace at Lebanon, Pa., will be put in blast in the coming week.

STEEL CORPORATION EARNINGS

Surplus for June Quarter, $47,964,535, Making Surplus for Half-Year $80,818,707

The United States Steel Corporation's statement for the quarter ended June 30, issued on Tuesday, shows net earnings of $81,126,048—a truly stupendous amount, far in excess of any previous quarter. Net earnings for the corresponding period of 1915 were $27,950,055. The statement is as follows, in comparison with that quarter:

	1916	1915
April	$27,422,876	$7,286,499
May	27,554,899	9,320,576
June	28,147,473	11,343,070
Total earnings after deducting all expenses incident to operations, including those for ordinary repairs and maintenance of plants and interest on bonds of the subsidiary companies	$81,126,048	27,950,055
Less charges and allowances for depreciation:		
Sinking funds on bonds of subsidiary companies and depreciation and extraordinary replacement funds	8,071,848	6,031,013
Sinking funds on U. S. Steel Corporation bonds	1,673,978	1,607,458
Net income	71,380,222	20,311,584
Deduct interest for the quarter on U. S. Steel Corporation bonds outstanding	5,412,962	5,493,884
Premium payable on bonds redeemable under sinking funds	261,000	245,136
Balance	65,706,260	14,572,564
Deduct dividends for the quarter on stocks of the United States Steel Corporation:		
Preferred, regular, 1¾ per cent.	6,304,919	6,304,919
Common, regular, 1¼ per cent.	6,353,781	.....
Common, extra, 1 per cent.	5,083,025	.....
Surplus for the quarter	$47,964,535	$8,267,645

It will be observed that the huge earnings of the past quarter have encouraged the directors to begin to reimburse the common stockholders for the lean period through which they were obliged to go without dividends.

Gronwall-Dixon Electric Furnace Anniversary

A banquet commemorating the first anniversary of the starting of the Gronwall-Dixon electric steel furnace at its plant in Detroit, Mich., was given Saturday night, July 22, at the Detroit Athletic Club by the John A. Crowley Company of Detroit, which controls the United States and Canadian selling rights of this furnace. The pouring of this first heat was the beginning of the electric steel industry in Detroit. During the past year more than 5000 tons of chrome-vanadium, nickel-chrome, nickel and other alloy steels has been made. A new and modern plant is being completed there which will house several furnaces, including 10-ton units, giving a yearly output of 30,000 tons of steel.

At the banquet Mr. Crowley said that the selection of Detroit as the location for the proposed steel plant was because it is the center of the greatest alloy and high grade steel consuming district in the world. He announced the sale of two Gronwall-Dixon furnaces, which will be installed shortly. One of these furnaces will be used for sheet bars, and the second for high grade tool steel.

Ferrovanadium Exports Very Large

Ferrovanadium exports are mounting, those for May being 205,760 lb., the greatest ever recorded. This brings the total to June 1, 1916, to 506,243 lb. or 101,248 lb. per month. For the 11 months ended May 31, 1916, they were 978,031 lb. against 663,238 lb. and 575,231 lb. for the same periods in 1915 and 1914 respectively.

The United Steel Company, Canton, Ohio, has placed in operation two additional 80-ton open-hearth furnaces in its plant B and plans to start up two more furnaces about Aug. 1, making six of its ten new furnaces in operation.

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Iron and Steel Markets

STEEL FOR LARGE SHELLS

Deliveries Run to April Next Year

Heat Further Reduces Steel Mill Output—Foundry Pig Iron Weaker

Surpassing the highest estimates, the Steel Corporation's $81,000,000 earnings in the past quarter, reported on Tuesday, following two remarkable statements of independent steel companies, confirm what the market has lately shown of the exceptional position of the producers of steel. Along with heavy tonnages of unfilled orders, and the large purchases Europe is yet to make in this country, they point to a stronger market in the remainder of the year than was indicated one or two months ago.

The week has brought a new crop of rumors of large shell orders. What is confirmed is that over 1,000,000 shells of 8-in. and 9.2-in. sizes have been actually placed for deliveries running up to April 1, 1917. Negotiations for 6-in. to 12-in. shells in quantities representing heavy steel tonnages are still under way, and steel makers look for the placing of more orders soon. The slackening in 3-in. shell business here and the larger British and French output are well known, but in heavy shells this country's capacity will be called upon for a good many months.

To the firmer stand of the steel companies on contract enforcement and the large percentage of orders existing in the form of specifications has been credited the recent caution of domestic buyers as to far forward deliveries. But the new developments in export demand are now the basis for predictions of a September buying movement.

Implement makers' buying of bars for the first half of 1917, reported at 2.35c., Pittsburgh, two weeks ago, has brought out the fact that some mills have thus far made no bar sales for that delivery at less than 2.50c. Implement makers, on the one hand, emphasize the reduced buying of their products which advances have always caused, while bar manufacturers find signs that prices for rolled steel will again be made by the consumer in the way that was seen early this year.

The extent to which foreign demand is now making the market is indicated by the fact that out of 170,000 tons booked in the past week by one Chicago interest, less than 12 per cent was for domestic delivery.

The heat continues to cause an unusual curtailment of output throughout the country—a factor on which more stress is being laid. In the Pittsburgh district the reduction last week is put at 15 to 20 per cent.

Semi-finished steel is more difficult to get for early delivery, after some irregularity in price in June and early July. A sale of 4000 tons of open-hearth billets was made at $45, Pittsburgh, and for Bessemer billets $42 is reported, as against $40 recently. Ohio sheet mills are sounding the market for fourth quarter sheet bars, and $42.50 for Bessemer and $45 for open-hearth are tentatively named.

Plate prices for delivery in 1917 show an advancing tendency and 3c., Pittsburgh, is now more common for second quarter delivery. Seaboard shipyards will have little capacity available for more than a year. Two additional vessels for the Chilean ore trade have just been placed by the Bethlehem Steel Company at its Sparrows Point yard, making five building for that service.

An inquiry has come up in southern Ohio for 24,000 tons of steel rounds for delivery in the next four months to a company having a British contract for large shells.

One of the expected readjustments due to spelter was announced this week in a $10 reduction in galvanized iron and steel pipe. The galvanized wire trade remains to be heard from. In sheets the spelter decline was quickly reflected, and that market is even now making some slight response to the recovery of spelter from the low point.

The foundry pig-iron market is affected by the smaller output of foundries, particularly in the Chicago and Central Western districts. Many absentee molders are reported because of hot weather. Foundries are holding up shipments of pig iron, in consequence, and some have offered iron on the market. Some weakness has resulted, notably at Chicago, Detroit and in northern and southern Ohio.

In the Pittsburgh and Valley districts three furnaces have gone out and buying of basic iron for one or two steel companies is expected. There is still export inquiry for 30,000 to 40,000 tons of Bessemer iron and Japan wants 3000 tons additional of low phosphorus.

Ferromanganese is decidedly easier and there is also the possibility of the leading domestic producer figuring again as a seller.

Pittsburgh

PITTSBURGH, PA., July 25, 1916.

Export demand continues heavy for Bessemer and open-hearth billets and sheet bars, shell steel, wire products, beams, channels, iron car axles and other commodities. This demand is greater for Bessemer and open-hearth steel than can be supplied, and has served to further tighten up the local steel market, semi-finished steel being scarcer and bringing higher prices now than several months ago. The foreign inquiry for Bessemer pig iron has fallen off, but there are yet 30,000 to 40,000 tons of Bessemer iron, mostly for Italy, to ship on orders taken some time ago. The very hot weather has cut down the output of everything 20 per cent or more, and this is being severely felt. There is still belief that early in September there will be a home buying movement, as many domestic consumers have not covered their needs for last quarter and first quarter. The reduction of $10 per ton on galvanized iron and steel pipe is the only notable change in prices during the week. Galvanized sheets are reported a little firmer with some mills, due to the higher prices of spelter the last few days. The scrap market is again dull, and prices are soft. Coke output is a good deal heavier, but there is still a shortage of labor, and prompt furnace coke is bringing high prices. Conditions are not likely to change much the next month

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

Pig Iron, Per Gross Ton.	July 26, 1916.	July 19, 1916.	June 28, 1916.	July 28, 1915.
No. 2 X, Philadelphia...	$19.75	$19.75	$19.00	$14.00
No. 2, Valley furnace...	18.25	18.25	18.25	12.75
No. 2 Southern, Cin'ti..	16.90	16.90	16.90	12.90
No. 2, Birmingham, Ala.	14.00	14.00	14.00	10.00
No. 2, furnace, Chicago*	19.00	19.00	19.00	13.00
Basic, del'd, eastern Pa.	19.00	19.00	19.00	14.00
Basic, Valley furnace...	18.00	18.00	18.00	13.00
Bessemer, Pittsburgh ...	21.95	21.95	21.95	15.20
Malleable Bess., Ch'go*..	19.50	19.50	19.50	13.00
Gray forge, Pittsburgh..	18.70	18.70	18.70	13.45
L. S. charcoal, Chicago..	19.75	19.75	19.75	15.75
Billets, etc., Per Gross Ton				
Bess. billets, Pittsburgh.	**42.00**	40.00	42.00	22.00
O.-h. billets, Pittsburgh..	**45.00**	42.00	42.00	22.00
O.-h. sheet bars, P'gh....	**45.00**	42.00	42.00	23.00
Forging billets, base, P'gh	69.00	69.00	69.00	28.00
O.-h. billets, Phila.....	45.00	45.00	46.00	30.00
Wire rods, Pittsburgh ...	50.00	45.00	46.00	29.00
Finished Iron and Steel, Per Lb to Large Buyers	Cents	Cents	Cents	Cents
Bess. rails, heavy, at mill	1.47½	1.47½	1.47½	1.25
O.-h. rails, heavy, at mill	1.56½	1.56½	1.56½	1.34
Iron bars, Philadelphia..	2.659	2.659	2.659	1.30
Iron bars, Pittsburgh...	2.50	2.50	2.50	1.25
Iron bars, Chicago.....	2.35	2.35	2.35	1.20
Steel bars, Pittsburgh....	2.50	2.50	2.75	1.25
Steel bars, New York....	2.669	2.669	2.919	1.169
Tank plates, Pittsburgh	2.50	2.50	2.75	1.25
Tank plates, New York	2.669	2.669	2.919	1.369
Beams, etc., Pittsburgh..	2.50	2.50	2.50	1.25
Beams, etc., New York..	2.669	2.669	2.669	1.419
Skelp, grooved steel, P'gh	2.35	2.35	2.60	1.20
Skelp, sheared steel, P'gh	2.45	2.45	2.45	1.30
Steel hoops, Pittsburgh..	2.75	2.75	2.75	1.30

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton

Sheets, Nails and Wire, Per Lb to Large Buyers	July 26, 1916. Cents	July 19, 1916. Cents	June 28, 1916. Cents	July 28, 1915. Cents
Sheets, black, No. 28, P'gh	2.90	2.90	3.00	1.90
Sheets, galv., No. 28, P'gh	4.00	4.00	4.00	3.00
Wire nails, Pittsburgh..	2.50	2.50	2.50	1.60
Cut nails, Pittsburgh..	2.60	2.60	2.70	1.70
Fence wire, base, P'gh.	3.25	3.25	3.40	1.85
Barb wire, galv., P'gh.	3.35	3.35	3.50	2.10
Old Material, Per Gross Ton				
Iron rails, Chicago	18.50	18.50	18.00	12.25
Iron rails, Philadelphia	20.00	20.00	20.00	15.50
Car wheels, Chicago	12.00	12.00	12.00	11.00
Car wheels, Philadelphia..	**15.50**	15.00	16.00	12.50
Heavy steel scrap, P'gh.	*16.25*	16.50	15.75	13.00
Heavy steel scrap, Phila	15.00	15.00	14.75	12.50
Heavy steel scrap, Ch'go	**15.25**	14.00	14.00	11.50
No. 1 cast, Pittsburgh..	15.50	15.50	15.00	12.00
No. 1 cast, Philadelphia	16.00	16.00	16.00	14.00
No. 1 cast, Ch'go (net ton)	11.50	11.50	11.00	9.50
Coke, Connellsville, Per Net Ton at Oven				
Furnace coke, prompt..	$2.75	$2.75	$2.40	$1.60
Furnace coke, future..	2.50	2.50	2.50	1.75
Foundry coke, prompt...	3.25	3.25	3.25	2.00
Foundry coke, future..	3.00	3.00	3.00	2.25
Metals, Per Lb to Large Buyers	Cents	Cents	Cents	Cents.
Lake copper, New York	25.25	25.25	24.00	17.00
Electrolytic copper, N. Y.	25.00	25.00	23.50	18.00
Spelter, St. Louis....	**10.25**	9.00	11.50	18.00
Spelter, New York....	**10.50**	9.25	11.75	18.25
Lead, St. Louis.....	*6.00*	6.10	6.65	5.45
Lead, New York.....	*6.20*	6.25	6.80	5.50
Tin, New York.....	**38.00**	37.25	39.00	36.00
Antimony, Asiatic, N. Y.	*13.50*	14.00	17.50	35.50
Tin plate, 100-lb box, P'gh	$6.00	$6.00	$6.00	$3.10

or six weeks, but the last three or four months of this year are expected to be very active.

Pig Iron.—The local market is dull and foreign inquiry for Bessemer iron has also quieted down. One Eliza furnace of the Jones & Laughlin Steel Company went out of blast a few days ago for relining and repairs. It is expected that one or two of the large steel companies may come into the market within a short time for round lots of basic iron, and also possibly for some Bessemer. It is stated that the molders' strike in this district, which has been on since December, may be settled within a few days, and if this occurs a better demand for foundry iron may result. Prices are ruling firm. We quote Bessemer iron at $21; basic, $18; gray forge, $17.75 to $18; malleable Bessemer, $18.50 to $19, and No. 2 foundry, $18.25 to $18.50, all at Valley furnace, the freight rate to the Pittsburgh and Cleveland districts being 95c. per gross ton.

Ferroalloys.—All grades are quiet, with prices on ferromanganese easier than for some time. Consumers are well covered and there is but little inquiry. Domestic 80 per cent for prompt shipment is offered at $200 or less, and on contracts for the remainder of the year at about $175 at furnace. Spiegeleisen, 18 to 22 per cent, is quoted at $45 to $50, and 25 to 30 per cent, from $60 to $70, at furnace. We quote 50 per cent ferrosilicon at $85 in lots up to 100 tons; over 100 tons and up to 600 tons, $84, and over 600 tons, $83, all per gross ton, f.o.b. Pittsburgh. We quote Bessemer ferrosilicon as follows: 9 per cent, $30; 10 per cent, $31; 11 per cent, $32; 12 per cent, $33; 13 per cent, $34.50; 14 per cent, $36.50; 15 per cent, $38.50, and 16 per cent, $41. Seven per cent silvery is $28.50; 8 per cent, $29; 9 per cent, $29.50; 10 per cent, $30; 11 per cent, $31, and 12 per cent, $32. These prices are f.o.b. at furnace, Jackson or New Straitsville, Ohio, or Ashland, Ky., all having a freight rate of $2 per gross ton to Pittsburgh.

Billets and Sheet Bars.—There is still a very heavy export demand for soft Bessemer and open-hearth steel in various forms, running much beyond the capacity of the mills to supply as promptly as wanted. This has made prices firmer. We note sales of about 4000 tons of 4 x 4-in. open-hearth billets for export at $45 per ton, f.o.b. Pittsburgh, and 2000 to 2500 tons of sheet bars at $43 to $44.50 at mill. One large domestic maker of steel is running short and is in the market for a round lot. It is doubtful whether any open-hearth steel could be found at less than $45 at mill, but Bessemer could be had at $42 to $43. We quote soft open-hearth billets and sheet bars at $42 to $45; Bessemer billets, $42 to $43, and Bessemer sheet bars, $42 to $43, maker's mill, Pittsburgh or Youngstown district. We quote forging billets at $69 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take $1 extra.

Plates.—The situation in plates is steadily getting tighter, and, with prospects of very heavy business being placed by the Government for the boats it has decided to build, it would not be surprising if prices of plates in the last three or four months of the year should be higher than they are now. While one or two mills still quote 2.75c. on ¼-in. and heavier sheared plates for delivery in about the second quarter of next year, most mills are quoting 2.90c. to 3c., and for prompt plates, for shipment in two to three months, mills report there is no trouble in getting 3.50c. to 4c. at mill. Inquiries for cars are very light, the only important one in the market being from the Lehigh Valley Railroad for 1500 box cars. We quote ¼-in. and heavier plates for deferred delivery at 2.90c. to 3c., and for shipment in two to three months, from 3.50c. to 4c. at mill.

Structural Material.—The new inquiry is quite heavy, but local fabricators are not bidding on much new work, being filled up for four or five months. The American Bridge Company has taken 1800 tons for a power house at Dayton, Ohio, and 200 tons for the Amherst College library. The Massillon Bridge & Structural Company has taken 200 tons for a new steel building for the Elyria Steel & Iron Company, Elyria, Ohio. We quote beams and channels up to 15 in. at 2.50c. to 2.75c. at mill, for delivery in third and fourth quarters, while small lots from stock are held at 3.25c. up to 4c., prices depending entirely on the size of the order and how soon deliveries are wanted.

Steel Rails.—Only a few scattering orders for small lots of standard sections are being placed. The Car-

negie Steel Company is filled up on heavy rails into the third quarter of 1917. Most of the new business in light rails is said to be going to the rerolling rail mills, which are naming lower prices on light rails made from old rails than are asked for light rails made from billets. We quote 25 to 45 lb. sections at $47; 16 and 20 lb., $48; 12 and 14 lb., $49; and 8 and 10 lb., $50 in carload lots, f.o.b. at mill, the usual extras being charged for less than carload lots. We quote standard section rails of Bessemer stock at 1.47½c., and of open-hearth, 1.56½c., Pittsburgh.

Sheets.—The advance in spelter in the last few days has firmed up prices a little on galvanized sheets. The demand for electrical sheets is still heavy, also for light and heavy gages of blue annealed, but for Bessemer black and galvanized sheets is only fair. Specifications against contracts are somewhat irregular, one day being light and the next day good. It is said that one or two mills, owing to the advance in spelter, have withdrawn the 4.25c. price on galvanized sheets and are quoting higher. We quote blue annealed sheets, Nos. 9 and 10, at 3c. to 3.25c., for delivery at convenience of the mill. We quote No. 28 Bessemer and open-hearth black sheets at 2.90c. to 3c.; No. 28 galvanized, Bessemer, and open-hearth, 4.25c. to 4.35c.; Nos. 22 and 24 black plate, tin-mill sizes, H. R. & A., 2.90c.; Nos. 25, 26 and 27, 3c. to 3.10c.; No. 28, 3.10c. to 3.15c.; and No. 29, 3.20c. to 3.25c. These prices are for carloads and larger lots, f.o.b. mill, Pittsburgh.

Tin Plate.—The plant of the Union Sheet & Tin Plate Company, Marietta, Ohio, is to be started shortly, a supply of tin bars having been secured. The domestic demand for tin plate is rather heavy, but foreign inquiry is light, the few inquiries in the market coming mostly from Russia. The McKeesport Tin Plate Company has started five more mills, and it is said their output is sold for the remainder of this year. The output of tin plate fell off a good deal in the last two weeks, due to the very hot weather. One large company states that on the average it is not getting out more than about 70 per cent of its normal output. We quote wasters from stock at $5.75 to $6, and primes at $6 to $6.25 to the domestic trade, while for export, $6.25 per base box, and higher, is quoted. We quote 8-lb. coated ternes at $8.50 to $8.75 for 200 lb., and $8.75 to $9 for 214 lb., all f.o.b. Pittsburgh.

Skelp.—New demand is very dull, with prices steady. We quote grooved steel skelp at 2.35c. to 2.40c.; sheared steel skelp, 2.45c. to 2.50c.; grooved iron skelp, 2.70c. to 2.80c., and sheared iron skelp, 3c. to 3.10c., all delivered to consumers' mills in the Pittsburgh district.

Cold-Rolled Strip Steel.—Nearly all consumers are covered for the remainder of the year and new buying is light. Specifications against contracts are active. Most makers have their output sold up for the next five or six months. On contracts we quote cold-rolled strip steel at $6 per 100 lb., base, and on small lots, for fairly prompt delivery, from $6.50 to $7. Extras, standard with all the mills, were printed on page 810 of THE IRON AGE of March 30.

Wire Rods.—New inquiry is quite good and consumers are specifying freely against contracts. The declared value of rods being shipped into Canada has been $55 for some time, and this is said to be minimum of the market. We quote soft Bessemer, open-hearth and chain rods at $55 to $60 per ton, f.o.b. Pittsburgh.

Wire Products.—The wire trade is quiet and specifications against contracts are light. Manufacturers look for a heavy fall trade and are accumulating large stocks to meet it. As yet no changes have been made in prices on galvanized wire products, but buyers are holding off in the belief that prices may be adjusted to a lower basis. Regular prices are as follows: Wire nails, $2.50 to $2.60 per keg; galvanized, 1 in. and longer, taking an advance over this price of $2, and shorter than 1 in., $2.50. Bright basic wire is $2.65 per 100 lb. and annealed fence wire $2.45; galvanized wire, $3.15; galvanized barb wire and fence staples, $3.35; painted barb wire, $2.65; polished fence staples, $2.65; cement-coated nails, $2.50, base, all f.o.b. Pittsburgh, with freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing are now 61½ per cent off list for carload lots, 60½ per cent for 1000-rod lots and 59½ per cent for small lots, f.o.b. Pittsburgh.

Railroad Spikes.—New inquiry is still light. The Seaboard Air Line has placed 5000 to 8000 kegs for delivery over the remainder of the year, and the Western Maryland 2250 kegs. Local makers are bidding on the inquiry from Russia for 50,000 kegs of dog-eared spikes, and it is expected part of the order will be placed here. Regular prices, which are only fairly strong, are as follows:

Standard railroad spikes, 4½ x 9/16 in. and larger, $2.65 to $2.75; railroad spikes, ½ and 7/16 in., $2.75 base; railroad spikes, ⅜ in. and 5/16 in., $3.05 base; boat spikes, $2.80 base, all per 100 lb., f.o.b. Pittsburgh.

Nuts and Bolts.—New demand is not heavy, as consumers are covered for the remainder of the year. Specifications are fairly active. The supply of steel is better than for a long time. Discounts in effect from May 19 are as follows, delivered in lots of 300 lb. or more, where the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days:

Carriage bolts, small, rolled thread, 50 and 10 per cent; small, cut thread, 50; large, 40.

Machine bolts, h. p. nuts, small, rolled thread, 50, 10 and 5 per cent; small, cut thread, 50 and 5; large, 40 and 10.

Machine bolts, c. p. c. and t. nuts, small, 40, 10 and 5 per cent; large, 35 and 5. Blank bolts, 40 and 10 per cent; bolt ends with h. p. nuts, 40 and 10; with c. p. nuts, 35 and 5. Rough stud bolts, 15. Lag screws (cone or gimlet point), 50 and 10.

Forged set screws and cap bolts, 10 per cent. Cut and round point set screws, case hardened, 60. Square and hexagon head cap screws, 55. Flat, button, round or fillister head cap screws, 50.

Nuts, h. p. sq., tapped or blank, $2.90 off list; hex., $2.90 off; c. p. c. and t. sq., tapped or blank, $3.00 off; hex., $3 off; semi-finished hex., 60 and 10 per cent; finished and case hardened, 60 and 10.

Rivets, 7/16 in. in diameter and smaller, 45, 10 and 10 per cent.

Iron and Steel Bars.—Heavy inquiries for steel rounds for foreign delivery, mostly from Russia, are coming into the market nearly every day, but local mills are filled up so far ahead that, as a rule, they do not quote. The reported sales of steel bars for first half of 1917 have unsettled the local market to some extent for next year, other consumers insisting that if 2.35c. has been done for the implement makers they should have the same price. The new demand for steel bars is heavy, and specifications are active. The general price on steel bars is 2.50c. for such deliveries as the mills can make, which probably would not be before the first quarter of 1917, while from warehouse small lots for prompt shipment bring 3c. to 3.25c. In the new bar mills being erected by the Carnegie Steel Company at McDonald, Ohio, one large mill will be devoted entirely to the rolling of reinforced steel bars for concrete work. We quote refined iron bars at 2.50c. to 2.60c., and railroad test bars at 2.70c. to 2.80c. at mill.

Shafting.—New demand is not heavy. Consumers are covered over the remainder of the year and specifications against contracts are not so active as they were some time ago. Prices are firm. We quote cold rolled shafting at 20 to 15 per cent off in carload lots for delivery in last quarter of this year and first quarter of 1917, and 10 per cent off in less than carload lots, f.o.b. Pittsburgh, freight added to point of delivery.

Cotton Ties.—Practically all the business in cotton ties for this year has been placed, but a few scattering orders are expected to come in in August and September. We quote cotton ties at $1.35 per bundle of 45 lb., f.o.b. Pittsburgh, for July shipment.

Merchant Steel.—New orders are mostly for small lots, as consumers are covered over the remainder of the year. Specifications are active. Prices on small lots are about as follows: Iron-finished tire, ½ x 1½ in. and larger, 2.50c., base; under ½ x 1½ in., 2.60c.; planished tire, 2.70c.; channel tire, ¾ to ⅞ and 1 in., 2.85c. to 2.95c.; 1⅛ in. and larger, 3.25c.; toe calk, 2.95c. to

3.05c., base; flat sleigh shoe, 2.70c.; concave and convex, 2.75c.; cutter shoe, tapered or bent, 3.25c. to 3.35c.; spring steel, 2.95c. to 3.05c.; machinery steel, smooth finish, 2.75c.

Hoops and Bands.—Current demand is light, as consumers are covered for five to six months. Mills report specifications active, and shipments are heavy. We quote steel hoops at 2.75c. and bands at 2.50c., steel-bar card extras applying on the latter.

Rivets.—The new demand is not heavy, most consumers being covered over the remainder of the year. The foreign demand has fallen off. Prices with makers are firm, but some jobbers who have stocks bought when prices were lower, are offering them at less than makers' prices, which are as follows: Buttonhead structural rivets, ½ in. in diameter and larger, at $4 per 100 lb., base, and conehead boiler rivets, same sizes, $4.10 per 100 lb., base, f.o.b. Pittsburgh. Terms are 30 days net, or one-half of 1 per cent for cash in 10 days.

Wrought Pipe.—Reports that 100 miles or more of 12-in. pipe had lately been placed with local mills are not confirmed, but a recent order for 45 to 50 miles of 20-in. pipe has been so placed. On 2-in. to 8-in. lap weld pipe, mills are filled up for four or five months and on o. d. pipe three to four months. On butt weld sizes, mills can ship promptly. Effective Monday, July 24, discounts on galvanized iron and steel pipe were increased five points, equal to a reduction of $10 per ton. The discounts on black and galvanized iron and steel pipe are given on another page.

Boiler Tubes.—On locomotive and merchant tubes makers are filled up six to eight months, and are much behind in deliveries. Consumers are specifying heavily and premiums are being paid for prompt shipments. Discounts are strong on iron and steel boiler tubes, as given on another page.

Old Material.—The market has settled down to a condition of lethargy, there being no new inquiry. Consumers are not interested, even at the low prices ruling. Borings and turnings are dull and lower. A freight embargo is on to the plant of the principal consumer located at Brackenridge, Pa. Dealers are not trying to force sales under present conditions. Prices quoted by dealers for delivery in Pittsburgh and nearby districts that take the same rates of freight, per gross ton, are as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	$16.25 to $16.50
No. 1 foundry cast	15.00 to 15.25
Relaying rails, Newark and Cuyahoga, Ohio, Cumberland, Md., and Franklin, Pa.	16.25 to 16.50
Hydraulic compressed sheet scrap	13.50 to 13.75
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	11.25 to 11.50
Bundled sheet stamping scrap	10.75 to 11.00
No. 1 railroad malleable stock	11.75 to 12.00
Railroad grate bars	9.00 to 9.25
Low phosphorus melting stock	19.50 to 20.00
Iron car axles	27.00 to 27.50
Steel car axles	27.00 to 27.50
Locomotive axles, steel	28.00 to 28.50
No. 1 busheling scrap	13.00 to 13.25
Machine shop turnings	8.00 to 8.25
Cbi carwheels	13.00 to 13.25
Cast-iron borings	8.00 to 8.25
*Sheet bar crop ends	17.25 to 17.50
No. 1 railroad wrought scrap	18.25 to 18.50
Heavy steel axle turnings	11.00 to 11.25
Heavy breakable cast scrap	12.50 to 12.75

*Shipping point.

Coke.—A shortage in supply of prompt blast furnace coke still exists, best grades bringing $1.75 per net ton at oven, while some makes can be had as low as $1.50. No inquiry is reported for contract furnace coke, furnaces being covered for this year. The Youngstown Sheet & Tube Company is now receiving shipments of coal for its new Koppers by-product coke plant at East Youngstown, Ohio, but the plant will not likely be started for some little time. We quote blast furnace coke for prompt shipment at $2.50 to $2.75 per net ton at oven, depending on quality, and on contracts over the remainder of the year, from $2.35 to $2.50. Several makers that got $2.65 for their furnace coke on contracts report they are sold up and have no more to offer. We quote best grades of 72-hr. foundry coke at $3 to $3.25 per net ton at oven, and on contracts $3.25 to $3.50. The Connellsville *Courier* gives the output of coke in the upper and lower Connellsville regions for the week ended July 15 as 418,016 net tons, an increase over the previous week of 58,486 tons.

Chicago

CHICAGO, ILL., July 25, 1916.

New business of local origin is still of very little consequence, negotiations of larger importance in which Western manufacturers are interested being almost entirely connected with inquiry from abroad or overflow business normally placed in other territories. A large amount of inquiry for billet and bar steel, for first quarter delivery to the Allies, is under consideration, as well as large quantities of ship plates for Japan. Of nearly 170,000 tons of orders taken last week by one interest, less than 12 per cent is ultimately for domestic delivery. The plate situation presents an increasingly wide spread between the prices and deliveries of wide and heavy plates and those that are more commonly rolled. For the former, 4c., Pittsburgh, has been done for delivery as protracted as 90 days, while narrow plates have been taken at 3.25c. for shipment in two weeks. The future attitude of domestic buyers of finished steel is still an enigma. Against the possibility of a pronounced buying movement in the fall to cover first half requirements, or an allotment of tonnage such as the mills made to their customers for last half, is the growing disposition of buyers to commit themselves at the present high prices only for what they need in the immediate future, an attitude fostered by the disposition of many mills to hold consumers to a stricter accountability on contracts. In the pig-iron market prices of Northern iron are being maintained in the face of a discouraging situation. Melters who have had their operations curtailed by labor difficulties are not only holding back shipments from the furnaces, but are themselves offering iron for resale. For Southern iron the price is largely determined by offerings of resale iron. The strike of miners at the southern Illinois fluorspar mines is becoming a serious menace. The scrap market was helped somewhat last week by another sale of steel scrap to a local melter at an advance of 75c. per ton.

Pig Iron.—Inquiry is not improving. A lot of 2000 tons of malleable iron for delivery at the Indianapolis plant of a manufacturer of conveying machinery is the most important new business up for consideration. Other inquiries of 200 and 500 tons are noted, but most of the prospects are limited to even smaller lots. Local furnaces are maintaining their prices despite the long-continued dearth of new business, and in addition are confronted with resale offerings of iron from foundries whose consumption has been curtailed because of labor troubles. Prices are supported, however, by the patent fact that buying is restricted for other reasons than that of price. Southern furnaces are taking practically no business, the small lots of iron that are being bought being absorbed by offerings of resale iron, which is quoted at prices ranging from $13 to $13.50, while the minimum furnace price appears to be $14, Birmingham. The demand for iron for export is still absorbing attention, and sales of foundry iron from the South and of Bessemer iron are noted. Prices for low phosphorus iron, Ohio silvery and ferrosilicon are easier. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of $1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 plain	$19.75
Lake Superior charcoal, No. 1	20.25
Lake Superior charcoal, No. 6 and Scotch	20.75
Northern coke foundry, No. 1	19.50
Northern coke foundry, No. 2	19.00
Northern coke foundry, No. 3	18.50
Southern coke, No. 1 Gray and 1 soft	$18.00 to 18.50
Southern coke, No. 2 Gray and 2 soft	18.00 to 18.50
Malleable Bessemer	19.00
Basic	19.00 to 19.50
Low phosphorus	24.00
Silvery, 8 per cent	24.00
Bessemer ferrosilicon, 10 per cent	24.00

Rails and Track Supplies.—The inquiry from the Canadian Pacific Railway for 25,000 tons of rails is the only large item on which quotations are now outstanding. There is some buying of tie-plates, but in general railroad purchasing is at a standstill. Railroad spikes are still being offered by a Pittsburgh mill on the basis of 2.65c. Quotations are as follows: Standard railroad spikes, 2.75c., base; track bolts with square nuts, 3.25c. to 3.50c., base, all in carload lots, Chicago; tie-plates, $50, f.o.b. mill, net ton; standard section, Bessemer rails, Chicago, $33, base; open-hearth, $35; light rails, 25 to 45 lb., $40; 16 to 20 lb., $41; 12 lb., $42; 8 lb., $43; angle bars, 2c., Chicago.

Structural Material.—It is the understanding that the construction of the factory for James S. Kirk & Co., which was originally figured in structural steel, will now be carried out in reinforced concrete. The fabrication of steel for the new plant of the Mark Mfg. Company, involving about 2500 tons, will be done, it is understood, by the Morava Construction Company. Other structural lettings were of less importance. The American Bridge Company took 720 tons for a sugar factory at Mason City, Iowa, and Christopher & Simpson 300 tons for the Monsanto Chemical Works, St. Louis. The Utah Copper Company at Arthur, Utah, and the Anaconda Copper Mining Company at Butte, Mont., placed orders, involving about 130 tons each, with a Kansas City fabricator. Car builders are figuring on a few new inquiries, one for 1000 cars for the Western Pacific. The Minneapolis & St. Louis is reported in the market for 1000 box cars, and the Chicago & Northwestern has increased its mine car inquiry from 200 to 400. We quote for Chicago delivery of structural steel from mill 2.689c.

We quote for Chicago delivery of structural steel from jobbers' stock 3.10c.

Plates.—Quotations on plates are in sharp contrast, depending upon the sizes of plates desired. Ship plates and wide and heavy plates for other purposes are commanding premiums for protracted deliveries to a greater extent than has heretofore obtained, while narrow plates, such as can be rolled by the average mill, are to be had much more promptly. On a lot of 800 tons 4c., Pittsburgh, was quoted and the order placed for delivery in 90 days. Another lot of 200 tons, sold at 3.25c., Pittsburgh, is to be delivered in two weeks. Inquiry for 4000 to 5000 tons of ship plates for Japan is reported. We quote for Chicago delivery of plates from mill, 3.439c. to 3.689c., for prompt shipment, and 3.089c. for delivery at mill convenience.

We quote for Chicago delivery of plates out of jobbers' stock 3.50c.

Sheets.—The rapid decline in the price of galvanized sheets is being checked by the upturn in spelter prices. The firmer attitude of the sheet mills in the matter of the observance of contracts, and their refusal to guarantee prices against decline, may be tested under present conditions, with a number of contracts at 5c. still to be worked out. With respect to blue annealed and black sheets the market is about as last quoted. We quote for Chicago delivery, blue annealed, No. 16 and heavier, 3.089c. to 3.339c.; box annealed, No. 17 and lighter, 2.939c. to 3.039c.; No. 28 galvanized, 4.439c. to 4.589c.

We quote for Chicago delivery out of stock of steel base gauges applying on base sheets as follows: No. 10 blue annealed, 3.40c.; No. 28 black, 3.10c. to 3.20c.; No. 28 galvanized, 5c. to 5.10c.

Bars.—Inquiry for ammunition bars in large sizes, for 1917 delivery, now before the mills, embraces a large and increasing tonnage. It represents practically the only activity in open-hearth bars. For reinforcing bars there is demand from a number of directions, a considerable part of which will be satisfied with Bessemer, discard, or rail-carbon steel. The appearance of weakness in the rail-carbon situation which has been commented upon seems not to have developed farther, and business more recently placed has been closed very generally on the basis of 2.50c., Pittsburgh. Bar-iron buying is light, but the price is firm. We quote mill shipment, Chicago, as follows: Bar iron, 2.35c.; soft steel bars, 2.689c. to 2.939c.; hard steel bars, 2.50c.; shafting, in carloads, 25 per cent off; less than carloads, 20 per cent off.

We quote from stock prices for Chicago delivery: Soft steel bars, 3.10c.; bar iron, 3.10c.; reinforcing bars, 3.10c. base with [illegible] extras on lengths, sizes [illegible] usual [illegible] for smaller sizes, shafting 10 per cent off.

Rivets and Bolts.—While the prompt shipment business in rivets and in bolts and nuts continues unsettled as to price, with a variable range of quotations, contract negotiations develop a firm attitude on the part of the mills. Orders are neither plentiful nor large. We quote carriage bolts up to ⅜ x 6 in., rolled thread, 50-10-5; cut thread, 50-5; larger sizes, 40-5; machine bolts up to ⅜ x 4-in., rolled thread, with hot pressed square nuts, 50-10-10; cut thread, 50-10; larger sizes, 40-10-5; gimlet point coach screws, 60; hot pressed nuts, square, $2.90 off per 100 lb.; hexagon, $2.90 off. Structural rivets, ¾ to 1¼ in., 4c. to 4.15c., base, Chicago, in carloads lots; boiler rivets, 10c. additional.

We quote out of stock: Structural rivets, 3.50c.; boiler rivets, 3.60c.; machine bolts up to [illegible] x 4 in., 60 per cent; larger sizes, 40 per cent; carriage bolts up to [illegible] x 6 in., 50 per cent; larger sizes, 50 per cent; hot pressed nuts, square, [illegible] hexagon, $4.25 off per 100 lb.; lag screws, 60.

Wire Products.—The advance in the price of plain wire for fourth-quarter contracts is expected to prove to be an anticipation of corresponding advances in other wire products the sale of which is restricted to 60-day periods. The general business in wire is light, but recent reports from jobbers indicate some picking up in the sales of wire nails. We quote as follows: Plain wire, Nos. 6 to 9, base, $2.839; wire nails, $2.689; painted barb wire, $2.839; galvanized barb wire, $3.539; polished staples, $2.839; galvanized staples, $3.539; all Chicago.

Old Material.—The purchase of heavy melting and shoveling steel scrap by a local independent mill, in amount reported as 15,000 tons, has added some strength to the old material market. An advance of 75c. per ton over the price at which the recent Gary order was placed was established, with a differential of 50c. between heavy melting and shoveling steel grades. The market also gathered some strength from the greater scarcity of country and dealer scrap. Yard dealers are not only finding their operations handicapped by lack of labor, but seem disposed to limit their output through the summer months. While consumers of rolling-mill scrap are showing very little interest, this tightening up in supply is making for slightly higher quotations. Foundry scrap, however, seems unimproved and a sale of railroad malleable at $11.25, delivered, is reported. Railroad offerings of scrap, to close this week, include 3000 tons from the Santa Fe, 2100 tons from the Milwaukee, 2600 tons from the Burlington and 4000 tons from the Rock Island. A typographical error in the issue of July 13 caused the quotation for No. 1 railroad wrought in this market to appear as $14.25 to $14.50, whereas it should have been $15 to $15.50. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

	Per Gross Ton	
[illegible]	[illegible]	[illegible]
Heavy melting steel scrap	15.25 to	15.50
[illegible]	[illegible]	[illegible]
	Per Net Ton	
[illegible]	[illegible]	[illegible]
Steel angle bars	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
No. 1 boilers, cut to sheets and rings	9.25 to	[illegible]
Boiler punchings	13.50 to	[illegible]
[illegible]	[illegible]	[illegible]
Cast borings	[illegible]	[illegible]
No. 1 cast scrap	[illegible]	[illegible]
Stove plate and light cast scrap	[illegible]	[illegible]
Grate bars	[illegible]	[illegible]
Brake shoes	9.75	[illegible]
[illegible]	[illegible]	[illegible]
Agricultural [illegible]	[illegible]	[illegible]

Cast-Iron Pipe.—The United States Cast Iron Pipe & Foundry Company has taken 1000 tons at Milwaukee and 100 tons at Winslow, Ill. An inquiry for 300 tons is reported from Garrison, N. D. We quote as follows, per net ton, Chicago: Water pipe, 4 in., $33.50 to $34; 6 in. and larger, $30.50 to $31, with $1 extra for class A water pipe and gas pipe.

Philadelphia

PHILADELPHIA, PA., July 25, 1916.

Little or no change is apparent. The domestic pig-iron market is especially dull. Foreign consumers continue to inquire for low phosphorus and Bessemer, one inquiry reported for the former calling for 25,000 tons. The Pennsylvania Railroad, which had inquired for 2000 to 6000 tons of plates, shapes and bars for first half delivery, has raised the quantity to 5000 to 10,000 tons. Structural shapes continue quiet, but some large propositions are being developed. Plates continue active and strong. Consumers of steel products, especially plates and stock for bolts and nuts, are complaining because of backward deliveries. A local manufacturer of bolts and nuts has lost one or two days a month because of shortage in stock. The tightness which exists in some steel materials is undoubtedly due to the fact that mills are utilizing open-hearth steel in directions where the greatest profit is to be obtained. This not only makes it impossible for consumers to get material from regular sources, but also throws an extra burden on mills that have a narrow line of products and have adhered to them.

Iron Ore.—In the week ended July 22 arrivals at this port consisted of 7700 tons from Cuba, 9889 tons from Sweden, and 11,215 tons from Spain.

Pig Iron.—It is reported that J. P. Morgan & Co. have issued an export inquiry for 25,000 tons of low phosphorus, while inquiries from other sources, also for export, continue to hold the interest of the trade. The market otherwise presents no special feature. The domestic situation is flat, with foundry iron continuing weak. Except for small lots of prompt low phosphorus, the domestic demand for that grade is quiet, but prices are strong, the minimum quotation being about $34, Philadelphia. Basic has been inactive, except for the taking of 1000 tons by a local interest, for which $19, delivered, was paid. Quotations for standard brands, delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa., No. 2 X foundry	$19.75 to $20.25
Eastern Pa., No. 2 plain	19.50 to 20.00
Virginia, No. 2 X foundry	21.25
Virginia, No. 2 plain	20.75
Gray forge	18.50 to 19.00
Basic	19.00 to 19.50
Standard low phosphorus	34.00

Ferroalloys.—The market continues quiet, with both foreign and domestic 80 per cent ferromanganese unchanged at $175, seaboard, for comparatively nearby delivery. Some sellers ask $175 for August shipment from England, while for some prompt unrestricted domestic material $200 to $225 is asked. For spiegeleisen $52, furnace, has been quoted, although $50 has been done on contract. The arrival of 665 tons of English ferromanganese at this port last week is recorded.

Plates.—Consumers are protesting in many instances because their demands are not satisfied by the makers. The latter report that the call from both domestic and foreign consumers is as great as ever; in fact, one mill, even though it is not taking foreign or war business, cannot catch up on orders. The Pennsylvania Railroad is in the market for first half delivery. The Pusey & Jones Company, Wilmington, Del., is in the market for 2400 tons, this year delivery. Japanese interests are in the market, as are other foreign buyers. Quotations are unchanged at 3.659c. to 4.159c., Philadelphia.

Bars.—Bessemer bars for delivery within 30 days are obtainable at 2.659c., Philadelphia, but open-hearth bars are quoted over this price, one mill asking 3.409c., Philadelphia. Iron bars are unchanged at 2.659c., Philadelphia.

Structural Material.—New business is light, but two or three large propositions are said to be in process of formation. An eastern Pennsylvania mill asks 3.159c., Philadelphia, on current business, but would accept 3.909c. on a desirable lot.

Billets.—Contracts into the fourth quarter are being booked at $45 to $50 for open-hearth rerolling billets, and around $65 for forging steel.

Sheets.—Eastern Pennsylvania mills quote 3.659c., Philadelphia, for No. 10 blue annealed. The demand is active.

Coke.—Quiet prevails, and what little business there is results from concessions, especially in foundry coke. Spot furnace is quoted at $2.75 per net ton at oven, and contract at $2.50. Spot foundry quotations range from $3.25 to $3.50 per net ton at oven, and contract at about the same figures. Freight rates from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Old Material.—The unsatisfactory state of the market continues, the mills showing no interest, and two or three important points still being under embargo. Italy and other European countries are paying high prices for steel and iron axles. The quotation for axles for export shipment is about $30, seaboard. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania, and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$15.00 to $15.50
Old steel rails, rerolling	17.00 to 18.00
Low phos. heavy melting steel scrap	20.00 to 21.50
Old steel axles (nominal)	26.00 to 27.00
Old iron axles (nominal)	28.00 to 29.00
Old iron rails	20.00 to 20.50
Old carwheels	17.50 to 18.00
No. 1 railroad wrought	19.50 to 20.00
Wrought-iron pipe	12.50 to 13.00
No. 1 forge fire	13.00 to 13.50
Bundled sheets	13.00 to 13.50
No. 2 busheling	10.50 to 11.00
Machine-shop turnings	8.50 to 9.00
Cast borings	10.00 to 10.50
No. 1 cast	16.00 to 16.50
Grate bars, railroad	11.75 to 12.25
Stove plate	11.75 to 12.25
Railroad malleable	13.50 to 14.00

Buffalo

BUFFALO, N. Y., July 25, 1916.

Pig Iron.—Inquiries were before the market the past week for considerable tonnages of Bessemer iron for export, aggregating about 30,000 tons. None of these inquiries has materialized into an order, however. The only buying reported of this grade consisted of two local orders of 400 or 500 tons each. The market price for Bessemer is $21 and over at furnace. In some instances $22 is asked. In other grades inquiry has been very light. Practically all resale iron in this district has been disposed of, less than 13,000 tons remaining out of 100,000 tons available at the first of the year. The volume of shipments on orders has been large. We quote without change as follows, f.o.b. furnace, Buffalo, for last-half delivery:

No. 1 foundry	$19.00 to $19.50
No. 2 X foundry	18.50 to 19.00
No. 2 plain	18.50 to 18.75
No. 3 foundry	18.00 to 18.25
Gray forge	18.25 to 18.50
Malleable	18.50 to 19.00
Basic	19.50 to 20.00
Bessemer	21.00 to 21.50
Charcoal, regular brands and analysis	21.00 to 22.00

Finished Iron and Steel.—Consumers are apparently not in a hurry to cover for far forward business. They know that mill deliveries on current specifications are uncertain, and they are not yet endeavoring to provide for requirements that may be shipped beyond first or second quarters. Demand for delivery of material on books is as keen as at any time since the congestion started, showing that consumers are not accumulating stock. Few cancellations are being made, notwithstanding top prices apply on orders which will take the extended deliveries. A reduction is announced on standard galvanized pipe and galvanized merchant casings. A little more activity is noted in structural lines than for some time. The Buffalo Structural Steel Company has taken 400 tons for the new Bank of Buffalo building and the steel for the International Acheson Graphite Company's new plant on the Niagara River.

Old Material.—Business has consisted principally of shipments on contracts. The continued hot weather has

tended to check activity. Prices remain practically the same as a week ago. We quote dealers' asking prices as follows, per gross ton, f.o.b. Buffalo:

Heavy melting steel	$17.00 to $18.00
Low phosphorus steel	20.00 to 21.00
No. 1 railroad wrought scrap	17.00 to 17.50
No. 1 railroad and machinery cast scrap	15.00 to 15.50
Steel axles	24.00 to 24.50
Iron axles	24.00 to 24.50
Carwheels	14.00 to 14.50
Railroad malleable	14.00 to 14.50
Machine shop turnings	6.00 to 6.50
Heavy axle turnings	12.00
Clean cast borings	7.25 to 7.75
Iron rails	18.00 to 18.50
Locomotive grate bars	11.50 to 12.00
Stove plate (net ton)	11.00 to 11.50
Wrought pipe	12.00 to 12.50
Bundled sheet scrap	11.50 to 12.00
No. 1 bushelings	13.00 to 13.50
No. 2 bushelings	11.00 to 11.50
Bundled tin scrap	15.00 to 15.50

Cincinnati

CINCINNATI, OHIO, July 26, 1916—(*By Wire*).

Pig Iron.—An Indiana manufacturer is asking for 2500 tons of malleable for shipment this year. Some competition has developed, but it is asserted that the Ohio and Northern furnaces are not willing to shade their prices to any extent, no matter how attractive the business may be. Foundry iron is dragging, with little or no inquiry from any source in this territory. Resale iron in Ironton territory has been reduced to a minimum quantity, but competition from other sources is now a more serious problem to be considered than that of speculative iron. The Southern furnace price on No. 2 foundry ranges from $14 to $15, Birmingham basis. Some resale iron is offered at $13.50, but with the extra expenses added it figures out about the same as the minimum furnace quotation. The consumption of foundry iron is curtailed on account of the hot weather, and quite a number of shipments have been lately held up. Several houses have sent out their salesmen on scouting trips merely to get in touch with buyers and not with any intention of forcing the market. An inquiry for 18,000 tons of Bessemer for export was received last week, but as far as known local firms are not in a position to submit bids on this business. It is reported, but not officially confirmed, that an additional order for forging high explosive shells has been received by a Southern Ohio manufacturer. Based on freight rates of $2.90 from Birmingham, and $1.26 from Ironton, we quote, f.o.b., Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	$17.40 to $18.40
Southern coke, No. 2 f'dry and 2 soft	16.90 to 17.90
Southern coke, No. 3 foundry	16.40 to 17.40
Southern coke, No. 4 foundry	15.90 to 16.90
Southern gray forge	15.40 to 16.40
Ohio silvery, 8 per cent silicon	28.26 to 28.76
Southern Ohio coke, No. 1	20.76 to 21.26
Southern Ohio coke, No. 2	19.76 to 20.26
Southern Ohio coke, No. 3	19.26 to 19.76
Southern Ohio malleable Bessemer	19.76 to 20.26
Basic, Northern	19.76 to 20.26
Lake Superior charcoal	21.20 to 22.20
Standard Southern carwheel	24.90 to 25.40

(By Mail)

Coke.—Shipments have been held up to some extent, and there is no call for 72-hr. coke for filling-in purposes. Furnace coke is also dull and no inquiries are issued from any source. Oven operators are not having any trouble in obtaining cars in which to make shipments. We quote Connellsville 48-hr. coke at $2.50 to $2.75 per net ton at oven and the nominal figures given on foundry coke in the Connellsville, Wise County and Pocahontas fields range from $3.25 to $3.75. New River foundry coke remains at $4 at oven.

Finished Material.—The local warehouse price on No. 28 galvanized sheets is from 5c. to 5.25c. The mill price is around 4.65c., Cincinnati, or Newport, Ky. The mill quotation is higher than that of the previous week. Some business has been done lately but mostly for carload lots. It is stated that the sheet market is recovering from the recent slight slump. No. 28 black sheets are quoted at 2.90c., Cincinnati, or Newport, Ky. The hot weather has cut off the demand for building material to some extent, but the jobbers welcome this let-up as it enables them to catch up on old orders. We quote from local store stocks as follows: No. 10 blue annealed sheets, 3.50c.; steel bars and small structural shapes, 3.20c.; plates, 3.50c.; wire nails, $2.75 per keg, base; barb wire, $3.60 per 100 lb. Only a few lists have been changed lately on heavy hardware and mill supplies. High-speed steel is a little easier and manufacturers' prices range from $2 to $2.75 per lb. on standard brands.

Old Material.—A slight betterment is noted, but as a general rule the market is still unsatisfactory. Heavy melting steel is stronger, and locomotive tires have also taken on a small advance. The following are dealers' prices to consumers, f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton

Bundled sheet scrap	$11.00 to $11.75
Old iron rails	15.00 to 16.00
Relaying rails, 60 lb. and up	21.00 to 21.50
Relaying steel rails	15.00 to 15.50
Heavy melting steel scrap	14.25 to 14.75
Steel rails for melting	12.00 to 13.00

Per Net Ton

No. 1 railroad wrought	$13.00 to $13.75
Cast borings	7.00 to 7.25
Steel turnings	7.00 to 7.50
Railroad cast scrap	11.00 to 11.50
No. 1 machinery cast scrap	12.75 to 13.25
Burnt scrap	8.25 to 8.74
Iron axles	19.00 to 22.00
Locomotive tires (smooth inside)	19.75 to 20.25
Pipes and flues	9.75 to 10.00
Malleable and steel scrap	10.75 to 11.25
Railroad tank and sheet scrap	9.00 to 9.00

Cleveland

CLEVELAND, OHIO, July 25, 1916.

Iron Ore.—Ore continues to come down the Lakes in very heavy volume. The deep water this season makes possible the moving of very large cargoes and some record breaking loads are being shipped. The steamer W. P. Snyder, Jr., reached Cleveland July 21 with a record cargo of ore amounting to 13,544 gross tons. The steamer J. M. Schoonmaker sailed from Ashtabula the same day with 14,409 net tons of coal, which is said to be the largest coal cargo ever floated. The labor situation in the Mesaba range continues to improve and more underground mines have resumed operation. However, some of these mines which have fair-sized stock piles will remain shut down the remainder of the season. We quote prices as follows, delivered lower Lake ports: Old range Bessemer, $4.45; Mesaba Bessemer, $4.20; old range non-Bessemer, $3.70; Mesaba non-Bessemer, $3.55.

Pig Iron.—The labor situation is curtailing considerably the consumption of foundry iron, and blast furnaces are feeling the effects in the holding up of shipments. In many foundries where there are no labor troubles molders have left their jobs temporarily because of the extremely hot weather, making the labor shortage that previously existed more serious. In a Toledo malleable foundry all of the men quit with the announcement that they would stay out several days because of hot weather. The market is extremely dull and local prices are not firm. Quotations on Northern foundry iron are nominally maintained at $18.50, Cleveland, for No. 2, but there appears to be no doubt that a fair inquiry would bring out an $18 price for out of town shipment. Southern resale iron is still having a depressing influence on Southern foundry iron prices, but this is claimed to be coming gradually less a factor in the market. Southern iron is quoted by furnaces at $14 to $14.50, Birmingham, for No. 2 for last half and $14.50 to $15 for the first half of next year. M. A. Hanna & Co. will blow out their Cherry Valley furnace at Leetonia, Ohio, shortly for relining and the Ella furnace of Pickands, Mather & Co. at West Middlesex, Pa., has gone out for relining. The Struthers Furnace Company's stack at Struthers, Ohio, which has been out for relining, was blown in July 23 on Bessemer iron. We quote, delivered Cleveland, as follows:

Bessemer	$21.95
Basic	18.95
Northern No. 2 foundry	$18.70 to 18.80
Southern No. 2 foundry	18.00 to 18.50
Gray forge	18.50
Jackson County silvery, 8 per cent silicon	28.62 to 30.62
Standard low phos., Valley furnace	32.00

Coke.—Although new demand is light, coke for prompt shipment is scarce and some producers have advanced their prices on foundry grades to $3.50 for spot shipment. Early in August the Roberts by-product coke plant at Canal Dover, Ohio, will be placed in operation and the furnace there will no longer be a consumer of Connellsville coke. We quote standard Connellsville foundry coke at $3 to $3.50 per net ton at oven, for prompt shipment, and $3.25 to $3.50 for contracts. Connellsville furnace coke is held at $2.75 for prompt shipment.

Finished Iron and Steel.—There is a good demand for steel bars and plates for early delivery, but not much inquiry for contracts. New specifications are rather light, consumers generally having orders with the mills for extended future requirements. No inquiry is coming from the implement trade in this territory for first-half contracts for steel bars, and mills are not quoting less than 2.50c. Pittsburgh, for future delivery. Bessemer steel bars are quoted at 2.50c. Pittsburgh, for early delivery. Third and fourth-quarter contracts for Bessemer bars and structural material are being placed at 2.75c. Plates are very firm at 3.50c. to 4c. Pittsburgh. The demand for structural material is light. The American Bridge Company has taken 700 tons for New York Central bridge work in Youngstown, Ohio. The price of galvanized pipe has declined five points. Ohio sheet mills are feeling the market on sheet-bar contracts for fourth quarter. While prices have not been established, there is a disposition to quote sheet bars at $45 for open-hearth and $42.50 for Bessemer for that delivery. Bar iron is dull and unchanged at 2.50c. Cleveland. The demand for sheets continues fairly active. We quote black sheets at 2.90c. to 3c., Ohio mill, for No. 28; blue annealed at 3c. to 3.25c. for No. 10, and galvanized sheets at 4.25c. to 4.40c. for No. 28. Warehouse prices are unchanged at 3.25c. for steel bars and structural material, 3.65c. for plates, and 3.20c. for iron bars.

Bolts, Nuts and Rivets.—Several new export demands for bolts and nuts have developed, and specifications from the railroads, car builders and shipyards are heavier than they have been for the past few weeks. Rivets are in good demand. Many consumers have been unwilling to contract at present prices, and are placing orders as needed. We quote rivets at 4c., Pittsburgh, for structural, and 4.10c. for boiler rivets. Bolt and nut discounts are as follows:

Common carriage bolts, ⅜ x 6 in. smaller or shorter, rolled thread, 50 and 10; cut thread, 50; larger or longer, 40; machine bolts with h. p. nuts, ⅜ x 4 in., smaller and shorter, rolled thread, 50, 10 and 5; cut thread, 50 and 5; larger and longer, 40 and 10; lag bolts, gimlet or cone point, 50 and 10; square h. p. nuts, blank or tapped, $2.90 off the list; hexagon, h. p. nuts, blank or tapped, $2.90 off; c. p. c. and t. sq. nuts, blank or tapped, $2.60; hexagon nuts, all sizes, $3 off; cold pressed semi-finished hexagon nuts, all sizes, 60 and 10.

Old Material.—The market is dull and weak. Most mills are covered with contracts for 60 days. The local demand for steel-making scrap is at present very light, as Corrigan, McKinney & Co. are using more pig iron, and a minimum amount of scrap, in their open-hearth furnaces, and the Upson plant is embargoed. Considerable demand has sprung up for old steel axles for export. The sale of a small lot of steel axles is reported at $35. Busheling is weak and in light demand, sales being reported at $11. Cast scrap has sold down to $13. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton

Steel rails	$14.75 to $15.00
Iron rails	18.50 to 19.00
Steel car axles	30.00 to 32.00
Heavy melting steel	15.00 to 15.25
Carwheels	12.75 to 13.00
Relaying rails, 50 lb. and over	22.50
Agricultural malleable	12.50 to 12.75
Railroad malleable	14.00 to 14.75
Steel axle turnings	12.00 to 12.25
Light bundled sheet scrap	12.00 to 12.25

Per Net Ton

Iron car axles	$23.00 to $24.00
Cast borings	6.00 to 6.25
Iron and steel turnings and drillings	5.75 to 6.00
No. 1 busheling	11.00 to 11.25
No. 1 railroad wrought (nominal)	15.00 to 15.50
No. 1 cast	13.00 to 13.50
Railroad grate bars	10.00 to 10.50
Stove plate	10.00 to 10.25

St. Louis

ST. LOUIS, MO., July 24, 1916.

Pig Iron.—Melters continue to accept iron under contracts, even when they have to pile it up in yards. Sales continue rather light, so far as new contracts go. One sale of 700 tons of Northern No. 2 was reported. Prices quoted show no change.

Coke.—Sales were in small quantities, but melters are taking shipments on specifications against the future, as they are pig iron. By-product coke practically rules the market now except where special brands are wanted. Quotations show no change.

Finished Iron and Steel.—The market has been very quiet, but movement out of warehouse is free and demand for warehouse stocks seems to show no slackening. We quote for stock out of warehouse as follows: Soft steel bars, 3.15c.; iron bars, 3.05c. to 3.10c.; structural material, 3.15c.; tank plates, 3.55c.; No. 10 blue annealed sheets, 3.45c.; No. 28 black sheets, cold rolled, one pass, 3.30c.; No. 28 galvanized sheets, black sheet gage, 5c. to 5.25c., according to delivery and quantity.

Old Material.—Although no new buying from consumers has appeared, a better tone prevails among the dealers, or else they are buying against shortages on contracts, for steel is markedly stronger, though not quotable higher, except in the case of steel axles, which are in renewed demand for export, with the market practically bare of them. Relaying rails are strong, and in active demand, and an offering of 2000 tons by the St. Joseph & Grand Island is expected to go at good figures. The only list appearing on the market was 2500 tons from the Chicago, Burlington & Quincy, closing Tuesday. We quote dealers' prices f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton

Old iron rails	$16.25 to $16.75
Old steel rails, rerolling	14.75 to 15.00
Old steel rails, less than 3 ft	14.50 to 15.00
Relaying rails, standard section, subject to inspection	22.00 to 23.00
Old carwheels	11.50 to 11.75
No. 1 railroad heavy melting steel scrap	14.25 to 14.50
Heavy shoveling steel	12.25 to 12.50
Frogs, switches and guards cut apart	14.25 to 14.50
Bundled sheet scrap	8.00 to 8.50

Per Net Ton

Iron angle bars	$15.75 to $16.25
Steel angle bars	13.00 to 13.25
Iron car axles	24.50 to 25.00
Steel car axles	26.00 to 26.50
Wrought arch bars and transoms	18.50 to 19.00
No. 1 railroad wrought	14.00 to 14.50
No. 2 railroad wrought	13.75 to 14.25
Railroad springs	13.50 to 13.75
Steel couplers and knuckles	13.50 to 13.75
Locomotive tires, 42 in. and over, smooth inside	19.25 to 19.50
No. 1 dealers' forge	10.25 to 10.75
Cast-iron borings	5.75 to 6.25
No. 1 busheling	11.50 to 12.00
No. 1 boilers, cut to sheets and rings	8.25 to 8.50
No. 1 railroad cast scrap	10.75 to 11.00
Stove plate and light cast scrap	8.25 to 8.75
Railroad malleable	10.50 to 11.00
Agricultural malleable	9.50 to 10.00
Pipes and flues	9.50 to 10.00
Railroad sheet and tank scrap	9.00 to 9.50
Railroad grate bars	8.50 to 8.75
Machine-shop turnings	6.75 to 7.25

Birmingham

BIRMINGHAM, ALA., July 24, 1916.

Pig Iron.—Outside of export inquiry, the market is listless. Eastern agencies continue to offer shipping room on vessels leaving Southern ports at rates from $26 to $35, with only occasional bookings when the lower rate is named. The export metal recently moved out of the Woodward yards was sold on a basis of the freight rate to the Gulf without knowledge to the iron maker of what the ocean rate was. This iron has gone largely to Genoa, 3000 tons moving through Charleston this week. There is no doubt that Southern iron manufactured further north than Birmingham has gone into competitive territory at $14.50, and fractionally under, Birmingham basis. High phosphorus Tennessee iron is known to have done so. Freight rate advantages, as much as $1 and more in some instances, easily allow this business. So far as Birmingham district furnaces are concerned, they are selling only small lots, which

go at around $15. Not enough business is offering to tempt lower quotations. Resale metal has gone at all sorts of prices, according to the disposition of the consumer to overlook the analysis. One of the largest local makers is oversold for the remainder of the year on basic and high grades of foundry, and therefore is more or less independent of present conditions. With the others, shipments continue at a rate enabling them to stave off sharp concessions. Floods have put some Southern foundries out of business for as much as two weeks and have delayed and still delay shipments, but the loss in output occasioned by the same cause will offset this. Furnaces prepared for operation by July 1 have not resumed and probably will not unless conditions change. St. Louis territory, where $14, Birmingham basis, is mentioned as the price paid for 400 tons, is in a peculiarly advantageous position to secure lowest prices, because it enjoys much lower freight rates via the Tennessee River. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	$15.00 to $15.50
No. 2 foundry and soft	14.50 to 15.00
No. 3 foundry	14.00 to 14.50
No. 4 foundry	13.75 to 14.25
Gray forge	13.50 to 14.00
Basic	14.50 to 15.00
Charcoal	22.00 to 22.50

Cast-Iron Pipe.—The sanitary pipe market is quiet—more so than it has been in some time. There is some improvement in water pipe in the way of inquiries. Several export specifications are floating round, but no recent bookings are reported. Quotations appear to remain firm, per net ton, f.o.b. pipe shop yards, as follows: 4-in., $28; 6-in. and upward, $25, with $1 added for gas pipe and 16-ft. lengths.

Coke.—Coke is even stiffer than it has been. There has been a strong demand from the middle and extreme West, the South and Southwest and, in fact, the entire Birmingham trade territory for spot shipments of standard beehive foundry. Foundries of all kinds are laying in heavy stocks—as much as two to three months' supply in some instances. Providing against a possible railroad strike is assigned as among the causes for the rush. The bottom price is $4.25 per net ton at oven, with $4.50 easily obtained on new business. Furnace coke is in strong demand at $3.25 to $3.50.

Old Material.—The scrap market shows no signs of altering its hand-to-mouth status. Prices are soft and large stocks are still in the yards of consumers. We quote, per gross ton, f.o.b. Birmingham dealers' yards, as follows:

Old steel axles	$22.00 to $23.00
Old steel rails	10.00 to 10.50
No. 1 steel scrap	9.25 to 9.75
No. 1 wrought scrap	12.50 to 13.00
No. 1 cast scrap	10.50 to 11.00
Extra heavy cast scrap	9.50 to 10.00
Stove plate and light	9.00 to 9.50
Old carwheels	9.50 to 10.00
Tram carwheels	9.50 to 10.00

New York

NEW YORK, July 26, 1916.

Pig Iron.—The local pig iron market is drifting and business is at a low ebb. Small-lot inquiries for delivery in the third and the early part of the fourth quarter amount to 500 to 1000 tons. Statements differ as to the extent of shipments. In some cases foundries are urging the forwarding of iron; in others, because of inability to get sufficient labor, certain foundry buyers are holding up shipments in part. Buffalo iron in small lots has been quoted at $18.50 furnace for No. 2 X or $21.08 delivered in New England. There is still some resale iron to be had under this price. New York speculators in Southern warrants have recently closed out considerable lots at prices from $1 to $1.50 below what could have been done at the high point for Southern iron. A large foreign inquiry for low phosphorus iron is reported, and there is still a call for Bessemer iron from Italy and France. There has been a quite general participation of furnaces in the recent export business. The outlook is for a featureless summer market so far as the domestic trade is concerned. We quote at tidewater for early delivery: No. 1 foundry, $20.50 to $21; No. 2 X, $19.75 to $20.25; No. 2 plain, $19.50 to $20; Southern iron at tidewater, $20 to $20.50 for No. 1 and $19.50 to $20 for No. 2 foundry and No. 2 soft.

Ferroalloys.—Foreign inquiry for ferromanganese is of more immediate interest than domestic business, which is limited to sales of a few carload lots at about $175, seaboard. Export inquiries amount to about 4000 tons, one being for 2000 tons. Japan is asking for 500 tons. Receipts from England are very liberal and are being speedily absorbed by consumers specifying on contracts, the demand being rather insistent. Spiegeleisen is quiet at $50 furnace, but 1500 tons of low grade has been sold to Italy in the last week. Japan is inquiring for 400 tons of 50 per cent ferrosilicon, which is strong at $80 to $100 for early delivery. A producer near Baltimore is about to start a new furnace which is stated to have a capacity of about 15,000 tons per year.

Finished Iron and Steel.—Dullness in domestic buying is frequently commented on. While consumers in a number of lines are protected under contracts, many placed in the middle of the first half and for third quarter and in most cases for last half of the year delivery—a large percentage of steel consumers have no such contracts and are buying minimum quantities. Their belief is that the market will go no higher, and before the end of the year may show some drop. Sellers are positive these consumers do not appreciate the situation and will find themselves embarrassed. Certain it is that the inquiries from abroad are increasingly formidable, and nowhere is noted any suggestion of weakness even in structural material, which has just passed through a pretty dull month. Manufacturing plant extensions are still engaging the attention of fabricators except those more closely identified with city structures. Further loft and apartment building projects are under way, but like the great numbers which have already been before the market, are shelved, awaiting apparently a reduction in material costs. One late building which may be regarded as more active than some others is a Hess apartment, West End Avenue near Eighty-eighth Street, taking 500 tons. Railroad bridge work has been conspicuous for some time, and some 6500 tons for the Southern Railway may now be added, bids having been taken for this amount on July 25. From a fabricating standpoint the Southern's offering is exceedingly attractive, comprising 100-ft. spans and in all five bridges The Southern is also seeking quick delivery to replace spans washed out in the recent floods. In steel plates, in addition to the continued seeking for ship plates for export shipment, it now seems likely that the Pennsylvania will enter the market for 5000 hopper cars and an inquiry for 1000 cars is expected shortly from the Western Pacific. The Gadsden Car Works wants 1400 center constructions and the Burlington 1000 center sills. We quote mill shipments of plain structural material at 2.669c. to 2.919c., New York, and even higher in specially prompt work; steel plates at 2.919c. to 4.169c., depending on the width of the plate as much as on delivery; steel bars at 2.669c. to 2.919c., the lower price for the Bessemer product fairly promptly (which, however, is not so easily obtained), and for open-hearth steel at the convenience of the mill but little if any this year; bar iron at 2.669c., New York. Out of warehouse we quote iron and steel bars and shapes at 3.25c. to 3.30c., New York, and plates at 4c. to 4.25c.

Cast-Iron Pipe.—No important municipal lettings are announced in this immediate territory, but quite a considerable number of purchases of quantities running from 100 to 150 tons are being made by public award. Small jobs of this character are especially numerous throughout New York. Private buying continues rather brisk, the volume of this class of business running somewhat larger than at the corresponding time last month. The Warren Foundry & Machine Company was the successful bidder and has been awarded the contract for 2800 tons of 30-in. pipe on which bids were opened at Perth Amboy, N. J., July 12. Carload lots of 6-in., class B and heavier, are firmly held at $30.50 per net

ton, tidewater, class A and gas pipe taking an extra of $1 per ton.

Old Material.—Practically no change has occurred in the character of the demand. Inquiry is almost completely lacking, and transactions are few and small. About the only life shown in any class of old material is in relaying rails, which are quite scarce, and in old axles, which are wanted for export. It is stated that some axles were sold the past week as high as $34 or more per gross ton. Brokers quote buying prices about as follows to local dealers and producers, per gross ton, New York.

Heavy melting steel scrap (eastern Pennsylvania specifications)	$12.00 to $12.25
Old steel rails (short lengths) or equivalent	12.75 to 13.25
Relaying rails	28.00 to 30.00
Rerolling rails	16.00 to 16.50
Iron car axles	26.00 to 27.00
Steel car axles (for domestic use)	28.50 to 29.00
Steel car axles (for export)	30.00 to 31.00
No. 1 railroad wrought	18.00 to 18.50
Wrought-iron track scrap	15.00 to 15.50
No. 1 yard wrought, long	14.50 to 15.00
No. 1 yard wrought, short	12.00 to 12.25
Light iron (nominal)	4.00
Cast borings (clean)	7.50 to 7.75
Machine shop turnings (nominal)	4.50 to 5.00
Mixed borings and turnings	4.50 to 5.00
Wrought pipe	10.00 to 10.50
Old carwheels (nominal)	15.00 to 15.50
Malleable cast (railroad)	12.25

Some improvement in demand from foundries was observed for a few days of the past week, but the demand has again fallen off. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York.

No. 1 cast (machinery)	$16.00 to $16.25
No. 2 cast (heavy)	15.00 to 15.25
Stove plate	12.00 to 12.25
Locomotive grate bars	12.00 to 12.25

British Steel Market

More Inquiry for American Billets—Pig Iron Output Is Increasing

LONDON, ENGLAND, July 26, 1916.—(*By Cable.*)

Pig iron is firm and moderate licenses for France are being granted. Midland brands have been officially advanced 5s. The output of hematite iron is expected to increase next month. There is more inquiry for American billets at $62 to $63. Tin plates are depressed at 28 to 29s. Quotations, mostly nominal, are as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 28s. to 29s. against 30s. to 31s. a week ago.
Steel black sheets. No. 28, export, f.o.b. Liverpool, £20.
Steel ship plates, Scotch, delivered local yards, £13 17s. 6d.
Steel rails, export, f.o.b. works port, £10 17s. 6d.
Hematite pig iron, f.o.b. Tees, about 140s.
Sheet bars (Welsh) delivered at works in Swansea Valley, £10 7s. 6d.
Steel bars, export, f.o.b. Clyde, £18.
Ferromanganese, £35 nominal.
Ferrosilicon, 50 per cent, c.i.f., £29.

The Hirsch Rolling Mill, at St. Louis, Mo., after being idle for five years, started up again July 22. The plant has an annual capacity of about 60,000 tons and is equipped to produce bar iron and steel, small angles and shapes, reinforcing bars for concrete construction and light rails. Marcus A. Hirsch is president and general manager; Thomas Cunningham, formerly general manager of the Republic Iron & Steel Company's plant at East St. Louis, is general superintendent, and Louis St. Clair, formerly with the Republic Company, is master mechanic. C. C. Denniston is assistant to the president.

The first order placed for the Russian Government by the Imperial Munitions Board at Ottawa is for 7000 box cars, and has been divided chiefly between the Canadian Car & Foundry Company and the National Steel Car Company, both of Canada. The total orders to be placed by the board are likely to reach 50,000 cars.

Iron and Industrial Stocks

NEW YORK, July 26, 1916.

Whether the tide of speculation has definitely turned upward remains to be seen, but the fact is apparent that values the past week have quite generally improved under the splendid financial showing made by various industries. Some of the steel stocks made quite sharp gains. The dominating influences of the week appeared to be decidedly favorable to higher prices. The range on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com.	19 - 23	Pressed Stl. pref.	100¼
Allis-Chal., pref.	71½ - 74¼	U. Steel Spring, com.	43½ - 45½
Am. Can, com.	54½ - 56⅞	Republic, com.	45¾ - 48
Am. Can, pref.	108½-110½	Republic, pref.	108¾-110⅝
Am Car & Fdy., com.	54½ - 56¾	Sloss, com.	40½ - 44½
Am. Loco, com.	65½ - 68	Tenn. Cop.	20 - 20½
Am. Loco, pref.	100 -101	U. S. Steel, com.	84½ - 87⅛
Am. Steel Fdries.	46 - 50⅛	U. S. Steel pref.	117¾-118
Bald. Loco., com.	67½ - 74¼	Va. I. C. & Coke	43¾ - 45
Bald. Loco., pref.	107½	Westing. Elec.	54½ - 58⅛
Beth. Steel, com	439 -449	Am. Rad., com.	397
Beth. Steel, pref	126 -130	Am Ship, com.	41½ - 44
Colorado Fuel	42½ - 46	Am. Ship, pref.	87 - 87½
Gen. Electric	163¾-170¾	Chic. Pneu. Tool.	68½ - 70
Gt. No. Ore Cert.	35 - 36	Lake Sup. Corp.	10½ - 11
Int. Harv. of N. J., com	115½-117¾	Warwick	9½
Int. Harv. of N. J., pref.	120	Cruc. Steel, com.	66 - 71¾
Int. Harv. of N. J., com.	80	Cruc. Steel, pref.	114½-114⅜
Lacka. Steel	68 - 73¼	Harb. Walk Refrac., com.	95
Nat. En. & Stm., com.	23⅜ - 24	Harb. Walk Refrac., pref.	102
N. Y. Air Brake	122 -126	La Belle Iron, com.	51 - 51½
Pitts. Steel, pref.	98	Driggs-Seabury	98½ 105
Pressed Stl., com.	44¼ - 50¼	Midvale Steel	60 - 64½

Dividends

The Stewart-Warner Speedometer Company, regular quarterly, 1½ per cent on the common stock, and 1¾ per cent on the preferred stock, both payable Aug. 1.

The Cambria Steel Company, regular quarterly, 1¼ per cent, payable Aug. 15.

The Dominion Bridge Company, Ltd., regular quarterly, 2 per cent and extra 3 per cent, payable Aug. 15.

The Packard Motor Car Company, regular quarterly, 1¾ per cent on the common stock, payable Aug. 1.

The Penn Seaboard Steel Corporation, quarterly, $1 per share, payable Aug. 1.

The Torrington Company, $1 per share on the common stock, payable Aug. 1.

The United States Steel Corporation, regular quarterly, 1¾ per cent on the preferred stock, payable Aug. 30, and regular quarterly, 1¼ per cent, and 1 per cent extra on the common stock, payable Sept. 29.

The Eastern Steel Company, regular quarterly, 1¾ per cent on the first preferred stock and an extra dividend of 21 per cent on account of accrued dividends, payable Sept. 15.

The International Harvester Corporation and the International Harvester Company of New Jersey, regular quarterly, 1¾ per cent on the preferred stocks, payable Sept. 1.

The Ontario Steel Products Company, Ltd., regular quarterly, 1¾ per cent, payable Aug. 15.

Domestic Ferromanganese Situation

The very much easier situation in ferromanganese is the occasion of some concern to domestic manufacturers. There is scarcely a merchant furnace which can make 80 per cent alloy on domestic ores and show an adequate profit on the basis of the current price of $175, and large buyers seem able to get even lower prices. The ability of some merchant furnaces making spiegeleisen to get a profit at, say, $2 to $2.25 a unit, which is the equivalent of ferromanganese contract prices, is also a question, if they in turn pay the prices that have been talked of for domestic ores. Meanwhile, there are intimations that the Steel Corporation is willing to consider orders for ferromanganese at going prices. It is probable that one independent interest, availing itself of its leasing arrangement, which permits of intermittent operation of the furnace it has taken, will temporarily discontinue the manufacture of ferromanganese, pending an improvement in the market.

The J. J. Davenport Corporation was recently incorporated with a capital stock of $10,000 to continue the business of J. J. Davenport at 97 Liberty Street, Brooklyn, steel merchant. J. J. Davenport is president and treasurer, A. C. Anderson, vice-president, and S. C. Adler, secretary.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, effective from April 10, 1916, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c.; Pacific coast (by rail only), 65c.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 2.50c. to 2.75c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	10
H-beams over 15 in.	10
Angles over 6 in. on one or both legs	10
Angles, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.10
Tees, structural sizes (except elevator, handrail, car truck and concrete bar)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .30
Deck beams and bulb angles	.10
Handrail tees	.75
Cutting to lengths, above 3 ft. to 2 ft. inclusive	.50
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths under 1 ft.	1.25

No charge for cutting to lengths 3 ft. and over.

Plates.—Tank plates, ¼ in. thick, 6 in. up to 100 in. wide, 2.90c. to 4c., base, net cash, 30 days, or ½ of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras

	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers)	.10
Boiler and flange steel plates	.15
"A. B. M. A." and ordinary firebox steel plates	.20
Still bottom steel	.20
Locomotive firebox steel	.70

Marine steel, special extras and prices on application.

Gage Extras

Rectangular, ¼ in. thick, over 6 in. wide to 100 in. wide	Base
Lighter than ¼ in., to 3/16 in., up to 72 in. wide	.10
*Lighter than ¼ in., including 3/16 in., over 72 in. to 84	.20
*Lighter than ¼ in., including 3/16 in., over 84 in. to 96	.30
*Lighter than ¼ in., including 3/16 in., over 96 in. to 100	.40
*Lighter than ¼ in., including 3/16 in., over 100 in. to 102	.45
Lighter than 3/16 in., including No. 8, up to 72 in. wide	.15
*Lighter than 3/16 in., including No. 8, over 72 in. to 84	.25
*Lighter than 3/16 in., including No. 8, over 84 in. to 96	.35
Lighter than No. 8, including No. 10, up to 60 in. wide	.30
Lighter than No. 8, including No. 10, over 60 in. to 64	.35

Up to 72 in., not less than 10.2 lb. per sq. ft. will be considered ¼ in.
Over 72 in. must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.
Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.
Over 72 in., ordered weight 3/16 in., take No. 8 price.
Over 72 in., ordered weight No. 8, take No. 10 price.

Width Extras

Over 100 in. to 110 in. inclusive	.05
Over 110 in. to 115 in. inclusive	.10
Over 115 in. to 120 in. inclusive	.15
Over 120 in. to 125 in. inclusive	.25
Over 125 in. to 130 in. inclusive	.50
Over 130 in.	1.00

Length Extras

Universal plates 80 ft. long up to 90 ft. long	.05
Universal plates 90 ft. long up to 100 ft. long	.10
Universal plates 100 ft. long up to 110 ft. long	.20

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over.

Lengths under 3 ft. to 2 ft. inclusive	.25
Lengths under 2 ft. to 1 ft. inclusive	.50
Lengths under 1 ft.	1.25
Circles 3 ft. in diameter to 100 in.	.20
Circles over 100 to 110 in. (width extra)	.35
Circles over 110 to 115 in. (width extra)	.40
Circles over 115 to 120 in. (width extra)	.45
Circles over 120 to 125 in. (width extra)	.55
Circles over 125 to 130 in. (width extra)	.80
Circles over 130 in. (width extra)	1.30
Circles under 3 ft. to 2 ft. inclusive	.55
Circles under 2 ft. to 1 ft. inclusive	.80
Circles under 1 ft.	1.85

Half circles take circle extras.
Sketches, not over four straight cuts, inc. straight taper .10
Sketches having more than four straight cuts .20
Plates sheared to a radius take complete circle extras.

*Including extra for width.

Wire Rods.—Including chain rods, $55 to $60.

Wire Products.—Prices to jobbers effective May 1: Fence wire, Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, $2.45; galvanized, $3.15. Galvanized barb wire and staples, $3.35; painted, $2.65. Wire nails, $2.50 to $2.60. Galvanized nails, 1 in. and longer, $2 advance over base price; shorter than 1 in., $2.50 advance over base price. Cement-coated nails, $2.50. Woven wire fencing, 61½ per cent off list for carloads, 60½ off for 1000-rod lots, 59½ off for less than 1000-rod lots.

The following table gives the price per 100 lb. to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	to 10	11	12&13	14	15	16
Annealed	$2.75	$2.75	$2.80	$2.85	$2.95	$3.05
Galvanized	3.20	3.25	3.30	3.35	4.00	4.10

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect on black pipe from April 21, 1916, and on galvanized from July 24, 1916, all full weight pipe:

Butt Weld

Steel Inches	Black	Galv.	Iron Inches	Black	Galv.
⅛, ¼ and ⅜	63	37½	⅛ and ¼	32	24
½	67	51½	⅜	53	25
¾	70	55½	½	57	38
1 to 4	70	55½	¾ to 1½	60	43

Lap Weld

⅜	65	50½	1¼	48	31
½ to 3	68	53½	1½	54	38
3½ to 12	65	49½	2	55	39
13 and 14	53½	..	2½ to 4	57	42
15	51	..	4½ to 6	57	42
			7 to 12	56	41

Reamed and Drifted

1 to 3, butt	68	53½	¾ to 1½, butt	55	37
2, lap	63	48½	1¼, lap	48	25
2½ to 6, lap	66	51½	1½, lap	49	32
			2, lap	50	33
			2½ to 4, lap	52	36

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	59	41½	⅛ and ¼	32	34
½	64	50½	⅜	57	43
¾ to 1½	68	54½	½ to 1½	61	45
2 to 3	69	55½			

Lap Weld, extra strong, plain ends

⅜	63	49½	1¼	50	33
½	66	52½	1½	55	39
2½ to 4	65	51½	2	57	42
4½ to 6	65	51½	2½ to 4	57	42
7 to 8	61	45½	4½ to 6	59	45
9 to 12	56	40½	7 to 8	58	44
			9 to 12	52	38
			13 to 15	47	33

Butt Weld, double extra strong, plain ends

½	55	43½	¼	44	31
¾ to 1½	58	46½	⅜ to 1½	47	34
2 to 3	60	48½			

Lap Weld, double extra strong, plain ends

⅜	55	43½	1¼	44	30
½ to 4	57	45½	2	44	30
4½ to 6	56	44½	2½ to 4	46	35
7 to 8	54	39½	4½ to 6	45	34

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Sheets.—Makers' prices for mill shipments on sheets of U. S. standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Blue Annealed Sheets

	Cents per lb.
Nos. 8 to 10	2.90 to 3.20
Nos. 10 to 12	2.95 to 3.25
Nos. 11 and 12	3.05 to 3.30
Nos. 13 and 14	3.10 to 3.35
Nos. 15 and 16	3.20 to 3.45

Box Annealed Sheets, Cold Rolled

Nos. 17 to 21	2.70 to 2.80
Nos. 22 and 24	2.75 to 2.85
Nos. 25 and 26	2.80 to 2.90
No. 27	2.85 to 2.95
No. 28	2.90 to 3.00
Nos. 29	2.95 to 3.05
No. 30	3.00 to 3.25

Galvanized Sheets of Black Sheet Gage

Nos. 10 and 11	3.25 to 3.35
Nos. 12	3.30 to 3.45
Nos. 13 and 14	3.35 to 3.45
Nos. 15 and 16	3.45 to 3.55
Nos. 17 to 21	3.60 to 3.70
Nos. 22 and 24	3.70 to 3.80
Nos. 25 and 26	3.85 to 3.95
No. 27	4.10 to 4.20
Nos. 28	4.20 to 4.35
No. 29	4.40 to 4.50

Boiler Tubes.—Discounts on less than carloads, freight to destination added, effective from April 15, 1916, are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1¼ in.	37	1¼ in.	27
1¾ and 2 in.	47	1½ and 2 in.	39
2¼ in.	44	2¼ in.	36
2½ and 2¾ in.	50	2½ and 2¾ in.	42
3 and 3¼ in.	55	3 and 3¼ in.	47
3½ to 4½ in.	56	3½ to 4½ in.	48
5 and 6 in.	49	5 and 6 in.	41
7 to 12 in.	46	7 to 13 in.	38

Locomotive and steamship special charcoal grades bring higher prices.

1¾ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin,	Lead		Spelter	
		Electro-	New	New	St	New	St
July	Lake	lytic	York	York	Louis	York	Louis
19	25.25	25.00	37.00	6.25	6.10	9.50	9.2
20	25.25	25.00	38.00	6.25	6.10	9.87½	9.62½
21	25.25	25.00	38.00	6.25	6.10	10.12½	9.87½
22	25.25	25.00		6.25	6.10	10.25	10.00
24	25.25	25.00	38.00	6.20	6.00	10.50	10.2
25	25.25	25.00	38.00	6.20	6.00	10.50	10.2

NEW YORK, July 26, 1916.

Copper is slightly stronger but demand continues light. Tin is higher following fairly good buying. Lead is dull and weak. Spelter is higher but the domestic buying has tapered off. Antimony is dull and inactive.

New York

Copper.—The market is a little stronger as a result of increased inquiry and the gradual absorption of the resale metal on which attention has been centered for some weeks. Not all of this copper has disappeared, by any means, but enough has been taken to impart the firmer tone referred to. If the producers have reduced their quotations they are not saying so publicly, but there is a feeling that some of the smaller ones have offered concessions. At £122, the London market for electrolytic is unchanged from this time a week ago. The exports this month, including yesterday, total 28,917 tons, which is a good showing. Electrolytic was to be had in New York yesterday, prompt delivery, at about 25c., cash, 30 days, and Lake at 25.25c., cash.

Tin.—Fairly good sales have been made in the past week, and the market has a decidedly better tone. Spot Straits was quoted yesterday at 38c. The activity started on July 19 with a good demand and fair sales, taking in futures and tin afloat, with the result that at the end of that day sellers were somewhat scarce and the market became strong for the first time in months. Business tapered off on the following day and on July 21 the market was quiet again. On Monday there was widespread inquiry which resulted in moderate sales in which, however, only a few buyers figured, most of them dealers. This buying continued until yesterday. The London market is sympathetic with that in New York, and quickly responds to any change here, so much so that it has advanced sharply on the slightest show of any better tone here, thereby tending to halt business in this market. Spot Straits was quoted in London yesterday at £167. The arrivals this month total 2055 tons, and there was afloat yesterday 2396 tons.

Lead.—In this metal there has been little or no change, and the market is weak and drifting. It is believed consumers want lead and that a good movement would follow a reduction to 6c., New York. The leading interest continues to quote 6.50c., New York, and 6.42½c., St. Louis, but independent sellers have offered down to 6.20c., New York, and 6c., St. Louis. It can be reiterated that present prices will not hold unless there comes a good volume of foreign orders. It is well understood in the trade that production is exceeding consumption. The exports this month, including yesterday, total 2126 tons.

Spelter.—In the past 10 days there has been a good demand from abroad which is not believed to be entirely satisfied. Domestic galvanizers who bought heavily when the market dropped slightly below 9c. for spot are less active. Their buying tapered off with the price advances which came with the buying. Prompt was quoted yesterday at about 10.50c., New York, and 10.25c., St. Louis; August at about 10.25c., and September at about 10c. The last quarter is nominally 9.50c. The London market has advanced steadily, and whereas it stood at £48 a week ago it was quoted yesterday at £60, yesterday's cable reporting an advance of £4. Domestic buyers seem to be of the opinion that the spot price should be around 8c., but the producers maintain that the present cost of production makes that total about equal to the 5c. of normal times. None of the galvanizers are operating over 50 per cent and some of them are not running over 35 or 40 per cent of capacity. The exports of this month, including yesterday, reached the large total of 5648 tons.

Antimony.—For metal in bond 11c. has been paid. The market continues extremely dull, although a little inquiry is cropping out. Offerings of spot at 13.50c., duty paid, have elicited no orders.

Aluminum.—No change is reported and No. 1 virgin aluminum, 98 to 99 per cent pure, is quoted at 58c. to 60c.

Old Metals.—The market has apparently stopped in its downward course and the result is more activity. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and wire	21.00 to 22.00
Heavy machine composition	17.00 to 18.00
No. 1 yellow and red brass turnings	13.00 to 14.50
Zinc	7.00 to 8.00

Chicago

JULY 24.—With moderate activity, copper prices have held firmly, except that casting and Lake are now in a more normal relation to each other. Spelter has proved a mild surprise, and is again above 10c. While the leading interest still holds its lead price at 6.45c., 6.20c. has been done. We quote: Casting copper, 24.50c. to 25c.; Lake copper, 26c.; tin, carloads, 38.75c., and small lots, 40.50c.; lead, 6.20c. to 6.45c.; spelter, 10.50c.; sheet zinc, 15c.; Cookson's antimony, 50c.; other grades, 16c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 17.75c.; copper bottoms, 15.75c.; copper clips, 16.75c.; red brass, 15.50c.; yellow brass, 11.50c.; lead pipe, 4.50c.; zinc, 5c.; pewter, No. 1, 27c.; tinfoil, 27c.; block tin pipe, 32c.

St. Louis

JULY 24.—Some metals have been a little stronger and others a little weaker. The close to-day was as follows: Lead, 6.12½c.; spelter, 10c. to 10.25c.; tin, 38c. to 39c.; Lake copper, 26c.; electrolytic copper, 25.50c.; antimony, 14.50c. to 15c. The leading interest's price on lead was 6.42½c., but independent producers made the figure about three-tenths of a cent lower. In the Joplin ore district the tone was better. Zinc blende, 60 per cent, ranged from $75 per ton down to $50 for the second grades, with the average for the week's output $63. Calamine ranged from $40 to $50, with the average for the week $45. Lead ore was slightly weaker and the average price for the week was $70. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 7.50c.; heavy yellow brass, 10.50c.; heavy red brass and light copper, 14.50c.; heavy copper and copper wire, 17c.; pewter, 25c.; tinfoil, 30c.; zinc, 4.50c. to 5c.; lead, 5c.; tea lead, 3.50c.

German Pig-Iron Output for May

The German pig-iron production for May was 1,112,574 metric tons, against 1,073,706 tons in April. This is the largest war output except that for March, which was 1,114,194 tons. The output in May, 1915 and 1914, was 985,968 tons and 1,607,193 tons respectively. The May output this year was made up of 161,191 tons of foundry iron, 4646 tons of Bessemer iron, 713,425 tons of open-hearth iron, 212,430 tons of steel-making iron and speigeleisen, and 20,882 tons of forge or puddle iron.

Coke production in Alabama in 1915 was 3,071,811 net tons, or 12,338 tons less than in 1914. By-product coke increased from 2,031,535 tons in 1914 to 2,070,334 tons. To produce the bee-hive coke, 1,708,228 tons of coal were used, against 2,987,710 tons for by-product coke.

OBITUARY

EMERSON LEE FOOTE, formerly vice-president and general manager of the Sligo Iron Furnace Company, St. Louis, Mo., died at his home in that city, July 20, aged 67 years. He was born in Milwaukee, Wis., but went to St. Louis early in his business career. He leaves his widow, four sons and one daughter.

CHARLES H. BRADLEY, once prominent in the stove industry in Pittsburgh, died July 20 at his home in Bridgeport, Conn., aged 57 years. He was born in Pittsburgh, and retired from business about 15 years ago. He leaves his widow, one son and two daughters.

THOMAS E. NASH, a director of the Carey Machinery & Supply Company, Baltimore, Md., died July 17, aged 46 years. He became connected with the company at the age of 16. He leaves his widow.

EDWIN V. SMITH, president Eccles & Smith Company, machine tools and railroad supplies, San Francisco, died July 12, aged 48 years.

ROBERT J. COLLINS, sales manager Cataract Refining & Mfg. Company, Buffalo, N. Y., died in that city July 20.

A Safety Feature of the McDonald Mills

In the construction of the McDonald mills of the Carnegie Steel Company, between Girard and Niles, Ohio, provision is made for a tunnel through which employees can reach their places in perfect safety. Entering the yard by means of a viaduct over the railroad tracks, the workers go down an incline into the subway, which is so constructed that each can reach his department. Thus the testing building will be the first reached, then in turn the machine shops and the bar mills, which are numbered in rotation. The tunnel walls will be painted white and it will be electrically lighted. The safety secured by the new arrangement is in contrast with conditions requiring employees to pilot themselves through the mills properties to their various departments, usually over crane and metal yards, along dinkey tracks and through buildings where their unfamiliarity with the operation might lead to accidents.

Electric power for the McDonald mills will be transmitted a distance of eight miles, being generated by large gas engines at the Ohio Works in Youngstown and conveyed by a line now nearly completed. Just to the south of the works site, the company owns 500 acres of land extending three-quarters of a mile from the high level Girard-Niles road on the south side of the river, to the chain of railroad tracks that girdle the Mahoning valley, thence fully a mile east and west, and on this tract a model borough for employees is to be built. The employees will be given the opportunity to purchase homes.

An iron and steel foundry in Malaga, Spain, known as Los Altos Hornos de Andalucia, has been reorganized with Belgian and French capital. Two decades ago it was one of the principal industrial establishments of that district but it failed a few years ago and has since been closed. Its capacity is about 150 tons of iron and 50 tons of steel castings per day, or a combined output of about 75,000 tons per year. The present production is to be kept down to 45,000 tons, 15,000 tons of which will be sold in Spain, the remainder being sent probably to France.

The International Oxygen Company, 115 Broadway, New York, is installing a new plant at College Point, Long Island, for the manufacture of oxygen and hydrogen gas, which will be completed late in August or early in September. When the plant is in operation the company's trade in Brooklyn and environs, as well as in Manhattan, will be largely handled from this point. Heretofore this local business has been supplied from the company's Newark works.

Page Company to Make Copper Clad Wire

The Page Woven Wire Fence Company, Monessen, Pa., has made an arrangement with the Copper Clad Steel Company, Pittsburgh, with works at Rankin, Pa., by which it secures exclusive control of its product of copper clad rods to be drawn into copper clad wire. This new product will be known as "copperweld" wire, and is stated to be wire with an absolute weld between the copper and steel. The Page Company states it is prepared to furnish the wire in two grades of conductivity, 40 and 30 per cent, and that other grades will be furnished under special arrangements.

The Page Woven Wire Fence Company was organized in 1886, and established a plant at Adrian, Mich. Its business expanded rapidly and in 1899-1900 it built an open-hearth steel plant, rod and wire mills at Monessen, Pa., where the first steel was made May 31, 1900. Its plant at Monessen contains two 60-ton basic open-hearth furnaces, two Morgan reheating furnaces, a 25-in. 3-high, one stand blooming mill, a semi-continuous rod mill with 14-in. 2-high, four-stand continuous billet mill, a 12-in. 2-high, 5-stand, and a 10-in. 2-high, 5-stand, continuous mill, an 8-in. 2-high, 4-stand, looping mill, one 1500-lb. steam hammer, 212 wire drawing blocks for wire to 20 gage, three galvanizing furnaces with an annual capacity of 25,000 net tons of wire and 81 machines for making barb and woven wire fence. The annual capacity is 60,000 tons of ingots, 60,000 tons of wire rods, 50,000 net tons of wire products and 6000 tons of wire rope and springs. The Michigan works turn out wrought-iron fence, ornamental iron work, windshields for automobiles, etc.

Copper Tax Eliminated

WASHINGTON, D. C., July 25, 1916.—The Senate Finance Committee, in view of the protests of producers, smelters, and refiners of copper, has decided to strike from the omnibus revenue bill the tax on that metal, which, if this recommendation prevails, will pay only the munitions tax on such quantities as may be actually consumed in the production of war material. The committee's amendment striking out the special tax on copper must now run the gauntlet of the Senate and of the conference committee, but indications point to the final elimination of the tax, the leaders of both houses having been convinced of the unfairness of levying a special impost on one of a dozen metals used in the manufacture of munitions, especially when that metal is already twice taxed as a component part of war materials subject to the munitions tax and as the product of corporations paying the corporate income tax.

Not only has much time been consumed in hearings before the sub-committee having the munitions tax in charge, but further delay has been occasioned by the necessity of finding some other source of revenue to supply the $12,000,000 cut off through the abandonment of the copper tax. At this writing, the committee is undecided as to how this money shall be raised, but the sub-committees having concluded their deliberations, the full committee will now address itself to this serious problem. W. L. C.

Manganese Ore from the Crimora Mine

The Crimora Manganese Corporation, 15 Broad Street, New York, has started its crushing and washing mill at Crimora, Va., and is now producing 30 to 40 tons of manganese ore per day. It expects to increase this very soon to 200 tons per day. The ore being turned out is reported to average 44 to 46 per cent manganese and under 10 per cent silica, which is expected to be lowered to 8 per cent.

California's output of chrome ore is said to be greater than ever. For the first six months of 1916 it was more than three times the greatest annual previous yield and is still increasing, according to J. S. Dillon of the U. S. Geological Survey. The reduction in freights by the transcontinental railroads so as to meet the competition of imported ores is said to be an important factor.

PERSONAL

J. V. W. Reynders, formerly vice-president and general manager Pennsylvania Steel Company at Steelton, Pa., has opened offices at 2218 Equitable Building, 120 Broadway, New York.

Charles M. Schwab has accepted an invitation to attend a dinner to be given in his honor by city officials and other leading men of Baltimore, Md. The invitation was extended by Mayor James H. Preston. The dinner will be held about Oct. 1.

Emmett B. Carter, chief engineer Midvale Steel Company, is president of the Engineers' Club of Philadelphia.

J. E. Thropp, Jr., has resigned as superintendent of Alburtis and Hellertown furnaces of the Thomas Iron Company to become superintendent of the Berkshire furnace of E. J. Lavino & Co., at Sheridan, Pa.

Charles A. Moffett has been elected vice-president and general manager of the Gulf States Steel Company, Birmingham, Ala. Heretofore he has been general manager of the company's steel works at Gadsden, Ala.

E. E. Entwisle has been made mechanical engineer at the Steelton plant of the Bethlehem Steel Company in charge of all construction. He will report to Chief Engineer C. P. Turner. F. E. Howells, superintendent of the machine shop, has been made assistant mechanical engineer and will report to Mr. Entwisle.

William H. Carpenter, general manager Mayo Radiator Company, New Haven, Conn., has resigned to accept a responsible position with the Seymour Mfg. Company, Seymour, Conn. He was formerly superintendent of the Bristol Brass Company, Bristol, Conn.

H. Hildenbiddle, formerly with the Whitaker-Glessner Company, Portsmouth, Ohio, has resigned to accept the position of chief engineer of the Wilmington Steel Company, Wilmington, Del.

John Calder has been made works manager and assistant to Vice-President H. H. Pinney of the Bridgeport, Conn., works of the Remington Arms-Union Metallic Cartridge Company, Inc. For some time he has been serving with the banking house of Willett, Sears & Co., Boston, as an advisory engineer to a number of New England industrial interests, and since 1897 or 1898, when he came to the United States from Glasgow, Scotland, he has been associated with the management of large plants producing interchangeable metal manufactures, notably the Remington Typewriter Company, Ilion, N. Y., of which he was general manager for nine years.

At a recent meeting of the directors of the American Rolling Mill Company, Middletown, Ohio, Charles R. Hook, general superintendent, was elected vice-president of the company. He will continue his duties as general superintendent.

R. L. Lovell, who has been associated with the Illinois Steel Company in the pig-iron sales department, has resigned to take charge of sales for a newly organized mining company having iron ore and calcite deposits in Georgia. He will be located at Atlanta.

P. A. Montanas, vice-president Springfield Machine Tool Company, Springfield, Ohio, has been elected president of the Engineering Club of Springfield.

Charles A. Morrow, formerly of the Pittsburgh office of the A. M. Byers Company, is now associated with F. M. Minninger in the Chicago office.

W. R. Palmer, general superintendent of the American Tube & Stamping Company, Bridgeport, Conn., has been elected vice-president and a director of the company.

Director of Sales J. F. Bowman, of the Federal Motor Truck Company, announces the appointment of V. K. McBride as assistant sales manager of the company, and of H. A. Conlon, as field sales manager H. M. Rosenberg, formerly branch manager of the White Company at St. Louis, and for five years a member of the White sales force, has joined the sales department of the Federal Motor Truck Company as a traveling district representative in Western territory.

E. O. Wells, of Chattanooga, has been made superintendent of the Roane Iron Company, Rockwood, Tenn., succeeding Frederick H. Clymer, superintendent of the plant since 1907.

David F. Baker, who has been connected with the blast furnace department of the Broken Hill Proprietary Company's plant at Newcastle, New South Wales, is now in the United States and will take up permanent work here. He is a son of David Baker, who has been at Newcastle for several years.

Robert M. Jones, of Minneapolis, where he was sales representative of the Republic Iron & Steel Company for the Northwest, has joined the local force in the offices at Birmingham, Ala., and will assist General Manager of Sales Barnes.

Charles G. Williams, an automobile and aviation engineer, has resigned from the Mason Motor Company to accept an appointment authorized by the Secretary of War as inspector of United States army aeroplanes and aeroplane motors. His first duties call him to the Curtiss Aeroplane & Motor Corporation, Hammondsport, N. Y.

Albert T. Keller, who as chief engineer of the Indiana Steel Company, has had charge of construction work at Gary, Ind., has accepted the appointment as chief engineer of construction for the Bethlehem Steel Company at Sparrows Point, Md., and will have charge of the extensive new work at the Maryland plant, of which an outline was given in THE IRON AGE of July 20. His successor at Gary is W. H. Bailey, who has been engineer at that plant.

A. C. Garrison, manager at St. Louis of the Columbia lamp plant of the General Electric Company, succeeds his father, the late D. E. Garrison, as president of the Corrugated Bar Company, Buffalo. A. L. Johnson becomes vice-president and general manager, and W. H. Kennedy, vice-president and treasurer. W. M. Armstrong has resigned as vice-president and sales manager.

T. R. Davis has resigned as treasurer of the Vermilion Malleable Iron Company, Hoopeston, Ill., to become general manager of the Artillery Fuse Company, Inc., Wilmington, Del.

J. O. MacIntosh, formerly of Renshaw & Co., coal dealers, Philadelphia, Pa., has been placed in charge of the coal department of Park & Williams, dealers in iron, steel, coal and fire brick, Real Estate Trust Building, Philadelphia.

The Trussed Concrete Steel Company, Detroit, Mich., which was sued some time ago for alleged infringement of the Berger Mfg. Company's metal lumber construction, has been awarded a favorable decision in the United States District Court, which has adjudged the claim upon which patent No. 682,316 was issued to William L. Caldwell as "void for want of patentable novelty and invention." The Trussed Concrete Steel Company announces now that the Kahn pressed steel costruction can be used without thought of any interference.

In connection with the announcement that the bridge and construction business heretofore conducted at Steelton, Pa., by the Pennsylvania Steel Company of Delaware, will now be carried on by the Bethlehem Steel Bridge Company of Delaware, the names of the officers of the new company are given as follows: G. H. Blakeley, president; Thomas Earle, vice-president; B. H. Jones, secretary and treasurer, and F. A. Shick, controller.

The American Steam Gage & Valve Mfg. Company, whose general offices and works are in Boston, Mass., is moving its Chicago office and stock room to the new building, 25-27 South Jefferson Street, where the manager, Charles C. Kilander, with a larger and better stock, will be able to serve the trade even more quickly than heretofore.

STRIKES AND SETTLEMENTS

Milwaukee Machinists' Strike Extending

MILWAUKEE, WIS., July 25, 1916—(*By Telegraph*).—Further attempts of Governor Phillips to end the machinists' strike having failed, the union leaders resumed activity to-day after a halt since Friday, calling out thirty-five men at the Evinrude Motor Company's plant. Seven metal polishers quit by direction of Cincinnati headquarters. The scheduled walkout at the Andrew Kopperud shop was postponed, the unions claiming an offer of arbitration was made.

The Governor was authorized to make two propositions to the Metal Trades Association: one to grant a 52-hr. week immediately and guarantee a 50-hr. week within one year; the other to grant a 52-hr. week at once and arbitrate the 48-hr. demand. The employers proposed a comprehensive investigation covering the entire country by the Industrial Commission, but the offer was rejected.

MILWAUKEE, WIS., July 22, 1916.—Approximately 2000 machinists had been called out of seven plants up to Friday afternoon, when the union leaders announced that a "truce" had been declared and that there would be no further walkouts until at least Monday or Tuesday, depending upon the outcome of certain conferences on Saturday and Sunday. E. L. Phillips, Governor of the State, and J. D. Beck, chairman of the Industrial Commision, conferred with strike leaders on Saturday, but it was announced that no headway had been made. The position taken by the employers forming the Milwaukee Metal Trades & Founders' Association was made clear to the public in half-page advertisements published in every daily newspaper of the city on Thursday and Friday. The advertisement described what the employers had done in getting the Industrial Commission to investigate the hours of work in the Middle West and the result of the investigation by which the fact was established that on June 30 the working hours of the Milwaukee metal trades were as short or shorter than those of a large majority of the shops of similar industries in the Middle West. Despite this showing the metal trades manufacturers on July 1 voluntarily reduced the basis of working hours from 55 to 52½ per week, the hourly rate of pay remaining the same, overtime commencing from such 52½-hr. schedule instead of the former 55. "By such action," continues the advertisement, "these manufacturers demonstrated their sincere desire to establish conditions in this district even more favorable than enjoyed by the large majority of employees in other places throughout the Middle West." It concludes as follows: "Under present conditions of trade and competition in the Middle West it is impossible to institute a reduction of working hours to a basis of less than 52½ hr. per week and our shops will remain open on this basis until economic conditions make possible a further shortening of working hours."

The plants affected up to the time the "truce" was called Friday were: Allis-Chalmers Mfg. Company, Pawling & Harnischfeger Company, Nordberg Mfg. Company, Beaver Mfg. Company, Geuder, Paeschke & Frey Company, T. L. Smith Company, and Smith Engineering Company. Some machinists in several small plants also walked out. In every case the number of strikers formed only a small proportion of the total working forces, and no shop was obliged to shut down, although in some instances production was necessarily curtailed. Popular opinion seems to be that the machinists have taken a most inopportune time to strike. The public statement by the employers did much to strengthen their cause, by reason of the fact that not everyone was informed as to the exact status of the controversy until the statement was published.

New England

Everyone busy up to the limitations imposed by the shortage in labor describes the situation in New England at this time. The labor status is practically unchanged. The molders' strike in Bridgeport drags along and the men are still out in the shops of the Coulter & McKenzie Company, Automatic Machine Company, Pequonnock Foundry, Monumental Bronze Compay and Joseph R. Taylor Company. These foundries are now open shop plants; the owners consider that in granting a flat minimum wage of $3.75 per day they would be recognizing one of the cardinal principles of the closed shop, and this is now the real issue. A week ago the molders at the Union Mfg. Company, New Britain, Conn., walked out because of differences arising over the amount and time of bonus payments. All but about 50 of Polish nationality have returned to work and a prompt settlement of the difficulty seems assured.

San Francisco

The waterfront strike in San Francisco has been practically settled, but labor conditions are still unsatisfactory, the structural iron workers having been out since July 10, with considerable work waiting in the shops.

Ohio Strike Notes

A strike was declared last week by about 200 molders and core makers employed by the Ohio Foundry Company, Cleveland, Ohio, to enforce demands for a recognition of the Molders' Union. Both plants of this company are now shut down. A similar strike was declared several weeks ago against the Interstate Foundry Company, Cleveland, but last week the men returned to work without securing the granting of their demands.

Since May 1 the machinists, toolmakers and sheet-metal workers employed by the Automatic Sprinkler Company of America, Youngstown, have been on strike. Recently the company has been securing new men from other districts, and expects in a short time to be operating its plant to full capacity.

An Advance at Pottsville, Pa.

The Eastern Steel Company, Pottsville, Pa., on July 21 granted its employees a 10 per cent increase in wages, effective at once. The employees had claimed they were much underpaid, as compared with mills at Philadelphia and Reading.

Western Puddlers' Scale Settled

At the conferences held in Detroit, Mich., starting last week and concluding on Monday, July 24, a settlement was reached on the puddling and finishing scales between the Amalgamated Association and the mills that sign its scale. Puddlers and finishers will receive an advance of 5 to 7 per cent dating from Monday, July 24. Under the old scale, when bar iron reached 1.30c. puddlers were paid $6.20; but under the new scale, on a 1.30c. card they will receive $6.50, the rate advancing 20c. for each 5 points in the bar-iron card. Up to Monday, July 24, puddlers were being paid $8.40 per ton, based on 1.85c. bar-iron card, but under the new agreement the rate will be $8.80 per ton on a 1.85c. card. This is the highest rate for puddling ever paid under the Amalgamated scale, with one exception of a short period over 40 years ago. Wages of finishers will also be higher than ever before. Bar-iron mills in Ohio, Indiana, Illinois, Michigan and Missouri that sign the Amalgamated scale all pay the new rate of $8.80 from July 24.

The Simmons Company, Kenosha, Wis., probably the largest manufacturer of steel beds and box bed springs in the world, has taken out a group insurance policy covering its 5500 employees at Kenosha and San Francisco. The amount of the policy is in excess of $3,000,000 and is stated to be the largest contract of this kind that has ever been written in the United States.

The University of Illinois has issued a directory of former students, alumni, faculty members and others, with an alphabetical and a geographical arrangement and with occupations indicated. A copy of the book may be had for $5 by applying to Vergil V. Phelps, editor, University of Illinois, Urbana, Ill.

Pittsburgh and Nearby Districts

The recently organized Mahoning Valley Steel Company, of which J. D. Waddell is president, is making good progress in the building of its sheet mills at Niles, Ohio. The main building will be 140 x 575 ft. and will be so constructed that it can be extended later to accommodate more mills. This company recently bought the entire equipment of the Atlanta Sheet & Tin Plate Company, Atlanta, Ind.

The Stevens Metal Products Company, Niles, Ohio, has been organized with a capital stock of $50,000. It will make a line of metal products such as conductor pipe, eaves trough, etc.

The M. & D. Mfg. Company, Youngstown, Ohio, has been organized with a capital of $75,000 to manufacture metal products.

The Ohio Corrugating Company, Warren, Ohio, has increased its capital stock from $50,000 to $100,000, and will make extensions to its works.

The Youngstown Sheet & Tube Company, Youngstown, Ohio, has completed and put in operation three 100-ton open-hearth furnaces, which will give it an increase in its output of open-hearth steel of about 20,000 tons per month. The company now has a total of nine 100-ton furnaces with an annual capacity of close to 500,000 tons.

The Republic Iron & Steel Company will soon commence work on a steel railroad bridge to connect its four blast furnaces at Haselton with its Koppers by-product coke plant across the Mahoning River at Lansingville, Ohio. The contract for the bridge was placed some time ago with the McClintic-Marshall Company, Pittsburgh.

Recent contracts secured by the Westinghouse Electric & Mfg. Company East Pittsburgh, include two 1500-hp. motors to the Carnegie Steel Company for installation in its Duquesne works, one to be used for operating four roughing mills and the other for driving a 12-in. merchant mill; also a 7000-hp. induction motor for driving a 16-in. plate mill, and a 4000-hp. induction motor for operating a 20-in. merchant mill for the Gary works of the Illinois Steel Company.

The Carnegie Steel Company has decided to install a 12-in. bar mill in its Duquesne steel works. It will be built along the lines of the present 10-in. mill, which has made some notable records for output. The new mill will roll heavier shapes than the 10-in. mill. A 20-ton Heroult electric furnace will also be installed in the Duquesne works. A 10-ton ore bridge is being built at the Duquesne blast furnaces to replace four 5-ton bridges, which will be taken out. There will be two 10-ton bridges at Duquesne when the new one is finished.

The Carnegie Steel Company now has in blast 55 of its 59 blast furnaces. The idle stacks are one Lucy, one Zanesville, one Edgar Thomson and one Bellaire. The Bellaire and Edgar Thomson furnaces are being completely rebuilt and enlarged. Lucy is out for relining. The Zanesville stack is an isolated furnace that has not been operated in some years.

The new butt-weld furnace being added to the pipe mills of the Republic Iron & Steel Company, Youngstown, Ohio, is nearly finished and is expected to be making pipe from ½-in. to 2½-in. in the latter part of August. The lap-weld furnace will not be completed before late in September or October. Automatic stokers are being installed under the boilers at the Brown-Bonnell works of this company, and work will start soon on a new laboratory to be erected at the open-hearth plant in Haselton.

The Phoenix Iron Works Company, Meadville, Pa., has been reorganized, the company having recently satisfied a mortgage of $100,000 against its plant and equipment, and has sold a new issue of $250,000 first mortgage bonds, mostly in Pittsburgh. The company has made some extensive improvements and additions to its plant, including an extension to the foundry, an increase in the power plant equipment and extensions to the boiler erection plant. Its products consist of boilers, engines and gray-iron castings. The new officers are: Joseph McK. Speer, president; W. C. Schade, vice-president and general manager, and E. P. Cullum, secretary and treasurer.

Five of the new 20 hot tin mills being erected for the McKeesport Tin Plate Company, McKeesport, Pa., were started up on Monday, July 24. The other 15 mills are expected to be completed and started in the latter part of August. The company had 22 mills in the old plant, and when the 20 mills are finished it will have the distinction of having the largest single tinplate plant in the world. S. Diescher & Sons, Pittsburgh, drew the plans and are construction engineers for the entire 20 mills.

The National Tube Company will start up about Aug. 1 the puddling department of its Republic works on the South Side, Pittsburgh, the entire plant having been idle for some years. It contains 40 puddling furnaces and will turn out muck bar to be used in making couplings.

The General Fireproofing Company, Youngstown, Ohio, is having a very heavy demand for all-steel transfer cases for office purposes. It has been turning out about 1000 of these cases per day for some time. Nearly the entire plant is working night and day.

A Modern Malleable Foundry

The Decatur Malleable Iron Company, Decatur, Ill., expects to begin molding in the first week in August at its new foundry. The buildings are of concrete, brick and steel—side walls about 22 ft. high, and special provision for good ventilation and light. Electric traveling cranes handle all material, including the charging of the melting furnace. Aside from the saving of labor, this feature is noteworthy for doing away with the hard and grimy work of dumping material into the furnace by hand. A blower system cools the shop in summer and heats it in winter. The air furnace is of 20 tons capacity and with 90 to 100 molders the foundry can turn out 20 to 25 tons of malleable castings per day. All castings, both hard iron and annealed, will be cleaned in sand blast mills. The molding equipment consists of 50 pneumatic squeezer molding machines and wherever practicable it is planned to attach vibrator frames to handle patterns, thus avoiding the excess of weight which often attends the making of castings where patterns are rapped by hand. The product will be hardware specialties and malleable parts for automobiles and agricultural implements.

Locomotive Orders

Locomotive orders in the first three weeks of July have been about 74, with inquiries amounting to only about 35. The American Locomotive Company will build 10 consolidated locomotives for the Duluth, Winnipeg & Pacific, 19 for the Central of Brazil, and 13 for miscellaneous foreign railroads. The Philadelphia & Reading will build 10 switching engines in its own shops. The Cincinnati, New Orleans & Texas has ordered 5 mountain-type locomotives from the Baldwin Locomotive Works and 4 switching engines from the Lima Locomotive Corporation. The Wabash has revived its inquiry for 25 locomotives, and the New York Central is asking for bids on 5 Pacifics.

The Huessener Engineering Company has moved its offices to 1405 Oliver Building, Pittsburgh. Recent orders for the Bradshaw burners include an equipment for 8000 hp. of boilers for the Donner Steel Company, Buffalo, N. Y.; 3600 hp. for the McKeefrey Iron Company, Leetonia, Ohio; 2750 hp. for the Clinton Iron & Steel Company, Pittsburgh, and 1500 for the Sharpsville Furnace Company, Sharpsville, Pa.

The No. 1 Colebrook furnace of the Lackawanna Iron & Steel Company at Lebanon, Pa., which was operated on ferromanganese for several months and in the middle of June was turned to foundry iron, has been blown out for repairs.

Machinery Markets and News of the Works

LARGE LATHES ACTIVE

New Shell Orders Require Heavy Tools

General Demand Continues Good—Second-Hand Machines Inflicting No Harm—Big Seattle Exports

Inquiries received by the machine tool trade indicate that the placing of orders for large shells by J. P. Morgan & Co. will result in the purchase of a considerable number of heavy engine and turret lathes by companies to whom contracts are awarded. That such contracts are to be placed is generally accepted, though official confirmation is being withheld at present. New York dealers, however, have received large inquiries for engine lathes with a swing of 22 in. and upward, and several large turret lathes have been bought in the past 30 days by one of the companies mentioned as having been proffered an order for 8-in. shells. The contracts are for shells in sizes from 6 to 12 in., their value being in excess of $60,000,000.

The general demand for machine tools continues good, both East and West. In Cleveland inquiry is more active, one automobile maker alone inquiring for 75 tools. Several new factories are projected in that city, although from Milwaukee comes complaint of the high cost of building material restricting plant extensions.

In Cincinnati munitions makers are doing some occasional buying, and automobile truck makers are active factors in the market. The export demand in Cincinnati is quiet, except where shipments to Canada are concerned.

Exports from Seattle in the first six months of the year totaled $194,725,533, or about double that in the same period of 1915.

In Canada the Imperial Munitions Board continues to place orders on a large scale, mostly for shells of the larger sizes.

The offering of second-hand tools is inflicting no injury on the market.

New York

New York, July 26, 1916.

The outstanding feature of the market is the placing of British orders for large shells through J. P. Morgan & Co. The American Locomotive Company is understood to have received an order for 9.2 shells to the value of $1,000,000. The American Car & Foundry Company is reported to have an order for 9.2 shells valued at something like $18,000,000, with negotiations said to be under way which will give a contract to the Mayari Steel & Ordnance Company, valued at least at $8,000,000. Other companies mentioned as likely to receive orders are the Bethlehem Steel Company and the American Steel Foundries. The American Locomotive Company is reported to be transferring work from its Richmond, Va., plant to its Schenectady, N. Y., works.

J. P. Morgan & Co., as fiscal agents for the British Government, some time ago asked manufacturers to make an estimate as to how many large shells they could turn out in a certain time, up to April being mentioned in one instance. It is estimated that the total value of the shell business in prospect will exceed $60,000,000.

The machine tool trade has received inquiry for large numbers of engine lathes having a swing of 22-in. or more, and in the past thirty days large turret lathes suitably equipped for boring shells of large diameter have been purchased. Members of the trade who have figured on the lathe inquiries were pledged to secrecy. The making of large shells is largely an engine lathe proposition, although large turret lathes are most advantageously used for the inside work, the shell being chucked in the operation. The outside is usually finished in an engine lathe and, of course, the boring can be done on them also.

As heretofore stated in THE IRON AGE, contracts for 3-in. shells are being rapidly completed by American manufacturers. Some, of course, have considerable distance to go. It is reported that American shell makers have operated more successfully than those in Canada, and it is believed that the policy of Great Britain in the future will be to place all the large shells it can in the United States rather than in Canada, although the Dominion will be favored with extensive fuse contracts. The Canadian plants took shell work at low prices, but the final results are said to have been more expensive than in the United States.

In Toronto a fuse plant is to be established which will have a capacity of 6000 fuses a day. It will utilize some of the equipment used by the Nathan Mfg. Company, New York, which has very successfully handled a fuse contract. The Ashcroft Mfg. Company is expected to undertake additional fuse work.

Aside from war business the machine tool trade is active. Reassuring reports are heard as to the condition of some second-hand machinery that is on the market. Much of it, of course, is in fairly good condition, but some, in use only six months, is badly battered up.

A local maker of shaping machines is working overtime. Milling machines are difficult to procure for prompt delivery, hundreds being under contract for future delivery. Planers are also well into the future. One maker of boring mills has advanced his prices 10 per cent in the past week.

The copper and other metal companies are liberal purchasers of machines, and close quickly despite high prices.

The Artillery Fuse Company, Inc., Wilmington, Del., is inquiring for machines for boring brass rods. This is a fuse operation.

The General Electric Company, which issued two or three lists recently, is now inquiring for about a dozen large turret lathes.

A large metal company in the vicinity of New York is inquiring for additional equipment.

The railroads are slow in coming into the market, the Pennsylvania being practically the only road that has shown interest, although it was expected that the New York Central and the New York, New Haven & Hartford would be active before this time.

The Atkins Filter Press Corporation, 165 Broadway, New York, would like to get in touch with manufacturers of machinery with a view to contracting for a term of years for the manufacture of its filter presses in sizes from 2 to 10 tons. Shops will be required to make turnings up to 6 ft. in diameter in order to handle the production. S. B. ATKINS is president.

The Sprague Electric Works of the General Electric Company, with main offices at 527-531 West Fifty-fourth Street, New York, will shortly erect a new building at its plant at Watsessing, N. J. The structure will occupy property adjoining the existing plant, and will be used for building the motor shop. It will be of reinforced concrete, 50 x 200 ft., with one end part back along the [illegible] for 250 ft., making it ell-shaped. The equipment installed will be of most up-to-date type. S. C. Durland is general manager.

The Schafer Ball Bearing Company, recently incorporated with a capital stock of $100,000 by F. T. [illegible] and C. Barthel, has taken over the business of Barthel & Daly, formerly importers of ball bearings. It has purchased about

...30 lots in Hawthorne, N. J., near Paterson, between Second Street and the Susquehanna Railroad, and will at once erect a factory to be completed about Sept. 15, at a cost of about $25,000. Manufacturing operations are expected to start about Oct. 1 and all sizes of ball bearings will be made, deliveries to start in November. The initial output will be about 2000 bearings a day and about 125 workmen will be employed. C. Barthel is president. The company maintains an office at 1790 Broadway, New York.

The Arrow Motor & Machine Company, recently incorporated with a capital stock of $[illegible] to manufacture engines, motors, special machinery, dies, etc., has purchased the business of the L. Weiscopf Company, 30 Church Street, New York, whose business it continues. The company reports that it has several large contracts for its work and has been very busy since organized, having the general machinists' strike which began June 14 when all but two of its force quit. It is now employing a larger number of men than before the strike started. The walk-out was against the wishes of the workmen as they were well paid and treated, but were compelled to quit on account of union affiliations. L. Weiscopf is president, M. E. Skerritt, secretary and George H. Timmerman, is factory manager.

The Columbia Metal Box Company, manufacturer of electrical and sheet-steel specialties, 226 East 144th Street, New York, is taking bids for the construction of a four-story brick factory, 75 x 125 ft., on the west side of Rider Avenue near 144th Street, to cost about $75,000. John Hauser, 358 West 125th Street, New York, is the architect.

The Hill Insulating & Mfg. Corporation, 511 West Forty-second Street, New York, recently incorporated with a capital stock of $25,000 to manufacture a cast-iron spark plug, has leased a plant at its present location for three years. After this expires it will probably build a plant at some outlying point. The company will also handle motor and specialize in the production of straight and tapered tubes and complete cores. Later on it will take up the manufacture of other automobile and aeroplane accessories. Robert R. Hill is president, T. H. Thorne, vice-president, Charles G. Vogell, secretary and B. T. Hill, treasurer.

The Buffalo Metal Goods Company, manufacturer of coaster brakes, screw machine products, etc., 184 Winchester Avenue, Buffalo, N. Y., is taking bids for the construction of a two-story factory and office building, 40 x 55 ft., to cost about $10,000. It is also adding to its machine shop an extension 27 x 45 ft., and will in a few days break ground for a hardening building. Its main plant is now 105 x 170 ft., and the additions are planned to increase its capacity. Cyrus K. Porter, 73 West Eagle Street, Buffalo, is the architect.

The Gehnrich Indirect Heat Oven Company, 60 Franklin Avenue, Brooklyn, N. Y., at the last meeting of its board of directors voted to purchase a site 100 x 200 ft. in Long Island City, on which it will erect a three-story factory. Plans are now being drawn and the construction work will start shortly. The new plant is made necessary on account of an increased demand which its present plant could not take care of. Charles L. Gehnrich is vice-president.

The Maydrite Machinery Mfg. Company has been incorporated with a capital stock of $50,000 by John C. Delatush, 562 Newark Avenue, and others, and has established a plant at 310 Bergen Avenue, Jersey City, N. J., for the manufacture of machinery and machine products. John C. Delatush is president.

The Ford Motor Company, Detroit, Mich., has awarded contract to George P. Kelly, 20 John Street, Yonkers, N. Y., for the construction of a four-story steel and brick service building, to be erected at South Broadway and Herriot Street, at a cost of about $100,000.

Announcement was made July 13 that the American Locomotive Company, Schenectady, had awarded contracts for the constructing of three large buildings at the Schenectady plant to cost $310,000. The largest will be a cylinder shop, 175 x 300 ft., to cost $230,000 and will be constructed by Howard Bennett. The second largest will be a foundry, 100 x 175 ft., to cost $60,000, including equipment. The third, a wing to the foundry, will be 55 x 230 ft., and will cost $20,000. Patrick McDermott will construct the foundry and its wing.

The L. W. F. Engineering Company, 67 Sixth Street, Long Island City, N. Y., manufacturer of aeroplanes, has leased according to reports the building on Eighth Street, Third to Fourth avenues, College Point, Long Island. It leased its present plant in the Russell Building in Long Island City last January, but larger quarters are now needed.

The Lubricating Metal Company, 2 Rector Street, New York, is having plans prepared by Shape & Bready, 220 West Forty-second Street, New York, for the construction of a one-story factory, 50 x 100 ft., to be erected at Newark, James and Van Winkle avenues, Jersey City, N. J., at a cost of about $[illegible]. E. E. Austin, engineer.

The Popp Foundry Company, Rochester, N. Y., has re-[illegible] the plant formerly operated by the Rice Foundry, but which has been idle for two years. It will [illegible] for the manufacture of [illegible] The company is capitalized at $10,000. Charles Popp is president, [illegible] T. Hudson is [illegible] and Charles Stowell is secretary and treasurer.

The Planographic Equipment Company, 52 Duane Street, New York, [illegible] with a capital stock of $[illegible] and the [illegible] of and [illegible] and other printing presses. W. [illegible] is president, [illegible] vice-president and [illegible] secretary and treasurer. Albert S. Page is manager.

The Pratt Chuck Company, Frankfort, N. Y., has let the general contract for additions to its factory, to cost $20,000. Charles T. Pratt is president.

John A. Beisel, consulting engineer, 111 Broadway, New York, is preparing plans for a hydroelectric plant for the city of Oswego, N. Y., estimated to cost with equipment $[illegible]. Thomas H. McGuinness is city clerk.

The Oneida Steel Pulley Company, Oneida, N. Y., has commenced construction of a power plant from private plans.

The Pratt & Letchworth Company, Buffalo, is building a one-story steel and brick addition to its foundry and a pattern storage building at its plant at Tonawanda, Street and the New York Central Railroad.

Catalogs Wanted

[illegible] Stone, 76 Church Street, New York, who conducts an export and import business with Spain, France, Portugal and other countries, desires catalogs of tools suitable for equipping a large machine shop.

Philadelphia

PHILADELPHIA, PA., July 24, 1916.

Current reports state that Coatesville, Pa., is experiencing great difficulty because its traffic is outgrowing its railroad facilities. It is said 700 cars are held up on the Pennsylvania tracks between Coatesville and Parkesburg waiting to be transferred to the Reading for shipment to the steel town. The Reading Railroad is moving about 125 cars every 24 hr., and extra crews have been put on this work. It is also expanding its yards at Valley and Modena; but until these are completed, traffic will be congested. The Pennsylvania has no yards into the Coatesville mills, although steps have been taken whereby sidings will be run in off the main line.

The Philadelphia Brass Company, 917 Crozer Building, Philadelphia, Pa., has been incorporated with a capital stock of $101,000 to manufacture brass rods, extruded shapes and seamless tubes. It has purchased 17 acres at Downington, Pa., on which it will at once erect a plant which will be operated from the start on a day and night schedule to fill orders already on hand. Henry T. Coates, Jr., is president; William E. Chickering, secretary and treasurer and Walter S. Johnston, general sales manager. The board of directors include C. C. Anthony, Lewis Bernum, H. T. Coates, Jr., J. Lloyd Coates, Carl B. Ely, E. B. McCarthy and W. S. Johnston.

The Pennsylvania Equipment Company, Coleman Building, Philadelphia, is in the market for a few billet cars of 24 or 30-in. gage to hold about 2 tons of steel and for one second-hand 10-ton Browning, four-wheel, standard gage locomotive crane of about 10 ft. boom equipped with steel [illegible] top, double drum and cables and furnished with complete equipment except bucket.

The Frankford Arsenal, Philadelphia, is now working three shifts of 8 hr. each in the production of army supplies and equipment.

The Harrisburg Foundry & Machine Works, Harrisburg, Pa., has increased its bonded debt from $[illegible] to $[illegible]. The stockholders have been asked to [illegible] for the issuance of the bonds. The funds will be used to pay the floating debt.

Storm damage to the extent of about $[illegible] is reported to the Columbia Pipe Mills, Columbia, Pa., July 13. A number of buildings were unroofed and some of the machinery was damaged.

The [illegible] Valve & Coupling Company, 14 North Seventh Street, Philadelphia, manufacturer of high-pressure couplings and valves, incorporated with a capital stock of $25,000, has established a plant at 626 Cherry Street. Howard W. [illegible] is president; Frederick B. Williamson, Jr., [illegible] Alfred W. Swartz [illegible] It has established branch offices in New York and Baltimore.

The report recently current that the Standard Chain Company, York, Pa., has awarded contract for an addition to cost about $60,000, is erroneous, as it is not putting up any new buildings at this time.

The Keystone Surgical Instrument Company, 912 Harrison Building, Philadelphia, incorporated with a capital stock of $6,000, has purchased the eye, ear, nose and throat instrument business of Joseph C. Ferguson, Jr., and will continue to manufacture these specialties, including eye magnets, headlights and special operating-room lighting equipment. Smith Cecil is president and general manager.

The International Money Machine Company, Terre Haute, Ind., manufacturer of payroll, change-making and similar machines, a corporation capitalized at $2,000,000, is planning to move its plant to Reading, Pa. A new factory is to be erected there at a cost of about $100,000 and several hundred men will be employed. The company was brought to Reading by the Chamber of Commerce.

The Sharples Separator Company, manufacturer of dairy equipment, West Chester, Pa., states that its plant is taxed to capacity to produce current orders. It is now running day and night; but is 2400 separator orders behind, several hundred milk units and is also nearly six weeks behind in the production of its engines.

The Traylor Engineering & Mfg. Company, Allentown, Pa., manufacturer of mining and cement-making machinery, plans to erect a new building on the site of its present No. 2 shop, as soon as it has completed the extension to its No. 1 shop, so that it can move over the machine tools that are now in No. 2 shop to No. 1, a four-story warehouse and administration building. The building to replace shop No. 2 will be about 100 x 500 ft., and will be equipped with cranes and elevators to handle crushing machinery and other equipment which it will keep in stock to the value of about $300,000.

Hoopes, Bro. & Darlington, Inc., manufacturer of carriage and automobile wheels, West Chester, Pa., which for the last four months has been operating day and night, is making additions to its works to enable it to handle its product on the day shift alone. E. S. Darlington is treasurer.

The Pusey & Jones Company, shipbuilder and manufacturer of paper-making machinery, Wilmington, Del., has recently taken contract for eight more vessels of about 300 ft. length. The Norwegian shipbuilding interests, which recently acquired this company, have in mind largely extending its facilities for both lines of its products. C. Stewart Lee is assistant to the managing director.

The Lancaster Iron Works, Inc., manufacturer of plate-metal foundry and machine work, Lancaster, Pa., is building an addition to its plant, 100 ft. long, of brick and steel, to increase its machine shop capacity. W. W. Posey is president and general manager.

The Electric Storage Battery Company, Nineteenth Street and Allegheny Avenue, Philadelphia, is having plans drawn by the William Steele & Sons Company, 1600 Arch Street, Philadelphia, for the erection of a seven-story reinforced concrete and brick factory addition, 115 x 117 ft., at a cost reported to be about $300,000.

Hafleigh & Co., manufacturers of bone products, American and Somerset streets, Philadelphia, have awarded contract to Henry Brocklehurst, 512 West Norris Street, for the erection of a one-story reinforced concrete powerhouse, 45 x 70 ft., from plans by W. E. S. Dyer, Land Title Building, Philadelphia.

Baltimore

BALTIMORE, MD., July 24, 1916.

The Coastwise Shipbuilding Company, Fidelity Building, Baltimore, has awarded contract to the McLean Contracting Company, Fidelity Building, for the erection of a one-story corrugated iron machine shop, 40 x 200 ft. F. L. Simon, Commerce and Water streets, Baltimore, is the engineer.

The Chemical Pigments Company, St. Helena, Md., will erect a building, 100 x 300 ft., and install equipment.

The John H. Grimes Packing Box Company, Leadenhall and Stockholm streets, Baltimore, is planning the erection of an addition to its plant.

A new power house and other improvements will be made at the municipal power plant, Front Royal, Va.

A [illegible] repair shop and garage will be erected at Portsmouth, Va., by Minter & Mason.

Additional electrically operated equipment will be installed at Lonaconing, Md., by the Maryland Coal Company.

The Automatic Sealing & Stopping Machine Company, 605 Keyser Building, Baltimore, has been incorporated by E. J. Gill, 605 Keyser Building, L. W. Rascoll and E. O. Thomas.

New England

BOSTON, MASS., July 24, 1916.

The National Sweeper Company, a subsidiary of the Torrington Company, Torrington, Conn., has purchased the Domestic Vacuum Cleaner Company, Worcester, Mass., and will operate the Worcester plant in connection with the Standard Company of Torrington. The Worcester firm has had a rapid growth and F. J. Quist, its founder, will remain with the business for a time. The new officers are: F. P. Weston, president; G. Q. Porter, vice-president and treasurer; F. J. Quist, assistant treasurer; A. T. Quist, clerk; directors, F. P. Weston, G. Q. Porter, J. H. Graham, William R. Reid, F. J. Quist.

The Esty Machine Company, Laconia, N. H., has been incorporated with capital stock of $100,000 to manufacture machinery, operate water rights and generate and sell electricity. The incorporators are William Esty, George W. Shurwell, Fred F. Taylor, L. A. Dearth, Rose E. Esty and Edithe H. Cate.

The Lebanon Machine Company, Lebanon, N. H., has been incorporated with capital stock of $[illegible] to conduct a general machinery and foundry business. The incorporators are Thomas P. Waterman, Thomas F. Dwyer, Arthur H. Hough, A. B. Hunt and Phil R. Hatton of Lebanon.

The Buchanan Bolt & Wire Company, Holyoke, Mass., has awarded a contract for an addition, 36 x 50 ft., two stories.

The Rockwell-Drake Company, Plainville, Conn., is pushing the erection of an addition to its plant, which has been in operation less than a year and is working now with a day and night force.

The Fire Alarm Signal Company, Boston, Mass., has been incorporated with capital stock of $100,000. The directors are Benjamin B. Hatch, president; Alfred J. Hixon, 303 Congress Street, Boston, treasurer; and Hollis H. Sawyer.

The New Departure Mfg. Company, Bristol, Conn., is having plans drawn for a factory on Valley Street, about 300 ft. long, four stories, with ells. It will be used by the ball bearing department.

The American Graphophone Company, Bridgeport, Conn., has awarded to the Austin Company a contract for the building of an addition to its recently acquired Birdseye-Somers plant on Barnum Avenue. The new building will be 80 x 420 ft., with ell 15 x 60 ft., three stories and basement. The company is rushed with business and has been expanding its plants greatly in the past year.

The American Electric Equipment Company, 115 Broadway, New York, is having plans drawn for the rebuilding of its plant in Bridgeport, Conn.

The Bryant Electric Company, Bridgeport, Conn., has broken ground for two one-story additions, 40 x 53 ft. and 48 x 66 ft.

Norwalk, Conn., has awarded contract to the J. G. White Engineering Corporation, 43 Exchange Place, New York, for improvements to its electric light and power station.

Chicago

CHICAGO, ILL., July 25, 1916.

The floor stocks of the local dealers in machinery are beginning to show a return of used machinery for resale. More than a sprinkling of single-purpose lathes may be found. In view of the fact that there has been a marked increase in the sizes on shells demanded, requiring much heavier tools for their manufacture than were called for by the earlier shrapnel contracts, the disposition of these used tools now coming in the market becomes a problem, unless further shrapnel orders are to be placed. A report is current that a large order for 3-in. shells has just been closed in Canada. Within the last few days two large contracts for 9.2-in. shells have been closed and others are pending for 12- and 16-in high-explosive shells. An order was placed this week for 100 heavy lathes for 9-in. and 12-in. shells and one lot of 300 additional lathes is before the market. Inquiry is also noted for twelve 36-in. heavy-duty engine lathes. In the normal lines of business no great activity is reported. Manufacturers of certain lines of tools, including a number of makes of lathes, are finding themselves in position to quote fairly prompt deliveries. In a few instances manufacturers are again putting machines into stock. These conditions are still in contrast to deliveries quotable on other standard lines which run in some cases as far ahead at March, 1917.

The Sanitary Wire Door Mat Company, Chicago, has been organized with a capital of $2,500 by James A. Flinn, E. M. Dowd and Albert N. Charles, 155 North Clark Street, Chicago.

The Sherwin-Williams Company, Chicago, has awarded contracts for the erection of a one-story factory addition at its Kensington plant.

The Acme Packing Company, Chicago, has recently purchased property on which it plans to erect a new plant, involving an expenditure of $25,000.

The Schultz Ball Bearing Company, Chicago, has filed a petition for a charter authorizing a capital of $40,000. The company may be addressed in care of H. F. Tucker, Otis Building, Chicago.

Norgaard & Christensen, 1616 North Campbell Avenue, Chicago doing an automobile repairing business, will build a one-story machine shop, 50 x 100 ft., to cost $10,000.

The Excelsior Steel Furnace Company, 417 West Monroe Street, Chicago, Arthur W. Glessner president, is having plans prepared in the office of F. E. Davison, architect, for its proposed plant to be erected at a cost of $150,000.

The Metal Specialties Mfg. Company, L. W. Golder, secretary, 736 West Monroe Street, Chicago, is planning to erect a four-story factory, 100 x 140 ft., to cost about $75,000.

F. W. Patterson, a dealer in automobiles, 834 East Forty-third Street, Chicago, will build a one-story garage, 60 x 150 ft., to cost $18,000.

Plans for the new Pullman Free School of Manual Training now include the erection of a two-story foundry and forge shop, 47 x 115 ft. These shops are expected to cost $25,000. The architect is C. F. Jobson, 79 East Adams Street, Chicago, and Dr. L. V. Weld is principal of the school.

The Decatur Pump & Mfg. Company, Decatur, Ill., has been organized with a capital of $15,000 by H. C. Burke, A. W. Burks and M. M. Myers.

The Gibson Brothers Mfg. Company, Waukegan, Ill., has awarded the contract for a small addition to its plant.

A controlling interest in the Peerless Machine Works, Freeport, Ill., has been acquired by H. L. Bering, and it is the ultimate plan to move the plant to Decatur, Ill. This change has been delayed because of the excellent volume of business now being handled by the company.

The Comstock Mfg. Company, Evanston, Ill., has been incorporated with a capital of $10,000 by W. A. Bockius, Wilmette, Ill., E. J. Clampitt and H. M. Byall. It will manufacture air compressors and other machinery.

The Hercules Porcelain Company is building a plant at Belvidere, Ill., for the treatment of clays for the manufacture of insulating devices, including automobile spark plugs. The company was organized by William S. Brown, Sr.

The Illinois Corrugated Metal Company, Bloomington, Ill., sheet-metal manufacturer, will move its plant to Springfield, Ill., where it will occupy the plant formerly operated by the Gibson Gear Company.

The American Protective Pole Company, Freeport, Ill., has been organized with a capital of $50,000 to manufacture iron and sheet-metal specialties by S. M. Molinix, J. W. Stocks and W. M. Arnold.

A new corporation, known as the Kelsey Wheel Company, has been incorporated with $3,000,000 preferred and $10,000,000 common stock. It will absorb the Kelsey Wheel Company of Michigan, the Herbert Mfg. Company of Michigan, the Kelsey Wheel Company of Tennessee and a company of the same name located in Canada. These firms manufacture automobile wheels, doing a business in 1915 of $5,227,523 and of $3,949,222 in the first six months this year, according to a statement issued recently by officers of the company. John Kelsey is president.

The Holihan Mfg. Company, manufacturer of hoods, tanks and other sheet-metal stampings, Twenty-first Street and West Jefferson Avenue, Detroit, Mich., has purchased 3½ acres at Milford Avenue and the Pere Marquette Railroad at a cost of about $20,000. It has broken ground for a plant, 80 x 400 ft., which will give it double its present manufacturing space. The company's business has doubled since 1915. William Christian is secretary and general manager.

The Western Crucible Steel Casting Company, Minneapolis, Minn., advises that in connection with its plant improvements it will spend at least $100,000. Its new building will be 90 x 255 ft., and there will be installed a two-ton Snyder electric furnace, a 5-ton Pawling & Harnischfeger crane, a Milwaukee sprue cutter, new tumbling barrels, a Pangborn sand blast air hoist and electric elevator. It is expected that the new plant will be ready for operation by the middle of October. G. T. Honstain is president and W. J. Milne, vice-president and general manager.

The Mayer Brothers Mfg. Company, Mankato, Minn., will build a one-story reinforced concrete factory, 100 x 400 ft.

Wernette, Bradfield & Mead, architects, Grand Rapids, Mich., are preparing plans for a factory, 60 x 350 ft., for the Piqua Handle Mfg. Company, to be located at Marquette, Mich.

Cleveland

Correspondence Office, July 24, 1916.

New [illegible] has been pending [illegible] for some time. One [illegible] has been awarded the contract for about [illegible] for a dozen or more [illegible]. One of the [illegible] for a number of [illegible] for [illegible]. A particularly active demand is experienced on small lathes in 16 and 18 in. sizes. Dealers say that considerable prospective business is being held up because of high prices. In spite of the heavy advance of recent months, as compared to a few months ago, a [illegible] amount of new machinery is coming on the market and is being taken care of.

The Foundry Equipment Company, Cleveland, which has succeeded the Coleman Foundry Equipment Company, plans to establish a new plant to make larger quantity and will build core ovens and other foundry equipment. Much of the business heretofore done by the company in other plants. The Foundry Equipment Company has just been incorporated with a capital stock of $10,000. The president is James Tatom, formerly president of the Columbian Hardware Company, Duplex Herger Company and the Republic Structural Iron Works Company, Cleveland, who purchased the plant of the Coleman Foundry Equipment Company. F. V. Coleman, former president, remains as general manager. The company reports the recent taking of a number of orders for foundry equipment among these being orders from the Otis Steel Company, Cleveland; Johnson Bronze Company, New Castle, Pa.; Gleason Works, Rochester, N. Y.; Otis Elevator Company, Harrison, N. J., and the Kokomo Glass Company, Kokomo, Ind.

Orders for factory buildings aggregating $526,000 have been taken by the Austin Company, industrial builders, Cleveland, during the past two weeks. Most of these are for industrial buildings of standard design for quick delivery. These include a building for the Ohio Seamless Tube Company, Shelby, Ohio, to cost $125,000 and providing 110,000 sq. ft. of floor space for making tubing; a one-story building, 158 x 208 ft., for the Elyria Iron & Steel Company, Cleveland, for making oxy-acetylene welded steel tubing, costing $75,000; a factory extension for the Torbenson Gear & Axle Company, Cleveland, for making automobile truck axles, costing $16,000; a building for the Turner, Vaughan & Taylor Company, Cuyahoga Falls, Ohio, to cost $20,000; a building for the Jackson Welding Company, Jackson, Mich., for making automobile parts to cost $75,000, a standard building 300 ft. long for Robert Hassler, Indianapolis, Ind., costing $45,000, for making shock absorbers; a building for the American Graphophone Company, Bridgeport, Conn., to cost $150,000, and a building, 60 x 225 ft., for Harrison Brothers, Philadelphia, Pa., to cost $20,000.

The Ohio Crane Company, Bucyrus, Ohio, has been incorporated with a capital stock of $200,000 and has acquired the plant of the Bucyrus Forge & Machine Company, which includes a building 42 x 115 ft. Plans are being prepared for additional buildings that will include a machine and erecting shop, 90 x 100 ft., a structural and forge shop, 50 x 150 ft. and a power house and office building. The new company will manufacture locomotive cranes for the Ohio Locomotive Crane Company of Bucyrus. At present the latter company's cranes are being built by the Carroll Foundry & Machine Company.

The Fulton Tool Works, Canal Fulton, Ohio, has passed into the hands of the Fulton Tool Company, Huntington, W. Va. The plant will be operated for a number of weeks until a new plant under way in Huntington is completed. The products of the Fulton Tool Works include miners' picks, shovels, supplies, etc. Practically the same products will be made in the West Virginia plant. The officers of the new company are C. C. Hartzell, president and general manager; J. L. Hawkins, vice-president, and A. C. Bastianelli, secretary and treasurer.

The Baxter Stove Company, Mansfield, Ohio, announces that it will close down its plant and discontinue business shortly for the reason that John L. and Edwin D. Baxter, the two remaining owners of six brothers that started in business in 1883, wish to retire from active business. The plant equipment will be offered for sale. The products of the plant are stoves and ranges.

The plant of the United Electric Company in New Philadelphia, Ohio, will shortly be moved to the main works in Canton, Ohio. This plant was formerly operated by the Wise-Harrold Electric Company and was taken over by the United Electric Company several months ago.

The American Stove Company has completed plans for a factory addition in Cleveland. This will include a four-story brick warehouse and a one-story factory building, 125 x 320 ft.

G. M. McLaren, president of the McLaren Iron Works,

Cleveland, has taken bids for a two-story foundry and office building, 60 x 200 ft.

The Ohio Corrugating Company, Warren, Ohio, manufacturer of roofing, ceiling and other sheet-metal products, is contemplating the erection of a sheet mill, but advises that it has not yet decided on definite plans.

The Scanlon Machine Company, Toledo, Ohio, has been incorporated with a capital stock of $10,000. William Wilmington, Julian H. Tyler and L. G. Gardner are stockholders.

The Houghton Malleable Castings Company, Toledo, has been incorporated with a capital stock of $100,000. R. L. Houghton and Rupert Holland and others are the incorporators.

The Ohio Corrugating Company, Warren, Ohio, has increased its capital stock from $50,000 to $100,000.

The Defiance Screw Machine Products Company, Defiance, Ohio, will erect a one-story building for storage purposes.

The Urbana Tool & Die Company, Urbana, Ohio, has under consideration the erection of a factory extension.

The American Fork & Hoe Company has under way extensive improvements to its Ashtabula plant, including the erection of a forge shop and a powerhouse.

The Hester Tire & Rubber Company, Lima, Ohio, has acquired a three-acre site on which it will shortly begin the erection of a building, 60 x 150 ft., and a powerhouse.

Indianapolis

INDIANAPOLIS, IND., July 24, 1916.

The Campbell Folding Car Step Company, Indianapolis, has been incorporated with $100,000 capital stock to manufacture folding car steps. The directors are Nelson J. Carr, W. J. Wilson and Socrates A. Campbell.

The Ponton Mfg. Company, Indianapolis, has been incorporated with $50,000 capital stock to manufacture extensible braces and machinery. Arthur, Alford and P. Ponton are the directors.

E. C. Atkins & Co., saw manufacturers, Indianapolis, are erecting a three-story brick, steel and reinforced concrete addition, 40 x 190 ft., to their plant. It will be used as a forging department and will cost $30,000.

Robert H. Hasler, Indianapolis, manufacturer of automobile accessories, will erect a new building at 1585 Naomi Street to cost $44,000.

The Link-Belt Company, Indianapolis, will erect an addition to its foundry to cost $20,000.

The Briant Mfg. Company, Indianapolis, has been incorporated with $10,000 capital stock to manufacture novelties, etc. The directors are George A. Buttler, Mark E. Archer and Isaac A. Lewis.

The plant of the Westcott Motor Car Company, Richmond, Ind., has been moved to Springfield, Ohio, and the buildings will be taken by the Davis Motor Car Company as an extension to its plant.

The Brosche & Kenley Twentieth Century Supply Company, Attica, Ind., has been incorporated with $75,000 capital stock. Charles T. Jacobson is manager.

The New Idea Mfg. Company, Crawfordsville, Ind., has been incorporated with $5,000 capital stock to manufacture crates. The directors are Robert C. Smith, Charles A. Westfall and Albert E. Harris.

The Hercules Buggy Company, Evansville, Ind., will build an addition to its plant, 80 x 120 ft., to cost $20,000. John D. Craft is vice-president.

The Owens Bottling & Machine Company, Toledo, Ohio, has bought the Graham Glass Company, Evansville, Ind., and its two other plants, for $1,000,000.

The Richmond Industrial Development Company, Richmond, Ind., has been organized to develop the industrial interests of the city. The directors are George H. Eggemeyer, George H. Knollenberg and J. M. Lontz.

The Commercial Club, Winchester, Ind., has raised $8,000 to buy stock in the S. J. Beebe Stove Works, capitalized at $15,000. Option on a site for the plant has been taken.

The Fort Wayne Corrugated Paper Company, Fort Wayne, Ind., has increased its capital stock from $1,000,000 to $1,500,000.

The International Steel & Iron Company, manufacturer of architectural iron work, store fronts, etc., Evansville, Ind., has completed its new planing mill, of frame and steel construction, 70 x 150 ft., and a lumber shed 30 x 100 ft., costing together about $10,000. It has finished erecting a structural shop 140 x 280 ft., at a cost of about $75,000. The building is equipped with an electric crane of 20-ft. span. The sides of the plant are 32½ ft. bay used for architectural iron.

Milwaukee

MILWAUKEE, WIS., July 24, 1916.

The production of machine tools in the Milwaukee district has not yet been affected by the strike of machinists, the walkout not having reached this particular line of the metal-working industry. All available capacity is still well occupied. New business is nearer normal than since the revival of buying months ago. Gas engine and automobile shops are the best buyers of milling tools, lathes and drills. A period of two weeks of torrid weather has caused some lassitude in production and trade. Complaints are still heard that the high price of building materials—steel as well as others—is precluding numerous important new construction projects which, if erected, would require considerable miscellaneous machinery and tools. A feature of the situation throughout Wisconsin is the continuance of the establishment of new garages, with machine and repair shops. These projects take up considerable of the used tools of the smaller and lighter types, and in some instances the equipment includes large lathes. The condition is doubtless due to the fact that already there have been licensed in Wisconsin 105,000 privately owned motor vehicles, an increase of 25,000 over last year's total figures. So far the used tool market in Milwaukee has not received a surfeit of machines, and the dumping reported in the East is not apparent here. A good market for second-hand tools is had and stocks are kept cleaned up. Buyers are discriminating, however, and will not take machines that ought to be scrapped. Prices are well maintained, but attractive.

A report from Sheboygan Falls, Wis., states that the Falls Machine Company, of that city, manufacturer of automobile engines, has passed into the control of a syndicate represented by Andrews & Co., bankers, of Chicago. It is stated that the company will be re-incorporated under the style of the Falls Motors Company, under the laws of Virginia, with $1,500,000 capital.

The Manitowoc Dry Dock & Shipbuilding Company and the Manitowoc Boiler Works Company, Manitowoc, Wis., have been consolidated as to ownership, but will be operated as separate institutions, the names having been changed to the Manitowoc Shipbuilding Company and the Manitowoc Boiler Works respectively. E. E. Gunnel continues as general manager of the shipyards and C. C. West of the boiler plant. Arrangements have already been made to increase the size of the boiler works 25 per cent. This contract has been placed with the Wisconsin Bridge & Iron Company, Milwaukee. The machinery and equipment are now being ordered. The two plants now employ over 1200 men.

The Rotary Gas Engine & Pulverizer Company, Antigo, Wis., the incorporation of which was noted, has contracted for the production of its devices and machines with Mayer Brothers, who recently took over the former International Hoist Company works and are operating a commercial foundry and machine shop. The arrangement is temporary and later the Rotary Company will build a plant of its own. Its products include rotary gas and steam engines, clod crushers, subsurface packers, mulchers, rotary pulverizers, farm tractors, automobile chassis, transmissions and similar equipment. Clarence Rishel, who went to Antigo from Denver, Col., is mechanical engineer.

The Mohr Lumber Company, Wausau, Wis., is preparing to rebuild its sawmill destroyed by fire with a loss of $75,000. C. F. Mohr is president.

The Continental Motor Truck Company, Superior, Wis., has broken ground for its new manufacturing plant on Belknap Street and the Soo Line tracks to cost $50,000. Occupancy will be taken about Sept. 1. All of the equipment of the present works in leased quarters will be utilized; but a list of new tools will be purchased. J. G. Barnsdale is secretary.

Platteville, Wis., will build a high school at a cost not to exceed $100,000, with a complete manual training equipment.

H. C. Biddison, Madison, Wis., who has been manufactuirng lubricating and general machinery appliances in leased quarters at 1516 Williamson Street for many years, is having plans prepared for a machine shop at Williamson and Rogers streets, of brick and concrete, one-story, 44 x 60 ft.

The Commonwealth Power Company, Milwaukee, has disposed of its entire holdings to the Milwaukee Electric Railway & Light Company for $1,100,000.

The Baldwin Co-Operative Creamery Association, Baldwin, Wis., is preparing to expend $20,000 to [illegible] a new creamery plant, to contain a large refrigerating unit. John Nelson is manager.

The Blanchester Paper Company, Blanchester, Wis., is making extensive improvements in its [illegible] and intends to build a complete plant and tower expected to cost $10,000 in all [illegible]. John Van Alstine is superintendent.

James Evans Madison, Wis., is having plans prepared for a garage at Henry and Dayton streets, of brick and steel, 66 x 198 ft., two stories and basement.

The Terrio Mfg. Company, Waupaca, Wis., organized recently, will establish a factory for the production of butter testers, egg-candling machines, etc. Quarters will be leased for the present.

Edwin J. Terwilliger, Clinton, Wis., has purchased the machine and automobile repair shop of the Terwilliger Garage Company, and will do a commercial machinery business. A few pieces of new equipment will be installed.

The Wisconsin Foundry & Steel Works, Cedar Grove, Wis., at a special meeting of stockholders, decided to change its corporate style to the Cedar Grove Stove Company, to better express the nature of its business.

The Flach & Schneeberg Company, Milwaukee, operating a machine shop at 764 Thirty-second Street, has filed a voluntary petition in bankruptcy. The assets are listed at $6,396 and liabilities at $3,172. The creditors will meet July 28.

G. O. Bergland, Deerfield, Wis., will establish a small factory for the manufacture of a new type of concrete mixer for small jobs.

The Overland-Madison Company, Madison, Wis., western Wisconsin automobile agent, will spend $15,000 to $20,000 in erecting a garage, warehouse and repair shop, 66 x 80 ft., at East Wilson and King streets, Madison. It will be three stories and basement. R. A. Warner and J. Parker Gillespie are managers.

H. W. Forsyth, S. R. Deakin and H. R. Clough, all of Milwaukee, have organized the Spring Power Machinery Company, with a capital stock of $50,000. Plans are not quite matured.

Byron Scheiderer, architect, Milwaukee, is taking bids this week on important additions to the garage and machine shop of Warren Brothers, State Street, Wauwatosa, Wis. A second story, 54 x 144 ft., will be added, and an extension, 40 x 40 ft., will be built to the machine shop.

The C. H. Armiger Chemical Company, Milwaukee, awarded the general contract for a fireproof addition, 75 x 130 ft., to its plant at 770 Greenbush Street, to the Northern Construction Company, Milwaukee.

The Lake Superior Electrical Company, Lamborn and Third streets, Superior, Wis., recently incorporated with a capital stock of $50,000, has taken out a building permit for the construction of a factory at Grand Avenue and Third Street to cost about $7,000. It will manufacture a flashlight and an electric whistle, employing about 25 men at the start.

Cincinnati

CINCINNATI, OHIO, July 24, 1916.

Second-hand machine tools have not been offered in this market by nearby manufacturers. In fact, munition makers, who have recently taken on additional contracts, have lately placed orders for new lathes, and are not offering to sell more than the usual number of used machines. Auto-truck manufacturers, who are very busy, are quietly buying single tools, but are not issuing any lists. Business from the railroads is still disappointing. With the exception of Canada, the export demand for machine tools is limited, although quite a number of machines are still being shipped to Europe on old contracts. Some new business has lately been received from the Pacific coast.

Full details are not yet available as to the plans of the Pfau Mfg. Company, Cincinnati, but it is currently reported that the company will erect a large addition to its plant in Norwood for the manufacture of sanitary pottery.

It is rumored that the United States Cast Iron Pipe & Foundry Company is having plans prepared for doubling the capacity of its plant at Addyston, Ohio, a Cincinnati suburb.

The Carlton Machine Tool Company, Cincinnati, Jack C. Carlton, president, has acquired a site adjoining its plant in West End, and will soon commence the construction of a large addition. The company recently acquired the plant of the W. E. Gang Company.

The Domestic Engineering Company, Dayton, Ohio, has let contract for a new plant to be constructed in a Dayton suburb that will be used for the manufacture of farm lighting outfits. The new building will be 270 x 1000 ft., of sawtooth construction and when completed will cover more ground space than any one manufacturing building in that vicinity. A large amount of machinery will be required.

The Safety Emery Wheel Company, Springfield, Ohio, is preparing plans for an addition to its plant that will be completed before the winter season. The company now has under construction an office addition.

The National Mortar & Supply Company, Springfield, Ohio, has commenced the erection of the recently acquired plant of the Cold Springs Lime & Stone Company, located near Springfield. It is reported that 10 new kiln will be erected together with a hydrating plant.

The Urbana Packing Company, Urbana, Ohio, has contracted for construction of an addition to its plant for which refrigerating equipment will be required.

The Hercules Buggy Company, Evansville, Ind., will soon begin work on an addition to its plant that will be 50 x 120 ft., three stories and of brick construction.

St. Louis

ST. LOUIS, MO., July 24, 1916.

Machine-tool demand continues satisfactory and the aggregate of orders is quite equal to the ability to deliver. Pressure for delivery has about disappeared and the business is regaining a normal state. No pressure of second-hand tools has been felt here as a result of the completion of munitions contracts elsewhere. No premiums are being paid for machinery. Reports from all parts of the St. Louis territory are of excellent business conditions and also of fine crops.

The Laclede Iron Works, St. Louis, Andrew J. Franz manager, has leased additional space at 1315 Chestnut Street, and will increase its equipment for the manufacture of ornamental iron, etc.

The Light & Development Company, St. Louis, Mo., has increased its capital stock from $1,500,000 to $3,000,000 for the purpose of acquiring new plants and extending equipment of its existing plants, chiefly electric plants and waterworks.

The General Explosives Company, St. Louis, Mo., has been incorporated with a capital stock of $50,000, to be increased later, and will manufacture explosives and shells. The stockholders are E. William Hawley, Railway Exchange Building, St. Louis; Walter W. Edwards and Joseph M. Owne, of Chicago, and Alfred J. Rawlings, New York.

The Richardson Hardware Mfg. Company, St. Louis, Mo., has been incorporated with a capital stock of $50,000 by Carl N. Richardson, D. Murray Foley and J. Carter Carstens to manufacture hardware specialties.

The Knox Furnace & Cornice Company, St. Louis, Mo., has leased quarters at 4414 Easton Avenue, and will increase its plant capacity.

The Ford-Davis Mfg. Company, St. Louis, Mo., has been incorporated with a capital stock of $30,000 by E. W. Oelfcken, W. C. Kleine, George H. Allan, T. D. Davis and James J. Masterson to manufacture metal products, including piston rings, etc.

The Davis-O'Fallon Equipment Company, St. Louis, Mo., has been incorporated with a nominal capital stock of $10,000 by John J. O'Fallon, Jr., William H. Davis and others to manufacture railway equipment and supplies.

The branch of the American Express Company, at St. Louis, Mo., N. T. Brown superintendent, will erect a garage and machine shop for its vehicles. The Wells-Fargo Company at St. Louis will also equip a garage and machine shop under the direction of its superintendent, Grover B. Simpson.

The plant of the Rogers Foundry & Mfg. Company, Joplin, Mo., was recently damaged by fire to the extent of $65,000.

A branch assembling plant, machine shop and garage to cost about $50,000 will be equipped at East St. Louis, Ill., by the Ford Motor Company, Detroit, Mich.

The Kansas City Fan & Motor Company, Kansas City, Mo., has been incorporated with a capital stock of $12,000 by H. C. Hoffman, David E. Long and Alden W. Burke to manufacture electric fans, etc.

The West Side Machine Shop Company, Webb City, Mo., has been incorporated with a capital stock of $32,000 by J. C. Coffee, L. E. Sweetland and Charles Jaccard to do a general machine business and to manufacture tools.

The Gille Mfg. Company, Kansas City, Mo., has acquired a seven-story building at Ninth and Liberty streets, and will equip a plant for the manufacture of tinware, cans and metal containers.

The Stuttgart Public Service Company, Stuttgart, Ark., has been incorporated with a capital stock of $100,000 by F. G. Proutt, T. H. Rhodes and William A. Smith to equip a waterworks, an electric light plant, etc.

L. K. Brown and others, Gurdon, Ark., will install equipment for a four-saw, 80-stand cotton gin.

The Farmers' Gin & Mfg. Company, Round Pond, Ark., has been incorporated with a capital stock of $17,500 by John Mosely, John Mallory and Charles Fleming and others.

The Sawyer Gin Company, Sawyer, Okla., has been incorporated with a capital stock of $15,000 by J. D. Moore, J. W. Robinson and J. A. Deavours and others.

The Mayo Refinery Company, Claremore, Okla., has

been incorporated with a capital stock of $[illegible] by G. W. Fry of Claremore, A. S. Nelson of [illegible] and A. M. White of McKinney, Tex.

The Brenton Oil & Gas Company, G. B. Stone president, Colcord Building, Oklahoma City, Okla., will equip a pipe line and install pumping machinery, etc. W. C. Burke is engineer.

The Millikin Company, Tulsa, Okla., has been incorporated with a capital stock of $[illegible] by W. T. Millikin and others to equip a[illegible] oil refinery. Guy Forcier is manager.

The Sinclair Pipe Line Company, Tulsa, Okla., a subsidiary of the Sinclair Oil and Refining Corporation, will equip a pipe line from Tulsa to Chicago, Ill., and is in the market for the necessary pumping equipment as well as piping, etc.

The Pierce-Fordyce Oil Corporation, St. Louis, Mo., will equip a pipe line from Tulsa, Okla., to a refinery in Texas, and is reported in the market for the pumps, piping, etc.

H. W. Hartsaw and others of Bristow, Okla., have organized a company with $[illegible] capital for the manufacture of lightning arresters for oil tanks, etc.

The Valley Motor Company, Pauls Valley, Okla., has been incorporated with a capital stock of $15,000 by R. C. Baird, Pearl Baird and E. O. Tribbey of Purcell, Okla., and will equip a machine shop and garage. They will aslo equip a similar plant at Purcell under the corporate title of the Baird Motor Company.

The New Orleans Refinery Company, New Orleans, La., in care of the Rosenberg-Rowan Company, will equip an oil refinery above New Orleans. The company is controlled by the Royal Dutch Shell Corporation, Tulsa, Okla.

The Central South

LOUISVILLE, KY., July 24, 1916.

Statements of a slackening in industrial operations are not borne out by reports from the iron, steel and machinery trades in this section. The usual mid-summer lull is conspicuously absent. Labor shortage is expected to have some influence on the trade, and an increased demand for labor saving machinery is looked for. Coal operators particularly are seeking means of increasing their working capacity by adding to their machinery equipment.

The Norton-Caldwell Company, Louisville, has purchased property at Third and Breckenridge streets, and it is reported contemplates erecting a garage to cost $18,000.

J. J. Gaffney, architect, Louisville, has purchased a lot 146 x 160 ft., on Guthrie Street, and will erect a two-story garage at an estimated cost of $50,000, for W. A. Thomas.

The Callahan-Whiteside Motors Company, Louisville, has been incorporated with $20,000 capitalization to do a general garage business. The incorporators are William P. Callahan, Addison H. Whiteside, Benjamin H. Radebaugh.

The plant of the Sherrill-King Lumber Company, Paducah, Ky., has been taken over by C. H. and Fain King, to be operated as the King Mill & Lumber Company.

M. L. Forrest, J. H. Ford and Harry Ford are erecting a canning factory at Sedalia, Ky., to have a capacity of 12,000 cans daily.

The Ashland Iron & Mining Company, Ashland, Ky., is completing construction of its new machine shop, 120 x 260 ft.

Winchester, Ky., will seek permission to utilize the water power in connection with the flow over the Government dam in the Kentucky River. It is stated that the power would be sufficient to operate a municipal water system pumping station. The mayor may be addressed.

John T. Livingston, Lancaster, Ky., is making plans for the manufacture of a special automobile fender.

H. A. Williams, John R. Burrows, and others, have incorporated the Brown Chemical Company, Nashville, Tenn.

Elrod & Co., Erwin, Tenn., are in the market for a molder for planing two sides of automobile blank spokes, a 24-in. Defiance automobile spoke lathe; rip table and a short log mill for rim strips, all second hand.

The Southern Coffin & Casket Company, Maryville, Tenn., has increased its capital to $90,000.

The Mascot Stove Company, with Sewell Howard, Harry Howard, Polk Tarwater, Fred G. Haggard, and others, Chattanooga, Tenn., will organize a stove manufacturing plant to have $50,000 capital at Rockwood, Tenn. J. G. F. James, general manager of the Mascot plant, will manage the new enterprise.

The Womble Storage Battery Company has equipped a plant at 204 Market Street, Chattanooga, Tenn., to manufacture storage batteries.

Texas

AUSTIN, TEX., July [illegible], 1916.

The excessively hot weather the last week has tended to put [illegible] all the machinery and tool trade. The demand for cotton ginning machinery continues good. Crop prospects are satisfactory in every respect. New cotton is beginning to come in and high prices are paid for the staple.

The Texas Company, 17 Battery Place, New York, has purchased a tract of 29 acres, adjoining the International & Great Northern Railroad at Houston, upon which it will build general machine shops for its oil-well [illegible] transportation equipment.

The Bay City Products Company, Bay City, which has a capital stock of $25,000, will operate a plant for the manufacture of tile, brick and other clay products. J. W. Rugeley is one of the promoters.

W. A. Boeckmann & Co., Meyer, will build a cotton gin at a cost of about $15,000. William Bauer, Sr., is in charge.

The Robstown Gin & Ice Company, Robstown, will build a cotton gin and ice plant at a cost of about $60,000.

C. Knipstein & Co., Burton, will build a cotton gin to cost about $12,000.

The Texas Wheel & Body Company, Dallas, has just finished the erection of a new factory. It manufactures wheels and bodies for vehicles. R. F. Robinson is president.

It is reported that the Atchison, Topeka & Santa Fe Railroad plans to remove its general shops from Needles to Seligman, Ariz.

The Scott-Fulton Mfg. Company, El Paso, plans to install a plant for manufacturing a patent fly trap.

T. L. Moss & Co., Bomarton, will build a grist mill and cotton gin at a cost of about $14,000. T. L. Moss is a stockholder.

Birmingham

BIRMINGHAM, ALA., July 24, 1916.

Leading wholesale machinery interests report business as more and more slack with the passage of the past month. Gasoline engines and pumps, recently in demand incident to the excessive rains and floods are the only items on the active list. Deliveries are easier than at any time. Low prices in the lumber trade and the prior rush of activity by many small plants, thus increasing the supply and tending to prices softening, have had a marked effect in that direction. High prices of finished material have stopped structural work of many kinds.

J. A. Powers, Atlanta, and associates have purchased 4000 acres of timber lands near Baxley, Ga., for $60,000, and will cut the timber.

The Gas Engineering Company, West Palm Beach, Fla., will establish an ice and cold storage plant. Frank D. Moses, Trenton, N. J., is president.

G. H. Wood, president of the River Basin Paper Company, and George R. Wright, vice-president of the Louisiana Fibre Board Company, Bogalusa, La., are negotiating with the citizens of Hattiesburg, Miss., who have offered a free site for the location of a wood fiber plant to cost $750,000.

Columbia, S. C., is planning extensions of its waterworks and sewer systems at a cost of $350,000. Bonds were recently voted.

San Francisco

SAN FRANCISCO, CAL., July 18, 1916.

The machine-tool trade is brisk and many buyers are placing orders for distant deliveries. Inquiries on hand indicate still greater activity as shipments become normal. Country garage equipment is in especially strong demand, and second-hand tools are eagerly sought. Improvements to shipbuilding plants are proceeding rapidly. Traction engine manufacturers are working on some war orders, in addition to a heavy domestic trade. Exports of gas engines are large, especially to Australia. Several substantial orders have been placed for industrial railway equipment.

The Gorham Engineering Company, Oakland, specializing in gas engines, is developing a line of aeroplane engines. A small foundry has been installed for aluminum and bronze castings.

It is reported that the Aluminum Products Company, Chicago, has purchased a factory site at Third Avenue and East Eleventh Street, Oakland.

The C. L. Best Gas Traction Company has decided to locate its new plant at San Leandro, Cal., a short distance from its old establishment.

The Union Iron Works has laid foundations for the new shop at its Alameda plant, formerly the United Engineering Works, the building to be 600 ft. long. Three large traveling cranes will be in operation within a week, and an industrial railroad is being installed in the yards.

The Golden West Motors Company, Sacramento, Cal., has been reorganized, and arrangements are under way for the resumption of the manufacture of motor trucks.

The E. H. Moyle Engineering & Equipment Company, Los Angeles, has moved to 1638 East Ninth Street, and is installing machinery to manufacture crushers and stamp mills.

The San Pedro Marine Engine Works, operated by W. M. Parke and Samuel Mills, has secured a permit for the use of a tide land site at Los Angeles Harbor for boat building and repair shops.

The Western States Gas & Electric Company is making a large addition to its hydroelectric plant near Junction City, Trinity County, Cal.

George I. Gardner and W. B. August, Stockton, Cal., have opened a foundry in the plant formerly occupied by the Globe Iron Works.

The Mechanical Educator Company, Los Angeles, plans to build a factory, the equipment of which is estimated to cost about $4,000. W. B. Farr is president.

The Pacific Northwest

SEATTLE, WASH., July 18, 1916.

Statistics for the first six months of 1916, show that water shipment from Seattle amounted to $194,725,533, or practically double that for the same period of last year. This is regarded as a remarkable figure, as Seattle ports have been almost demoralized by strikes among waterfront workers for the past month. At present, shipping is carried on under the greatest difficulty—all the union workmen in Tacoma and Seattle are on strike, and cargo shipments are greatly hampered. Added to this is the continued scarcity of tonnage.

The mid-summer repairing season and consequent shutdown of practically all the lumber camps and mills in the Pacific Northwest has resulted in a curtailment of production of fifty per cent, but the fall season is expected to open on a sound basis.

The Neubert & Weber Mfg. Company, Seattle, has been incorporated for $10,000, and plans the establishment of a factory to manufacture store fixtures.

Equipment and machinery in the plant of the Union Iron Works, Spokane, Wash., was damaged to the extent of $3500 in a recent electrical storm.

The Kenney Economy Hydraulic Company, Vancouver, Wash., has been incorporated for $250,000, and has completed plans for the construction of a plant to manufacture hydraulic stump pulling and splitting machines and other apparatus. Frank E. Kenney, Portland, is president, and other incorporators are D. W. Hoebling, John F. Shorey and George B. Simpson. The company reports orders approximating $200,000 are now booked, and the plant will be rushed to completion.

Plans have been completed for the two-story addition, 45 x 60 ft., to the plant of the Clark-Wilson Lumber Company at Linnton, Ore. Work will start immediately.

The sash and door factory of W. G. Scrim & Co., Vancouver, B. C., was recently destroyed by fire with a loss of $9,000.

The North Pacific Shipbuilding Company, Portland, Ore., has been incorporated for $100,000, with F. A. Ballin, president; R. A. Purdy, vice-president, and J. B. C. Lockwood, treasurer. It plans the immediate construction of a plant in Portland to build composite cargo steamers of 5000 tons capacity. The vessels will handle 4,000,000 ft. of lumber, and will be 346 ft. long, with 50-ft beam. The company will work in conjunction with the Smith & Watson Iron Works and the Northwest Steel Works, where the machinery for the steamers will be built. Plans for the plant are being prepared, and construction work will be rushed.

C. E. Warwick, Anaconda, Mont., plans the installation of an electric lighting plant in Whitetail, Mont., to supply that city and surrounding territory.

The Elliott Bay Ship & Engine Company, Seattle, Wash., recently incorporated, has secured a nine-acre site on the West Waterway, on which a shipbuilding plant to cost $250,000 will be erected. The plant will be in operation by Oct. 1, and C. O. Morrow, president, states that enough work has been contracted for to keep the plant busy for one year. It will be equipped to build wooden hull ships of any size, and will also specialize in repair work. The new company is an outgrowth of the Elliott Bay Yacht & Engine Company, which has operated a small repairing plant on the West Waterway for many years. The new plant will be kept in operation until the new [illegible] completed.

The Eshelman Floating Mill, Seattle, Wash., awarded contract for the construction of a concrete, concrete and steel addition, 50 x 150 ft., to its plant on the West Waterway at a cost of $100,000.

Metz & Metz, Seattle, Wash., has established a foundry at Seward, Alaska, to do general repair work.

The Pacific Sheet Metal Works has opened a sheet metal shop at 115 Pacific Avenue, Bremerton, Wash., with O. L. Hines in charge. It formerly was located at Seattle.

The West Kootenai Power & Light Company, Nelson, B. C., according to reports, will construct an addition to its power plant at Upper Bonnington Falls, which will generate 5000 hp.

The W. W. Wood Mfg. Company, Bellingham, Wash., has taken over the Bellingham Cedar Company's veneer plant in Bellingham. New machinery is being installed and extensions made.

The Davis Sport Belting Company, Seattle, is constructing a plant at 308 First Avenue South, for the manufacture of oak leather belting, and will begin operation Sept. 1. This is the only plant of its kind in the Pacific Northwest. Charles R. Davis is president.

The Potter Lumber & Shingle Company's mill near Mill City, Ore., was destroyed in a recent fire, with a loss of more than $10,000.

The mill of the East Kootenai Lumber Company, Nelson, B. C., was destroyed by fire with a loss of $100,000.

Canada

TORONTO, July 24, 1916.

Orders are continually being placed by the Imperial Munitions Board, of which J. W. Flavelle is chairman, for the manufacture of shells and other war munitions. Authority for the placing in Canada by this board of further shell orders amounting to $35,000,000 was received on July 18. This order is for 6-in. and 9.2-in. Edward Fitzgerald, recently of the Canadian Pacific Railway purchasing department, has been appointed assistant to J. W. Flavelle, the chairman of the board.

While deprecating the excessive talk about the shortage of labor in relation to the harvest in the Canadian West, J. Bruce Walker, the Commissioner of Immigration at Winnipeg, Man., recognizes the seriousness of the situation and recently stated that it would be necessary for commercial and industrial undertakings to close down for a time in order to supply sufficient labor for removing the crops. This drastic remedy he considered the only way of placing the harvest in a position of security.

The great demand for paper is making it necessary for a large number of Canadian manufacturers to increase their plants. Among these companies the following increases are under way: The Donnacona Paper Company, Donnacona, Que., an increase of 50 tons per day; Laurentide Paper Company, 200 to 400 tons a day; Union Bag & Paper Company, Three Rivers, Que., a news-print mill of 100 tons daily capacity; Ontario Paper Company, Thorold, Ont., additions and new machinery; Abitibi Power & Paper Company, Ltd., Iroquois Falls, Ont., to purchase two 235-in. paper machines; Price Brothers & Co., Ltd., Kenogami, Que., an addition to cost $500,000; International Paper Company, 30 Broad Street, New York, plans reported for a 200 ton news-print mill in Canada.

The plant of the O'Brien Munitions, Ltd., Renfrew, Ont., was destroyed by fire on July 16 with a loss of between $100,000 and $150,000. The plant will be rebuilt. This is the third fire at the plant in the past year.

The Stratford Brass Company, Stratford, Ont., manufacturer of brass fixtures, is building an addition to its plant, 42 x 42 ft., two stories. Alfred Hahn is manager.

The Harbor Commissioners, Toronto, have received a permit for an addition to the blacksmith and machine shop at the foot of Cherry Street, to cost $2,700.

Large additions are being made to the boiler room and machine shop of the Canadian Northern Railway at Port Arthur, Ont. Six new stalls are also being added to the roundhouse. The company is also greatly extending its plant at Rainey River.

A. E. Ponsford, Ltd., has been awarded the contract for the erection of a new brick and concrete factory, 25 x 50 ft., for the American Brake Shoe & Foundry Company at St. Thomas, Ont., at a cost of $17,000.

The Western Canada Marble & Tile Company, Ltd., Winnipeg, Man., has purchased a site at a cost of $100,000

and will build a finishing plant, 50 x 175 ft. W. B. Purtell is president.

The Electro Steel & Metal Company has taken over a planing mill on Niagara Street, St. Catharines, Ont., and is equipping the building to be used in conjunction with its present plant.

The Eau Claire Waterworks Company, Tecumseh, Ont., has secured a site 50 x 125 ft., and will shortly call for tenders for the erection of a plant to cost $20,000.

The Steel Company of Canada will build an addition to its plant at Toronto, to cost $4,500. F. B. Cowan is branch manager. It has also awarded contract to William Yale, 24 Leeming Street, Hamilton, for the construction of an addition to its plant there to cost $12,000.

The H. Morgan Company, Montreal, has commenced the erection of a garage to cost $40,000.

Mr. Blachensky, St. Boniface, Man., proposes to build an abattoir and packing plant on Archibald Street to cost $75,000. Plans have been prepared.

D. Balcovske, St. Boniface, Man., is contemplating the erection of an abattoir at the Union Stock Yards to cost $65,000.

The W. J. Trick Company, Ltd., Oshawa, Ont., has received contract for the erection of a factory there for the Chevrolet Motor Company, to cost $40,000. The Chevrolet Company will also build another structure there at a cost of $50,000.

The Electric Products Company, Ltd., Three Rivers, Que., has been incorporated with a capital stock of $95,000 by J. A. Oligny, G. D. Quillan, A. Boivin, and others, to manufacture electrical goods.

New Toronto, Ont., will purchase a pump for the waterworks plant, to have a capacity of 600 gal. per min. George D. Scott is clerk.

James, Loudon & Hertzberg, engineers, Toronto, are preparing plans for a water supply for Woodbridge, Ont., to include mains, pumping plant, filtration plant, stand pipe, etc., to cost $10,000.

Stratford, Ont., will purchase a 10-hp. motor for the sewage disposal works. R. R. Lang is clerk.

Nesbitt & Co., Edmonton, Alberta, have been awarded contract for the erection of a machine shop there for the Canadian Northern Railway, to cost $65,000.

The Modern Tool Mfg. Company, Ltd., Montreal, has been incorporated with a capital stock of $200,000 by Ismael J. Sarault, Louis P. Renaud, Joseph Peloquin, and others, to manufacture machinery, tools, arms, shells, ammunition, etc.

The Manitoba Steel Foundries, Ltd., Winnipeg, Man., has been incorporated with a capital stock of $300,000 by Peter J. Smith, Arthur M. Tirbutt, Horace Ormond, and others.

The Superior Tile Company, Ltd., Montreal, has been incorporated with a capital stock of $40,000 by Gaylen R. Duncan, Robert D. Sutherland, Frederick Babe, and others, to manufacture brick, tile, sewer pipe, etc.

Government Purchases

WASHINGTON, D. C., July 24, 1916.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until date not set, schedule 9924, for one combined hand and power pipe cutting and threading machine to take pipes from 2½ to 12 in. in diameter, for Portsmouth, N. H.; schedule 9934, for one motor-driven test pump for Newport; schedule 9935, for four steam turbine-driven blowing sets for Charleston.

Bids were received by the Bureau of Supplies and Accounts, Navy Department, Washington, July 18, for supplies for the naval service as follows:

Schedule 9821, Construction and Repair

Class 34, Brooklyn—One hydraulic joggling press—Bid 107, $8,135 and $12,194; 152, $5,700; 185, $5,285 and $4,950; 190, $9,250.

Schedule 9822, Steam Engineering

Class 41, Boston—Two air compressors with spares—Bid 127, $3,667.60; 183, $539.90.

Class 42, Boston—One pipe cutting and threading machine—Bid 82, $1,719; 89, $1,338; 107, $1,500 and $1,950; 132, $1,950, $1,500, $1,700, $1,561 and $1,497; 178, $2,761.

The names of the bidders and the numbers under which they are designated in the above list, are as follows:

Bids 82, Jarecki Mfg. Company; 89, Kemp Machinery Company; 107, Manning, Maxwell & Moore, Inc.; 127, Norwalk Iron Works Company; 132, National Electrical Supply Company; 152, Southwark Foundry & Machine Company; 178, Universal Trading Company; 183, Westinghouse Air Brake Company; 185, R. D. Wood & Co.; 190, Worthington Pump & Machinery Corporation.

NEW TRADE PUBLICATIONS

Air Compressors.—Ingersoll-Rand Company, 11 Broadway, New York. Spanish catalog entitled "Productos de la Ingersoll-Rand." Size, 6 x 9 in.; pages, 124. Covers a line of air and gas compressors, vacuum, reciprocating and centrifugal water pumps, rock drilling, metal and coal mining, prospecting and quarrying machinery and pneumatic tools for machine and boiler shops and foundries. Illustrations, descriptive matter and tabulated data are included.

Worm Drive Motor Truck.—Federal Motor Truck Company, Detroit. Pamphlet. Size, 9 x 11¾ in.; pages, 64. Deals with a line of worm-driven motor trucks and contains a collection of photographic reproductions showing some of the numerous uses to which they are put. Practically every class of service and raw material or manufactured product is covered by the illustrations. A general description of the engine and drive is presented followed by engravings and condensed specifications of different sizes of trucks that are built. A number of views of various styles of bodies are included.

Engine Lathe.—United States Lathe & Machine Company, Cincinnati. Circular. Treats of a 20-in. heavy duty screw cutting engine lathe that is equipped with a five-step cone pulley and a single back gear. An engraving and a condensed specification table of the lathe are presented with a brief description of its special features.

Oxy-Acetylene Welding and Cutting.—Searchlight Company, 415 Karpen Building, Chicago. Folder. Shows the different welding and cutting outfits that can be supplied with brief descriptions of the equipment furnished in each case. Attention is directed to the use of the apparatus in various fields of manufacturing and repair work.

Speed Regulators.—Goodman Machine & Tool Company, 49 Church Street, New York. Circular. Contains illustrations and a brief statement of the features of the Scriven speed regulator. The special advantage claimed is the absence of any intermediate disk, belt or friction mechanism, which enables any speed to be obtained within a ratio of 1 to 2¼ and maintained as long as may be desired.

Sheets and Sheet Metal Products.—Reeves Mfg. Company, Dover, Ohio. Catalog. Size, 6¾ x 10¼ in.; pages, 254. Describes and illustrates a line of metal sheets and the various products made from them. The materials listed include sheets, roofing and siding, eaves trough, conductor pipe, metal tile, tin plate, metal ceilings, stove pipes and elbows and a number of miscellaneous sheet metal products. The catalog is divided into sections, one for each line of products listed and in a number of cases the title page to the section contains reproductions of the method of manufacturing the particular article covered. A section devoted to the manufacture of genuine charcoal iron is included, together with one containing a number of tables of useful information.

Poppet Valve Engines.—Nordberg Mfg. Company, Milwaukee. Bulletin No. 28. Illustrates a line of poppet valve engines which includes three types, the full poppet, poppet-uniflow and poppet-Corliss. Following a discussion of the different kinds of engines and their construction, test results are given. A short discussion of the application of the engines to compressors, pumps and ice machines is given. Views of installations are given, together with engravings of details of the construction of the valves, valve operating gear, removable cages, cylinders, and head, the latter containing all the cored passages and ports and thus making the cylinder proper a simple cylindrical casting free to expand and contact with temperature changes. An illustrated description of two of the largest uniflow engines constructed in this country, which have been shipped to the Youngstown Sheet & Tube Company for driving rod mills, appeared in THE IRON AGE, July 20, 1916.

Hydrostatic Instruments.—Scientific Materials Company, Pittsburgh. Bulletin No. 4. Describes a line of hydrostatic instruments which includes pressure and draft indicators and recorders. The construction of these instruments, which are built on the same principle as the U-tube manometer, is gone into at some length and there are a number of views of the various instruments and tables of the different sizes that can be supplied are included.

Payroll and Adding Machine.—[illegible] Money Machine Company, Terre Haute, Ind. Catalog. Refers to a line of payroll machines which are designed to give the total of the payroll and the number of coins or bills of different denominations required to complete it, as well as delivering the money required to the envelope in the smallest number of pieces. A number of views of different types of machines supplement the description and mention is made of an adding and listing machine that has also been built. A partial list of users of the company's machines is included.

THE IRON AGE

New York, August 3, 1916

ESTABLISHED 1855 VOL. 98 : No. 5

The New Home of the Jacobs Chuck

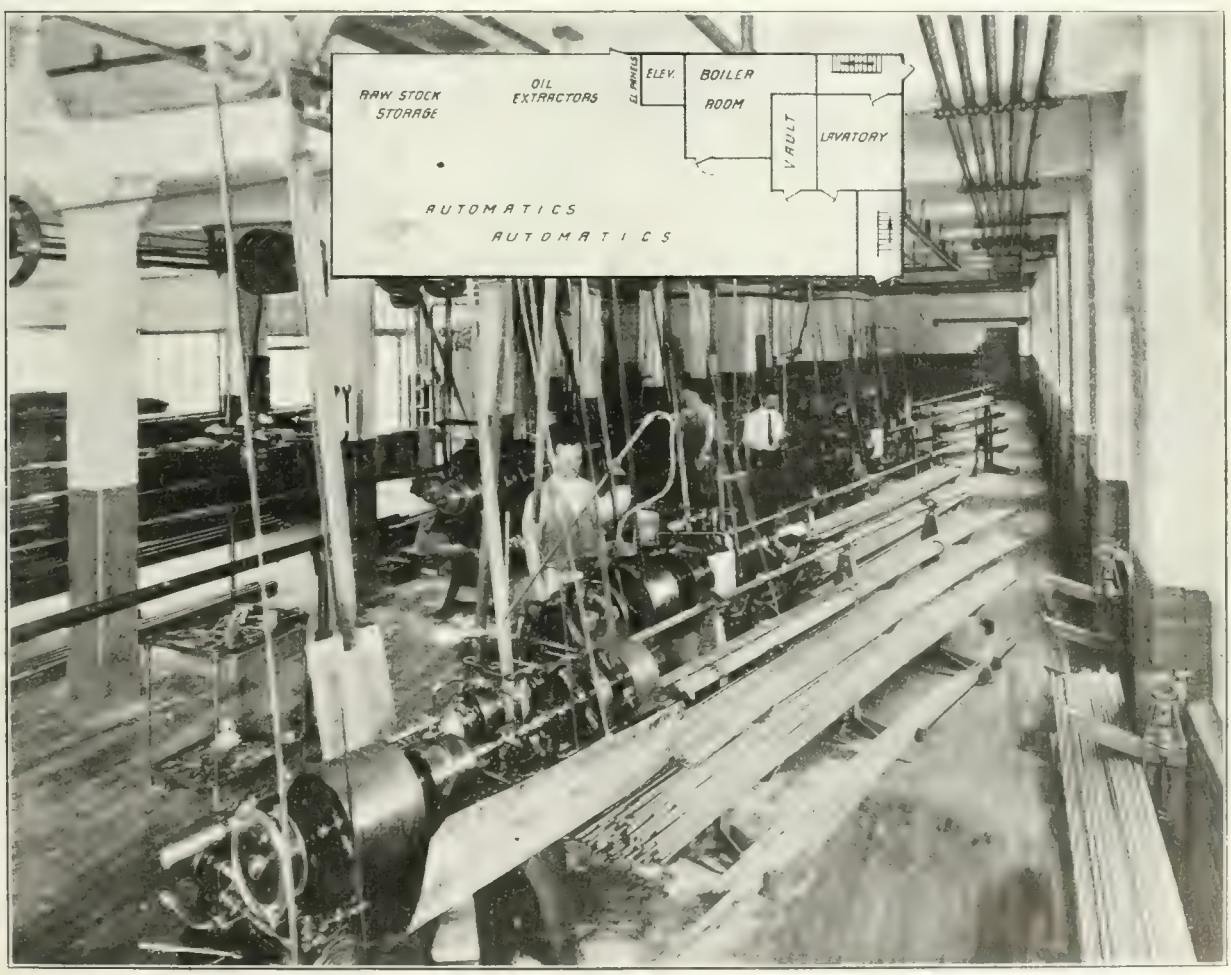
A Hartford Factory Wherein the Skill Required for Fine Machine Work Finds Efficient Means for Expression

BY W. E. FREELAND

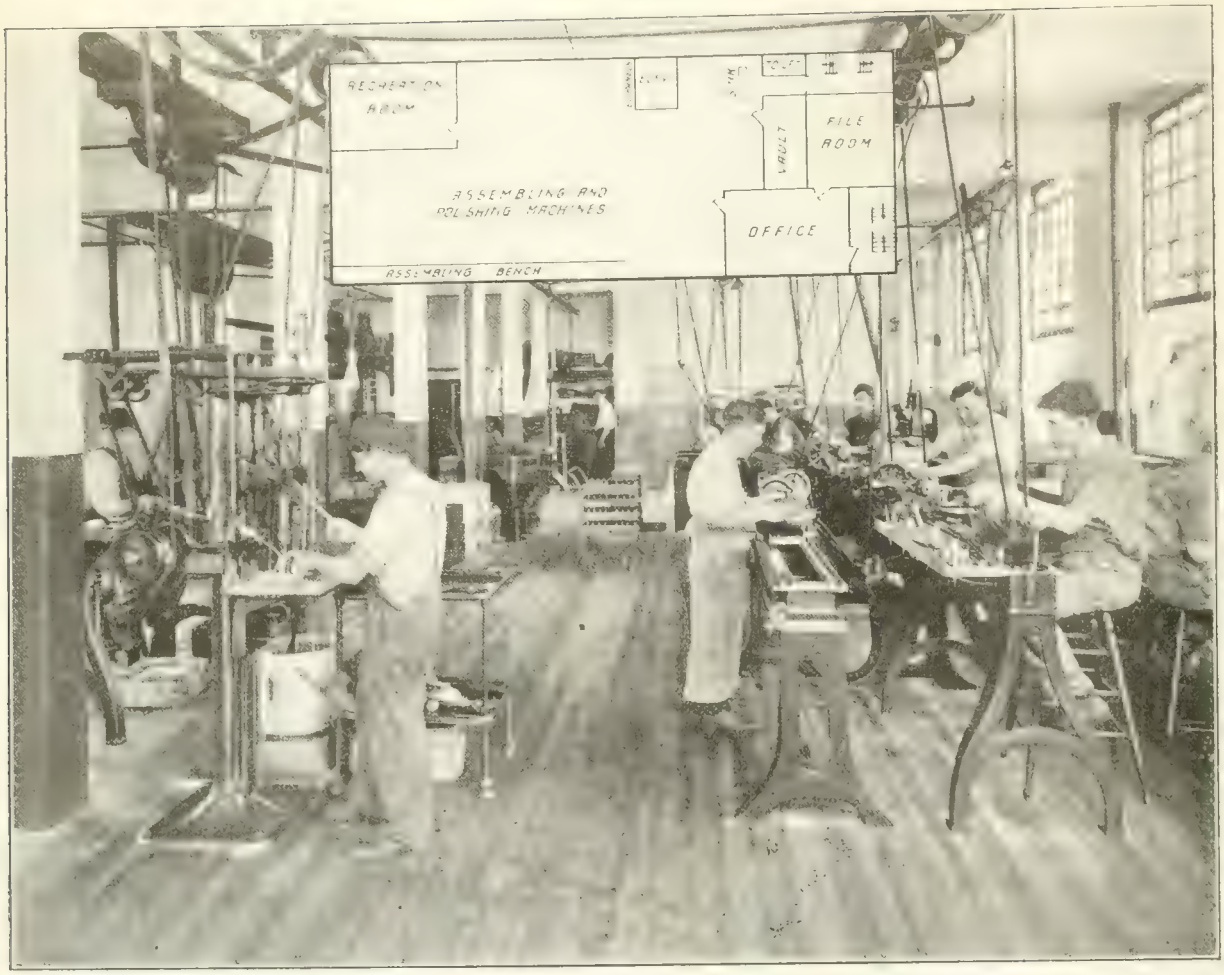
THE new plant of the Jacobs Mfg. Company, Park Street and Rowe Avenue, Hartford, Conn., is typical of the splendid type of new factories which are being built in response to the greatly increased demand for machine tools and appliances of standard reputation. The history of the Jacobs drill chucks is very similar to that of other highly developed specialties in the machine tool industry. The chuck was patented Sept. 16, 1902, by A. I. Jacobs and active manufacture was begun Oct. 1, 1903, in a small factory space on Pearl Street. The early policy, continued to this day, was to put out a quality product with the expectation that increased sales would follow the utilization of skill in tool making, exceeding care in the selection of raw stock and thorough inspection and rigid tests of each part in process.

Upon this solid foundation the business grew apace and in 1906 it became necessary to remove to larger quarters at 32 Union Place. Export sales became a large factor and the sudden rush of business a year or more ago found the plant cramped for room. Then the present site was bought for a new plant and a good engineering firm was called in to plan a factory which should embody all that modern designing could offer toward efficient production, safety and comfort.

The new factory is 42 x 106 ft. in plan, three



Two Rows of Automatics on the First Floor Equipped with New Britain Racks Which Hold the Stock for the Job in Process



A Corner of the Assembling Room on the Second Floor with the Entrances to the Office and Vault for Storing Finished Chucks and Parts in the Background

stories in height and is of slow burning mill construction. At two corners of the building are brick inclosed, fireproof stair wells with firedoors on each floor level and steel stairs with reinforced concrete treads. The exit doors at the ground level are equipped with so-called panic locks. The building is equipped with a sprinkler system and a noteworthy fireproof feature is found in the vaults on the two lower floors. The one on the first floor is used for the storage of jigs and fixtures and that on the second floor for finished parts and chucks. This latter feature is made possible and potentially profitable by the compact nature and the value of the finished product.

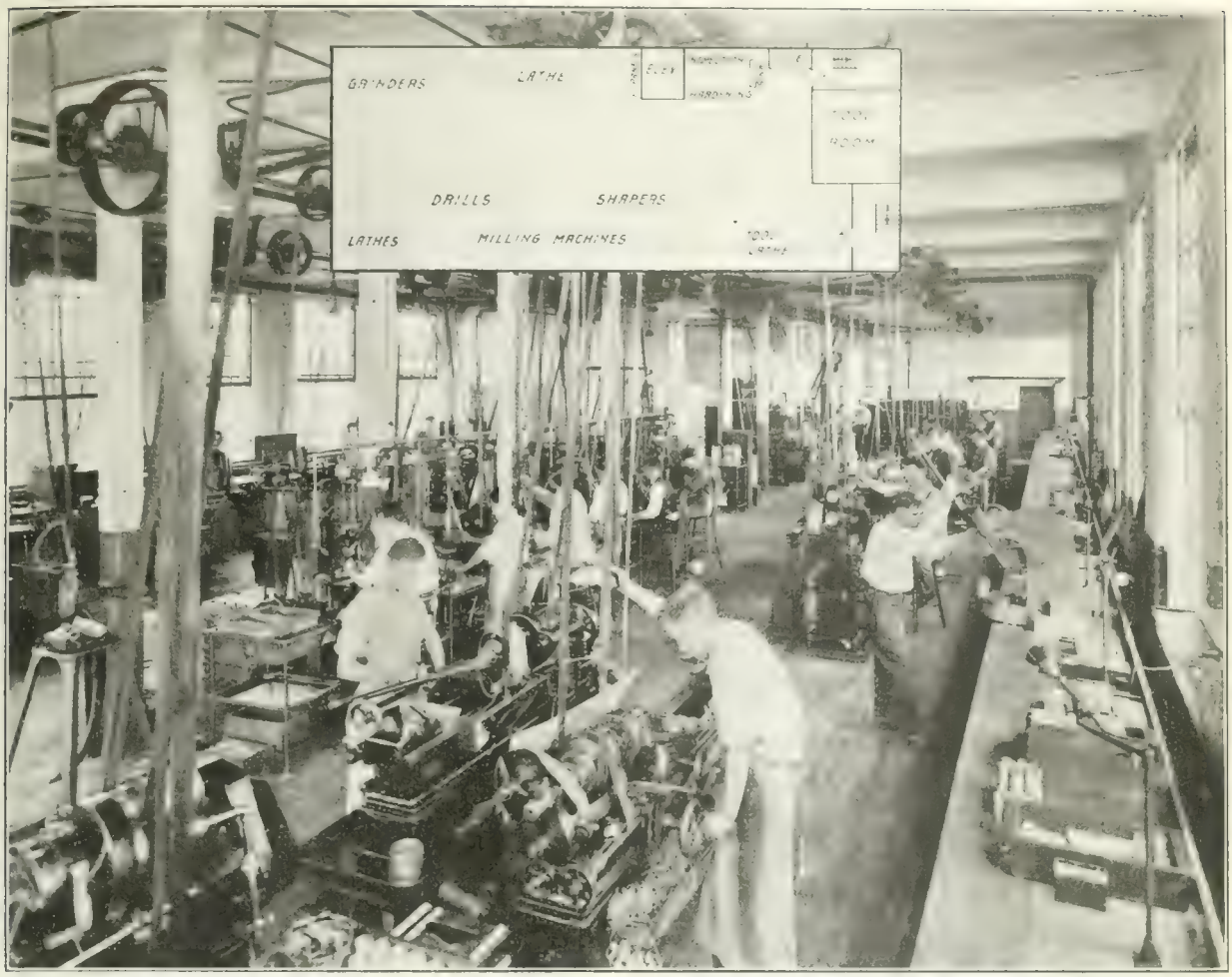
The boiler room occupies a space 16 x 20 ft., with an ell 8 x 8 ft., on the ground floor and is shut off from the other parts of the building by brick partitions. The boiler is used only for heating purposes, electric power being purchased for operating the machinery. The various motors are suspended from the ceiling and on each floor are inclosed switchboard panels. Many of the Hartford factories are notable for the care used in installing all electrical equipment. In this plant, for example, as shown in an accompanying illustration, all switches are inclosed to be as near foolproof as possible and all electrical mains and feeders are incased in iron pipe. All electric mains are painted black, sprinkler mains are red, hot water mains green and cold water mains blue. There are large incandescent lamps in reflectors on each alternate beam overhead for flood lighting and drop light circuits over each row of machines and the benches. The drop lights are attached to universal arm fixtures for greater convenience.



The Glass Shield Protecting the Operator from the Heat of the Furnace Is Composed of Two Pieces of Glass Separated by a 1-In. Opening To Give a Clear View of the Work

A capacious lavatory, which has toilet fixtures of porcelain and slate and is equipped with individual basins having both hot and cold water available, is located on the ground floor between the stairways. On the other two floors are smaller toilet rooms located near the head of the employees' stairs and long, deep enameled sinks with several hot and cold water faucets are placed nearby in the workrooms.

A 3000-lb. elevator serves the three floors. A door in the side wall of the elevator well at the level of a truck body on the outside drive gives ready means for transferring loads from or to the elevator. An interesting feature of the elevator installation is the manner in which the counterweight is boxed in to prevent injury to the operator or others. It will be noticed in the illustration that



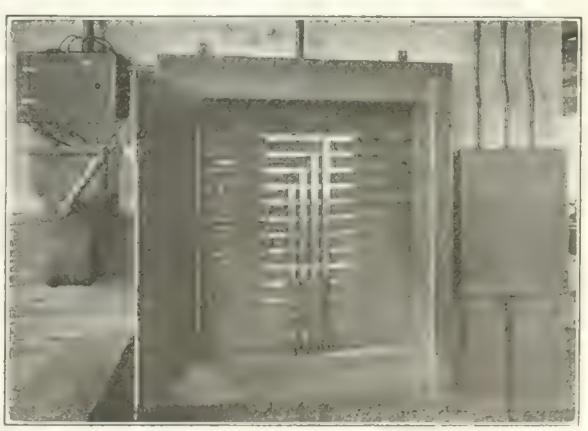
One Side of the Third Floor Showing the Arrangement of the Lathe and Milling and Drilling Machine Sections and Fireproof Stairhall in Background

boards slightly separated cover the opening between the guides of the weight. Every alternate one is firmly bolted to the guides but the others are thinner and only lightly attached to the guides by two nails in each end, the heads of the nails being left slightly projecting so that these thinner boards can be quickly removed for the infrequent greasing of the guides.

The heating coils on the first floor are placed on the ceiling beams near the side walls. On the other two floors the heating coils are suspended on the side walls under the benches. Gas is used for heating the tempering furnaces. A large furnace with pyrometer attachment is placed in the boiler room and a small furnace on the top floor. For the protection of the operator against the heat of this small furnace there has been devised a glass shield which is illustrated herewith. As first made, this shield was one plate of glass, but the condensation of moisture made much bother which was eliminated by making the shield of two pieces of glass separated a little over 1 in., the open space permitting clear observation of the small pieces being treated.

The working space on the first floor is given over to the storage of bar stock and to the automatics which play so important a part in the manufacture of drill chucks. The bar support of each automatic forms the top member of a New Britain rack, which has arms holding the stock for the job in process. This factory is unusually liberal to its machinists in the matter of clean waste as it has found that all the waste from the two upper floors after it has become too dirty for use there has a further extension of service in cleaning bars for the automatics. After the work leaves the automatics and is cleaned it is carried in tote boxes to the upper floor where the final machining work is performed.

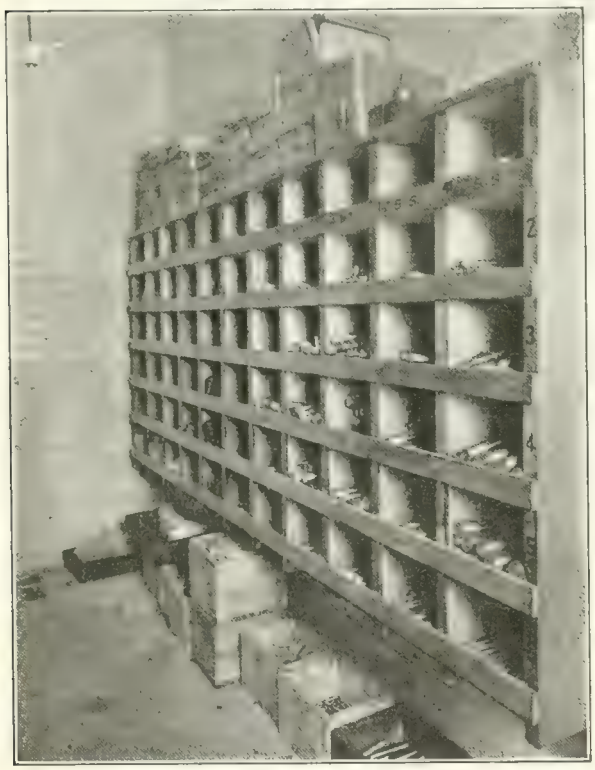
This third floor is arranged so that there shall be as little travel as possible for each part that enters into the final assembly of the chucks and ample space has been provided about each machine for movement of trucks and for work tables. This feature is perhaps more noticeable in some of the newer plants in New England because in this section more, perhaps, than in any other part of the country one constantly runs across old plants where the great need for prompt and high production at this time has been solved temporarily by the crowd-



The Electrical Equipment Is Carefully Installed with the Wiring Run in Iron Conduit and the Power Switches Inclosed To Prevent Manipulation by Unauthorized Persons

ing together of machinery rather than by the building of new plants and additions. The equipment in this room, particularly the milling and shaping machines, would interest most machinists by reason of the many developments in jigs, fixtures and special attachments. The simplification by these special developments of what would otherwise be slow, expensive and intricate machining operations, has been no small factor in the growth of the plant and the popularity of the product. Occupying the space between the stairways at one end of this floor is a well-arranged toolroom with some of the heavier tool making equipment located in an adjoining corner of the machine shop.

From the third floor the finished parts are carried to the second floor where they are delivered direct to the assembling department or, as is more frequently the case, turned into the finished parts



One of the Fireproof Vaults for Storing Finished Chucks, Parts, Jigs and Fixtures, All the Parts for One Size of Chuck Being in a Horizontal Tier and the Similar Parts for Each of the Six Standard Sizes Being in a Vertical Tier

bins which, as previously stated, are placed in the fireproof vault on this floor. The arrangement of these bins is shown in an illustration. As there are six sizes of chucks made for regular stock, the bins are arranged with all the parts for one size of chuck in a horizontal tier and the different sizes of each specific part in vertical tiers, making the selection of a particular part of any size chuck an easy matter. A large storage rack for finished chucks, also placed in the vault, has shelves with the same arrangement. The chucks are wrapped in oiled paper and inclosed in paper cartons. Storage for the empty cartons is provided by a large platform suspended from the ceiling beams in the corner formed by the elevator well and the side wall. The packing department occupies the space between the elevator and the storage vault. The packing is done on large truck tables which can be moved about to benches where the assembled chucks of different sizes are stacked. The assembling department requires a considerable equipment of tools, both hand and machine, and an assembling bench which extends the length of one side of the room. Unusual care and skill are necessary on the part of the assemblers, as the slightest deviation of the chuck jaws will cause the drill to "run out" from the axis of rotation of the drill spindle. The final tests are calculated to detect any such error.

One end of this floor is used as an office and a file room, the latter being a brick walled room which is practically a fireproof vault. A large section of this floor is partitioned off to provide a recreation room for the employees who do not leave the factory for lunch. This is provided with reading matter and smoking is permitted outside of working hours.

There is sufficient land for future expansion and the location of the elevator, boiler room and employees' stairway will permit the erection of a large addition on the Rowe Avenue side without changing the structural features of the present building and

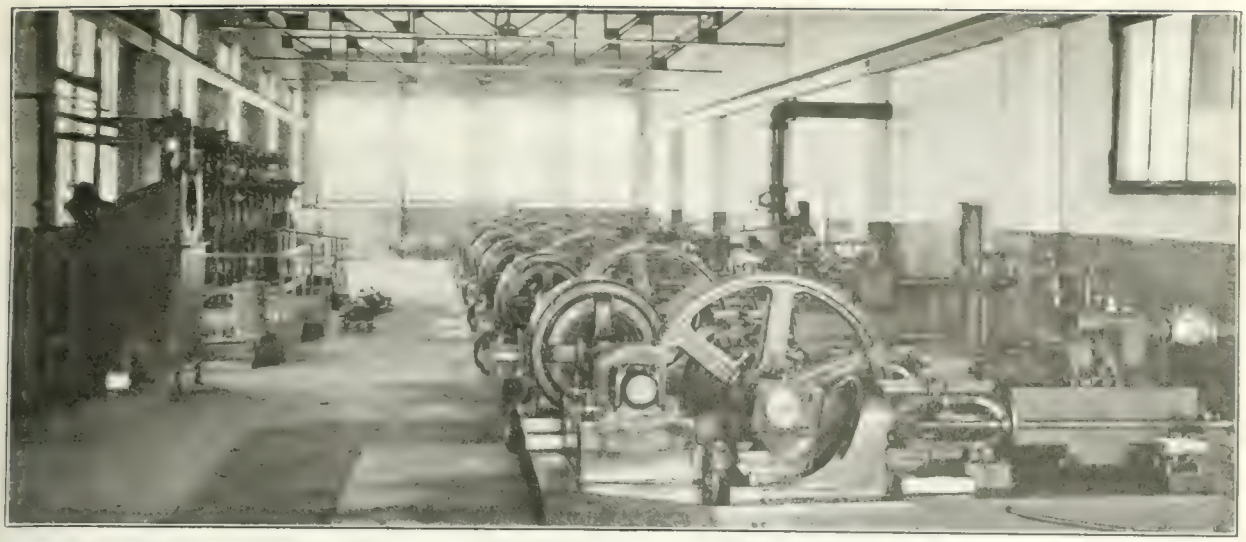


The Elevator Counterweight Is Protected by Alternate Thick and Thin Boards, the Former Being Firmly Bolted to the Guides, While the Latter Are Fastened by Two Nails at Each End Having the Heads Projecting for Easy Removal

without addition to the elevator and boiler equipment. A five-car brick garage has been built in the space which will constitute the court of the factory when expansion becomes necessary.

The present officers of the company are Arthur I. Jacobs, president; Louis E. Stoner, treasurer, and Raymond B. Jacobs, secretary.

The Department of Ceramic Engineering of the University of Illinois, Urbana, Ill., will mark the beginning of a new college year in September by offering unusual facilities to those interested in the clay-working industries. Ceramic engineering, broadly defined, covers the science and practice of cement mills, of tile factories and brick yards, of terra cotta mills, of porcelain factories, including those making tableware and electrical insulating materials, and of glass works. The field is broad and rapidly developing. Conditions imposed by the European war are prompting American manufacturers to extend their undertakings and have created an unprecedented demand for men who can lead and for facts that will guide. The University of Illinois has anticipated this demand.



Hydraulic System in Modern Shell Plant

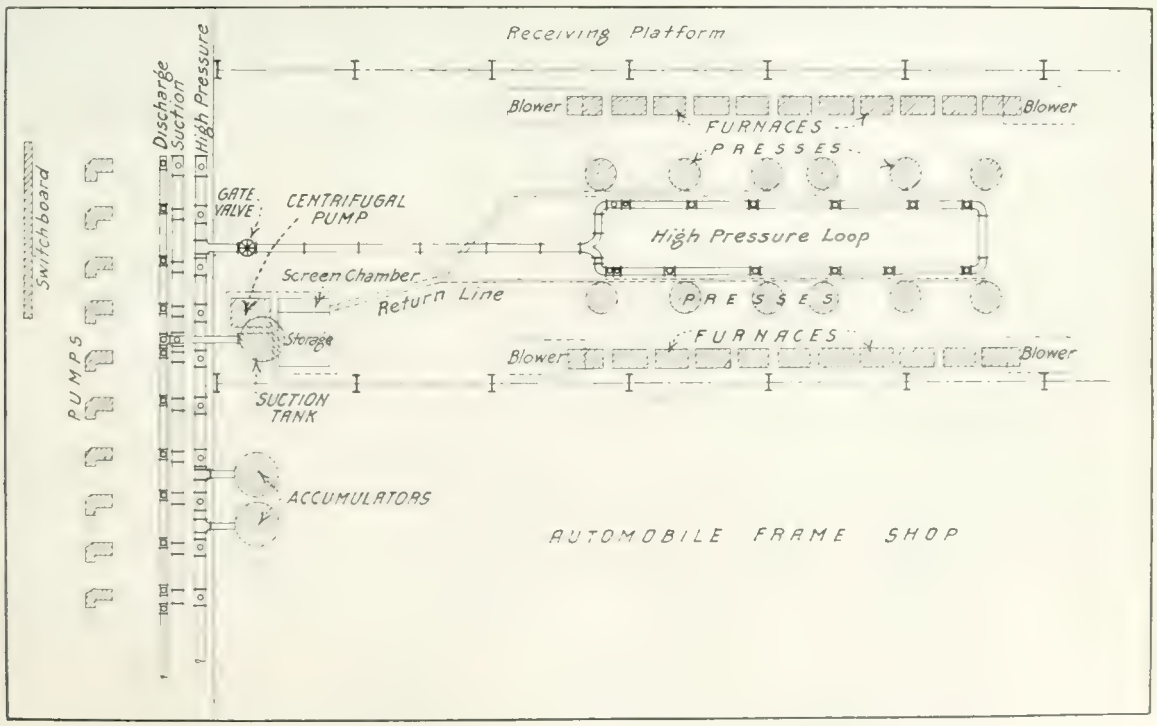
Pumping Equipment and Other Notable Features in New Shop of Hydraulic Pressed Steel Company, Cleveland

BY F. L. PRENTISS

THE heavy demand for shrapnel and high-explosive shells for use in the European war has made it possible for the American manufacturers taking large shell contracts to build plant extensions on a large scale. They have laid out new units according to the most advanced practice in their particular field, having opportunities to design a modern well-arranged plant that the manufacturer who is making minor additions from time to time commonly does not have. In the case of manufacturers of pressed steel using hydraulically-operated presses, as for making automobile parts and other pressed steel forms, it has been the usual practice to install an additional pump in such space as may be found available to meet the additional requirements. There has rarely been the systematic arrangement that may be developed when an entire new plant of large capacity is being built.

THE HYDRAULIC EQUIPMENT

A notable example of a large new plant, the construction of which to a certain extent has been made possible by war orders, is that of the Hydraulic Pressed Steel Company, Cleveland, Ohio. One of the most interesting features of this plant is its hydraulic system for the hydraulic presses used in making shrapnel forgings. The shell plant is equipped with six units, each consisting of a



Plan of the Shell Piercing and Drawing Plant and Adjoining Pumping Plant

piercing and drawing press, and its capacity is indicated by the fact that its present daily output is 15,000 3-in. shrapnel forgings. In the control of the pumps and arrangement of the piping system a number of original and interesting features have been adopted to reduce the maintenance and operation cost and make the hydraulic plant practically automatic in its operation. While the shell plant is equipped for making shell forgings, it was laid out with a view of converting it to other hydraulic press work as soon as the demand for shell forgings ceases.

The plant extensions of the Hydraulic Pressed Steel Company include a shell shop 76 x 360 ft., an automobile frame shop 80 x 560 ft. and a pump house adjoining the above-mentioned buildings at one end, 40 x 157 ft. The main buildings have structural steel frames and the Pond type of roof trusses. The greater part of the side wall space is covered with wire mesh glass fitted in steel sash. The main buildings are parallel and join with no partition between, making them practically one building.



Three of the Large Hydraulic Press Units, Each Unit Consisting of a Piercing and Drawing Press. The oil-fired furnaces appear in the background along the side wall

The pumping equipment consists of eight Deane of Holyoke duplex high-pressure pumps, with 4½-in. plungers and 12-in. stroke, having a capacity of 200 gal. per minute each, and maintaining a pressure of 1050 lb. per square inch on the high-pressure lines at all times. Each pump is driven by a 150-hp. direct-connected Westinghouse motor through a herringbone gear. Foundations are provided for two additional pumps that will be installed shortly for operating the presses in the automobile frame department.

The pumps are located in a row along one side of the pump house. The compact arrangement of the pumps simplifies the piping layout and the wiring for control and reduces the labor cost of operation. One attendant and two oilers are able to take care of the entire pumping equipment. The arrangement also makes it possible to serve the entire pump house with one overhead crane for use in case of repairs. The current for driving the pump motors is supplied through a transformer station adjacent to the pump house. Electricity enters the transformer house through public service lines at 11,000 volts and is stepped down to 220 volts, alternating current. Two switchboards are provided, one in the transformer station where the electrical power for the entire battery of pumps is controlled, and another in the pump house that is provided with separate switches for controlling the individual pumps.

The headers are located in a trench between the pumps and the accumulators. The pumps discharge into a 10-in. high-pressure header, each being connected to the header through a line containing a gate shut-off valve. The return water to the pumps is carried by a 14-in. header. A third 12-in. header, in the trench, allows the water to circulate at low pressure when a pump is not in service, thus making it unnecessary to shut down the pump motors and pumps.

The number of pumps running at any one time depends upon the amount of water required. The control of the pumps and water supply is entirely automatic. The pumps are controlled by means of an automatic valve operated by a multiple air valve which is controlled by a cable connected to the accumulators. The operation of the multiple valve is such that when the accumulators drop 1 ft. one pump is cut in, and an additional pump is cut in for every additional foot of drop of the accumulators. The reverse applies as the accumulators rise, one pump being cut out for every foot of rise.

When the pump valve, controlled by the air valve, is opened it puts the pump directly into communi-

cation with the high-pressure line. When the valve is closed the water, instead of going into the high-pressure line, circulates through the low-pressure header, thus allowing the pump to operate at practically no load. The high-pressure header is connected in parallel with two accumulators of 500-gal. capacity each, 28 ft. high and 15 ft. in diameter. These, of course, serve to maintain the pressure constant, regardless of the quantity of water that is being used in the operation of the presses.

Overhead piping is eliminated by having the water supply lines run from the header through the shop in tunnels. The water is carried from the high-pressure header through a 10-in. main pressure line from which 8-in. branch lines are carried through the shop, each branch line serving three units and each unit consisting of a piercing and drawing press. One main shutoff valve is provided on the 10-in. line and there is another valve for each press with an 8-in. line. This small line is provided with a shock valve, which acts as an equalizer, and a three-way operating valve. The shock valve takes the place of the usual overflow chamber and has the advantage of taking less space than is required for the latter. Two lines are carried from the valve, one going to the main press cylinder and the other to the pull-back.

The trench back of the pumps, in which the main lines are located, is of concrete, 6 ft. 3 in. deep and 4 ft. wide. The branch tunnels in the shop, also of concrete, are 4 ft. 6 in. x 3 ft. 9 in., and the loop tunnel connecting the branches is 3 ft. 4 in. x 3 ft. 3 in. In addition to the high-pressure line, they carry compressed-air lines and low-pressure city water for cooling. The return lines consist of 4-in. laterals opening on 10-in. lines that lead into 12-in. mains on each side of the shop. These return pipes are buried under the shop floor.

The 12-in. return line leads through screen chambers into an underground concrete tank of 5000 gal. capacity. From this tank the water is pumped by a 10-in. centrifugal pump located adjoining the tank beneath the shop floor to an elevated suction tank 8 ft. in diameter and 12½ ft. high, connected to the return header. This pump is controlled by a float switch. The suction tank takes the place of the usual overhead tank, and its use eliminates overhead pipes with screw or flange joints, with their large cost of maintenance. The suction tank provides a maximum head of 8 ft. on the pump valves. The water is drawn from the suction tank by the pumps, and if any part of the suction tank system is out of order the water can be pumped directly from the underground tank.

Double extra heavy steel pipe of ⅞ in. wall thickness is used for high-pressure service lines. The return lines are cast iron. All supply lines of every kind are arranged in loops so that each unit can be isolated. Provision has been made for outlets to a water cooling system, providing it is found desirable to install such, but so far this has not been found nesessary, as the maximum temperature of the water is 130 deg. Fahr. with a maximum shop temperature of 96 deg. In the equipment of the entire plant two additional accumulators, one of 150 gal. and the other of 300 gal. capacity, will be moved to the new buildings from the old plant. An equalizing device is being provided to insure the equal travel of all accumulators, giving a high-pressure water capacity of 1500 gal. per minute. The maximum intensified pressure used in the plant is 6000 lb. per square foot.



Close View of One of the Presses, Showing the Shut-Off Valve for the Press, Shock Valve, Three-Way Operating Valve, In-Going High-Pressure Line to the Presses and the Return Line. At the left of the press is one of the tool boxes with three drawers containing tools for the press gangs employed on the three turns

OPERATIONS IN FORGING SHOP

The fuel oil for the four furnaces is supplied by a pumping system consisting of one steam and two reserve electrical pumps with a total capacity of 400 gal. per minute. The oil is stored in two 6000-gal. steel underground tanks. The piercing and drawing press equipment and accumulators were furnished by the Southwark Foundry & Machine Company and the valves and fittings were supplied by the Crane Company.

Specially designed tool boxes are provided for tools used in changing the tools in the presses. These boxes are of steel 50 in. high, 40 in. wide and 19 in. deep, standing on legs and having three drawers 10 in. deep. The plant operates on three 8-hr. turns and a tool box is provided for each press, each of the foremen having separate set of tools which he keeps under lock in one of the drawers. In this way the man in charge of the press gang is made responsible for his own tools and the trouble of having tools lost or mislaid when handled by separate sets of men is eliminated.

Economy and speed in production required convenient arrangements for the handling of material through the plant. Steel bars cut to length are unloaded on the platform on one side of the shop. Approximately 100 tons of material is converted into 15,000 shell forgings in a day of three 8-hr. turns. The blanks are thrown from the cars into steel boxes, placed on trucks, each box having a capacity of 500 blanks that weigh a trifle over 13 lb. each. The trucks with loaded boxes are pushed or pulled into the shop through a side door with an electric tractor and the boxes are picked up by a

(*Continued on page* 261)

Mobilization of Industrial Resources

Experiences and Observations of A. L. Humphrey, of the Westinghouse Air Brake Company, in the Manufacture of War Munitions

WHAT the making of war munitions for Europe and the securing of materials therefor has taught American manufacturers was told by A. L. Humphrey, vice-president and general manager of the Westinghouse Air Brake Company, Wilmerding, Pa., before a meeting held under the auspices of the Engineers' Society of Western Pennsylvania at the Carnegie Music Hall, Pittsburgh, on May 31. The address was the fifth and last of a series of military engineering lectures, and a copy of the address in full has just become available from advance pages of the June *Proceedings* of the society. Mr. Humphrey's attitude is that manufacturers engaged like his own concern can render a great national service by imparting the information gained in their own experiences to managers of other plants which are likely to be enrolled in a general preparedness scheme in any war in which this country may become involved.

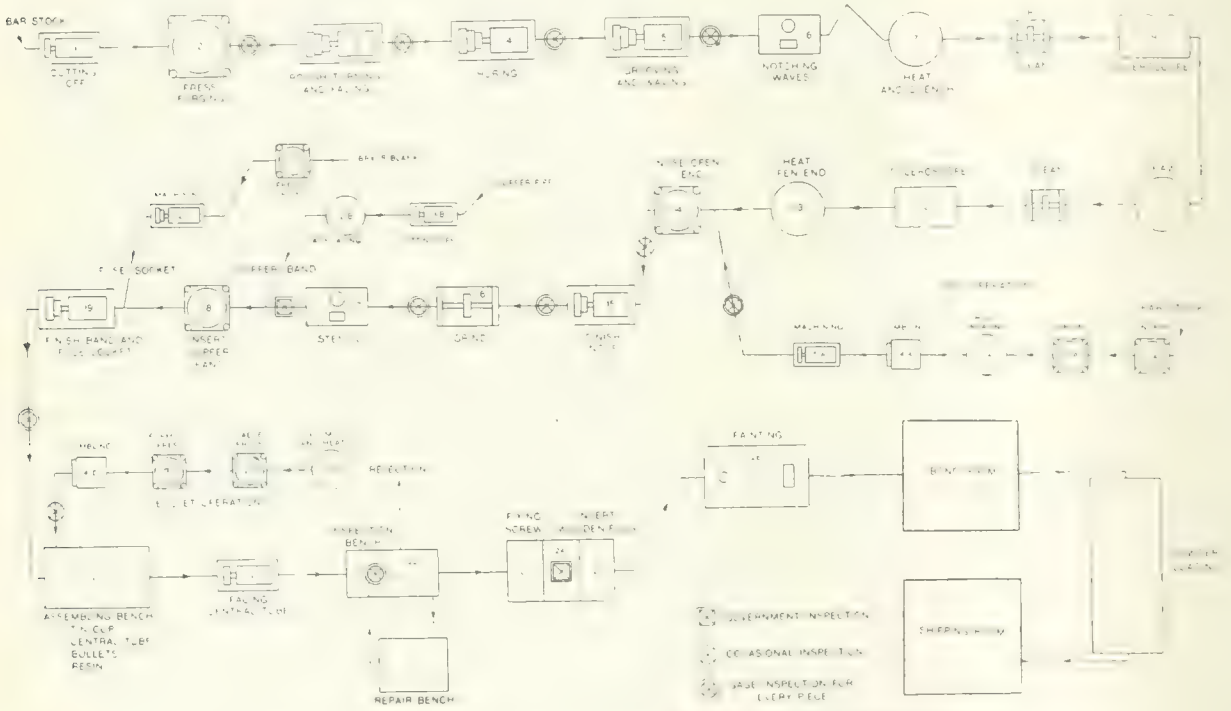


Diagram of Operations and Shop Routing for Manufacturing Shrapnel Shells

Among the topics which he discussed at length was the preparation which must be considered by any company which takes on war business without building or equipment or organization and also by the concern which starts with a sufficiently large organization from which a nucleus can be taken for handling munitions work. He emphasized the need in time of war of keeping men at home who are skilled and specially trained for the work of munitions manufacture. He had something to say about restrictive labor legislation in checking output and preventing men being paid according to their ability, and he told of the satisfactory performance of women in machine shops in this country. Naturally he made some convincing observations on unnecessarily exacting specifications, and the question of gages, jigs and special fixtures received extended consideration. On the general matter of preparedness, he outlined the notoriously weak situation in this country; dwelt on the dangerous concentration of manufacture along the Atlantic sea coast; told something of the work of the industrial preparedness committee of the Naval Consulting Board; discussed the need of this country's being self-sufficient and self-contained with regard to the sources of materials needed in war time; described briefly the manufacture and loading of timing fuses; argued for universal training, and urged the necessity of paying attention to transportation systems, which, in the time of emergency, are the connecting links between the factory and the battle front. In spite of the exactions of the specifications and of the final tests for acceptance, Mr. Humphrey mentioned that his company at the time of his address had almost completed a contract for 1,250,000 shrapnel shells and not a single lot had been rejected and in only two cases were shells required for a second proof to check the first.

With regard to the secretiveness of some manufacturers at the time when others were organizing for the task of making ammunition, he asserted that such could have supplied valuable assistance without monetary loss or violation of any business ethics. The volume of European orders at that time, he explained, exceeded the capacity of the available manufacturing plants, yet the manufacturers in question absolutely refused to divulge any helpful information, even though one may have been a customer of the other along ordinary commercial lines, and the mutual relationship had been most cordial. "It is needless to say," he continued, "that this narrow-minded and selfish attitude cost enormous sums of money and much valuable time. Contrast this attitude with that maintained by our brother manufacturers in the Dominion of Canada. The ammunition plants there threw their doors wide open, and those United States manufacturers who sought information not only had their requests gratified, but knowledge was gladly and liberally imparted in every instance."

With privately-owned plants delivering, under the plan of the Industrial Preparedness Committee of the Naval Cosulting Board, a small, constant output to the Government, the arsenals of the latter, he suggests, could be used for testing and general development work

and for building the secret devices arising from such work. This plan would much reduce the overhead charges as compared with a Government plant of the maximum capacity necessary, forced to run at a load of perhaps but 10 per cent. As an example, the overhead charges for the production of armor plate by the Bethlehem Steel Company are carried in the greater measure by the mills and furnaces devoted to the standard steel product, and the Government therefore could not begin to produce armor plate at the costs possible in the private plant—quite aside from all considerations of "pork" and political inefficiency.

The address in part was as follows:

EQUIPPING FOR MUNITIONS MAKING

Most of the contracts with foreign nations were taken by combinations of manufacturing interests. The combination with which I happen to be associated consists of three extensive companies with well-organized manufacturing plants located in four geographic centers of the country: The American Locomotive Company, with plants at Dunkirk, N. Y., and Richmond, Va.; the New York Air Brake Company, Watertown, N. Y., and the Westinghouse Air Brake Company, Wilmerding, Pa. One contract called for 5,000,000 shells, all for one country, 2,500,000 being for shrapnel shells and the remainder for high explosive shells. In addition, contracts for small amounts were taken from some of the other countries at war.

After the contract was executed, new buildings were constructed, materials, machinery and supplies of all kinds were contracted for and the actual work of manufacturing begun. Not one of the three companies referred to was able to obtain, with but one exception, a single expert or employee who had ever worked in an ammunition factory of any description.

The machinery required for the economical manufacture of the projectiles was designed, manufactured, and installed, irrespective of the large bonuses and enormous prices demanded. The work was undertaken with vigor and determination to meet the guaranteed date of delivery. The company with which I am directly associated was compelled to spend between $6,000,000 and $7,000,000 in constructing buildings, providing machinery, manufacturing jigs, gages, patterns and special appliances and for the purchase of materials before one single payment had been made by the foreign governments. Assuming that the other companies forming our combination made corresponding expenditures, the total amount paid out in getting ready for the work was $25,000,000 to $28,000,000 before one cent of profit was received. This enormous expenditure will indicate the serious responsibility that the officers of the different companies took upon themselves for the purpose of providing employment for their idle workmen and incidentally to put a little profit, perhaps, in the pockets of the stockholders of their companies.

The plant for making munitions may be considered from two viewpoints: The new concern without buildings, equipment or organization; and the going concern.

In the case of an entirely new plant, careful consideration must be given to the following points:

(a) A preparatory schedule on the basis that the contract is sufficiently large to warrant installation of the most suitable types of tools for the work.

(b) Plan of buildings most suitable.

(c) Organization.

(d) Labor costs.

The condition of the machinery market and the urgency of the contract will largely determine the type of machine installed. In every case, where possible, automatic or semi-automatic machines should be given preference, in order to eliminate the necessity for any degree of skill on the part of the operators, and thereby reduce materially the losses due to error of the individual. Careful consideration should be given to every detail of the manufacture before decisions are made as to the types of machines, a thorough time study made and the most logical sequence of operations worked up and scheduled. Too great stress cannot be placed upon this feature, as any changes it may be necessary to make after machines have been ordered will result either in considerable loss or inefficient manufacture. Grouping of the machines should also be gone into very carefully to avoid unnecessary handling and permit the product to travel from one operation to another with the least amount of labor.

With the above data settled, the size and type of buildings required can be quite readily determined. As a concrete example I might state that a building 65 x 600 ft. of wooden construction, concrete foundations and sills, with a capacity of 20,000 3⅜ x 11½ in. cartridge cases per day of 20 hr. equipped with necessary machines, and an additional building 65 x 150 ft. for annealing and pickling, were erected and ready for operation in about eleven weeks.

If possible, someone who has had direct experience in the manufacture of the munitions under consideration should be placed in charge, but in case such a man is not available, one with extensive experience in duplicate

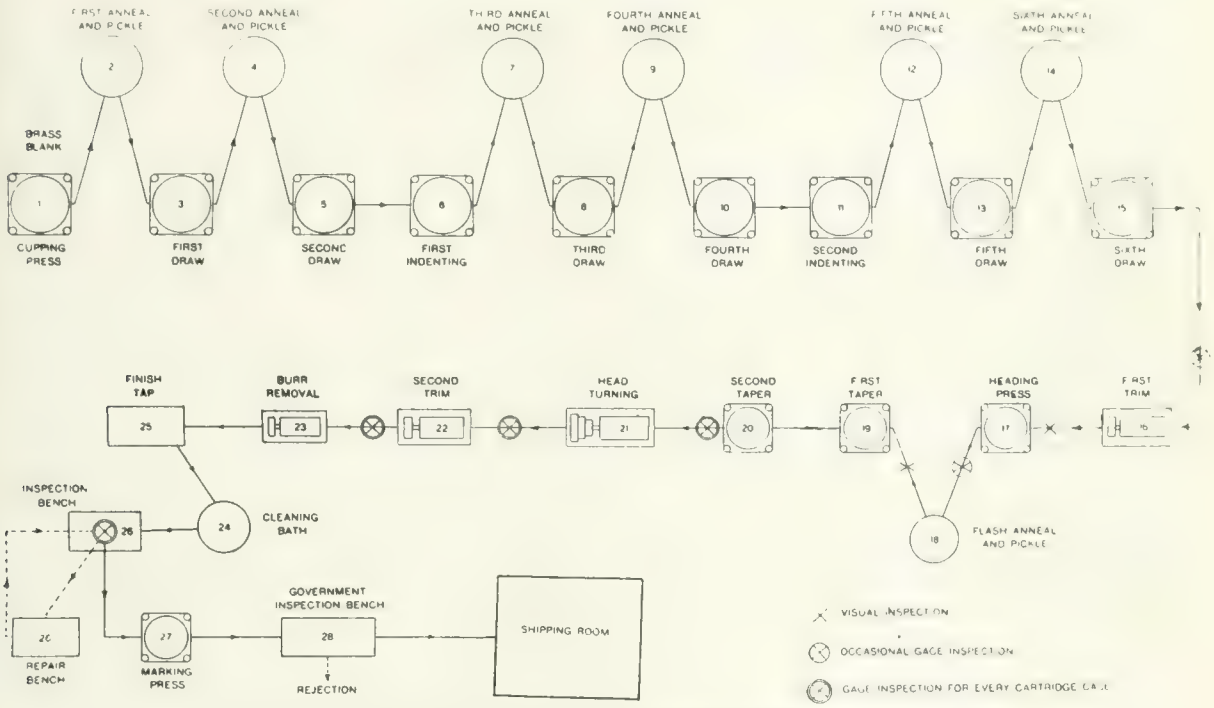


Diagram of Operations and Shop Routing for Making Shrapnel Cartridge Cases

manufacture and with sufficient knowledge and practical experience to keep in mind the human equation, as well as the technical problems to be met, should be considered.

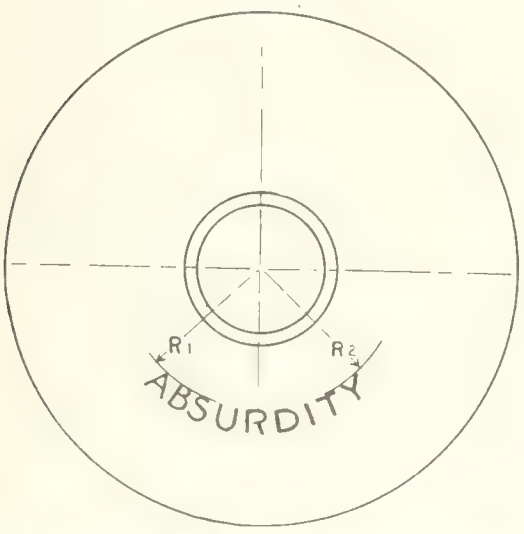
Before starting manufacture to any extent, a careful time study should be made of each operation in detail, determining the number of strokes per minute of the machines, cutting speeds, best type of cutting tools, taps, etc., and the approximate piecework prices at which the work can be done, based on a certain earning per hour.

Where an attempt is made to take a going concern and convert it into an ammunition factory, it will be found necessary in practically every case to discard at least 50 per cent of the tools used in ordinary commercial work, providing the order is large enough to warrant installation of the most suitable machines. In our own case the percentage of tools suitable for this work in any one department did not amount to possibly more than 2 per cent. Assuming that in no instance would orders be considered for less than 200,000 of any one size shell, it would be a more economical proposition to consider installation of machinery for the particular contract, as by getting a uniform installation sufficient reduction will be had in manufacturing cost to more than offset the initial cost of machinery, and a better product will be obtained. The purchasing of such machinery as would be flexible enough to meet manufacturing conditions on standard products should be kept well in mind.

Where this work is undertaken by a going concern the question of organization is more simplified than in a new concern, as men having suitable training for various phases of the work can be transferred from the standard departments. This is true as to the men in charge as well as to workmen, and will result in getting production started in a much shorter period than where an organization must be built up from the bottom. Under these conditions the time required to equip our plant and have production in full swing required approximately four months. In general, this will depend upon the supply of labor and the availability of the necessary machinery. A great deal will depend upon the machine tool market as to how soon a plant may be placed in full operation.

RESTRICTIVE LABOR LEGISLATION

It has been estimated that for every man needed at the front to operate the machines of actual warfare



Because One Reads for the Art of Stamped Lettering Was 1/32 In. Longer than the Other Two Sets Were Rejected After 60,000 Had Been Accepted

there are needed three men at home to furnish him with the supplies for his operations. Thus for an army of two million men at the front six million men are needed in the work shops to keep supplied the men in active service. When one considers that there are not more than 3000 truly expert gage makers in the country, the point where they can render most effective service is fully apparent. The work of the Committee on Industrial Preparedness, then, is most wise in listing our skilled artisans that they may not be foolishly sent to the front in the time of need and thereby impose starvation upon military operations.

Right here let me draw attention to the insidious, lurking dangers in the way of restrictive labor legislation that have become so manifest to the manufacturers of this country who undertook at an enormous financial risk the manufacture of a commodity with which they were not familiar. The absence of laws governing the hours of labor and output, together with the hearty co-operation of their employees, enabled the manufacturers mentioned to inaugurate a system for increasing production and for rewarding their employees on the basis of individual skill and efficiency. I have been informed by the representatives of foreign governments that the excellent results obtained from this system have amazed the world.

I want to go on record as saying that had the manufacturers of the United States been compelled to quote prices on ammunition contracts received from foreign governments during the past two years under the restrictions imposed by our own National Government, it would have been necessary to bid from 25 to 50 per cent higher than the prices at which the contracts were actually taken, and it is the opinion of those in a position to know that such prices would have been prohibitively high and that the business would not have been procured. Unhampered by foolish laws, mechanics engaged in the manufacture of ammunition have been able to earn from 50 to 100 per cent more than has ever been earned by the same class of workmen heretofore.

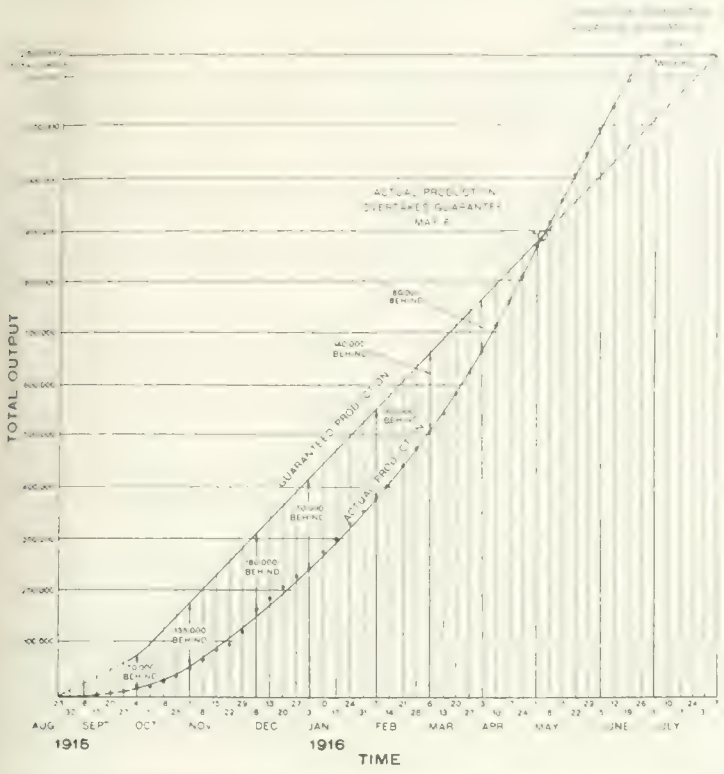
WOMEN IN THE WORKSHOP

In Europe the emancipation of woman has advanced very rapidly, due to the vast war which has called the men to the front and has left much of the work at home to be done by women. In our country also the sphere of woman's activity has widened recently, and this is of great significance in our problem of training and mobilizing skilled labor. As a concrete illustration I wish to refer to the Recording & Computing Machines Company, Dayton, Ohio, which took the contract for the manufacture of five million time fuses for the Russian Government. This work was undertaken by an organization entirely inadequate for the project. As time went on they found it impossible to obtain not only experts, but male help in general. Like the combination that I have referred to and with which I am associated, Mr. Ohmer, president of the Dayton concern, decided, on account of the impossibility of obtaining skilled assistance in carrying on the new line of work, and not being able to obtain male workmen in sufficient numbers, to employ female help quite generally throughout the entire plant.

After a personal investigation of the successes at present being attained at Mr. Ohmer's factory, I am glad to record the fact that his company is now employing approximately 6000 people and is manufacturing 20,000 to 30,000 time fuses per day. These fuses are meeting the specifications in every particular and 80 per cent of the work is being done by women gathered together from Dayton and vicinity. These women are employed in every class of labor, with the exception of that requiring more physical strength than they can muster. Between 3000 and 4000 of them are running screw machines, drills, mills, lathes and many of them have learned in a short period of time how to grind their own tools. They are not only doing men's work, but a study of the time sheets shows that many of them, who are working entirely on piece work, are doing with ease quite a good deal more work than the men whom they displaced. It is gratifying to say that the women mentioned are being paid according to their efforts, many of them earning as high as $5 to $6 a day. To quote Mr. Ohmer, the company "makes no discrimination in the pay as to whether it be for man or woman. Since the time women have been put in the places of men assigned to other duties, the product has multiplied by leaps and bounds."

THE MATTER OF SPECIFICATIONS

Military supplies should, so far as practicable, conform to standards established by experts having a full comprehension of all the factors involved in the way of ballistics and commercial manufacturing as well. The plans and specifications of these materials should be submitted not only to the scrutiny of manufacturers, but also to that of the consulting or advisory boards. They will thus be able to point out many modifications



The Total Production of a 1,250,000 Shell Order, Week by Week, Compared with the Guaranteed Production

which would reduce the manufacturing cost and thereby speed up the output without materially affecting the military value of the product in the way of service on the firing line.

As an illustration of requirements utterly unreasonable I may, for the benefit of our own Government, speak of the rejection of 7000 cartridge cases for a defect in stenciling which happened at a local plant. The specifications called for the formation, by the stenciled letters, of a true circle concentric with the cartridge case head. Due to one of the tools becoming slightly sprung the radius to one end of the stenciling exceeded the radius to the other end by about 1/32 in. Sixty thousand cases had already been accepted and shipped before this was discovered. Seven thousand finished cases awaiting shipment were rejected on this account alone. Though the specifications provided no latitude, the poor judgment was almost wholly that of the inspector in view of the opening left by the Government. As a rule, however, the Government inspectors with whom we have dealt, that is, the British—have been thorough and business-like, and to their cooperation and assistance is due much of the success of our undertaking.

From our own experience, when going over the specifications offered by various countries, we have picked up weak points which show that the factor of quantity of available material was not considered. For example, in addition to the question of antimony, which it might be impossible to obtain if we were at war with the country from which it is now being secured, there was a certain specification from one of the Allies that provided for a quantity of magnesium powder in the manufacture of shrapnel. It was found upon investigation that there was in the United States not more than one-fourth the magnesium powder required to supply the demand called for in this particular specification. After some months of negotiations and delay, the foreign government was notified that the magnesium powder could not be obtained and that in order to fill the contract it would be necessary to eliminate this item from the specifications, which was finally done, thus making the specifications similar to those of other European countries.

In our negotiations we found certain compositions of brass desirable for the manufacture of the timing fuse. Perhaps it will be found that the abnormal demand for large quantities of a certain grade of copper and spelter would make it difficult to obtain the required amount, or at least the price might be so high as to prevent the manufacturer from making a reasonable bid. In this case, is it not possible that some other alloy could be used? From experience in the manufacture of our standard line of apparatus we are firmly convinced that the metallurgist and the chemist can work out problems of this sort.

A very important factor which enters into this question is the workability and the machining properties of a given material. In the specifications provided by some of the foreign governments we have found that, while the material specified was ideal, so far as tensile strength, ductility and other properties were concerned, it would be so difficult to machine that the labor expended would often be three or four times the amount that would have been necessary had the specifications been prepared with this most important item in view, as well as supplying the necessary physical properties.

GAGES, JIGS, SPECIAL TOOLS

One of the most crying needs in the recent mobilization of American industrial talent in the service of foreign governments has been for gages, jigs, machine fixtures and other special tools. In the manufacture of the combination time and percussion fuse, 170 gages are required to make a complete set, and we are using seven sets for an output of 10,000 fuses per day of 20 hr., or a total of 1190 gages. A total of 243 separate operations are required to complete the details and 32 special fixtures and jigs

On the shrapnel shell and details a total of 128 manufacturing operations are required and 51 shop inspections. There are 65 gages used, five sets being required for an output of 10,000 shells per day, or a total of 325 gages.

In the manufacture of the cartridge case there are 50 manufacturing operations and 15 inspections. Seventeen gages are required for one set, and approximately five sets are in use for an output of 10,000 per day, or a total of 85 gages.

It might be said that even to-day, after one year on this work, gages, fixtures and tools are constantly being subject to revision and simplification. These are matters which require time to develop and a national emergency should not be awaited before applying the necessary attention.

None of the European governments was able to furnish master gages. All gages and special tools that were prepared by the American manufacturers had to be made from drawings and specifications. The permissible tolerances were small and in many cases the exact type of gage required was exceedingly indefinite. Lack of time will prevent my speaking in any but general terms, but from information that I obtained during close observations and constant association with the work, I believe I can say without hesitancy that the greatest problem the munition manufacturer had to overcome was the obtaining of the jigs, gages, special tools, etc.

Therefore, profiting by the experience obtained by the manufacturers in their present undertakings along the ammunition line, the Government should manufacture a supply of jigs, fixtures, gages, cutters and special tools far beyond any possible expectation of requirements; doing this after the designs have been agreed upon jointly by the consulting board, the manufactu

and the Government officials. Gages are to be used only for from 8000 to 10,000 gagings and then scrapped. The surfaces become so abraded that the gage is no longer sufficiently accurate for the work and new gages must be substituted. Thus it will be seen that in plants where rifles, shrapnel and high explosive shells are being manufactured to the extent of from 5000 to 20,000 per day, the number of gages required is enormous.

Machining 9.2-In. High-Explosive Shells

Details of Each Machine Operation Described in Sequence with Data on Time Consumed as Determined by Stop Watch

BY G. F. BRYANT

THE method of machining outlined in the following article is based on the actual performance of several of the leading manufacturers of both the United States and Canada, and the production figures contained herein are the result of the writer's personal observation. At the beginning of the European conflict, the writer's efforts were directed exclusively to the design and manufacture of complete equipment, comprising jigs, fixtures, cutters and machine tools, for the machining of a large variety of shells, and the following is an accurate survey of the situation after many of the manufacturers have been producing shells for a period of one year.

The first demand made on the various engineers was for equipment necessary to the making of small sizes of shells. This was, of course, a comparatively easy task, as the smaller sizes of shells were readily adaptable to the equipment of plants engaged in what might be termed medium heavy work, and as there were many of such plants availble, it was a comparatively easy matter for such manufacturers to employ their equipment in the machining of these smaller shells. As time elapsed the demand for small sizes of shells greatly diminished and the engineers of the country were confronted with quite a different problem in machining shells in 6-in. and larger sizes, as there were few manufacturers who possessed such equipment as could be readily adapted to their manufacture.

THE ROUGHING OPERATIONS

The first machining operation of the 9.2-in. shells is to drill and ream a preliminary hole in the nose end concentric with the true axis of the curved portion of the shell, which is used later for trueing up the inside of the rough shell for the operation of boring (see fifth operation). The shell is placed in a drilling jig, Fig. 1, and stands in a vertical position, having an aligning mandrel which acts as a guide at both the nose and base ends of the shell. A three-jaw universal chuck device is arranged at the base of the mandrel and clamps the shell in a central position with the holding mandrel, which is in true alignment with the drill guide hole. The outer nose end is faced after the hole is drilled and reamed, on the same fixture, by unclamping the guide which is pivoted at the top of the fixture and lifting it out of the way. The end is faced to a specified relation to the inside of the nose, leaving a uniform amount of metal for boring. The fixture is designed for use on a radial drilling machine, and requires an operator and helper. By means of a suitable hoist the helper places the shells in position in the jigs ready for drilling and removes finished shells from the opposite side of the fixture. It is common practice for one helper to place and remove shells on two machines, and with an equipment of this kind it will be noted that the machine is in almost constant operation. The average time for this operation is 6½ min.

The second operation consists in trimming the base or open end. At this stage the nose end has been faced and the shell is placed in a cutting-off machine having two tools, one on the front and one inverted at the rear of the machine. The shell is now cut to a preliminary length, gaging from the finished face of the nose end. The average time for this operation is 7 min. The shell is then placed in a former lathe, having an adjustable three-cutter boring head, Fig. 2, attached to the face plate. A center bearing, Fig. 3, is inserted in the nose end. The shell is then rough turned, true with the rough interior, leaving approximately 0.040 in. for finish. The average time for this operation is 35 min. It is surprisingly significant that the Canadian manufacturers, by using patented cutting tools which are supplied from the United States, are performing this and other operations in approximately 35 per cent less time than is required by concerns in the United States.

The fourth operation comprises the finishing of the inside, except the nose hole. The shell is placed in a pot chuck, Fig. 4, with the nose end supported by a straight cylindrical center which is placed in the spindle of the machine. The open or base end is gripped by a universal contraction chuck. The hole is first rough bored, including the radius, using a special boring head. The open end is then faced true and the counterbored portion roughed, after which the shell is finish bored, using the same boring head as in the roughing operation, excepting that the head is provided with finishing blades. The average time for this operation is 23 min.

At this stage of the process there hinges a very critical point, and the correct method to adopt is really so simple that many manufacturers have experienced considerable difficulty as the result of assuming the matter to be of minor importance. At the beginning of the fifth operation we now have a shell rough turned, finish bored and with a preliminary hole in the nose end. The equipment such as heretofore described and used in performing the operations of boring will permit errors to ensue between the longitudinal axis of the nose hole and that of the main bore, which if not corrected at this stage will cause difficulties with all other operations. The shell is placed on a revolving double fixture, Fig. 5, and resting on the inside curved portion of the nose finds its position concentric between the finished inside and the long guide hole in the end of the vertical mandrel. A boring bar having a double-end cutter and driven by a flexible shaft is then placed in the guide hole and the nose hole is again bored true to the longitudinal axis of the main bore, after which the hole is again reamed and used for the finish turning operation. By this method the

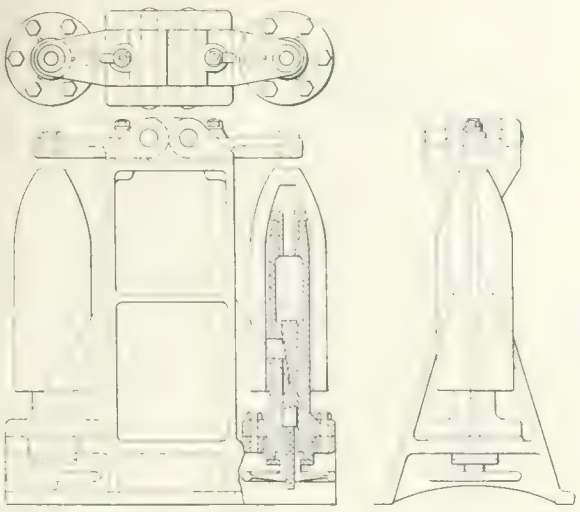


FIG 1 - RADIAL DRILL FIXTURE PROVIDED FOR THE DRILLING OF THE HOLE IN THE NOSE END OF LARGE HIGH EXPLOSIVE SHELLS.

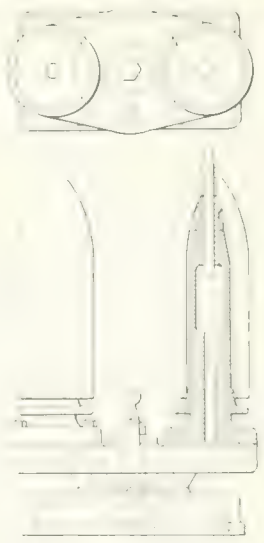


FIG. 5 REVOLVING DOUBLE FIXTURE ARRANGED FOR MOUNTING THE SHELL FOR THE FINISHING AND REAMING OF THE NOSE HOLE

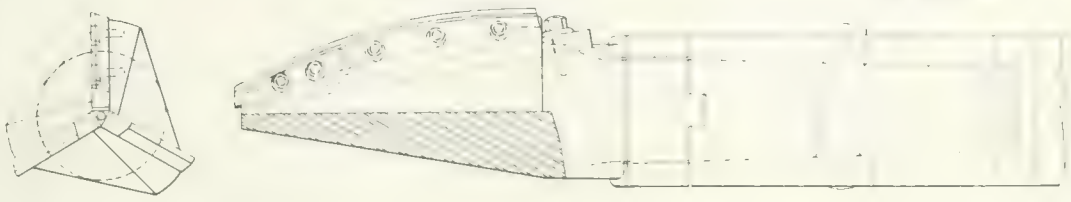


FIG. 2 - AN ADJUSTABLE THREE-CUTTER BORING HEAD FOR ROUGHING AND FINISHING THE INSIDE OF SHELL

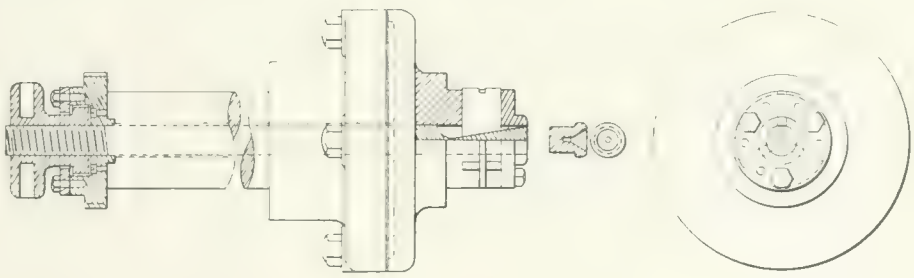


FIG. 3 - THE FORM OF CENTER BEARING INSERTED IN THE NOSE END OF THE SHELL AS A SUPPORT DURING THE OPERATION OF ROUGH TURNING

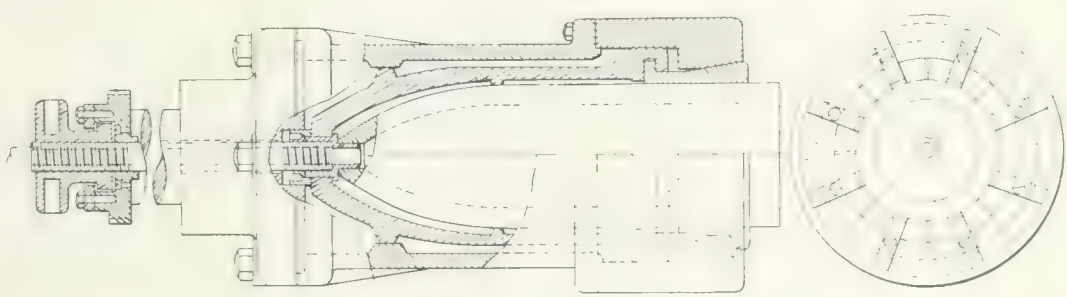


FIG 4 - CROSS-SECTIONAL VIEW OF POT CHUCK IN WHICH THE SHELL IS PLACED FOR THE FINISHING OF THE INSIDE

Some of the Fixtures Employed in Machining 9.2-In. High-Explosive Shells

accuracy of the shell is not dependent on the stiffness of the boring bar or other discrepancies that go to make up eccentricity between the bore and outside of the shell.

The fixture is made with two mandrels to permit the changing of shells in the least possible time, the operator making the change on one side while the shell is being bored on the other. The average time required is 3 min. and an ordinary vertical drilling machine is used.

The shell is next finish turned on the outside except for the band groove, which is turned later. The open or base end is held on an expansion chuck which is attached to the face plate, and the nose end is supported on the tailstock center by a bearing inserted in the small hole in the nose. The machine used is a former lathe and the entire contour is now finished to proper size and the metal is generally removed in one cut. The average time taken is 22 min., which includes placing and removing from the machine.

The next operation comprises the roughing and finishing of the band groove. The open or base end is held on an expanding mandrel which is attached to the face plate, or otherwise arranged with the nose end supported either on the center or rest. The machine used is a lathe having a carriage arranged with a revolving tool block on the front and a waving device, engaging a cam on the face plate, on the rear of carriage. The machine runs in either direction and is reversed for the waving operation. The revolving tool block carries three tools and first necks the groove; second, removes the surplus metal with a diamond point tool by traversing the carriage, and, third, forms and undercuts, which finishes the groove. The tool block is then drawn out of the way. The machine is now reversed and the waving device brought into operation as described. The average time consumed is 17 min. Many firms are using two separate machines to perform this operation, but time may be saved by the use of one machine operating in both directions.

The copper band is now put on the shell, using a hydraulic press having a series of cylinders inclosed in a steel ring and operating on all sides of the band. The shell is placed in a vertical position in the machine. The band is heated to the proper temperature, preferably by an electric heater especially arranged for the purpose, and is then placed over the shell. Pressure is now applied and the band forced into place. The average time is 3½ min.

The counterbore at the base end is now finished and the hole directly under the band is gone over again, removing any metal that has been compressed in the banding operation and also facing the extreme end. The shell is supported in the nose hole at one end and on the outside of the body at the other end by a contraction chuck supported in the rest. An average of 11 min. is the time consumed. The machine used is a lathe having a carriage provided with revolving tool block.

THE FINISHING OPERATIONS

The nose hole is next finished, as the eleventh thread in the base end is milled, being finished by revolving the shell only once. This, the tenth operation, requires an average of 18 min., a thread milling machine being used.

The shell is placed in a contraction chuck and the operation, on a lathe having its carriage arranged with a turret and without a tailstock. The hole is tapped and the end is faced, 11 min. being the average time consumed. Operation 12 consists in drilling and tapping the fixing screw hole on a vertical drilling machine and the average time is 6½ min. In the next operation, after weighing and assembling the base plug, the band is turned on a lathe having a carriage with a revolving tool block and special slide for undercutting. The surplus metal is first removed and the band formed by the tools in the block. The fine serrations are made by a circular tool mounted on a slide at the rear of machine. The average time consumed is 10 min. The shell is then weighed again, the base plug having been removed and the shell cleaned. The base plug is now cemented, assembled and riveted, the entire operation requiring an average time of 10 min.

The fifteenth operation comprises the finishing off of the base end after the seam has been riveted together, and the average time required is 7½ min. An engine lathe having a contraction chuck and a supporting rest is used. The inside of the shell is then varnished by spraying through the nose hole and after cleaning, burring and marking is ready for the final inspection.

The base plugs are machined in accordance with the following sequence of four operations and in an average total time of 76 min.

The base plug is first held in a suitable chuck attached to the spindle of an engine lathe and the large or flange end turned to size, for which the average time consumption is 27 min. The plug is now held in a universal contraction chuck by the flange end and the threaded end is faced and turned to size, requiring an additional 29 min. An engine lathe arranged with a revolving tool block carriage is used. The thread is next milled on a thread milling machine, consuming 18 min., and the fourth and final operation comprises drilling the wrench holes. On an ordinary vertical drilling machine with a double-drill attachment the average time required is 2 min.

The average machining time consumed for the complete shell, as detailed above, operation by operation, is as follows:

Body		*Base Plugs*	
Operation	Time, min.	Operation	Time, min.
1	6½		
2	7		
3	35		
4	23	1	27
5	3	2	29
6	22	3	18
7	17	4	2
8	3½		
9	11	Total time for plugs	... 76
10	18	Total time for bodies ...	... 191
11	11		
12	6½	Complete job 267	
13	10	Or 4 hr 27 min.	
14	10		
15	7½		
Total time	191		

Alcohol-Benzol for Automobile Fuel

A mixture of alcohol and benzol, as a substitute for gasoline as fuel for automobiles, is a new development in Germany. From a French source the following details are derived:

Because of the scarcity of gasoline, the German Government instructed the technical department of the transportation service to seek a combustible that would effectively replace gasoline. A Mercedes 1914 touring car, having an ordinary carburetor, was used in the experiments with the following results:

Fuel	Speed per Hour (Miles)	Distance Covered on 1 Pint of Fuel (Miles)
Alcohol-benzol mixture:		
1 part benzol, 1 part alcohol	41	4.66
1 part benzol, 2 parts alcohol.....	41	4.47
1 part benzol, 3 parts alcohol	[illegible]	4.34
1 part benzol, 4 parts alcohol.....	38	4.10
1 part benzol, 5 parts alcohol.....	36	3.72
Benzol, pure	[illegible]	3.79
Gasoline, pure	44	3.60

Even if alcohol be figured at pre-war prices, the use of such a mixture is an economy, the report states. The drawback in starting the automobile was overcome by the use of a small supplementary reservoir of gasoline, benzine or ether, the mixture being substituted thereafter. Germany is now reported to be using this mixture extensively, distilling beets to obtain the alcohol.

Liquid Contraction in Cast Iron*

High Temperatures Yield the Greatest Tensile Strength—Their Effect on Shrinkage and Structure — Gas and Phosphide Eutectic Contents

BY GEORGE HAILSTONE

IN a Carnegie memoir presented by the author in 1913, liquid contraction in cast iron of fairly good quality was dealt with. (An abstract appeared in THE IRON AGE, Aug. 14, 1913.) The following were the conclusions of that investigation:

Liquid contraction is accompanied by a lowering of the specific gravity or density.

Casting temperature is one of the ruling factors in obtaining a dense and solid casting, and therefore also affects the liability to liquid contraction.

When castings have been cast with iron hotter than will conduce to liquid contraction, solid and dense castings result; when cast with iron too cold to conduce to liquid contraction, blowholes appear. Hence the casting hot gives dense castings, medium heat gives liquid contraction, and cold iron gives blowholes.

The more regular the sizes of the microscopical constituents the less will be the liquid contraction.

Conditions which conduce to a maximum solid contraction conduce to a maximum liquid contraction.

Gases appear to be held in more intimate contact in cast iron poured at a high temperature, and therefore tend to produce a more solid and dense casting.

Since the publication of the above the author has been able to extend his investigations on cast iron of commoner variety, the results of which are embodied in the following report. The methods of molding the test bars, measurement of the microconstituents, specific gravity, hardness, and chemical analysis were those used in the previous investigation. The K test bars being cast in duplicate in each case, one only being used in the above tests, the long leg of the other was used for the tensile test, the bar being turned to 0.25 sq. in. in cross-section with 2 in. parallel.

PREPARATION OF SAMPLES

Ten sets of bars were molded in 12-in. square molding boxes, with facing sand as usually used for green-sand work. Great care was taken to insure, as far as possible, that the molds and methods of running were the same in each case, the down and in gates being of the same size each time. The ten molds were placed side by side and cast, at intervals of 2 min. from a ladle containing 5 cwt. of iron tapped from the cupola.

The casting temperature was taken by means of a thermocouple and a millivoltmeter, the thermocouple being held in the ladle of metal during the pouring, and the reading of the millivoltmeter being taken as soon as each mold was full. The intervals of time between the casting of the ten bars and the temperature of casting are given in Table 1.

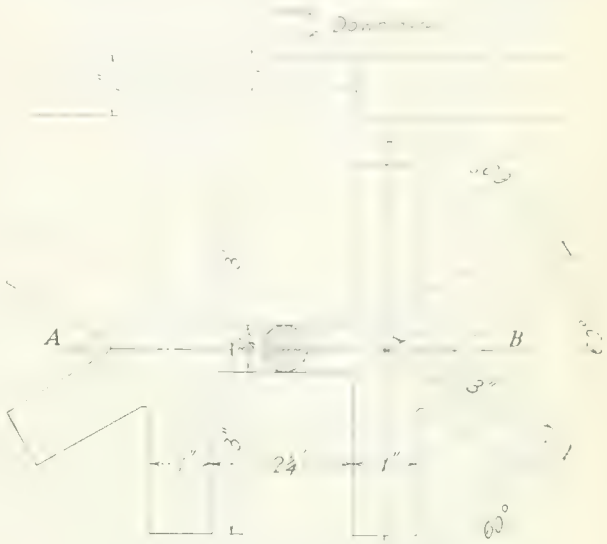


Fig. 1.—The Test Bar Used

After being poured the castings were allowed to stay in the molds until the next day, when they were fettled, and then broken through the line marked *A—B* in Fig. 1 for examination. The analysis and specific gravity of each of the bars is shown in Table 2.

From these analyses it will be seen that the total

*From a paper published as a Carnegie Scholarship Memoir by the Iron and Steel Institute in May, 1916.

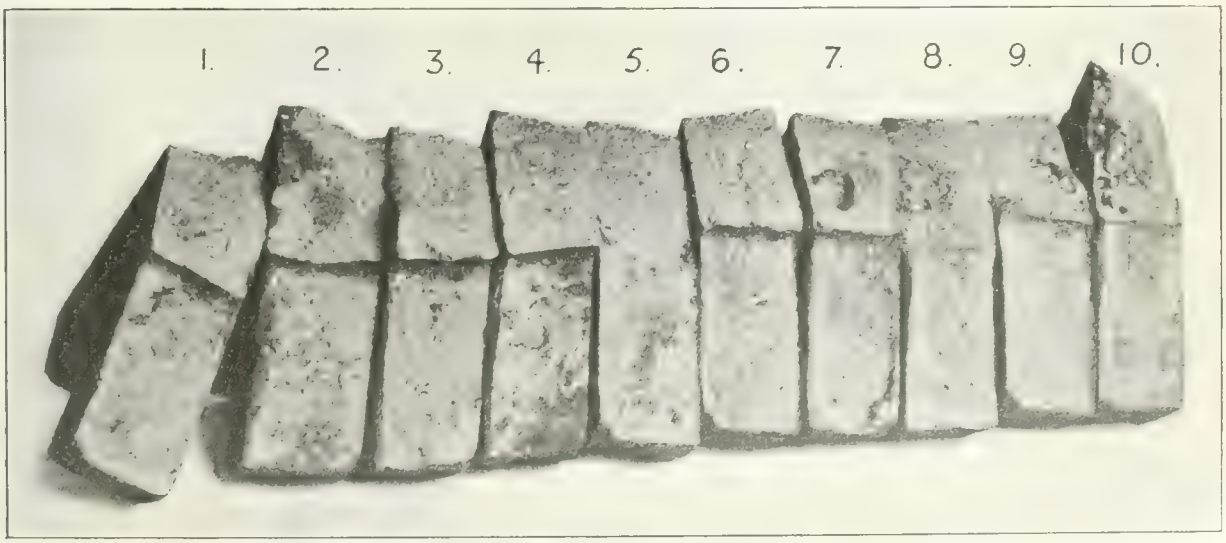


Fig. 2.—The Appearance of the Fractured Section of the K-Bars of Cast Iron

carbon in the whole series is practically constant, the bar cast last only containing a few hundredths of a per cent more than the bar cast first. The combined carbon, however, differs considerably, being greatest in bar 1 and gradually decreasing in the other bars with the reduction of the casting temperature. The silicon is practically constant

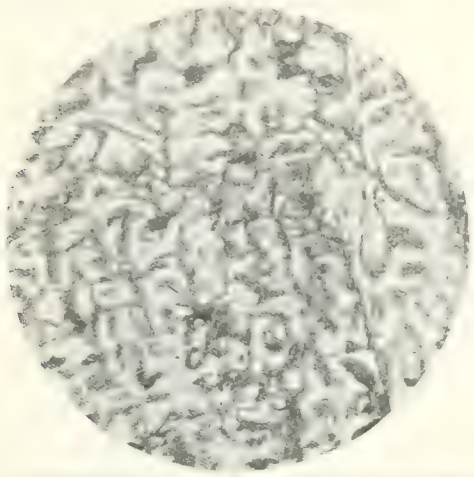


Fig. 3 Photomicrograph, 120 diameters, of the Typical Structure of the Bars

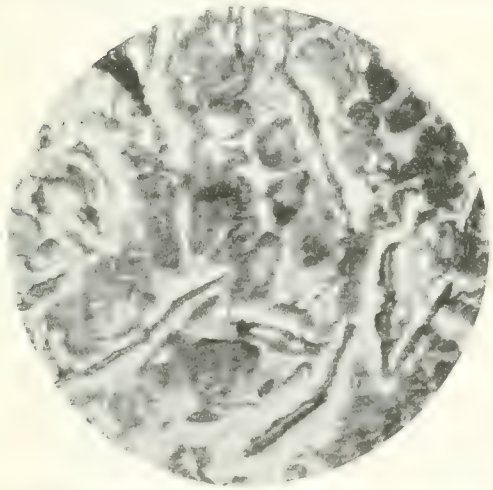


Fig. 4 Photomicrograph, 120 diameters, of Bar 10, Showing Large Area of Phosphide Eutectic

through the series, as is also the phosphorus. An interesting feature of the series is that bar 1 contains nearly double the amount of manganese than do the others; also the sulphur is much higher.

Table 1—Intervals of Time Between the Casting of the Bars and the Temperature of Casting

Bar	Time Cast H.	M.	Casting Temperature Deg. C.	Interval between the Casting of "K" Bars after Bar. No. 1, Min.
1	3	30	1428	..
2	3	32	1400	2
3	3	34	1390	4
4	3	36	1386	6
5	3	38	1361	8
6	3	40	1348	10
7	3	42	1330	12
8	3	44	1302	14
9	3	46	1272	16
10	3	48	1264	18

This is no doubt due to the top layer of metal in the ladle containing an excess of manganese sulphide, besides which the metal was at the proper temperature for the elimination of manganese sulphide.

From an observation of the specific gravity of the bars it will be noticed that the bar cast at the highest temperature has the highest density, the density diminishing as the casting temperature becomes lower in the subsequent bars.

TENSILE STRENGTH OF THE BARS

Table 3 gives the tensile test results together with the casting temperatures of the ten bars. It is very interesting to see that the bars cast at high temperatures yield the highest results, the strength decreasing with a reduction of the casting temperature. It will be noted the best results are obtained in bars 1 to 4, which have casting temperatures of from 1428 deg. C. to 1386 deg. C., a range in temperature of 42 deg. C. for this particular class of iron. The difference in strength between bars 1 and 10 is most marked, a reduction of 164 deg. C. in casting temperature reducing the tensile strength by more than 50 per cent.

Table 3—Tensile Strength and Casting Temperature

Bar No.	Tensile Strength Tons Per Square Inch	Casting Temperature. Deg. C.
1	10.98	1428
2	10.94	1400
3	10.87	1390
4	10.50	1386
5	9.64	1361
6	9.60	1348
7	8.40	1330
8	7.65	1302
9	6.42	1272
10	7.24	1264

The appearance of the fractured surfaces of the K bars is shown in Fig. 2. Bars 1 to 5 exhibit the fracture of a close-grained solid cast iron of a light gray color. Bars 5 and 6 show a slight opening of the grain at the center, the color being of a shade darker gray than in the previous bars, while bars 8, 9 and 10 exhibit excessive openness in the center, and blowholes will be noticed to appear, being small in bar 8 and gradually increasing in size to a maximum in bar 10, bars 8, 9 and 10 also showing increasing depths of grayness in color.

On polishing the sections for the measurement of the microscopical constituents it was found that bars 1, 2, 3, 4 and 5 exhibited an even surface and were of a sound nature, therefore only one set of readings was taken, while bars 6 and 7 showed signs of liquid contraction, a large hole being present in No. 7. Bars 8, 9 and 10 exhibited liquid contraction also, blowholes being least in No. 8, larger in No. 9, and reaching a maximum in No. 10. Readings were taken from both the unaffected or sound areas and the affected or unsound areas in the case of the bars 6 to 10.

The mean dimensions of the constituents from 12 readings were taken in each case. Bar 1 had the highest density of the series, contained the smallest and thinnest flakes and plates of graphite and the largest areas of manganese sulphide. The size of the flakes and plates of graphite in the bars increases as their identification numbers, the areas of manganese sulphide diminishing in size.

With regard to bars 6 to 10, in each case the graphite flakes and plates were larger in the affected area than in the unaffected area, while the size of the manganese sulphide areas did not vary greatly in the different portions of the same section.

Table 2—Analyses and Specific Gravity of the Samples

Chemical Constituents	1	2	3	4	5	6	7	8	9	10
Total carbon	3.178	3.246	3.261	3.256	3.281	3.283	3.291	3.297	3.312	3.312
Graphitic carbon	2.830	2.840	2.862	2.891	2.915	2.926	2.951	2.987	3.126	3.126
Combined carbon	0.348	0.406	0.399	0.365	0.366	0.357	0.340	0.308	0.293	0.186
Silicon	1.907	1.875	1.900	1.898	1.894	1.904	1.915	1.901	1.902	1.910
Sulphur	0.114	0.097	0.092	0.096	0.096	0.094	0.094	0.093	0.092	0.092
Phosphorus	1.482	1.414	1.468	1.412	1.441	1.441	1.460	1.471	1.469	1.469
Manganese	0.420	0.270	0.270	0.267	0.268	0.268	0.267	0.265	0.264	0.264
Specific gravity of bars	7.281	7.262	7.240	7.225	7.201	7.158	7.123	7.085	7.012	6.956

HARDNESS OF SAMPLES

The hardness of the samples was determined by the Shore scleroscope, the diameter of the indentation being measured by means of the microscope micrometer. The results are quoted in Table 4. From the hardness numbers obtained by the scleroscope it would be inferred that the 10 samples were of approximately the same hardness, but on observing the diameter of the indentation it will be noticed that different diameters are obtained which bear a relation to the specific gravity and casting temperature of the samples. The higher the casting temperature and specific gravity of the sample, the smaller the diameter of the indentation. As in the previous investigation, it will be noticed that the Shore number does not bear any direct ratio to the density, although the diameter of indentation does.

Table 4—Hardness of the Samples

Sample	Hardness No. (Shore), Mean of 12 Determinations	Diameter of Indentation, Mean of 12 Determinations, In
1	26	0.01589
2	27	0.01601
3	26	0.01625
4	26	0.01728
5	26	0.01796
6	26	0.01854
7	26	0.01926
8	27	0.01987
9	26.25	0.02126
10	27	0.02315

MICROSTRUCTURE OF SAMPLES

A transverse section was cut from the tensile test bars of the samples, polished, etched with a 5 per cent solution of sulphurous acid, and examined under a magnification of 120 diameters. Bars 1 to 6 exhibited a close structure, consisting of fine flakes of graphite, small areas of phosphide eutectic in a matrix of ferrite and pearlite. The photomicrograph, Fig. 3, which has been taken from bar 1, is the typical structure exhibited by these samples, although of course bar 6 exhibits a much coarser structure than No. 1.

As the number of the sample increases from 7 to 10 the structure becomes much larger, due to casting temperature, time the metal was allowed to stand in the ladle, etc. The photomicrograph, Fig. 4, has been taken from bar 10. This shows large flakes of graphite surrounded by areas of ferrite; also in the matrix are observed large areas of phosphide eutectic. These two photomicrographs are enough to convince anyone that the higher the casting temperature the stronger the resultant casting.

After examination the microsections were deeply etched with a 20 per cent solution of nitric acid, as suggested by Dr. J. E. Stead some years ago, to reveal the phosphide eutectic or phosphide of iron as the case may be, and examined under a magnification of 30 diameters.

The photomicrograph Fig. 5 is from bar 1, the strongest, hardest and densest iron of the series, which has also been cast at the highest temperature: a distinct network structure of the phosphide eutectic will be noticed. The photomicrograph, Fig. 6, is from bar 10, the weakest and softest iron of the series; the phosphide eutetic in this case is evenly distributed throughout the section. This proves that the condition of the phosphide eutectic has a great effect on the strength of cast iron, also that it may be controlled by casting temperature, etc.

Table 5—Gas Evolved on Heating and Its Analysis

Sample	Cubic Centimetres Evolved Per Gramme	Constituents, Per Cent		
		CO_2	CO	H_2, N_2 etc.
1	0.402	0.98	29.62	69.40
2	0.362	0.99	28.46	70.55
3	0.319	1.21	28.25	70.54
4	0.261	1.36	27.89	70.75
5	0.206	1.61	26.46	71.93
6	0.172	1.82	25.05	73.13
7	0.126	2.32	24.76	72.92
8	0.101	2.58	24.02	73.40
9	0.085	2.96	23.78	73.26
10	0.076	3.21	23.03	73.76

GASES EVOLVED ON HEATING

Table 5 gives the amount of gas evolved from the specimens per gram, also the analysis of the gas.

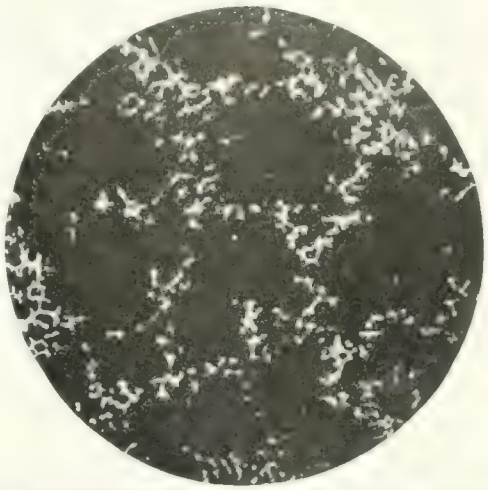


Fig. 5.—Photomicrograph, 30 diameters, Deeply Etched with 20 Per Cent Nitric Acid, Showing Phosphide Eutectic of Bar 1, the Stronger Iron



Fig. 6.—Photomicrograph, 30 diameters, Etched Deeply with 20 Per Cent Nitric Acid, Showing Phosphide Eutectic of Bar 10, the Weak Iron

It will be noticed that the lower the temperature of casting the higher the percentage of carbon dioxide, hydrogen, and nitrogen, etc., in the gas evolved; also that the carbon monoxide is decreased. The greatest volume of gas is evolved from sample 1 and the least from sample 10.

CONCLUSIONS

From the results obtained in this investigation the following conclusions are arrived at:

A cast iron of a given composition has a certain range of casting temperature to produce a solid, dense, and strong casting free from liquid contraction, which, in the case of the iron under investigation, is between the temperatures of 1428 and 1386 deg. C.

A cast iron poured at its proper casting temperature will always show a closer microstructure than otherwise, and the phosphide eutectic will be in network formation.

The more regular the size of the micro-constituents throughout cast iron, the less liable is the iron to liquid contraction.

Blowholes only appear in cast iron when that iron has been poured at a temperature as low or lower than the temperature at which liquid contraction takes place.

There is no doubt that the gases play an important part in the soundness of cast iron, as liquid contraction is always more severe in an iron containing a minimum amount of gas held in solution.

Employing Methods That Make Good Workers

The Lowest Labor Turn-Over in the Industry Has Resulted from the Methods Used in a Middle Western Plant

— BY ROBERT T. KENT —

That the annual labor turnover of a factory can be reduced to an extremely low figure by care in the selection of the employees and the use of good methods of management, has been demonstrated by the experience of Joseph & Feiss Company, owner of the Clothcraft Shops, Cleveland. These shops are operated under scientific management which has been developed to a high degree. In the welfare work which has been started in connection with it and in the development of scientific methods of employment, which is necessarily a part of scientific management, the Joseph & Feiss Company has probably progressed further than any other concern in the United States. The net result of its efforts in these two lines is a reliable, stable and highly efficient labor force. In 1910 on a standing payroll of 1044 employees, there were hired 1570 new hands, a labor turnover of 150 per cent. In 1914 the progress in the adoption of the methods to be outlined below had reduced the number of new hands to 290 on a standing payroll of 865, or a labor turnover of 33 per cent. Notwithstanding a decrease in the payroll, the product of the factory was materially increased by reason of the increase in the efficiency of the employees due to the methods of scientific management.

The manager of the concern, Richard A. Feiss, has somewhat radical ideas upon the handling of labor. His attitude toward employees is distinctly paternalistic. Every prospective employee is interviewed personally by him and at the interview ideals of the shop are explained and an outline is given of the methods of the management carried out in the factory and the reason for these methods as they affect the employees. No employee can be discharged without the justice of the discharge being certified by the manager. Thus, every employee who feels that he or she may have a grievance is absolutely certain that this grievance will be heard and judged at the court of last resort in the factory before being disposed of.

EMPLOYMENT AND SERVICE

For the purpose of administering the function of the employment and welfare work, there has been established an employment and service department, which is considered one of the most important adjuncts of the management. All applicants for positions first come in contact with one of the heads of this department and information concerning each applicant is entered upon the blank reproduced in Fig. 1.

It is important that these essential items of information be obtained.

English - speaking applicants are given the preference, but desirable employees are not rejected because they do not understand the language. They are, however, required to attend one of the classes in English which form a part of the factory service for its employees. It is stated that it is difficult to impart instruction to, and obtain the desired standards of output from those who do not speak English. Out of 35 employees whose knowledge of English is imperfect only one has obtained an efficiency equal to that of the best worker of the same class of work.

The wage contribution to the family is obtained for several reasons. Other things being equal, preference is given to those who have to support themselves or whose contribution to the family support is necessary. Where an entire income is contributed to the family support, the efficiency of the worker is, as a rule, found to be materially lower and no incentive is present for the worker to improve. In such cases, a visit to the home is made by a member of the service department and an arrangement is established whereby a definite contribution to the family support is made, the balance being retained by the employee. Numerous instances might be cited to prove the efficiency of this method. For instance: The earnings of an employee were almost immediately raised from 13 to 22 cents per hour upon piece work by this arrangement.

The record of previous employment is obtained principally to indicate whether or not the applicant is what is known as a "floater" in the industry. The information is not considered of any particular value for purposes of reference and is never so used. Wherever possible, applicants give as their

APPLICATION RECORD OF Doe, Jane

(ISSUED BY THE JOSEPH & FEISS CO., CLEVELAND, OHIO)

APPLIED Apr. 15, 1915	Address 1323 W. 48th	For Handwork	
Birthdate Oct 6, 1897	Birthplace Cleveland, O.	Suitability Fair	
Immigrated —	Parentage Am - Ger.	Married No	
Family F. M. S. 14-12-16	B. 22	Wage Contrib. Partial (necessary)	

REFERENCES (IN OUR EMPLOY)	
Mary Smith	3
Susy Jones	3

PREVIOUS EMPLOYMENT	Time	Capacity	Wage	Why Ended
John Smith & Co. (waists)	13 mo.	Hand sewing	$7. wk.	Dissatisfaction
Brown Bros.	1 yr.	Clerical	$5. wk.	low wages
Mrs. S. T. Baker, Lorain	9 mo.	Housework	$4.50 wk.	To be at home nights.
American Knitting Co.	4 mo.	Clipping	$5. wk	Trouble with foreman

EMPLOYED May 10, 1915 By M.	Class W.P.W. No 842	Rate P.W.	
Operation Sleeves felled	Locker 1027	Fore. J. T.	Checked ✓
Approved S. R	Signature Jane Doe		

Fig. 1—The application blanks provide for all statistics that may even remotely affect the efficiency of the prospective employee

reference members of the factory organization.

HIRING THE EMPLOYEES

Applicants are not hired at the time they make their first application, nor is any immediate decision arrived at regarding their suitability for employment. Decision is deferred for one or several days in order to bring all applicants in their proper relationship in the mind of the one who finally is responsible for their selection. Postponement also tends to reduce the number of floaters appearing on the payroll.

Application records are classified as to age, sex and apparent suitability. When a position is to be filled, several of the applicants whose records have already been obtained, are sent for, a definite time being set for their appearance. Enclosed with the notification are self-addressed postals which the applicant may use if it is impossible to keep the appointment at the time stated. At this second interview selection for immediate employment is made and the suitability of the prospective employee is more definitely determined.

PHYSICAL EXAMINATIONS

The better the health of the worker, the higher will be the efficiency, other things being equal. Consequently, effort is made not only to select workers whose health is good, but to maintain them in perfect health so long as they are members of the organization. A complete medical department, therefore, forms a portion of the equipment of the factory, a graduate nurse being in charge of the work. A dispensary, separate rest rooms, a waiting room and consultation room for the factory physician comprises the equipment of this department. The medical staff consists of a physician, oculist and dentist, the physician spending three mornings per week at the factory, the oculist two mornings and the dentist one morning.

All medical work at the factory is at the expense of the company. If medical attention outside the factory is required, it is at the employee's own expense save in exceptional cases where the employment and service department recommends that the expenses be borne by the company. Arrangements have been made by the company whereby this medical and dental service is secured outside at special rates. New employees are subjected to physical examinations and the time of their appointments with the employment and service department is regulated so as to coincide with the physician's visit. In regard to eye examinations of new employees, a preliminary examination is made by the nurse to discover any obvious defects. The oculist later makes a very thorough examination and if glasses are found to be necessary, prescribes them. Arrangements have been made whereby glasses can be obtained from reliable opticians in the city at one-half the usual rate.

The dental examination is also regarded as of supreme importance, in that many chronic cases of headache, neuralgia or stomach trouble have been directly traced to neglected condition of the teeth or to poor dental work already done. Less than 15 per cent of the employees were found to have teeth that were properly cared for and in good condition; and it is stated that this percentage is considerably better than the average among employees in factories in Cleveland. A chart is made of the defective teeth and is given to the employee, together with an estimate of the cost of the work needed. No dental work is done at the factory excepting examination, advice and prophylaxis.

Information obtained from the medical, ocular and dental examinations is entered upon the record shown in Fig. 3. Not only is the applicant thoroughly examined at the time of the appointment, but this work is followed up from time to time as will be clearly indicated by examination of Fig. 3.

DETERMINATION OF MENTAL FITNESS

In addition to the physical tests described above,

QUALIFICATIONS: A 2+ M 3 I 3 G 3

Languages Eng. Ger.

Education 7th grade (Public School) + 3 mo. Business College

NOTES. Anemic, listless in appearance. Will need careful follow up physically. Desirous of working here because she has heard there is good chance for advancement. Father out of work most of the time. Mother came along when application was taken and promised to cooperate with nurse, etc.

Fig. 2.—On the reverse of the application record the interviewer notes such facts as will enable the employment and service department to follow up the applicant when employed

certain simple tests are made to determine the mental fitness of the applicant. These are to determine both his capacity for certain kinds of work and also the general fitness for advancement which depends, to a certain degree, upon mental fitness. Tests that are being developed under the direction of Prof. Walter Dill Scott of Northwestern University, include a test for the ability to follow instructions and a series of tests for dexterity. No matter how much care is exercised in the selection of workers, errors are bound to occur. Workers are often placed at jobs for which they are not suited and some are selected who are unfit mentally for the industry. The aim is to use these tests to aid in the selection and to avoid placing either normal or sub-normal persons at work for which they are unlikely to prove adapted.

The second purpose of the tests is to minimize errors in promotion. In the factory under consideration, a large percentage of the organization is moved up during the course of a year, it being the policy to fill positions of clerical or executive natures, in fact positions of every kind, by advancement. In the past, many mistakes have been made by advancing individuals to positions beyond their mental capacity. Eventual reduction in position resulting from this improper advancement is hu-

miliating to the individual and often causes his loss to the organization. In addition, the organization has suffered by reason of a position being poorly filled. The tests are expected to minimize errors of this nature.

It is impressed upon all that the tests just described are for inherent intelligence and not for education or character. The fact is emphasized that such tests cannot determine what a person can do but can help in determining what he cannot do. It is recognized that physical and psychological tests can be made instruments of abuse and that care must be exercised to see that they do not eliminate a large proportion of the community which, while not normal physically or mentally, must be used to assist in saving by the scientific selection every person capable of productive effort.

WELFARE WORK OUTSIDE THE FACTORY

Interest in the health of the employee does not cease with the hiring of him, but continues throughout his connection with the organization and extends beyond the bounds of the factory into the home. As soon as possible after an employee is hired, a member of the service department visits the home and investigates conditions there. It is often found that influences in the home are contrary to the influences of the factory and that if the highest efficiency in his work is to be obtained by the new employee, bad influences in the home must be corrected.

Thus, unhygienic home conditions would counteract all conditions for health established in the factory. In many cases, it has been found among new employees that the practice of sleeping four or five in a room with the windows tightly closed was responsible for dullness, headaches and other disorders which affected the worker's ability. Sound advice and constant follow-up of such cases on the part of the employment and service department correct such conditions and have a marked effect in improving the efficiency and *esprit de corps* of the factory force. Also family troubles, financial and otherwise, are often detected and remedied in these home visits.

The company makes no excuses for its practice of "invading the privacy of the home," as it is often termed by objectors to these methods. It holds that the object of the company is to make money and that this can best be done by a happy, contented and efficient working force. The employee spends but eight hours out of the 24 in the

DATE OF BIRTH 3 Mch. 1884 EMPLOYED 4 Jan. 1903 NAME Doe, Jane

CEDED BY THE JOSEPH & FEISS CO. CLEVELAND, OHIO

FAMILY HISTORY Father died of cancer of stomach, 1899
Twin sister epileptic.

HOME CONDITIONS lives with mother, twin sister, ten yr. old sister and seventeen yr. old brother. Shares badly ventilated room with two sisters. Home neat and thrifty 5 rooms + bath. Garden.

INCOME CONDITIONS. Mother owns home and lucy and 17 yr. old brother (earning about $8.00 wk.) support family

SAVINGS Yes



Apr. 8, 1914



	DATE	COMPLAINT	TREATMENT	REMARKS	BY
①	4-5-'14	Examination	No organic trouble. Gen'l health good, but must have more sleep and avoid tea and coffee. Should consult oculist because of headaches. Tonsils enlarged.		
②	4-11-'14	Headaches	O13 5/9 cyl 5/5 Fundus normal O13 5/5		M
①	5-16-'14	Sore throat	Has glasses from optician (obtained 1½ years ago) Homatropin necessary.		S.M
②	4-18-'14		Cathartic. Gargle Homatropin administered. Shadow OP – sph 150 O13 – " 125 = -cyl 025 +180 Subj O10 – " 150 O13 – " 125 -cyl 025+180 5/5		M.
②	4-25-'14		Glasses satisfactory		S.M
③	7-30-'14		Dental work partly completed		S.M
①	8-1-'14	Sore throat	Cathartic. Gargle.		W.
④	8-3-'14	Anemic	Blaud's pills	Will go to summer camp. Constant follow up about fresh air + sleep necessary.	M
③	9-30-'14		Dental work finished.		K
①	10-19-'14	Sore throat	Cathartic Gargle.		W.
①	11-2-'14	Enlarged tonsils	Operation by M at German Hospital	Absent 8 d.s. Consents to operation Successful	M.
④	11-23-'14	General follow up.	Health greatly improved.		M
					K

Fig. 3—The medical record contains statistics regarding the physical condition of the employee during his entire connection with the plant. Poor workmanship can thus be often traced to poor physical condition. The physician's records are entered in green ink, the oculist's in violet ink, the dentist's in red ink and the nurse's in black ink

factory, and his efficiency is vitally affected by what he does or influences to which he is subjected during the other 16 hr. Happiness and contentment of the employee are more often than not the result of conditions outside of the factory, and the company believes that by taking some cognizance of these conditions it can materially increase the health and happiness of the employees, and therefore their efficiency in the factory. The results

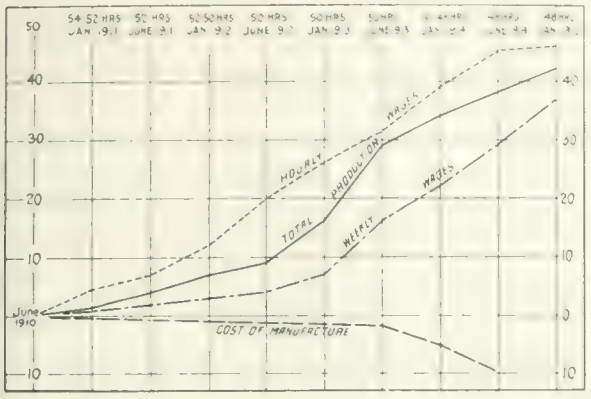


Fig. 4—The methods of scientific management have raised wages increased production, shortened hours and decreased the cost of manufacture

that have been accomplished bear ample testimony to the soundness of these ideas.

The employment and service department is not regarded by the employees as meddlesome or interfering with their liberties and pleasures. On the contrary, employees look upon the members of this department as friends to whom they can go at any time for advice upon any subject whatever, whether it has to do with their work in the factory or their affairs outside of it. As a matter of fact about one-fifth of the entire working force consults the department every day.

WORKING CONDITIONS

Of the working conditions existing in the factory it is hardly necessary to speak. It goes without saying that a factory which has the high ideals of this one will necessarily furnish the best working conditions possible. It is sufficient to say that the shop proper is splendidly lighted, well ventilated and kept scrupulously clean. Chairs are provided for all workers and every facility has been adopted that will minimize fatigue. In addition to providing working facilities of the highest order, the company has also provided facilities for rest and recreation. The entire basement of the factory building is given over to this purpose. Shower baths are installed here for the employees and in addition there is a large dining room in which the employees can eat lunches which they have brought with them or they can obtain prepared lunches from the factory kitchen, practically at cost. Nearly all of the employees avail themselves of this privilege. The remainder of the basement is given over to a recreation floor on which dances can be held or games played, and these facilities are used to the limit every noon and after working hours. A branch of the Cleveland public library is maintained in the employment department and is well patronized. A savings bank conducted by the company for its employees is another institution that is well patronized.

The spirit of democracy pervades the entire establishment. The office force is regarded as being no better or no worse than the factory force. They keep the same hours, have the same privileges and obey the same rules as do the workers in the shop. They also use the same dining room.

An extensive sociological experiment such as has been conducted in this factory can be judged only by its results. The results in this instance have proved to be highly satisfactory. The low labor turnover has already been mentioned. One or two other results are worthy of attention. In presenting these results, however, it should be borne in mind that they are not due solely to the service work which has just been described, but to the applications of the principles of scientific management of which the service work forms only a part, albeit a highly important one.

In the five years in which this experiment has gone on, the hours of labor have been reduced from 54 to 48 per week. The average wages per week have increased 37 per cent. The output of the factory has increased about 42 per cent, while the cost of manufacture has decreased about 10 per cent. It is thus evident that from the standpoint of both employer and employee, the experiment has been a success, financially, physically and morally.

One-Slag Process for Basic Electric Steel

A one-slag process for making basic steel in an electric furnace, involving a saving of time, current, lime and other materials, is covered by a patent (U. S. 1,187,623—June 20, 1916) granted to Ernest Humbert. The slag is used in such a way as to overlap from one heat to the next, forming the finishing slag of one heat and the starting slag for the next. After performing its duty as a dephosphorizing slag it is poured off and a new slag introduced which finishes this heat and in turn starts the next one. The finishing slag is introduced as a mixture of lime, silicon and carbon, with generally some fluorspar. Calcium carbide is thus formed as usual. With this slag the finishing operations, consisting of the additions of ferromanganese, ferrosilicon, etc., are performed. This slag is left in the furnace after the metal is tapped. It may be removed and part of it returned to the furnace.

To this old slag in the furnace iron oxide as scale, or any other oxidizing material, is added, sufficient to oxidize the carbon left in the slag as well as the calcium carbide and to leave an excess of the oxide. This converts the slag into an oxidizing one, and the heat of oxidation of the calcium carbide is so great that, combined with the residual heat in the furnace, the resulting oxidizing slag is liquefied. Fluorspar may be added if necessary. The slag now consists of lime, silica and iron oxide and perhaps fluorspar.

Upon this slag the metal to be refined is introduced and the slag, in rising through the metal, is completely mixed with it, expediting the dephosphorization, which begins at once and is completed in a comparatively short time. The slag containing the phosphate is then removed and a new finishing slag provided.

The inventor states that as soon as liquid Bessemer metal has been poured in a good boil is secured, and that in 10 minutes the reduction of phosphorus is practically complete. Besides the savings, an improved product is claimed because of the more thorough dephosphorization.

The shipyard of Yarrows, Ltd., at Esquimalt, British Columbia, established two or three years ago by Sir Alfred Yarrow, of the Yarrow Shipbuilding Institution of Great Britain, is described briefly in a recent issue of London *Engineering*. The yard is located across the Strait of Juan de Fuca from the State of Washington, and was established as a nucleus for a large enterprise which is expected to develop when the war brings back commerce to its normal state. It can accommodate vessels up to 312 ft. in length and of 55 ft. beam and of 3000 tons gross measurement. A wharf over 500 ft. in length gives space for overhauling and repairing vessels on both sides.

The Steel Industry in the War Zone

Important War Problems in Minette Ores and Their Bearing on the Industrial Future of France and Germany

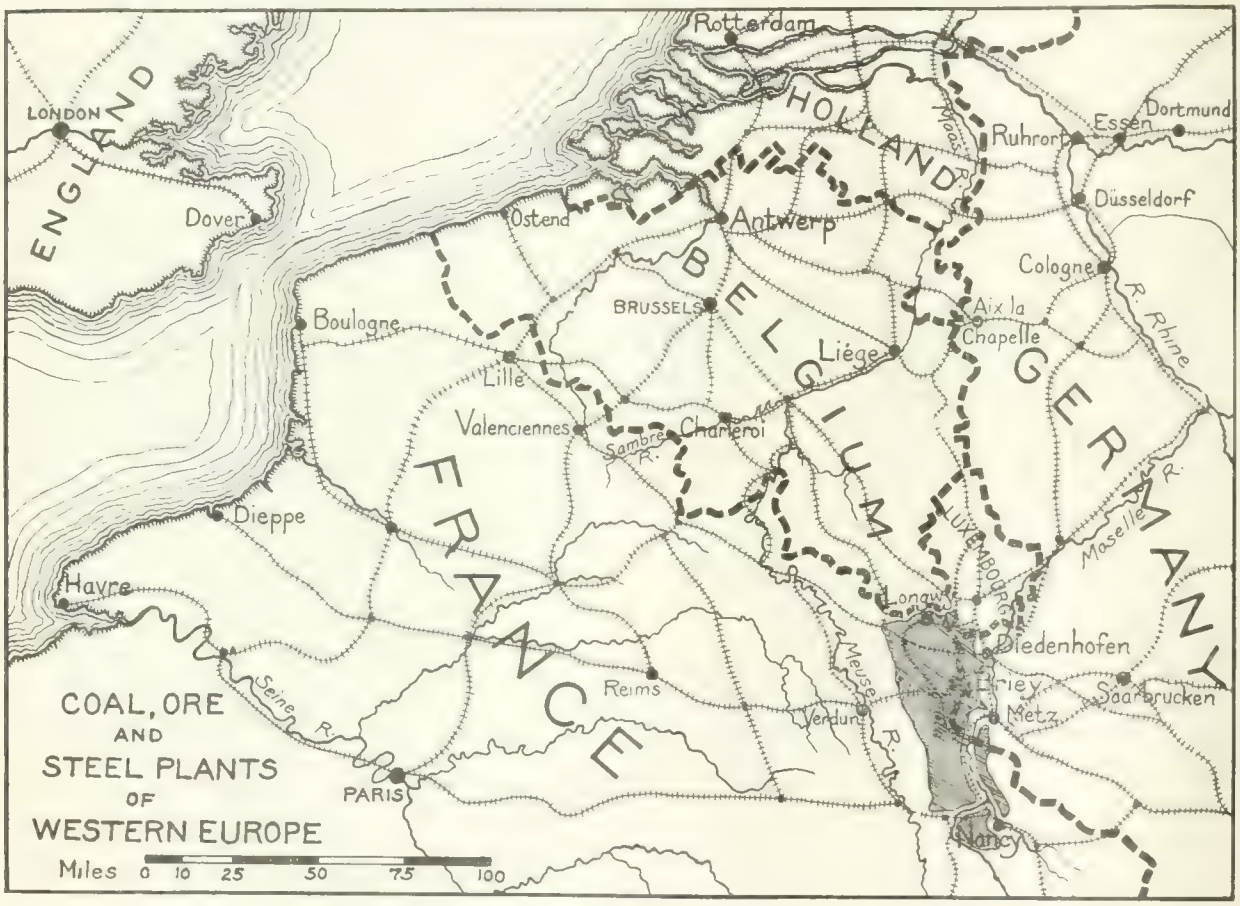
BY H. H. CAMPBELL

At the close of the Franco-Prussian War, when Germany took from France the territory that has been the cause of so much trouble, the ore deposits in Lorraine were looked upon as of little importance; but since then the basic Bessemer process has come into its own and the whole steel industry of the continent now centers around the iron ore in German and French Lorraine. This mineral area was described by the writer in THE IRON AGE of July 15 and 22, 1915, and was again referred to in articles on the steel industry of Germany, France and Belgium, published in these columns May 11, 18 and 25, 1916. It was stated that the general average of the ore sent to the blast furnaces runs from 30 to 35 per cent in iron, and that the pig iron contains about 2 per cent of phosphorus, so that it is just fitted for the basic Bessemer process.

The articles just mentioned dealt with the subject from a metallurgical standpoint, but we must now take a bird's-eye view of the situation, because this ore district after the war will be a bone of contention between the warring nations. In order to present the subject clearly, a map is given which has been drawn especially for this article. A few cities like Paris, Lille and Rheims are marked so that the reader can get his bearings, but almost every place shown is an important factor in the steel business, either because it has steel plants or mines of ore or coal, or because it is a shipping port.

LOCATION OF STEEL PLANTS AND DEPOSITS OF ORE AND COAL

Steel Plants.—The steel plants in eastern France are mostly near Longwy, Briey and Nancy; in Belgium near Charleroi and Liege; while in German Lorraine they are at small places like Rombach and Hayingen, which are not shown on the map, because they are close to Diedenhofen. There are also steel plants at Dudelingen in Luxemburg and at Differdingen near Luxemburg. In Westphalia the only places given on the map are Ruhrort, Essen and Dortmund, but there are important steel works at Hoerde, Bochum, Oberhausen and elsewhere. The map does not give these details, being intended to show only the general situation. There is also a steel plant at Aachen (Aix la Chapelle) in the Rhine province.



The Shaded Portion of the Map Represents the Minette Iron Ore Field

Coal Fields.—Valenciennes in France; Charleroi and Liege in Belgium; Saarbrucken and Westphalia in Germany.

Shipping Ports.—Rotterdam in Holland; Antwerp in Belgium; Boulogne and Havre in France.

Ore Deposits.—The shaded portion of the map represents the Minette ore fields, occupying a rect-

angle measuring 60 miles north and south by 20 miles east and west. This deposit really extends across the frontier into Belgium, but this is not shown on the map, because Belgium only produces one-third of 1 per cent of the output of the whole field. There are three countries—France, Germany and Luxemburg—which share this deposit, while Belgium is an important factor in the problem as a manufacturer of steel. We will consider these four countries separately and then take a view of the field as a whole.

THE SITUATION IN FRANCE

In French Lorraine there are three separate ore fields—Longwy, Briey and Nancy. Of these Briey is the most important, producing two-thirds of all the ore mined on the French side of the border. It was about ten years ago that men realized the full extent of the deep-lying deposits around Briey, and ever since there has been a rapid increase in production; but France is not able to use all this ore, in spite of the building of several new steel works. French steel makers are handicapped by being 150 miles from the coal mines at Valenciennes, so that much of the coal must be imported from Belgium and pay a duty. This tariff acts as a bounty given to German and Belgian manufacturers to enable them to make steel cheaper than it can be made in France, and as a consequence half the ore raised in the French district is exported to Belgium and Germany. In addition to these shipments to neighbors, ore is sent to Great Britain and other countries, the total exports in 1913 amounting to 10,067,000 tons, which was more than the output of either Spain or Sweden. In other words, France exported more iron ore in 1913 than any other country in the world, and 40 per cent of this went to Germany.

GERMANY

There are four separate steel districts in Germany that are founded on Minette ore, the first being the narrow strip along the frontier, just north of Metz. The ore comes from 48 different mines, and in 1913 there were 18,000 miners at work producing 21,153,000 tons of ore. A little over half was smelted close by, while the rest was divided about equally between Westphalia, Saarbrucken and Luxemburg, although France and Belgium received a little. There are several up-to-date steel works in this section, but the only well-known town is Diedenhofen, which often appears on our maps as Thionville, which is its old French name.

Another separate district is around Saarbrucken, where there are mines of very inferior coal. Years ago steel works were built there, ore being brought from Luxemburg, but during the last quarter of a century there have been many small improvements in saving fuel, so that it is not such a great advantage to-day as it once was to be alongside a coal mine, and it is not impossible that the steel works at Saarbrucken will be moved to the ore field before many years.

In the province of Westphalia are a large number of important steel centers, but it was thought sufficient to put only three places on the map. Dortmund and Essen are both situated in the coal regions, while Ruhrort is the chief harbor for shipping material to Rotterdam for export, and for receiving ore that has come from Sweden or Spain and has been put on river steamers at the Dutch port. Westphalia is one of the largest steel producing districts in the world, ranking next to the Pittsburgh territory. More than half the raw material is brought from the Minette region, the remainder coming from abroad. The last of the four districts referred to is Aix la Chapelle, which remelts pig iron coming from Luxemburg.

THE DUCHY OF LUXEMBURG

Luxemburg has an area of only 1000 square miles, equivalent to a square 32 miles on a side, and its only claim to importance rests on its ore deposits. Large amounts of ore are exported to Germany and Belgium, while large quantities of pig iron are also made, part being used by basic Bessemer steel plants in the duchy, the rest being sent to the steel works of Belgium, Westphalia and Aix la Chapelle. For a generation Luxemburg has had a commercial treaty with Germany, which from an industrial point of view has made this territory a province of the empire, so that usually the statistics giving the production of ore, pig iron and steel combine the output of the two countries.

BELGIUM

The total production of ore in Belgium in 1913 was only 149,000 tons, while the imports were 7,085,000 tons, from which should be subtracted 725,000 tons of re-exports. Over 90 per cent of all the ore came from France, Luxemburg and Germany, and contained less than 35 per cent of iron. The blast furnaces made 2,485,000 tons of pig iron, most of it going through the basic converter, the steel output being 2,467,000 tons; so it is plain that the whole iron and steel industry of Belgium rests on the ore from the Minette district.

PRODUCTION OF MINETTE ORE

The accompanying table gives in metric tons the amount of ore produced in the whole Minette field at different periods and the tonnage for each country in 1913:

	Ore.	Equivalent Pig Iron.
1872, whole district	3,000,000	1,000,000
1895, whole district	11,000,000	3,700,000
1903, whole district	22,000,000	7,300,000
1913, Germany	21,150,000	7,050,000
France	17,300,000	5,770,000
Luxemburg	6,500,000	2,160,000
Belgium	150,000	50,000
1913, total	45,100,000	15,030,000

Thus 45,000,000 tons of ore was mined in 1913, equivalent to 15,000,000 tons of pig iron, or 56 per cent of the combined output of Germany, Luxemburg, France and Belgium, so that more than half the pig iron produced in those countries had its origin in Minette ore, and most of this went into basic Bessemer steel. These figures contrast with the record for 1872, which was the year following the Franco-Prussian War, when the output of the whole field was equivalent to only 1,000,000 tons of pig iron, while not a pound of it went into steel.

THE MARKET

On the map that has been given we may draw a triangle with its points at Dortmund, Charleroi and Nancy, which will have an area about one-quarter that of the State of Pennsylvania, and will include most of the ore deposits, coal mines and steel plants of western Europe. In 1913 this triangle absorbed 45,000,000 tons of Minette ore and also 25,000,000 tons from Sweden, Spain and other countries. About 20,000,000 tons of steel was made here, or two-thirds of the output of the United States.

It is needless to prove that all this steel cannot find an ultimate market in the immediate vicinity of the mines, while neighboring countries on the south and east do not buy very much steel. The outlet in Switzerland is limited, and both Austria and Russia have protective tariffs, while across the Channel is England, which has taken quite a little

steel from Germany in the past, but which will be a poor customer for many years to come. It is therefore necessary for a good part of the product of this region to find a world market, and so the map shows the seaports of Antwerp, Rotterdam, Boulogne and Havre, although these last two export only small amounts of iron and steel. The French works at Briey are 250 miles from Boulogne, which is the nearest good French seaport, and over 300 miles from Havre, these distances being formidable on the miserably managed French railroads.

The steel works in both French and German Lorraine must bring coal 100 miles or more, and then the nearest port is Antwerp, 170 miles away. Westphalia is even more unfavorably situated, since for every ton of pig iron made 3 tons of ore must be brought 150 miles, and then the finished material must be sent by river steamers 100 miles to Rotterdam, where it must be handled again. The plants in Belgium have the best location, for they are right alongside the coal mines of Charleroi or Liege; they bring ore only 100 miles and are within 70 miles of Antwerp. It is evident that Antwerp is the gateway to the Minette district, and Germany will try to retain possession of her new front door.

WAR PROBLEMS

Until we know how the war is going to end, it is almost a waste of time to theorize about the future of the Minette district, but we ought to understand the conditions as they are to-day. The battle line is not shown on the map, for it may change any day; but the reader may draw it for himself. Take a pencil and draw a line due south from Lille, until a point is reached west of Rheims; then go east through Rheims to Verdun; then due south until a line drawn east will pass about half way between Antwerp and Metz. This will show the line of trenches as it has been for nearly two years, and one glance will explain why Germany is willing to buy Verdun at a price that staggers humanity. If Verdun falls, then Nancy may come next; and if Germany gains that area and holds what she now has, France will disappear from the list of important producers of iron and steel, while Germany will control the whole steel industry of the continent. Even as things are to-day, the area held by France produces only one-twentieth part of the output of the Minette field.

It may be, however, that France will have her way, and annex a part or perhaps the whole of German Lorraine. This would upset the present industrial balance, for the steel works in Lorraine that are owned by German companies would not be able to market their product in Germany on account of the tariff. There is a third possibility, for the frontier may remain just as it has been for nearly half a century, and perhaps the Allies will adopt a policy of non-intercourse with Germany. Such an agreement would deprive France of a market for the 4,000,000 tons of ore that was sent to Germany in 1913, and it would also destroy a system of interchange of ore that has grown up on account of local conditions. In fact, it would be almost impossible to maintain such an arrangement on account of the peculiar position of Luxemburg. This country was not a partner of Germany, but a helpless victim, and should not be subjected to any boycott; yet if Luxemburg is left free, then ore can be bought from France and sold to Germany, merely passing through the duchy just as some undoubtedly does to-day.

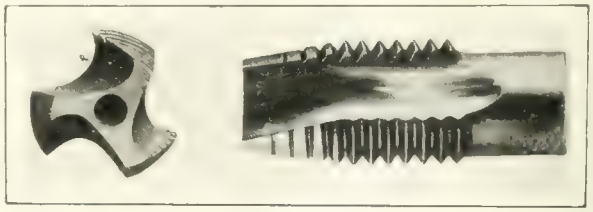
INTERCHANGE OF ORE

In 1913 France sent 4,065,000 tons of ore to Germany and received 807,000 tons in return; Luxemburg received 2,896,000 tons from Lorraine, and sent 1,578,000 tons to Belgium; and so every different part of the ore fields sent large amounts to every other part. This interchange is due in great measure to the desire to get a self-fluxing mixture, for some of the ore both in France and Germany contains an excess of lime, while some in both countries carries too much silica. For this reason blast furnaces and steel companies in Germany, Belgium and Luxemburg have bought ore mines just across neighboring political frontiers, so that a routine movement of ore from their own mines to their own steel works, a distance perhaps of less than 50 miles, appears in international statistics in the columns of imports and exports. On account of these conditions any prohibition of exports from the mines owned by German steel works would virtually be confiscation of private property.

It is not likely that the final treaty of peace will overthrow the complex industrial and commercial machinery that now exists, since men realize that political and sentimental considerations ought to give way to economic facts; but we must wait to find out how all the conflicting conditions are to be harmonized.

Interesting Type of Three-Flute Tap

A tap differing materially from those which it formerly made has been placed on the market by the Greenfield Tap & Die Corporation, Greenfield, Mass. The distinctive feature of it is the shooting of the chips in advance of the tap in long, unbroken curls which have caused it to be known as the "Gun" tap.



A Three-Flute Tap in Which the Cutting Is Done by the Portion Ground Away at an Angle, While the Remaining Threads Serve as a Lead Screw to Steady the Tap

This result, it is claimed, is secured by the peculiar form of construction used at the point. It is also possible to use a single one of these taps where two and three of the ordinary type used succeessivly have been formerly required.

The cutting edges at the point of the tap are ground at an angle to the axis, which it is pointed out enables the tap to cut with a shearing motion. The angularity is relied upon to deflect the chips and cause them to curl out ahead of the tap instead of collecting and breaking up in the flutes as is sometimes the case. This eliminates clogging and the taps do not have to be backed out when deep holes are being threaded to remove the collected chips from the flutes. The hook on the cutting edge does the threading, while the remainder of the threaded portion of the tap acts in a manner somewhat similar to a lead screw without any cutting action, thus tending to hold the work true to the lead.

When it becomes necessary to grind the tap, this is done only on the angular cutting edge, instead of in the flutes. It is possible to repeat this process as often as may be necessary until there are only two or three full threads left without, it is emphasized, impairing the accuracy of the thread cut.

The name of the Duplexo Vacuum Cleaner Company, Inc., 429 Kent Avenue, Brooklyn, N. Y., has been changed to Duplexo Metal Stamping Company, Inc.

Bronze Alloys for Automobile Work*

Test Bars Not Always a Guide to the Quality of the Casting—Value of the Microscope—Composition and Properties of Commercial Alloys

BY W. M. CORSE AND G. F. COMSTOCK

EXPERIENCE in the bronze casting business has demonstrated the need of data on the physical and chemical properties of alloys that are not available in handbooks or other sources of information on the subject. Tables showing such properties determined from actual practice, which may be termed experience tables, are rare; some data exist, but they are usually in the private files of individuals or companies. The Bureau of Standards at Washington reports daily requests for such information and states that there is great difficulty in obtaining data that enables them to make correct replies.

With this need in mind the committee on non-ferrous alloys of the American Society for Testing Materials discussed at a recent meeting the advisability of publishing such data as might be compiled from existing experience tables. On account of the fact that publication of data by that society is made in a formal manner, usually as specifications, it was thought best to delay so as to allow the experience tables to be checked by further work. The need was fully realized, however, and it is with that idea in mind that the table included in this paper was compiled.

VARIATION BETWEEN BARS AND CASTINGS

One very important point should be emphasized in connection with the use of the table. Most tests are made on standard test bars either attached to castings or cast separately. Test bars cut from castings where this procedure is possible, show conclusively that a variation exists between results on standard test bars and the metal in the castings themselves.

Castings may show higher or lower results, depending on the design and size of the casting itself. The latter is usually the case on account of the fact that the average size of castings exceeds the test bar size. It has been proved conclusively that the rate of cooling and the shape of the casting affect the results markedly.

Alloys of high shrinkage are much more liable to show internal strains due to practical inability to feed the shrinkage properly, so that the net strength is the difference between the true value for the metal and the internal strains caused by this shrinkage. Manganese bronze, for example, normally shows an average ultimate tensile strength of from 65,000 to 75,000 lb. per square inch. It is not uncommon to find this lowered to 30,000 or 40,000 lb. per square inch in actual castings.

Copper-tin alloys, such as phosphor-bronzes, do not exhibit high shrinkage, but show the same proportional discrepancy in strength, on account of large crystal growth and the formation of a coarse network of the high tin eutectoid, which is very hard and brittle. Thurston, for instance, in his standard work on alloys, quotes from Major Wade's report of 1856 on "Experiments on Metals for Cannon," in regard to gun bronze containing 10 per cent tin that 83 test bars from gun heads of castings averaged about 30,000 lb. per square inch tensile strength, while 32 small bars averaged about 42,000 lb. Also "The average of 12 gun heads was one-half (in strength) of that obtained from small sample bars cast with the guns." The area of the cross-section of the casting, as well as its design, therefore, has a very important bearing on the subject and should always be taken into account in engineering work.

Improper foundry practice affects the tests of any alloy to a very marked extent, so that two metals of the same chemical analysis may show very different results when handled by different foundries. The latter statement is almost self-evident, but many engineers do not realize the effect of small amounts of impurities, some of which are acquired during the melting process, on the final result.

We may learn two things from the above. First, to secure, if possible, the maximum amount of information on castings themselves even at the expense of a few spoiled pieces. Second, to employ the most reliable foundryman you can find, as the best practice is none too good with the appliances existing in the foundry.

VALUE OF MICROSCOPE

To the above might be added a suggestion to examine the structure of the metal with the microscope. We all know the value of such a procedure with steel, but so little work has been done with the bronzes that its value here may easily be overlooked. The high copper-aluminum alloys, commonly known as aluminum bronzes, are very interesting from a metallographic standpoint.

In two metals of the same composition but with different structures, due to "self-annealing" or heat treatment in the mold during the casting process, tests show a difference in ultimate tensile strength of 11,000 lb. per square inch and in elongation of 10 to 12 per cent. The microscope was a distinct help in explaining these differences. Our experience in the last two years indicates increasingly the value of metallography as applied to bronzes.

Many engineers believe that when figuring loads it is not safe to go above the value of the true proportional limit as shown by the extensometer readings in the tension test. An interesting point has arisen recently in connection with aluminum bronze. The fatigue test as made with several types of machines indicates clearly that the primitive yield point as shown by the tension test is not the true yield point of the material. The endurance or fatigue resistance of this alloy exceeds that of manganese bronze, or even of steel under certain conditions, although the primitive yield point of manganese bronze is above that of aluminum bronze. It would seem therefore that valuable information might be obtained by considering the fatigue resistance of a material in addition to the usual properties shown in the table.

MATERIALS FOR BEARINGS

We have avoided specific statements or recommendations about materials for bearings because it is difficult to predict the result with several other variables undetermined. For instance, the hardness of the steel shaft and its machine finish are as much a factor in the selection of the bronze as the properties of the bronze itself. Moreover, the quality of the surface finish needed on the bronze bearing is also determined by the ability of the bronze to conform to the steel. It is evident that as the bearing pressure increases the hardness also must increase to avoid flowing. In order to have a satisfactory hard bearing, it is necessary to have a finely machine-finished surface on both bearing and shaft because they will not conform as will softer metals.

Inasmuch as there are many different bearing conditions of pressure and speed, it can be seen that no one bronze can fill all the needs of the automobile engineer. In a general way tin and zinc harden bronze and lead softens it. The use of zinc in small proportions is principally for deoxidizing purposes, but has a detrimental effect on the wearing properties. Consequently, when conditions require hard bronze bear-

*From a paper presented at the semi-annual meeting of the Society of Automobile Engineers, June 12 to 16, 1916. Mr. Corse is manager bronze department and Mr. Comstock is metallographist, the Titanium Alloy Mfg. Company, Niagara Falls, N. Y.

Specifications and Results of Tests of Commercial Bronze and Brass Castings

Name of Alloy	Composition: Copper per Cent	Tin, per Cent	Zinc, per Cent	Lead, per Cent	Aluminum, per Cent	Iron, per Cent	Manganese, per Cent	Phosphorus, per Cent	Tensile Test: Yield Point, Thousands of Lb. per Sq. In.	Elastic Limit, Thousands of Lb. per Sq. In.	Ultimate Strength, Thousands of Lb. per Sq. In.	Elongation in 2 Inches, per Cent	Reduction of Area, per Cent	Hardness: Brinell	Sclero-scope	Compression Test: Elastic Limit, Thousands of Lb. per Sq. In.	Per Cent Reduction in Height After Loading to 100 000 Pounds per Sq. In.	Uses, Remarks, Etc.
Bronze	80	20						1 pr						126			3 4	Dies, bells, bearings, etc.
Grade A or Ledoux bronze	80	20						1 pr								25 40	6 10	In bridges for contact with hard steel under pressure above 1500 lb. per sq. in.
[illegible] phosphor bronze	80	20						0 2 pr								24 [illegible]		Disks for draw bridge
Grade B and [illegible] bronze	85	15						1 pr								19 25	12 25	In bridges for contact with soft steel at pressure below 1500 lb. per sq. in.
Special phosphor bronze	[illegible] 99							1 pr								19 25	12 16	Trunnion bearings
Lead bronze	82 5 84 5	15 8 11 2	1 1 2 9	0 8 1 2						15 19	5 27	1r 4	1r 4	20 24				Bearings and bushings
Gear bronze	85	14	1						23 25		17 19	2 3	1 4					Gears
Phosphor bronze	79 5	12		7 5				1			30 31	1 2		74 80				Bushings and bearings not subjected to shock
Tough bearing bronze	85 5 86 5	10 5 12	1 1 5 5	1 pr.		0 25 pr.	0 15 pr.			15 20	31 32	2 15	2 15		15 22			Bearings, gears, etc.
Stone's Turkish gear bronze	89	11							22 25		35 40	6 10	7 9	80		15 5 16 5	25 27	Gears and worm wheels
Gear bronze	89	10 5						0 5			31 35	6 10		72 77				Worm, spur and bevel gears
Gun metal (U. S. N.)	87 89	9 11	1 3	0 2 pr.		0 06 pr.			15 pr.		30 pr.	15 pr.						Valves, gates, etc., not where strength and incorrodibility are desired
Eagle bronze	85 7 89 3	9 11	1 5 2 5	0 3 0 8						12 16	26 34	10 22	9 21		14 18			Durable castings
Gun metal bronze	86 89	8 11	1 3								33 1	11 16						A. S. T. M. tentative specification
Bronze	88	10									32 38	14 18		70 74				Hard bearings, hydraulic work, valves, machine parts, etc.
Grade D bridge bronze	88	10	2					0 25 pr.			33	14				14 1		Gears, worm wheels, nuts, etc.
Gun metal	88	10	2						19 23		32 38	14 18	12 15	70 75		14 5 15	24 29	Bearings for heavy pressures and high speeds, thrust collars, steam fittings, hydraulic work
Bronze A (U. S. N.)	87 91	8 [illegible]	1 pr.	1 pr.		0 5 pr.		0 5 pr.			30 pr.	15 pr.						Water tightness and bearing qualities in thin sections
Cast phosphor bronze Pc Grade A (U. S. N.)	85 90	6 11	Remainder	0 2 pr.		0 06 pr.		0 3 pr.	25 pr.		50 pr.	25 pr.						Castings for strength and incorrodibility
Bronze	90	10							22 24		35 40	15 18	15 20	65 70		15 5 16	28 29	To resist acid, and for thrust collars and disks under high pressure
Bronze	90	10						1 pr.			25 pr.	10 14		67 70				Pumps, collars, bearings, and to resist corrosion
Bronze	89 5	10			0 5 Si pr.		Included in Cu pr.									15		Worm wheel rims; upper content includes manganese
Bronze	89	10		1							33					11		Worm gearing; safe working stress 2000 lb. per sq. in.
Bronze	88	10		2					19 23		30 35	15 20	18 26	65 70		15	28 29	Gears under moderately heavy pressure and to resist corrosion
Grade [illegible] (U. S. N.)	87 89	9 11	Remainder	0 25				0 75 1	20 25		35 pr.	18 pr.						Gear blanks
Bronze	87 89	9 11		0 25				0 75 1								15 20		Bearings not subject to shock
Phosphor bronze	89 pr.	10		10				0 25	20		30	6						S. A. E. specifications
Phosphor bronze	79 75	19		10				0 25			38 52	7		65 70				Bearings for high speeds and heavy pressures
Grade C bridge bronze	80	10		10				0 75 1								15 20		Ordinary machinery bearings
Bronze	80	10		10				0 5								18		Bridge bearings

Phosphor bronze	80	10		10					19-21		28-32	5-7	6-16	55-60		11-5-12	34-35	Standard for high speeds, heavy pressures, shock and vibration
Bronze	80	9-2		10				0-8										
Bronze	84	9-5		6-3				0-2			29-33	8-10		59-61		27	6-25	Slide valves, bearings, and for resisting acids
Bronze	88	8	2	2							31-37	16-20		57-59				Bearings, small valves, steam fittings
Free-machining bronze	87-8-89-8	7-7-8	0-4-3-4	1-5-2-3						11-5-15-5	21-31	11-15	7-15		8-12			Gear and pump castings.
Bronze	81	7	3	9					19-20		30-35	15-18	22-24	50-55		12-5-13	34-35	Inexpensive bearings
Bronze	78	7		15					17-18		28-31	12-18	17-23	48		11-12	38-39	Bearings for medium pressure and high speed
Bronze	90	6-5	2	1-5							34-40	25-33		54-57				Bearings, steam fittings, and for non-corrodibility
Bronze	90	6-5	2	1-5					18-22		34-40	25-33	26-34	50-60		12-5-13	33-34	Small automobile bearings, or for high speed and heavy pressure, and steam fittings
Bronze	85	5	5	5							27-33	16-20		59-63				Valves and bearings
Red composition, ounce metal	85	5	5	5					15-19		27-33	16-20	15-20	50-60		11-5-12	36	Pump lining, valves, steam fittings, and bearings
Bronze	89	7	3	3					16		34	26-31	29	40-45		11-5	34-35	Valves, steam fittings and metal patterns
Red brass	85	4	7	6					14-16		28-33	15-20	20-26	55-60		9-5-10	37-39	Valves and pipe fittings
Red brass	85	3	9	3							23-25	19-18						Oil and water pumps and trolley fittings
Red brass	83	2	5	10					10-11		19-23	7-13	11-17	34		7-8	46-47	Inexpensive bearings for low pressure and crosshead valves, fittings, etc
Bronze, 3, U. S. N.	60-70	1-a	25-37	1-a		0-5-a					25-a	15-a						Miscellaneous fittings not subjected to friction, or steam pressure
Natural color brass	74-5-77-5	0-8-1-2	21-23-3	0-3-1-2		0-2-a				7-11	22-28	23-33	15-25		6-5-9-5			Gilding, Water top over etc. for automobiles
Yellow brass	70	1	27	2					10-11		28-31	22-28	27-30	50-55		6	40	Light castings and ornamental work not requiring strength.
Yellow brass	69	1	30								28-32	22-28		57-59				Ornamental work
Bronze, 1, U. S. N.	55-62	1-5-a	Remainder	0-4-a	1-5-a	0-5-2	0-5-3-5				60-a	15-a						For strength in heavy work, substitute for steel in intricate designs, resistance to corrosion
Cast manganese bronze, Mn-C, U. S. N.	56-58	1-a	40-42	0-2-a	0-5-a	1-a	0-3-a		30-a		65-a	20-a						Castings requiring great strength
Manganese bronze	57-75-58-25	0-2-0-5	38-5-39-5	tr-0-2	0-5-a	1-05-1-35	tr-0-25			26-34	56-72	18-30	22-30		17-23			Strong castings
Manganese bronze	56	0-75	41-5		0-5	1	0-25				72-84	22-35		109-119				Propellers, engine brass and all strong castings
Manganese bronze	57	1	40		0-75	1	0-1			37-a	75	18	22					Strong casting
Manganese bronze	56	1	41		0-5	1	0-5		33		70	22-35	25	104-119		27-5-28-5	10-11	Propeller valve stem engine trimmings and castings requiring great strength and toughness
Manganese bronze	56-57	1	38-40			1-5										37-40		
Manganese bronze	53-62		36-45	0-15-a	0-05-0-5						70-a	20-a						Ingots for castings, A. S. T. M. specifications
Manganese bronze	60		40						30		60	20						A. S. T. M. specifications
Yellow brass	55		45								30-45	9-13		80-93				Low grade castings
Vanadium bronze, Vn-C, U. S. N.	64-a	1-a	35-a						22-5-a		55-a	25-a						Locomotive valves, crosshead, piston
Ferrite	64	0-2	29		3-1	1-2	2-5		30		98	16	17	130				Specification
Ferrobo	67		24		4-4		3-8	0-01								60	1	Railroad research
Titanium aluminum bronze	90				10				22-26		70	20	21	90-100		19-20	11-4	For strength, toughness, and resistance to corrosion
Aluminum bronze	90				9-9				25		71	21						Light. Report to Alloys Research Committee, Engineering Institute of Mechanical Engineers
Titanium aluminum bronze	89				10	1			24-30		70	24-5	27-3	92-96		18-20	13-15	For strength and resistance to wear, pressure of superheated steam
Cast monel metal, Mn-C, U. S. N.	Remainder			0-0	0-5	6-5-a	*60-a		32-5-a		65-a	25-a						Fittings, etc., and castings requiring great strength
Morel metal	27					6	67		37		78	38						

NOTES—*Nickel. —a—Maximum limit. —a—Minimum limit. Other figures show either approximate average or range. Compiled from 16 different sources. Not in each case the physical data came from the same authority as the corresponding chemical composition

ings, the tin content must be relatively high. It sometimes goes to 15 per cent in automobile work.

Lead also may go to 30 or even 40 per cent for special work, such as in racing cars, but its effect should be considered in relation to the tin content as well as by itself. It is a good lubricant in bronze. Present practice frequently calls for a combination bearing with a relatively hard back and a soft lining of babbitt metal. The selection of babbitt should be determined by the thickness of the lining, and pure tin or solder can be used if the lining is very thin.

SUMMARY AND CONCLUSIONS

In order to aid engineers in choosing the right alloy, we must first recognize several facts:

Standard test bar results do not necessarily represent the material in the castings. Wherever possible, secure tests from pieces cut from castings as a check on the properties the metal is shown to possess from test bar results.

The aid of competent foundrymen should be secured in making castings as the chemical analysis or standard test bar results do not tell the whole story.

The microscope is as important in determining the properties of bronze as those of steel. All that is needed is more information on the subject.

The endurance or fatigue test is an important aid in determining the quality of a bronze and like the metallographic test should be used to be appreciated.

The proper composition to use in automobile work depends on the kind of service required. For conditions requiring hardness, high tin is needed. If conformability is more essential, the lead content should be high.

Published data is very meagre, so that any additional reliable information will be a distinct gain to the literature of the subject.

(The paper also contains a large assortment of photomicrographs.)

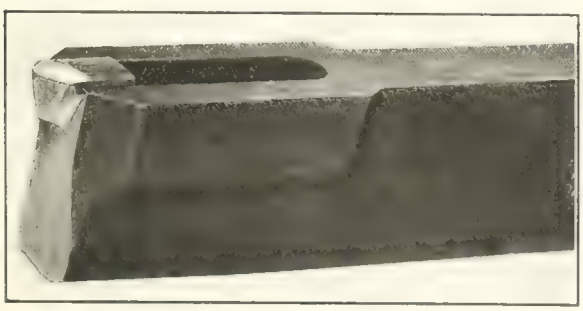
New Tool Employing Inserted Cutters

A tool in which reliance is placed upon the contraction of the holder due to cooling to hold an inserted cutter in position has been patented by H. P. Parrock, general manager Lumen Bearing Company, Buffalo, N. Y. It is of course designed for use in connection with metal-working machine tools. The holder may be made of ordinary steel, while the cutting point, say of high-speed steel or of Stellite, may be removed and replaced when worn out. Loss of high-grade material, as by grinding or sharpening the solid tool, is eliminated on account of the reduced cross-section of the cutting point.

The holder is made by drop forging, for example. The groove in the top face is ordinarily made slightly shallower than the height of the cutting point used, and the width of the groove is slightly less than that of the cutting point. The grooved end of the shank is heated and the cold cutting point forced into position in it. The heated side walls of the groove are then pressed or hammered to make contact with the sides of the cutting point and thus insure a tight fit between the two parts when the walls cool.

In some cases the cavity between the end of the cutting point and the end wall of the groove is filled with an infusible clay or molding sand and the upper face of the cutting point and the adjacent portions of the side walls of the groove projecting above the cutter are subjected to a welding heat, a puddle of molten metal being formed on the upper face of the inserted portion of the cutting point by feeding an iron wire into the welding flame. This is designed to form a welded connection between the upper face of the cutting point and the adjacent portions of the side walls of the slot, and the sand or clay prevents the metal from filling the cavity at the inner end of the cutting point. The welded connection, together with the shrink fit brought about by the forcing of the heated metal of the holder into contact with the cold cutting point, is relied upon to secure the cutting point firmly and rigidly in the holder.

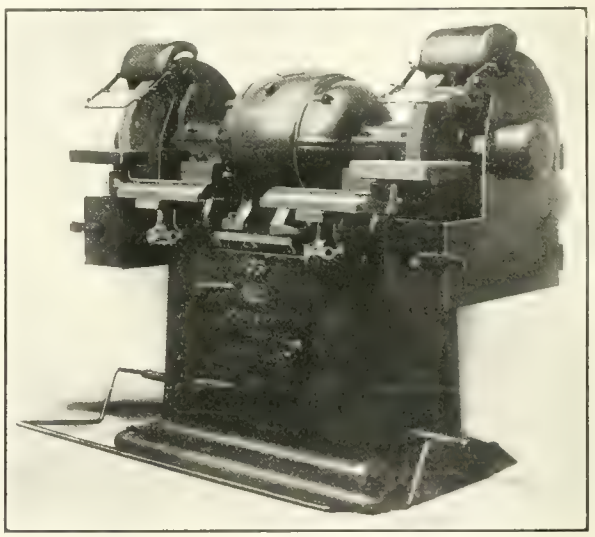
When desired to remove the cutting point, the metal welded to the upper face of the cutting point must be removed either by remelting or cutting out in a machine. The cutting point is then removed by driving a tool into the wedge-shaped cavity between it and the end wall of the groove and forcing the point out of the groove. If necessary the holder may be heated before driving out the cutting point.



In This New Type of Tool Reliance Is Placed upon the Contraction of the Holder in Cooling To Hold the Inserted Cutter Firmly

Specially Equipped Grinding Machine

The Ransom Mfg. Company, Oshkosh, Wis., has recently provided special equipment for its motor-driven machine mounting two 18-in. emery wheels. This includes a foot treadle for starting and stopping the machine and glass eye shields on the wheel guards.



A Two-Wheel Motor-Driven Grinding Machine Having a Foot Treadle Control for the Main Switch

In shops where grinding is done either occasionally or intermittently, it is pointed out that workmen often allow a machine to run continuously instead of shutting it off when they have finished grinding. The addition of the foot treadle is designed to correct this condition and reduce the power consumption, as it is necessary for the operator to put his foot on the treadle before the machine will start and as soon as pressure is removed the machine stops automatically. A single-pole switch is thrown in when the foot treadle is depressed and the wheel is brought up to speed by an automatic accelerating starter.

The guards used around the wheels are of the builder's style D which was illustrated in THE IRON AGE, Feb. 10, 1916. They are made of tank steel with the exception of the nut guard at the side, the exhaust pipe connection at the back and the adjustable trap at the top, these parts being steel castings. In addition a glass shield for the eyes is attached to the adjustable trap at the top to protect the workmen against sparks and flying particles. The heavier particles from the grinding wheel are caught in a box at the bottom, which it is pointed out eliminates chance of the exhaust pipe becoming clogged. The outer plate is hinged to permit the wheels to be changed or the accumulation of sediment from the box at the bottom to be removed easily.

SENATE'S BROAD ARMY BILL

Enlarged Opportunity Given War Department to Contract for Arms and Ammunition

WASHINGTON, D. C., Aug. 1, 1916.—If the House concurs in sweeping changes made by the Senate in the army appropriation bill just passed by that body, the War Department will be able to use a much freer hand in the purchase of arms and ammunition than under existing law and will be able to give a greater measure of encouragement to private manufacturers desiring to equip their plants for the production of war material made to United States Army standards.

The army appropriation bill as passed by the Senate carries $313,973,000, an increase of no less than $131,000,000 in the measure as it passed the House and of $212,000,000 as compared with the appropriations for the fiscal year ended June 30, 1916. The total defense budget, including the army, navy, fortifications, military academy and army and navy deficiency bills, has now been brought up to the huge sum of $685,343,000.

The appropriation of $4,500,000 made by the House for the manufacture of ammunition for small arms was increased by the Senate to $12,776,000. The House provision that not more than $2,000,000 of this appropriation might be used in the purchase of ammunition was stricken out by the Senate, leaving the entire sum available for that purpose, subject to the proviso that "the Government shall manufacture at its arsenals as much of said ammunition as can be produced by the exercise of the greatest economy and efficiency."

THE PROVISION FOR EDUCATIONAL ORDERS

Under this appropriation the Senate retained the House provision setting aside $250,000 to procure "gages, dies, jigs, tools, fixtures and other special aids and appliances, including specifications and detail drawings, necessary for the manufacture by the Government and by private manufacturers of ammunition," but added an amendment giving the Secretary of War full discretion in the matter of the placing of so-called educational orders to concerns in whose plants special equipment has been installed. This amendment provides that "in the expenditure of this sum, the existing laws prescribing competition in the procurement of supplies by purchase shall not govern in orders not to exceed $50,000 in any one case and in the purchase of lots of ammunition to complete the object of this proviso."

In connection with the appropriation for "manufacturing, repairing, procuring and issuing arms at the national armories" the bill as passed by the Senate also provides that $200,000 of the $2,500,000 appropriated may be used for the equipment of private concerns to manufacture such arms, and in this connection it is also provided that the requirement that contracts shall go only to the lowest bidder need not apply as to orders not exceeding $50,000 in any one case.

INCREASED APPROPRIATION FOR FIELD ARTILLERY

The Senate Committee on Military Affairs, being greatly impressed by the lessons of the European war as to the necessity for large increases in the amount of field artillery available for the arming of the National Guard, increased the House appropriation of $8,000,000 for this purpose to $14,200,000 and also raised the amount available for the purchase of field guns from private manufacturers from $4,000,000 to $11,200,000. The Senate was equally liberal in providing for a supply of ammunition for field artillery for the National Guard, increasing the House appropriation from $8,000,000 to $14,000,000 and raising the amount available for purchasing ammunition from private manufacturers from $4,000,000 to $8,000,000. In this connection also the Senate provided that $200,000 may be used for purchasing special equipment for private plants with competition waived as to orders not exceeding $50,000 each.

There will doubtless be speculation as to the construction that will be placed by the War Department upon the proviso attached to the appropriations for arms and ammunition that the Government shall manufacture at its arsenals as much as can be produced "by exercise of the greatest economy and efficiency." Obviously, great latitude is permitted the executive officers and there will be much opportunity for the exercise of judgment and discretion. Whether the restriction as to economical production is to be construed actually or relatively as compared with purchases made by contract or in the open market is an interesting phase of the subject. In any event, however, the War Department is no longer bound by hard and fast rules, and the officials of the Ordnance Bureau may safely be trusted to exercise an intelligent discretion in the matter.

W. L. C.

Progress in the Industrial Preparedness Inventory

More than 30,000 manufacturing concerns in the United States doing a business of over $100,000 a year are being inventoried by the Committee on Industrial Preparedness of the United States Naval Consulting Board, to say nothing of many smaller plants with equipment peculiarly suited to turn out material for the fighting line. The committee reports that its carefully worked out plans to teach American manufacturers now, in time of peace, through annual educational orders, how to turn out war munitions and all other military and naval supplies when needed, will be incorporated into law. It likewise seems probable, it says, that legislation will soon be passed adopting the committee's measure for an industrial reserve, so that in time of war the skilled mechanic shall be kept at home on the job where his services are most needed to feed the firing line.

This legislation comes during the closing days of the committee's three-month campaign, made with a volunteer, unpaid organization of business men and engineers. Although the industrial inventory had been making excellent progress, national conditions recently became such that Chairman Howard E. Coffin sent urgent telegrams to the chairmen of the committee's State boards directing them to make all possible haste to gather the industrial information. At the same time Secretary of War Baker detailed five officers of the regular army service, two of them members of the general staff, to the committee's offices in the Engineering Societies Building, New York, to assist in rushing the work to the limit and to gain immediate benefit for the Government of the large amount of data already obtained.

Only a few business men have refused to give the desired information, usually to yield on a fuller explanation of the committee's purpose and the country's need. Reports from the State boards serving the main committee include the following noteworthy items:

An indication of how the inventory may create new industries is the opinion of Florida experts that while charcoal is not manufactured to any extent in the State considerable quantities could be produced in the time of great demand.

In Chicago there are more than 500 chemical and metallurgical plants to be studied. For added speed in securing the inventory for Illinois, engineering experts are working in conjunction with the Chicago Association of Commerce and the Illinois Manufacturers Association. Things are in good shape there. The chairman is Frederick K. Copeland, president Sullivan Machinery Company.

Indiana's canning plants could supply all the canned food that would be required to feed an army of any size that the United States might ever have to put in the field.

In the great agricultural State of Iowa a surprisingly large number of industrial plants, including railroad shops, has been inventoried.

The board of Nebraska has discovered a railway-motor manufacturing company that could transform its equipment to turn out 1000 high-explosive shells a day and could make guns if necessary.

In New York State it was even recently discovered that a silversmith is making thousands of cartridge cases a day for the 75-mm. guns, and caps for small arm cartridges and bullet jackets at the rate of several million a week. This firm is also equipped to produce complete lines of ammunition for field guns.

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The Eastern Steel Trade's New Era

American steel manufacturers are too busy meeting the war's demands to take serious account of the changes war conditions have already made in the alignment of the competitive factors in the home industry. There will be much to say under this head when peace comes and the steel trade attempts to find itself, in the recasting of the lines of domestic and international competition. One phase of the transition may be referred to now, however, as among the changes whose significance is apt to be passed by, in all the engrossment of unparalleled sales and profits. It is the new place the Eastern steel industry has taken as the result of the two mergers of the past nine months.

For years the possibilities of a greater steel industry on the Atlantic seaboard or in the territory immediately tributary thereto have been discussed. More than one project has been promoted, based on Eastern magnetites and imported ores, with the outlet on the one hand of a home trade in vessel, structural and railroad steel, and a variety of wants of Eastern metal-working industries, and on the other hand of an export trade having the advantage over Pittsburgh of eliminating the long rail haul to the sea and expensive lighterage. Now and then the way seemed opening for the realization of some of these plans. But the Sparrows Point enterprise, for which much was hoped, was not an encouragement to further investment, and the Staten Island steel works ended in receivership; though neither of these, for reasons apart from location, was representative of the seaboard possibilities.

Less than a year of highly profitable export and domestic business and two or three rapid moves in the consolidation of important interests have set two strong companies far on the way toward realizing the long deferred hope for the steel industry of the East. The one, with a $30,000,000 program of new plant at tidewater, to be built largely out of the profits of war contracts, looks to a permanent export trade in a variety of steel products, including rails, bars, plates, tin plates and wire, and to a large share in the development of American shipping, while its inland plants have a still greater career ahead in railroad, structural, ordnance and specialty lines. The other, with important bases in Government, shipyard, railroad equipment and specialty work for its two Eastern steel plants, is now engrossed with munitions orders, and having besides the most profitable line in domestic trade, with early delivery plates at 3.50c. to 4c. a pound, is rapidly adding to its resources. Its plants west of the Alleghenies and its large holdings of Lake ore give it a position in the Central West—the best steel consuming district in the country—which strongly reinforces its seaboard and near-seaboard undertakings. A second year of war trade and of home prices made by the war promises to make both companies so strong in resources as to insure a commanding position in the Eastern steel trade for years to come.

It thus comes about that the European war has done more in a year to bring in the long looked-for new day of the Eastern steel trade than twenty-five years of promotions and theoretical discussions of the Atlantic seaboard's advantages as a future situs of profitable steel-making.

Trade After the War

It is a very impressive fact that the Allies have been getting together to make plans and agreements as to what they will do commercially after the war. It is quite unusual for a country to determine that when the war with its enemy is finished and a peace treaty is signed it will not trade with its former enemy. If the Allies feel that way, it is an enterprising thing to complete their agreements with each other while the war is at its height, for to take up such matters at a time when peace negotiations are in progress would be embarrassing all around, and to attempt to formulate arrangements after peace had been declared would be to invite the most serious difficulties among the Allies and with their former enemies.

These negotiations are strongly suggestive of the great trade awakening that should make very active business after the war. There are two other important facts that indicate great commercial activity after the war, facts that do not always seem to be given their full weight in the many discussions of after-the-war conditions.

One of these facts is that for many years prior to the war it was generally recognized that business would be better if there were no war cloud hanging over Europe. While nearly everyone was startled by the explosion, it was far from being something that had not been referred to as a distinct possibility, and that not for one or two years but for many years. The fear of a European war was al-

most an incubus, and now that incubus is removed, so that at length business will have an added tendency to expand.

The other fact to which attention should be directed is that one of the proximate causes of the war was the expansion the Allies, and particularly Russia, were undertaking. That was one of the things that kept Germany so on the alert. Thus the present plans for commerce after the war are not entirely new, but had their origin before the war started, and this fact gives the matter so much the greater weight.

The plans of Russia before the war were not well advertised by any means, and, of course, information is now held back as much as possible. It may be recalled, however, that the project to furnish Russia with an Arctic port open all the year round was undertaken well before the war started. Archangel becomes ice-bound by winds at certain times massing the ice. Five hundred miles to the west is the harbor of Ekaterinenhaven, open the year round because the Gulf Stream penetrates to its vicinity, and the building of a connection between this harbor and Petrograd, some 800 miles, was undertaken before the war, a short stretch by private capital and the major part by the government. The Russian demand for rails indicates that this is but one of several projects, including probably a completion of the double tracking of the Trans-Siberian railroad, but precise information as to these other projects is lacking.

Our exports of rails to Russia furnish concrete information of no small value. These exports, in gross tons, have been as follows:

	Russia in Europe	Russia in Asia
Last half, 1915	82,509	117,386
January, 1916	4,653	19,136
February	9,963	4,596
March	9,076	6,315
April	8,280	857
May	0	8,901
Eleven months	114,481	157,192
To both Russias		271,673

It may be surmised that the shipments to Russia in Asia are entirely for the Trans-Siberian, but of course this is not certain. The latest rail orders placed by Russia are chiefly for a section of 67½ pounds, which would run 106 tons to the mile, so that the shipments to Russia in Europe in the 11 months ending May might represent 1080 miles of track. Estimates made late last year ranged about 335,000 tons for the rails bought by Russia in the United States during the year, which would indicate that with 271,673 tons shipped up to June, and additional orders placed lately, there is still due Russia about 400,000 tons of rails, enough for perhaps 4000 miles of track in addition. Only a relatively small fraction of the rails purchased can be assumed to be for direct prosecution of the war.

Russia had many other ambitious projects, as is suggested by the fact that before the war there had already been undertaken a complete water supply and complete sewerage system for Petrograd, to cost in the neighborhood of $100,000,000, while a union station was planned for Moscow, the nine roads reaching to the city having thus far extended only to the outer line of the fortifications, from 2½ to 4 miles from the center of the city.

Thus, with the plans undertaken before the war, the removal of the war incubus, and the fresh plans developed during the war, there is a cumulative influence in the direction of trade activity after the war. That Russia is able to finance railroad building during the war strongly suggests that the financing of new projects after the war will not be as difficult as has been feared in some quarters.

Figuring Burden in Future Costs

Overhead costs were never a more uncertain factor than at the present time. The manufacturer's books tell him just what they amount to and also their exact relation to productive labor, process hours, machine hours or whatever other basis he may employ in apportioning burden in the cost of his products. But the figures apply with accuracy only to work actually done to date. The cost of a product cannot be determined until it is completed.

Therefore, in considering the future everything must be more or less of an estimate, no matter how detailed and exact the system of cost keeping. And in the estimate overhead must be considered as a variable whose ratio to the base may increase or decrease in a large way and possibly with astonishing suddenness. At present the percentage to be added to productive labor cost or to any other base is very low, in spite of the high price of labor, because the volume of business is so large that the distribution of burden is a broad one. Probably about low level has been reached.

How alterations in business conditions affect the overhead percentage, and consequently the cost of a product, may be illustrated by the supposititious case of a machine tool, the figures being close enough to the actual to preclude exaggeration. In the works where the machine is manufactured the total productive labor cost of the department two years ago was $50,000, and the total overhead apportioned it was $60,000, giving an overhead percentage of 120. The books at the present time show a total labor cost of $100,000 and an overhead of $75,000, or 75 per cent. Two years ago the productive labor cost of the machine was $200; the added 120 per cent made a total cost, excluding material, of $440. To-day the productive labor cost of the same machine is $240, and the added overhead of 75 per cent brings the figure to $420. In spite of the increased cost of labor and the increased total of overhead, the actual cost of the machine without material is less than it was before business became good. This condition is true of many products, because manufacturing is on so large a scale. In one comparatively small works building machine tools overhead has dropped from 120 to 65 per cent.

On the other hand, it takes no great drop in the volume of business to increase the overhead percentage and the cost of the machine. Supposing the total productive labor drops to $70,000 because men have been laid off, business having let up somewhat, and at the same time total overhead falls to $70,000 likewise. The latter item is more gradual in its shrinking always. The overhead percentage

thus jumps to 100. The labor cost of the machine does not decrease immediately; men may be dismissed, but it takes time to procure a reduction in the wages of employees as individuals. Consequently the cost of the machine increases from $420 to $480, a pretty serious advance.

The above goes to show that in looking to the future some safer estimate of overhead than the prevailing figure is necessary. Some firms strike an average of the percentages covering a period of years and, to get at a cost upon which to base a price, add this to an estimate of productive labor and material. Then, if business lets up before the product is ready for the customer, it is reasonably certain that no error has been made on the wrong side. To use this higher percentage naturally results in higher prices; but when conditions are such as to make this sort of figuring necessary, customers are not complaining very much about what they have to pay.

Canadian Car & Foundry Meeting

At the recent annual meeting of the Canadian Car & Foundry Company, Ltd., held in Montreal, President Nathaniel Curry said that the profits of the company and its subsidiaries for the first nine months of the present fiscal year amounted to $1,178,353. After taking off $298,000 for depreciation and renewals and $480,717 for bond interest, the net earnings were $398,742, which more than takes care of the preferred dividend. In addition to the $298,000 written off for depreciation, $600,000, the purchase price of new machinery, was written off. This was on home business, irrespective of Russian business.

Bringing the business up to date, President Curry reported that on July 22 unfilled orders on the books of the company amounted to $12,664,000. Of this total $4,281,000 is held by the Canadian Steel Foundries and the balance by the Car Company. Of the total orders $6,949,545 is regular car business. The Canadian Steel Foundries has an order of $3,202,000 for munitions.

Regarding home business, he said that it was the best in two years. Many of the railroads were already buying cars and must soon be in the market for more. Explaining the export car business, he stated that some of this had to be completed at a loss. It was new business that had to be learned, but was going along nicely now. He contended that, though the company had earned its preferred dividend this year, it would be impossible to resume payments until it had got back the $3,500,000 expended on Russian business. There might, he thought, be some hope of a dividend in January.

New Company to Make Steam Turbines

The Moore Steam Turbine Corporation, Wellsville, N. Y., has been organized with an authorized capital stock of $160,000 to build single and multi-stage steam turbines from 5 to 1000 hp. J. L. Moore, formerly chief engineer of the Kerr Turbine Company, is president; J. B. Laird is vice-president and E. D. Spicer is secretary and treasurer. The officers were formerly connected with the staff of the same company. Plans have been drawn and the contract will be let for a two-story reinforced concrete factory, 80 x 100 ft.

Chester Shipbuilding Company Expanding

The Chester Shipbuilding Company, Chester, Pa., operating what was formerly the John Roach shipyard, is reported to have bought the nearby property in Chester on which the Duplex Metals Company's plant is situated. It is on the Delaware River and has a frontage along the Reading Railroad of 560 ft. Since the Duplex Metal Company closed down, over a year ago, the plant has been used for storage purposes. The shipbuilding company will launch its first vessel early in August.

INSTITUTE OF METALS

Papers for the Cleveland Convention—Exhibition Space Much More Than in 1915

The tentative program for the annual meeting of the American Institute of Metals at Cleveland, Sept. 11-15, in connection with the convention of the American Foundrymen's Association, has been compiled by the secretary, W. M. Corse, and contains the following papers:

"Recrystallization of Metallics from the By-products of Foundry and Manufacturing Plants," by A. F. Twaddell, Hammond Laboratory, Yale University, New Haven, Conn.

"Method of Selling Non-Ferrous Scrap," as Pursued by a Large Producer," by J. M. Bateman, Western Electric Company, Cleveland.

"The Result of Joint Work of Casting and Testing the 88-10-2 Alloy by Five Foundries, Report on the Use of the Deoxidizers of Bronzes and Report on the Aspects of Bronze Failures," by various experts affiliated with the U. S. Bureau of Standards, Washington, D. C.

"Copper-Aluminum-Iron Alloys," by W. M. Corse, Titanium Alloy Mfg. Company, Niagara Falls, N. Y.

"Tests on Rolled Brass Sheets Taken in the Direction of Rolling and at Right Angles to the Direction," by W. B. Price and P. H. Davidson, Scovill Mfg. Company, Waterbury, Conn.

"The Application of Oxy-Acetylene Welding Process in the Repair of Defective Non-Ferrous Castings," by S. W. Miller, Rochester Welding Company, Rochester, N. Y.

"Continuation of Discussion in Connection with Defective Bronze Castings in Use by the Board of Water Supply of New York City," by A. D. Flinn, Board of Water Supply, New York.

"Evolution of Die Casting Process," by Charles Pack, Doehler Die Casting Company, Brooklyn, N. Y.

"Disclosure of Blowholes by Means of X-Ray Apparatus," to be reported by testing engineers employed in laboratory D of the General Electric Company, Schenectady, N. Y.

"Aluminum Castings and Forgings," by P. E. McKinney, U. S. Navy Yard, Washington, D. C.

"Annealing Properties of Copper," by G. W. Ceaser and G. C. Gerner, Hammond Laboratory, Yale University, New Haven, Conn.

"Metallography as Applied to Non-Ferrous Metals," by W. W. Arthur, Frankford Arsenal, Frankford, Philadelphia.

"Heat Treatment of German Silver," by G. C. Holder, American Optical Company.

S. D. Sleeth of the Wecstinghouse Air Brake Company, Wilmerding, Pa., and Mr. Barnes of the Fort Wayne Electric Company, Fort Wayne, Ind., will present papers at the session which is to be devoted exclusively to the discussion of brass foundry practice, and papers also will be read by F. L. Antisell, Raritan Copper Works, Perth Amboy, N. J., and by Mr. Bragg, Ohio Brass Company, Mansfield, Ohio.

The managers of the foundry exhibition, which will be held in the Coliseum at Cleveland in the week of the foundrymen's conventions, state that 50 per cent more space has been sold already than was taken at the Atlantic City exhibition of last year. A temporary building will be erected opposite the Coliseum which will afford 10,000 sq. ft. additional floor space.

A meeting of the Cleveland reception, entertainment and plant visitation committees was held at the Hollenden Hotel on Thursday, July 27, and the principal entertainment features were then announced. There will be a trip to the ball park Tuesday afternoon, Sept. 12, for the game between Cleveland and Detroit; a trip to Euclid Beach Park Tuesday evening in special cars, tickets being furnished to all concessions; an inspection trip Wednesday afternoon to the Cleveland Furnace Company's blast-burnace plant on the Cuyahoga River flats, and entertainment at Keith's Hippodrome Wednesday evening. A luncheon will be given the ladies at the Hotel Statler and on a later day an automobile ride. The annual banquet will be held Thursday evening at the Statler, with Irving Bacheller as one of the speakers. Plant visitation will be limited to Thursday and Friday. Arrangements have been made thus far for the inspection of the plants of the Ferro Machine & Foundry Company, Allyne-Ryan Foundry Company and Westinghouse Electric & Mfg. Company.

Senate Puts Its Stamp on Inefficiency

Grotesque Ignorance Concerning the Purpose and Method of Time Studies —Labor Union Orders Again Obeyed

WASHINGTON, D. C. AUGUST 1, 1916.—Pursuant to the understanding reached a fortnight ago, the final chapter in the farcical performance by which Congress will deprive all Government establishments of the right to employ efficiency systems was enacted in the Senate on July 26 when, by a vote of 36 to 15, 44 Senators not voting, an amendment drafted by the Committee on Military Affairs striking out the House provision prohibiting the use of scientific shop management in Government factories was rejected. There have been many disgusting exhibitions of ignorance as to what constitutes scientific management, since this important question first came before Congress, but the debate in the Senate on the army bill just concluded bears off the palm, not only for utter lack of accurate information on the part of the opponents of efficiency, but for reckless misstatement of every important fact in connection therewith.

Whatever opportunities to handicap the manufacturing establishments of the Government the labor leaders may have overlooked a year ago, when they failed to secure the complete prohibition of efficiency systems in the arsenals, they have done a very comprehensive job in the present session. Specific prohibitions against the use of any time-measuring device and against the payment of bonuses or premiums have been incorporated in the Army, Navy and Fortifications appropriation bills, which provide the funds for the support of the entire military establishment of the Government, and also in the Sundry Civil appropriation bill from which are paid the salaries and wages of all civilian employees engaged in any form of manual labor. Thus, at a time when the Government is facing the most serious emergency it has confronted in half a century, Congress has deprived it of every means of developing the efficiency of those branches of the public service upon which the safety and general welfare of the country depend.

EGREGIOUS IGNORANCE OR WORSE

In deference to the unanswerable arguments presented by General Crozier, chief of the Ordnance Bureau of the War Department, the Senate military committee reported an amendment to the army bill striking out the provision adopted in the House prohibiting efficiency systems in the arsenals. This action of the committee was sharply assailed on the floor by Senator Martine of New Jersey. A fair illustration of the gross misrepresentation employed by the opponents of scientific management in Congress is found in the following extract from Senator Martine's remarks:

> Of course, we cannot prevent the installation and operation of such systems in private institutions, in mills and plants operated by private parties, but to me the whole thought is so barbarous that in my opinion our Government should have no connection with it, but should spurn it and drive it out of every plant under its control. I refer to the system known as the Taylor system.
>
> Mr. Taylor, I believe, at one time was a laborer. He found it wise, for purposes of his own or for the profit of his employer, to inaugurate the so-called Taylor system, which is a time-watch system. We can all tolerate—I can, I know—a time watch being held over a race horse to find out what he may accomplish in a given time, but to have an officer of the Government hold such a watch over a workman in the employ of the Government, a workman who is doing his honest best for his employer, I feel is most humiliating and belittling and contrary to the spirit of American institutions.
>
> I do not believe that the God of humanity breathed the breath of life into man that he should live to work, but that he should work in order to live, and there is a very wide difference between the two.

Continuing, Senator Martine declared that an employee of the Post Office Department had been "placed under a time watch and driven on to see how much he could accomplish" until he "suffered a mental collapse and was taken to the asylum"; but upon being questioned by his colleagues, the Senator admitted that he did not know the name of the man referred to nor could he state where he was employed.

SANITY AND TRUTH

The chief defender of efficiency systems in the debate on the army bill was Senator Weeks of Massachusetts, who lives within a few miles of the Watertown Arsenal and is thoroughly familiar with the operation of scientific management in that institution. Senator Weeks sharply assailed Senator Martine's description of efficiency systems, declaring that if the picture drawn were accurate there would not be a vote in the Senate in favor of continuing such methods. Senator Weeks explained that the time study was limited to the planning room and that the picture drawn by opponents of efficiency systems of men laboring breathlessly under a stop-watch held by an overseer was purely imaginative. Continuing, he said:

> I went through the Ford shops in Detroit not very long ago. They are a marvel of industrial efficiency, I should say. There was one thing particularly which I noticed, that is, that most of the men, or very many of the men, stood at a machine and simply started and stopped it. They did not have to change their positions in any way. The operation was so developed that a man did one thing, and generally he did not have to move more than a foot or two in order to do that thing, especially when they came to assemble the parts of the cars; the material never stopped from the time it was placed on a traveling sidewalk, as you might call it, until somebody jumped into the seat of the car and off it went under its own power. Everything was so systematized that there was not a lost motion, and I should say there is not a lost motion in that manufacturing establishment. This arrangement makes a tremendous saving in the cost of manufacture; that is exactly what the people at the Watertown Arsenal, and I think now at one or two other arsenals, have undertaken to do in behalf of the Government.

INEFFICIENCY AT A TIME OF CRISIS

After paying a tribute to Mr. Taylor's work as a pioneer in the establishment of efficiency systems, Senator Weeks declared that the country was now facing a crisis which could only be satisfactorily met by the development of efficiency in every possible direction. He said:

> Now, what kind of a position are we going to be in when this European war is over, Mr. President, if we are to say to our people, "You shall not adopt efficient methods"? We know that Germany, for example, has developed itself and its people enormously because they have done just that thing. At the end of the war we are going to see millions of thoroughly trained men return to industrial pursuits, in addition to the competition which we are meeting today; and I believe that if the very leaders in labor circles who are in favor of this general legislation known as the Tavenner bill would take into consideration the broad problem of competition with European workmen they themselves would be in favor of the adoption of this system as it has been carried out at Watertown.

Senator Weeks quoted from letters in support of scientific management in Government establishments recently written by Elmer A. Sperry and Frank J. Sprague, members of Secretary Daniels's Naval Consulting Board, and placed in the record a large number of communications from manufacturers in a dozen different industries and from employees in Government and private establishments where scientific management is in use.

Senator Reed of Missouri spoke at length against scientific management, disclosing abject ignorance as

to its practical operation as will be gathered from this extract from his remarks:

In order to determine what a workman is doing, as I understand the system—and I speak of it in the rough—if the expert has determined that a certain job ought to be done in 50 minutes, when a workman starts at that job the stop watch is started, and when it has run the 50 minutes the stop watch stops. If it takes the workman an hour longer to complete the job, he gets no pay for that additional hour; but if he gets through with his job in 40 minutes, he not only gets the price he would receive if he did it in 50 minutes, but he gets an additional price. So that the premium is put upon speed—not upon the care or skill with which the work is done. If it be up to a standard sufficient to pass at all, a premium is put upon speed.

A strong appeal to the Senate not to discredit the Government and the Senate itself by assaults upon efficiency methods was made by Senator Thomas of Colorado, who said in part:

We must, legislation or no legislation, recognize the right of a man who possesses faculties superior to those of his fellows to enjoy the benefit of them in any system, regardless of what his calling may be. We recognize the right in every other department of life. We send our children to school and spur the ambition of each to exceed his fellows. Every system that will hold the ambitious down to the level of his less fortunate fellows will be repudiated by the common sense of every thinking man and woman in the country. The same is true in the professions; the same is true everywhere; and it will always be true, regardless of human legislation, as long as time shall run. There is no equality in nature; there is no equality of physical and mental endowment among men.

What is efficiency, Mr. President? One homely definition would be, the best way of doing things. I understand it is the purpose of the Government to follow that method of procedure which will enable it to ascertain the best way of doing things, so that it can compete with those great private institutions engaged in the manufacture of the articles which the Government proposes to make for itself, and just in proportion as we place handicaps on the Government just in that proportion will its attempt to compete with private institutions fail, and the Government manufacture will be a failure because of the contrast that its cost of production will present to that high state of efficiency prevailing in private circles and to which no just complaint can be made.

Upon the conclusion of Senator Thomas's remarks the vote was taken, resulting in the rejection of the committee amendment and leaving the prohibition of efficiency systems as adopted by the House in full force and effect.

W. L. C.

RECORD TUNGSTEN ORE OUTPUT

The United States Now the Largest Producer—Imports and Consumption

The tungsten production of the United States in the first six months of 1916 exceeded the production of this or any other country in any previous twelve months. Prices were even more phenomenal, reaching more than ten times their ordinary level. The output was equivalent to about 3290 net tons of concentrates carrying 60 per cent WO_3, valued at $9,113,000, according to an estimate by Frank L. Hess of the U. S. Geological Survey. These figures are no less noteworthy when it is known that in 1915 much the larger part of the production was in the second half of the year, so that the total domestic output for the twelve months ended June 30, 1916, probably amounted to about 5000 tons.

Colorado has regained its lead in the production of these ores, and between Jan. 1 and June 30 marketed 1505 tons, valued at $3,638,000, of which the Boulder field furnished 1494 tons. California sold 984 tons. From Nevada 461 tons and from Arizona 175 tons are estimated to have been shipped. The quantities and values were approximately as follows: Ferberite, 1495 tons, $3,590,000; scheelite, 1404 tons, $4,322,000; wolframite, 201 tons, $613,000; and hübnerite, 185 tons, $587,000. In most countries the prevailing mineral is wolframite, and no other country approaches the United States in the quantity of ferberite or scheelite produced. The scheelite comes mostly from Atolia, Cal., but significant quantities are mined in Nevada, Arizona, Idaho and Connecticut.

The tremendous increase of prices caused by the need for high speed tools, of course, caused the great increase in production. At the beginning of the year ores carrying 60 per cent tungsten trioxide brought as much as $66 a unit, but by the last of March some ferberite sold for $93.50 a unit at the mills. Under the stimulus of these high prices production, not only in this country but in the world at large, has been at the highest point ever known. It increased faster than the consumption and soon overran the demand that would absorb the output at the extremely high prices prevailing, so that a drop in prices was inevitable. June closed with the price around $25 a unit, which was still much higher than any price known before this year. The highest price previously reported to the Geological Survey was $15 a unit, paid in 1907. The normal price has been $6 to $7.

In the six months 40 mills of various types and sizes were in operation part or all of the time on tungsten ores, and at the end of June 14 were under construction. In the tungsten mining camps the excitement that followed the increase of prices was similar to that caused by important gold discoveries. Nederland, Col., a little village of two or three dozen homes, suddenly became a town of 3000 or more inhabitants. East of Nederland two settlements, each containing several hundred people, sprang into existence. Atolia, Cal., a camp of 60 or 80 people, grew to more than 1000.

In the Boulder region, Colorado, 10 mills, six of which were new, were in operation. Besides these, at the end of June five old mills were being overhauled to work on tungsten ores, and three new ones were under construction. In Arizona four mills were erected at Dragoon, three at Arivaca, and one at Yucca. In California two mills were reported under construction near Goffs and one near Nipton. At Atolia the mill of the Atolia Mining Company was burned, but was rebuilt and enlarged. In Nevada a mill was constructed and operated near Toy, Humboldt County, and four or more mills were constructed in the Snake range, in which tungsten deposits were found through a length of 50 miles.

The consumption of tungsten in the United States was even greater than was indicated by the ores produced, for all parts of the world free from the control of the warring European nations were drawn on for supplies, and during the first five months of the year 1520 tons of tungsten ore, valued at $3,449,311, were imported. The June imports were probably equal to the average of the five preceding months, making a total for the half year of 1824 tons, valued at $4,139,000. Most of the ore came from South America—Peru, Bolivia, Argentina and a little from Brazil—but some came from Japan and Mexico. Ten tons of tungsten metal and ferrotungsten, valued at $36,885, were recorded as imported. The exports for the first five months of the year amounted to 4906 lb., valued at $10,571.

If the American production and imports are added, the consumption seems to have amounted roughly to 5100 tons of 60 per cent concentrates, valued at $13,278,000. On the supposition that 20 per cent of the metal was lost in various operations, it seems probable that between 11,000 and 12,000 tons of new high speed steels were made during the period, in addition to the steel made from tungsten saved from scrap and scale.

Record Exports of Locomotives

In the 11 months ended May 31, 1916, 740 locomotives were exported, as compared with 216 and 364 for the like periods in 1915 and 1914 respectively. In 1915 the total number exported was 621, against 269 in 1914 and 491 in 1913. Of the 740 sent abroad in the last 11 months, 209 went to Europe, 209 to Russia in Asia, 103 to Cuba, 39 to Canada and 36 to Mexico.

A wire drawing plant for its own use is being installed in the factory of the Williamsport Wire Rope Company, Williamsport, Pa., and it is expected to be in operation by Dec. 1.

Hydraulic System in Modern Shell Plant

(*Continued from page 233*)

10-ton Shaw electric traveling crane that serves the entire floor and are carried down the shop floor and set in front of the furnaces. The boxes have an eye on each corner and are picked up by means of chains and hooks attached to the crane. After the second heating and drawing operation the formed shells are piled on trucks and conveyed by the crane to the cooling space near the north or shipping end of the press room. After cooling they are loaded on trucks and are conveyed by the tractors out to the shipping platform and directly on the cars. A depressed railroad siding brings the car floors on a level with the shipping platform.

UNIQUE HEATING SYSTEM

The heating system is unique, being designed especially to meet the requirements of the plant. Underground ducts for heating were not wanted because of the cost and there was no place for over-head ducts, and as a result a unit system of forced air circulation through Vento heaters was provided, which is extremely flexible and is regarded as well adapted to a plant of this character, where the heating requirements are to a large extent localized; no service from the heating system is of course required in the section of the plant near the furnaces. However, it is stated that this system would not be practical in a plant where it is desired to operate blowers during the summer for ventilation.

There are twelve separate heating units, each composed of a 22-in. turbo under-grate type of blower and five sections of 40-in. regular Vento radiation, each section consisting of seven loops spaced on 5¾-in. centers, arranged horizontally. The coils are inclosed in a sheet steel jacket at the top of which is located a steam turbine and blower. The Vento coils are heated by exhaust steam from the turbine. Steam comes to the turbine through a 1-in. supply line at 100 lb. pressure. A by-pass connection is made from the steam supply line through a reducing valve to the coils so that in the extremely cold weather, when the exhaust steam from the turbine is not sufficient for the heating, the supply can be augmented by live steam. The return is collected into one pipe and the condensation is taken care of by the Webster vacuum return system. The heated air passes out through a diffuser just above the floor that splits it, sending it out horizontally in three directions along the floor.

The blower displaces 11,000 cu. ft. of air per minute running at a speed of 5000 r.p.m. A test showed that air entering the heater at 68½ deg. left the coils at 150 deg. with the blower running at 3139 r.p.m. The heating equipment was furnished by the B. F. Sturtevant Company.

The toilet room facilities are unusually complete. Both hot and cold water is supplied at the wash basins, and in addition to the usual toilet accommodations and steel lockers 12 showers are provided, equipped with Power thermo shower control, maintaining a temperature of 110 deg.

The Haskell & Barker Car Company, Michigan City, Ind., has set its clocks one hour ahead for the summer. Work begins at 5.45 a. m. and stops at 4.30 p. m.; noon spell, 11.45 to 12.30. The new schedule gives six hours for work in the morning and four in the afternoon, employees thus gaining an hour of daylight for themselves for the afternoon.

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Magnesite Imports and Prices

Despite freer conditions as to the importation of magnesite from Greece, quantities now being received are far below normal, and the operating difficulties of steel manufacturers are very considerable. The following table of Government data shows imports in pounds in

		Per Month
January to June, 1916, 5 months	11,309,472	2,261,894
Year, 1915	55,146,407	4,595,534
Year, 1914	241,165,822	20,097,151
Year, 1913	335,867,672	27,988,972

The present import rate of about 3,000,000 lb. per month is thus but a fraction of the importations of about 28,000,000 lb. per month in 1913. The greatest source before the war was Austria. Magnesite brick have advanced from about $150 per 1000 before the war to $600 and $650 at present.

PIG-IRON PRODUCTION

A Further Falling Off in July

More Furnaces Go Out for Relining, Making a Net Loss of Six in the Month

By the special co-operation of the blast-furnace companies THE IRON AGE is able to send to press on Aug. 2 its pig-iron statistics for July. The total output of coke iron for the month, estimates being made for a few furnaces, was 3,229,819 tons, or 104,188 tons a day, against 3,211,588 tons in July, or 107,053 tons a day. Due to humidity, most furnaces fell short of their June rate and the number of furnaces compelled to blow out for relining is increasing. Thus July, with one day more, exceeded by only a small amount the output of the 30 days of June. Eleven furnaces were blown out last month and five were blown in, so that the number active on Aug. 1 was 319, with a daily capacity of 104,474 tons, against 325 active on July 1, with a daily capacity of 107,822 tons.

DAILY RATE OF PRODUCTION

The daily rate of production of coke and anthracite pig iron by months, from July, 1915, is as follows:

Daily Rate of Pig-Iron Production by Months—Gross Tons

	Steel Works	Merchant	Total
July, 1915	62,895	19,796	82,691
August	67,801	21,865	89,666
September	70,977	24,108	95,085
October	73,595	27,227	100,822
November	73,282	27,962	101,244
December	73,647	29,686	103,333
January, 1916	72,614	30,132	102,746
February	75,305	31,151	106,456
March	76,274	31,393	107,667
April	77,226	30,366	107,592
May	77,706	30,716	108,422
June	76,526	30,527	107,053
July	74,360	29,728	104,088

OUTPUT BY DISTRICTS

The accompanying table gives the production of all coke and anthracite furnaces in July and the three months preceding:

Monthly Pig-Iron Production—Gross Tons

	Apr. (30 days)	May (31 days)	June (30 days)	July (31 days)
New York	189,312	210,464	190,140	190,115
New Jersey	1,538	6,686	6,379	6,621
Lehigh Valley	112,210	117,870	111,689	104,835
Schuylkill Valley	90,753	94,254	93,552	89,811
Lower Susquehanna and Lebanon Valley	69,407	80,293	75,092	73,064
Pittsburgh district	752,068	750,303	728,071	736,652
Shenango Valley	191,700	195,867	172,259	178,903
Western Pennsylvania	165,790	167,913	157,909	169,412
Maryland, Virginia and Kentucky	90,584	94,302	85,687	89,967
Wheeling district	127,101	131,764	125,889	128,135
Mahoning Valley	309,045	324,739	315,675	314,461
Central and Northern Ohio	239,963	274,693	274,526	261,132
Hocking Valley and Hanging Rock	50,120	46,079	48,640	48,650
Chicago district	467,147	481,714	462,394	465,895
Mich., Minn., Mo., Wis. and Col.	119,634	127,278	123,116	120,985
Alabama	227,417	223,439	204,076	214,566
Tennessee	25,424	32,815	33,494	33,515
Total	3,227,768	3,361,073	3,211,588	3,226,719

PRODUCTION OF STEEL COMPANIES

Returns from all furnaces of the United States Steel Corporation and the various independent steel companies show the following totals of product month by month. Only steel-making iron is included in the figures below, together with ferromanganese and spiegeleisen. These last, while stated separately, are also included in the columns of "total production."

Production of Steel Companies—Gross Tons

	Pig, total production			Spiegeleisen and ferromanganese		
	1914	1915	1916	1914	1915	1916
Jan.	1,261,430	1,115,944	2,251,035	17,325	18,041	24,866
Feb.	1,329,414	1,237,280	2,183,845	10,524	13,319	23,877
Mar.	1,704,688	1,551,082	2,365,116	20,133	12,274	29,388
Apr.	1,683,226	1,584,111	2,316,768	18,676	12,337	31,862
May	1,447,847	1,694,290	2,408,890	21,504	13,440	35,844
June	1,329,623	1,770,657	2,295,784	16,244	19,200	38,597
July	1,395,851	1,949,750	2,305,148	16,574	17,854	30,786
Aug.	1,477,054	2,101,818		11,577	27,463	
Sept.	1,390,322	2,129,322		13,786	23,159	
Oct.	1,271,820	2,281,456		17,435	25,992	
Nov.	1,059,159	2,198,479		21,977	28,741	
Dec.	1,034,802	2,282,047		20,733	25,004	

CAPACITY IN BLAST AUGUST 1 AND JULY 1

The following table shows the daily capacity in gross tons of furnaces in blast August 1 and July 1 by districts:

Coke and Anthracite Furnaces in Blast

Location of furnaces	Total number of stacks	Aug. 1 Number in blast	Aug. 1 Capacity per day	July 1 Number in blast	July 1 Capacity per day
New York:					
Buffalo	19	17	5,555	17	5,950
Other New York	5	3	578		590
New Jersey	6	1	214	1	213
Pennsylvania:					
Lehigh Valley	20	12	3,494	12	3,362
Spiegel	2	2	202	2	195
Schuylkill Val.	12	10	2,897	11	3,133
Lower Susquehanna	6	5	1,376	5	1,510
Lebanon Valley	8	7	941	7	1,003
Ferro and Spiegel	1	0	0	1	90
Pittsburgh Dist	53	50	23,274	52	23,851
Ferro	3	3	300	3	372
Shenango Val.	19	18	5,771	18	5,942
Western Pa.	24	18	5,377	18	4,603
Ferro and Spiegel	1	1	108		103
Maryland	3	3	1,238		1,247
Ferro	1	1	104	1	108
Wheeling District	14	13	4,136		4,196
Ohio:					
Mahoning Val.	25	25	10,615	24	10,522
Central and Northern	24	21	8,427	21	9,154
Hock Val., and Hang'g Rock	15	11	1,608	11	1,657
Illinois and Ind.	35	30	14,666	32	15,425
Ferro	1	2	150	1	87
Michigan, Wis. & Minn.	12	10	2,603	11	2,952
Col. and Mo.	6	5	1,032		998
Ferro	1	1	169	1	153
The South:					
Virginia	18	9	1,070	8	989
Kentucky	5	4	498	4	458
Alabama	38	29	6,921	29	7,018
Tennessee	15	10	1,084	10	1,041
Total	404	319	104,374	325	107,822

THE RECORD OF PRODUCTION

Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1912—Gross Tons

	1912	1913	1914	1915	1916
Jan.	2,057,911	2,795,331	1,885,054	1,601,421	3,185,121
Feb.	2,160,815	2,586,237	1,888,670	1,674,771	3,087,212
Mar.	2,405,318	2,763,563	2,347,867	2,063,884	3,334,691
Apr.	2,375,436	2,752,761	2,269,655	2,116,494	3,227,768
May	2,512,782	2,822,217	2,092,686	2,263,470	3,361,073
June	2,440,745	2,628,565	1,917,782	2,380,827	3,211,588
July	2,410,889	2,560,646	1,957,645	2,563,420	3,226,719
7 mo.	16,303,696	18,909,420	14,359,360	14,664,237	22,637,172
Aug.	2,512,431	2,545,763	1,995,261	2,779,647	
Sept.	2,463,839	2,505,927	1,882,577	2,852,561	
Oct.	2,689,933	2,546,261	1,778,186	3,125,491	
Nov.	2,630,854	2,233,123	1,518,316	3,037,308	
Dec.	2,782,737	1,983,607	1,515,752	3,203,322	
Total, yr.	29,383,490	30,724,101	23,049,752	29,662,566	

DIAGRAM OF PIG-IRON PRODUCTION AND PRICES

The figures for daily average production, beginning January, 1909, are as follows:

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1909—Gross Tons

	1909	1910	1911	1912	1913	1914	1915	1916
Jan.	57,975	84,148	56,752	66,384	90,172	60,808	51,659	102,746
Feb.	60,976	85,616	64,090	72,442	92,369	67,453	59,813	106,456
Mar.	59,232	84,459	70,036	77,591	89,147	75,738	66,575	107,667
Apr.	57,962	82,792	68,836	79,181	91,759	75,665	70,550	107,592
May	60,755	77,102	61,079	81,051	91,039	67,506	73,015	108,422
June	64,656	75,516	59,585	81,358	87,619	63,916	79,361	107,053
July	67,793	69,305	57,841	77,738	82,601	63,150	82,691	104,088
Aug.	72,746	67,963	62,150	81,046	82,057	64,363	89,666	
Sept.	79,567	68,476	65,903	82,128	83,531	62,773	95,085	
Oct.	83,856	67,520	67,811	86,722	82,133	57,361	100,822	
Nov.	84,917	63,659	66,648	87,697	74,453	50,611	101,244	
Dec.	85,022	57,349	65,912	89,766	63,987	48,896	103,333	

The fluctuations in pig-iron production from January, 1908, to the present time are shown in the accompanying chart. The figures represented by the heavy lines are those of daily average production, by months, of coke and anthracite iron. The two other curves on the chart represent monthly average prices of Southern No. 2 foundry pig iron at Cincinnati and of local No. 2 foundry iron at furnace at Chicago. They are based on the weekly market quotations of THE IRON AGE.

Among furnaces blown out in July were one Bethlehem and one Crane in the Lehigh valley, Delaware River in eastern Pennsylvania, one Colebrook in the Lebanon valley, one Eliza in the Pittsburgh district, Ella in the Shenango valley, one Central and one

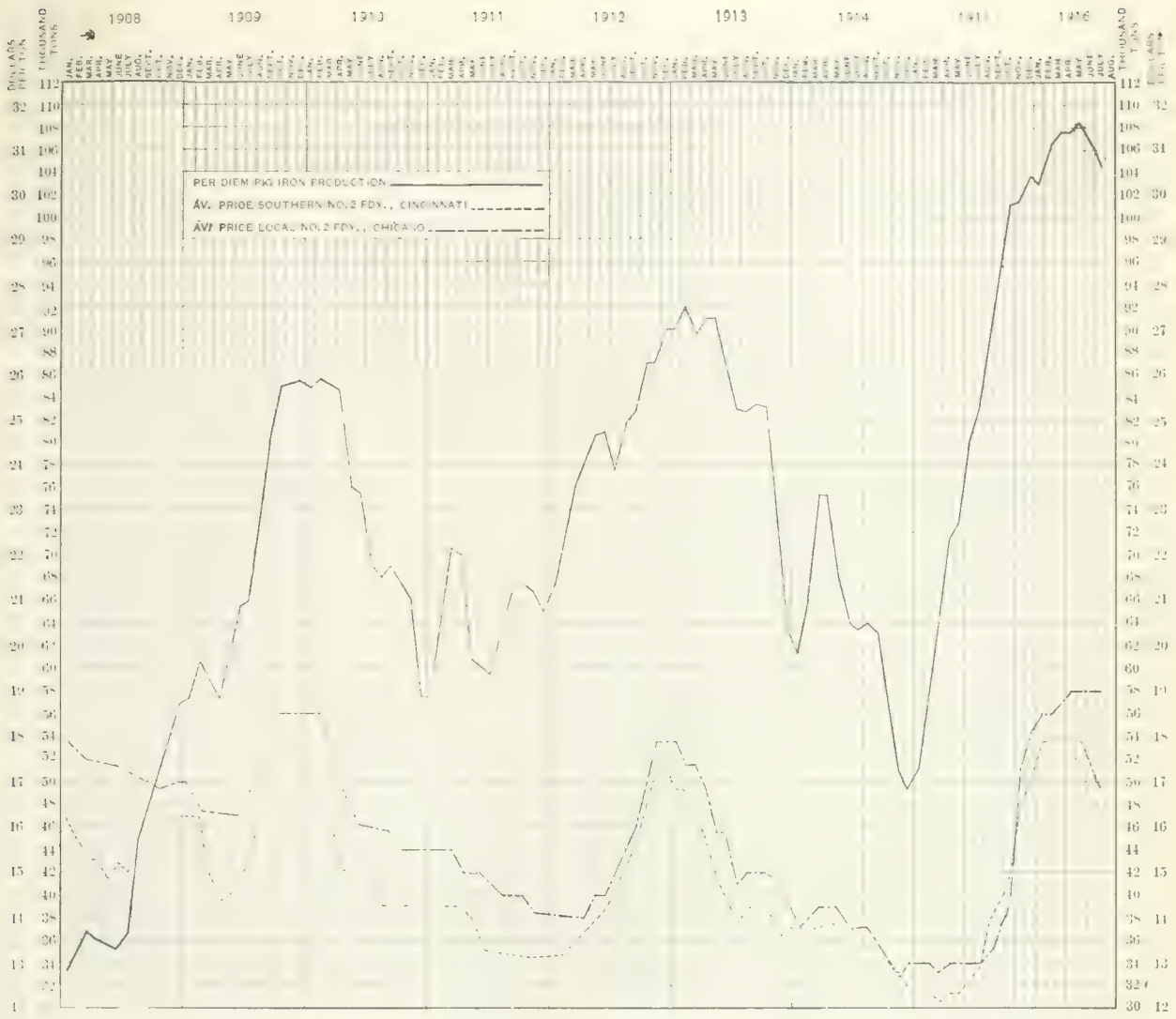


Diagram of Daily Average Production by Months of Coke and Anthracite Pig Iron in the United States from Jan. 1, 1908, to Aug. 1, 1916. Also of Monthly Average Prices of Southern No. 2 Foundry Iron at Cincinnati and Local No. 2 Foundry Iron at Chicago District Furnace

Columbus in Ohio, one South Chicago and one Gary in the Chicago district, one Bay View in Wisconsin.

The list of furnaces blown in last month includes Crumwold and Macungie in the Lehigh valley, Buena Vista in Virginia, Struthers in the Mahoning valley, and one South Chicago in the Chicago district.

Blast Furnace Operations

No. 2 furnace of the Wellston Iron Furnace Company, the larger of the company's two stacks at Wellston, Ohio, was scheduled to blow in on Aug. 3.

The furnace of the Bessie Furnace Company at New Straitsville, Ohio, was blown out July 11 for relining and for repairs to stoves. Blast was put on again Aug. 1.

The old Union works blast furnaces of the Illinois Steel Company at Ashland Avenue and Thirty-first Street, Chicago, were dismantled in July. These two stacks were built in 1881 and were rebuilt in 1889. They were last active in 1910.

One of the Bethlehem Steel Company's furnaces at South Bethlehem, Pa., has been blown out for relining.

The Woodstock Operating Corporation will blow in next week the Anniston, Ala., furnace it has been preparing for operation after a long idleness.

The Adamant Iron & Steel Company, Kent, Ohio, has begun the manufacture of high-speed and standard tool steel from iron and low-grade steel. It is stated that the process used is the same as that followed in making a new tool steel in Sheffield, England, that was referred to on page 1527 of THE IRON AGE of June 22. The company's furnaces are located at the plant of the Cleveland Steel Valve Company in Kent.

Record-Breaking Lake Ore Shipments

CLEVELAND, OHIO, Aug. 2, 1916. *(By Telegraph)*—Iron-ore shipments from Lake Superior mines again broke records during July, when the movement reached 9,750,157 gross tons, or a gain of more than 200,000 tons over June. The total for the season to Aug. 1 is 29,365,724 tons, a gain of 5,036,265 tons over the corresponding period in the record-breaking season of 1913. If the rate of gain is kept up, this season's water shipments will easily exceed 60,000,000 tons.

Ferromanganese Imports Above Normal

Ferromanganese imports in June, from Government data furnished THE IRON AGE, were 12,124 gross tons, the largest for this year or for any month since the war started. Imports in May were 8466 tons, and for the first five months, 46,488 tons. This is at the rate of 111,564 tons per year, which compares with only 55,201 tons for 1915 and 128,070 tons for 1913, the record year. The 5-yr. average (1910 to 1914) was 100,793 tons. The June imports were received as follows: Through Baltimore, 6471 tons; Philadelphia, 1910 tons; New York, 2998 tons; New Orleans, 595 tons; Norfolk, 150 tons.

The Iroquois Iron Company, Chicago, has purchased from the United States Smelting & Refining Company a large tract adjoining its present plant, which is a preliminary to the erection of another blast furnace. The construction of this stack will probably not be undertaken until more normal conditions and more normal costs of material are again in effect.

Iron and Steel Markets

LARGER EXPORT DEMAND

Home Prices Turn on Its Continuance

An Advance in Steel Bars—Pig-Iron Output Declines Further

The placing of additional contracts for large shells, deliveries in some cases running to July 1, 1917, is confirmed by negotiations for steel which have been actively under way in the past week. Apparently some of the companies taking shell orders have not yet covered in the steel market. Their requirements, added to steel which agents of the Allies are seeking to buy for the next nine or ten months, make a total estimated at 400,000 to 500,000 tons.

The effect on the situation, of war buying on a scale greater than was counted on a few months ago, is becoming the foremost issue in the domestic steel market. Consumers at home have relied on a waning munitions demand, the increase in steel-making capacity, and the cutting down of buying of certain steel products because of high prices, to work out lower prices for them when they came to buy for the late months of 1916 or the first half of 1917. There is, too, the factor of stocks in consumers' hands, due to the heavy specifying of many months, also the disappearance of the excited scramble for material that was marked six months ago.

Steel producers point not only to the large scale of the new buying for the Allies, but to the accumulating world demand for steel apart from war uses, which this country must satisfy if the war goes on another year or more.

In the face of the abstention of many consumers from the market and the active efforts of some for lower prices, as in the case of implement makers, the steel makers are less inclined to make concessions than in June and early July. On steel bars the Steel Corporation is understood to have advanced its price $2 a ton this week, or to 2.60c. Pittsburgh. Sales of bars have been made in the past week, however, at 2.50c. for forward delivery and Bessemer bars have been available at that price for delivery in two months.

As the bar market has been the storm center in the contest for concessions, the effect of this latest move will be closely watched.

At Pittsburgh steel billets have shown greater strength, and there are no longer offerings at concessions as in June and early July. Pittsburgh steel companies have made large sales of their shell steel discards, the amount taken by English buyers being put at 120,000 tons.

On the Pacific coast four new vessels have just been ordered, calling for 12,500 tons of steel. In railroad steel, there is a 14,000-ton order at Chicago from one of the Canadian systems; some delayed Western buying of nuts and bolts, in which the roads seem to have profited by waiting; an inquiry for 1000 twin hopper cars for the Delaware & Hudson, that will take 15,000 tons of steel, and the expectation that the Pennsylvania Railroad will ask for 5000 steel underframe cars.

In all districts the effect of unusually hot weather in cutting down output has been intensified in the past week. Some mills, therefore, have fallen further behind, whereas gains on order books were expected.

It will soon be determined how the balance will be struck in foundry iron prices between the lessened operations of foundries due to labor's holidays and the reduced pig iron output from the forcing out of furnaces for repairs. The weakness due to resale iron continues. In the Chicago district malleable pig iron has sold at 50 cents below the recent market.

Pig iron output suffered in July from excessive humidity and from the blowing out of more furnaces for relining. The total was 3,226,719 tons or 104,088 tons a day, against 3,211,588 tons in June or 107,053 tons a day—a falling off of 3000 tons a day. There was a net loss of six furnaces in the month, 319 being active Aug. 1, with a daily capacity of 104,374 tons, against 325 on July 1, with a capacity of 107,822 tons a day.

The effect of export sales of Bessemer iron as a stimulant to the pig iron market is wearing off. The only notable transaction in basic iron was the purchase of 25,000 to 30,000 tons by a southern Ohio steel company for delivery in the first quarter of 1917. There was sharp competition between Ohio furnaces for this business.

Lake Superior iron ore shipments again exceeded every record in July, with a total of 9,750,157 gross tons. The season's movement to Aug. 1 was 29,365,724 tons, or more than 5,000,000 tons in excess of the previous record to that date, made in 1913. If the present rate of gain can be kept up, the season's shipments can easily exceed 60,000,000 tons. Lake seamen are agitating an increase in wages, but serious trouble is not looked for in the operation of boats.

Pittsburgh

PITTSBURGH, PA., Aug. 1, 1916.

The excessively hot weather of the past three weeks and the indifference of labor have cut down the output of iron and steel products from 15 to 20 per cent. This is being severely felt by the mills, which, instead of catching up on orders, are getting further behind. A car shortage has also developed in the past week, and when the Western grain commences to move it will likely get more acute. It is said that important railroads are figuring on unloading box cars in the East in their yards and hauling the material in wagons and trucks to the boats in order that cars may be returned as fast as possible. The chief feature of the market continues to be the enormously heavy demand for semi-finished steel in the form of billets, sheet bars and ingots. There is also a heavy export demand for barb wire, beams up to 12 in. and some other products. Of the 200,000 tons of barb wire for Russia lately placed definitely or tentatively, nearly half went to three or four independent mills. The domestic inquiry has quieted down, buyers not now being in the mood to cover for last and first quarters, but they are expected to come in the market about September. The expected advance in wire nails and wire has not been announced, but may come at any time. The pig-iron market is quiet and firm, but on

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

Pig Iron, Per Gross Ton	Aug. 2, 1916	July 26, 1916	July 5, 1916.	Aug. 4, 1915.
No. 2 X, Philadelphia	$19.75	$19.75	$19.75	$14.50
No. 2, Valley furnace	18.25	18.25	18.25	12.75
No. 2 Southern, Cin'ti	16.90	16.90	16.90	13.15
No. 2, Birmingham, Ala.	14.00	14.00	14.00	10.25
No. 2, furnace, Chicago*	19.00	19.00	19.00	13.50
Basic, del'd, eastern Pa.	19.00	19.00	19.50	14.00
Basic, Valley furnace	18.00	18.00	18.00	13.00
Bessemer, Pittsburgh	21.95	21.95	21.95	15.20
Malleable Bess., Ch'go*	*19.00*	19.50	19.50	13.50
Gray forge, Pittsburgh	18.70	18.70	18.70	13.45
L. S. charcoal, Chicago	19.75	19.75	19.75	15.75
Billets, etc., Per Gross Ton:				
Bess. billets, Pittsburgh	**43.00**	42.00	42.00	25.50
O.-h. billets, Pittsburgh	45.00	45.00	42.00	22.50
O.-h. sheet bars, P'gh	45.00	45.00	42.00	23.50
Forging billets, base, P'gh	69.00	69.00	69.00	38.00
O.-h. billets, Phila.	47.00	47.00	46.00	30.00
Wire rods, Pittsburgh	55.00	55.00	50.00	26.00
Finished Iron and Steel, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.47½	1.47½	1.47½	1.25
O.-h. rails, heavy, at mill	1.56½	1.56½	1.56½	1.34
Iron bars, Philadelphia	2.659	2.659	2.659	1.35
Iron bars, Pittsburgh	2.50	2.50	2.50	1.25
Iron bars, Chicago	2.35	2.35	2.35	1.20
Steel bars, Pittsburgh	2.50	2.50	2.75	1.30
Steel bars, New York	2.669	2.669	2.919	1.469
Tank plates, Pittsburgh	3.50	3.50	3.25	1.25
Tank plates, New York	3.669	3.669	3.419	1.419
Beams, etc., Pittsburgh	2.50	2.50	2.50	1.30
Beams, etc., New York	2.669	2.669	2.669	1.469
Skelp, grooved steel, P'gh	2.35	2.35	2.35	1.25
Skelp, sheared steel, P'gh	2.45	2.45	2.45	1.30
Steel hoops, Pittsburgh	2.75	2.75	2.75	1.30

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire,	Aug. 2, 1916.	July 26, 1916.	July 5, 1916.	Aug. 4, 1915.
Base, to Large Buyers	Cents	Cents	Cents	Cents.
Sheets, black, No. 28, P'gh	3.00	3.00	3.00	1.80
Galv. sheet, No. 28, P'gh	4.00	4.00	4.00	4.00
Wire nails, Pittsburgh	2.50	2.50	2.50	1.60
Cut nails, Pittsburgh	2.60	2.60	2.60	1.75
Fence wire, base, P'gh	2.45	2.45	2.45	1.40
Barb wire, galv., P'gh	3.35	3.35	3.35	2.50
Old Material, Per Gross Ton:				
Iron rails, Chicago	18.50	18.50	18.00	12.50
Iron rails, Philadelphia	20.00	20.00	20.00	15.50
Carwheels, Chicago	12.00	12.00	12.00	11.50
Carwheels, Philadelphia	16.50	16.50	16.00	12.75
Heavy steel scrap, Chicago	16.00	16.00	16.00	13.25
Heavy steel scrap, Phila.	*14.75*	15.00	14.75	13.00
Heavy steel scrap, Chicago	15.00	15.00	14.00	11.25
No. 1 cast, Pittsburgh	15.00	15.00	14.75	12.00
No. 1 cast, Philadelphia	16.00	16.00	16.00	12.50
No. 1 cast, Ch'go (net ton)	11.50	11.50	11.50	9.50
No. 1 RR wrot, Phila.	19.50	19.50	19.50	14.00
No. 1 RR wrot, Ch'go (net ton)	15.25	15.25	14.50	9.75
Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	$2.75	$2.75	$2.75	$1.50
Furnace coke, future	2.50	2.50	2.50	1.75
Foundry coke, prompt	3.25	3.25	3.25	2.00
Foundry coke, future	3.50	3.50	3.50	2.25
Metals, Per Lb. to Large Buyers	Cents	Cents	Cents.	Cents.
Lake copper, New York	**26.25**	25.25	27.00	21.00
Electrolytic copper, N. Y.	**26.00**	25.00	26.50	18.25
Spelter, St. Louis	10.25	10.25	10.75	17.25
Spelter, New York	10.50	10.50	11.00	17.50
Lead, St. Louis	6.00	6.00	6.05	4.90
Lead, New York	6.25	6.20	6.30	5.00
Tin, New York	38.00	38.00	38.87½	35.00
Antimony, Asiatic, N. Y.	*12.50*	13.50	16.00	34.50
Tin plate, 100-lb. box, P'gh	$6.00	$6.00	$6.00	$3.10

Bessemer and open-hearth semi-finished steel prices are $3 to $5 per ton higher, steel being scarcer than in early June. The scrap market is neglected, with prices easy. The scarcity of labor and the hot weather are again cutting down the output of coke, prices on the better grades for prompt shipment being very strong. Steel makers state that developments of the past month, particularly the heavy export demand for steel products, assure the continuance of present abnormal conditions in the steel trade over the remainder of 1916, with indications becoming stronger every day that they may extend some months into next year.

Pig Iron.—W. P. Snyder & Co. report the average price of Bessemer iron in July to have been $21, and of basic, $18, per gross ton, at Valley furnace, the same average prices as ruled in June. The local market is quiet, but, with three furnaces in the Pittsburgh and Valley districts out of blast, and two others likely to go out soon, a buying movement in both Bessemer and basic by several of the large steel companies may occur at any time, when, it is believed, prices on those grades iron would soon show a marked advance, as they have been out of line when compared with other materials for many months. There is some inquiry for foundry iron for first half delivery, and one sale of about 1200 tons, equal monthly deliveries in first half, has been made at about $18.25, Valley furnace. We quote Bessemer iron at $21; basic, $18; gray forge, $17.75 to $18; malleable Bessemer, $18.50 to $19, and No. 2 foundry, $18.25 to $18.50, all at Valley furnace, the freight rate to the Pittsburgh and Cleveland districts being 95c. per gross ton.

Ferroalloys.—It is reported that prices on 50 per cent ferrosilicon have been advanced $3 to $5 per ton. The market on ferromanganese is quiet and prices for prompt are lower domestic 80 per cent being offered at $165 to $175 at furnace. Prices on spiegeleisen are also lower, and we quote 18 to 22 per cent at $40 to $45, and 25 to 30 per cent, $55 to $65, at furnace. On 50 per cent ferrosilicon, we quote $88 to $89 in lots up to 100 tons; over 100 tons, $87 to $88, and over 600 tons, $86 to $87, all per gross ton, f.o.b. Pittsburgh. We quote Bessemer ferrosilicon as follows: 9 per cent, $30; 10 per cent, $31; 11 per cent, $32; 12 per cent, $33; 13 per cent, $34.50; 14 per cent, $36.50; 15 per cent, $38.50, and 16 per cent, $41. Seven per cent silvery is $28.50; 8 per cent, $29; 9 per cent, $29.50; 10 per cent, $30; 11 per cent, $31, and 12 per cent, $32. These prices are f.o.b. at furnace, Jackson or New Straitsville, Ohio, or Ashland, Ky., all having a freight rate of $2 per gross ton to Pittsburgh.

Billets and Sheet Bars.—Soft Bessemer and open-hearth semi-finished steel, and, in fact, all grades are scarcer now, and are $3 to $5 per ton higher than early in June. Several of the large steel companies have run into a shortage in their own supply, and are trying to buy either billets or sheet bars in the open market. It is stated that one leading interest has recently sold about 120,000 tons of shell steel discards for shipment to England. Another maker has used up its supply of discard steel in the rolling of light rails. Export inquiry for small billets, 4 x 4-in. billets and sheet bars is still very heavy and $45, Pittsburgh, for soft Bessemer or open-hearth steel, if it could be found, would be easily obtained. We note a sale of 2000 tons of 1½-in. billets, Bessemer or open-hearth steel at the seller's option, for export, at $46, Pittsburgh. A sale of 300 tons of forging billets is also reported at about $69, Pittsburgh, for delivery over the remainder of the year. We quote soft open-hearth billets and sheet bars at $45; Bessemer billets, $43 to $45, and Bessemer sheet bars, $43 to $45, maker's mill, Pittsburgh or Youngstown district. We quote forging billets at $69 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular eqtras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take $1 extra.

Plates.—The situation in plates as regards supply is getting worse, and 2.90c. on ¼-in. and heavier sheared plates for delivery at convenience of the mill, which would be in the last quarter of this year or first quarter of 1917, now seems to be minimum of the market. For delivery in two to four months, a few mills quote as low as 3.50c., while others will not shade 4c., and claim to be making sales at this figure. New inquiry for steel cars is light. The Boston Elevated Railway Company has placed 42 passenger cars and 50 articulated centers with the Pressed Steel Car Com-

pany, and also 50 motor cars with the Laconia Car Company, Laconia, N. H. The Pennsylvania Railroad has placed two 70-ft. passenger coaches with the Pressed Steel Car Company, and it is said will soon send out inquiries for 5000 freight cars with steel underframes. The Pressed Steel Car Company is furnishing a large amount of railroad equipment to the Russian State Railways. We quote ¼-in. and heavier plates for delivery at convenience of the mill at 2.90c. to 3c., and for shipment in two to four months at 3.50c. to 4c. at mill.

Structural Material.—A large amount of new work is coming up all over the country. The Jones & Laughlin Steel Company has taken 900 tons for three new steel buildings for the Aluminum Company of America, Massena Springs, N. Y.; the McClintic-Marshall Company, 250 tons for a bridge in Philadelphia, and the Fort Pitt Bridge Works, 250 tons for the Brooklyn-Edison Company, Brooklyn, N. Y. Some of the Southern railroads that had bridges washed away in the recent floods have inquiries out for a large amount of new bridge work. Deliveries of shapes by the mills are still very unsatisfactory. We quote beams and channels up to 15 in. at 2.50c. to 2.75c. at mill, for delivery in third and fourth quarters, while small lots from stock are held at 3.25c. up to 4c., prices depending entirely on the size of the order and how soon deliveries are wanted.

Steel Rails.—It is said that several large contracts for standard sections and also for light rails have lately been placed with the Steel Corporation to be rolled at the Edgar Thomson mills of the Carnegie Steel Company. The Cambria Steel Company is reported to have used up a very large amount of discard steel recently in the rolling of light rails. On any large inquiries for standard sections or for light rails, the Carnegie Company could not quote for delivery before the second or third quarter of 1917. We quote 25 to 45 lb. sections at $47; 16 and 20 lb., $48; 12 and 14 lb., $49; and 8 and 10 lb., $50 in carload lots, f.o.b. at mill, the usual extras being charged for less than carload lots. We quote standard section rails of Bessemer stock at 1.47½c., and of open-hearth, 1.56½c., Pittsburgh.

Sheets.—While consumers are well covered on all grades of sheets, except galvanized, for the remainder of this year, new inquiry is heavy for the first quarter and first half of 1917. One inquiry is in the market for 10,000 tons of blue annealed sheets, but, with the sold-up condition of the mills it is not likely any one is in position to take this contract and make deliveries on it before late this year or early in 1917. Prices on galvanized sheets are a little stronger, some mills now quoting 4.35c. on No. 28 that two weeks ago quoted 4.25c. or less. On blue annealed and electrical sheets, mills are sold up for this year, but on Bessemer black and galvanized they can ship in 8 to 10 weeks. Prices are firm but unchanged. We quote blue annealed sheets, Nos. 9 and 10, at 3c. to 3.25c., for delivery at convenience of the mill. We quote No. 28 Bessemer and open-hearth black sheets at 2.90c. to 3c.; No. 28 galvanized, Bessemer, and open-hearth, 4.25c. to 4.35c.; Nos. 22 and 24 black plate, tin-mill sizes, H. R. & A., 2.90c.; Nos. 25, 26 and 27, 3c. to 3.10c.; No. 28, 3.10c. to 3.15c.; and No. 29, 3.20c. to 3.25c. These prices are for carloads and larger lots, f.o.b. mill, Pittsburgh.

Tin Plate.—The demand has quieted down, and it is believed consumers are pretty well covered for the remainder of this year. None of the mills can sell any more tin plate for delivery this year, with the chances that deliveries on some contracts will run into the first quarter of 1917. Output in the past three weeks has fallen off probably 20 per cent, due to the hot weather and also to the very high rates of wages tin-mill hands are receiving. These men earn as much in four days as they formerly earned in six, with the result that many work only four days a week, idling the other two. There is a shortage in tin-plate and sheet-mill skilled labor, and several leading concerns are advertising for men, promising steady work. Export inquiry is quiet, and what there is comes mostly from Russia. We quote wasters from stock at $5.75, and primes at $6 to the domestic trade, while for export, $6.25 per base box, and higher, is quoted. We quote 8-lb. coated ternes at $8.50 to $8.75 for 200 lb., and $8.75 to $9 for 214 lb., all f.o.b. Pittsburgh.

Skelp.—Mills report the new demand very quiet, but prices ruling firm. Nearly all the pipe mills roll their own skelp and the open market is very narrow. We quote grooved steel skelp at 2.35c. to 2.40c.; sheared steel skelp, 2.45c. to 2.50c.; grooved iron skelp, 2.70c. to 2.80c., and sheared iron skelp, 3c. to 3.10c., all delivered to consumers' mills in the Pittsburgh district.

Cold-Rolled Strip Steel.—We note one contract for 450 tons of cold-rolled strip steel for delivery over the remainder of this year at $6 base per 100 lb., and several others for smaller amounts at the same price. We also note a sale of about 100 tons for prompt shipment, say in September and October, at $6.75 base. No contracts for cold-rolled strip steel have yet been taken by makers for 1917 delivery, and it is said that all contracts contain a very tight non-cancellation clause. On contracts we quote cold-rolled strip steel at $6 per 100 lb., base, and on small lots, for fairly prompt delivery, from $6.50 to $7. Extras, standard with all the mills, were printed on page 810 of THE IRON AGE of March 30.

Wire Rods.—Several fairly large export inquiries are in the market for Canada and Russia. On an inquiry for 1000 tons of open-hearth wire rods (carbon 0.40 to 0.50), one mill has quoted $65, f.o.b. New York, and expects to get the order. The domestic demand for rods is quite heavy, some consumers being anxious to cover through the first quarter of next year. On soft Bessemer rods in large quantities to regular customers, mills are quoting $50 to $55, and on open-hearth $55 to $60. For the current demand, $55 is minimum on either Bessemer or open-hearth rods. We quote soft Bessemer, open-hearth and chain rods at $55 to $60 per ton, f.o.b. Pittsburgh.

Wire Products.—It is stated that Russia has closed for between 200,000 and 225,000 tons of barb wire, slightly more than half of the order going to the leading maker, while about 80,000 to 100.000 tons were divided among four independent mills. One local maker took 20,000 tons, and another 25,000 tons, while a Youngstown mill is credited with having taken 20,000 tons and an Eastern mill about the same quantity. It is said that the price was close to 4c. per pound, f.o.b., Pittsburgh. The new demand for wire and wire nails is only fair, this being the worst of the dull season, and mills report specifications not active. It is believed, however, that the latter part of August will be better, as jobbers will desire to stock up for the fall trade. It is said that with the heavy export contracts for barb wire taken by the local mills, together with the demand from domestic trade that will have to be taken care of, there will be a decided shortage in barb wire this year. The expected advance in wire nails and wire has not yet been announced. Regular prices are as follows: Wire nails, $2.50 to $2.60 per keg, galvanized, 1 in. and longer, taking an advance over this price of $2, and shorter than 1 in., $2.50. Bright basic wire is $2.65 per 100 lb. and annealed fence wire $2.45; galvanized wire, $3.15; galvanized barb wire and fence staples, $3.35; painted barb wire, $2.65; polished fence staples, $2.65; cement-coated nails, $2.50, base, all f.o.b., Pittsburgh, with freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing are now 61½ per cent off list for carload lots, 60½ per cent for 1000-rod lots and 59½ per cent for small lots, f.o.b., Pittsburgh.

Railroad Spikes.—It is said that owing to the severe specifications in the inquiry from Russia for 50,000 kegs of dog-eared spikes, it is not likely any portion of this order, if it is placed, will be taken by local makers. One of the specifications is that the spikes shall be able to be driven 100 times in the tie and withdrawn. There is very little domestic demand for spikes, and makers are operating only intermittently, using the excess steel for other products which bring higher

prices. Regular prices, which are only fairly strong, are as follows:

Standard railroad spikes, 4½ x 9/16 in. and larger, $2.65 to $2.75; railroad spikes, ½ and 7/16 in., $2.75 base; railroad spikes, ⅜ in. and 5/16 in., $3.05 base; boat spikes, $2.80 base, all per 100 lb., f.o.b. Pittsburgh.

Nuts and Bolts.—Both domestic and export demand are only fairly active, consumers being covered over the remainder of the year and shipments by makers are quite heavy. The hot weather and scarcity of labor are restricting output to some extent. Discounts in effect from May 19 are as follows, delivered in lots of 300 lb. or more, where the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days:

Carriage bolts, small, rolled thread, 50 and 10 per cent; small, cut thread 50, large, 10.

Machine bolts, h. p. nuts, small, rolled thread, 50, 10 and 5 per cent; small, cut thread 50 and 5, large, 40 and 10.

Machine bolts, c. p. c. and t. nuts, small, 40, 10 and 5 per cent; large, 35 and 5. Blank bolts, 40 and 10 per cent; bolt ends with h. p. nuts, 40 and 10; with c. p. nuts, 35 and 5. Rough stud bolts, 15. Lag screws (coach or gimlet point), 50 and 10.

Forged set screws and tap bolts, 10 per cent. Cut and round point set screws, case hardened, 60. Square and hexagon head cap screws, 55. Flat, button, round or fillister head cap screws, 30.

Nuts, h. p. sq., tapped or blank, $2.90 off list; hex., $2.90 off; c. p. c. and t. sq. tapped or blank, $2.60 off; hex., $3 off; semi-finished hex., 60 and 10 per cent; finished and case hardened, 60 and 10.

Rivets, 7/16 in. in diameter and smaller, 45, 10 and 10 per cent.

Iron and Steel Bars.—Two of the larger steel bar makers in this district state that as yet they have not sold any for first half of next year delivery at less than 2.50c. at mill. They also claim to have taken some fairly large contracts at this price. It is also stated that in general implement makers are not disposed to contract at 2.35c., believing that price to be too high, their ideas being 2c., or not over 2.15c., for first half delivery. For new current demand, the general price on steel bars is 2.50c. for late delivery, while from warehouse small lots for prompt shipment bring 3c. to 3.25c. Nearly all large consumers are covered for the remainder of this year on old contracts for steel bars at 1.90c. to 2.10c., and deliveries on some of these contracts are certain to run over into the first quarter and perhaps second quarter of 1917. We quote refined iron bars at 2.50c. to 2.60c. and railroad test bars at 2.70c. to 2.80c. at mill.

Shafting.—The new demand is light, as consumers are covered, and some makers report a slowing down in specifications. The entire output of shafting is under contract for the next four or five months, and it is believed specifications will be more active in the last quarter. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots for delivery in last quarter of this year and first quarter of 1917, and 10 per cent off in less than carload lots, f.o.b. Pittsburgh, freight added to point of delivery.

Cotton Ties.—Practically all the cotton tie business for this season has been done, and any belated orders placed in August are at an advance of ¾c. per pound over the July price, which was $1.35 per bundle of 45 lb., f.o.b. Pittsburgh.

Merchant Steel.—Output in July was cut down very much by the hot weather and scarcity of labor. Consumers are covered for this year and specifications are fairly active. Prices on small lots are about as follows: Iron-finished tire, ½ x 1½ in. and larger, 2.50c., base; under ½ x 1½ in., 2.60c.; planished tire, 2.70c.; channel tire, ¾ to ⅞ and 1 in., 2.85c. to 2.95c.; 1⅛ in. and larger, 3.25c.; toe calk, 2.95c. to 3.05c., base; flat sleigh shoe, 2.70c.; concave and convex, 2.75c.; cutter shoe, tapered or bent, 3.25c. to 3.35c.; spring steel, 2.95c. to 3.05c.; machinery steel, smooth finish, 2.75c.

Rivets.—Makers report the new demand only fair and specifications not so active as some time ago. Export inquiry is quite heavy, but not much is being placed, as makers say they are still having trouble in getting prompt deliveries of steel. Prices with manufacturers are stronger than with jobbers, the latter occasionally naming lower prices. Makers' prices are: Buttonhead structural rivets, ½ in. in diameter and larger, at $4 per 100 lb., base, and conehead boiler rivets, same sizes, $4.10 per 100 lb., base, f.o.b. Pittsburgh. Terms are 30 days net, or one-half of 1 per cent for cash in 10 days.

Wrought Pipe.—The new demand for oil country goods is still heavy, but for butt and lap weld pipe is only fair. Some large gas and oil lines, mostly in Oklahoma, are being talked of, but they are slow in coming to a head. On lap weld pipe the mills are sold up for remainder of this year, but can ship out promptly on butt weld sizes. Discounts on black and galvanized iron and steel pipe are given on another page.

Boiler Tubes.—Specifications against contracts are heavy, but nearly all large consumers are covered over the remainder of the year. On locomotive and merchant tubes, mills are sold up for four or five months, and on seamless steel tubing largely through the first half of 1917. Discounts on iron and steel tubes are given on another page.

Old Material.—The local scrap market is quiet, new inquiry being light and prices soft. No large quantities of scrap are being pressed on the market, dealers realizing that consumers are not in a buying mood. At the same time, dealers will not sell short, believing the market will be higher later on. Prices quoted by dealers for delivery in Pittsburgh and nearby districts that take the same rates of freight, per gross ton, are as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	$16.25 to $16.50
No. 1 foundry cast	15.00 to 15.25
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	16.25 to 16.50
Hydraulic compressed sheet scrap	13.50 to 13.75
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	11.25 to 11.50
Bundled sheet stamping scrap	10.75 to 11.00
No. 1 railroad malleable stock	14.75 to 15.00
Railroad grate bars	9.00 to 9.25
Low phosphorus melting stock	19.50 to 20.00
Iron car axles	27.00 to 27.50
Steel car axles	27.00 to 27.50
Locomotive axles, steel	28.00 to 28.50
No. 1 busheling scrap	13.00 to 13.25
Machine-shop turnings	8.00 to 8.25
Old carwheels	13.00 to 13.25
Cast-iron borings	8.00 to 8.25
*Sheet bar crop ends	17.25 to 17.50
No. 1 railroad wrought scrap	18.25 to 18.50
Heavy steel axle turnings	11.00 to 11.25
Heavy breakable cast scrap	12.50 to 12.75

*Shipping point.

Coke.—Owing to the excessively hot weather and an acute shortage of labor in the coke regions, the supply of high grade blast-furnace coke for prompt shipment is light and it readily brings $2.75 per net ton at oven. We note sales of 100 to 125 cars in the past week of high grade furnace coke for prompt shipment at $2.75, but some grades that are not so high in quality can be had at $2.50. Contracts for furnace coke for the remainder of the year have all been closed, and there is not much new inquiry. We quote furnace coke for prompt shipment at $2.50 to $2.75, and on contracts over the remainder of the year from $2.35 to $2.50, depending on the quality. We quote best grades of 72-hr. foundry coke for prompt shipment at $3 to $3.25, and on contracts $3.25 to $3.50 per net ton at oven. The Connellsville *Courier* gives the output of coke in the upper and lower Connellsville regions for the week ended July 22 as 413,280 net tons.

Chicago

CHICAGO, ILL., Aug. 1, 1916.

In a small way inquiry and sales last week showed improvement. The turn in the spelter market was followed by a better inquiry for galvanized sheets, and sales were made at prices ranging from 4.30c. to 4.35c., Pittsburgh. Some implement makers are negotiating for rail-carbon steel for next year's delivery, of which material an increasing amount, in proportion to the total bar tonnage purchased, is being used. There has also appeared a delayed buying of bolts and nuts by some of the railroads. The Canadian Pacific has placed at Chicago 14,000 tons against its rail inquiry for 25,000 tons. Activity in structural steel is limited to small work, but of this kind of business fabricators appear to have plenty for a profitable operation of

their shops. There is a scattering car business, the most important inquiry being that of the Delaware & Hudson for 1000 twin hopper cars, for which approximately 15,000 tons of steel will be required. Except for the more sharply drawn contrast between plates of average width and the very narrow or very wide plates with respect to premium prices, there is little of interest in that direction. An adjustment of store prices for rivets and bolts to bring them into line with mill quotations is being undertaken. Inquiry for pig iron shows some increase and is to a greater extent the forerunner of buying than has latterly been the case. Against an inquiry for 2000 tons of malleable iron, 800 tons was purchased, resale iron winning out over furnace quotations. The scrap market shows no change toward greater activity.

Pig Iron.—The pig-iron situation, with all of its discouraging surface appearances, is considered by some sellers to have in it the possibility of a turn marked by active buying for the fourth and first quarters. Some encouragement is had in this direction from the inquiry of the past week, which includes several lots of 500 tons, concerning which there is every expectation of the iron being bought. The most depressing feature, however, is still the dominance of speculative iron available for resale. The Southern market has suffered most from this cause, but more recently reselling of Northern iron has made inroads on furnace business. On its inquiry for 2000 tons of malleable, an Indianapolis melter bought 800 tons or resale Ohio iron, paying it is understood, about 50c. per ton less than the equivalent of $18 at the furnace. A sale of 1000 tons of malleable made last week was at $19, Chicago furnace. This is 50c. below the price that has prevailed for some time. Despite the favoring prices for Southern iron as against Northern, for delivery at any distance from Chicago, there is little or no selling. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of $1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5	$19.75
Lake Superior charcoal, No. 1	20.25
Lake Superior charcoal, No. 6 and Scotch	20.75
Northern coke foundry, No. 1	19.50
Northern coke foundry, No. 2	19.00
Northern coke foundry, No. 3	18.50
Southern coke, No. 1 f'dry and 1 soft	$18.50 to 19.00
Southern coke, No. 2 f'dry and 2 soft	18.00 to 18.50
Malleable Bessemer	19.00
Basic	19.00 to 19.50
Low phosphorus	34.00
Silvery, 8 per cent	29.50
Bessemer ferrosilicon, 10 per cent	32.50

Rails and Track Supplies.—The Canadian Pacific has been able to place at Chicago 14,000 tons of rails on its inquiry for 25,000 tons. This is the only recent rail buying of importance. Local mills have taken an additional 40,000 kegs of spikes to apply against the track-fastening requirements to accompany the recent Russian rail order. Quotations are as follows: Standard railroad spikes, 2.75c., base; track bolts with square nuts, 3.25c. to 3.50c., base, all in carload lots, Chicago; tie-plates, $50, f.o.b. mill, net ton; standard section, Bessemer rails, Chicago, $33, base; open-hearth, $35; light rails, 25 to 45 lb., $40; 16 to 20 lb., $41; 12 lb., $42; 8 lb., $43; angle bars, 2c., Chicago.

Structural Material.—The fabricating shops, while they have on hand very little in the way of large work, an exception being the Mark Mfg. Company contract taken by the Morava Construction Company, have on their books a very satisfactory aggregate of business made up of jobs of 300 tons and less. Contracts reported as placed last week are also of this character. The American Bridge Company took 330 tons for an hotel annex at Dallas, Tex., 315 tons for bridges for the Duluth, Missabe & Northern Railroad, and 200 tons for the Chicago, Milwaukee & St. Paul. The Minneapolis Steel & Machinery Company will supply 200 tons for a high school at Rochester, Minn., while another school building at Lake Linden, Mich., calls for 150 tons. There is a scattering of car work, including the inquiry of the Delaware & Hudson for 1000 steel hopper cars, which will require about 15 tons apiece. The Pennsylvania Railroad also is preparing to enter the market. The Rock Island has bought 900 center sills and the Chicago & Northwestern has placed its order for mine cars with the Duncan Foundry & Machine Company, Alton, Ill. We quote for Chicago delivery of structural steel from mill, 2.689c.

We quote for Chicago delivery of structural steel from jobbers' stock 3.10c.

Plates.—Sales of plates are few in number and, for the ordinary domestic consumption, small as to tonnage. Transactions of the past week have simply served to indicate a continuance of the situation which has prevailed. Regular tank steel in average widths is selling at from 3.25c. to 3.50c., Pittsburgh, while very narrow and very wide plates are quoted at 4c. The delivery now is of less significance in determining the price than the size of the plates. We quote for Chicago delivery of plates from mill, 3.439c. to 3.689c., for prompt shipment, and 3.089c. for delivery at mill convenience.

We quote for Chicago delivery of plates out of jobbers' stock 3.50c.

Sheets.—The hope of a more stable price for spelter at the lower level to which it has come recently seems to have encouraged users of galvanized sheets to a more active interest. Inquiry has been noticeably better and a number of sales are reported, the prices ranging from 4.30c. to 4.35c., Pittsburgh, for No. 28. Demand for black sheets continues stagnant. For sheets of special finish, for automobile and metal furniture construction, there is a demand considerably in excess of the available mill supply. We quote for Chicago delivery, blue annealed, No. 16 and heavier, 3.089c. to 3.339c.; box annealed, No. 17 and lighter, 2.939c. to 3.039c.; No. 28 galvanized, 4.439c. to 4.589c.

We quote for Chicago delivery of sheets out of stock, minimum prices applying on bundles of 25 or more, as follows: No. 10 blue annealed, 3.40c.; No. 28 black, 3.10c. to 3.20c.; No. 28 galvanized, 5c. to 5.10c.

Bars.—The appearance of implement inquiry covering rail-carbon steel bars for first half delivery had some prominence last week. A number of sales were made, prices being at the market. The excessive heat of the last week interfered with mill operations to a considerable extent, and some of the bar-iron mills were shut down for two or three days. We quote mill shipment, Chicago, as follows: Bar iron, 2.35c.; soft steel bars, 2.689c. to 2.939c.; hard steel bars, 2.50c.; shafting, in carloads, 25 per cent off; less than carloads, 20 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 3.10c.; bar iron, 3.10c.; reinforcing bars, 3.10c. base with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting 10 per cent off.

Rivets and Bolts.—Belated railroad inquiry for bolts and nuts has appeared in the market and it is not improbable that these roads will profit by their delay. The market for hot pressed nuts, in particular, shows decided irregularity in quotations. Makers of rivets are encouraged by the firming up of the store position, which for some time has been an excuse to some manufacturers for making concessions. We quote carriage bolts up to ⅜ x 6 in., rolled thread, 50-10-5; cut thread, 50-5; larger sizes, 40-5; machine bolts up to ⅜ x 4 in., rolled thread, with hot pressed square nuts, 50-10-10; cut thread, 50-10; larger sizes, 40-10-5; gimlet-point coach screws, 60; hot pressed nuts, square, $2.90 off per 100 lb.; hexagon, $2.90 off. Structural rivets, ¾ to 1¼ in., 4c. to 4.15c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

The price of rivets out of store has been advanced $5 per ton and is now more nearly in keeping with mill prices for prompt shipment business. We quote out of store: Structural rivets, 3.75c.; boiler rivets, 3.85c.; machine bolts up to ⅜ x 4 in., 60-10; larger sizes, 50-10; carriage bolts up to ⅜ x 6 in., 60-5; larger sizes, 50 off; hot pressed nuts, square, $3.25, and hexagon, $3.25 off per 100 lb.; lag screws, 65.

Wire Products.—Wire mills report new sales of barb wire to Canada and a sustained improvement in the movement of wire nails in Western territory. The

anticipation of higher prices has not yet been realized. We quote as follows: Plain wire, Nos. 6 to 9, base, $2.839; wire nails, $2.689; painted barb wire, $2.839; galvanized barb wire, $3.539; polished staples, $2.839; galvanized staples, $3.539; all Chicago.

Cast-Iron Pipe.—The leading interest is the low bidder for 300 tons of pipe at Garrison, N. D., and has also taken a contract for 1000 tons of gas pipe. New inquiry for municipal pipe includes 300 tons for Lincoln, Neb., 400 tons for Glen View, Ill., and 150 tons each for Riverton, Wyo., and Marshalltown, Iowa. We quote as follows, per net ton, Chicago: Water pipe, 4 in., $33.50 to $34; 6 in. and larger, $30.50 to $31, with $1 extra for class A water pipe and gas pipe.

Old Material.—Consumer buying continues discouragingly out of proportion to the scrap available for marketing. The mills rolling iron and rail steel are generally in possession of very heavy stocks and seem to have coming in, on old orders or exchange deals, nearly enough to offset current consumption. While the present low prices might be explained on the basis of the plentiful supply of scrap, even with a normal volume of buying, the reasons for the exceptional lack of interest on the part of purchasers, when considered in the light of comparatively heavy mill operations, are less clear, save as it may be accounted for by an unusual amount of conversion tonnage. The demand for steel axles for export is again uncertain with the completion of current outstanding orders and lower prices are likely to appear again. Since iron axles were recently sold by a railroad at a price around $26, it is stated that offerings have failed to bring out better than $22. With the exception of a large Pennsylvania Railroad list and 3000 tons from the Chicago & Northwestern, offerings in this market for the current week are small. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

	Per Gross Ton	
Old iron rails	$18.50 to	$19.00
Relaying rails	19.50 to	20.50
Old carwheels	12.00 to	12.25
Old steel rails, rerolling	15.50 to	15.75
Old steel rails, less than 3 ft	15.00 to	15.25
Heavy melting steel scrap	14.25 to	14.50
Frogs, switching and guards, cut apart	13.25 to	13.50
Shoveling steel	14.75 to	15.00
Steel axle turnings	9.25 to	9.75
Per Net Ton		
Iron angles and splice bars	$18.75 to	$19.00
Iron arch bars and transoms	19.50 to	20.00
Steel angle bars	13.50 to	14.00
Iron car axles	25.50 to	26.00
Steel car axles	28.00 to	28.50
No. 1 railroad wrought	13.25 to	13.75
No. 2 railroad wrought	14.25 to	14.50
Cut forge	14.25 to	14.50
Pipes and flues	10.75 to	11.00
No. 1 busheling	12.25 to	12.75
No. 2 busheling	8.50 to	9.00
Steel knuckles and couplers	13.50 to	14.00
Steel springs	14.00 to	14.50
No. 1 boilers, cut to sheets and rings	9.75 to	10.25
Boiler punchings	13.50 to	14.00
Locomotive tires, smooth	20.00 to	20.50
Machine-shop turnings	5.50 to	6.00
Cast borings	6.00 to	6.50
No. 1 cast scrap	11.50 to	12.00
Stove plate and light cast scrap	9.25 to	9.75
Grate bars	10.00 to	10.25
Brake shoes	9.75 to	10.25
Railroad malleable	11.25 to	11.75
Agricultural malleable	10.75 to	11.25

Philadelphia

PHILADELPHIA, PA., Aug. 1, 1916.

Billets and plates show a little added strength, a prominent maker of the former asking $45, Eastern mill, for open-hearth rerolling billets, instead of quoting the Pittsburgh base as heretofore. Bessemer steel is scarcer. The export inquiry for all manner of steel products appears to be growing, and is pouring in on mills which heretofore have not been extensively favored. It comes direct by cable and letter as well as from export agents. Many thousand tons of shell steel are under inquiry here, as elsewhere. The demand for wire nails and wire products is active, but wire fencing is quiet, inasmuch as this is not the season when farmers give much attention to fences. It is predicted that if the export demand for steel keeps up, as it shows every indication of doing, domestic consumers who dally too long in placing contracts for their future requirements may encounter difficulty in getting material, even at higher prices. The pig-iron market is flat, except for the export demand, for which there is none too much iron available. Old material shows no improvement; on the contrary, heavy melting steel is easier.

Pig-Iron.—The domestic market is flat, with the few transactions reported confined to small lots which in the aggregate do not amount to much. Most of the furnaces are so well sold up, however, that the dullness is not inciting pressure to sell, such as frequently occurs in periods of quiet. The producers are feeling optimistic, and predict a heavy movement in September or before. Foreign inquiry for Bessemer and low phosphorus continues to appear, and in this connection a situation has developed which demonstrates the active consumption of foundry grades. Makers of low phosphorus, desirous of concentrating to the fullest extent on that grade, have asked their foundry customers if shipments against their contracts may be delayed, but the answer has invariably been in the negative. The only recourse of the low phosphorus makers is to make deliveries to the foundries to the best of their ability, possibly arranging for the delivery of other brands where they can. For a carload of Bessemer a domestic consumer is reported to have paid $25, delivered. Quotations for standard brands, delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa., No. 2 X foundry	$19.75 to $20.25
Eastern Pa., No. 2 plain	19.50 to 20.00
Virginia, No. 2 X foundry	21.25
Virginia, No. 2 plain	20.75
Gray forge	18.50 to 19.00
Basic	19.00 to 19.50
Standard low phosphorus	34.00

Iron Ore.—Arrivals of foreign ore at this port in the week ended July 29 consisted of 4100 tons from Spain and 7700 tons from Cuba.

Ferroalloys.—Both foreign and domestic 80 per cent ferromanganese are obtainable at $175, seaboard, for prompt or future delivery. The domestic product is weak, and $175 could probably be shaded. The market is quiet. A purchase of 500 tons of spiegeleisen is reported at a price believed to have been slightly above $50, furnace. Contract ferrosilicon, 50 per cent, is now quoted at $86 to $88, Pittsburgh, according to quantity, and 11 per cent at $35.44.

Plates.—The week has been even more active than the preceding one, with heavy orders from shipyards, tank shops, locomotive works and miscellaneous consumers. While quotations are unchanged at 3.659c. to 4.159c., Philadelphia, the tone of the market is stronger, partly because of deliveries being further off, and because of increased strength at Pittsburgh. A mill in the East which has been making fairly prompt deliveries reports that it is nearly filled up. With others, orders continue to keep pace with production. Export inquiries are heavy.

Bars.—The quantity of Bessemer bars obtainable at 2.659c., Philadelphia, is steadily becoming more restricted, and more than this price is asked except for the most desirable class of business. Open-hearth bars are nominally 2.659c., Philadelphia, but up to 3.659c. is asked on current business. Iron bars are moving well at 2.659c., Philadelphia, and business in that direction is reported with export agents who look after the shipping end after delivery at seaboard.

Structural Material.—The minimum quotation is 2.909c., Philadelphia, but this price is made only on choice propositions and there are few of these. On current business 3.159c., Philadelphia, is asked. The trade is interested in a railroad project known as the Washington & Newport News Short Line, which, it is estimated, will require 17,000 to 20,000 tons of bridge work, etc., but the plans are moving slowly, as so often is the case with railroad enterprises.

Billets.—The market is stronger. For open-hearth rerolling billets, $45, Eastern mill, is quoted. A maker of Bessemer billets quotes $45, Pittsburgh, or $47.56, Philadelphia, and has less steel to offer. Forging steel is unchanged at $65.

Sheets.—Quotations for No. 10 blue annealed range from 3.159c. to 3.659c., the first named price applying

only to contracts. New Western mills, in their zeal to get business, are reported to have quoted slightly under 3c., Pittsburgh.

Coke.—The market is slightly firmer, not because of any increase in demand, but due to the heat in the coke regions, where, in some cases, the workmen have refused to load box cars because of the high temperature. Quotations are unchanged at $2.75 per net ton at oven for spot furnace and $2.50 to $2.65 for contract furnace. Both prompt and contract foundry range from $3.25 to $3.50 per net ton at oven. Freight rates from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Old Material.—Heavy melting steel is a trifle easier, in a market that is quiet to dullness. Important points are still embargoed, and the situation is generally unchanged. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania, and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$14.75 to $17.25
Old steel rails, rerolling	17.00 to 18.00
Low phos. heavy melting steel scrap	20.50 to 21.50
Old steel axles (nominal)	30.00 to 31.00
Old iron axles (nominal)	28.00 to 29.00
Old iron rails	20.00 to 20.50
Old carwheels	15.50 to 16.00
No. 1 railroad wrought	19.50 to 20.00
Wrought-iron pipe	12.50 to 13.00
No. 1 forge fire	12.50 to 13.00
Bundled sheets	12.50 to 13.00
No. 2 busheling	10.50 to 11.00
Machine-shop turnings	8.50 to 9.00
Cast borings	10.00 to 10.50
No. 1 cast	16.00 to 16.50
Grate bars, railroad	11.75 to 12.25
Stove plate	11.75 to 12.25
Railroad malleable	13.50 to 14.00

Cleveland

CLEVELAND, OHIO, Aug. 1, 1916.

Iron Ore.—Outside of the curtailment of production in the underground mines in the Mesaba district, conditions in the ore trade are very satisfactory. Shipments continue heavy, and the restriction of production on the Mesaba range apparently has had very little effect, being offset by the increased production in open-pit properties. Although the Mesaba strike is broken, not many of the men are returning to work and operations in but few of the underground properties have been resumed. Lake seamen will probably demand an increase in wages, but trouble is not looked for in the operation of boats. We quote ore prices as follows, delivered lower Lake ports: Old range Bessemer, $4.45; Mesaba Bessemer, $4.20; old range non-Bessemer, $3.70; Mesaba non-Bessemer, $3.55.

Pig Iron.—The market is almost lifeless. The effect of the labor shortage and decreased consumption, due partly to the molders refusing to work but part of the time during the extremely hot weather, is being felt more by the blast furnaces in the increase of orders to hold up shipments on foundry iron. Some foundries now have large stocks, having continued to take iron until their yards were filled. In the absence of inquiries of any size for several weeks, quotations are nominal and furnacemen do not venture to guess what price will come out in response to a round-lot inquiry. However, $18 would probably be quoted for No. 2 foundry for out-of-town shipment. Southern iron is dull and unchanged at $14 to $14.50, Birmingham, for No. 2 for last half, and $14.50 to $15 for the first half of next year. Silvery iron is nominally unchanged, but it is admitted that an inquiry would bring out considerably lower than regular quotations because of the competition of the Tennessee furnaces. We quote, delivered Cleveland, as follows:

Bessemer	$21.95
Basic	18.95
Northern No. 2 foundry	$18.70 to 18.80
Southern No. 2 foundry	18.00 to 18.50
Gray forge	18.50
Jackson County silvery, 8 per cent silicon	28.62 to 30.62
Standard low phos., Valley furnace	32.00

Coke.—There is a scarcity of both furnace and foundry grades for prompt shipment, and some of the producers have advanced their prices on foundry coke for prompt shipment to $3.60. A Cleveland interest has paid as high as $2.85 per net ton at oven for a small lot of Connellsville furnace coke for prompt shipment. We quote standard Connellsville foundry coke at $3.25 to $3.50 per net ton at oven for contract and $3.25 to $3.50 for prompt shipment.

Bolts, Nuts and Rivets.—New bolt and nut inquiries for both prompt shipment and contracts have improved. Specifications are heavy and deliveries are getting no better. Although there is some shading, prices generally are well maintained. The demand for rivets continues quite active. We quote rivets at 4c., Pittsburgh, for structural and 4.10c. for boiler rivets for prompt shipment and contract. Bolt and nut discounts are as follows:

Common carriage bolts, ⅜ x 6 in., smaller or shorter, rolled thread, 50 and 10; cut thread, 50; larger or longer, 40; machine bolts with h. p. nuts, ⅜ x 4 in., smaller and shorter, rolled thread, 50, 10 and 5; cut thread, 50 and 5; larger and longer, 40 and 10; lag bolts, gimlet or cone point, 50 and 10; square h. p. nuts, blank or tapped, $2.90 off the list; hexagon, h. p. nuts, blank or tapped, $2.90 off; c. p. c. and t. sq. nuts, blank or tapped, $2.60; hexagon nuts, all sizes, $3 off; cold pressed semi-finished hexagon nuts, all sizes, 60 and 10.

Old Material.—There is practically no activity in the scrap market. Local mills are still well supplied and dealers find it hard to move material even at price concessions. There is still an embargo against the Upson plant and two other local steel plants are not taking material. Relaying rails have become scarce owing to the disposition of some of the railroads not to sell this material. Iron car axles are also scarce, a foreign demand having developed for this grade as well as for old steel axles. We quote, f.o.b., Cleveland, as follows:

Per Gross Ton

Steel rails	$14.75 to $17.00
Iron rails	18.00 to 19.00
Steel car axles	30.00 to 32.00
Heavy melting steel	15.00 to 15.25
Carwheels	12.75 to 13.00
Relaying rails, 50 lb. and over	25.00
Agricultural malleable	12.50 to 12.75
Railroad malleable	14.00 to 14.25
Steel axle turnings	12.00 to 12.50
Light bundled sheet scrap	12.00 to 12.25

Per Net Ton

Iron car axles	$24.00 to $25.00
Cast borings	6.00 to 6.25
Iron and steel turnings and drillings	5.75 to 6.00
No. 1 busheling	11.00 to 11.25
No. 1 railroad wrought (nominal)	15.00 to 15.50
No. 1 cast	15.00 to 15.50
Railroad grate bars	10.00 to 10.50
Stove plate	12.00 to 12.50

Finished Iron and Steel.—One independent mill has opened its books for steel-bar contracts for the first half of 1917 at 2.50c., Pittsburgh, and while not soliciting business has closed with a few consumers anxious to get under cover. None of this business has come from the Ohio implement trade. July specifications show a falling off as compared with June. However, many consumers are crowding mills as hard as ever for shipments and the delivery situation is apparently growing worse in some lines. Some of the shipments on specifications sent in early in the year for July delivery will not be made until September or October. New inquiry for steel, both for early shipment and for contracts, has improved somewhat. The demand for steel bars for early shipment continues fairly active. They are quoted at 2.50c., Pittsburgh, for Bessemer bars for delivery within about two months. A northern Ohio manufacturer is in the market for 12,000 tons of 6-in. rounds for shells, but is having trouble in finding a mill in position to quote on this inquiry. Another inquiry is for 2000 tons of plates for water pipe. Plates are in good demand and local prices range from 3.25c. to 3.50c., Pittsburgh. However, mills making plates in light gages and narrow sizes are eager for business, and prices on these are somewhat easier, the usual quotation being around 3c., Pittsburgh. Inquiry for structural material is very light. There is a local inquiry for 1000 tons of 60-lb. rails for export to Cuba. The demand for hard steel bars is moderate and mills have apparently settled down to a uniform quotation of 2.50c. at mill. Bar iron is quoted at 2.50c., Cleveland. The blue annealed sheet market is active, but the demand for black and galvanized sheets is rather light. We quote sheets at 2.90c. to 3c., Ohio mill, for No. 28

black; 3c. to 3.25c. for No. 10 blue annealed, and 4.25c. to 4.40c. for No. 28 galvanized. Warehouse prices are 3.25c. for steel bars and structural material, 3.65c. for plates and 3.20c. for iron bars.

Cincinnati

CINCINNATI, OHIO, Aug. 2, 1916.—(*By Wire.*)

Pig Iron.—A southern Ohio steel company has purchased 25,000 to 30,000 tons of Northern basic iron for first-quarter shipment. It is rumored that another consumer of basic is testing the market, but as far as known no definite inquiry has yet been put out. Some Bessemer iron was sold for export last week by a local house. The foundry iron business is at a standstill. Only one small general inquiry from central Ohio has been issued lately. Order books are almost blank as regards foundry iron, and the largest sale reported is one for 150 tons for an Ohio foundry. Quotations are unchanged, but no late sales at the furnace price of $19, Ironton, are known to have been made. The recent extremely hot weather has cut the consumption of basic and foundry iron below estimates. The silvery irons are inactive. From $27 to $29 at furnace is quoted by Northern producers on an 8 per cent analysis and around $24, Birmingham basis, for Southern silvery. The inquiry for malleable mentioned last week is still said to be open. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	$17.40 to $18.40
Southern coke, No. 2 f'dry and 2 soft	16.90 to 17.90
Southern coke, No. 3 foundry	16.40 to 17.40
Southern coke, No. 4 foundry	15.90 to 16.90
Southern gray forge	15.40 to 16.40
Ohio silvery, 8 per cent silicon	28.26 to 28.76
Southern Ohio coke, No. 1	20.76 to 21.26
Southern Ohio coke, No. 2	19.76 to 20.26
Southern Ohio coke, No. 3	19.26 to 19.76
Southern Ohio malleable Bessemer	19.76 to 20.26
Basic, Northern	19.76 to 20.26
Lake Superior charcoal	21.20 to 22.20
Standard Southern carwheel	24.90 to 25.40

(By Mail)

Finished Material.—No. 28 black sheets are still held by the nearby mills at 2.90c., Cincinnati or Newport, Ky., and No. 28 galvanized around 4.65c., with a slightly firmer feeling due to higher spelter. The extremely hot weather has cut down production, while the demand is said to be slightly improving. It is understood that the mills are not putting by any large stocks and prefer merely to keep up with the market demands. The warehouse price on No. 28 galvanized sheets ranges from 5c. to 5.25c. Weather conditions continue to affect adversely the call for all kinds of building material, and the warehouses as a rule report last week as not being a very satisfactory one. The mill supply business is also slow. We quote from local store stocks as follows: No. 10 blue annealed sheets, 3.50c.; steel bars and small structural shapes, 3.20c.; plates, 3.50c.; wire nails, $2.75 per keg, base; barb wire, $3.60 per 100 lb.

Old Material.—The small improvement noted last week has not kept up, as both the foundries and rolling mills are not consuming the usual tonnage of scrap and new contracting is said by many dealers to be almost at a standstill. However, this is considered a somewhat temporary condition that will doubtless improve as soon as the pig-iron market shows some life. The following are dealers' prices to consumers, f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton	
Bundled sheet scrap	$11.25 to $11.75
Old iron rails	15.50 to 16.00
Relaying rails, 50 lb. and up	21.00 to 21.50
Rerolling steel rails	14.50 to 15.00
Heavy melting steel scrap	14.25 to 14.75
Steel rails for melting	13.00 to 13.50
Per Net Ton	
No. 1 railroad wrought	$13.25 to $13.75
Cast borings	4.75 to 5.25
Steel turnings	5.25 to 5.75
Railroad cast scrap	11.00 to 11.50
No. 1 machinery cast scrap	12.75 to 13.25
Burnt scrap	8.25 to 8.74
Iron axles	21.00 to 22.00
Locomotive tires (smooth inside)	19.75 to 20.25
Pipes and flues	9.50 to 10.00
Malleable and steel scrap	10.75 to 11.25
Railroad tank and sheet scrap	8.50 to 9.00

Coke.—Shipments of foundry coke are going forward at a slower rate, although there have been no cancellations reported and not many requests for holding up the forwarding of coke. Producers in all districts have curtailed production at about the same rate as consumption has fallen off, due to the hot weather. We quote 48-hr. Connellsville coke at $2.50 to $2.75 per net ton at oven and the nominal figures given on foundry coke in the Connellsville, Wise County and Pocahontas fields range from $2.35 to $3.75. New River foundry coke remains at $4 at oven.

Buffalo

BUFFALO, N. Y., Aug. 1, 1916.

Pig Iron.—The furnaces of the district report very small inquiry and "low ebb" buying. They are, however, shipping heavily on contracts and to the limit of daily production, besides making large inroads into stock on yards. In the face of the extremely light demand producers are making no effort to sell, but it is fair to assume that, although no material change is shown in the week's quotations, the prices at which the few sales made were based on the minimum rather than the maximum side. We quote as follows, f.o.b. furnace, Buffalo, for last half delivery:

No. 1 foundry	$19.00
No. 2 X foundry	$18.50 to 19.00
No. 2 plain	18.00 to 18.50
No. 3 foundry	18.50 to 18.[illegible]
Gray forge	18.[illegible] to 18.50
Malleable	18.50 to 19.00
Basic	19.00 to 20.00
Bessemer	21.00 to 22.00
Charcoal, regular brands and analysis	21.00 to 22.00

Finished Iron and Steel.—The leading producing interest announces an advance of $2 per ton on steel bars effective to-day, making the price 2.60c., Pittsburgh base. An increase in inquiry is noted over last week, and some new buying, mostly carload lots, is reported. One large seller reports a marked change in sentiment among buyers as regards the desirability of placing new business in the near future, with indications that there may be a development of a buying movement in September or October. The pressure for delivery on contracts continues even more insistently than reported a week ago. Most mills report that the intense heat prevailing recently has had the effect of cutting down production 10 to 20 per cent on account of exhaustion of the men, and will tend to create extension in delivery dates. The demand for wire rods is very strong and the price is higher. The Corrugated Bar Company, Buffalo, has a contract with the Aberthaw Construction Company, Boston, to furnish 240 tons of reinforcing bars for three factory buildings to be erected by the latter company for the Buffalo Potteries. Bids are being taken for about 800 tons of steel for a bridge to be erected by the Lackawanna Railroad in Buffalo. The American Bridge Company has the contract for two highway bridges for the Eastman Kodak Company's terminal railroad, Rochester, 100 tons.

Old Material.—Sales of heavy melting steel were of good volume and prices for this commodity are being well maintained. Several good-sized inquiries are still before the market. A fair number of sales in turnings and borings were also reported, and the rest of the list was fairly active, with the exception of railroad malleable, cast scrap and carwheels, which were quiet. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	$15.50 to $16.00
Low phosphorus steel	20.00 to 20.50
No. 1 railroad wrought scrap	17.25 to 17.75
No. 1 railroad and machinery cast scrap	15.50 to 16.00
Steel axles	30.00 to 31.00
Iron axles	26.00 to 27.00
Carwheels	13.00 to 13.50
Railroad malleable	15.00 to 15.50
Machine shop turnings	6.00 to 6.50
Heavy axle turnings	12.00
Clean cast borings	7.25 to 7.75
Iron rails	18.00 to 18.50
Locomotive grate bars	11.50 to 12.00
Stove plate (net ton)	11.00 to 11.50
Wrought pipe	12.00 to 12.50
Bundled sheet scrap	11.50 to 12.00
No. 1 busheling	12.00 to 12.50
No. 2 busheling	11.00 to 11.50
Bundled tin scrap	15.00 to 15.50

St. Louis

ST. LOUIS, MO., July 31, 1916.

Pig Iron.—Transactions have all been in the 100-ton class the past week, with no disposition on the part of melters to look to the future. The intense heat has also had the effect of slowing up work in the foundries; but there is an expectation of improved conditions with the determination of the effect of the weather upon crops and general business in St. Louis trade territory.

Coke.—Only small lots have been dealt in, all for immediate needs or special purposes. Prices remain on the Connellsville basis, with by-product coke held at a parallel figure, with no pressure to sell.

Finished Iron and Steel.—A noticeably better feeling is reported among the fabricators, although they have not begun to make any additions to their future contracts. Some inquiries have appeared for round lots of reinforcing bars. Movement out of warehouse has continued heavy, with prices for such stock as follows: Soft steel bars, 3.15c.; iron bars, 3.10c.; structural material, 3.15c.; tank plates, 3.55c.; No. 10 blue annealed sheets, 3.45c.; No. 28 black sheets, cold rolled, one pass, 3.30c.; No. 28 galvanized sheets, black sheet gage, 5c.

Old Material.—While there has been a stiffening in the values at which steel scrap is held, there has been no notable demand for such material from the mills nor for the other classes of scrap. It has been essentially a dealers' market, with an inclination to hold stocks at prices quoted even though there be no immediate demand. The quotations given are therefore on a nominal basis. Lists out this week include 1200 tons from the Mobile & Ohio and 750 tons from the Terminal Railroad Association of St. Louis. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton

Old iron rails	$16.25 to $16.75
Old steel rails, rerolling	14.75 to 15.00
Old steel rails, less than 3 ft.	14.50 to 15.00
Relaying rails, standard section, subject to inspection	22.00 to 23.00
Old carwheels	11.50 to 11.75
No. 1 railroad heavy melting steel scrap	14.25 to 14.50
Heavy shoveling steel	12.25 to 12.50
Frogs, switches and guards cut apart	14.25 to 14.50
Bundled sheet scrap	8.00 to 8.50

Per Net Ton

Iron angle bars	$15.75 to $16.25
Steel angle bars	13.00 to 13.25
Iron car axles	24.50 to 25.00
Steel car axles	26.00 to 26.50
Wrought arch bars and transoms	18.50 to 19.00
No. 1 railroad wrought	14.00 to 14.50
No. 2 railroad wrought	13.75 to 14.25
Railroad springs	13.50 to 13.75
Steel couplers and knuckles	13.50 to 13.75
Locomotive tires, 42 in. and over, smooth inside	19.25 to 19.50
No. 1 dealers' forge	10.25 to 10.75
Cast-iron borings	5.75 to 6.25
No. 1 bushelings	11.50 to 12.00
No. 1 boilers, cut to sheets and rings	8.25 to 8.50
No. 1 railroad cast scrap	10.75 to 11.00
Stove plate and light cast scrap	8.25 to 8.75
Railroad malleable	10.50 to 11.00
Agricultural malleable	9.50 to 10.00
Pipes and flues	9.50 to 10.00
Railroad sheet and tank scrap	9.00 to 9.50
Railroad grate bars	8.50 to 8.75
Machine-shop turnings	6.75 to 7.25

Birmingham

BIRMINGHAM, ALA., July 31, 1916.

Pig Iron.—The monotony of the Southern iron market has been unbroken for six to seven weeks. The average small lot characterizing the going business is sold on the basis existing prior to the present period of stagnation. The total export movement of the month of July figures around 15,000 tons. Mobilians, in presenting arguments for a 36-ft. channel there, claimed that 40,000 tons of steel made in Birmingham had been shipped through the port of New Orleans to France in the past month. Certainly movements from the Ensley mill of the Tennessee Company and the Fairfield plant of the American Steel & Wire Company have been quite regular and on a large scale. There is a floating inquiry in the Birmingham district for 16,000 tons of pig iron to consist of gray forge and Nos. 2, 3 and 4 foundry, indicating that some pipe interest is sounding the market. Quotations were asked for delivery over the remainder of the year, with alternate prices for the first half of 1917. One manufacturer named $15 and $15.50 for the two periods. In this as in other cases, where these quotations were named, no business has followed. The situation seems to be this: While the market is absolutely listless, the consumers are taking the iron ordered far ahead several months ago; the leading interest is practically out of the foundry market on account of its own basic metal requirements; another large interest is sold throughout the remainder of the year on basic and several other grades, and a smaller concern is well covered for two to three months to come, while the remainder need be in no special hurry to take on new business. The result is that the Birmingham manufacturers seem to agree that if a good buying movement sets in by September 1 the situation will be saved. There are no fresh evidences of price cutting any more than there is evidence of real business. Carload lots of No. 2 soft have sold at $15 and $15.50. Resale metal brings what the holder can get, which is anywhere from $13.50 (possibly less) to around $14. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	$15.00 to $15.50
No. 2 foundry and soft	14.50 to 15.00
No. 3 foundry	14.00 to 14.50
No. 4 foundry	13.75 to 14.25
Gray forge	13.50 to 14.00
Basic	14.50 to 15.00
Charcoal	22.00 to 22.50

Cast-Iron Pipe.—The character of operations at the larger water and gas pipe shops differs. Operations in one were slow in resuming after the national holiday, while in another a large aggregate of small orders put order books in good form. Conditions are still somewhat slack, but there is no disposition to shade prices. We quote, per net ton, f.o.b. Birmingham, as follows: 4-in., $28; 6-in. and upward, $25, with $1 added for gas pipe and 16-ft. lengths.

Coal and Coke.—Alabama coal operators have not recovered the trade taken from them by the development of hydroelectricity. Many mines are working only a few days per week. The movement out of Mobile via the Warrior River for Gulf points is becoming freer, with additional craft. Coke is moving out rapidly in response to recent heavy orders. Prices remain firm at $4.25 to $4.50 per net ton at oven for standard beehive foundry and $3.25 to $3.50 for furnace coke.

Old Material.—No change has occurred in the scrap market, which remains a matter of bargaining on each sale. The activity of steel scrap users presages an early improvement in conditions. We quote, per gross ton, f.o.b. Birmingham district yards, as follows:

Old steel axles	$22.00 to $23.00
Old steel rails	10.00 to 10.50
No. 1 steel scrap	9.00 to 9.50
No. 1 wrought scrap	12.50 to 13.00
No. 1 cast scrap	10.50 to 11.00
Extra heavy cast scrap	9.00 to 10.00
Stove plate and light	9.00 to 9.50
Old carwheels	9.00 to 10.00
Tram carwheels	9.00 to 10.00

San Francisco

SAN FRANCISCO, CAL., July 25, 1916.

The adjustment of the waterfront labor trouble has caused a better feeling, permitting a freer movement of merchandise; but aside from that there is little change. Business is dull as compared with the spring months, though there is a fully normal jobbing movement, and there is no sign of curtailment in specifications from the larger consumers. The completion of new manufacturing plants and of additions to old ones is beginning to cause a perceptible increase in routine requirements, and as few of these enterprises are of a temporary nature a larger buying movement is expected for next year.

Bars.—Concrete reinforcing material continues in strong demand, with some fairly large building contracts and many small bridges all over the country. Most of this business is coming in single carloads or less, but amounts to a large tonnage. The movement of soft steel bars in some directions is rather slow, but heavier demands in the small shop trade are expected

in the fall. The larger concerns are specifying substantial tonnages, besides placing frequent orders for prompt delivery from store. Local values continue steady on the old basis of 4c. on jobbing sales, 3.50c. for prompt and 3c. for future shipment from local mills.

Structural Material.—Local shops are at considerable disadvantage just now on account of labor conditions, and comparatively little work is being placed here. There is considerable figuring, and a great many jobs are expected to come out in August, bridge work being especially active. The American Bridge Company recently took about 300 tons for a bridge in the San Joaquin Valley, and bids have been taken for a three-span bridge over the Russian River, Sonoma County. Plans are under way for a $120,000 bridge on the Feather River at Live Oak, Cal. Bids will be taken Aug. 10 for a bridge on Digger Creek near Red Bluff, and plans are out for some bridges near Quincy, Cal. Bids will be opened Aug. 17 for a bridge near Florence, Ariz. Several bridges are projected near San Diego, Cal. Arrangements are being made for a large extension of the Hobart Building, this city, and it is reported that the Willys-Overland Company will build a large warehouse at Sacramento.

Plates.—Specifications for ship work are going forward in large volume, as several plants are getting extensions in shape to handle more plate work. While shipping rates are easier, there are still more inquiries for steel ships than can be considered, and there is no end of the present activity in sight. Such requirements are fairly well covered to the end of the year, and buyers are beginning to negotiate for further contracts, though it is not known whether anything has been definitely closed. Penstock and pipe work also make an important item, and some new business is coming out on this account. The Baker and Llewellyn Iron Works, Lacey Mfg. Company, Western Pipe & Steel Company and Los Angeles Mfg. Company are working on a large pipe order for the San Fernando water district, the total price being $714,000.

Sheets.—The sharp decline on galvanized in the primary market is being followed rather slowly by the local trade. The effect on the volume of business has so far been hardly perceptible, but there is little doubt that a return to normal value will bring out a much better consuming demand as the fall buying season approaches, the recent high level having retarded trade greatly. Stocks appear to be not uncomfortably large. Specifications continue to come out well for blue annealed, but new orders are hard to place.

Wrought Pipe.—The drop of $10 per ton on galvanized pipe effective the first of this week has brought a similar decline in resale prices, which tends to disturb the market temporarily. It is believed, however, that the lower price will have a stimulating effect within a short time. Merchant sizes show no great activity, but the jobbing movement has been about normal recently, and jobbers are beginning to sort up more freely. Oil country goods continue in fairly strong demand, but the delayed deliveries retard business.

Cast-Iron Pipe.—Municipal business is coming out a little more freely, and quite a tonnage is being booked in small orders from corporations. The town of Whittier, Cal., has just taken bids for about a mile of 12-in. pipe. Pasadena has ordered a lot of 24-in.; Los Angeles, 1050 tons of 4 and 6 in., and Othello, Ore., is figuring on a lot of 6-in. The city of Tacoma, Wash., is considering a project requiring a long pipe line and a lot of new mains.

Pig Iron.—The foundries both here and in the interior continue very busy, and there is apparently no curtailment in the tonnage melted. Shipments coming in on contracts, however, are about sufficient for current needs, and business is practically limited to a few scattering orders for prompt delivery. While some concessions might be had on new orders, local agents continue to ask about $26 per gross ton for No. 1 Southern foundry iron; and values on iron bought by analysis are pretty well maintained.

Coke.—New business continues quiet, with a rather large tonnage arriving on contracts covering the remainder of the year, which takes care of foundry needs without difficulty. Values hold fairly firm at a range of from $15 to $15.50 per net ton for Southern coke to $17 or over for favored brands.

Old Material.—Cast-iron scrap continues in good demand, most local offerings being readily absorbed at $16 to $18 per net ton. Steel melting scrap is in rather less urgent demand than earlier in the season, owing to the large tonnage already secured by the principal melters and the ample supply in sight for future needs. There is a moderate movement, however, at about $10 to $12 per gross ton.

Ore.—A contract has just been closed for the hauling of 50 tons of chrome ore per day from the mine to the railroad at Fruto, Cal., in the Sacramento Valley, for a period of two years.

New York

NEW YORK, Aug. 2, 1916.

Pig Iron.—Domestic inquiry is for small lots, the largest sale reported being of 500 tons. Deliveries desired are for this year, indicating piecing out of requirements, and there is practically no interest in contracting for 1917. Export business is still far larger than domestic. J. P. Morgan & Co.'s negotiations for 5000 to 9000 tons of Bessemer iron, believed to be for France, have been concluded, but the exact amount taken has not been made public. The iron will come from Central Western Valley interests. The price is understood to have been somewhat under $21 at furnace. Domestic inquiry is perhaps a trifle more active than in recent weeks, but that is saying little for an exceedingly dull situation. We quote at tidewater for early delivery: No. 1 foundry, $20.50 to $21; No. 2 X, $19.75 to $20.25; No. 2 plain, $19.50 to $20; Southern iron at tidewater, $19.50 to $20 for No. 1 and $18.50 to $19 for No. 2 foundry and No. 2 soft.

Finished Iron and Steel.—Manufacturing consumers appear to have enough stock on hand that specifications on contracts sent to the mills in July were relatively light and new buying was at a notably low ebb. Domestic commitments appear to be only for sheer needs. Mills not producing materials in active demand from abroad are here and there looking for buyers, and such cases are regarded as straws that indicate price concessions if August repeats the July experience. Sheets, narrow plates, universal plates and bar iron are put in this class. The check to buying for new projects or for equipment, such as railroad cars and locomotives, because of high prices; the increasing productive capacity in steel making; the restricted lines of the admittedly prodigious demand from the belligerents; the dullness of the present securities market, and the seemingly satiated demands of steel users are set down as causes. War business is exceedingly heavy, and offerings for early shipments are far beyond what the steel companies can consider. Besides this condition as a factor calculated to maintain the stiff general price situation, the hot-weather and labor-shortage checks are emphasized by those who see no weakness. Foreign buying for other than war uses is as yet of no consequence, as representatives here get no decisions from their principals, let alone the provision of satisfactory credit. One lot of 30,000 tons of plates is in this class. For war purposes it is now understood that Russia will take 340,000 tons of barbed wire all told. One late shell steel inquiry is for 25,000 tons for 6-in. projectiles. In fabricated steel in domestic markets, the activity is chiefly in railroad bridges, and some of these represent replacement of flood losses, mostly in North Carolina. Steel building work still shows the deterrent effect of high prices. That all fabricators, however, are not in great need of bookings is shown in bids received for the five bridges for the Southern Railway. In spite of the attractive character of the work, as to delivery and duplications of 100-ft. spans, the pound price differed between high and low bidders by $35 per ton erected. Somewhat better deliveries are possible in plates, and 3.50c., Pittsburgh, is obtained for universal plates in an attractive lot and in cases 3.75c. for sheared plates.

The lettings in structural steel include 1500 tons of flood replacement, 700 tons for the Southern to be supplied by the Virginia Bridge & Iron Company and 800 tons for the Seaboard to be supplied by the American Bridge Company. The latter company and the Fort Pitt Bridge Works have each a bridge, the two totaling 150 tons, for the Boston & Maine, which is now in the market for two more bridges, or about 200 tons. Windsor, Conn., is taking bids on 300 tons in two bridges; the Philadelphia & Reading is to buy 200 tons of bridge work; the Piedmont & Northern needs to replace a 500-ton bridge in North Carolina, and the Baltimore & Ohio has placed 200 tons with the American Bridge Company. In general building work, some 2500 to 3000 tons will be required for a terminal station at Halifax, Nova Scotia, and 800 tons for an apartment at Broadway and Ninety-first Street, New York. The Gilbert & Barker factory steel work at Springfield, Mass., will be built by the Levering & Garrigues Company, and two residence jobs on East Seventy-ninth Street have been closed: the Rogers with the Harris-Silvers-Baker Company and the Newbold with the Hinkle Iron Company. In railroad car work, the Bettendorf Company is to supply 900 center constructions for the Rock Island and the Lehigh Valley has taken bids on 1500 box cars, while the Gadsden Car Works, it is understood, are not to buy the 1400 center constructions because of high prices. We quote mill shipments of plain structural material at 2.669c. to 2.919c., New York; steel plates at 2.919c. to 4.169c., depending on the width of the plate as much as on delivery, and with universal plates easier by $5 to $10 per ton than sheared plates; steel bars at 2.669c. to 2.919c., the lower price for the Bessemer product in several weeks, but for open-hearth steel at the convenience of the mill and little if any this year; bar iron at 2.669c., New York. Out of warehouse we quote iron and steel bars and shapes at 3.25c. to 3.30c., New York, and plates at 4c. to 4.25c.

Cast-Iron Pipe.—Nothing of special interest has transpired. No public lettings of consequence are announced, but private buying continues quite satisfactory. Carload lots of 6-in., class B and heavier, are firm at $30.50 per net ton, tidewater, class A and gas pipe taking an extra of $1 per ton.

Old Material.—Relaying rails are in active demand, not only for domestic use but also for export. Single transactions have run into thousands of tons. Old steel axles continue in active demand for export, and recently a better export trade has been done in rerolling rails. The inquiry from eastern Pennsylvania for heavy melting steel scrap and rolling-mill stock continues light. While for shipment West up to $13.50 is offered for steel, brokers quote buying prices for the Eastern trade about as follows to local dealers and producers, per gross ton, New York:

Heavy melting steel scrap (eastern Pennsylvania specifications)	$11.75 to $12.00
Old steel rails (short lengths) or equivalent	12.50 to 12.75
Relaying rails	29.00 to 30.00
Rerolling rails	16.00 to 16.50
Rerolling rails (for export)	19.00
Iron car axles	28.00 to 29.00
Steel car axles (for export)	32.00 to 34.00
No. 1 railroad wrought	17.50 to 18.00
Wrought-iron track scrap	15.50 to 16.00
No. 1 yard wrought, long	13.50 to 14.00
No. 1 yard wrought, short	11.75 to 12.00
Light iron (nominal)	3.50 to 4.00
Cast borings (clean)	7.25 to 7.50
Machine shop turnings (nominal)	4.25 to 4.50
Mixed borings and turnings	4.75 to 4.50
Wrought pipe	10.00 to 10.50
Old carwheels (nominal)	15.00 to 15.50
Malleable cast (railroad)	12.25 to 12.50

The foundry trade shows no improvement. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

No. 1 cast (machinery)	$16.00 to $16.25
No. 2 cast (heavy)	14.50 to 15.00
Stove plate	12.00 to 12.25
Locomotive grate bars	12.00 to 12.25

Ferroalloys.—Very little has been done in ferromanganese, but $170 has been established by some recent sales, with the probability that this price can be shaded. Export inquiries are still figuring in the market and include several thousand tons for Italy. The importation of over 12,000 tons in June, or at a rate greater than the average before the war, together with efforts of some domestic producers to get business, has put consumers much more at ease as to future supplies. The quotation of $50 at furnace for 20 per cent spiegeleisen is still maintained, but little is doing. Ferrosilicon is quoted at $86 to $88, Pittsburgh, prices advancing on the recent loss in production. Ferrotungsten is easy at $5 per lb. of contained tungsten. The demand from makers of high-speed tool steel is lighter in view of the smaller demand for their product, but the placing of new shell orders promises a heavier demand for tool steel. Ferrochrome, 60 to 70 per cent, is unchanged at 16c. to 20c., New York, per lb. of contained chromium. Ferrovanadium stands at $2.75 to $3, Pittsburgh, per lb. of contained vanadium. High-carbon ferrotitanium, 15 per cent, is quoted at 8c. per lb. for carload lots, 10c. for ton lots and 12.50c. for small quantities. Carbon-free, 25 per cent ferrotitanium, is quoted at 35c. per lb.

British Steel Market

American Sheet Bars Sold for Early Delivery—Further Export Prohibitions

LONDON, ENGLAND, Aug. 1, 1916.—(*By Cable.*)

The pig-iron tightness is acute. French demands are urgent. American sheet bars have sold at £13 5s. c.i.f. for August and September delivery. Four-in. billets are quoted by American makers at $62 to $63. Exports have been prohibited of galvanized sheets, cotton ties, cast-iron pipe and steel plates and sheets. Tin plates are lifeless.

The by-product market shows little change. In July benzol advanced a trifle and 90 per cent is quoted at 1s. ½d. Tuluol is quoted at 2s. 3d. and solvent naphtha is nominal at 1s. 10d. to 2s. Ammonium sulphate is £16 5s. per ton.

Iron and steel quotations, chiefly nominal, are as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 28s. to 29s.
Steel black sheets, No. 28, export, f.o.b. Liverpool, £20.
Steel ship plates, Scotch, delivered local yards, £13 17s. 6d.
Steel rails, export, f.o.b. works port, £10 17s. 6d.
Hematite pig iron, f.o.b. Tees, about 140s.
Sheet bars (Welsh) delivered at works in Swansea Valley, £10 7s. 6d.
Steel bars, export, f.o.b. Clyde, £18.
Ferromanganese, £[illegible].
Ferrosilicon, 50 per cent, £21 to £22.

Ministry of Munitions Makes Official Iron and Steel Prices Actual

(*By Mail*)

LONDON, July 18, 1916.

The intense pressure of activity in the British iron and steel industry continues, the dominant factor being the vast outlet for the various descriptions of material needed for munitions. The full effect of requirements in that direction is doubtless now being felt, and is likely to be for an indefinite period, and under the circumstances merchant business in the home trade and for export is being whittled down to insignificant dimensions. Manufacturers are crowded with orders sufficient to absorb the great bulk of their output over the remainder of the year, and therefore have very little to sell.

Clear evidence of the dearth of supplies was afforded by the result of the Birmingham quarterly meeting, where buyers were pretty fully represented, but no important fresh features were disclosed. The tendency of steel prices proved as strong as ever, the scarcity showing not the least sign of abatement, and seriously hindering operations at the sheet mills, including galvanized iron and tin plates. It is hoped by tin plate makers that the abstention of buyers will not last much longer, for the requirements of food packers on Government account should again be on the increase shortly.

All descriptions of semi-finished steel are very scarce. Whereas, business in Welsh bars was recently done at various prices ranging up to £14 10s., delivered

locally, the official price still remains at £10 7s. 6d., which also applies to billets, and the authorities insist that this rate must be accepted by makers. The tendency of prices for American material has been rather easier, offers now being made at $63 down to $61, c.i.f. Liverpool, but business is slow to mature.

There is no change in the position of pig iron, which remains very tight, producers having hardly anything to spare. Deliveries of Cleveland iron to home consumers have been more liberal, and new French demands are being met a little more freely against permits. The export price is now 97s. 6d. f.o.b. for No. 3. Hematite has continued strong at recent rates, and there is a big demand, while good quantities are being sent to France against running contracts. There has been a renewed advance in the price of rubio ore owing to the labor troubles at Bilbao.

Business in ferromanganese has been much quieter, but the tone is very steady, owing to the difficulty of placing new orders for this year's shipments. Manganese ores are slow, consumers being fairly well supplied.

SCHEDULE OF MAXIMUM PRICES

The Ministry of Munitions, by placing iron and steel under the defense of the real act, are clearly resolved that the farce of declaring official prices which are disregarded shall end. As intimated above, makers of sheet bars and billets are now buying at the official rates, and it may be well, therefore, to detail the actual operative prices for leading classes of material now being enforced:

Maximum Prices for Pig Iron

	Per Ton Net, f.o.t. Makers' Works
Hematite pig iron, East Coast, Scotch and Welsh	£6 2s 6d
Hematite pig iron, West Coast	£6 7s 6d
Cleveland pig iron, No. 1	£4 11s 6d
Cleveland pig iron, other grades	£4 7s 6d

Maximum Basis Prices for Steel

	Per Ton Net, f.o.t. Makers' Works
Ship plates, ¼ in. and over	£11 10s 0d
Boiler plates	£12 10s 0d
Subject to extras for special thickness, sizes and qualities not exceeding those customary in district of manufacture	
Angles, ordinary sizes	£11 2s 6d
Joists, ordinary sizes	£11 2s 6d
Rails (railroad), over 60 lb. per yard	£10 17s 6d
Sheet and tin plate bars	£10 7s 6d
Blooms and billets, ordinary mild steel	£10 7s 6d
Blooms and billets, special	£11 0s 0d
Rounds and squares, 3 to 5½ in. diameter or square (untested)	£12 10s 0d

Tees, channels, flats, bulb angles, zees and other sections of which the prices are customarily based on the price of angles, to be at price of angles, subject to extras not exceeding those published in any list recognized by the trade in the district of manufacture and current on the 7th day of July, 1916.

All subject to extras for special sizes and qualities not exceeding those published in any such list as above.

Heavy steel, melting scrap..£5 10s per ton deld. buyers' works
Turnings and borings.....£2 15s per ton deld. buyers' works

Maximum Price for Bar Iron

Standard quality, ordinary sizes and merchants' lengths, £13 15s per ton net, f.o.t. makers' works.

Marked bars, £15 per ton, less 2½ per cent, f.o.t. makers' works.

Subject to extras for special sizes and qualities not exceeding those published in any such list as above.

To the above mentioned prices for bar iron and steel a sum not exceeding 2½ per cent on such prices may be added in the case of sales by persons other than the makers.

Maximum Prices for High-Speed Tool Steel

Finished bars, 14 per cent tungsten,
2s 10d per lb. delivered buyers' works
Finished bars, 18 per cent tungsten,
3s 10d per lb. delivered buyers' works
(Subject to usual extras for special sizes)

Scrap:

Millings and turnings, 5d per lb. net, delivered steel makers' works.

Bar ends, 6d per lb. net, delivered steel makers' works.

The Ashland Iron & Mining Company, Ashland, Ky., is now represented in New York City by Morris H. Smith, 298 Avenue A, for the sale of blue annealed, black and galvanized sheets, and all painted and galvanized roofing and metal shingles.

Iron and Industrial Stocks

NEW YORK, Aug. 2, 1916.

A week ago the stock market appeared to have struck a good gait upward, but conditions have since changed and some recessions in values have occurred. The splendid showing of earnings made by the United States Steel Corporation had apparently no effect in stimulating speculation. Instead of this, the pressing for sale of bonds and of some stocks from Europe had a greater influence, while added to this were reports of damages to growing crops through extreme heat in important grain producing sections of the West. The possible culmination of labor troubles on the railroad systems of the country within the next few days may also have had something to do with the curbing of speculation. Favoring the so-called war stocks was the announcement of further contracts for high explosive shells which will add materially to earnings. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com.	21	22¼	Rep. Stl. Spring com	42⅜	43½
Allis-Chal., pref.	73	74½	Republic, com.	46¼	47⅞
Am. Can, com.	63⅛	64⅜	Republic, pref.	109¼	110
Am. Can, pref	110	110¾	Sloss com	42¾	43¾
Am. Car & Fdy. com.	75¼	76½	Tenn. com.	19⅜	20⅝
Am. Car & Fdy. pref.	116½	117	Tobe, pref	53	54¾
Am. Loco., com.	63½	66¾	U. S. Steel com	85¾	87
Am. Loco., pref	101	101¾	U. S. Steel, pref.	116¼	116⅞
Am. Steel Fdries.	49	53½	Va. I. C. & Coke	41	42
Bald. Loco., com.	68⅛	72¼	Westing. Elec.	47⅜	48
Beth. Steel, com.	439½	440	Am. Rad., com.	390	395
Colo. Fuel	43⅛	45⅛	Am. Ship. com	43½	44
Deere & Co., pref.		90½	Am. Ship, pref.	90	90½
Gen. Electric	167⅛	169¾	Chic. Pneu. Tool.	67½	68¾
Gt. No. Ore Ctf.	34⅛	35⅛	Lake Sup. Corp.	10	10⅝
Int. Harv. of N. J., com.		114	Warwick		90½
Int. Harv. of N. J., pref.		120	Crucible Steel, com	66⅜	70
Int. Harv. Corp., com.		78½	Crucible Steel, pref.	114¾	116
Int. Harv. Corp., pref.		108½	Heath-Walk. Retrac., pref.	102½	103
Lacka. Steel	70	71¾	La Belle Iron, com.	52½	53
Nat. En. & Stm., com.	221½	234	La Belle Iron, pref.		120⅞
N. Y. Air Brake	123	129	Am. Brit. Mfg., com.	12	25
Pitts. Steel, pref.	98	98⅝	Am. Brit. Mfg., pref.	43	58
Pressed Stl., com.	47	49¼	Driggs-Seabury	98½	100
Pressed Stl. pref.		100½	Midvale Steel	61	62⅝

Dividends

The Scovill Mfg. Company extra, 10 per cent, payable Aug. 1. Including this dividend the company has paid 62 per cent thus far in 1916.

The American Brass Company, regular quarterly, 1½ per cent and extra 3½ per cent, payable Aug. 15.

The American La France Fire Engine Company, regular quarterly 1 per cent on the common stock, payable Aug. 15.

The Inland Steel Company, regular quarterly 2 per cent, payable Sept. 1.

The Pressed Steel Car Company, regular quarterly 1¾ per cent on the preferred stock, payable Aug. 23, and the resumption of dividends on the common stock by the payment of 1 per cent Sept. 6.

The United Engineering & Foundry Company, regular quarterly, 2 per cent on the preferred stock and an increase in the quarterly dividend on the common stock to 3 per cent.

Japanese to Work a Chinese Iron Mine

Negotiations which have been proceeding since 1914 with the Chinese authorities by the Sino-Japanese Industrial Development Company have recently been concluded and the rights to work the Taochung iron mine at Taochung, Fanchang-Hsien, China, have been definitely conceded. The mine is reported to contain 60,000,000 tons of ore, averaging 65 per cent iron, against 60 per cent usually found in the Tayeh ores, from which the Hanyang furnaces are supplied.

Canada's foreign trade in the three months ended June 30 totalled $527,512,344, against $272,646,868 for the corresponding quarter of 1915. The imports rose from $98,017,187 to $186,245,480, and the domestic exports from $113,578,221 to $245,381,035. Foreign exports increased from $8,577,775 to $66,989,732. June contributed largely to the good showing for the quarter, the increase in the trade total being from $127,102,516 in June, 1915, to $243,953,544 in June this year.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, effective from April 10, 1916, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c.; Pacific coast (by rail only), 65c.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 2.50c. to 2.75c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs	.10
Angles, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Plates.—Tank plates, ¼ in. thick, 6 in. up to 100 in. wide, 2.90c. to 4c., base, net cash, 30 days, or ½ of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras

	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers)	.10
Boiler and flange steel plates	.15
"A. B. M. A." and ordinary firebox steel plates	.20
Still bottom steel	.30
Locomotive firebox steel	.50

Marine steel, special extras and prices on application

Gage Extras

Rectangular, ¼ in. thick, over 6 in. wide to 100 in. wide	Base
Lighter than ¼ in., to 3/16 in., up to 72 in. wide	.10
*Lighter than ¼ in., including 3/16 in., over 72 in. to 84	.20
*Lighter than ¼ in., including 3/16 in., over 84 in. to 96	.30
*Lighter than ¼ in., including 3/16 in., over 96 in. to 100	.40
*Lighter than ¼ in., including 3/16 in., over 100 in. to 102	.45
Lighter than 3/16 in., including No. 8, up to 72 in. wide	.15
*Lighter than 3/16 in., including No. 8, over 72 in. to 84	.25
*Lighter than 3/16 in., including No. 8, over 84 in. to 96	.35
Lighter than No. 8, including No. 10, up to 60 in. wide	.30
Lighter than No. 8, including No. 10, over 60 in. to 64	.35

Up to 72 in., not less than 10.2 lb. per sq. ft. will be considered ¼ in.
Over 72 in. must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.
Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.
Over 72 in., ordered weight 3/16 in., take No. 8 price.
Over 72 in., ordered weight No. 8, take No. 10 price.

Width Extras

Over 100 in. to 110 in. inclusive	.05
Over 110 in. to 115 in. inclusive	.10
Over 115 in. to 120 in. inclusive	.15
Over 120 in. to 125 in. inclusive	.25
Over 125 in. to 130 in. inclusive	.50
Over 130 in.	1.00

Length Extras

Universal plates 80 ft. long up to 90 ft. long	.05
Universal plates 90 ft. long up to 100 ft. long	.10
Universal plates 100 ft. long up to 110 ft. long	.20

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over

Lengths under 3 ft. to 2 ft. inclusive	.25
Lengths under 2 ft. to 1 ft. inclusive	.50
Lengths under 1 ft.	1.55
Circles 3 ft. in diameter to 100 in.	.30
Circles over 100 to 110 in. (width extra)	.35
Circles over 110 to 115 in. (width extra)	.40
Circles over 115 to 120 in. (width extra)	.45
Circles over 120 to 125 in. (width extra)	.55
Circles over 125 to 130 in. (width extra)	.80
Circles over 130 in. (width extra)	1.30
Circles under 3 ft. to 2 ft. inclusive	.55
Circles under 2 ft. to 1 ft. inclusive	.80
Circles under 1 ft.	1.85
Half circles take circle extras.	
Sketches, not over four straight cuts, inc. straight taper	.10
Sketches having more than four straight cuts	.20

Plates sheared to a radius take complete circle extras.

*Including extra for width.

Wire Rods.—Including chain rods, $55 to $60.

Wire Products.—Prices to jobbers effective May 1: Fence wire, Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, $2.45; galvanized, $3.15. Galvanized barb wire and staples, $3.35; painted, $2.65. Wire nails, $2.50 to $2.60. Galvanized nails, 1 in. and longer, $2 advance over base price; shorter than 1 in., $2.50 advance over base price. Cement-coated nails, $2.50. Woven wire fencing, 61½ per cent off list for carloads, 60½ off for 1000-rod lots, 59½ off for less than 1000-rod lots.

The following table gives the price per 100 lb. to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	6 to 9	10	11	12&12½	13	14	15	16
Annealed	$2.50	$2.55	$2.60	$2.65	$2.75	$2.85	$2.95	$3.05
Galvanized	3.20	3.25	3.30	3.35	3.45	3.55	4.00	4.10

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect on black pipe from April 21, 1916, and on galvanized from July 24, 1916, all full weight pipe:

Butt Weld

Steel Inches	Black	Galv.	Iron Inches	Black	Galv.
⅛, ¼ and ⅜	63	35½	⅛ and ¼	52	24
½	67	51½	⅜	53	25
¾ to 3	70	55½	½	57	38
			¾ to 1½	60	43

Lap Weld

2	65	50½	1¼	48	31
2½ to 6	68	53½	1½	54	38
7 to 12	65	49½	2	55	39
13 and 14	53½	..	2½ to 4	57	42
15	51	..	4½ to 6	57	42
			7 to 12	56	41

Reamed and Drifted

1 to 3, butt	68	53½	¾ to 1½, butt	55	37
2, lap	63	48½	1¼, lap	43	25
2½ to 6, lap	66	51½	1½ lap	49	32
			2, lap	50	33
			2½ to 4, lap	52	36

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	59	40½	⅛, ¼ and ⅜	52	34
½	64	50½	½	57	43
¾ to 1½	68	54½	¾ to 1½	61	45
2 to 3	69	55½			

Lap Weld, extra strong, plain ends

2	63	49½	1¼	50	33
2½ to 4	66	52½	1½	55	39
4½ to 6	65	51½	2	57	42
7 to 8	61	45½	2½ to 4	59	45
9 to 12	56	40½	4½ to 6	58	44
			7 to 8	52	38
			9 to 12	47	33

Butt Weld, double extra strong, plain ends

½	55	43½	½	44	31
¾ to 1½	58	46½	¾ to 1½	47	34
2 to 2½	60	48½			

Lap Weld, double extra strong, plain ends

2	55	43½	1½	44	30
2½ to 4	57	47½	2	44	30
4½ to 6	56	44½	2½ to 4	46	35
7 to 8	51	37½	4½ to 6	45	34

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing, higher prices that the above discounts on black and three (3) points on galvanized.

Sheets.—Makers' prices for mill shipments on sheets of U. S. standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Blue Annealed Sheets

	Cents per lb.
Nos. 3 to 8	2.95 to 3.20
Nos. 9 and 10	3.00 to 3.25
Nos. 11 and 12	3.05 to 3.30
Nos. 13 and 14	3.10 to 3.35
Nos. 15 and 16	3.20 to 3.45

Box Annealed Sheets, Cold Rolled

Nos. 17 to 21	2.70 to 2.80
Nos. 22 and 24	2.75 to 2.85
Nos. 25 and 26	2.80 to 2.90
No. 27	2.85 to 2.95
No. 28	2.90 to 3.00
No. 29	2.95 to 3.05
No. 30	3.15 to 3.25

Galvanized Sheets of Black Sheet Gage

Nos. 10 and 11	3.25 to 3.35
No. 12	3.35 to 3.45
Nos. 13 and 14	3.35 to 3.45
Nos. 15 and 16	3.45 to 3.55
Nos. 17 to 21	3.60 to 3.70
Nos. 22 to 24	3.70 to 3.80
Nos. 25 and 26	3.85 to 3.95
No. 27	4.10 to 4.20
No. 28	4.25 to 4.35
No. 29	4.40 to 4.50

Boiler Tubes.—Discounts on less than carloads, freight to destination added, effective from April 15, 1916, are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1½ in.	35	1½ in.	27
1¾ and 2 in.	47	1¾ and 2 in.	39
2¼ in.	44	2¼ in.	36
2½ and 2¾ in.	50	2½ and 2¾ in.	42
3 and 3½ in.	55	3 and 3½ in.	47
3½ to 4½ in.	56	3½ to 4½ in.	48
5 and 6 in.	49	5 and 6 in.	41
7 to 13 in.	46	7 to 13 in.	38

Locomotive and steamship special charcoal grades bring higher prices.

1¾ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin,	Lead		Spelter	
		Electro-	New	New	St.	New	St.
July	Lake	lytic	York	York	Louis	York	Louis
26	25.25	25.00	37.87½	6.10	6.00	10.25	10.00
27	25.50	25.25	37.87½	6.05	6.00	10.25	10.00
28	25.75	25.50	38.25	6.10	6.00	10.00	9.75
29	26.00	25.75	....	6.15	6.00	10.00	9.75
31	26.25	26.00	38.25	6.10	6.00	9.75	9.50
Aug							
1	26.25	26.00	38.00	6.10	6.00	9.50	9.25

NEW YORK, Aug. 2, 1916.

Copper is stronger because of the absorption of resale lots. Tin is practically unchanged in a quiet market. Lead has been fairly active, but prices are lower. Spelter is dull and quotations again show a declining tendency. The dullness in antimony is unbroken and the nominal quotation is lower.

New York

Copper.—The market has continued very slow, but it has a better undertone because of the gradual absorption of metal in second hands. No sales of individual importance are reported, and the producers have confined their activity to filling contracts. There is a general feeling that a change in conditions is not far off, and it probably will come by a revision in producers' prices, thereby inducing the brass mills to buy for the last quarter and beyond. For some months the latter have been operating on metal supplied under contract. The London market for spot electrolytic is stronger at £125 against £122 a week ago. The exports in July reached the excellent total of 35 048 tons. Electrolytic was quoted at New York yesterday at 26c. to 26.25c., cash, and Lake was nominal at 26.25c.

Copper Averages.—The average price of Lake copper for the month of July, based on daily quotations in THE IRON AGE, was 25.84c., and of electrolytic, 25.57c.

Tin.—In its entirety the week has been quiet, although on July 26 a fair business was done. On that day early arrivals sold at 37.62½c. and early shipments from the East in small volume at 36.50c. to 36.75c. On no other day was there noteworthy activity. The supply of Banca is in excess of the need, and it has sold at 37c. for spot delivery. The deliveries into consumption in July totaled 4432 tons, of which 832 tons came to the East from Pacific ports. In stocks and landing July 31 was 5028 tons. There is now afloat 1696 tons. Spot Straits was quoted at New York yesterday at 38c.

Lead.—Of all the metals lead has been the most active, and in the aggregate a fair business was done on both foreign and domestic account. A feature of the week was the fairly large number of inquiries and consequent sales for carload lots wanted promptly, indicating that consumers' reserve stocks have reached a low point. A few large orders were placed. It is the general opinion that consumers will buy at a lively rate and in good quantities if the leading interest reduces its quotation to 6c., New York. It continues to quote 6.50c., New York, and 6.42½c., St. Louis, and declares it is getting orders on that basis. The independents, however, who have been taking most of the business to the exclusion of dealers and second hands, have been selling down to 6.10c., New York, and 6c., St. Louis, the minimum quotations of yesterday. The exports in July totaled 2541 tons.

Spelter.—The market has become very dull and producers' representatives are of the opinion that there will not be any considerable betterment until the brass trade enters the market again. This will not be until they have neared the end of the metal they have under contract. A week ago the tone of the market was such that holders of spelter withdrew offerings and it had every appearance of being scarce, to the distress, more or less, of interests believed to have been short. Since then, however, plenty of the metal has become available and prices have declined. Prompt and August were quoted yesterday at 9.25c. to 9.50c., St. Louis, and 9.50c. to 9.75c., New York. September was about 9c., St. Louis, and October and November at about 8.75c. Brass mill special is quoted at from 10.50c. to 11c. The exports in July were extremely large, amounting to 7079 tons, representing sales made some time ago. The London market dropped from £60 to £55 yesterday, which had a weakening effect here.

Antimony.—This metal can be had without difficulty at 12.30c., New York, duty paid, but there is little demand. A phase of the situation is that stocks are held in New York which cost the owners over 30c. per pound. Incidentally, the price is getting down to a point where some domestic producers cannot manufacture except at a loss.

Aluminum.—The quotation for ton lots is unchanged at 58c. to 60c. for No. 1 virgin metal, 98 to 99 per cent pure.

Old Metals.—The demand has improved and more activity is reported. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible	22.50 to 23.50
Copper, heavy and wire	21.50 to 22.50
Copper, light and bottoms	18.00 to 19.00
Brass, heavy	13.00 to 14.00
Brass, light	10.50 to 11.50
Heavy machine composition	17.00 to 18.50
No. 1 yellow rod brass turnings	13.50 to 14.25
No. 1 red brass or composition turnings	14.50 to 15.50
Lead, heavy	5.75
Lead, tea	5.25
Zinc	3.00 to 3.50

Chicago

JULY 31.—On the strength of an active market in copper, prices have held firmly. Electrolytic has been especially strong. Tin quotations were higher at the end of last week, but lead quotations from independent sources displayed more pronounced weakness. We quote: Casting copper, 24.50c. to 25c.; Lake copper, 26c.; tin, carloads, 39.25c., and small lots, 40.50c.; lead, 6.05c. to 6.45c.; spelter, 9.50c. to 9.75c.; sheet zinc, 15c.; Cookson's antimony, 50c.; other grades, 15c. to 16c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 17.75c.; copper bottoms, 15.75c.; copper clips, 16.75c.; red brass, 15.50c.; yellow brass, 11.50c.; lead pipe, 4.50c.; zinc, 5c.; pewter, No. 1, 27c.; tinfoil, 27c.; block tin pipe, 32c.

St. Louis

JULY 31.—Metals have been quiet with quotations closing to-day as follows: Lead, 6.25c prompt and 6.12½c August; spelter, nominal, 9.50c to 9.75c; tin, 40c; Lake copper, 26c; electrolytic copper, 25.50c; antimony, 13.50c to 14c. In the Joplin ore district the range on zinc blende was from $55 to $75 for 60 per cent, with the average for the week $66 per ton. Calamine sold on a basis of $40 to $50 for 40 per cent with the average $44. Lead ore sold at $70 for 80 per cent metal with the week's average $72 because of premiums. Many producers are now holding their ore, while dry weather is affecting some of the mines which need water for operation. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 7.50c.; heavy yellow brass, 10.50c; heavy red brass and light copper, 14.50c; heavy copper and copper wire, 17c; pewter, 25c; tinfoil, 30c; lead, 5c; zinc, 4.50c; tea lead, 3.50c.

The property of the Nova Scotia Car Works, Halifax, was sold at auction July 26 by the liquidator, the purchaser being F. B. McCurdy. It is understood the old security holders will be afforded the opportunity of protecting their investment by joining in the contemplated reorganization if they wish to do so, and the property will be offered to them at the cost price. The price at which it was purchased—$167,500—is subject to a mortgage of $115,000 held by the city of Halifax.

Railroad shipments from Archangel to the interior of Russia are averaging 300 to 400 cars a day, according to Commercial Attache Henry D. Baker, Petrograd. On some days as many as 1000 cars have left the port. The line to Vologda is now broad gage, so that 14-ton cars are possible against 10-ton cars last year on the narrow-gage line then existing, and freight shipments are thus made to all parts of Russia without change of cars.

PERSONAL

Capt. H. M. M. Richards has resigned as treasurer of the American Iron & Steel Mfg. Company, Lebanon, Pa., and the duties of treasurer will be added to those of Daniel G. Scott, secretary. Charles B. Foster, Jr. assistant secretary, has also resigned.

George M. Hendee has resigned as president and director of the Hendee Mfg. Company, Springfield, Mass. He is succeeded by John F. Alvord, president of the Torrington Company and its associated enterprises. The stock interest of Mr. Hendee, a minority interest, has been secured by Mr. Alvord and his associates. Mr. Hendee had been desirous of retiring from his industrial activities for some time, but had not before found an opportunity to retire without injury to the company. Charles N. Kinckley, secretary of the company, has resigned to accept a position with the Willys-Overland Company, Toledo, Ohio.

John A. Hunter, who has for some years been steam engineer of the American Sheet & Tin Plate Company, Pittsburgh, has also been placed in charge of the welfare department.

Charles Pascoe, former metallurgist for the Canadian Steel Foundries, Ltd., and recently connected with the Thomas Davidson Mfg. Company, Ltd., Montreal, as consulting metallurgist, has joined the Snyder Electric Furnace Company, Chicago, as metallurgist in that company's electric furnace research plant, at Clearing, Ill. Mr. Pascoe's work in connection with the Thomas Davidson Mfg. Company had to do with the production of shell billets from a Snyder electric acid steel furnace, and his work in this connection has been peculiarly successful, as evidenced by the fact that approximately 90 per cent of the billets passed inspection. Douglas Walker, former salesman for the Electric Furnace Company and in charge of the Chicago district, has been appointed sales manager.

Willard A. Van Brunt, Horicon, Wis., farm implement and machinery manufacturer, has presented the Grand Lodge of Wisconsin, Free and Accepted Masons, with $200,000 in first mortgage farm securities as an endowment fund for the maintenance of the Masonic home at Dousman, Wis., for which in 1905 he presented a 319-acre farm and buildings, now valued at $155,000.

W. R. Hulbert, sales manager of the Goldschmidt Thermit Company, New York, delivered an illustrated lecture, supplemented with demonstrations, to the members of the Clinchfield Railway Club, Erwin, Tenn., on Tuesday evening, July 25.

H. B. Coleman has been appointed sales manager of the Russell & Erwin Mfg. Company, New Britain, Conn. He was formerly with this company for a number of years, but recently has been with the T. B. Rayl Company, Detroit, Mich.

The Titanium Alloy Mfg. Company, Niagara Falls, N. Y., has recently added to its bronze department sales force Gilbert T. Mason, formerly secretary and treasurer of the Atkinson Company, Rochester, N. Y. Its business is expanding rapidly and in keeping with its policy of service finds it necessary to increase its organization.

Frank G. Bolles, formerly manager of *International Trade*, an export publication, at Chicago, has been made vice-president of the Russian Trade Corporation of America and will have charge of its business. This is a subsidiary company formed by R. Martens & Co., Inc., New York, and its offices will be in the Maritime Building, 8 and 10 Bridge Street, New York. Offices of the Russian Trade Corporation have also been opened in several of the large commercial centers of Russia. The Russian trade operations of R. Martens & Co., Inc., are limited to mechanical lines, while those of the new company will be in non-mechanical lines.

Lieut.-Col. H. A. Johnson, senior director of the wire manufacturing company of Richard Johnson & Nephew, Ltd., Bradford Iron Works, Manchester, England, was wounded at the front in France early in July and is now in a hospital in London. He was in command of the 17th Battalion Manchester Regiment and was leading an attack on Montauban. The firm of Richard Johnson & Nephew, Ltd., has been known in the United States for some years, having been licensed by the Washburn & Moen Company in 1877 for the manufacture of Glidden barb wire fence and having installed the first continuous wire-rod rolling mill in England.

Earl McIntire, for 17 years connected with the Republic Iron & Steel Company, Youngstown, Ohio, but who resigned recently to take the position of field engineer for the Canadian Steel Corporation at Ojibway, Canada, was presented with a chest of silver by his associates in the Republic company offices, the presentation speech being made by G. C. Shackleford.

Raymond McLaughlin, for 15 years in the offices of the Union works of the Carnegie Steel Company at Youngstown, Ohio, has been appointed secretary to Ward B. Perley, vice-president and general manager of the Canadian Steel Corporation at Ojibway, Canada. He was presented with a handsome stickpin by his associates.

Richard Peters, Jr., has opened offices at 52 Vanderbilt Avenue, New York, as chairman of the Connellsville Coal Tariff Association. This organization was formed recently by leading operators in the Connellsville coking district to present to the railroads the need of a readjustment of freight rates on coal out of that district. With the growth of by-product coke oven installations it will be necessary in the future to ship in place of a portion of the present Connellsville coke output, Connellsville district coal for use in these by-product ovens. The association recently presented its claims for more advantageous rates before an examiner of the Interstate Commerce Commission.

W. G. Savage, for many years associated with the United States Cast Iron Pipe & Foundry Company at its Chicago office, has been made assistant Western sales manager.

Advanced Safety Code for Foundries

The American Foundrymen's Association Safety Committee which met at Rochester, July 20 and 21, is made up as follows: Victor T. Noonan, director of safety, Industrial Commission of Ohio, Columbus, chairman; Earl B. Morgan, safety engineer, Norton Company, Worcester, Mass.; F. H. Elam, manager casualty department, American Steel Foundries, Chicago; George B. Koch, general foreman, South Altoona Foundries, Altoona, Pa.; Ralph H. West, president West Steel Castings Company, Cleveland, Ohio; C. E. Pettibone, chief safety inspector, Pickands, Mather & Co., Cleveland, and Dr. Richard Moldenke, Watchung, N. J.

All were present at Rochester except Mr. Pettibone. Other participants in the conference were F. Will, Sr., president, and Thomas A. Soults, superintendent, Sill Stove Works, and Joseph E. McHenry, superintendent Gleason Works Foundry, Rochester. Chairman Noonan believes that the recommendations adopted at Rochester, which follow in many particulars the Ohio foundry code, represent the most progressive steps along safety lines that have yet been taken up in industrial organizations, and also expresses the opinion that they will go far toward bringing about better relations between foundry workmen and employers. The committee report, which will be presented to the Cleveland convention of the American Foundrymen's Association in September, contains many reforms for which workmen have been contending. These were adopted with unanimity by the committee, though none of its members represents organized labor.

Great Britain's manganese ore imports in June were 50,826 gross tons against 42,068 tons in May. This brings the total imports to July 1, 1916, to 225,492 tons, against 134,526 tons in the first six months of 1915. In 1914 and 1913 these imports were 39,953 and 50,098 tons per month respectively.

Pittsburgh and Nearby Districts

Blast-furnace operators in the Youngstown district have decided to pay the railroad charge of 20c. per ton approved by the Interstate Commerce Commission for hauling away furnace slag. The money will be paid to the railroads under protest until the question is finally settled. The railroads announced recently that they would haul no more slag after Aug. 1 without assurance from the furnace operators that they would be paid for the service. A blast furnace making 500 tons of pig iron per day will make about 250 tons of slag. With a total of 22 furnaces in the Youngstown district, this means that 5500 tons of slag will have to be hauled away every day at a charge of 20c. per ton. Some of the furnace operators declare they will arrange to dump their slag near the furnaces.

The Foreign Trade Commission of Pittsburgh reports very heavy export inquiries for iron and steel in various forms. In one day it received inquiries from London for 7400 tons of 60-lb. rails, 5500 tons of steel railroad ties, 210 tons of fish plates, 48 tons of nuts and bolts, 1200 tons of 3/16-in. wire and 90 tons of cable; from Italy an inquiry for a large quantity of brass rods, and from Russia an inquiry for two crankshafts.

The Penn Iron & Steel Company, Peterson, Pa., recently organized, plans to build a plant to manufacture bar-iron products.

The American Pattern Mfg. Company, Youngstown, Ohio, has been organized to make patterns for foundries. Identified with the new company are S. S. French, general manager of the William Tod Company; Harry M. Kelly, manager of the Lloyd Booth department of the United Engineering & Foundry Company; Gerald F. Hamilton and B. M. Campbell, all of Youngstown, and Edmund Collins, formerly connected with a pattern works at Sharon, Pa. The company will occupy buildings on Wilson Avenue, Youngstown.

The cooling system in use in the plants of the American Sheet & Tin Plate Company at Sharon, and Farrell, Pa., has proved very satisfactory during the recent excessively hot weather. It is said the men were thus enabled to work longer hours and to turn out more product than in other plants not so equipped. The system was invented by W. H. Davis, superintendent of the company's tin-plate mills at Farrell.

Fred H. Merrick, the leader in the Westinghouse strikes and in the riots at Bessemer, Pa., early in May, and who was sentenced to three years and six months in the workhouse, has been released on $10,000 bail, pending the disposition of an appeal which has been taken to the Superior Court.

The Carnegie Steel Company, Pittsburgh, is in the market for a 24-in. open-gap, double-end, motor-driven, combination punch and shear for its Ohio works, to punch ⅞-in. holes through ¾-in. plate, and a bar shear for its Duquesne works.

The Valley Forging Company, Oakmont, Pa., is in the market for a motor-driven shear.

Referring to the increase in the capital stock of the Pennsylvania Tank Car Company, Sharon, Pa., from $500,000 to $1,000,000, it is stated by L. F. Jordan, president, that none will be issued in the near future. The company does not now contemplate making any additions to its plants.

The Youngstown Sheet & Tube Company, Youngstown, Ohio, denies that it has received an order for 50,000 tons of barb wire for shipment to Russia, although it is filling several smaller orders for such shipment.

In the near future Youngstown will be a large producer of benzol. The Republic Iron & Steel Company has been a maker of benzol since its by-product coke plant was completed in December last year, and the Youngstown Sheet & Tube Company and the Brier Hill Steel Company are also erecting benzol plants, both of which will be in operation before the end of the year.

The Zug Iron & Steel Company, which was one of the oldest bar-iron manufacturers in the Pittsburgh district, but which has not been active for some years, has sold its property to an unknown buyer. Reports that it had been sold to the American Steel & Wire Company and would be used in making large additions to the latter's Shoenberger works have been officially denied.

The Brier Hill Steel Company is adding to its open-hearth steel plant at Youngstown, Ohio, one additional soaking-pit furnace, which is being built in line with the others, making six in a row.

The Baldwin Tool Works, Parkersburg, W. Va., has bought the Ruschaupt canning factory building at Princeton, Ind., and will equip it for the manufacture of handles.

The new plant which the Standard Car Construction Company is erecting at Masury, near Sharon, Pa., will use electric power throughout. A contract has been made with the Mahoning & Shenango Railway & Light Company to furnish the power, the equipment to include two motor generator sets with 22-hp. motors, four 58-hp. motors for the air compressors, four 75-hp. motors for the hydraulic riveters and other machinery and a large number of smaller motors for various purposes. The three large steel buildings are nearly completed and the installation of equipment will start in a short time, all contracts having been placed.

The Stevens Metal Products Company, Niles, Ohio, recently organized, will manufacture a line of metal products, including straight side drums of practically all standard capacities. E. D. Thompson, for some years with the Metal Post & Culvert Company, Niles, will resign Aug. 8 to become vice-president of the Stevens Company.

The Edgewater Steel Company, Pittsburgh, has made application for a Pennsylvania charter with a nominal capital of $5,000.

The Jamison Coal & Coke Company, Pittsburgh, which operates extensively in the Fairmont coal mining district in West Virginia, has sold 1500 steel hopper cars to the Baltimore & Ohio Railroad, subject to unexpired equipment trusts amounting to $600,000.

Thomas L. Brown has been appointed temporary receiver for the Safety Armorite Conduit Company, the Garland Nut & Rivet Company, the West Penn Realty Company and the Garland Corporation of Pittsburgh. The last-named company is a holding concern for the others. The plants of the Safety Armorite Conduit Company and the Garland Nut & Rivet Company are located at West Pittsburgh, near New Castle, Pa. Bills in equity had been filed against all four companies in which the appointment of a receiver was asked to take over their affairs for the purpose of saving the assets from being wasted through legal proceedings on the part of pressing creditors.

The Petroleum Iron Works Company, Sharon, Pa., has acquired a site of 66 acres adjacent to its present plant, which will be utilized for extensions. Plans are under consideration for very large additions.

All of the 10 furnaces in the zinc plant of the American Steel & Wire Company at Donora, Pa., are now in full operation, turning out between 3000 and 3500 tons of zinc per month. The plant is also making sulphuric acid, and when this department is in full operation it will turn out 100,000 tons of acid per year.

Ohio Sheet Metal Contractors' Meeting

The Master Sheet Metal Contractors' Association of Ohio held its annual convention in Cincinnati July 25, 26 and 27. About 150 active members were present. In addition to various trade matters that came up for discussion, the question of closer co-operation with the mills in their efforts to improve their materials received deep consideration.

The following officers were elected to serve the ensuing year: President, F. J. Hoersting, Dayton; vice-president, John Weigel, Cincinnati; secretary, W. J. Kaiser, Columbus; treasurer, W. J. Birmingham, Cleveland. The next annual meeting will be held in June, 1917, in Cleveland at the same time that the National Association of Sheet Metal Contractors will meet in that city.

The Japanese steamer Tatsuno Maru, which left Seattle recently, carried 5000 tons of steel plates, angles and bars consigned to Japanese shipbuilding yards.

OBITUARY

JOHN HAMILTON BROWN, consulting engineer of the Maxims Munitions Corporation, died July 25 at his home in West Hoboken, N. J., aged 79 years. He was born in Maine and became an inventor at the age of 20. Among his inventions were machines for shoe making, quilting lace, making automobile tire valves and for wire making. He was the inventor of the wire wound gun tested by the Government in 1905. He had designed a new military rifle for the Maxims Munitions Corporation. He was a champion rifle shot. The American team of sharpshooters, which defeated a British team at the famous Wimbledon match in 1883, used a rifle of his invention.

FREDERICK C. GEDGE died July 28 in Chicago, aged 59 years. He was one of the early manufacturers of wire nails, having been vice-president of the American Wire & Nail Company, which was merged in the American Steel & Wire Company. At the time of his death Mr. Gedge was district manager of the plants of the American Steel & Wire Company in the Chicago district, having entire charge of operations. He was also vice-president of the Gedge Brothers' Iron Roofing Company, Anderson, Ind., and had other personal business interests. He was born in Covington, Ky., and was there buried. He leaves his widow and six children.

HOWARD MACRUM, general superintendent of the Lakeside and Riverside works of the Otis Steel Company, Cleveland, died suddenly July 27, of acute indigestion, aged 48 years. He had worked his way up from a minor position in the operating department of the National Tube Company at its McKeesport works and went to the Otis Steel Company in 1903 as superintendent of its plate mill. Shortly after the completion of the company's new Riverside works he was put in charge of both plants.

JOHN H. ALLEN, of New York City, died July 22 at his summer home, Kattskill Bay, Lake George, N. Y., aged 57 years. For the last 15 years he had been president of the John F. Allen Company, 370-372 Gerard Avenue, New York, maker of the original Allen riveting machines. Mr. Allen succeeded his father, who founded the business some 45 years ago. He had long been an active member of the Bronx Board of Trade, New York City.

JUDSON H. BOUGHTON, president Great Lakes Boatbuilding Company, Milwaukee, Wis., died July 29 of burns received a few days previously when a power boat in which he was cruising on Lake Michigan caught fire. He removed to Milwaukee from St. Louis Jan. 1 last, when St. Louis interests purchased the Milwaukee Yacht & Boat Company and transferred the headquarters of a large boat syndicate to Milwaukee. He was 37 years old and leaves his widow and two children.

GEORGE H. CAREY, assistant treasurer, William Cramp & Sons Ship & Engine Building Company, Philadelphia, Pa., died suddenly July 22 at his home in that city, aged 64 years. For about 25 years Mr. Carey had served his company as purchasing agent and in that position won a reputation for fair and conscientious dealing and made for himself innumerable friends. About five years ago he was made assistant treasurer He leaves his widow and one son.

JOHN T. BURR, Brooklyn, N. Y., died July 27, aged 76 years. He was born in New York City, was graduated from Columbia University in 1861, served through the Civil War and subsequently founded the firm of John T. Burr & Son for the manufacture of machinery, whose establishment is now located at 429 Kent Avenue, Brooklyn. He leaves a son, William Burr, and three daughters.

F. WOLFF, well known in the iron and steel industry of Portland, Ore., having been for 12 years general superintendent of the Phoenix Iron Works, died July 13, aged 74 years. He was a native of Germany, locating in San Francisco in 1869 and in Portland two years later.

STRIKES AND SETTLEMENTS

Milwaukee Shops Still at Work

MILWAUKEE, Aug. 1.—(*By Telegraph*).—Leaders of the machinists claim a total of 2739 men now out. Workmen in three plants struck on Monday and to-day namely, Power & Mining Machinery, Union Electric and Gemco Mfg. companies. Every shop affected is at work, although operations are somewhat reduced by walkouts. Murmurings are heard in strikers' ranks over the conduct of the strike. Bad management and unpreparedness are charged against the leaders. It is claimed that no strike benefits have yet been received, resulting in the return to work of a considerable number. The Metal Trades and Founders' Association has made no further announcements and is standing firm.

Mail advices state that 18 plants had been involved in the strike when union agitators called a halt for the week on Friday night. Disorder in the strike up to this time has been rare. There have been a few arrests, but in each instance the union agitators insist that the offender was not a member of the machinists' organization. Pickets have been at work throughout the week, and union leaders say that lines will be drawn tighter the coming week. An irritating feature of the situation is the report of walkouts by strike leaders when the facts do not bear out the statements. The city, like most of the Middle West, has been suffering under a spell of the hottest weather known in years, and numerous plants have been compelled, for humanitarian purposes, to shut temporarily. Some of these instances have been used by strike leaders as examples of their members being shut out because of anticipation of a walkout.

The Milwaukee Tank Works on Friday announced that it had voluntarily granted its force a 9-hr. workday. The company employs few machinists and is not a member of the employers' association.

Andrew Kopperud, operating a small shop, offered a 50-hr. week at the former 55-hr. week pay, which was accepted.

Bonuses at Youngstown

The Youngstown Sheet & Tube Company, Youngstown, has notified salaried employees who did not participate in the wage advance which went into effect May 1 that they will be given a bonus of 10 per cent on their total earnings during the first half of 1916. A general readjustment of salaries has been made by this company to a higher basis for the last half of the year.

The Banner Electric Company, Youngstown, has notified 55 of its employees who have been with the company for five years or more of a bonus of 5 per cent in their earnings for the first half of the year, which has already been paid. The amount was about $1,200, distributed among 14 male and 41 female employees.

The Strike at the Fluorspar Mines

The strike at the mines of the Fairview and Rosiclaire companies in Illinois, from which approximately 75 per cent of the fluorspar production of the country is obtained, holds out no promise of an immediate settlement. The operators claim to have no alternative in the matter of granting the increased wages asked by the miners except as they may be able to sell their product at correspondingly higher prices. At one of the properties the decision has been reached to pull the pumps and cease operations. The other mine will attempt, for the time being at least, to operate its pumps and keep the mine from flooding, but ability to secure the necessary labor for even this week is questionable.

The selling representatives of these properties have advised their trade to purchase, whenever offered, the scattered lots of fluorspar produced from other sources and one such purchase of 1000 tons by a large steel company is reported. While the larger open-hearth plants are understood to have on hand a comfortable supply, there are those who will shortly suffer from the curtailment, as fluorspar has no substitute in open-hearth steel practice. Foundries which are accustomed to use it can, under necessity, substitute a lime flux.

Machinery Markets and News of the Works

REVIVAL OF WAR BUYING

Contractors Buy Hundreds of Lathes

Munitions Makers Also Want Other Tools—One Inquiry Calls for 100 Milling Machines—Canada's Great Activity

Following placing of contracts for large shells valued at millions of dollars orders have been placed for hundreds of engine lathes of 24-in. to 30-in. swing, to be delivered within eight weeks. The E. W. Bliss Company and the American Locomotive Company have been large purchasers of lathes wherewith to execute shell orders, and it is probable that the American Brake Shoe & Foundry Company and other manufacturers will buy, if they have not done so already. Inasmuch as deliveries of lathes can be made within the required time without much difficulty, and because they tend to simplify the labor problem, there is a tendency to use lathes for both the inside and outside work on the shells, despite the fact that large turret lathes afford undeniable advantages.

Chicago reports some figuring on heavy lathes, and this type of machine is active in Cleveland also.

The hot weather in the West has interfered somewhat with production, but the markets in general are active. In the Chicago market there is a notable list of current new factory construction work.

Accompanying the activity in lathes, there also has been a good volume of inquiry for other equipment required by munitions shops. One inquiry received in the East called for 100 milling machines. Under the renewed war demand, deliveries which are easing up a bit are likely to stiffen again.

It is reported from Canada that shell production is falling under expectations in point of quantity. Orders placed in the Dominion are estimated at $500,000,000.

In Cincinnati, makers of sheet-metal-working machinery are enjoying noteworthy activity. In that city complaint is heard that foundries have fallen behind on deliveries because of the hot weather.

In the Pacific Northwest, labor troubles which have restricted activity are nearing settlement and the lumber industry is gaining headway. Scandinavian marine engines of the Diesel type are being imported at Seattle.

New York

NEW YORK, August 2, 1916.

Quick action in placing orders for large engine lathes followed the awarding of contracts for shells by agents of Great Britain. Reports vary as to the monetary value of these contracts, but they run into many millions of dollars. In the past few days the American Locomotive Company and the E. W. Bliss Company, both of whom received contracts for making large shells, together purchased about 350 engine lathes, most of which are to be delivered within seven weeks. Lathes having a swing of from 24 in. to 30 in. are required. The American Locomotive Company has been buying in several directions, taking miscellaneous machines as well as the lathes.

The American Brake Shoe & Foundry Company is reported to have closed an order for 9.2-in. shells, valued at approximately $22,000,000. The total of orders so far placed is estimated at $60,000,000. Information concerning the shell business has been coming out slowly for the reason that while it has been definitely settled as to who will receive contracts, some orders have not been formally signed. Negotiations have been sufficiently conclusive, however, to justify the purchase of materials and machinery by several companies. The Midvale Steel & Ordnance Company and the Baldwin Locomotive Works are mentioned as having practically closed contracts.

Question has arisen as to cancellation clauses in the contracts. In this connection an authority says that while most of the contracts contain a cancellation clause, it gives the contractors a time allowance, usually three months, and in addition, in case of the clause becoming operative, the purchasers agree to reimburse for all expenses incurred in connection with the contracts. The contracts closed last week specify deliveries up to March 31, 1917.

The American Locomotive Company, in addition to the $15,000,000 contract for 8-in. shells referred to a week ago, has received another for 6-in. shells valued at $3,000,000.

A machinery dealer in this city has received from a munitions maker an inquiry for 100 milling machines. Hand screw machines are active, many being wanted by firms having fuse contracts. The American Can Company is in the market for about 40 of these machines, and a number have been bought by Bartlett, Hayward & Co., Baltimore, Md. The General Electric Company has purchased small turret machines for delivery to West Lynn and Pittsfield, Mass.

Some attractive orders for grinding machines have been placed in the week in lots up to six. The ordinary domestic demand is mostly for one or two tools, but on the whole it is good.

Dealers continue to receive pleasing orders for export, principally to France and Italy. They sell to the exporters and receive payment on delivery to the steamship pier.

It is believed that the demand for large machines, most of which are wanted for delivery within eight weeks, will have a tendency of tightening up deliveries on smaller machines, inasmuch as manufacturers making all sizes will concentrate on the larger ones. It is expected that important orders will be placed soon for large turret lathes needed in boring operations on the heavy shells. Shell contractors are now figuring on such purchases.

The Maydrite Products Mfg. Company has purchased a three-story brick factory at Bergen, Ege and Kearney avenues, Jersey City, to which it is removing its plant from 1401 Clinton Street, Hoboken, N. J., increasing its manufacturing space from 5000 to 21,000 sq. ft. It has purchased about $50,000 worth of new machine tools, which will largely increase its capacity for its regular line of work, which is the building of tools, jigs, dies, and gages, of which it now has all that it can handle on its present operating basis. It is not working overtime, but runs a full 8-hr. shift. About 200 machinists will be employed in the new plant. The company is now having plans drawn for an addition to the present building 50 x 87 ft., with an ell 15 x 100 ft., which will add about 36,000 sq. ft. of floor space, and will be devoted to increasing its capacity for its present lines of work. The company was established about eight months ago, with a capital stock of $100,000. O. E. Ekoll is president, J. C. Janser is vice-president, Charles Fowler is secretary and treasurer, and H. E. Eppley, formerly with the Webster Mfg. Company of Tiffin, Ohio, is general manager. The same interests have incorporated the Maydrite Machinery Mfg. Company, capitalized at $50,000, to handle the manufacture of heavy work and products for which the rest of the shop is not equipped. It will occupy the ground floor in the plant. John E. Cobaugh, 11 Broadway, New York, is special representative of the company.

The Universal Stamping Machine Company, 416 West Thirty-third Street, New York, manufacturer of post-office machinery, etc., has acquired a plant in Port Chester, N. Y., to be used as overflow quarters for special work. It has not decided to permanently give up its New York plant, as has been stated elsewhere.

The Eastern Tool & Mfg. Company, 74 Richmond Street, Newark, N. J., will put its new plant at Bloomfield Avenue and the Erie Railroad, Bloomfield, N. J., in operation Aug. 10.

The Meldrum-Semon-Greiner Company, 107 North Franklin Street, Syracuse, N. Y., succeeds to the business of the

Crescent Machine Company, manufacturer of special machinery, tools, gages, jigs, etc., dies, etc. It employs about 28 workmen, and specializes in job work. Its capital stock is $30,000. Joseph C. Semon is president, John A. Greiner vice-president, and Alexander Meldrum is secretary, treasurer and general manager.

The Corona Typewriter Company, Groton, N. Y., has awarded contract to the McClintic-Marshall Company, Pittsburgh, Pa., for the erection of a four-story reinforced-concrete building, 162 ft. long, to be added to its plant. It will be constructed with three wings 40 ft. long on one side, two four-story and one six-story, and a fourth wing 44 x 72 ft., two stories, in the rear, giving a total added floor space of about 88,000 sq. ft., sufficient to accommodate all its present equipment and enough new machinery to double its present output. It is expected that all equipment will be complete within six or eight months. All machines will be operated in groups driven by individual motors. A new power plant will be added, including a 300-hp. up-draft Skinner automatic, direct-connected engine with a generator of 300 kw. and an additional 500-hp. boiler. C. T. Yates is purchasing agent.

The W. M. Sharp Mfg. Company, incorporated with a capital stock of $50,000, has succeeded to the business and equipment of the W. M. Sharp Company, Binghamton, N. Y., manufacturer of dental specialties, and of the Binghamton Plating & Machine Works. It intends to materially increase its line of dental goods, etc. Charles T. Kinsman is president and manager, A. G. Snow is vice-president, and H. M. Smith is secretary and treasurer.

Clarence H. Booth, president of the Scripps-Booth Company, announces the incorporation under New York laws of the Scripps-Booth Corporation, with a capitalization of 70,000 shares, no par value. The company is a consolidation of the Scripps-Booth Company of Detroit, maker of automobiles, and the Sterling Motor Company, also of Detroit.

The Hydral Company, 125 Front Street, New York, has let general contracts for the construction of its oil plant at Niagara Falls, N. Y., including a factory building 50 x 100 ft., two stories, and a boiler house 30 x 34 ft., one story.

The Moore Steam Turbine Corporation, Wellsville, N. Y., has completed plans for a two-story factory, 80 x 100 ft. It has been incorporated with a capital stock of $150,000, by E. D. Spicer, J. B. Laird, and J. L. Moore. J. L. Moore is president.

The K. M. Davis Company, Williamson, N. Y., will erect a cold-storage building, 128 x 250 ft., two stories.

Henry N. McCracken, president of Vassar College, Poughkeepsie, N. Y., is having plans prepared for a boiler plant and improved heating system for the college buildings.

The Portland cement plant of the Thomas Millen Company, near Jamesville, N. Y., was totally destroyed by fire July 29, with all its machinery and contents. The plant was valued at $300,000.

The warehouse, pumping station and reservoir to be added to the plant of the Eastman Kodak Company, Kodak Park, Rochester, will cost $200,000.

The C. H. Simmons Machine Company, 985 Broadway, Albany, N. Y., has awarded contract for the erection of a one-story factory and machine shop, 125 x 131 ft., to cost about $10,000. John Dennis, Kinderhook, N. Y., is the contractor.

The International Time Recording Company, Endicott, N. Y., has let contract to A. E. Badgley, Binghamton, N. Y., for the erection of a factory building, 50 x 200 ft.

The Acheson Graphite Company, Buffalo Street and Portage Road, Niagara Falls, N. Y., is having plans drawn for three factory buildings, one and two stories, to be erected on River Road, Tonawanda, N. Y., at a cost of about $150,000.

The Warsaw Elevator Company, Warsaw, N. Y., plans to erect a one-story addition, 25 x 100 ft., to cost about $15,000. C. D. Ketchum is president.

The Samuel Moore & Sons Corporation, Elizabeth, N. J., has about completed plans for the construction of a one-story powerhouse and office, 60 x 140 ft., to cost about $25,000, and for a two-story shop, 40 x 75 ft.

The Raritan Copper Works, Perth Amboy, N. J., is having plans prepared for a two-story addition to its foundry, 33 x 43 ft., to cost about $6,000; and for a one-story extension to its machine shop, 48 ft. square, to cost about $6,000.

The Cott-A-Lap Company, maker of wall covering, Somerville, N. J., has drawn plans for a group of factory buildings, including a three-story office building, 40 x 105 ft., a one-story refrigerating plant, 27 x 80 ft., a manufacturing building, 60 x 500 ft., and three smaller structures. S. H. Chamberlain is superintendent.

Philadelphia

PHILADELPHIA, PA., July 31, 1916.

The Carpenter Steel Company, Reading, Pa., has purchased 65 acres of land on the bank of the Schuylkill River opposite its plant, to provide for future needs. No plans are in existence for its improvement. The Philadelphia & Reading Railway is now constructing a siding into the company's works.

The Bell Motor Car Company, York, Pa., will erect a one-story factory 108 x 240 ft., on a 15-acre site which it has purchased adjoining the Rockburn Street station. H. M. Stauffer is president; B. F. Posey, secretary and treasurer; H. W. Posey, vice-president and general manager; H. W. Conlon, assistant general manager and sales manager, and E. T. Gilliard, consulting engineer.

The Domestic Talking Machine Corporation, Thirty-third and Arch streets, Philadelphia, Pa., has equipped a plant and is manufacturing talking machines. It is capitalized at $500,000. Horace Shields is president, Marcus W. Saxman, vice-president, and Joseph E. Barnett, secretary and treasurer.

The Pyrolectric Instrument Company, manufacturer of pyrometers and electrical precision instruments, 118 East State Street, Trenton, N. J., has been incorporated with a capital stock of $50,000. It is equipping a plant which will be completed about Sept. 1. E. F. Northrup, Princeton, N. J., is president and technical adviser; Dudley Willcox is treasurer and H. F. Porter is secretary.

The Dairymen's Supply Company, 1919 Market Street, Philadelphia, Pa., recently incorporated with a capital stock of $30,000 to deal in dairy equipment, has established a factory at Lansdowne, Pa., where it is manufacturing a few specialties, such as bottle fillers, washers, coolers, etc. Alfred D. Street is in charge.

The Williamsport Wire Rope Company, Williamsport, Pa., is erecting a wire-drawing plant for its own requirements and plans to have it in operation before Dec. 1. Contracts have been placed covering buildings and machinery. Garrett Cochran is president and general manager.

The Potter-Mackie Mfg. Company, Pottstown, Pa., operating a general machine shop, has started the manufacture of 45-hp. four-cylinder gasoline motors for motor trucks and will put on the market within the next three months a 30-hp. four-cylinder motor for the same use. The company is undecided whether it will remain in its present location or build a new plant. It was incorporated about a year ago with a capital stock of $35,000 and has recently increased the capitalization to $50,000. Norman S. Mackie is president and S. Cary Potter is vice-president and general manager. The officers, with Elton Hoyt and Amasa S. Mather, Cleveland, Ohio, were the incorporators.

The Salem Brass & Iron Mfg. Company, manufacturer of cast-iron pipe and fittings, Salem, N. J., has purchased the Hess Steel Company's plant at Bridgeton, N. J., and will use it as a branch to manufacture soil pipe and fittings and plumbers' cast-iron goods. H. G. Hart is treasurer.

The H. B. Pancost Company, 243 South Third Street, Philadelphia, manufacturer of steam fitters' supplies, is having bids taken by its architect, W. C. Furber, 118 Walnut Street, Philadelphia, for the erection of a machine shop and office building to cost about $20,000.

The Downingtown Mfg. Company, East Downingtown, Pa., manufacturer of paper-making machinery, has started the construction of a one-story foundry to cost about $6,000.

New England

BOSTON, MASS., July 31, 1916.

The American Power Company, Bridgeport, Conn., has been incorporated with capital stock of $100,000 to manufacture a new type of gas engine. The corporators are John J. Hogan of Bridgeport, John G. Hoffman of New York and John T. L. Hubbard of Hartford. The company will locate its plant in Bridgeport but the site has not been selected.

The Worcester Pressed Steel Company, Worcester, Mass., has received an order for 100,000 howitzer shell cases for the British Government. It has now on hand an order for 1,000,000 one-pounder cases for Russia and the two orders will keep the plant busy for about five months on a 24-hr. a day basis.

The New England Westinghouse plant at Meriden, Conn., has now been practically completed and it is expected to be turning out 1000 rifles a day by Sept. 1.

The Standard Metal Work Company, Thompsonville,

Conn., following the purchase of the G. H. Bushnell Press Works, an adjoining property, has been incorporated with capital stock of $200,000. It retains the same name and the same officers and expects to greatly enlarge its output. The Standard Company manufactures engine parts for automobiles and has more business booked than it has ever turned out in a single year.

The Edward Miller Company, Meriden, Conn., has awarded a contract for an addition, 57 x 141 ft., one story, to its brass rolling mill.

The Bridgeport Piston Ring Company, Bridgeport, Conn., has been incorporated with capital stock of $40,000. The incorporators are Adolf Kroegling, Karl Butzler and Arthur W. Palmer, Jr.

The Precision Gauge & Tool Company, Bridgeport, Conn., has been incorporated with capital stock of $10,000 by George H. Cornell, Anna E. Morgan and Charles E. Williamson.

The Connecticut Electric Steel Company, 50 Church Street, New York, has secured a permit to erect a foundry, 125 x 158 ft., on Flatbush Avenue, Hartford, Conn. Two smaller brick buildings will also be built.

The American Aeroplane Company, Boston, Mass., has been incorporated with capital stock of $200,000. The directors are William Stevens, Roslindale, president and treasurer; Francis W. Kittredge and Wheaton Kittredge.

The Market Forge Company, Chelsea, Mass., is having plans drawn for a new plant, 48 x 200 ft., two stories, to be erected in Everett, Mass.

Baltimore

BALTIMORE, MD., July 31, 1916

The Monitor Controller Company, 111 South Gay Street, Baltimore, has leased three floors of the building at 514 East Lombard Street. G. H. Whittingham is chairman of the board.

The business of Charles Zies & Sons, 314-320 South Fremont Street, Baltimore, machinists and machinists' supplies, has been incorporated, with $80,000 capital stock, by Charles, John, Charles N., William C. and Frederick Zies.

The Chesapeake Paper Board Company, Claggett and Woodall streets, Baltimore, will erect a one-story brick boiler house.

John A. Strong, 847 Calverton Road, Baltimore, will build a brick boiler house at 805 Calverton Road.

The Nash Motors Company, Baltimore, has been incorporated, with a capital stock of $24,999,500, by Charles McH. Howard, attorney, 1409 Continental Building, Baltimore, and Robert F. Herrick, J. Wells Farley, Phillips Ketchum, and Edward A. Taft, all of Boston, Mass. It is stated the company will acquire the plant of the Thomas B. Jeffrey Company, Kenosha, Wis.

Contract has been let for the construction of several new buildings for the H. B. Davis Company, paint manufacturer, at Severn and Bayard streets, Baltimore.

The Poole Engineering & Machine Company, Woodberry, Md., will build an addition to the mezzanine floor in the building at Railroad and Woodberry avenues, to cost about $3,000.

The Baltimore Tube Company, Ostend and Wicomico Streets, Baltimore, will build an addition, 63 x 351 ft., to its plant, at a cost of about $30,000.

Plans are being made by the Baltimore Roofing & Asbestos Mfg. Company, near Reisterstown, Md., for the construction of two additional manufacturing buildings.

The Albert C. Putts Company, Munsey Building, Baltimore, will equip the buildings at 420 and 422 West Conway Street to manufacture leather goods.

An addition will be built to the plant of the Union Envelope Company, Richmond, Va.

Announcement has been made that the Chester Paper Company, Chester, Pa., has purchased a tract of land at the foot of Market Street, adjoining its plant, and additional buildings will be erected.

Announcement is made that the Delaware Shipbuilding & Engineering Corporation has been formed, with $1,000,000, and will establish a plant at New Castle, Del. A tract of land known as Battery Park has been acquired, consisting of about 11 acres. The front will be about 600 ft. on the Delaware River. It is understood that the company has been formed by men who are interested in shipbuilding on the Great Lakes. At the beginning, it is said, the company will construct wooden and steel vessels up to 300 ft. in length. Arrangements will also be made for constructing larger vessels.

Chicago

CHICAGO, ILL., July 31, 1916.

[illegible] lathes and [illegible] are figuring actively [illegible] The American Ideal Steel & Forging Company [illegible] to have or [illegible] machinery, in the expectation of securing what they [illegible] the machine tools [illegible] but the kind [illegible] for the uses for which munitions [illegible] plan to put them in their own normal manufacturing operations, while for the special-purpose tools offered a less promising market exists. Some of these shell-turning lathes are likely to be bought in at prices which will warrant remodeling to make them general-purpose tools where their design permits.

An interesting and important speculation hinges upon the question of which phases of the war time expansion in machine-tool manufacture will be permanent. It seems likely that when the market again becomes normal, increased competition will result more from the greater variety of tools made by long-established manufacturers than from new companies created in response to exceptional conditions.

In an interesting review of industrial activity at Chicago, the *Economist* offers the following list of current new construction:

Central Bag Company, four-story factory 95 x 194 ft., 3622-3630 Iron Street, $125,000. National Carbon Company, four-story factory, 120 x 166 ft., 3711-3725 South Ashland Avenue, $100,000. Cole Mfg. Company, three-story factory, 150 x 185 ft., 2436-2450 Bross Avenue, $75,000. A. B. Dick & Co., seven-story factory, 50 x 104 ft. and 43 x 74 ft., 740-742 West Jackson Boulevard, $60,000. Sigmund Greenblatt, three-story addition, 100 x 126 ft., southwest corner Adams and Halsted streets, $50,000. Sherwin-Williams Company, one-story factory, 124 x 266 ft., northwest corner Stevenson Avenue and 116th Street, $40,000. Justrite Mfg. Company, four-story factory, 32 x 74 ft. 1452-1454 Fargo Avenue, $40,000. Commercial Furniture Company, three-story factory, 75 x 175 ft., 2711-2729 West Chicago Avenue, $38,000. Barrett Mfg. Company, additional story and one-story alterations to factory, 142 x 181 ft., northwest corner Twenty-ninth Street and Sacramento Avenue, $35,000. Victor Mfg. & Casket Company, three-story factory, 50 x 125 ft. and 45 x 46 ft., 1944-1946 South Troy Street, $33,000. National Brewing Company, two-story factory and office, 75 x 125 ft., 1916-1920 West Eighteenth Street, $30,000. George S. Carrington, two-story factory, 59 x 115 ft., 2338-2340 West Van Buren Street, $25,000. H. H. Walker, one-story factory, 146 x 150 ft., southeast corner Taylor and Waller streets, $24,000. Zeitler & Lamson, two-story factory, 75 x 175 ft., 4644-4650 West Madison Street, $22,000. S. Loeb, two story factory, 50 x 164 ft., 3426-3428 South Wabash Avenue, $22,000. H. E. Holsinger, factory, 44 x 71 ft., 212-214 Sheldon Street, $20,000. Independent Can Company, two-story factory, 49 x 100 ft., 1748-1758 West Kinzie Street ,$20,000. N. Johnson Mfg. Company, two-story addition, 56 x 95 ft., 1235-1237 North California Avenue, $20,000. I. Horween, two-story factory, 87 x 95 ft., 1051 West Division Street, $20,000. Harry R. Gibbons, one-story factory, 75 x 125 ft., 1210-1214 West Lake Street, $20,000. L. R. Harsha, four-story factory, 60 x 75 ft., 405-411 North Lincoln Street, $20,000. Sasgen Derrick Company, two-story factory, office and auto shed, 57 x 204 ft., and 25 x 42 ft., 3101-3109 Grand Avenue, $18,000. A. Rohn, two-story factory, 60 x 113 ft., 2016-2018 West Lake Street, $18,000. Frank Vogler, two-story warehouse, 40 x 75 ft., 35 x 99 ft. and 30 x 35 ft., 1684-1688 Elston Avenue, $17,000. Robert Malcolm, two-story factory, 59 x 125 ft., 2300-2302 Walnut Avenue, $16,000. John F. Mortenson, three-story factory, 60 x 63 ft., 345-347 North Oakley Avenue, $15,000. F. W. Williams, three-story factory, 51 x 126 ft., 2531-2535 West Taylor Street, $15,000.

W. A. Jones Foundry Company, two-story foundry, machine shop and office, 1200-1258 South Kostner Avenue, $200,000. Link Belt Company, one-story steel shop and boiler house, 3596 West Thirty-ninth Street, $50,000. Great Western Smelting & Refining Company, one-story foundry, 47 x 410 ft., 626-628 West Forty-first Street, $50,000. Acme Steel Goods Company, three-story warehouse, 92 x 105 ft., 2708-2714 Farrell Street, $40,000. Western Steel Car & Foundry Company, one-story steel forge shop, 71 x 652 ft., 136th Street and Brandon Avenue, $37,500. Lasker Iron Works, one-story boiler shop, 100 x 300 ft., 3201-3229 South Lincoln Street, $25,000. Illinois Steel Company, one-story skull crusher structure, 75 x 200 ft. between [illegible] third Streets, east of Brandon Avenue, $22,000; also addi-

tion to factory between Eighty-ninth and Ninetieth streets, east of Strand Avenue, $19,000. Gage Structural Steel Company, two-story shop and office building, 25 x 40 ft. and 66 x 200 ft., 3125-3141 South Hoyne Avenue, $20,000. Cyclone Blow Pipe Company, two-story factory, 75 x 120 ft., 2542-2552 West Thirty-first Street, $20,000. D. O. James Mfg. Company, three-story addition to machine shop, 1124 West Monroe Street, $15,500. Ryan Car Company, one-story power house, 37 x 200 ft., remodeling, 135th Street and Brandon Avenue, $15,000.

Stewart-Warner Corporation, six-story factory, 191 x 286 ft., 2829-2843 North Lincoln Avenue, $250,000. N. Landon Hoyt, four-story garage, 100 x 199 ft., 57-65 East Twenty-first Street, $118,000. Louis Geyler & Co., three-story salesroom, 80 x 180, 2453-2459 Indiana Avenue, $100,000. Ford Motor Company, two-story factory addition, 128 x 365 ft., northeast corner Wabash Avenue and Fortieth Street, $100,000; four-story auto station, 75 x 122 ft., 4301-4307 West Madison Street, $60,000; four-story blacksmith shop, foundry and machine shop, 75 x 125 ft., 4317 Broadway, $60,000. Ogren Motor Company, three and one-story factory and garage, 2947-2967 Grand Avenue, $60,000. Christoffer Motor Company, one-story salesroom and repair shop, 123 x 125 ft., 3312-3322 Sheffield Avenue, $20,000. Drover Garage Company, garage, 116 x 160 ft.

The Mitchell Auto Service Station, 2540 Michigan Avenue, Chicago, will erect a three-story building, 50 x 120 ft., at a cost of $50,000. S. Scott Joy, 1118 West Thirty-fifth Street, is the architect.

W. Sebastian, 3421 North Halsted Street, Chicago, will build a one-story garage to cost $12,000, and Mark Henry, 422 Federal Street, a two-story garage to cost $14,000.

The Holt Mfg. Company, East Peoria, Ill., tractor manufacturer, will build a one-story, steel frame foundry, 116 x 250 ft., and is completing a one-story machine shop 206 x 216 ft.

The Hanna Engineering Works of the Vulcan Engineering Sales Company, at 2059 Elston Avenue, Chicago, Ill., has been sold and the company is now seeking a new site from 2 to 5 acres, preferably with an existing manufacturing building, 100 x 300 ft., or over, with shipping facilities and good labor supply available, etc. A. F. Jensen is manager.

The McCauley Belting Company, Chicago, has moved its factory to 412-420 Orleans Street, to take care of the growth in its business. Additional machinery has been installed.

The Anderson, Shumaker Company, general blacksmith and steam forger, has moved to 824 South Central Avenue, Chicago.

The Illinois Watch Company, Springfield, Ill., has awarded a contract for the enlargement of its plant ,to cost approximately $15,000.

The Moline Plow Company, Rock Island, Ill., has let the contract to the Stone & Webster Company, 38 South Dearborn Street, Chicago, for its new plant, to cost about $500,000.

The Williams Motor Company of Chicago has leased a factory at Waukegan, Ill., which will be equipped with modern machinery to manufacture its motors and bridge control systems. It expects to either purchase or build a plant in Waukegan as soon as a suitable location can be obtained.

The Ireland & Matthews Mfg. Company, Detroit, Mich., is about to erect a four-story factory on the Michigan Central Railway between Beard and Green avenues. The main building will be 60 x 700 ft. Contracts for the work have been let by John Scott & Co., the architects.

The Western Iron & Foundry Company, Wichita, Kan., has built an addition to its shops, to be used exclusively for ornamental iron work, and for the manufacture of a special new automatic coal chute.

F. E. Potter & Sons, Sioux City, Iowa, have completed their new plant, 50 x 50 ft., and are installing suitable equipment for building fire escapes.

The Monroe Body Company, Pontiac, Mich., will erect a new office building and pressed steel plant, to take care of its growing business. The capital stock has been increased to $150,000.

Indianapolis

INDIANAPOLIS, IND., July 31, 1916.

The Indianapolis Corrugating Company has increased its capital stock from $100,000 to $150,000.

The Indiana Tank & Boiler Works, Indianapolis, has been incorporated, with $10,000 capital stock, to manufacture steel plate and sheet-iron products. The directors are J. E., R. R., and H. E. Bossingham.

The Universal Motor Products Company, Indianapolis, has been incorporated with $100,000 capital stock, to manufacture auto parts. The directors are Allen P. Vestal, R. Davidson, and Smiley N. Chambers.

T. H. Baltzell, County auditor, Decatur, Ind., is asking for bids until Aug. 7, for a sectional boiler for the County jail heating plant; F. A. Hausheer, County auditor, Laporte, Ind., until Aug. 11, for the construction of two 16 x 72 horizontal tubular boilers, 125 hp., or two water tube boilers of equivalent capacity. Thomas Ferguson, County auditor, Terre Haute, Ind., asks for bids until Aug. 12 for return steam boiler for County poor asylum.

The Nappanee Carriage Works, Nappanee, Ind., has been incorporated with $40,000 capital stock, to manufacture vehicles. The directors are David F. Miller, Roy R. Berlin, and Ira C. Strohm.

The Star Generator Company, Logansport, Ind., has been incorporated with $50,000 capital stock, to manufacture generators. The directors are Edgar F. Metzger, Harry C. Metzger, and Orpha Carter.

The Main Welding & Battery Service Company, formerly the Autogenous Welding Company, South Bend, Ind., has moved to 223 South Main Street, where a complete plant for welding of all kinds is being installed

It is announced that George W. Dunnyham, Evansville, Ind., formerly with the Chalmers Motor Company, is organizing a company with $2,000,000 capital stock, to manufacture automobiles at that place.

The Root-Johnson Ventilating Company, Indianapolis, has been incorporated with $10,000 capital stock, to manufacture ventilators. The directors are William R. Root, Ralph C. Root, and M. G. Root.

Milwaukee

MILWAUKEE, WIS., July 31, 1916.

The production of machine tools in the Milwaukee district for July compares favorably with that of preceding months, and builders enter the new month with a very satisfactory volume of business on their books. The demand for milling machines is being well maintained, the automobile industry furnishing the largest buyers. Some inquiry is noted for foreign account, but the large bulk of business is from domestic sources. Buying is almost wholly confined to requirements for replacements and equipment of plant extensions, which generally means standard types and single tools or small lots. Dealers in used tools report stocks moving satisfactorily and in fair volume. In this district the number of second-hand tools offered for sale is less than expected

The Mitchell Motors Company of New York has increased its capital stock from $5,000 to $625,000, and takes over the Mitchell-Lewis Motor Company, Racine, Wis., both business and property. It has also acquired the plant and equipment of the Mitchell Wagon Works, at Racine, but not its wagon business. The plant will be used for the manufacture of automobile bodies. Permanent officers and directors of the company have not been elected as yet. H. L. McClaren is president.

C. A. Pope, Darlington, Wis., has sold his machine shop to J. W. Wilkinson, who will install equipment and conduct a machine shop.

The Chicago & Northwestern Railway has been granted permits at Milwaukee to construct a repair shop costing $2,500. The building will be erected by the Charles W. Gindele Company, 3333 South LaSalle Street, Chicago.

The Werra Aluminum Company, Waukesha, Wis., maker of aluminum castings, has engaged the Thomas S. Watson Company, consulting engineers, Majestic Building, Milwaukee, to prepare plans for an addition to its foundry, occupying the former Wisconsin Central Railroad shops. The Werra Company does a large business with automobile motor manufacturers, and has been crowded for room for many months.

J. C. Haberman, Prairie du Sac, Wis., is installing machine-tool equipment in his machine shop, including boring and reaming machines and lathes. G. E. Lampmann is superintendent.

The Invincible Metal Furniture Company, Manitowoc, Wis., is reorganizing its official and production organizations, following the retirement of A. L. Noel, president and general manager. Negotiations are under way for the sale of the entire output for a term of years on contract.

The Four Wheel Tractor Company, Clintonville, Wis., has perfected its organization, and will start production at once The company originally was organized by interests at Antigo, Wis., and a short time ago was taken over by Clintonville capital identified with the Four Wheel Drive Auto Company. The officers just elected are: President, Dr. Charles Topp; vice-president, W. H. Finney; secretary, A. B. Mayhew; treasurer, L. C. Larson. The directors include the officers and Alex Stewart, Henry Zarling, and F. M. Hyde.

The Lyons Boiler Works, DePere, Wis., now in the hands of a receiver, is being overhauled and put into shape for operation. The plant has been idle for more than a year. The receivership is being closed up, it is stated, and the shops doubtless will go into the hands of A. P. Denkmann, Rock Island, Ill.

Pattison Brothers, Mondovi, Wis., will erect a garage and machine shop costing about $4,500.

The General Welding & Mfg. Company, Milwaukee, has awarded all contracts, and work is now under way on its new plant on Oregon near Greenbush Street.

The Overland-Wausau Company, Wausau, Wis., has broken ground for a garage and service station 66 x 120 ft., three stories and basement, to cost $30,000.

The Hoppe-Hatter Motor Company, 543 Broadway, Milwaukee, is building a new garage and repair shop 60 x 120 ft., two stories and basement. Adolph C. Hoppe is president.

R. J. McGeehan, Son & Co., DePere, Wis., makers of machinery and farm implements, which recently passed to the control of Grover McGeehan, have purchased adjoining buildings, and will remodel them into a garage and machine shop.

The Yawkey-Bissell Lumber Company, Wausau, Wis., has been organized with a capital stock of $350,000. It will construct a mill in Langlade County, Wis., at once, of the double band type, with resaw and including a planing mill. The annual cutting capacity will be 25,000,000 ft. The drive will be by a steam power plant. C. C. Yawkey, W. H. Bissell, Walter Alexander, and W. W. Gamble, are the chief owners.

The Townsend Mfg. Company, Janesville, Wis., is now on a regular production schedule of kerosene-burning tractors of 20 hp., and deliveries are being made to jobbers.

The Boone Tire & Rubber Company, Des Moines, Iowa, is negotiating with the Business Men's Association, Beloit, Wis., for a site upon which it plans to build a $25,000 branch factory. It has an authorized capital stock of $500,000, and operates a rubber works at Des Moines. I. V. MacLean is general manager.

The Reitman-Straus Company, Majestic Building, Milwaukee, will build a garage and machine shop, 50 x 150 ft., on Fifth Street. The work is in charge of Matt & Klenzendorff, architects.

The Chippewa Falls Foundry & Machine Company, Chippewa Falls, Wis., has increased its capital stock from $25,000 to $100,000. Plans are being made for the erection of a new plant, but details have not yet been announced.

Cleveland

CLEVELAND, OHIO, July 31, 1916.

Considerable inquiry is out for small lots of machines, mostly lathes, wanted for early delivery. By shopping around buyers are able to find some machines they desire. Several new round lot inquiries are pending, including one from a Youngstown manufacturer for 35 machines for work on high explosive shells. The placing of this order is dependent upon the company securing the shell contract which is pending. The extreme hot weather is interfering with operations in many plants as many men refuse to work more than part of the time. This has affected automobile plants in the Central West. Although some of these plants have cut down on their production, as is usual at this time of the year, complaint is made that because of lack of sufficient workmen it is impossible to operate at the desired schedule. The automobile forge shops are particularly affected.

Dodge Brothers, Detroit, will remodel their present foundry into a continuous foundry and will install new handling and other equipment, including core ovens. Plans for the changes have been prepared by Smith, Hinchman & Grylls, engineers, Detroit, who will shortly place contracts for the required equipment.

The Ford Motor Company, Cleveland, will erect a four-story concrete and steel service station, 100 x 145 ft., at Detroit Avenue and West Sixty-fifth Street.

The Electric Controller & Mfg. Company, Cleveland, will enlarge its plant by the erection of a five-story steel and concrete building. The first three floors will be used for manufacturing and the upper two for offices.

The Columbian Hardware Company, Cleveland, has taken out a permit for a two-story factory addition, 27 x 83 ft.

The S. P. Mfg. Company, Cleveland, has been incorporated with a capital stock of $25,000 to manufacture tools and patterns. Carl S. Shuler, L. Hopkins, and others are the incorporators.

The Seiss Mfg. Company, Toledo, Ohio, has purchased the plant of the Toledo Plow Company, which will be fitted up with new equipment to manufacture automobile horns.

The Timken Roller Bearing Company, Canton, Ohio, has taken out permits for a two-story office building, 100 x 100 ft., a grinding department, one story, 100 x 150 ft., a one-story hardening room, 50 x 100 ft., and a packing room, 45 x 80 ft.

The Stevens Metal Products Company, Niles, Ohio, has been incorporated with a capital stock of $50,000 to manufacture steel drums and other sheet metal products. The incorporators are John W. H. Stevens, Edward Thompson, H. H. M. Scriven, C. E. McConnell, and H. A. Bergess.

The Tillotson Mfg. Company, Toledo, Ohio, manufacturer of carburetors, will erect a four-story factory building providing 100,000 sq. ft. of floor space.

The Ohio Locomotive Crane Company, Bucyrus, Ohio, has elected Charles F. Michael president, C. T. Rogers vice-president, A. G. Stoltz secretary, and W. H. Picking treasurer. Mr. Michael was formerly secretary of the company.

It is reported that the General Tire & Rubber Company, Akron, Ohio, will build another addition to its plant. It has made application for an increase in capital stock from $200,000 to $500,000.

The National Grave Vault Company, Galion, Ohio, will enlarge its plant by the erection of a two-story brick building, 50 x 150 ft., and a wing, 50 x 90 ft.

Cincinnati

CINCINNATI, OHIO, July 31, 1916.

Makers of sheet metal machinery are all busy. The local machine tool plants also have considerable work ahead, but the extremely hot weather has tended to cut down production. Some complaint is registered with the foundries who are not able to make deliveries on time in some cases. Reports as to the receipt of additional orders for high-explosive shells by southern Ohio manufacturers appear to have some foundation, but munition makers have not lately bought any extensive lists of machine tools in this market. The Canadian demand is also a little slower.

Mill and factory supply dealers state that deliveries on machinists' supplies are becoming easier, although manufacturers are still curtailing the amount of purchases on many articles. Small electric motors are in especially good demand, but the call for larger units of generators and motors is only nominally good. The boiler and tank makers are busy.

It is reported that an addition to the plant of the Mumaw-Harbor Company, 711 Carr Street, Cincinnati, manufacturer of automobile fenders and other specialties, will be made at an early date. It is understood that Victor Murray has recently acquired an interest in the firm.

Work has been commenced on the foundations for an addition to the plant of the Cincinnati Planer Company, in Oakley suburb, recently mentioned as contemplated.

The Cincinnati Wire-Bound Box Company, Cincinnati, has increased its capital stock from $200,000 to $400,000 and will probably make some additions to its plant at an early date.

The A. J. Vail Tractor Company, Hamilton, Ohio, has leased part of a manufacturing building to be used for the manufacture of gasoline farm tractors. Most of the equipment has been purchased.

The New Foundry Appliance Company, Hamilton, Ohio, has been incorporated with $25,000 by Frank J. Becker, George F. Dana and others to manufacture a special molding device. A factory will probably be built at a later date, but for the present the devices will be made in the plant of the Hamilton Caster & Mfg. Company.

The Kelly-Springfield Motor Truck Company, Springfield, Ohio, has made an additional shipment of 33 large trucks to the War Department for use on the Mexican border.

The Metallic Casket Company, Springfield, Ohio, is fitting up a new plant on West North Street to be used to manufacture metallic caskets.

The main building of the Blackwood Steel Foundry Company's plant at Springfield, Ohio, is now under roof and the work of installing the necessary equipment will be commenced at an early date.

The C. A. S. Products Company, Columbus, Ohio, maker of automobile gears, is reported to be contemplating further extensions to its plant.

The Shelby Spring Hinge Company, Shelby, Ohio, has increased its capital stock from $325,000 to $450,000. Nothing is known regarding additions to its plant.

The West Newark Range & Furnace Company, Newark, Ohio, has been organized by C. W. Cunningham and others to erect a foundry for the manufacture of stoves, ranges and heaters.

St. Louis

ST. LOUIS, MO., July 31, 1916.

A satisfactory machine-tool trade is being done, although no large lists appear. The demand for single tools keeps up. No report of interference with business by reselling equipment from munition plants has been noted. Crop reports have not begun to materially affect business conditions.

The Foerster & Kaysing Iron Works, St. Louis, Mo., have been incorporated, with a capital stock of $10,000, by Henry E. J. Foerster, John E. Foerster, William G. Kaysing, and others, to fabricate iron and steel structural material.

The Reliance Oil & Gas Burner Company, St. Louis, Mo., has been incorporated, with a capital stock of $500,000, by Julius F. Hanke and others, to manufacture gas and oil burners.

The Sweet Power Transmission Company, St. Louis, Mo., has been incorporated with a capital stock of $1,000 by Allen H. Sweet, Francis C. Gerbig, and others.

The Champion Auto Spring Company, St. Louis, Mo., has been incorporated, with a capital stock of $15,000, by Thomas J. Ryan, J. W. H. Sasse, and Walter B. Donnell, to manufacture automobile springs.

The Carondelet Packing Company, St. Louis, Mo., has increased its capital stock from $60,000 to $100,000, for the purpose of adding to its packing-house equipment.

The Reflectolyte Company, St. Louis, Mo., has been incorporated, with a capital stock of $50,000, by Frank Adam, H. C. Adam, and C. J. Bente, to manufacture lighting fixtures.

The St. Louis Felling Machine Company, St. Louis, Mo., will erect and equip a factory for the manufacture of its machines. Charles L. Knower is president.

The Kansas City Brick Company, Kansas City, Mo., incorporated in Kansas, has been given permission to use its $40,000 capital in Missouri in equipping and operating a plant.

The Grassensbacher Mfg. Company, Overland, Mo., has been incorporated, with a capital stock of $15,000, by H. E. Grassensbacher, A. W. Jaeger, and others, to manufacture metal specialties.

The Rotor Motor Car Corporation, Hannibal, Mo., has increased its capital stock from $350,000 to $400,000, and will add to its plant equipment.

The Niangua-Osage Junction Mining Company, Lebanon, Mo., is in the market for electric hoists, motor-driven air compressors, air drills, crushers, rolls, pumps, mills, etc., for mining-plant equipment. Guy R. Stanton is manager.

The Arkansas Brick & Tile Company, Little Rock, Ark., has been incorporated, with a capital stock of $300,000, by W. A. Hicks, John Cochran, and M. H. Long, consolidating the Arkansas Brick & Mfg. Company and the Clark Pressed Brick Company. Additions will be made to the brick and tile machinery.

The Stuttgart Public Service Company, Stuttgart, Ark., will equip electric light, power, heat, and waterworks plants to cost about $150,000.

C. C. Epps and others will equip a cotton-oil cake mill at Bristow, Okla., the machinery to cost about $25,000.

The Phoenix Refining Company, Sand Springs, Okla., will double its present plant equipment, which has an output of 2500 bbl. daily.

The Monarch Gasoline Company, Tulsa, Okla., has been incorporated, with a capital stock of $300,000, by John P. Pollard, F. B. Dillard, and others.

The Erwin Gin & Mill Company, Erwin, Miss., has been incorporated, with a capital stock of $16,000, by J. H. Preston, J. H. Crouch, and others, and will equip a cotton gin and cotton-seed oil mill.

The Amory Lumber Company, Amory, Miss., will equip a planing mill with a daily capacity of 40,000 ft. of lumber. L. F. Garrett, C. L. Ray, and others, are stockholders.

J. D. Kerrigan will equip a plant for the manufacture of guncotton and other explosives near Columbus, Miss.

George R. Wright, care of the Louisiana Fiber Board Company, Bogalusa, La., will begin, with associates, the construction of a plant for the manufacture of box fiber for fancy paper cartons, involving an investment of about $900,000. Friend & Webber, New Orleans, La., are the engineers. G. H. Wood, Monroe, Mich., is interested also.

The Sewerage and Water Board, New Orleans, La., F. S. Shields, secretary, City Hall Annex, is in the market for two traveling cranes of 15 tons capacity each. Bids close Sept. 13.

The McNary Saw Mill Company, McNary, La., will rebuild its plant, recently burned with a loss of about $200,000.

The Central South

LOUISVILLE, KY., July 31, 1916.

Extraordinarily good business continues, mostly domestic. Metal-working plants are operating at capacity in practically all departments. One manufacturer states that business on the books or in sight insures continuation on the same scale for a year. Oil well and quarrying equipment are in good demand. Air compressors and contractors' equipment are also active. A shortage of labor is occasioning some trouble.

The Southern Star Graphite Company, Louisville, incorporated with $50,000 capitalization, proposes to establish a mill at Ashland, Ala., for the recovery of graphite flakes. Steel pieces on crusher, conveyors, dryers, motors, etc. The incorporators are George G. Montz, 1627 Story Avenue; W. S. Moutz, Charles W. Stoecker, E. D. Noe, M. L. and Frank Collyer.

The Louisville Lead & Color Company, Louisville, contemplates the purchase of twelve or fifteen 25-hp. motors.

The Reliable Paint Company, Louisville, has leased a building at 906-908 East Main Street which it will equip as a paint manufacturing plant to use the electric drive. Motors will be provided for when installation questions are settled. William E. Mullin is president and general manager.

B. C. Berry, Danville, Ky., has awarded a contract for the construction of a fireproof garage, 80x136 ft., for Durham & Mahon.

The plant, stock, etc., of the Rodgers Electrical Company, Owensboro, Ky., have been purchased by H. B. Lucas, who will continue the business.

Plans have been completed by the Anglo-American Milling Company, Owensboro, Ky., manufacturer of flour mills, for an additional 15,000 sq. ft. to the floor space and equipment to manufacture a patented wheat separator and scourer.

The Auburn Mills, Auburn, Ky., will be remodeled and wheat cleaning machinery and other equipment will be installed.

A factory to manufacture hogsheads is to be built by George W. Tomlinson, Winchester, Ky., and 20 motors of 3 to 30 hp., and a 100 kw., 60-cycle, 220-volt, belted, alternating current generator of 600 r.p.m., will be purchased.

Fire destroyed the machine shop of the Jellico Foundry & Machine Company, Jellico, Tenn., at an estimated loss to the machinery of $12,000.

A second-hand, 18-in., belt-driven drill press, adjustable head, combined belt and lever feed, is wanted by Robert R. Nixon, selling agent, 319 Hamilton National Bank Building, Chattanooga, Tenn.

The Kelsey Wheel Company, Memphis, A. E. Mahannah, general manager, will add to its plant and equip to manufacture automobile wheels complete with hubs and steel tires. Addition to the power plant will also be made.

Birmingham

BIRMINGHAM, ALA., July 31, 1916.

Machinery business is duller now than it has been since the revival following the early days of the European War. No explanation is given, beyond the fact that development of many sorts in the South has stopped for various causes. The great damage wrought by floods has put a damper on country trade for the time being. Undoubtedly the cessation of structural work, caused by high prices of finished products, especially steel, is another prime factor in promoting depressing conditions.

The Axton-Noe Graphite Company, Pyriton, Ala., capital stock $40,000, has been incorporated by W. F. Axton, A. E. Noe, I. P. Axton, and others, and will build a 100-ton graphite plant.

The Henderson Fiber Asphalt Company, Girard, Ala., capital stock $200,000, has been incorporated by E. E. Dysard, C. C. Peters, J. W. Crawford, and others.

The Reliance Equipment Company, 112 North Water Street, Mobile, Ala., desires to receive catalogs of machinery, mills supplies and heavy iron and steel products to replace files which were destroyed recently by flood in the business district of Mobile.

The McNary Lumber Company, McNary, Miss., will rebuild its sawmill, lately burned, at a loss of $250,000.

The Savannah Engineering and Construction Company, Savannah, Ga., will build ships, equipping a plant with sawmills, air compressors, woodworking machinery, etc. Wayne Cunningham is president.

C. G. Wilkinson, of the Wilkinson Machine Company, Savannah, Ga., and others, contemplate establishing a ship-

building plant on Hutchinson's Island for building barges and small schooners. A company with $100,000 capital is planned to be organized.

Texas

AUSTIN, TEX., July 29, 1916

The North Texas & Santa Fe Railroad has been incorporated, with a capital stock of $100,000, for the purpose of constructing a railroad from Hansford, Tex., to Fargo, or some other point in Ellis County, Okla., a distance of about 100 miles. The principal offices are at Hansford. It is an Atchison, Topeka & Santa Fe project. E. P. Ripley, Chicago, Ill., is one of the incorporators.

The Lubbock & Great Northern Railroad Company has been organized for the purpose of constructing a railroad from Lubbock to Wellington, Tex., a distance of 150 miles. The principal offices are at Lubbock, and the capital stock is $150,000. The incorporators include J. M. Elliott, S. S. Houston, and F. V. Leak.

The Texas Refineries Company, San Antonio, will make improvements to its plant at a cost of about $250,000, including eight cotton-seed oil presses, refining equipment, a conveyor system, three new boilers, and a 750-hp. engine.

The Robinson Sash & Door Company, which recently increased its capital stock from $5,000 to $10,000, will enlarge its plant at Houston.

The Pool Mfg. Company, Britton, Okla., plans to build a plant at San Antonio for manufacturing cotton choppers, planters, and tillers. S. M. Pool is president.

The Martin Wright Electric Company, San Antonio, has been incorporated, with a capital stock of $30,000, by Martin Wright and others.

The Douglas Traction & Ice Company, Douglas, Ariz., will build an ice and cold-storage plant at a cost of $100,000. The ice plant will be of 100 tons daily capacity.

The Agricultural Products Corporation, subsidiary of the International Rubber Company, 225 Fifth Avenue, New York, will build a factory at Tucson, Ariz., for extracting crude rubber from the wild guayule shrub. The company plans to also devote about ten thousand acres of land in that vicinity to growing the shrubs. Gen. L. H. Manning, Tucson, is a stockholder.

The Dalhart Water Company, Dalhart, will construct a waterworks plant and system at a cost of about $50,000. Sam A. Killen is in charge.

The Owen-Burnet Gin Company, Lodge, will build a cotton gin to cost about $12,000. W. J. Owen is a stockholder.

The Pacific Coast

SEATTLE, July 25, 1916.

Good progress has been made toward the settlement of labor troubles in the Pacific Northwest, and the lumber industry is gradually regaining headway, the tendency to keep production within reasonable limits being a reason for much encouragement. Orders are now ahead of production, and the outlook is good. Demand for lumber machinery is only fair, being mostly in the way of replacements and extra parts, though the many wooden shipbuilding plants now springing up are buying bandsaws, planers and air compressors, with motors or small engines. Marine engines and hoisting machinery are in good demand, for export as well as local trade, while some Scandinavian Diesel marine engines are being imported. Metal-working equipment is in good demand, and local stocks are kept closely cleaned up, though purchases are mostly of single tools of standard design. There is a scattering inquiry for special tools from the larger plants, however, and such buyers show little hesitation in placing their orders for such delivery as is obtainable.

The Gyrotor Corporation, Reno, Nev., has been organized with a capitalization of $400,000 by Raymond T. Ashley, George A. Campbell and H. A. Lemmon. It proposes to build a factory for the manufacture of pumps, motors, engines, etc.

The American Shipbuilding Company, Astoria, Ore., has been incorporated with a capital of $150,000, and has let a contract for the construction of ship ways near that city. H. B. Spear is president.

The Elliott Bay Ship & Engine Company, Seattle, will start work early next month on a new shipyard on the East Waterway of Seattle harbor at an estimated cost of $250,000. C. O. Morrow is president.

The American Can Company, New York, has filed plans for its proposed plant in Seattle, Wash., which will provide for a main building, 120 x 240 ft., five stories, to cost $200,000. The work will be rushed to completion. A frame dock warehouse, 60 x 300 ft., to cost $40,000, will also be built.

The Bridgeford Machine & Machinery Company, Spokane, has been incorporated for $50,000 by Carl M. Bridgeford, Charles S. Bridgeford and G. D. Menefee.

The Wallace Shipyards, Vancouver, B. C., has recently received orders for three twin-screw wooden motorships to be constructed for H. W. Brown & Co., Vancouver, a newly formed shipping firm. The vessels will be 225 ft. long, will have capacity of 1,500,000 ft. of lumber, and will cost about $170,000 each. Brown & Co. also have two similar vessels under construction in Victoria shipyards.

Eli Brumberg, Hoquiam, Wash., has taken over the plant of the Universal Mfg. Company, Aberdeen, which he will rebuild and convert into a factory to manufacture a patented blocking.

The Armstrong Machinery Company, Spokane, Wash., has recently secured contracts for supplying ice-making and refrigerating machinery for an ice factory to be built by the Kishore Ice Company at Cawnpore, India. Stanley Myall is president.

The sawmill of F. K. Baker, Everett, Wash., will be enlarged and improved at a cost of $20,000. New equipment will include a 10-ft. bandmill, an automatic trimmer, a band resaw and two new boilers. The mill will be extended 100 ft.

The Rhodes Harvester Company, Moscow, Idaho, will immediately move its plant to Colfax, Wash., where an enlarged plant will be constructed. The capital stock has been increased by $15,000. J. J. Miller, Colfax, has been elected president, and Charles L. Mackenzie, vice-president. The initial building will be 60 x 300 ft.

O. M. Graves, Dwight T. Heter and James W. Meyers, all of Ephrata, Wash., will construct a factory for the manufacture of an ice-less cooler.

A. R. Barnett, Seattle, contemplates the construction of a factory in Pullman, Wash., for the manufacture of a patented knife. The proposed plant will produce 1000 knives daily.

Announcement is made by Galbraith, Bacon & Co., building material dealers, Seattle, that plans are now being prepared for a cement plant to cost about $1,000,000, which is to be erected at Darrington, Wash., where the company owns a 600-acre site. Contract for the 2200-bbl. plant has been awarded to the Black Construction Company, Seattle. Work will start immediately, and the plant will be in operation by July, 1917. Plans provide for twelve buildings.

The Mays Mining & Milling Company, Seattle, plans the immediate construction of a factory and workshop in Georgetown, Wash., for the manufacture of a device to reduce the cost of grinding quartz. Contracts for a number of its quartz mills have been closed.

Contract has been let for the tearing down of the Greeninger wagon factory building at San Jose, Cal., and the erection of a brick automobile machine shop on the site. The new building is to be used by the San Jose Implement Company.

Canada

TORONTO, July 29, 1916.

Though the Canadian manufacturers have all the shell orders they can take care of, production continues away below the expected total, according to the returns to the Imperial Munitions Board. The exact shortage is not stated, and varies considerably, but in many cases the monthly or weekly output is below half of what it should be. The difficulty is in lack of sufficient co-operation, parts of the industry being held back because of the delinquency of others. In their anxiety to get orders many manufacturers have apparently trusted to luck as to their ability to fill them.

British orders in Canada for shells and high explosives now total nearly $500,000,000. So far Canada has delivered over $200,000,000 worth and at present the value of daily deliveries is nearly $1,000,000. By the end of the year this will be increased to $35,000,000 per month. The new fuse plant at Montreal is now being operated with great success, and this country can now produce for Great Britain over 20,000 completed shells daily. The chief difficulty now is the scarcity of skilled workmen. The employment of more female labor is being urged by the Imperial Munitions Board, which is distributing an illustrated booklet regarding the training and employment of women in munition production.

The Imperial Munitions Board at Ottawa, Ont., is allotting a further series of shell orders from Great Britain. Owing to the secrecy which the censor thinks advisable, details of the contracts or their distribution are not being made public.

The E. Long Company, Orillia, Ont., has taken over the Tudhope-Anderson Company's wheel works building and will equip it for a machine shop.

The plant of Brown-Boggs Company, King William Street, Hamilton, Ont., manufacturer of tools, metals, etc., was destroyed by fire with a loss to building and machinery of $75,000.

W. J. Trimble, care of the Ontario Paper Company, Thorold, Ont., has been awarded the contract for the erection of a sulphite mill for the Ontario Paper Company and also a contract for the construction of an addition to the machine room of the Ontario Power Company, Thorold, Ont. These two contracts will amount to approximately $1,000,000.

Witchall & Son, 156 St. Helens Avenue, Toronto, has received the contract for the erection of an ice plant for the William Davies Company, Front Street East, to cost $50,000.

The plant of the Doon Fibre Company, Doon, Ont., was destroyed by fire with a loss of $40,000.

The Dominion Steel Products Company, which will manufacture 9-in. shells, has decided to establish a plant at Brantford, Ont. It will put up a main building, 90 x 400 ft., and employ at the outset 450 workmen. After the war the company will go into another line already decided on.

J. Sutherland, 216 Cooper Street, Ottawa, Ont., has received contract for the erection of a power plant on Slater Street for the Imperial Realty Company, Ottawa, to cost $30,000.

F. F. Wilson, superintendent of the Indian Lake Lumber Company, Osaquan, Ont., announces that he is preparing to develop a water-power on the river and is in the market for water wheels, machinery, etc.

The Northern Company Power Company, Porcupine, Ont., will install a 4000-hp. water turbine and generator in its power plant at Wawaitin, Ont.

Crotty & Elliott, Bothwell, Ont., are having plans prepared for an oil power plant to be erected at a cost of $5,000.

St John, N. B., will provide $30,000 for the erection of a separate power station for the General Public Hospital.

The Motor Products Corporation of which W. C. Rand of the Rand Mfg. Company of Detroit is interested, will build a plant at Walkerville, Ont.

The City Council of Hamilton, Ont., is having plans prepared for an addition to the waterworks pumping plant to cost $70,000. James Bain is the engineer.

A quantity of machinery will be installed in the new buildings which will be erected by the O'Brien Munition, Ltd., Renfrew, Ont., at a cost of $6,500.

The Pembroke Electric Light Company, Pembroke, Ont., will build a brick and reinforced concrete sub-station at a cost of $303,000.

The Toronto-Niagara Power Company, Thorold, Ont., is building a transformer house at a cost of $100,000.

Nesbitt & Co., 10,243 Ninety-fifth Street, Edmonton, Alberta, have been awarded the contract for the erection of a machine shop at Edmonton for the Canadian Northern Railway at a cost of $19,500.

The Dominion Construction Company, 14 Wellington Street East, Toronto, has been awarded the contract for the erection of a factory for the Goodyear Tire & Rubber Company, 152 Simcoe Street, Toronto, at New Toronto, Ont., at a cost of $750,000.

The Canadian Briscoe Company has taken over the plant of the Brockville Electric Light Company at Brockville, Ont., and will convert it into a plant for the manufacture of steel parts for automobiles. The Canadian Briscoe Company is a subsidiary of the Carriage Factories, Ltd., of Brockville.

Davis & Fraser, Charlottetown, P. E. I., are having plans prepared by Chappell & Hunter, Des Bresay Block, for an addition to the boiler room of the company to cost $6,000.

H. G. James, White Block, Sherbrooke, Que., is preparing plans for additions to a machine shop, of concrete and steel, to cost $70,000.

The Manitoba Power, Pulp & Paper Company, Winnipeg, Man., proposes to erect a sawmill this year at Grand Rapids, Man., and pulp and paper plants in 1917. The estimated cost of the undertaking is $2,000,000.

The Sydney Foundry & Machine Company, Sydney, N. S., will commence at once the erection of a marine repair shop and slip, to be followed later by the construction of a drydock. W. E. Clark is manager.

The Kaufman Rubber Company, Berlin, Ont., is in the market for a 250-volt direct-current generator of about 100 kw., direct-connected to a steam engine.

Delfosse & Co., 249 Craig Street, Montreal, are in the market for an electric motor, 10 to 15 hp., direct or alternating current.

C. W. Helwig & Sons, Neustadt, Ont., are in the market for a rotary pump, belt drive, 1¼ or 1½-in. intake and with 1¼-in. discharge.

William Hood & Son, 10 Richmond Square, Montreal, are in the market for a 10 or 15-hp. electric motor, a heavy Bliss trimming or punching press, a power hacksaw, and a 1000 to 2000-lb. drop forging hammer.

The Mueller Mfg. Company, Sarnia, Ont., has received a contract from a munitions company in the United States to supply brass forgings for time fuses. The Mueller Company is already supplying many Canadian firms with these forgings.

The wood-turning plant owned by Ewing & Murphy, Cameron Street, Toronto, was destroyed by fire with a loss of $12,000, including some machinery. Richard Ewing is manager.

La Campagnie d'Automobiles Agricoles Bruneau, Ltd., Danville, Que., has been incorporated with a capital stock of $100,000 by Ephrem T. Bruneau, George N. Letendre, Danville, Que.; Ferdinand P. Bruneau, Athabaska, Que.; Joseph Martel, Asbestos, Que., and others to manufacture motors, automobiles, etc.

The Ottawa Paint Works, Ltd., Ottawa, Ont., has been incorporated with a capital stock of $250,000 by Thomas C. Hickman, John M. Young, George D. Kelley and others to manufacture paints, varnishes, brushes, etc.

Government Purchases

WASHINGTON, D. C., July 31, 1916.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until date not set, schedule 9940, for one apparatus for manufacturing oxygen and hydrogen, for Washington.

The lighthouse inspector, Boston, will receive bids until 2 p. m., Aug. 10, for one horizontal oil engine.

The chief of the Bureau of Yards and Docks, Navy Department, Washington, will receive sealed proposals until 11 a. m., Sept. 2, for an ice-making and cold-storage plant for the United States barracks, Pekin, China.

Bids were received by the Bureau of Supplies and Accounts, Navy Department, July 25, for supplies for the naval service as follows:

Schedule 9824, Steam Engineering

Class 11, Norfolk—Two 14-in. main circulating pumps, with spares—Bid 24, $5,684 and $5,484; 151, $5,400.

Class 12, Mare Island—Two 14-in. main circulating pumps, with spares—Bid 24, $5,724 and $5,524; 151, $5,480.

Schedule 9825, Steam Engineering

Class 13, ten lathe chucks and 2 sets of 4-face plate jaws for deliveries as follows:

Bid A—San Francisco—Bid 75, $671.10 and $685.80.

Bid B—New York—Bid 63, $480.20, part; 75, $611.45 and $623.80; 98, $582; 130, $133.40.

Schedule 9828, Steam Engineering

Class 14, Puget Sound—One lathe—Bid 62, $245; 99, $282.50; 139, $305.84.

Schedule 9859, Yards and Docks

Class 51, New York and Guantanamo—One gasoline-engine-driven fire pump. Bid 24, $2,090; 76, $2,990; 151, $2,105.

Schedule 9860, Yards and Docks

Class 52, Philadelphia—One horizontal centrifugal pump—Bid 9, $1,615; 24, $2,190, $2,290 and $2,390; 44, $1,490 and $1,298.50; 45, $1,509 and $1,239; 51, $1,718; 76, $1,295; 78, $1,538.50; 100, $1,358 and $1,215; 151, $1,792 and $1,717.

Schedule 9861, Yards and Docks

Class 53, Brooklyn—One hydraulic accumulator—Bid 161, $2,250.45.

Schedule 9862, Construction and Repair

Class 61—Furnishing and installing one oil-burning forge furnace at Brooklyn (N. Y.) yard—Bid 7, $1,370; 91, $1,220 and $1,705; 121, informal; 144, informal, $2,650.

The names of the bidders and the numbers under which they are designated in the above list are as follows:

Bid 7, American Ship Equipment Company; 9, Alberger Pump & Condenser Company; 24, A. S. Cameron Steam Pump Works; 44, Erie Pump & Equipment Company; 45, Earle Gear & Machine Company; 51, Fairbanks, Morse & Co.; 62, Hallidie Machinery Company; 63, The E. Horton & Son Company; 75, Kemp Machinery Company; 76, R. M. Klein; 78, Lea-Courtenay Company; 91, Mirces Fuel Oil Equipment Company, Inc.; 98, Manhattan Supply Company; 99, Manning, Maxwell & Moore, Inc.; 100, L. B. Merritt & Co.; 121, W. S. Rockwell Company; 130, Southern Sales Company; 139, South Bend Lathe Works; 144, Tate, Jones & Co.; 151, Worthington Pump & Machinery Corporation; 161, Watson-Stillman Company.

THE IRON AGE

New York, August 10, 1916

ESTABLISHED 1855 VOL. 98: No. 6

Advance in Cost of Farm Machinery

As an Illustration, the 1916 and 1915 Costs of Materials for a Farm Engine and Boiler Are Compared

— BY H. A. RUSSELL —

IF we take the 1915 cost of a certain size farm engine and boiler, based on the contracts in force at that time, and add 50 per cent to the figures, we will have a very close approximation to the present total cost of the same outfit. And even at this excessive advance in the cost, it will require from six to eight months to secure the boiler plate, boiler tubes, cold-rolled steel, etc. If, however, the customer is in urgent need of the equipment and desires quick shipment, which under present conditions would require from five to seven weeks (providing the size he orders is not in stock), the total cost of the outfit would advance over 60 per cent beyond the 1915 cost figure.

These percentages take into consideration only the advances in the cost of the different materials entering into the engine and boiler and do not take any account of approximately 20 per cent advance in the cost of labor, or the very much higher prices that are being paid for supplies of all kinds which are constantly wearing out through daily service. As a few instances of the enormous advances that have taken effect in the cost of certain supplies, we might state that white waste has advanced over 50 per cent, high-speed steel and high-speed twist drills have gone up from 350 to 400 per cent. Borax (used for welding) has jumped over 100 per cent and prussiate of potash (for case hardening) advanced approximately 1500 per cent. These are only a few of the items of supplies out of the hundreds that are regularly purchased and the items that have not advanced are few and far between.

If we omit the labor and manufacturing expense items from the cost of this same engine and boiler, we will find that the cost of the material alone, in 1915, was $281.94 and at the present time the same material has advanced $210.88, or a total of $492.82. If we consider this advance on a percentage basis, the present total is 74 per cent greater than the 1915 cost of the material. These figures are based on the supposition that the customer is willing to wait over half a year before receiving the outfit. If so-called quick shipment is required, namely about seven weeks, the advance cost of the material jumps to $250.99 (in place of $210.88) and the percentage of advance in the cost will be 89 per cent over the 1915 cost of the same material.

Advance in Cost of a Farm Engine and Boiler on Wheels, Material Only, Over the 1915 Cost. The Rates Given Per Pound Indicate the Difference Between the 1915 Prices That Were Paid and the Prices Which Have Been Quoted for the Last Half of the Present Year and Which Apply to Shipments Which Will Be Made by the Mills Many Months After the Orders Are Placed, Except in Quick Delivery Sales. When for Material Shipments in Several Weeks, the Prices in the Last Two Columns Apply

Material or Parts	Weight, Lb.	—Last Half Quotations— Actual Advance, Cents Per Lb. or Value	Total Advance	—For Quick Shipments— Actual Advance, Cents Per Lb. or Value	Total Advance
Cast iron	6,259	0.3	$18.78	0.3	$18.78
Bar steel	1,742	1	17.42	2	34.84
Boiler plate	3,598	2.5	89.95	2.5	89.95
Sheet steel	87	1.6	1.39	2.25	1.96
Cold rolled steel	47	2.1	.99	3.6	1.69
Bronze (for bearings)	30	12	3.60		3.60
Crankshaft forging	445	2	8.90	2.5	11.13
Boiler tubes	370 ft.	4	33.30	14	51.80
Babbitt metal	28	8	2.24	..	2.24
Pipe and pipe fittings	....	..	1.90	..	1.90
Fittings (valves, gages, etc.)	....	..	18.58	..	18.58
Studs and bolts and spoke nuts	....	..	5.10		5.10
Boiler rivets	277	2.5	6.93	2.75	7.62
Tongue, chains, etc.	....	..	1.28	..	1.28
Paints and varnishes	....	..	.52	..	.52
			$210.88		$250.99

We will now consider the advance in cost of the material, item by item, that is by the weight and rate of advance in cost of each grade of material where possible and by value, as in the instance of bolts and studs, etc.

As stated before, this total indicates an advance of 74 per cent over the 1915 cost of material only. If we pick out the items of steel bars, plates, tubes, sheets, rivets and cold-rolled steel, we will find that these six items advance the cost $149.98, or 53 per cent.

It must be remembered that these figures represent actual net cost advance in material only and the total cost to the customer will be further advanced by the percentage of profit which must be added, not only to the normal but to the advanced cost of material also, if the manufacturer is to continue to operate his factory successfully. If he does not include a profit on the excess cost of material, he will automatically reduce his percentage of profit and the average percentage of profit on farm machinery and implements will not permit of a reduction. The margin is too close.

So far we have used prices that are in effect for slow deliveries of material. Should the customer want quick shipment and the factory stock is exhausted, owing to the slow deliveries, it would be necessary to buy the tubes from warehouse stock. And there would probably be a certain amount of waste from each tube, owing to the fact that the warehouse length would not be the same as the required length. The cold-rolled steel would have to be purchased from warehouse stock also and in random lengths. There would be a percentage of waste here also. The bar steel and sheet steel would also come from the same source, or if from some mill, there would be a premium price to pay for prompt shipment. As far as possible these prices have been figured close to the average that is being asked. No account has been taken of the extra freight charges that should be added to the price of material when ordered from warehouse stocks. We will find that the percentage of advance jumps to 89 per cent. It is needless to state that only in isolated instances, where the need is urgent, will a customer pay the excessive price. It will be noted that for this condition a number of the articles will not change in value from the figures already given. A certain percentage of the items will be taken from the stock on hand.

Now let us presume that the high prices have been in effect for one year and the factory has on hand at the end of that period 100 engines and boilers made up complete and enough material in stock, rough, partly finished and finished, to complete another hundred outfits of the same size (on the basis of a general average) as the one on which this article is based. The stock must be kept up or the factory must close down. Customers cannot wait half a year for equipment. The season would be over long before the outfit would be received. With enough material on hand to complete 200 outfits, the manufacturer would face a loss of over $40,000 on this one line alone, if prices should suddenly drop to a normal level again. And it must be also remembered that boilers and engines are usually only a part of the factory output. The total loss would approximate $300,000 for every million dollars of output.

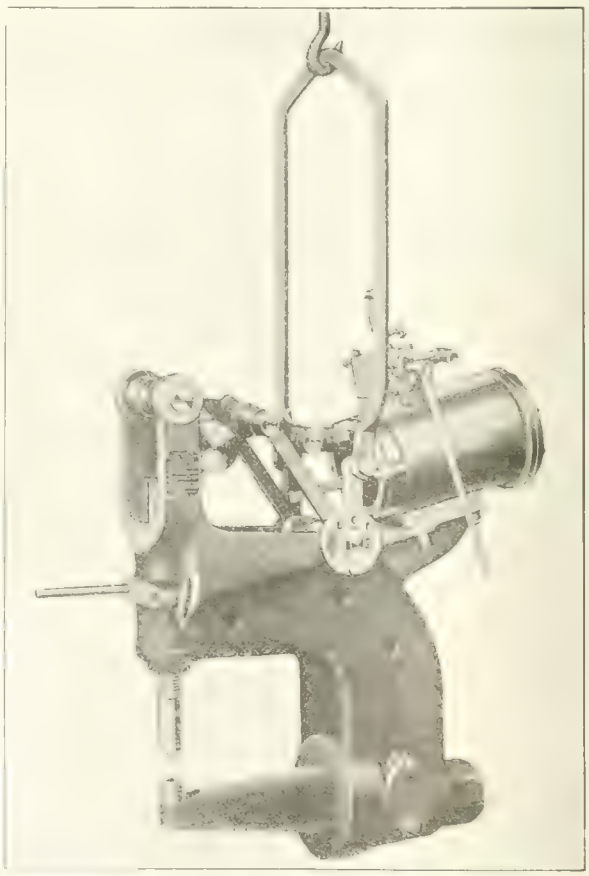
While the percentages will vary according to the size and style of machine or implement and according to the proportion of steel parts to cast iron, etc., the foregoing will give a fair idea of what the manufacturer must face, if the high prices continue much longer. So far the consumer has only paid a very small part of the advance, as the manufacturer has not advanced the price of the finished product in proportion to the present prices of material, but has given the consumer the advantage of what material was on hand purchased under the previous contracts.

A rich vein of lead ore has been found on the north shore of Lake Superior in McTavish Township, according to a report from the Ontario Bureau of Mines. The vein appears to average about 10 ft. wide and contains 8 to 10 per cent copper and about 35 per cent lead.

Riveting Machine for Limited Spaces

Several changes have been made by the Hanna Engineering Works, 2059 Elston Avenue, Chicago, in the pneumatic riveting machine that was illustrated in THE IRON AGE, Feb. 10, 1916. The earlier form, it will be recalled, was intended for use in the riveting of lattice columns where the space was limited, and while the one illustrated is likewise intended for working in confined quarters, it is intended for automobile and similar riveted work of close dimensions. The principal change made in the design of the machine is in the lower stake, which is removable and can be shaped to any form best adapted to the work that is being handled. The form of the lower portion of the machine has also been changed to care for this feature.

As was the case with the machine previously described, a combination of toggles, levers and guide links is employed to give the large opening of the toggle joint movement with a gradual increase in the amount of pressure applied until the desired amount is secured, followed by a simple lever movement through a considerable space under approximately the maximum pressure of the machine. This toggle action takes place while the piston is traveling through the first half of its stroke and the die covers the greater portion of its travel in that time. The die completes its stroke in the time required for the piston to travel the rest of the way, this amount being relatively quite small, but enough, it is pointed out, to eliminate any uncertainty regarding the pressure applied to the rivets. The change in the mechanism from that of a toggle to that of a lever is accomplished automatically without a critical point. As the rated maximum pressure is exerted through a relatively large space, it is emphasized that necessity for adjustment to take care of ordinary variations in rivet length, diameter of hole or thickness of plate is done away with after the machine has been once set. This slow movement, it is explained, also gives the metal in the rivet time to flow and fill the hole, in addition to giving an opportunity for the rivet to set prior to the release of the pressure on the return stroke of the die.



The Riveting Machine, Which Was Specially Designed for Use in Places Where the Space is Limited, as in Automobile Riveting, Has a Removable Lower Stake.

THE DIESEL ENGINE

Its Field in Comparison with the Steam Turbine in Good-Size Plants

In a paper by Herbert Hass, to be presented before the American Institute of Mining Engineers at the Arizona meeting in September, 1916, a chart, reproduced herewith, is given, which shows whether it will be more economical to install the steam turbine or the Diesel engine under given conditions of coal and oil costs. While the paper is based on conditions at mine power plants, much of it, however, is applicable to general power conditions.

The author states that about twelve times as much water will be required for condensing with the steam turbine as will be needed for jacket cooling of two-stroke-cycle Diesel engines and twenty times as much water for four-stroke-cycle Diesel engines. Based upon a fuel cost of $1.25 per barrel of 320 lb. and a lubricating oil cost of 35 cents per gal., the accompanying table was presented as showing the cost of generating power with four 3000 brake-horsepower Sulzer Diesel engines, direct-connected with alternators and exciters. The table is also based upon furnishing full, three-quarters, half or one-quarter load by operating four, three, two and one unit respectively. At full load 70,000,000 kw.-hr. are generated per year and the kilowatt-year is figured at 8760 kw-hr. The cost of the complete plant is estimated at $720,000, maintenance is figured at one per cent and interest and amortization at 6 per cent each.

Cost of Generating Power with Four 2000-Kw. Sulzer-Diesel Engines Direct Connected to Generators and Exciters

	Full Load	¾ Load	½ Load	¼ Load
	12,000 hp. 8,000 kw.	9,000 hp. 6,000 kw.	6,000 hp. 4,000 kw.	3,000 hp. 2,000 kw.
Kw.-hr. per year	70,000,000	52,500,000	35,000,000	17,500,000
Barrels	140,000	105,000	70,000	35,000
	Cost Per Year	Cost Per Year	Cost Per Year	Cost Per Year
Fuel cost	$175,000	$131,250	$87,500	$43,750
Labor	18,900	18,900	18,900	18,900
Lubrication	30,660	22,995	15,330	7,665
Maintenance	7,200	7,200	7,200	7,200
Total direct.	$231,760	$180,345	$128,930	$77,515
Interest and amortization	86,400	86,400	86,400	86,400
Total cost...	$318,160	$266,745	$215,330	$163,915
Cost per kw.-yr.	39.81	44.51	53.89	83.96

Table II shows the cost of operation under the same conditions, the power being generated with two 6000-kw. turbines. The turbines are to operate at 180 lb. steam pressure, 620 deg. Fahr. steam temperature, 80 per cent boiler efficiency, 60 deg. Fahr. inlet temperature, 75 deg. Fahr. discharge temperature of condenser circulating water; quantity of cooling water per 6000-kw. unit: 74,000 cu. ft. per hour. Commercial generator efficiencies. One unit operates continuously at full load, the other is a standby.

Table II—Cost of Generating Power with Two 6000-Kw. Steam Turbines

	Full Load	¾ Load	½ Load	¼ Load
	8,000 kw.	6,000 kw.	4,000 kw.	2,000 kw.
Kw.-hr. per year	70,000,000	52,500,000	35,000,000	17,500,000
Barrels	300,000	210,000	150,000	83,700
	Cost Per Year	Cost Per Year	Cost Per Year	Cost Per Year
Fuel cost	$375,000	$262,000	$187,000	$104,625
Labor, etc....	25,000	25,000	25,000	25,000
Maintenance	7,200	7,200	7,200	7,200
Total direct.	$407,200	$294,700	$219,200	$136,825
Interest and amortization	86,400	86,400	86,400	86,400
Total cost...	$493,600	$381,100	$305,600	$223,225
Cost per kw.-yr.	61.75	63.50	76.60	111.70

The general selection of either type of prime mover will be governed by the following economical considerations:

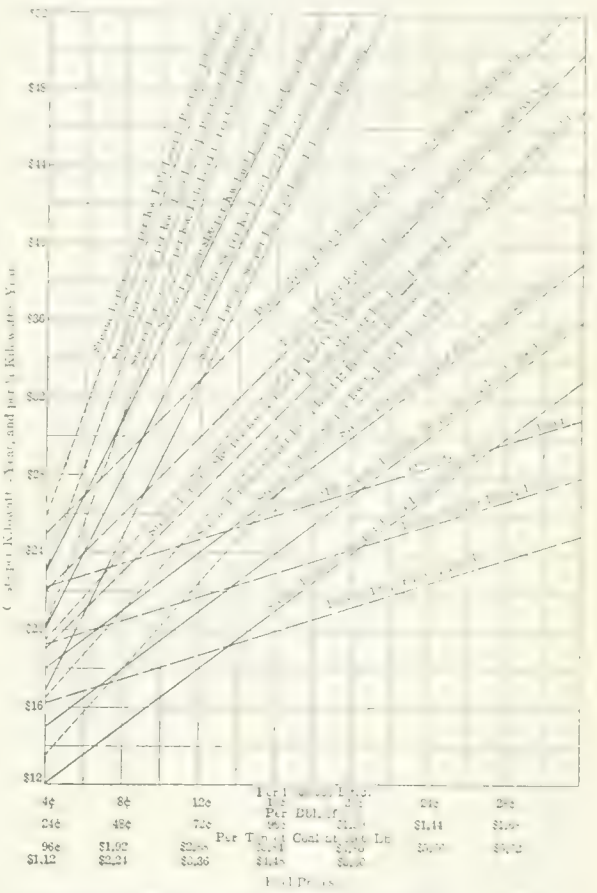
1. Where the cost of a given number of B.t.u. is high due to high fuel cost and the load factor also is high, conditions favor the use of the Diesel engine.

2. Lower B.t.u. price and low load factor conditions favor the steam turbine due to the influence of interest and amortization costs. This applies particularly to stationary power plants which are operated only occasionally or have supply recurring peak loads.

3. Conditions demanding readiness for constant and instant service favor the use of the Diesel engine. Against the difference of the interest charges of the Diesel engine and the steam turbine would have to be balanced the cost of keeping the boilers under steam continuously.

4. If the power plant is located at the sources of fuel, either in the oil fields or at coal mines, the steam turbine will be favored as costing less to install, and therefore fuel expenditures will be of less moment than interest and amortization charges.

5. Combination plants using the Diesel engine for supplying continuously and nearly constant main loads and steam turbines for furnishing periodically recurring peaks by the use of high duty boilers with large water and steam space and capable of forcing will prove profitable. Thus such periodical peaks as are produced in hoisting may be taken care of by a turbine floating on the line and operating in parallel with the Diesel engine.

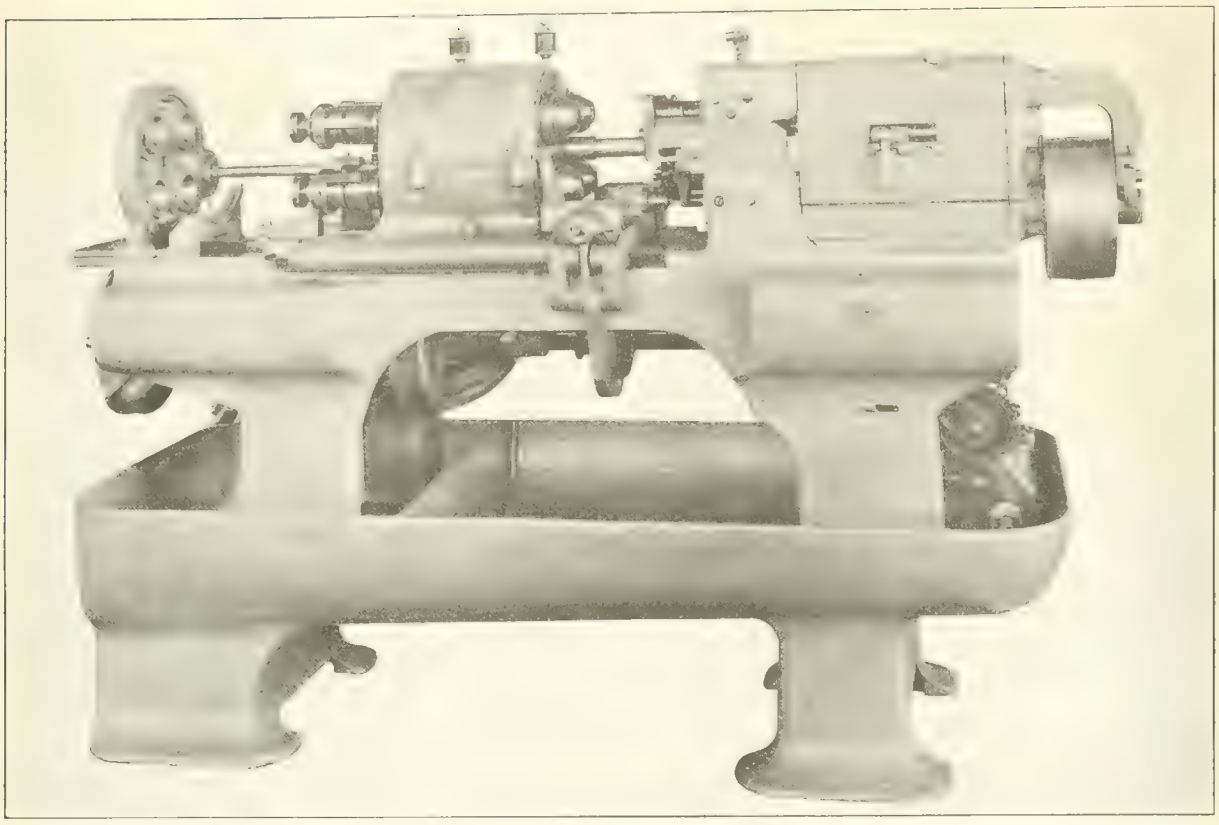


In the above diagram, showing the relative cost of power generated by the Diesel engine and the steam turbine, the oil costs are based on a barrel containing 6,000,000 B.t.u. and the coal costs on one pound's developing 12,000 and 14,000 B.t.u.

6. Where waste heat gases are available, steam power will prove the cheapest.

7. Up to capacities of 1000 hp., steam turbines can compete with Diesel engines only in special cases, such as supplying exhaust steam for heating purposes. For such small units, particularly for varying loads, high-grade reciprocating steam engines are preferred. Plants between 1000 and 10,000 kw. require careful analysis to determine the relative advantages of the Diesel engine and the turbine. In these analyses load factor, fuel price and water conditions must be considered. For power plants of larger than 10,000 kw., using units from 6000 kw. upward, it is preferable to use steam turbines unless a combination of high load factor, high fuel cost and poor water conditions favor a Diesel plant.

The Granby Mining & Smelting Company, St. Louis, Mo., announces the removal of its New York Sales office from 165 Broadway to the Equitable Building, 120 Broadway.



THE RADICAL SCREW MACHINE

The Fitchburg Company's Automatic Machine Measures Up to Its Name

BY W. E. FREELAND

After a development and testing period of three years the Fitchburg Automatic Machine Works, an outgrowth of the Fitchburg Machine Works, Fitchburg, Mass., has placed on the market a multi-spindle automatic screw machine in which is incorporated many new and novel features. In the selection of the name Radical for this machine, the designers were guided not so much by the fact that the machine is different and unusual as by the thought that they had attacked the very roots of the mechanical principles and problems involved in turning out screw-machine products and had built a machine for a specific purpose, which machine in conception and construction could not be subject to an accusation that it was a copy of existing machines for the same purpose.

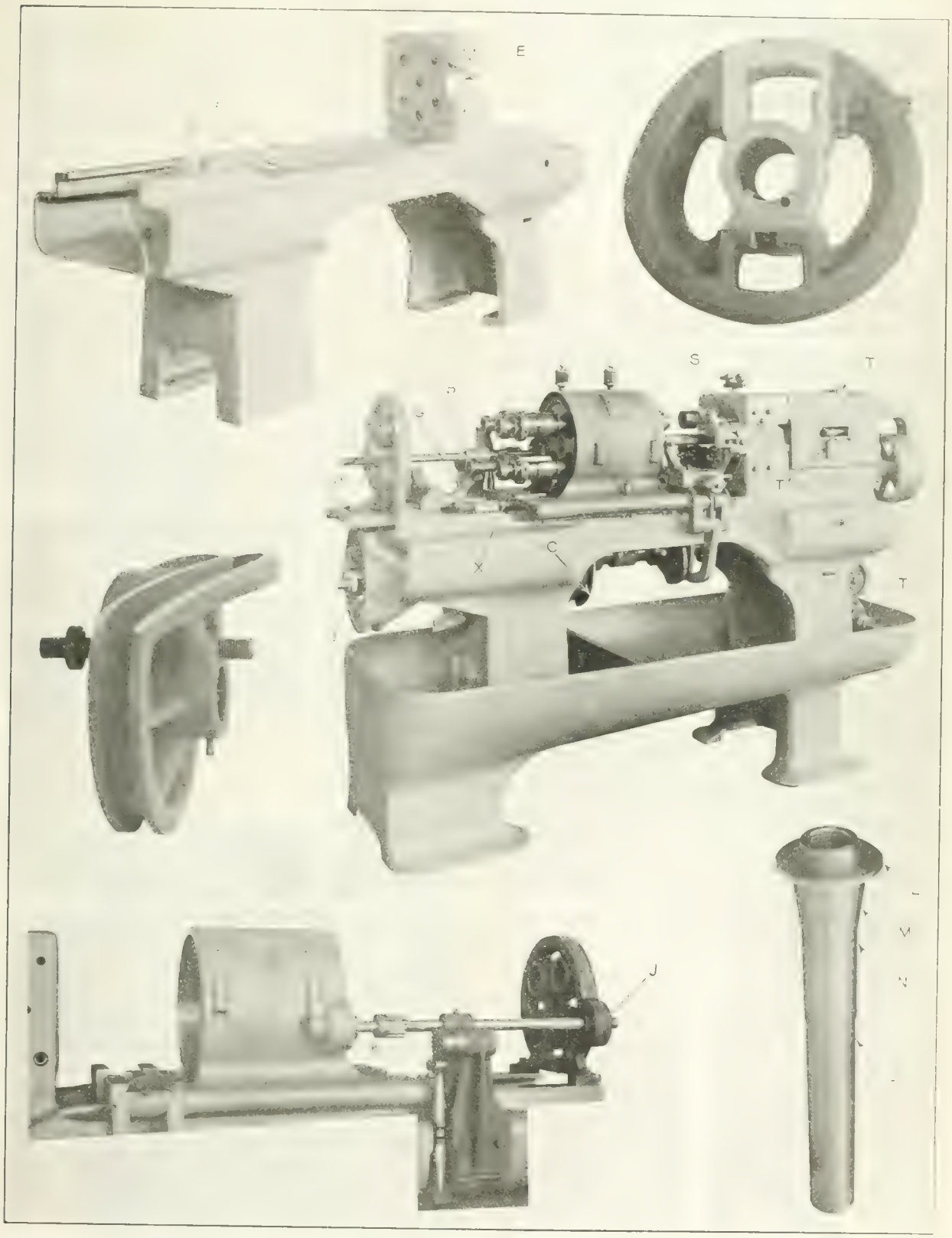
The fundamental principle of the machine is found in the bringing of the work to the tools. The original automatic designed upon this principle was developed by John J. Grant and sold to the Flanders Mfg. Company, from which the Fitchburg Automatic Machine Works secured the original patents. It is the perfection of the principle of bringing the work to the tools which has made possible the present machine. The designers were equipped through long years of experience in the automatic field to know what the trade was demanding in a multiple spindle screw machine, the defects which designers had been striving to overcome, the ranges of speeds most required, the tooling combinations and methods necessary for accuracy and production, and they had learned well the lesson of designing for the convenience of the operator, a point too frequently overlooked in machine tool design. Designing of this kind is not the work of a moment; some of the most interesting things that the writer saw at the factory were several features which had been discarded or redesigned solely to aid the operator.

Simplicity is a predominant characteristic; the illustrations emphasize this statement. The various movements of the mechanism are simple and easily adjusted. Whatever adjustments are required are made with the operator in a position where he can see what he is doing, an important factor in securing output. The manufacturers do not claim for the machine excessive speeds nor that it is sold for anything but accurate machine screw work. They do claim that it can be set up very quickly, that there is little opportunity for any of its mechanism to get out of order, that it is designed for the elimination of broken parts and that careful study of the machine and the work produced by it gives credence to these claims.

The design of the pan and bed, the latter shown in Fig. 1, is intended to give the utmost rigidity and consequent close working. The pan has an oil capacity up to 25 gal. and a chip capacity of 318 lb. The striking feature of the bed is the integral tool head, shown in both Figs. 1 and 4, in place of the usual sliding tool head. In previous designs of automatics, the problem has always existed of keeping two opposed and movable sets of surfaces in proper relation to each other and to a fixed center. In this machine it is only necessary to keep one set of surfaces in proper relation to a set of fixed surfaces and a fixed center. If space did not forbid, it would be interesting to describe the design and the extensive use of jigs and fixtures, the grinding operations and some of the assembling features. These can be only briefly sketched to show how accurate working has been made a point of prime importance.

The planing and boring operations for the carriage are all taken care of with one fixture for each and the carriage is then transferred to a grinding fixture which holds it for all grinding operations. For this operation the carriage is rough scraped

to a master bed and later finished scraped to the chilled ways of its individual bed. After the cylinder and spindles are assembled in the carriage, each tool hole is finished from a finishing bar carried in the spindle. The possibilities for accurate and permanent alignment are apparent when it is recalled that the tool head or knee is a part of the bed and not subject to any movement. The turner slide ways are lined and finished from the carriage ways, which ways present the stock to the



SOME OF THE DETAILS OF THE RADICAL AUTOMATIC SCREW MACHINE

Fig. 1—The integral tool head and the turner slide E and the carriage ways FF.

Fig. 2—The lead cam is composed of a hub and a shell. Two shells are provided with the machine.

Fig. 3—Stock feed cam, showing the longitudinal adjustment screw.

Fig. 4—From this view it may be noted the character of brackets, arms and levers. The chuck slide is marked X. The bracket on the bed of the machine is G. The feed tube collar is seen at P, the stock feed slide at H, and the stock feed cam at I.

Fig. 5—The indexing shaft and the stock reel; the extra gear is in the housing J and at K is the sector gear.

Fig. 6—One of the spindles; at L is the end thrust collar bearing; at M the taper bearing, at N the [illegible] behind the taper bearing, and at O the rear bearing.

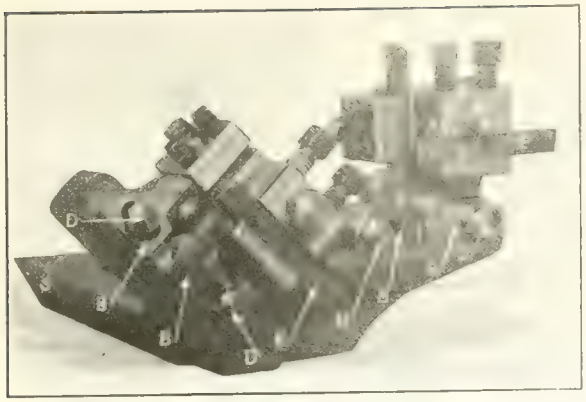


Fig. 7 -The Turner Slide Has Micrometer Adjustment

tools when the machine is in operation. All bosses and holes are jig drilled and finished.

The design and operation of the cams are notable features of the machine, especially that point of convenience which has led the designers to speak of them as "stay put" cams. The chuck and chuck release cam, the indexing, the lock bolt and the die cams are never changed. The lead cam hub, Fig. 2, is permanent on the shaft and is provided with two shells to cover the entire range of the machine; the forming and cut-off cam is adjustable for depth of cut. The stock feed cam, Fig. 3, is adjustable longitudinally of the cam shaft for length of feed, but is never changed or adjusted otherwise. All the cams are of steel or semi-steel.

Selective tooling is a feature in that not only can cross slide tools, shank-held end tools and turner slide tools be used but any desired combination of these tools may be employed. This gives the operator unusual scope and freedom in planning his tooling for convenience and best results. The turner slides, Fig. 4, are adjustable longitudinally for any length of cut desired in either the first or second positions and are used alone or in any combination with forming slide or shank-held tools.

In addition, micrometer adjustment is provided for the in and out movement of the cutting blades, a point of convenience in setting up. In Fig. 7, *A* represents the micrometer adjustment. The graduations are 0.001 in. The operation of the adjustment is to loosen slightly the clamping screw *G* and raise and lower the blade holder with the micrometer adjustment *A*. The operator is thus enabled easily and conveniently to get his diameters as he wants them.

The letters *BB* represent the steady rest roll holder and rolls. Provision is made for adjusting and locating the rolls and for having the rolls and holders held solid after they are located. Whatever the diameter of stock being used, the rolls are always in the proper position for supporting the stock. These roll holders are adjusted by loosening the locking screws *D*.

The accessibility of the entire mechanism is noteworthy. The longitudinal slides *S* are scraped to the turner slide ways. The photograph does not give a good idea of the length of the longitudinal slides. From one end to the other the length is 9 15/16 in. on one slide and 9⅞ in. on the other.

The threading is another distinctive feature, for the machine is designed to permit of any combination of threading and tapping in either the third or fourth position or both, or the threading mechanism may be removed entirely, thus making the machine a plain machine. No changing of cams or strips is necessary in threading operations, the operator while standing upright being required only to shift two dogs. The machine has hand control from either side.

The illustrations show the noticeable absence of brackets, arms and levers. Chuck and feed shell operating arms are eliminated. A roll on the bottom of the chuck slide *X*, Fig. 4, acts directly on the cam. A bracket *G* on the bed of the machine engages the feed tube collar *P* as the carriage advances, doing away with arms or levers for this operation. A roll on the bottom of the stock feed slide *H* operates in a groove on the face of the cam *I*, eliminating arms and levers at this point. As no adjustment or cam changing is required at any of these points, the advantages of the elimination of arms and levers is clear.

The cylinder and cylinder carriage are of semi-steel and the carriage moves on chilled ways. There is no overhang to the carriage as the ways carry the full length of the travel; there is, of course, no overhang to the solid tool head. The elimination of all indexing strain upon the spindle and cylinder bearings is made possible by the continuation of the indexing shaft, Fig. 5, back to the stock reel. The indexing shaft carries an extra gear on the end, which gear *J* automatically and without any strain on the stock indexes the reel just as the cylinder itself is indexed. The shaft is rotated by a sector gear *K*. The cylinder locking is of a positive type, which aims for correct alignment with each indexing movement and is of a design which insures completion of the indexing when the locking pin is seated. Two straight and four taper surfaces must wear out before the cylinder can be locked "out of line." The fit is so exceedingly close that it was found necessary to provide an air vent before the locking pin would seat.

The spindles, Fig. 6, are ground inside and out. The spindle bearings have had particular attention, a large end thrust collar bearing in front, a ball thrust bearing in back and a taper bearing in front all working together to take care of the end thrust

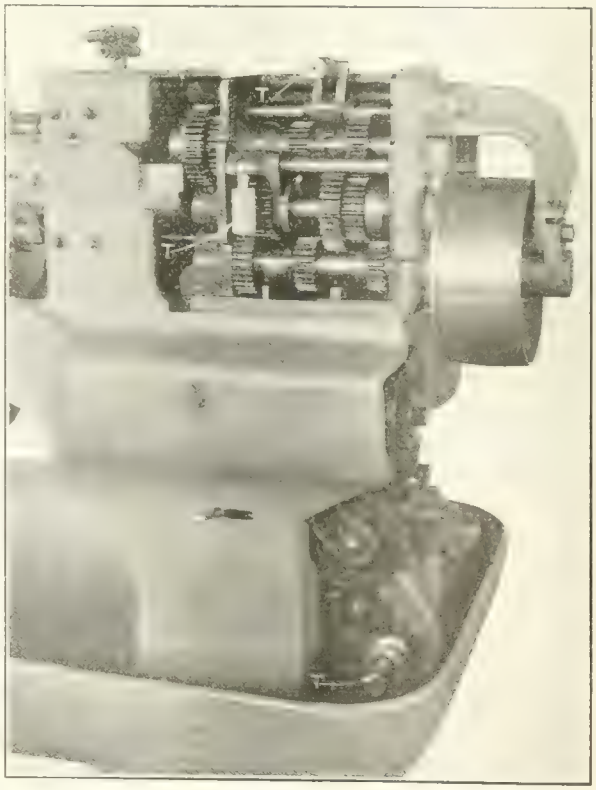


Fig. 8—Gear Drive for Both Spindles and Cam Shafts; at T, T are the Shifting Levers

load. The side thrust is taken care of by the taper bearing, a straight bearing behind the taper and the rear bearing. Three years' actual test indicates that the bearing proportions are well selected. The spindles are steel forgings. Bronze is used for all bearings.

The convenient method of gripping the stock with a master chuck with sleeves is a particularly good feature, replacing the older method of using pads and screws and eliminating the troubles which have been common to their use. The new method provides a master chuck for each spindle, which master chuck will take sleeves for handling stock up to the capacity of the machine. The inside of the master chuck has a ground tapered surface and the outside of the sleeve has a corresponding taper which prevents the sleeves from becoming longitudinally displaced even though there is no stock in the sleeve. For changing over to a different diameter of stock it is only necessary to give the sleeve a slight rap to release the taper, slide the sleeve out and slide in a sleeve of the required size. The advantages of this method are obvious.

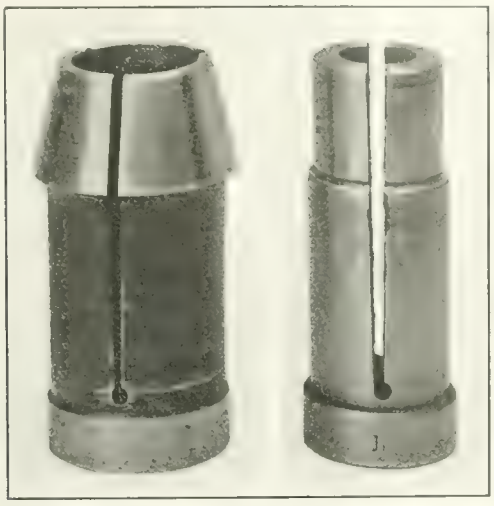


Fig. 9—Chucks for the Radical Automatic Machine

The gage stop is positive and rigid, yet is easily removed for setting up. Individual gage stops reduce forming tool variation to a minimum. The oil system is notably simple, a minimum of piping being required between the strainer and the reservoir in the cored tool head.

The machine is of the single-belt gear-driven type. The transmission of power to the camshaft is by chain through a compact and substantial gear box with wide-faced steel gears. The transmission of power to the spindles is through steel gears, the driving member meshing directly with the driven member gears on the spindles. At both points the provision for change of speeds seems to be strictly in accordance with the requirements of the machine with simple, positive shifting methods, as indicated at points *T*, Figs. 4 and 8.

Great care has been exercised in the selection of metals. High-grade steel and steel castings are used where cheaper metals could have been used. Semi-steel (0.40 per cent steel) is found where a cheaper cast-iron construction would not have been subject to criticism.

Two sizes, 1 in. and 1¼ in., are now being built and other sizes will soon be added.

Puddlers in eastern Pennsylvania rolling mills had their wages advanced Aug. 1 to $7 per ton, the highest rate ever paid in that part of the country. The former rate was $6 per ton.

Basic and Acid Castings in the United States and Germany

The greater extent to which basic steel castings are used in Germany rather than acid steel castings is indicated by the following table, showing the percentage of acid castings in the total open-hearth castings output of the United States and Germany for the last 15 years:

	United States		Germany	
Years	Acid Castings, Per Cent of Total	Total Open-hearth Castings, Gross Tons	Acid Castings, Per Cent of Total	Total Castings, Metric Tons
1901	68.4	301,622	37.0	107,210
1902	67.6	367,879	40.0	116,524
1903	66.2	400,348	34.3	131,756
1904	67.5	302,834	30.3	152,814
1905	60.9	526,540	35.1	186,131
1906	56.1	719,891	41.0	189,313
1907	50.9	716,525	40.4	211,498
1908	50.4	311,777	40.1	192,883
1909	49.0	601,040	40.3	206,456
1910	49.7	863,351	42.5	262,811
1911	48.3	571,191	37.9	269,372
1912	49.0	870,848	31.1	321,663
1913	49.1	910,216	30.1	362,916
1914	44.7	604,317	29.1	298,338
1915	54.7	735,332	27.8	694,515

While the total casting output in Germany in nearly every year has been much less than that of this country, the acid steel casting percentage has in no one year been as high as in the United States. The fluctuation in the percentages of acid and basic castings has been greater from year to year in Germany while in the United States the change has been a gradual increase for the basic. The highest acid percentage in Germany, 42.5 per cent in 1910, is less than the lowest in this country, at 44.7 per cent in 1914. In both countries the growth of basic steel for castings has been on the whole progressive.

The very large increase in the total German output of castings in 1915 is striking—694,515 metric tons against a previous high of 362,916 tons in 1913. As only 27.8 per cent of the total last year was acid castings, the sudden expansion in basic output is noteworthy. It is probably due to the large stocks of scrap steel as well as to the abnormal demand for castings for motor truck and other uses.

The jump in the relative output of acid steel castings in the United States in 1915 is rather surprising—from 44.7 per cent of the total in 1914 to 54.7 per cent or the largest since 1906, the totals for 1915 and 1906 being nearly the same. This may be partly explained by the large demand for castings for machine tools and to a lesser extent for locomotives as well as the small number of cars built in 1915.

Blow Cock for Cleaning Purposes

For use in connection with the compressed air systems found in machine shops and foundries, Stevens & Co., 375 Broadway, New York, have developed a special blow-off valve. This is known as the Stevens auto blow cock and is intended for removing chips and borings from machine tools, work benches and grinding machines, as well as for cleaning machine parts before assembling. It is intended for attachment at the end of an air hose and the amount of air discharged is regulated by pressing a handle on the side of the valve. The valve is fitted with a tapered metal to metal seat and is held in position by a coil spring. This arrangement is relied upon to prevent accidental opening or leakage under high pressure. Other uses to which the device may be put are for cleaning down automobile engines and frames in garages and reaching inaccessible places around axles, wheels and the steering gear.

The Seattle Car & Foundry Company, Seattle, has received orders from the Alaskan Railway Commission for about $12,000 worth of clamps, blocks, forgings and other material to be used in constructing the Government railroad in Alaska. The company reports an unusually busy season in forgings and castings besides its carbuilding operations.

MAKING COPPER CLAD STEEL

Methods of Producing Commercial Shapes with a Protective Coating

A great variety of steel products to which a coating of copper has been welded are being placed on the market by the Copper Clad Steel Company, Rankin, Pa. It is planned to furnish copper clad steel for all purposes for which pure copper is now used at a price, it is stated, approximately 30 per cent less than that of copper. The use of the steel secures increased tensile strength and higher elastic limit than obtainable with the all-copper article.

Open-hearth steel rounds, 4 and 4¼ in. in diameter, with a carbon content of 0.08 to 0.30 per cent are used. The material is delivered in 15 to 18 ft. lengths and is first cut into pieces about 30 in. long. These are taken to a pickling machine where they are immersed in sulphuric acid to remove the dirt and scale. The bars are next scrubbed and washed and covered with a specially prepared flux which, it is explained, prevents oxidation of the surface of the bars.

The next step in the process is to place the bars in plumbago molds, which are 5⅛ in. in diameter and about 30 in. long. The underside of the cap of the mold contains a recess which is relied upon to center the bar in the mold. A pouring spout is also employed on the top of the mold to keep the bar from floating when the molten copper is cast around it. The molds are loaded on buggies and taken on a narrow-gage track into a special heating furnace, designed by the company. They remain in the furnace until the desired temperature is reached, electric pyrometers being used to measure the heat. Copper, heated to a temperature of 1980 deg., is poured over the steel bar. The bars meanwhile go through a special treatment which, it is claimed, adds approximately 30 per cent to the strength.

The molds are then taken out of the furnace and after they have been removed the bar with its copper coating is placed in a Tate-Jones gas-fired heating furnace. The bar now goes to a roughing mill, where it is reduced to 3¾ in. in diameter and its length is increased to 6 ft. in six passes. After a second reheating, the bar goes to a 12-in. roughing mill and then to a 10-in. finishing mill, the finished product having the diameter of ⅜ in. In the finishing passes the bar is rolled into various shapes, such as rounds, flats, angles and ovals, which process tests the bars severely and insures that the copper has adhered rigidly to the steel.



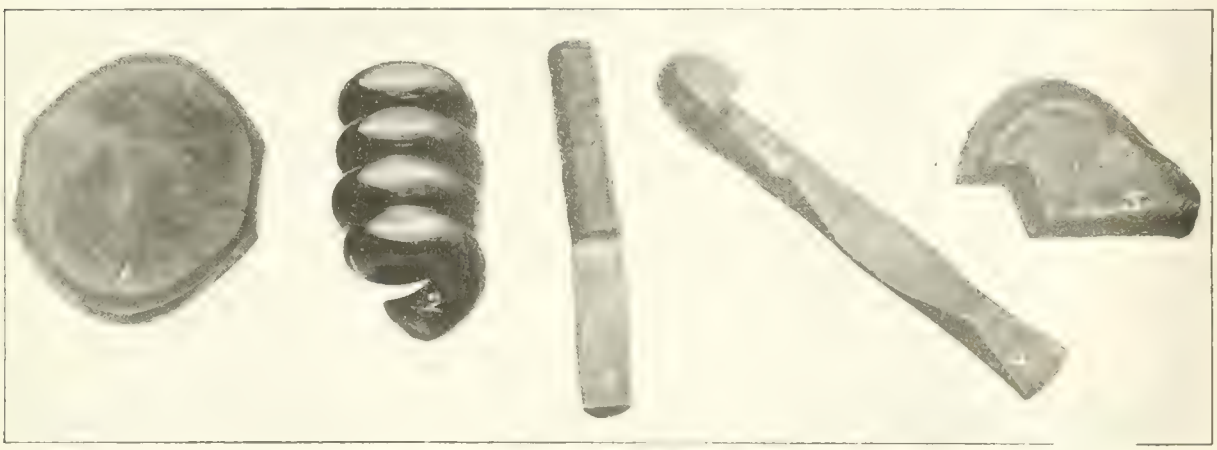
The Close Contact Secured Between the Steel and the Copper Covering. (The Cut Is a One-Third Reduction from a Photomicrograph at 100 Diameters)

The ⅜-in. rod is then drawn cold for any commercial size of wire desired.

One of the accompanying illustrations is a reduction two-thirds the original size of a photomicrograph at 100 diameters and is offered to show the entire absence of alloy and the complete welding of copper and steel. After the rods have been rolled, a piece 30 in. long is cut from each and tested for conductivity. When the material is placed in acid the steel dissolves throughout the entire section without accelerated action at any point, thus showing apparently that there is no electrolytic action. When exposed to the corroding action of acids or atmosphere, it is explained, that while the ends corrode slightly a protecting film is formed on the steel which prevents further corrosion.

The larger halftone shows some of the products made by the company subjected to tests. No. 1 at the left is a view of a piece of copper clad steel after the original passes through the finishing rolls. The next is a wire rod which was given four circular twists to show the elongation and then filed to show the uniformity of the steel and copper weld throughout. The piece in the center is a wire rod which after being given 16 twists when cold was heated and plunged in cold water. A portion of this rod was also filed to show the uniformity of the weld. No. 4 is a rod which after being heated to a high temperature was plunged in cold water and hammered 20 times on each end. The view at the extreme right is the same piece after being cut in two and the two ends of the piece hammered together when cold.

The Copper Clad Steel Company was formed in May, 1914, at Pittsburgh and was incorporated



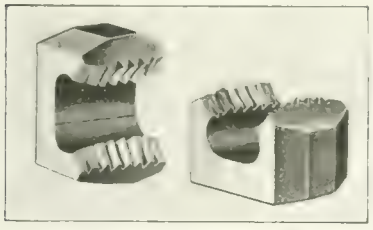
Some Copper Clad Products That Have Been Subjected to Tests

under the laws of the State of Pennsylvania a year later with a capital stock of $250,000, which was increased about two months ago to $350,000. A site of about four acres was leased at Rankin, Pa., a few miles from Pittsburgh. The plant, which consists of two buildings, one 120 x 240 ft. and the other 120 x 150 ft., has direct switch connections with Pittsburgh, McKeesport & Youghiogheny and the Baltimore & Ohio railroads. The smaller of the two buildings was recently completed and at the present time an 18-in. mill is being installed. This will increase the output from 10 to 50 tons per day and enable sheets and plates to be supplied as well as wire rods, which the company is furnishing to the Page Woven Wire Fence Company. Three new type electric furnaces are being installed for melting the electrolytic copper ingots which the company uses, and a new electric heating furnace is being installed to heat the steel bars. With this new furnace the bars will be heated in 15 min. instead of from 2 to 2½ hr.

The officers of the company are J. M. Roth, president; William Smith, vice-president; S. E. Bramer, second vice-president; S. F. Loeb, treasurer, and F. R. S. Kaplan, secretary. Mr. Roth, who is a chemist, began the development of the process, which is covered by patents, about 10 years ago. He was assisted in this work by J. W. Reisz, a mechanical and electrical engineer.

Double Reversible Screw Plate Dies

A die made to cut from both faces is being furnished in all the screw plates made by the Russell Mfg. Company, Greenfield, Mass. In addition to this feature it is also possible to turn the die over in the holder when one set of cutting edges becomes worn and bring the other into action. This combination of the two features has given the dies their name of double reversible.



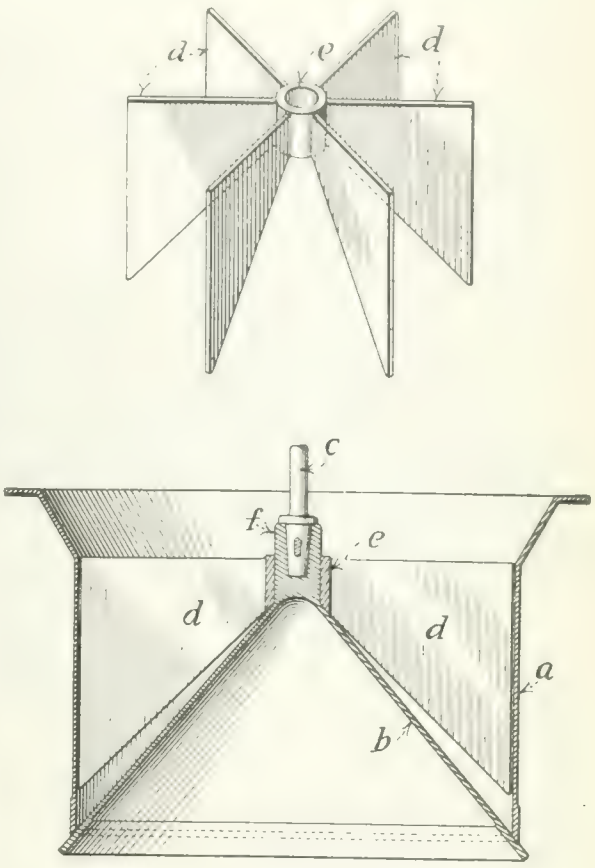
A Screw Plate Die Capable of Cutting from Both Faces

With this type of die it is pointed out that work which formerly could not be done easily can be readily accomplished. When a thread is to be cut close up to a shoulder or a very short piece is to be threaded, the cut is made from the front face of the die. In this way it is pointed out the space which the thickness of the guide prevents from being utilized when the cutting is being done from the guide side of the die can be threaded and the thread cut directly up to the shoulder or to the work holder. It is also possible to use the same die for either hand or machine work without turning the die over. The ability to turn the die over and bring the other set of cutting edges into play when one has become worn doubles the life of the die.

The David Ranken School of Mechanical Trades at St. Louis, Mo., which has completed its seventh scholastic year, at the graduating exercises July 19 granted diplomas to 95 graduates, the largest number since the school was established. Its total enrollment for the year was 867, of which 275 were in the regular day classes, 526 in the evening classes and 66 in co-operative apprentice classes. The diplomas granted were as follows: Plumbing, 16; carpentry, 5; painting, 3; pattern makers, 4; steam engineers, 7; machinists, 15; electricians, 23; bricklayers, 1; metal trades apprentices, 21. The school has become recognized as thoroughly practical in its instruction and is encountering no opposition from the trades unions in the various lines ta[illegible] It is conducted under an endowment by its founde[illegible] which provides not only the buildings and grounds of most modern type, but ample funds for the operating expenses.

Charging Bell for Blast Furnaces

An improvement in charging bells for blast furnaces is covered by a patent (U. S. 1,178,522, April 11, 1916) granted to Julian Kennedy of Pittsburgh. It has been designed for guiding or controlling the charge and maintaining the bell in its proper position, so that each charge will be approximately equally distributed around the furnace—a feat usually difficult to accomplish.



Details of Charging Bell for Blast Furnaces

The illustration shows part of the details, in which *a* designates a blast-furnace feed hopper and *b* the discharge bell with a supporting and operating stem, *c*. There are radial wings, *d*, so arranged as to retain the bell centrally within the hopper and also to provide guides for the charge, so that the material will move in a radial direction and be restrained from moving at a tangent with relation to the center of the hopper. The wings *d* do not extend to the upper face of the bell at their outer edges, permitting the material passing through one section to spread out and meet that passing through adjacent sections. These wings are cast as part of the hub *e*, mounted on the boss *f*.

Monarch Machinery Company's New Building

The Monarch Machinery Company, now at 249 North Third Street, Philadelphia, has purchased the granite building on the northwest corner of Third and Vine streets, formerly occupied by the National Bank of Northern Liberties. When the architect and builders get through with their work, the company expects to have one of the largest and best equipped machinery stores in the country. After the Monarch company moves, its present store will be occupied by the Advance Machine Company (Joseph A. Wolle, proprietor), now at 911 Vine Street, in the same city, builder of magnetic separators, special tools, dies and jigs.

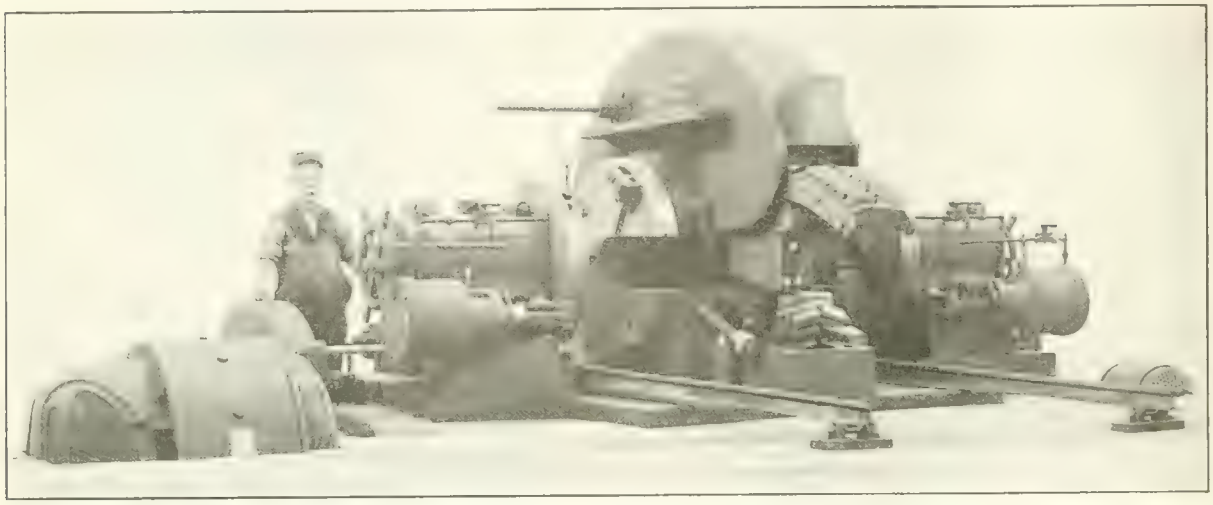
A HEAVY CARWHEEL LATHE

Hinged Driving Pinion Segment Acts as Automatic Wheel Locking Arrangement

An unusually heavy carwheel lathe has been brought out recently by the Niles Tool Works Company, Hamilton, Ohio, and has passed final tests in outside shops. As will be noted, the machine is provided with central driving gears and pinion of the double herringbone type. It is claimed by the builder that for transmitting heavy torque, as required in this class of work, the herringbone gear offers several advantages: first, its construction eliminates all end thrust, and, second, this type of gearing is very smooth in operation, due to the spiral action of the teeth.

The central driving gear is mounted on a so-called driving spool, which revolves in large bearings in the bed. This spool has two faceplates that carry the drivers and an opening of 10 in. to receive the axle. The driving gear has a patented hinged segment which works automatically. It closes and locks as the wheels are rolled into the lathe, and unlocks and opens as they are rolled out. The operation of the segment requires no manipulation by the workman.

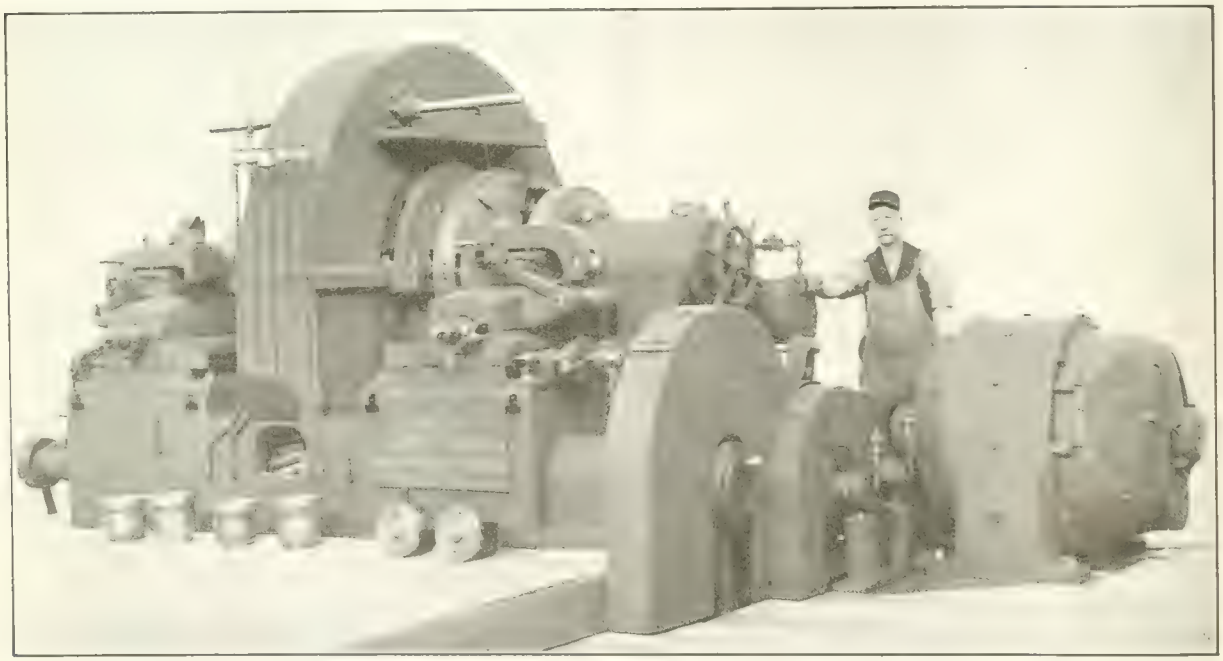
The wheels are rolled into the lathe on a short hinged track that connects with the shop track. For aligning the wheels with the center of the tailstocks, an elevating device driven by a 5-hp. constant-speed motor is provided. The wheels are centered by tailstocks which are moved on and clamped to the bed by powerful air cylinders. The tailstocks are controlled by air valves within easy reach of the operator, as shown.



A Very Heavy Lathe for Carwheels Having a Hinged Segment of the Herringbone Driving Pinion That Works Automatically to Admit and Release the Wheels

For wheels on axles with outside journals collapsible bushings fitting over the journals and tapered to fit the tailstock spindle are furnished. This method is relied upon to insure the treads of the wheels being concentric with the journals.

All gears are of steel and are fully covered with guards. Wipers are attached to the tailstocks to keep the track free from dirt and chips. Each faceplate of the driving spool is equipped with three drivers, that engage the inside of the wheels near the circumference. These drivers are tightened by hand and exert a uniform pressure on the wheels.



The Tailstocks Are Adjusted to the Wheel and Clamped in Place by Compressed Air and All the Gears Are Guarded

The tailstock faceplates are provided with independent chuck jaws that engage the outside of the wheels and support them against the thrust of the drivers. Thus the wheels are held with absolute rigidity. The tendency to chatter is said to be eliminated and the axles are relieved of all deflecting or torsional strains.

The tool rests are equipped with pneumatic clamps that enable the operator to change and clamp the tools in a few seconds without the use of a wrench. The tools are clamped by a wedge action which forms a positive lock independent of the air pressure. The tool slides have in and out adjustment for setting depths of cuts and also hand longitudinal traverse. The tool slide screws are fitted with ball thrust bearings. The rests can be swiveled to provide for the taper of the wheel treads.

The power feed is obtained by direct gearing, and is positive in action. The range is from 1/8 to 5/8 in. per revolution of the faceplates. There are 6.4 feeding strokes per revolution of the faceplates, giving practically a continuous feed.

The machine is gear driven by a 50-hp. motor. When direct current is used the speed variation is 3 to 1, and when the lathe is driven by direct-current motors they are equipped for dynamic breaking. This last feature enables the operator to stop the driving spool in any desired position, and also to obtain a fine adjustment when elevating the wheels to the center of the tailstocks.

The lathe will turn wheels from 26 to 42 in. in diameter on the tread. It will take the largest M. C. B. axles with outside journals up to 6½ in. in diameter, and will take axles up to 9½ in. in diameter with inside journals. The maximum distance between centers is 94 in., and 96 in. between tailstock faceplates.

Hollow Axles and Alloy Steels for Locomotives

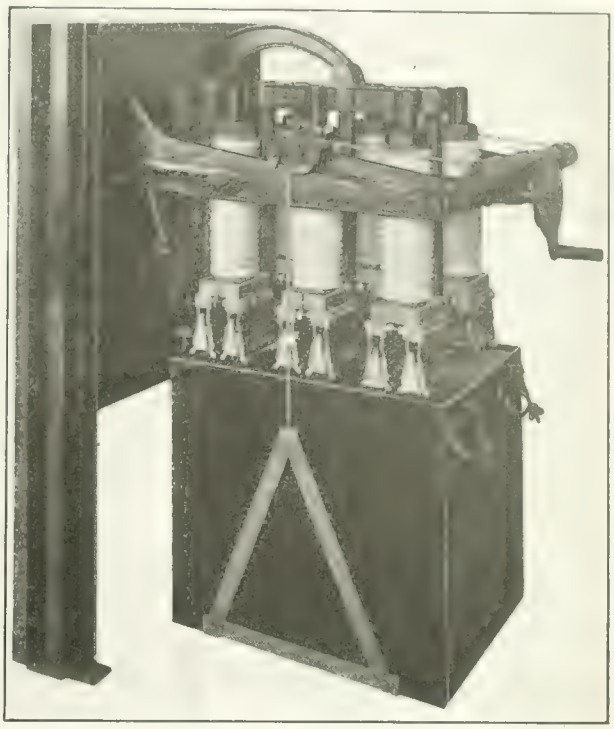
That hollow axles and crank pins of alloy steels are a great saving of dead weight in locomotives is the view of L. R. Pomeroy in a paper on "Alloy Steels in Locomotive Design," presented at the annual meeting of the Railway Master Mechanics' Association at Atlantic City, N. J., June 19 to 23. In addition, there is great benefit in hollow forgings for purposes of inspection. The increase in outside diameter is so small, to produce an axle as strong as the equivalent solid axles, that for old equipment a hollow axle can be substituted without changing the size of boxes. Commenting on the paper, the *Railway Age Gazette* said:

> The reduction in the weights of finished parts in a 2-10-2 type locomotive, accomplished by the use of special steels, may very easily be made to exceed 4000 lb. and in a Pacific type locomotive 2000 lb., both of these figures including the saving made by reducing the weight of the counterbalances. The use of hollow axles alone in a 2-10-2 type locomotive would save in the neighborhood of 1000 lb. Aside from other considerations the value in a direct way of the saving effected by the substitution of alloy steel for carbon steel in the piston rods, crossheads and pins, side rods, crank pins and valve gear, and the use of hollow driving axles, will be readily seen when it is considered that the resultant reduction in weight would permit an additional weight in the boiler which would add fully 2 in. to its diameter. Moreover, the increases in power which are being made in American locomotives should prompt designers to look into the future, when it may be necessary to use these special steels in other parts than those named, in order to keep the weight within reasonable limits.

The Ferguson Steel & Iron Company, Buffalo, believing that in order to produce the greatest efficiency in the employee some recreation is necessary, has constructed on the ample grounds at its works tennis and handball courts, besides providing for facilities for baseball. The general appearance of the grounds has been greatly improved by the installation of these recreation adjuncts.

Improved Lifter for Oil Tank Switches

The line of tank lifting arrangements for oil switches of various forms and sizes built by the General Electric Company, Schenectady, N. Y., has been increased by the addition of one designed for switches having a capacity up to 1500 amp. The first of these devices, which was designed for comparatively small switches, was illustrated in THE IRON AGE, July 22, 1915. This is operated by a lever arrangement, while the one that has just been developed uses a worm gear and two cables to lift the tank the entire distance between the switch frame and the floor or to lower it.



An Improved Form of Lifting Device for Oil Switch Tanks Employing Two Triangular Supports Controlled by Cables and a Worm Geared Handle

When it is desired to remove a tank, the lifting device is placed on the frame of the switch and fastened in place by turning two wing nuts. When the operating handle is turned it operates through a worm and worm gear to turn the bar on which the lifting cables are wound. The movement of these cables causes the two triangular supports for the tank, which ordinarily are a short distance below it, to bear against the bottom of the tank so that it can be easily lowered to the floor or any desired intermediate position as soon as the fastenings are loosened.

By moving the pulleys over which the cables run slightly forward or back it is possible to adapt the lifter for various sizes of the switch. When the tank that is to be handled is smaller than the one previously put in place, the pulleys are moved forward while for a larger tank the motion is, of course, reversed.

New Boiler Wall Coating

A new boiler wall coating has been placed on the market by the H. W. Johns-Manville Company, Madison Avenue and Forty-first Street, New York. This covering, which is known as J-M Aertite, forms a tough rubbery coating or blanket over the entire boiler setting, which, it is explained, remains tight on account of its adhesive and ductile qualities, thus preventing air infiltration. The material is applied by troweling and the thickness of coating recommended is 1/16 in., from 25 to 40 lb. being required to cover 100 sq. ft., depending on the number and variety of cracks and the manner in which the wall has been pointed up. In a test made at a large boiler plant in New York it was found that by the application of this coating the amount of CO_2 was increased 2¼ per cent after the flue gases had passed the first baffle and 16.4 per cent after they had passed the second baffle.



The Proposed San Francisco-Oakland Bridge

Cost: $22,000,000. Length: 5½ miles, in 87 spans, 60 of them 250 ft. long and two of them 600 ft. long. Two Decks: Three roadways on upper, two for slow-moving trucks and one for high-speed automobiles; four electrified railroad tracks on lower, two for overland trains and two for interurban trains. Provision is made for the passage of ships by high spans near the San Francisco shore, which ships will go under, and by two movable spans. Maximum grade on the bridge is 2½ per cent.

It is proposed to organize a bridge district of the counties of San Francisco and Alameda, which would build the bridge and charge a toll for its use sufficient to pay the interest on the bonds and to maintain it. Over 40,000,000 persons are carried across the bay every year by the ferries. The site of the bridge is generally shallow and is said to be beyond 95 per cent of the present shipping. Quicker transportation across the bay without danger due to the daily fogs is a factor in the demand for the bridge.

Plans have been under preparation one year. Chambers of Commerce of the Bay Cities have been investigating project over four months. Plans are now in hands of Federal Government for approval; a board of Army engineers has been appointed by Secretary of War to investigate the plans, and a public hearing by Army engineers will be held in San Francisco and Oakland Aug. 15 to 18. The engineers are Wilbur J. Watson & Co., Cleveland; William Russell Davis, Albany, N. Y., and Harlan D. Miller, New York.

BRITISH SHELL FACTORY

Typical of Several Plants, Privately Managed but Government Owned

Great Britain has provided for several large-scale projectile-making factories, built with government money but designed, equipped and operated each by a private company which has achieved distinction as a manufacturer. These plants are supplementary to the government arsenals and the old-established private munitions works. They receive steel in the form of billets and forge and machine shells therefrom. They are not concerned with the loading of the shells nor with the making of the fuses, but do make the steel noses, which are screwed into the ends of the shells. One of the plants is described in a general way in *The Engineer*, of London, which says that nine-tenths of the battle in the manufacture of modern artillery projectiles is the production of the steel shells. From this article are taken the following notes:

There is no reason why a shell should not be completely machined on a single lathe. Such a lathe, however, would not be a simple machine, for it would require to have as many adjustments as there are operations to perform on the shell. None but a skilled workman with long training could readily learn to operate it. The machine tool makers and other engineering firms set to work to produce specialized shell lathes. Instead of designing and making a lathe capable of performing the fourteen or so operations required on a shell they constructed fourteen different types of machine, each of which was specialized to do a single one of the operations and no more. The simplification of the mechanism in each case was carried to a truly remarkable degree, and as a result girls and others with no previous acquaintance with the inside of an engineering factory could be taught to use the machines efficiently in anything from a fortnight to a month.

The factory is really in two parts. At one place the shells are rough-shaped by forging. They are then taken on railroad cars to the second part of the factory about a mile or so away, where they are machined to shape and size, bored internally, screwed at one end for the nose pieces, varnished inside and painted outside.

The factory when visited was engaged on the production of 60-pounder high-explosive shells. The raw material as received consists of billets of steel some 4½ in. square, 15 in. long, and weighing about 80 lb. The steel has a breaking load of about 90,000 lb. per square inch. The billets arrive on a siding shown in the general plan of the shop. Three overhead electric traveling cranes command the billet yard and powerful electric magnets are used for handling, sometimes five billets at one time by each crane.

The billets are deposited on steel plate tables at the furnaces, which are of the continuous type with hydraulic pushers. The fuel used is coal and the coal is gasified within the furnace itself, the billets being heated by the combustion of the gas and not by the actual combustion of the coal.

THE FORGE SHOP

A row of hydraulic forging presses is arranged down the center of the forge shop. Each furnace serves a separate press. From a point above the furnace outlet door to a point on the press structure a stout wire rope is stretched. On this runs a pulley from which a chain depends. To the chain a pair of tongs is attached. The white hot billets can thus be readily and quickly, one at a time, pulled out of the furnace and carried over to the press. On the way across any scale formed on the surface of the billet is knocked off with pointed bars of steel. The corners of the billet as received are rounded off so that the length across the diagonals is about equal to the diameter of the forging.

The hydraulic presses are worked by water under a pressure of 1200 lb. per square inch. They are of the vertical type and consist of a bed-plate upon which four pillars are erected. The main hydraulic cylinder, which does the forging work, is inverted and carried by these four pillars. The bed-plate also carries a pair of guides upon which there runs a carriage carrying two large steel pots, within each of which is placed a steel mold or container. The carriage with these pots is moved to and fro on the guides by a horizontal hydraulic cylinder. Each pot alternately can thus be brought under the forging cylinder.

At each end of the bed-plate a small vertical hydraulic cylinder is sunk into the ground. The rams of these cylinders are used to eject the finished forgings from the mold in which they have been formed. While one billet is being forged the preceding one is being ejected.

The ejector ram when it rises enters a hole in the bottom of the pot. Rising farther it enters a similar sized hole in the bottom of the container or mold. This hole just fits the diameter of the ejector ram and is smaller than the diameter of the finished forging. In section, therefore, the container or mold shows a round bore of diameter equal to that of the forging and carried to a depth which exceeds the length of the untouched billet by a short amount. At the foot of this bore comes another one of smaller diameter, equal, in fact, to that of the ejector ram. On the circular step thus formed a round plate rests loosely. This supports the bottom of the billet while it is being forged, and can rise on the top of the ejector ram when the billet is forced out of the mold.

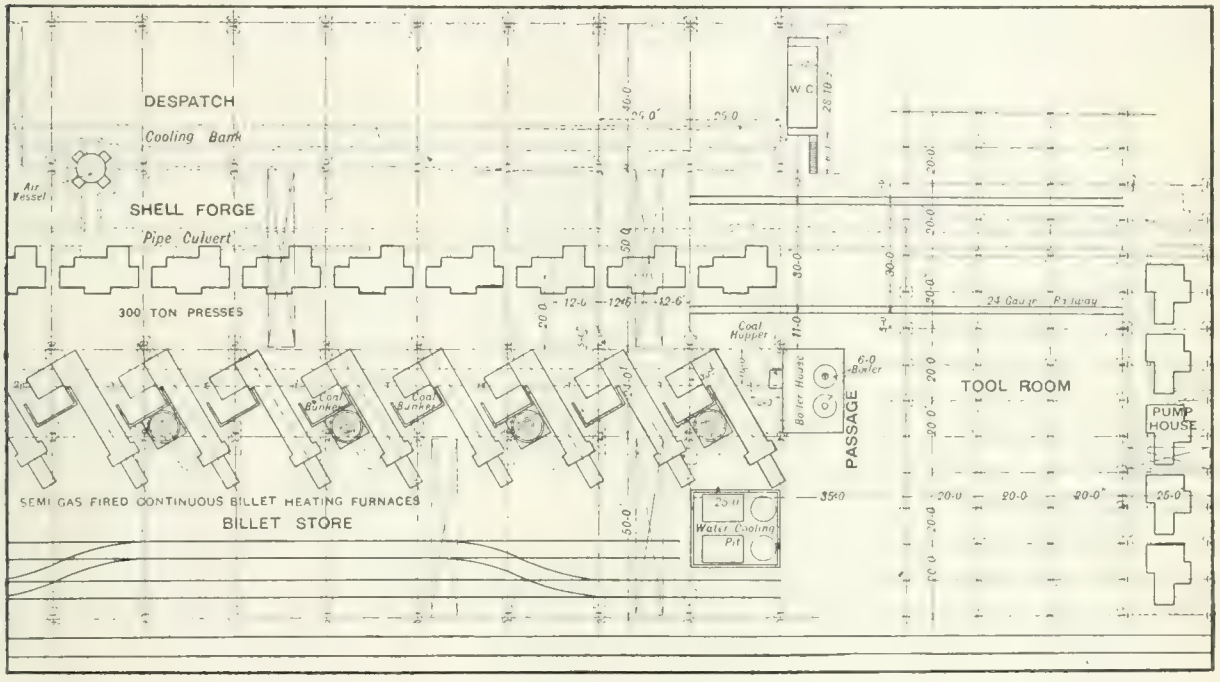
There are two of these punches on each press. These two punches are mounted on a slide which can be moved in a direction at right angles to the guides on which the pots run. Just as these pots are brought alternately beneath the forging cylinder, so, too, are the punches. The two punches are so connected that they move in unison. Thus, when punch *A* is being forced by the ram of the forging cylinder into the billet punch *B* is also descending. In so descending it passes into a pot of water where it is cooled. It is then ready to be moved across into the forging position and to deal with the succeeding billet. It will thus be seen that while one billet is being forged the preceding billet is being ejected and the succeeding billet being got ready in position. Simultaneously, the punch for the succeeding billet is being cooled.

To permit the punch to be withdrawn from the shell without dragging the shell out of the mold, two bars are fixed across the top of the pot at a distance apart which will permit the container or mold to pass between them as is required when the mold has to be replaced. When the forging is over, except for the withdrawal of the punch, a V-shaped block of steel is slipped beneath these bars. The limbs of this block pass on either side of the punch. The bottom surface of the block rests on top of the mold and overlaps the lip of the shell. With this block inserted, the punch can be withdrawn, the block and the bars meanwhile holding the shell down.

FIRST INSPECTION

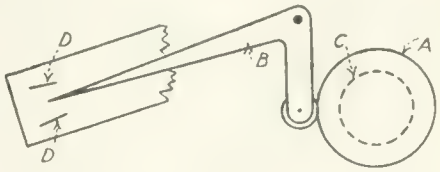
An interesting mechanical device is in use to assist in the inspection process. It is intended to detect any shells which have been forged eccentrically. The device is outlined in the accompanying sketch; *A* is the end of the shell and *B* is a lever, one arm of which is provided with a roller which rests on the surface of the shell at a point near its closed end. The other arm of the lever is a pointer. The shell is slipped over a power-driven spindle *C*, which just fits its bore. When it is rotated the end of the pointer must not pass outside two gage marks *D* inscribed on a board fixed behind the pointer. If it does, the shell is too eccentric to be passed. The eccentricity is thus examined at the closed end of the shell. If there is any eccentricity it will be most marked at this point. The device enables a large number of shells to be inspected in a very short time.

The containers, the punches and other parts of the presses have frequently to be renewed. The renewals are made and carried through by the staff of the tool room, the location of which is shown on the plan. Beyond the tool room is the pump house, which supplies the pressure water used by the forging presses. Here are to be found some electrically driven pumps, each with three rams and all delivering into an accumulator. The current to the motors driving the pumps is controlled automatically in such a way that as the demand for water increases or decreases more and more of the pumps start or stop working.



Plan of One of Several Government Owned but Privately Managed Shell Forging Plants in Great Britain

Both male and female labor are employed in the tool room. The portions of the presses actually coming into contact with the hot billets require very frequent renewal, particularly so in the case of the punches and their components. Arrangements have therefore been made for the production of these articles on the principle of specialized working and the greater part of this work is carried out by women. The renewal of parts of the valves, however, and other delicate adjuncts of the presses remains in the hands of skilled male workers, who are also responsible for the management of the workshop and the instruction of the women.



Device for Testing Eccentricity of Shells

The Passing of the Acid Bessemer

Phases of Its Career in the United States and Great Britain — Ores an Important Factor—The Passing Is Gradual

— BY H. H. CAMPBELL

THE acid Bessemer process was invented in 1856, but the first results in the hands of practical iron masters were far from successful, and it was left to Bessemer himself, not only to find the cause of failure, but actually to build a works and prove the merit of his invention. It is this complete dominance of the situation that puts him head and shoulders above other claimants for the honor of bringing about a revolution in the art of making steel.

Between 1860 and 1865 rapid progress was made in Great Britain, and converters were started in Germany, France, Belgium, Austria and the United States. By 1870 the process was firmly established and during the next ten years there was a rapid increase in the production; but the nations of central Europe labored under a great handicap in being forced to send to Spain, Algeria and Elba to get ore which would give a suitable pig iron. So when in 1878 the basic Bessemer appeared on the scene, it was immediately put in operation in both Germany and Belgium and a few years later in France.

For a long time these three countries did not collect records showing how much metal was treated in the acid and how much in the basic vessel, so no figures can be given of the early history of acid Bessemer steel on the continent. From a general point of view, however, it may be said that after 1880 no new acid works were built in Germany, Austria, France or Belgium, although many existing works continued to operate, while some increased their rate of production, but to-day Russia is the only large producer on the continent. In Germany in 1913 only 1 per cent of the steel output was made in the acid converter; in France and Austria only 2 per cent. Belgium does not keep separate records for acid and basic steel, but it is known that most of the product comes from the basic converter. Great Britain and the United States lead in making acid Bessemer steel and it may be well to give a few facts about the development of the process in those two countries.

WANING OF BRITISH ORES

In 1870 Great Britain was first in the list of steel producers, this being natural because the Bessemer process was first operated there and because England alone of all the leading European nations possessed a large supply of pure ore; for on the West Coast near Barrow-in-Furness in the counties of Cumberland and Lancashire there are several beds varying from 50 to 68 per cent in iron and giving a pig iron containing about 0.04 per cent of phosphorus. Half a century ago there was no special demand for pure ore and there was only a limited output in this district; but after the advent of the Bessemer process the mines on the West Coast became very important. The ore was shipped to southern Wales and the pig iron to Sheffield and to foreign countries, thousands of tons coming to the United States, where it formed the basis of our early steel industry. Of course, these conditions created great activity in Cumberland and Lancashire and the production of ore rapidly increased. In 1860 the output was 990,000 tons, while in 1870 it was 2,093,000 tons. The maximum was reached in 1882 when 3,136,000 tons was mined; but since then the output has decreased owing to the exhaustion of the mines, so that to-day it is only about half what it was 35 years ago.

BRITISH IMPORTS OF BESSEMER ORES

Before 1860 no foreign ore was brought into Great Britain and in 1870 only 400,000 tons was imported, which would account for less than 4 per cent of the total output of pig iron at that time. Imports have been steadily increasing ever since and in 1913 they amounted to 7,442,000 tons, which would account for over 38 per cent of all the pig iron produced. But leaving out of consideration all material high in phosphorus, we find that in 1870 only 15 per cent of the Bessemer pig iron produced in Great Britain was made from imported ores and 85 per cent from West Coast hematites; in 1882 the proportion was just half and half; while in 1913 Cumberland and Lancashire furnished only 24 per cent of the low-phosphorus ores used in the Kingdom, the remaining 76 per cent coming from abroad, most of it from Spain.

SPANISH ORES IN GREAT BRITAIN

As soon as the importance of the Bessemer process was realized, men turned to Spain for a supply of pure ore, because the deposits in the Province of Viscaya had been known to all the world for 20 centuries. It took a long time to develop a system of transportation and in 1870 every ton of ore was hauled from the mines in ox carts, while as late as 1881 over 700,000 tons was transported more than a mile over bad roads by this primitive conveyance. Even when tidewater was reached there were troubles, for only small vessels could cross the bar at the harbor of Bilbao, which was the chief shipping port. Political conditions were intolerable in Spain at that time and from 1872 to 1876 there was civil war, the city of Bilbao being besieged for five months.

Notwithstanding these difficulties, exports increased and in 1878 they amounted to 1,225,000 tons, three-quarters going to the British Isles. In 1913 Great Britain imported 4,714,000 tons of ore from Spain, which accounted for 60 per cent of the output of Bessemer pig iron. It should be said, however, that the greater portion of the iron made from Spanish ore is used in acid open-hearth furnaces, the West Coast hematites making a large proportion of the British acid Bessemer steel.

EARLY BESSEMER WORK IN THE UNITED STATES

Bessemer steel was made at Wyandotte, Mich., in 1864, and at Troy, N. Y., in 1865; but operations were not carried on regularly and commercially until after the Steelton plant was built in 1868, so that as late as 1870 the whole country made only 37,000 tons of Bessemer steel. It must be remembered, however, that while Europe was building converters, we were engaged in civil war and for

four years the destruction of capital and the loss of life in proportion to our wealth and population at that time were greater than the waste of money and of life in the European maelstrom to-day.

For a long time the pig iron used at Steelton was brought from the west coast of England and mixed with iron from Cornwall, Pa., but blast furnaces were built in 1872, which used a large proportion of anthracite as fuel and smelted the low-phosphorus magnetites of Cornwall, only 30 miles away, and a smaller amount from New Jersey. For many years every nook and corner of the earth was ransacked for suitable ore, and somewhere about 1884 the yard at Steelton contained at one time minerals from 26 different localities, including Pennsylvania, New Jersey, New York, Virginia, North Carolina, Spain, Algeria, Elba, Cuba, Ireland and the Grecian Archipelago, besides other places whose names have slipped away from recollection.

It may not be uninteresting to put on record that the Pennsylvania Steel Company started a chemical laboratory in 1869 and that it was in regular operation in 1870, with Andrew S. McCreath, now of Harrisburg, as chemist. This probably was the first fully equipped laboratory at any iron plant in the United States.

LAKE SUPERIOR ORES

All this time it was well known that there were vast iron deposits in Michigan, but transportation on the Lakes was crude and expensive, so that it was not until 1880 that as much as 2,000,000 tons of ore was mined on Lake Superior, while not until 1886

Production of Steel in the United States and Great Britain

	Total Steel, Thousand Tons		Acid Bessemer, Thousand Tons		Per Cent of Total Output	
	United States	Great Britain	United States	Great Britain	United States	Great Britain
1880.....	1,247	1,375	1,074	1,034	86	75
1890.....	4,277	3,679	3,689	1,613	86	44
1900.....	10,188	5,001	6,685	1,254	66	25
1910.....	26,094	6,374	9,413	1,138	36	18
1913.....	31,301	7,664	9,546	1,049	30	14
1914.....	23,513	7,835	6,221	797	26	10
1915.....	32,151	8,351	8,287	821	26	10
Five year averages:*						
1903 to 1907	19,036	5,572	10,267	1,286	54	23
1909 to 1913	27,256	6,635	9,313	1,033	34	16

*1908 and 1914 are omitted from these averages because these years were abnormal general financial conditions.

was 2,000,000 tons taken to Lake Erie. From that time to this the flood has been rising until in 1913 the output of Lake ores was 49,947,000 tons, which would make more pig iron than all the ore mined in Great Britain, Germany, France, Austria and Belgium combined.

Speaking roughly, about half of this ore will give a pig iron fit for the acid converter. In 1906 about 13,000,000 tons of Bessemer pig iron was made from Lake ores, which was more than half the total output of low-phosphorus iron in the whole world. In that year the United States made 12,276,000 tons of acid Bessemer steel, which is five times as much as has ever been made in one year either before or since by all the rest of the world put together.

DECREASE IN OUTPUT OF ACID BESSEMER STEEL

The accompanying table gives the production of acid Bessemer steel in Great Britain and the United States at different periods during the last half century. In Great Britain a maximum was reached about 1890 and the output has been decreasing ever since, there being a sharp decline in the last few years.

In the United States, on the other hand, there was a steady increase in production from the beginning until 1906 when the maximum output was recorded. From that time there has been a tendency to increase the output of the open-hearth furnace and to push the converter into the background. It is not fair to draw conclusions from the record of any single year; so an average has been taken of two recent five-year periods, two abnormal years being omitted.

The first period runs from 1903 to 1907 and the second from 1909 to 1913. During this time the total steel output increased 43 per cent, but the production of Bessemer steel decreased 9 per cent. If any process is holding its own, it ought to make from year to year the same proportion of the total output, and measured by this standard the converter has been losing ground for many years, as shown by the table herewith, which gives the production of Bessemer steel in per cent of the total output during the last 15 years:

Production of Bessemer Steel in the United States in Per Cent of the Total Steel Output

	Per Cent		Per Cent		Per Cent
1901.....	65	1906.....	52	1911.....	34
1902.....	61	1907.....	50	1912.....	33
1903.....	59	1908.....	44	1913.....	30
1904.....	57	1909.....	39	1914.....	26
1905.....	55	1910.....	36	1915.....	26

Both the tables here given show that as the years go by the acid converter is making a constantly decreasing proportion of our steel and this is the yardstick we unconsciously use in measuring the relative importance of different processes. We say, for instance, that the basic open-hearth has supplanted the acid furnace, because basic furnaces in 1915 turned out 16 times as much steel as the acid hearths; and we rightly ignore the fact that the acid furnaces in that year produced three times as much metal as they did in 1890 when the basic furnace was just getting under way. Thirty years ago it was firmly believed by many that the old crucible process would be displaced by the open-hearth furnace, but in 1915 this country made twice as much crucible steel as in 1880 and more than three times as much as in 1875. This sounds rather strange until we say that in 1880 crucible steel formed over 5 per cent of our total output, while in 1915 it was only one-third of 1 per cent.

SURVIVALS

All around us are examples of what the naturalists would call "survivals." Thus, when the acid Bessemer process was developed half a century ago it was said that "the death knell of the puddling furnace had been sounded"; and a belated requiem was again sung over its grave when the basic open-hearth furnace came upon the scene. Yet the United States to-day is making twice as much wrought iron as it did in 1870.

We say that charcoal pig iron belongs to a bygone age; but the output of our charcoal blast furnaces in 1915 was nearly twice what it was at the time of our Civil War. The maximum was reached as late as 1890, when 628,000 tons was produced, this being twice as much as was made in 1854. The case, however, has a rather different aspect when we say that in 1854 the output of charcoal pig iron was 47 per cent of our total tonnage, while in 1915 only 1 per cent of our blast-furnace product was smelted with charcoal.

So in 1906 the United States produced 95,000 tons of charcoal blooms and as late as 1880 we made 36,000 tons direct from the ore in the old Catalan hearths, which possibly is as much as was made in Noricum and Catalonia in the days of Julius Caesar. Old methods die hard and no one

alive to-day will see the total abandonment of the acid converter. We cannot yet write the final chapter of its history; but we can say that it made possible our modern railroads, which could never have reached their present development with wrought-iron rails. It created the Age of Steel and during the last half century has been one of the most potent factors in reconstructing our world.

Greatest Year in Iron and Steel Exports

Values, Including Machinery, Were 180 Per Cent Above Those for 1915—A Two-Years' Record

WASHINGTON, D. C., Aug. 8, 1916.—The fiscal year ended June 30, 1916, has made a record for exports of iron and steel that far overtops any previous fiscal twelvemonth in the history of the industry, according to the official statistics of the Bureau of Foreign and Domestic Commerce. The total shipments of iron and steel products on a basis of value rose fully 180 per cent over 1915 and more than 100 per cent over the high record of 1913. Tonnage commodities for the year 1916 exceeded by 143 per cent the figures for 1915 and by 93 per cent the record total for 1913. Shipments of machinery gained nearly 100 per cent over 1915 and 40 per cent over the high-water mark of 1913. Exports of machine tools for 1916 surpassed by 118 per cent the record for the corresponding period of 1915, which, in 1915, but declined 6 per cent as compared with the unprecedented total of May of this year.

The value of all shipments of iron and steel products in June, 1916, was $76,257,884 as compared with $31,757,103 for the same month of 1915 and $18,927,958 for June, 1914. The highest previous record for exports of iron and steel was made in May of this year when the total was $72,918,913. For the fiscal year 1916 the total was $621,209,547 as compared with $225,888,358 in 1915 and $304,605,797 in 1913, the record fiscal year for iron and steel exports.

The exports of iron and steel, for which quantities are given, aggregate 527,542 gross tons in June, 1916, as compared with 355,829 tons for the same month of 1915. The record for these exports was made in May

Exports of Machinery for June and for Fiscal Years Ended June 30, 1915 and 1916

	June		Fiscal year	
	1915	1916	1915	1916
Adding machines	$24,220	$117,972	$448,536	$1,074,299
Air-compressing machinery	43,746	84,354	386,520	574,396
Brewers' machinery	21,992	106	124,769	28,726
Cash registers	138,275	129,676	1,371,053	1,144,350
Parts of	14,860	9,777	116,633	118,545
Cotton gins	3,612	3,876	45,048	65,721
Cream separators	25,288	32,636	214,632	488,984
Elevators and elevator machinery	56,506	127,054	808,973	1,494,411
Electric locomotives	71,218	17,681	324,478	454,544
Gas engines, stationary	28,311	21,214	419,819	352,299
Gasoline engines	407,271	1,565,383	4,339,316	11,898,531
Steam engines	139,992	185,727	2,710,782	13,501,320
All other engines	67,363	664,716	794,361	3,463,036
Parts of	382,098	866,222	2,956,103	7,273,523
Laundry machinery, power	19,681	35,070	277,019	295,018
All other	20,564	13,460	217,224	252,723
Lawn mowers	27,370	26,341	291,507	201,258
Metal-working machinery (including metal-working tools)	3,735,562	8,465,985	28,162,968	61,315,032
Meters, gas and water	20,648	32,045	300,072	290,499
Milling machinery, flour and grist	163,687	323,919	1,437,968	2,749,734
Mining machinery, oil well	102,354	148,456	1,888,347	1,332,246
All other	453,656	518,593	4,408,810	6,241,333
Paper-mill machinery	30,225	36,601	706,939	858,234
Printing presses	173,589	206,955	1,431,070	1,647,998
Pumps and pumping machinery	289,685	494,104	2,539,693	4,718,185
Refrigerating and ice-making machinery	68,920	31,591	636,664	686,918
Sewing machines	564,125	426,431	6,223,521	5,422,182
Shoe machinery	75,880	83,713	1,193,212	1,266,221
Sugar-mill machinery	169,738	397,801	2,092,016	5,987,491
Textile machinery	118,280	369,767	1,525,644	2,705,827
Typesetting machines	21,559	77,714	664,349	884,021
Typewriting machines	793,770	1,114,025	5,315,134	9,104,189
Windmills	62,892	105,888	709,697	1,087,964
Wood-working machinery, saw mill	30,268	31,135	316,814	360,688
All other	81,464	56,649	679,738	1,076,845
All other machinery and parts of	1,818,312	3,068,543	17,773,245	31,971,774
Total	$10,266,981	$20,541,139	$93,863,694	$182,677,065

turn, exceeded by more than 100 per cent any previous fiscal year.

The month of June, 1916, proves to be the banner month of an extraordinary year on a basis of the value of the exports of iron and steel products, although as compared with the phenomenal record of May there was a slight shrinkage in quantities. The total shipments of iron and steel during June gained 140 per cent in value over the same month of 1915 and 4½ per cent over the unbeaten total of May, 1916. Tonnage commodities in June gained 50 per cent over the same month a year ago, but declined 2.4 per cent as compared with May of this year. Exports of machinery rose 100 per cent as compared with June, 1915, but show a shrinkage of 6 per cent as compared with May of this year, when high-water mark was reached. Exports of machine tools gained 118 per cent over June, of this year when the total was 540,591 gross tons. The total for the fiscal year 1916 was 4,862,154 gross tons as compared with 2,003,798 tons in 1915 and 3,008,498 tons in the record year of 1913.

EXPORTS OF MACHINERY

Exports of machinery in June, 1916, were valued at $20,541,139 as compared with $10,266,981 for the same month of 1915 and $9,204,575 in June, 1914. Shipments of metal-working machinery aggregated $8,465,985 as compared with $3,735,562 for the same month a year ago, and $9,935,806, the high record of May of the present year. Exports of machinery of all kinds for the fiscal year 1916 were valued at $182,677,065 as compared with $93,863,694 in 1915 and $130,554,379, the record total, in 1913.

Details of the exports of machinery for June, 1915,

and June, 1916, and for the two fiscal years are given in the preceding table.

EXPORTS OF TONNAGE IRON AND STEEL

The following table shows the exports of tonnage iron and steel in June and for the fiscal year ended June, 1916, as compared with 1915, all in gross tons:

	June		Fiscal Year	
	1915	1916	1915	1916
Pig iron	22,111	48,770	130,594	286,399
Scrap	7,280	15,867	29,830	154,709
Bar iron	2,273	6,056	12,345	70,519
Wire rods	18,137	18,045	98,441	171,528
Steel bars	58,453	61,017	232,953	625,138
Billets, ingots, etc.	48,999	116,425	220,416	962,228
Bolts and nuts	1,458	2,156	13,486	30,844
Hoops and bands	2,009	4,007	15,097	41,256
Horseshoes	2,956	1,369	13,017	13,126
Cut nails	416	372	2,643	4,420
Railroad spikes	603	2,099	5,487	26,405
Wire nails	10,181	17,187	55,472	128,762
All other nails, including tacks	1,266	1,067	5,455	9,634
Cast-iron pipes and fittings	5,056	5,879	62,390	52,617
Wrought pipes and fittings	15,064	12,161	117,695	125,628
Radiators and cast-iron house heating boilers	206	193	2,669	2,263
Steel rails	34,547	49,772	156,587	541,810
Galvanized iron sheets and plates	9,913	9,904	54,955	79,400
All other iron sheets and plates	1,239	4,048	9,526	42,631
Steel plates	22,530	18,662	124,611	271,280
Steel sheets	8,973	9,569	96,322	98,456
Structural iron and steel	22,812	25,034	168,624	276,866
Tin and terne plates	8,024	29,751	80,456	230,473
Barb wire	22,787	37,499	147,591	364,244
All other wire	28,536	30,333	147,136	251,518
Total	355,829	527,542	2,003,798	4,862,154

TWO YEARS' EXPORTS OF IRON AND STEEL AND MACHINERY

Inasmuch as the past two fiscal years coincide almost exactly with the period of the European war the following table, showing the export movement of iron and steel products by months, will be of special interest:

1914	Total Values	Tonnage Iron and Steel, Gross Tons	Total Machinery	Machine Tools
July	$16,737,552	114,790	$8,060,614	$810,217
Aug.	10,428,817	86,598	4,759,663	298,259
Sept.	12,531,102	96,482	5,295,167	550,106
Oct.	16,455,832	147,293	6,623,539	2,110,397
Nov.	15,689,401	140,752	6,204,927	1,871,171
Dec.	14,939,613	116,816	6,372,041	2,432,331
1915				
Jan.	18,053,421	139,789	7,676,078	2,903,740
Feb.	16,470,751	144,553	7,936,467	2,523,722
March	20,551,137	174,269	10,053,895	3,863,913
April	20,639,569	223,242	10,399,716	3,300,953
May	26,536,612	262,755	10,214,062	3,762,567
June	31,757,103	355,829	10,266,981	3,735,562
July	35,891,575	368,893	11,412,623	3,872,358
Aug.	37,726,822	401,298	11,439,391	3,624,411
Sept.	38,415,180	381,317	12,277,389	3,256,973
Oct.	43,602,741	351,128	15,239,415	3,236,079
Nov.	48,056,220	362,765	15,838,119	4,644,713
Dec.	45,825,277	354,109	13,328,450	3,205,788
1916				
Jan.	51,643,807	357,121	14,324,426	3,249,595
Feb.	54,155,386	368,820	13,945,347	4,662,905
March	58,300,297	438,150	16,243,981	6,501,022
April	58,722,411	384,920	17,526,899	6,552,397
May	72,918,913	540,591	21,984,961	9,935,806
June	76,257,884	527,542	20,541,139	8,465,985

IMPORTS OF IRON AND STEEL

Imports of tonnage iron and steel in June amounted to 26,888 gross tons as compared with 31,610 tons for the same month of 1915. Imports for the fiscal year 1916 were 309,051 gross tons as against 251,251 tons for the same period of 1915. The following table shows the imports of tonnage commodities for June and for the fiscal year 1916 as compared with 1915, all in gross tons:

	June		Fiscal Year	
	1915	1916	1915	1916
Ferrosilicon	386	536	6,608	5,469
All other pig iron	9,895	13,360	103,755	112,718
Scrap	2,833	3,868	32,667	96,012
Bar iron	664	1,251	10,284	8,241
Structural iron and steel	14	279	5,539	1,581
Hoop and band iron	....	....	648	1
Steel billets without alloys	1	254	1,777	11,325
All other steel billets	127	1,953	22,764	12,630
Steel rails	17,046	4,711	52,092	53,944
Sheets and plates	101	91	2,565	1,709
Tin and terne plates	75	91	4,751	802
Wire rods	468	494	4,801	4,619
Total	31,610	26,888	251,251	309,051

It should not be assumed that because the export statistics for June of this year show a decline in tonnage commodities and in the value of machinery that the peak of the war export movement has been reached. This may or may not be true. War orders undoubtedly are declining in volume, but deliveries are still increasing and the shrinkage in June as compared with May is attributed by experts here entirely to freight embargoes and to the impossibility of securing adequate ocean transportation. W. L. C.

Nitric Acid and Nitrates from Blast-Furnace Slags

Referring to the efforts made from time to time to utilize blast-furnace slags, with little material outcome apart from slag wool and cement, E. Kilburn Scott of London says that the time has arrived for pig-iron makers to consider the problem seriously. In a paper in the *Journal* of the West of Scotland Iron and Steel Institute on "Synthetic Nitric Acid in Connection with the Utilization of Slags and Waste Gases," Mr. Kilburn offers the following proposal:

The scheme is primarily intended to utilize the aluminous blast-furnace slag of the Cleveland district, but it only needs slight modification to deal with slags of other districts. Aluminous blast-furnace slag contains about 33 per cent of lime and 25 to 27 per cent of alumina, and when just tapped from the furnace it also contains a large amount of heat.

The problem of utilizing this heat has already been solved. In 1914 W. L. Johnson read a paper before the Iron and Steel Institute giving details of a method used at Bell Bros. Works, Port Clarence, by which 1017 lb. of steam was produced per ton of slag. After deducting 6.6 per cent for escape with the incondensable gases and allowing another 10 per cent loss, he estimated that there was 855 lb. of clean steam available per ton of slag. Assuming 27 lb. of steam per horsepower with a vacuum of 28½ in., a modern exhaust steam turbine should therefore give 31.6 hp. per hour per ton of slag per hour.

Of course the energy could be sold to a power company or utilized in other ways, but we feel most strongly that the best way to utilize it is to make nitric acid from the air by the direct electric process. We specially advise this because with the nitric acid so produced the slag can be still further utilized.

One interesting feature in the process of raising steam from slag is that it becomes granulated, and this makes it very easy to be acted on by nitric acid. The result of such action is a mixed nitric solution, chiefly of alumina and lime. After a separation from silica, the alumina in the solution can be precipitated by milk of lime, and when purified by known methods is ready for use for the manufacture of aluminum. At the same time the acid used in dissolving the slag is obtained as calcium nitrate, and after treatment to reduce its hygroscopic properties it becomes a rich fertilizer. The gelatinous silica obtained from the treatment of the slag may be added to act as a useful diluent.

Electric and Crucible Steels in Germany

The production of electric and crucible steels in Germany, as affected by the war, presents an interesting contrast. The following table presents the official figures in metric tons for various periods:

	Electric Steel, Per Month	Crucible Steel, Per Month
August, 1914	2,810	8,124
1913	8,479	8,264
1914	7,445	7,924
1915	10,804	8,337
January to June, 1916, five months	14,075	8,780

The increase in the output of electric steel to a present rate per month of five times what it was when the war broke out is in decided contrast with the crucible steel output which at present is not greatly in excess of the rate in 1913.

Lignite as a fuel in an electric station has given highly economical results according to *Engineering* of June 30. At the Weiswiller station, near Acken, Germany, lignite of about 2700 B.t.u. per pound, and with 64 per cent moisture is burned directly on the boiler grates. About 4 kg. or 8.8 lb. of lignite are used per kilowatt-hour generated. Ten tons of lignite is valued at 10.85 marks so that the fuel cost on this basis works out at about 0.1 cent per kilowatt-hour. Other charges amount to 0.135 cent per kilowatt-hour, making the cost of electric energy roughly 0.2 cent per kilowatt-hour.

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THE IRON AGE

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Capital Tied Up in Steel

When manufacturers who commonly discount their bills become payers of interest on their material accounts, it is reasonable to conclude that their capital is well engaged. A diminished margin of profit may be an explanation, particularly if it has proved impossible to bring up prices of manufactured articles as rapidly as some of the major raw materials have advanced. But the situation is very largely due to the temporary exhaustion of liquid capital because of the larger investment in materials. The effect is cumulative all along the line, and many buyers find it difficult to keep out of the slow pay class. Some few appear as willing to buy credit from the seller as from the banker, from whom, indeed, they may also have borrowed.

For some time it has seemed clear that a good many manufacturing consumers of iron and steel have gathered ample stocks of raw materials. In the early part of the second quarter of this year and just before, there was a rush to cover. This was not only for normal demands for the late months but for an extra amount which conditions indicated might be moved, and also to secure protection against the price advances, which were then quite uncertain. Though the quantities of material awaiting manufacture may be only the normal, the amount of money tied up is often nearly double the normal. Commitments involved in the far-forward specifications of the excited buying period tend at times to aggravate the situation. Deliveries against these may be made when least expected and for what is not in immediate demand, and on top of it all high prices check general buying by manufacturing consumers. There have been cases lately in which consumers with comfortable stocks have asked the mills to delay shipment, thus to minimize obligations. Meanwhile, the mills interpose no objection, as the export demand is so heavy and so broad as to give work to practically every steel producer.

It is thus a situation in which with his forced stock accumulation and its capital charge, the average consumer limits his present specifications as much as possible. He has shared in the general belief, obtaining up to this week, that contract steel prices were not likely to go higher, and is apparently not yet convinced that the volume of offerings from the other side is sufficient to cause fresh advances. At the same time there is evidence that Europe wants more steel for early delivery than the mills can entertain, at least if they reserve the average amount for estimated domestic wants. But until home consumers are moved again by fear of further advances, as in the early months of the year, and can discover signs of a better demand from their own customers, it is not likely they will call for the maximum amounts on their steel contracts, with all that these would involve in additional financing.

Meanwhile, on the more complicated question of providing for what they will need in the first half of 1917, they are willing to let events shed more light.

Steel a Product of Pig Iron

While a statement that steel is made from pig iron may appear to refer to a quite elementary fact, it should be observed that a not uncommon view is that open-hearth steel is made from scrap and pig iron. There is a large production of works scrap, chiefly by cropping, and it has been said that if a method were adopted whereby a sound steel ingot would be produced, necessitating a crop of not more than 5 per cent, the duplex steel-making process would come at once into general vogue.

The tonnage relation between the production of steel-making pig iron and finished steel products is closer, perhaps, than is generally realized. The following table shows for the past four years the reported production in the United States of Bessemer, low-phosphorus and basic pig iron and ferromanganese and spiegeleisen, together with the production of steel castings and of finished rolled steel, in the form in which reported, with the difference:

Production of Pig Iron and Finished Steel (Including Castings)—Gross Tons

	Pig Iron	Steel	Difference
1912	23,303,625	23,985,880	*682,255
1913	24,356,639	24,133,730	†222,909
1914	17,715,832	17,895,666	*179,834
1915	23,843,477	23,964,915	*121,438
Four years	89,219,573	89,980,191	*760,618

*Excess of steel. †Excess of pig iron.

Thus in four years the net excess of steel castings and rolled steel over the production of steel-making pig iron was three-quarters of a million tons in ninety millions, the exact proportion being 0.85

per cent. Of course the comparison is not precisely accurate, because limited portions of the iron included above find their way to the iron foundry, and because there are imports and exports. These factors, however, are practically insignificant. No allowance is to be made for the fairly large amount of Bessemer iron used in the manufacture of ingot molds, because when the molds become useless as such they are broken up and charged to the Bessemer cupola or the open-hearth furnace.

Despite this close agreement between steel-making pig iron and finished steel, the following excess of steel ingots over rolled steel have been reported:

	Gross Tons
1912	7,265,423
1913	7,167,144
1914	5,617,364
1915	8,186,121
Four years	28,236,052

This excess of 28,236,052 tons occurred in the production of 66,432,756 tons of finished rolled steel, the excess being 32.7 per cent. Conversely, the apparent loss from the ingot to the merchantable steel was 24.6 per cent of the weight of ingots reported.

The use of scrap arising outside the steel works does a great deal more, of course, than furnish the 190,000 tons a year excess of steel over pig iron. There is a loss of nearly all the metalloids contained in the pig iron, also a loss of iron in slag, and a loss to the steel works in scale, for the scale goes to the blast furnace. Less than half a million tons, probably, is furnished by the iron ore used in the open-hearth furnace. An exact analysis of the situation cannot be made, for the reason that there are no accurate data on the production of scale. The major part of the loss in weight from ingot to merchantable steel is in works scrap, however, and as there is necessarily old material to be used, as well as scrap produced in the fabrication of steel as sold by the steel mills, it is evident that a material reduction in the amount of cropping required to produce sound steel would totally disarrange the alignment as to scrap, and a general modification of practice, such as by the adoption of the duplex process, would be dictated. In 1915 only 7.5 per cent of the basic open-hearth steel produced was by the duplex process.

Galvanized Sheets and Tin Plates

Some surprise may be felt at the volume of production of galvanized sheets just reported for 1915, seeing that the high price of spelter caused a great decrease in galvanizing operations during the year; but it must be remembered that the slump in galvanized sheet production rate came late in the year, and followed by quite an interval the sharp rise in spelter. The high point in spelter was reached early in June, the spot market being above 25 cents for about a week, but at that time the mills had a very considerable volume of business on books, business on which some of them lost a great deal of money as they had not adequately covered themselves on spelter. Indeed, the experience at that time no doubt had a great deal to do with developing the sentiment in favor of a movement to make contracts binding in the sheet trade, as the sales contracts would not have been bnding in case of a decline in galvanized sheets while the mills would have been forced to take the spelter purchased against them.

The production of galvanized sheets and of formed products, stamped first and then galvanized, has been as follows in the three years for which statistics are available, the figures representing gross tons:

	1913	1914	1915
Sheets	824,047	806,994	706,058
Formed products.	57,674	58,752	50,119
Total	881,721	865,746	756,177

Thus there was a decline of 29 per cent. in the production of galvanized sheet products from 1913 to 1915, the statistics for 1914 being of no particular significance, as that was an off year. The production of sheets, thirteen gage and lighter, exclusive of black plate specialties and black plates for tinning, was: 1913, 1,464,631 gross tons; 1914, 1,302,355 tons; 1915, 1,676,577 tons, a material increase being thus shown. If from the black sheet production a deduction be made for the sheets galvanized, the production of black sheets not galvanized appears to have been about 650,000 gross tons in 1913 and about 975,000 gross tons in 1915, representing an increase of about 50 per cent. Compared with that increase, the 29 per cent. decrease in galvanized products is indeed striking.

Tin plate made a new production record in 1915, with an output of 72,978 gross tons of terne plate and 982,958 tons of tin plate, a total of 1,055,936 gross tons of tin and terne plate. The previous record had been made as far back as in 1912, with 962,971 tons, and thus the advance in production in recent years has really not been very large. As tin-plate production fluctuates so much from season to season comparisons can best be made by averages. The average production in the four years 1912 to 1915 inclusive was 893,000 gross tons, while the average in the four years 1902 to 1905, ten years earlier, was 448,000 tons, so that there was almost exactly a doubling in ten years.

The gain in tin-plate production in 1915 over 1912 was attained largely on account of the heavier exports, which amounted to 81,694 tons in 1912 and to 154,541 tons in 1915. If the average shown for the first five months of this year is maintained, the year's exports should be about 250,000 tons. Exports will doubtless be at a restricted rate this summer but late in the year the loss should be made up and it is not improbable that this year's production will exceed one and a quarter million gross tons. It was not until 1902 that the production of structural shapes reached such a tonnage and in three years since then it has fallen below the amount. Tin plate has made its place among the tonnage items of the steel industry.

Insect Pests in Factories

The fly, the mosquito and other insects which are either known to be carriers of disease or are under suspicion as such, and which in all respects are nuisances, have not been given as serious consideration as they deserve in connection with the health and comfort of persons employed in ma...

facturing establishments. Exception may be made of cases where protection from insects was absolutely necessary, or where owners thought it worth the trouble to be rid of the pests even though they might have been tolerated. Epidemics such as that of the prevalent infantile paralysis cause emphasis to be given to the menace of flies, since they are known to be carriers of some diseases and are suspected of being active agents of distribution of this baneful malady.

In certain malarial districts factory owners have gone to much trouble and expense in excluding mosquitoes and in ridding the adjacent country of their breeding places, and similar measures have been taken where mosquitoes are of a less dangerous species. These precautions are especially important where night shifts are employed, for a workman cannot give to his task his undivided attention if mosquitoes are hovering round him, and when he is uncomfortable he is not only fretful but he is less efficient. The results of a plague of flies are much the same; the infested workroom is an undesirable place, and, according to experts, the possibility of a spread of disease is strong, especially in factories where young people are employed.

It is pointed out that much good can be accomplished by scrupulous care in keeping factories and their surroundings free from everything that might attract insects, such as refuse from workmen's food. Efforts should be made by owners to secure the co-operation of their employees, and, where sources of trouble are found in the carelessness of neighbors, health officers should be stimulated to energy in their efforts to secure better conditions. Ill-kept stables, the slovenly use of yards and streets, unhygienic methods of garbage disposal and other similar evils should not be overlooked by factory owners. It is as highly important to have our factories free from all insect pests as engineering operations in the tropics. Yet we hear much of what has been accomplished in regard to the latter while too often neglect prevails near home.

CORRESPONDENCE

Price Adjustment of Iron Ores

To the Editor: The adjustment of iron ore prices because of increase or decrease in iron content from the guaranteed percentage has been an accepted factor in the purchase of ores for years. In fact, it has been customary since the beginning of the industry. The current method of calculating average analyses upon which to base such adjustments has long been in use. It is the purpose of this article to demonstrate that this method, which for years has been accepted unquestioningly by both buyers and sellers of iron ore, is a fallacious one.

The method now in use by the sellers of ore from the Lake Superior district may be reduced to the following formulae:

1. $\frac{\text{Tons ore} \times \text{\% of iron} + (\text{tons ore} \times \text{\% iron}) + \text{etc.}}{\text{Total tons}}$ = average iron.
2. $\frac{(\text{Tons ore} \times \text{\% moisture}) + (\text{tons ore} \times \text{\% moisture}) + \text{etc.}}{\text{Total tons}}$ = average moisture.
3. (Average iron) × (100% less average moisture) = average iron (natural).

The price adjustment is then based upon the result of formula 3.

This procedure that has been in force for a great many years seems correct on first consideration. Let us, however, analyze these formulae:

In formula 1 the tonnage used ("tons ore") is the actual weight of the ore as it is shipped, which is *in the natural state*, with moisture included. The iron content ("% iron") is the percentage of iron in the ore, *dried at 212 deg. Fahr.* The ore vendors, therefore, multiply "natural ore" by "dry iron" and call the product "units of iron." This procedure is followed for each succeeding cargo of ore, and the sum of the units thus obtained is divided by the total tonnage of ore. The result is called the average percentage of iron in the ore, dried at 212 deg. Fahr. Thus we see that the figure represented by the term "units of iron" is hybrid, being a mixture of *dry* and *natural* figures.

Formula 1, therefore, is both mathematically and metallurgically incorrect, and has been so characterized by Dr. Rukard Hurd, a recognized authority on iron ores and secretary of the Minnesota Tax Commission.

Formula 2 is undoubtedly correct, as the moisture determination must be made with the ore in its natural state.

Formula 3 is so familiar as to need no explanation; mathematically it is unquestionable.

The question, then, hinges upon the validity of formula 1, and the above analysis, showing the peculiar combination of *dry* and *natural* figures, seems to prove that it is fallacious.

To remedy this erroneous method the logical procedure is to calculate the iron in the natural state for each cargo of ore according to the usual method, as shown:

(% Iron dry) × (100% — % moisture) = % iron natural.

The various cargo tonnages should then be multiplied, each by its percentage of iron *natural*. The sum of the "units" thus obtained, when divided by the total tonnage of ore, will give an absolutely correct average of the iron in the ore *in the natural state*.

A small ore purchase, totaling 40,000 tons, when figured according to both the usual method and the one here proposed, showed a loss to the vendor amounting to $66.32, due to the use of this old, fallacious method. When we remember that the expected shipment from the Lake Superior district has been set at 60,000,000 tons for the 1916 season, the question assumes serious proportions.

Of course, in another case, the error might swing in the other direction, but the contention is that if a process is proven to be incorrect, it is illogical to continue its use.

The above demonstration was laid before the Lake Superior Iron Ore Association in May, 1915, but no change has yet been announced by that body. The writer therefore takes this means of bringing his contention before the ore vendors and consumers of the country, and will welcome any question or comment which this article may bring forth.

JAMES B. SPRAGUE,

Pittsburgh, Pa., Aug. 5, 1916.

That a corps of trained women workers in medical, social and domestic lines was put to work in the coal and iron mining camps and the steel plant of the Colorado Fuel & Iron Company Aug. 1 is announced in the last issue of the company's *Industrial Bulletin*. The system, which is to be extended widely throughout the properties of the corporation, is due to the combined action of the Colorado Fuel & Iron Company, the Y. M. C. A. and John D. Rockefeller, Jr. To begin with, five women workers, each an expert, are in the field. Of these two are assigned to the steel works community, one as a nurse and social worker and the other as a playgrounds teacher for the children of steel workers.

For America's Electrical Week, Dec. 2-9, planned by the Society for Electrical Development, 29 West Thirty-ninth Street, New York, local committees have been organized in 286 cities.

Production of Miscellaneous Products in United States in 1915

The American Iron and Steel Institute, 61 Broadway, New York, presents in its special statistical bulletin No. 4 (1916) the following statistics of the production of certain iron and steel products in this country which were not included in the statistical statement published in THE IRON AGE of July 20:

Production of Tinplates and Terne Plates, 1910-1915

Years	Tinplates	Terne Plates	Total Pounds
1910	1,450,821,000	168,184,000	1,619,005,000
1911	1,597,629,000	158,441,000	1,756,070,000
1912	1,965,659,000	191,396,000	2,157,055,000
1913	1,708,186,000	136,944,000	1,845,130,000
1914	1,939,785,000	146,195,000	2,085,980,000
1915	2,201,825,054	163,470,646	2,365,295,700

Production of Galvanized Sheets

Products	1914 Pounds Iron	Steel	Total
Galvanized sheets	91,235,731	1,716,431,398	1,807,667,129
Galvanized formed products*	3,879,072	127,724,537	131,603,609
Total	95,114,803	1,844,155,935	1,939,270,738

Products	1915 Pounds Iron	Steel	Total
Galvanized sheets	32,614,505	1,548,954,701	1,581,569,206
Galvanized formed products*	1,115,440	111,152,350	112,267,790
Total	33,729,945	1,660,107,051	1,693,836,996

*Articles formed or stamped from iron or steel black plates or black sheets and galvanized after the completion of the forming or stamping process.

Production of Rail Joints and Fastenings, 1914-1915

Articles	1914—Gross Tons Iron	Steel	Total	1915—Gross Tons Iron	Steel	Total
Angle splice bars	3,854	82,921	86,775	2,937	116,721	119,658
Tie-plates	30,563	157,595	197,158	43,606	239,903	283,509
Fish plates	393	29,314	29,707	88	10,748	10,836
Other rail joints	110	58,792	58,902	300	56,421	56,721
Total	43,920	328,622	372,542	46,931	423,793	470,724

The production of seamless steel tubes in 1915 amounted to 139,668 gross tons, against 90,595 tons in 1914, an increase of 49,073 tons, or 54.2 per cent. Of the total in 1915, 63,488 tons were hot-finished and 76,180 tons were cold-drawn, against 36,939 tons of hot-finished and 53,656 tons of cold-drawn tubes in 1914.

Production of Wire Nails—Kegs of 100 Lb.

Years	Production	Exports	Consumption
1910	12,704,902	960,295	11,744,607
1911	13,437,778	1,200,957	12,236,821
1912	14,659,700	1,530,353	13,129,347
1913	13,559,727	977,477	12,582,250
1914	13,132,814	809,167	12,323,647
1915	14,583,026	2,051,475	12,531,551

Production of Cut Nails—Kegs of 100 Lb.

Years	Production	Exports	Consumption
1910	1,005,233	182,087	823,146
1911	967,636	255,854	711,782
1912	978,415	208,568	769,847
1913	842,038	84,885	757,153
1914	769,665	76,676	692,989
1915	775,327	94,878	680,449

Horseshoe nails, cut tacks, wire nails, or railroad or other forged iron or steel spikes are not included.

Limited Freight and Baggage Liability

WASHINGTON, D. C., Aug. 8, 1916.—The so-called Cummins amendment to the interstate commerce law, approved March 4, 1915, which has occasioned endless annoyance and confusion to shippers and travelers, has just been comprehensively amended by a Senate bill which passed the House Aug. 2 and has been approved by the President. The action of Congress has been taken in response to the overwhelming demand from all parts of the country and it is an interesting fact that not a single adverse vote was recorded against the amendatory measure either in committee or on the floor of either house. The Cummins amendment was adopted as a proviso to the Carmack act, which was intended to prevent the railroads from limiting their liability for the loss or damage of merchandise by special contract. Its text was as follows:

> Provided, however, that if the goods are hidden from view by wrapping, boxing, or other means, and the carrier is not notified as to the character of the goods, the carrier may require the shipper to specifically state in writing the value of the goods, and the carrier shall not be liable beyond the amount so specifically stated, in which case the Interstate Commerce Commission may establish and maintain rates for transportation, dependent upon the value of the property shipped as specifically stated in writing by the shipper. Such rates shall be published, as are other rate schedules.

Immediately after the enactment of this amendment it was pointed out by the Interstate Commerce Commission that it would nullify the rules of the commission under which many kinds of merchandise have been specially listed and on which rates have been made dependent on the value of the goods. The commission also held that the Cummins amendment by its plain terms must apply to passengers' baggage. Thus all passengers during the past 15 months have been obliged to certify in writing to the value of each piece of baggage before it could be checked. Commercial travelers especially have suffered great annoyance.

With a view to amending the law to obviate these difficulties the Senate Committee on Interstate Commerce, early in the present session, drafted an amendment to the Carmack act, substituting for the Cummins amendment one to the effect that the provisions of the act respecting liability for full actual loss, damage, or injury, notwithstanding any limitation of liability or release as to value, shall not apply to baggage carried on passenger trains or boats, or to property, except ordinary live stock, received for transportation, concerning which the carrier shall have been or shall hereafter be expressly authorized or required by order of the Interstate Commerce Commission to establish and maintain rates dependent upon the value declared in writing by the shipper or agreed upon in writing as the released value of the property.

The new statute takes effect immediately, its first result being the abolition of the certificate of value of passengers' baggage. W. L. C.

Production of Pipes and Tubes

Kinds of pipe	1914—Gross Tons Iron	Steel	Total	1915—Gross Tons Iron	Steel	Total
Black standard	102,244	562,263	664,507	112,470	711,297	823,767
Galvanized	31,896	233,133	265,029	27,702	253,242	280,944
Oil country goods	50,824	568,467	619,291	39,753	563,167	602,920
O. D. and misc.	343	111,042	111,385	108	115,005	115,113
Boiler tubes	26,840	50,652	77,492	26,480	70,450	96,930
Total	212,147	1,525,557	1,737,704	206,513	1,713,161	1,919,674

Production of Cast-Iron Pipe, 1914-1915

Kinds of Pipe	1914—Net Tons Pipe	Fittings	Total	1915—Net Tons Pipe	Fittings	Total
Gas and water*	891,646	46,651	938,297	911,901	44,471	956,372
Soil and plumbers'	164,866	57,617	222,483	184,869	73,629	258,498
Total	1,056,512	104,268	1,160,780	1,096,770	118,100	1,214,870

*Includes culvert pipe. Manufacturers able to separate their production report 18,900 tons of culvert pipe in 1914 and 25,140 tons in 1915.

The California Industrial Accident Commission is publishing new rules governing the use of safety appliances on boilers, to take effect Jan. 1, 1917. Tentative rules were published some time ago, as a basis for public hearings in July.

MODERN SHOP MANAGEMENT

Some Preliminary Steps in Introducing It—One Need of Job Analysis Shown

A paper on scientific management was presented recently before the National Gas Engine Association at Chicago by Prof. J. A. Bursley, associate professor of mechanical engineering at the University of Michigan, Ann Arbor, Mich. From this paper the following notes have been taken:

SOME PRELIMINARY STEPS

In case it is decided to go ahead, there are certain preparatory steps which must be taken. The first of these is to obtain, if possible, a record of what has been done in the past so that after the new system has been started we may have something with which to compare the results obtained. In a large majority of shops it will be found that there is an almost total absence of records that are of any value. There has been no system of cost-keeping that really means anything. The chances are ten to one that all the management knows is that on the gross business done in any one year there has been a profit or a loss; but when it comes to the question as to which particular line of goods manufactured has shown a profit and which a loss, or why there is a loss, most concerns are absolutely at sea.

After obtaining such records of existing practice and conditions as we can, the next step will be a rearrangement of the plant to utilize better the space available and make possible more efficient and economical operation. This step must be very carefully thought out and all contingencies provided for as far as possible, before any actual changes are made. In order to minimize the confusion resulting during this reconstruction period, it is advisable not to try to do everything at once, but to proceed gradually with the changes, having a definite goal in mind, however, and making each step lead toward the final arrangement which we have previously planned out. In this connection, it is sometimes desirable to build a small model of the plant or simply lay out a drawing to scale, and then locate on each floor the various machines by pieces of cardboard cut to scale. The paths followed by the raw materials and manufactured products passing through the plant may be indicated by strings or ink lines of various colors. It will then be very easy to detect cross tracks, back paths, etc., and to remedy such devious courses by a rearrangement of the cardboard machines.

One of the first things to be decided in the rearrangement of the plant is the location of store-room, tool-room and planning-room. In most cases, unless the plant is very large or the raw material of peculiar character, it is advisable to have all stores in one place. Such a plan will make control of the stores easier. If the store-room for finished product can be placed near the raw material store-room, so much the better. The tool-room and planning-room should be as centrally located as possible to make them easily accessible to all employees.

The next step is to clean house. Nearly every plant which has been running any length of time has an accumulation of scrap and junk which, like Topsy, has "just growed" until it has become a fixture and it has been nobody's duty to dispose of it. This accumulation of years should be gone over by someone familiar with the plant in question and the part worth keeping carefully separated from the rest. There will probably be opposition on the part of the workmen when this cleaning-up process takes place as each one has carefully collected a set of the tools which he uses most frequently, and he feels that he has a sort of proprietary claim on them and he objects to having them returned to a central tool-room where they will be accessible to everyone.

STORES A FORM OF MONEY

It is important to remember, and it should be impressed upon all employees, that stores are simply another form of money and that it is just as necessary and vital to the financial success of the business to have a correct and accurate control and record of stores as it is of the cash drawer. There is no more reason why the store-room should be open so that anyone may take out material when he pleases than there is that anybody should have the right to put his hand in the cash drawer and take out what money he wants.

A SHOWING UP OF FAULTY CONDITIONS

In a shop (not running under scientific management) manufacturing automobile windshields, one of the operations consisted in turning and threading certain small brackets. Part of these were turned on a two-spindle bar machine and threaded on another machine, while others were both turned and threaded on a turret lathe. The management wished to know which of these two ways was better; that is, by which way the cost per piece was cheaper. An analysis and time-study of both operations showed the following:

The setting-up time for the two-spindle machine was 46.33 min., while that for the turret lathe was 84.33 min. A study of the data, however, revealed the fact that at least 32.46 min., or nearly 40 per cent, of the latter time might have been saved by proper planning and without the slightest change whatever in the method of operation or in the speed of the operator. The items going to make up this lost time were:

1.	Getting wrench and parts for new set-up	1.08 min.
2.	Getting a hammer	0.95 min.
3.	Cleaning bearing on fixture	4.14 min.
4.	Cleaning oil grooves in rest	1.68 min.
5.	Getting tin snips and cutting liners	1.64 min.
6.	Recutting thread on fixture stud	3.58 min.
7.	Grinding clamp to fit	0.73 min.
8.	Making shim to put back of stock	0.90 min.
9.	Hunting for file to clean die cutters	0.77 min.
10.	Cleaning dies with file	0.61 min.
11.	Cleaning dies with rag	1.45 min.
12.	Getting new dies	1.32 min.
13.	Tying up feed handle with block and rope	2.02 min.
14.	Getting thread gage	11.59 min.
	Total	32.46 min.

The psychological affect of conditions which permit and even necessitate such a loss of time are extremely bad. No workman will do his best when he finds it necessary to spend 10 to 15 min. looking for tools and then 15 to 20 min. more cleaning a dirty machine and getting it into workable shape by cutting shims, cutting new threads on fixture studs and tying the machine up so that it will run. The machine should have been clean, and in good repair, and all the necessary tools and liners should have been at the machine ready to be used.

When these 32.46 min. are subtracted from the total setting-up time on the turret lathe, 84.33 min., it leaves 51.87 min. as compared with 46.43 min. on the bolt cutter.

Now let us compare the actual machine and handling times. The total time per piece on the bolt cutter was 1.44 min. per piece as against 0.93 min. on the turret lathe, and this is on the basis of both spindles on the bolt cutter being operated simultaneously. At this rate it does not take long for the turret lathe to overcome the slight advantage in setting-up time held by the bolt cutter. The fact that the bolt cutter was not running anywhere near its proper speed was noted by comparing the actual cutting times. The time required to turn one end (47/64 in. in diameter and 2¾ in. run) was 1.51 min. on the bolt cutter and only 0.19 min. on the turret lathe.

PAYING BONUS EARNINGS PROMPTLY

The particular method of pay used is really of minor significance so far as results are obtained, although unfortunately it has been magnified in importance by those opposed to scientific management. If the men feel that they are getting a square deal, and the production is under proper control, the tasks will be accomplished and the work turned out, though the pay be based on a piece-rate system, task and bonus, premium system or any other. Control of material and confidence of employee are the keys to increased productivity.

One other point to be emphasized in this connection is this: in using any kind of bonus or premium system,

the sooner the men can be given the bonus after it is earned, the better it will be. If a man is going to get his bonus the next day or at the end of the week, he will work for it; but if it is not going to come until the end of the month or until the end of the year, he forgets about it and loses interest—he does not care anything about it. He wants his reward as soon as possible after it has been earned. In most shops working under this system, every man is given a ticket each morning informing him what his earnings were for the previous day.

Patching Concrete Factory Floors

One of the principal objections often raised against the use of concrete finished floors is the difficulty and cost of successfully repairing places that become worn or damaged. For best results it is usually considered necessary to cut down the worn place at least 1½ in. into the unbroken concrete, under-cut the edges, clean out the dust and loose particles thoroughly, wash with a thin cement grout, fill in with a paste grout and finally float to a level surface a mortar of cement and crushed stone or gravel. The patch must then be kept moist for at least a week or ten days, keeping all traffic off in the meantime.

W. P. Anderson, president Ferro Concrete Construction Company, Cincinnati, Ohio, states that his company often uses a method of patching concrete floors which is cheaper and requires far less time than the method commonly used. Mr. Anderson's method requires the use of mastic material made from a mixture of asbestos fiber and rubber gum. This mixture is applied with a trowel after thoroughly cleaning the damaged surface. Very little cutting of the old concrete is necessary, other than to break off loose particles. The gum can be worked to a feather edge, it is stated, so that it will readily join with the undamaged concrete surface and eliminate the under-cutting required with the old style of patch.

A patch of this sort can be opened to foot traffic within a few hours and to heavy traffic within a day or so. It is thus possible to repair a much-used portion of a mill or factory floor almost over night. The cost varies with the size of the patch, but is given as 16 to 18 cents per square foot.

Automobile Exports in Fiscal Year 1916

The exports of automobiles in the fiscal year ended June 30, 1916, reached a total of 77,496 machines, valued at $97,464,381, compared with $60,254,635 for the preceding year. June of this year, however, was over $5,000,000 less than June, 1915. During the past fiscal year the exports were classified as follows: Commercial cars, 21,265, valued at $56,805,548; passenger cars, 56,231, valued at $40,658,833. During the fiscal year 1915 there were 37,876 machines exported, the value being $60,254,635, consisting of 13,996 commercial cars, valued at $39,140,682, and 23,880 passenger cars, valued at $21,113,953.

Russian Steel Imports in 1915

Russian imports of certain steel products over the European, Russo-Finnish and Black Sea frontiers are given as follows in metric tons:

	1913	1914	1915
Wrought iron and steel	38,690	28,830	27,080
Tin plates and sheets	7,370	4,910	920
Wire and manufactures	8,710	7,490	48,660
Total	54,770	41,230	76,660

The large increase for 1915 over 1914 is due mostly to imports of barb wire.

Prizes awarded in May to employees of the Youngstown Sheet & Tube Company were for the following suggestions: Shoe for tap; bath for conveyor chain; slotting open-hearth skewback channels, and improvement on feed tables in the nail mill. The caliber of the suggestions may be gaged by the foregoing, and, as has been the practice of the management, the list of awards is made one of the regular bulletin-board announcements.

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Iron and Steel Markets

PRICES UP, LITTLE BUYING

Non-Cancellation Contract Provisions

Continued Weakness in Pig Iron—Strength in Semi-Finished Steel

Following the statement by the leading producer one week ago that it had raised the price of steel bars $2 a ton, or to 2.60c., Pittsburgh, the same interest has announced similar advances in wire products and in contract plates and structural shapes. These put wire nails at $2.60, fence wire at $2.55, contract plates at 3c. and shapes at 2.60c.

In a slow market—from the domestic standpoint—these advances have given little stimulus to buying. Sales of bars have been made at 2.50c. in the week, pending business at that figure being more readily closed. While independent producers in some cases are quoting the higher prices, they have not been generally established.

The tactical significance of the bar advance, in view of the recent upheaval over the reported and denied sales of agricultural bars at 2.35c., has caused wide comment. Producers aver that the advance was made less to establish existing contracts at 2.50c. than to notify home consumers that foreign buying may leave less steel for home use in the first half of 1917 than has been reckoned.

Manufacturing consumers of steel are facing smaller demand for their products, in view of high prices. Implement makers count on a 25 per cent falling off in their sales and possibly more. They contend that bars should be reduced rather than advanced.

It is understood that recent contracts for bars for Europe provide that the full tonnage must be taken out, if not in bars, then in plates, shapes or other products. A non-cancellation proviso has also been inserted in certain contracts with buyers at home.

The greater part of the forgings and bars required for the large shell contracts recently placed with five important companies—amounting to nearly $100,000,000—has been bought, but Europe is still asking for steel for this year's delivery, which few mills are able to take on. Two large Eastern interests are in the position of having to reserve capacity for Government orders, of which there is no definite assurance as yet.

Mills in Pittsburgh, Chicago and intervening districts report maximum losses in output from the excessive heat of the past week. The falling off in production of one Chicago interest has been as high as 1000 tons a day. In spite of the curtailment of shipments on this account in July, a reduction in Steel Corporation orders in the month has been indicated.

Railroad buying has been in a rut for weeks and promised car inquiries are withheld. For the Havana Railway a 5000-ton rail order has been taken at Chicago and 10,000 tons more for Cuba is wanted. A considerable British rail inquiry is also reported.

The structural outlook is not promising, and after six weeks of light business fabricating companies are reselling some of their steel. There are reports, both of work going ahead because the realization of lower steel prices may be a good while delayed and of projects laid aside because the expected reductions have not come.

A sale of 9000 tons of plates at Chicago has resulted from a recent vessel order to a Pacific coast yard. At Pittsburgh ship plate capacity has been sold into the third quarter of next year.

In the Central West the market for semi-finished steel has stiffened, but Bessemer steel is still to be had at $2 to $3 a ton less than open-hearth. An export sale of 3000 tons of Bessemer sheet bars has been made at $43, Pittsburgh.

The weakness in the pig-iron market is unrelieved, though more inquiry has appeared in the Central West. At Chicago Northern pig-iron producers are undercut by Southern iron, which has sold as low as $13.50 at furnace for a 2.25 silicon grade. The Milwaukee machinists' strike has cut down foundry operations and with the slow improvement in labor conditions at Chicago foundry pig-iron production is for the time in excess of consumption.

At Pittsburgh sales of 20,000 tons of basic iron have been made at the uniform price of $18 at Valley furnace. Some quiet buying by steel companies is rumored—all accomplished without lifting the market price.

Pittsburgh

PITTSBURGH, PA., Aug. 8, 1916.

The situation in this market during the past few days has been stronger, and the feeling of expectancy or uncertainty is more pronounced than it has been for at least two months. This followed a stiffening in semi-finished steel, including practically the whole range of hot rolled products. The continued demand and the inability to satisfy it have made the market for this class of material nominal, and makers announce that the prospects for the future made the advance in prices of wire, shapes, plates and bars advisable. The situation has been further marked by a labor shortage and consequent drop in production of about 10 per cent, due to the very hot weather. In the bar market mills have shown a disinclination to sell more than is necessary, and inquiries are not being closely followed up. With the advance in bars comes the announcement that mills will hereafter insist upon a non-cancellation policy on contracts, whether it is specifically mentioned or not, and customers will no longer arbitrarily get the benefit of a declining market. The general opinion of producers is that the market is headed into another buying movement. Present bar prices are for delivery up

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

	Aug. 9, 1916	Aug. 2, 1916.	July 12, 1916.	Aug. 11, 1915.
Pig Iron, Per Gross Ton				
No. 2 X, Philadelphia	*$19.50*	$19.75	$19.75	$14.75
No. 2, Valley furnace	18.25	18.25	18.25	13.25
No. 2 Southern, Cin'ti	16.90	16.90	16.90	13.90
No. 2, Birmingham, Ala.	14.00	14.00	14.00	11.00
No. 2, furnace, Chicago*	19.00	19.00	19.00	13.25
Basic, del'd, eastern Pa.	19.00	19.00	19.00	15.25
Basic, Valley furnace	18.00	18.00	18.00	14.00
Bessemer, Pittsburgh	21.95	21.95	21.95	15.95
Malleable Bess., Ch'go*	19.00	19.00	19.50	13.25
Gray forge, Pittsburgh	18.70	18.70	18.70	13.95
L. S. charcoal, Chicago	19.75	19.75	19.75	15.75
Billets, etc., Per Gross Ton				
Bess. billets, Pittsburgh	43.00	43.00	40.00	23.00
O.-h. billets, Pittsburgh	45.00	45.00	42.00	23.50
O.-h. sheet bars, P'gh	45.00	45.00	42.00	24.00
Forging billets, base, P'gh	69.00	69.00	69.00	28.00
O.-h. billets, Phila	45.00	45.00	45.00	30.00
Wire rods, Pittsburgh	55.00	55.00	55.00	27.00
Finished Iron and Steel,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.47½	1.47½	1.47½	1.25
O.-h. rails, heavy, at mill	1.56½	1.56½	1.56½	1.34
Iron bars, Philadelphia	2.659	2.659	2.659	1.40
Iron bars, Pittsburgh	**2.60**	2.50	2.50	1.30
Iron bars, Chicago	2.35	2.35	2.35	1.20
Steel bars, Pittsburgh	2.50	2.50	2.75	1.30
Steel bars, New York	2.669	2.669	2.669	1.469
Tank plates, Pittsburgh	3.50	3.50	3.50	1.25
Tank plates, New York	3.669	3.669	3.669	1.419
Beams, etc., Pittsburgh	2.50	2.50	2.50	1.30
Beams, etc., New York	2.669	2.669	2.669	1.469
Skelp, grooved steel, P'gh	2.35	2.35	2.35	1.25
Skelp, sheared steel, P'gh	2.45	2.45	2.45	1.30
Steel hoops, Pittsburgh	2.75	2.75	2.75	1.30

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

	Aug. 9, 1916	Aug. 2, 1916.	July 12, 1916.	Aug. 11, 1915.
Sheets, Nails and Wire,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh	2.90	2.90	2.90	1.85
Galv. sheets, No. 28, P'gh	4.00	4.00	4.00	2.85
Wire nails, Pittsburgh	**2.60**	2.60	2.60	1.60
Cut nails, Pittsburgh	2.60	2.60	2.60	1.60
Fence wire, base, P'gh	**2.55**	2.45	2.45	1.40
Barb wire, galv., P'gh	**3.45**	3.35	3.35	2.50
Old Material, Per Gross Ton:				
Iron rails, Chicago	18.00	18.00	18.50	12.25
Iron rails, Philadelphia	20.00	20.00	20.00	15.50
Carwheels, Chicago	12.00	12.00	12.00	11.50
Carwheels, Philadelphia	15.50	15.50	16.00	13.00
Heavy steel scrap, P'gh	*16.00*	16.25	16.50	14.00
Heavy steel scrap, Phila.	14.75	14.75	15.00	13.50
Heavy steel scrap, Ch'go.	15.25	15.25	14.00	11.50
No. 1 cast, Pittsburgh	15.00	15.00	15.75	12.50
No 1 cast, Philadelphia	16.00	16.00	16.00	13.00
No. 1 cast, Ch'go (net ton)	11.50	11.50	11.50	9.50
No. 1 RR. wrot, Phila	19.50	19.50	19.50	14.25
No. 1 RR. wrot, Ch'go (net ton)	15.25	15.25	14.25	10.50
Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	$2.75	$2.75	$2.75	$1.50
Furnace coke, future	2.50	2.50	2.50	1.75
Foundry coke, prompt	3.25	3.25	3.25	2.00
Foundry coke, future	3.50	3.50	3.50	2.25
Metals,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	**26.75**	26.25	26.00	20.00
Electrolytic copper, N. Y	**26.50**	26.00	25.75	17.75
Spelter, St. Louis	*8.12½*	9.25	8.75	14.00
Spelter, New York	*8.37½*	9.50	9.00	14.25
Lead, St. Louis	*5.75*	6.00	6.25	4.40
Lead, New York	5.90	6.10	6.15	4.50
Tin, New York	*37.37½*	38.00	38.50	34.62½
Antimony, Asiatic, N. Y.	*11.00*	12.50	15.50	33.50
Tin plate, 100-lb. box, P'gh	$6.00	$6.00	$6.00	$3.10

to June 30 of next year. The foreign inquiry is the biggest immediate factor, and these buyers are looking forward to their requirements through the first half of 1917. Despite the shipping records being made in Lake iron ore, some manufacturers are looking ahead with reference to ore for use before the opening of navigation next spring.

Pig Iron.—Reported sales the past week include 10,000 tons of basic to the American Steel Foundries, for delivery over the remainder of the year, 5000 tons of basic for the same delivery and 5000 tons of basic for delivery in the first quarter of next year, all at $18, Valley furnace. While this summarizes the principal sales, these seems to be a decided undercurrent of secret buying and selling, transactions evidently being made quietly to avoid a rise in the market, and indications point to a total of this class of business larger than those of the announced sales. There is considerable Bessemer inquiry for foreign shipment, but Eastern furnaces have preference in this class of business, because of freight differences, only one such sale being reported from the Pittsburgh district, this being 2000 tons at $21, Valley furnace. We quote Bessemer iron at $21, basic, $18; gray forge, $17.75 to $18; malleable Bessemer, $18.50 to $19, and No. 2 foundry, $18.25 to $18.50, all at Valley furnace, the freight rate to the Pittsburgh and Cleveland districts being 95c. per gross ton.

Ferroalloys.—This market is inactive, as purchasers are apparently pretty well covered for a considerable time ahead. On ferrosilicon, one furnace is quoting lower than its competitors because of a better supply for prompt delivery. A peculiar feature of this market is that there is a heavy export inquiry for the higher percentages of ferrosilicon, but no concern is in position to furnish the material in large quantities. Domestic 80 per cent ferromanganese is quoted at $165 to $175 at furnace. We quote 18 to 22 per cent spiegeleisen at $40 to $45, and 25 to 30 per cent, $55 to $65, at furnace. On 50 per cent ferrosilicon, we quote $88 to $89 in lots up to 100 tons; over 100 tons, $87 to $88, and over 600 tons, $86 to $87, all per gross ton, f.o.b. Pittsburgh. We quote Bessemer ferrosilicon as follows: 9 per cent, $30; 10 per cent, $31; 11 per cent, $32; 12 per cent, $33; 13 per cent, $34.50; 14 per cent, $36.50; 15 per cent, $38.50, and 16 per cent, $41. Seven per cent silvery is $28.50; 8 per cent, $29; 9 per cent, $29.50; 10 per cent, $30; 11 per cent, $31, and 12 per cent, $32. These prices are f.o.b. furnace, Jackson or New Straitsville, Ohio, or Ashland, Ky., all having a freight rate of $2 per gross ton to Pittsburgh.

Billets and Sheet Bars.—A shortage of semi-finished material for prompt delivery has developed. An effort to buy a considerable quantity at $1 per ton over recently quoted prices failed to get a supply. The scarcity is not confined to any one line, but is more decidedly noted on rods, billets and slabs. Foreign buyers are trying to cover through the first half of next year, and most of the recent important sales have been made for delivery abroad. The Pittsburgh Steel Company is expected to enter the market as a seller next month, having considerable tonnage in excess of its own requirements, but it is understood a good part of this has been disposed of at current prices. Some consumers are tiding themselves over the present scarcity in supply by using the munition class A discards. Prices are only nominal. We quote soft open-hearth billets and sheet bars at $45; Bessemer billets, $43 to $45, and Bessemer sheet bars, $43 to $45, maker's mill, Pittsburgh or Youngstown district. We quote forging billets at $69 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets, running above 0.25 and up to 0.60 carbon take $1 extra.

Structural Material.—Effective Friday, Aug. 4, some mills advanced structural shapes from 2.50c. to 2.60c., or an advance of $2 per ton. New projects in the building trade are few, largely because of the inability of mills to supply material within a reasonable length of time. A good many jobs are about ready, but when projectors learn the best deliveries that can be made they hold plans in abeyance. One large mill, in advising a customer, figured out that in holding the cost of carrying vacant property as against the probable increased cost of material in the next year or 18 months it would be better to go ahead now, but investors as a rule have been

unable to see this viewpoint. The railroads are placing practically nothing in the way of bridges and other material. New inquiry is light, and mills are devoting their attention to getting out production on present contracts rather than sales. We quote beams and channels up to 15 in. at 2.60c. to 2.75c. at mill, for delivery in third and fourth quarter, and from stock 3.10c. for all shapes and 3.50c. for structural plates.

Steel Rails.—No sales of any considerable tonnage are reported, the leading interest in this district having nothing to offer on standard sections before the second half of next year. A better inquiry and sales are reported on light rails. We quote 25 to 45 lb. sections at $47; 16 and 20 lb., $48; 12 and 14 lb., $49, and 8 and 10 lb., $50, in carload lots, f.o.b. at mill, the usual extras being charged for less than carload lots. We quote standard section rails of Bessemer stock at 1.47½c., and of open-hearth, 1.56½c., Pittsburgh.

Plates.—An advance of $2 per ton was announced by the leading interest on Friday, Aug. 4, the base price now being 3c. The situation in this line is tighter than it was a month or six weeks ago, although there is no great activity in fabricated steel, and railroads have assumed a waiting attitude. Mills are unable to take on any class of ship material for delivery before the third quarter of 1917. The general inquiry for cars is light, coming almost entirely from Western roads, and includes 1000 cars for the Nickel Plate, 300 automobile cars for the Northern Pacific, 500 hopper cars for the Delaware & Hudson and 500 box cars for the Minneapolis & St. Louis. We quote ¼-in. and heavier plates for delivery at convenience of the mill at 3c., and for shipment from stock, or during the next two months, at 3.50c. to 4c., f.o.b. Pittsburgh.

Sheets.—The inquiry for 10,000 tons of blue annealed sheets, mentioned in this report last week, has not materialized into a contract. Other new inquiry is still heavy. Prices are firm. We quote blue annealed sheets, Nos. 9 and 10, at 3c. to 3.25c., for delivery at convenience of the mill. We quote No. 28 Bessemer and open-hearth black sheets at 2.90c. to 3c.; No. 28 galvanized, Bessemer, and open-hearth, 4.25c. to 4.35c.; Nos. 22 and 24 black plate, tin-mill sizes, H. R. & A., 2.90c.; Nos. 25, 26 and 27, 3c. to 3.10c.; No. 28, 3.10c. to 3.15c., and No. 29, 3.20c. to 3.25c. These prices are for carloads and larger lots, f.o.b. mill, Pittsburgh.

Tin Plate.—Mills profess to see evidence of a new buying movement and will not open their books for next year's business until October. The labor situation presents the greatest difficulty in this trade, it being estimated that production has dropped off about 12 per cent, the men being unable to work on account of the excessively hot weather. The serious feature of this is that the hot weather has matured the corn crop earlier than usual, and therefore canners are importuning the mills to anticipate specifications on their contracts. The labor situation is illustrated by the fact that 49 new mills at five different plants, not including the 24 new mills at the new plant at Gary, Ind., are unable to operate more than half time because of the lack of skilled men. Nothing is expected of the Gary mill before Jan. 1. We quote primes at $6 to the domestic trade, while for export, $6.25 per base box, or higher, is quoted, wasters of suitable sizes often bringing full price. We quote 8-lb. coated ternes at $8.80 for 200 lb. and $9.10 for 214 lb., all f.o.b. Pittsburgh.

Skelp.—With the market very narrow, prices are nominal. We continue to quote grooved steel skelp at 2.35c. to 2.40c.; sheared steel skelp, 2.45c. to 2.50c.; grooved iron skelp, 2.70c. to 2.80c., and sheared iron skelp, 3c. to 3.10c., all delivered to consumers' mills in the Pittsburgh district.

Cold-Rolled Strip Steel.—The tonnage being placed is comparatively light. Prices range from $6 to $6.50 per 100 lb. for specifications placed against contracts for delivery prior to Dec. 31. The lack of big inquiry indicates that the heavy buyers are pretty well taken care of, and smaller buyers are paying from $1 to $3 per ton premium for prompt delivery. Shipment at mill convenience means about February of next year. Manufacturers will not open their books for 1917 delivery until the early part of October, or until after it becomes known what semi-finished steel prices will be for the first half of next year. The new contract provisions for cold-rolled strip steel manufacturers have brought forth considerable comment. These contracts are subject to no decline or cancellation, and discounts are computed from net amount of invoice after freight reductions, the practice heretofore having been to take the discount from gross delivered billing. Extras, standard with all the mills, were printed on page 810 of THE IRON AGE of March 30.

Wire Rods.—The unusually heavy demand for all kinds of semi-finished material applies particularly to rods, although prices have not changed. The minimum price on either Bessemer or open-hearth rods is $55, and we quote soft Bessemer, open-hearth and chain rods at $55 to $60 per ton, f.o.b., Pittsburgh.

Wire Products.—A very much better demand for wire and wire nails is in evidence, indicating that jobbers have begun to stock up for fall trade. Heavy tonnages of barb wire for foreign shipment have been placed, and more inquiries are pending. Some difficulty has been encountered because of credits. An advance of $2 per ton was made in wire products last week, and regular prices are now as given on another page.

Iron and Steel Bars.—With the advance of $2 per ton, or 2.60c., base, announced on bars, effective Friday, Aug. 4., the leading interest put into effect a non-cancellation clause, providing that hereafter a sale would be considered a sale and the purchaser would no longer be given the benefit of a declining market. While in some quarters the stability of this price is doubted, mills announce that it holds good for specifications between now and June 30 of next year, opening up bookings for the first half of 1917. Current promises on small bars run into second quarter of next year. Several inquiries came out in the past week for munition bars, but nothing has been definitely placed. Several manufacturers who had not previously covered are reported in a bad way for bar stock. Nearly all large consumers are covered ahead. We quote steel bars at 2.60c. for delivery at convenience of the mill, and small rounds from stock at 3.10c., and for large rounds, 2-in. and over, from stock at 3.75c. We quote refined iron bars at 2.60c., and railroad test bars, 2.70c. to 2.80c. at mill.

Shafting.—There is comparatively little new demand, largely because of the filled up condition of the mills and the fact that large consumers are covered for several months ahead. The discounts quoted below can still be obtained, but the advance in semi-finished material will probably cause a reduction in discounts to the minimum figure. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots for delivery in last quarter of this year and first quarter of 1917, and 10 per cent off in less than carload lots, f.o.b., Pittsburgh, freight added to point of delivery.

Boiler Tubes.—The demand for boiler tubes is unprecedented, and there appears to be no let-up on inquiry. Mills are filled with business and deliveries extend well over a year. Discounts on black and galvanized iron and steel boiler tubes are given on another page.

Wrought Pipe.—Reports are current of heavy sales of line pipe for delivery in California and of other sales to gas or oil companies in nearby territory, but details are not yet available. The National Tube Company and Spang, Chalfant & Co. divided 15 miles of 16-in. placed by the Philadelphia Company. There is a lively inquiry for oil country goods, but, owing to their filled-up condition, some mills are unable to take these contracts. Fairly prompt shipment can be made on butt weld sizes of pipe, but mills are sold up for six months or longer on lap weld sizes. Discounts on black and galvanized iron and steel pipe are given on another page.

Coke.—There is no new demand of note. The feature seems to be a considerable shortage of production in the Connellsville region, because of inability to get men during the excessively hot weather. This fact is responsible for a reduction of about 25 per cent in coke

production in the past three or four weeks. Furnaces have contracted for the remainder of the year on their supply of coke and prices remain about stationary. We quote furnace coke for prompt shipment at $2.50 to $2.75, and on contracts over the remainder of the year from $2.35 to $2.50, depending on the quality. We quote best grades of 72-hr. foundry coke for prompt shipment at $3 to $3.25, and on contracts $3.25 to $3.50 per net ton at oven.

Railroad Spikes.—It is understood that the United States Steel Corporation took the order for 50,000 kegs of dog-eared spikes from Russia and placed it with Dilworth, Porter & Co., Pittsburgh. Regular prices of spikes are as follows:

Standard railroad spikes, 4½ x 9/16 in. and larger, $2.65 to $2.75; railroad spikes, ½ and 7/16 in., $2.75 base; railroad spikes, ⅜ in. and 5/16 in., $3.05 base; boat spikes, $2.80 base, all per 100 lb., f.o.b. Pittsburgh.

Merchant Steel.—Conditions are without change. Prices on small lots are about as follows: Iron-finished tire, ½ x 1½ in. and larger, 2.50c., base; under ½ x 1½ in., 2.60c.; planished tire, 2.70c.; channel tire, ¾ to ⅞ and 1 in., 2.85c. to 2.95c.; 1⅛ in. and larger, 3.25c.; toe calk, 2.95c. to 3.05c., base; flat sleigh shoe, 2.70c.; concave and convex, 2.75c.; cutter shoe, tapered or bent, 3.25c. to 3.35c.; spring steel, 2.95c. to 3.05c.; machinery steel, smooth finish, 2.75c.

Rivets.—New inquiry is reported heavy. The advance in steel bars has not yet affected makers' prices on rivets, which are unchanged as follows: Buttonhead structural rivets, ½ in. in diameter and larger, $4 per 100 lb., base, and conehead boiler rivets, same sizes, $4.10 per 100 lb., base, f.o.b. Pittsburgh. Terms are 30 days net, or one-half of 1 per cent for cash in 10 days.

Old Material.—The local scrap market is inactive, with an inclination to lower prices on some lines. Consumers seem to be well covered and, on the other hand, only small lots are being offered for sale. Prices quoted by dealers for delivery in Pittsburgh and nearby districts that take the same rates of freight, per gross ton, are as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	$16.00 to $16.50
No. 1 foundry cast	15.00 to 15.25
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	16.25 to 16.50
Hydraulic compressed sheet scrap	13.50 to 13.75
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	11.25 to 11.50
Bundled sheet stamping scrap	10.75 to 11.00
No. 1 railroad malleable stock	13.50 to 14.00
Railroad grate bars	9.00 to 9.25
Low phosphorus melting stock	19.50 to 20.00
Iron car axles	27.00 to 27.50
Steel car axles	27.00 to 27.50
Locomotive axles, steel	28.00 to 28.50
No. 1 busheling scrap	13.00 to 13.25
Machine-shop turnings	8.00 to 8.25
Old carwheels	13.00 to 13.25
Cast-iron borings	8.00 to 8.25
*Sheet bar crop ends	16.50 to 17.00
No. 1 railroad wrought scrap	17.50 to 18.00
Heavy steel axle turnings	11.00 to 11.25
Heavy breakable cast scrap	12.50 to 12.75

*Shipping point.

Nuts and Bolts.—Consumers not covered by contracts are buying from hand to mouth. Manufacturers report mill conditions as to orders a little faster coming in than going out. The advance in bar prices has not affected the market on nuts and bolts. Discounts in effect from May 19 are as follows, delivered in lots of 300 lb. or more, where the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days:

Carriage bolts, small, rolled thread, 50 and 10 per cent; small, cut thread, 50; large, 40.

Machine bolts, h. p. nuts, small, rolled thread, 50, 10 and 5 per cent; small, cut thread, 50 and 5; large, 40 and 10.

Machine bolts, c. p. c. and t. nuts, small, 40, 10 and 5 per cent; large, 35 and 5. Blank bolts, 40 and 10 per cent; bolt ends with h. p. nuts, 40 and 10; with c. p. nuts, 35 and 5. Rough stud bolts, 15. Lag screws (cone or gimlet point), 50 and 10.

Forged set screws and tap bolts, 10 per cent. Cup and round point set screws, case hardened, 60. Square and hexagon head cap screws, 55. Flat, button, round or fillister head cap screws, 30.

Nuts, h. p. sq., tapped or blank, $2.90 off list; hex., $2.90 off; c. p. c. and t. sq. tapped or blank, $2.60 off; hex., $3 off. Semi-finished hex., 60 and 10 per cent; finished and case hardened, 60 and 10.

Rivets, 7/16 in. in diameter and smaller, 45, 10 and 10 per cent.

Chicago

CHICAGO, ILL., Aug. 9, 1916.—(*By Wire.*)

In the face of production reduced from 15 to 25 per cent because of the excessive heat, specifications continue to run as much as 40 per cent in excess of shipments. The pressure on Western mills still seems to be considerably less than in the East, as illustrated last week by the purchase of 2100 kegs of track bolts at Chicago by the Boston & Maine Railroad against a freight rate of $6 per ton, as well as the placing of an order for 5000 tons of rails for Cuba. The effect of the advance of $2 per ton on bars, shapes and plates is not yet clearly manifested, though some small implement bar contracts were closed at 2.50c. On the eve of the advance an unusually large number of small contracts for structural steel were closed. An order for 9000 tons of plates for the Pacific coast has been taken, and for prompt shipment of wide plates 4c., Pittsburgh, can still be secured. New York Central Lines are in the market for 1000 cars. The Northern pig-iron market is being held on its present basis by a very slender thread. Inquiry now in the market is reported to have brought out lower quotations in keeping with Southern prices. Local merchant furnaces have booked a round tonnage of steel-making iron for export.

(By Mail)

Pig Iron.—Local sellers of pig iron are holding to their position with considerable difficulty. With malleable iron now down to $19 and the competitive situation with respect to foundry iron calling for prices approximating $18 if business is to be secured, the arbitrary maintenance of a price $1 per ton higher is certain to be severely tested. There is in the market inquiry for various lots of iron ranging from 500 to 3000 tons, a considerable portion of which is regularly taken by Northern furnaces, but which in the present market would doubtless go to the South unless there is a reduction in local prices. Quotations made last week by Southern furnaces were as low as $13.50 at furnace for iron with silicon 2.25 per cent and over. Northern makers still have on their books a large proportion of contracts taken at higher prices and it has been felt that a reduction in the face of this undelivered iron would be very unfortunate. With labor conditions at Chicago improving but slowly and in Milwaukee with the foundries increasingly affected by the shutting down of machine shops to which they furnish castings, the situation is rendered even more unsatisfactory. While there is more inquiry in the market, including some for the first half of next year, negotiations move very slowly and a small proportion of purchases ensues. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of $1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5	$19.75
Lake Superior charcoal, No. 1	20.25
Lake Superior charcoal, No. 6 and Scotch	20.75
Northern coke foundry, No. 1	$19.00 to 19.50
Northern coke foundry, No. 2	18.50 to 19.00
Northern coke foundry, No. 3	18.00 to 18.50
Southern coke, No. 1 f'dry and 1 soft	18.00 to 18.50
Southern coke, No. 2 f'dry and 2 soft	17.50 to 18.00
Malleable Bessemer	19.00
Basic	19.00 to 19.50
Low phosphorus	34.00
Silvery, 8 per cent	29.50
Bessemer ferrosilicon, 10 per cent	32.50

Rails and Track Supplies.—The placing in this market of an order for 2100 kegs of heat-treated track bolts for the Boston & Maine Railroad and the purchase here of 5000 tons of rails by the Havana Railway for forward delivery are indicative of the exceptional conditions prevailing. Clearly Eastern mills have no desire for additional business in some lines at least. Quotations are as follows: Standard railroad spikes, 2.75c., base; track bolts with square nuts, 3.25c. to

3.50c., base, all in carload lots, Chicago; tie-plates, $50, f.o.b. mill, net ton; standard section, Bessemer rails, Chicago, $33, base; open-hearth, $35; light rails, 25 to 45 lb., $40; 16 to 20 lb., $41; 12 lb., $42; 8 lb., $43; angle bars, 2c., Chicago.

Structural Material.—The number of small contracts placed last week plainly indicates that many projects involving no great quantity of steel, which have perhaps been held up by high prices, are now to be put through on the strength of the belief that further delay will avail nothing. The American Bridge Company will furnish 650 tons for the Montana Power Company, 270 tons of bridge steel for the St. Louis Southwestern Railway, 330 tons for the capitol building at Jackson, Miss., 660 tons for an Illinois Steel Company shop extension at Gary, 300 tons of bridges for the Denver & Rio Grande Railroad and an additional 400 tons in three other contracts. The building for the Western Crucible Steel Castings Company at Minneapolis will be fabricated by the Minneapolis Steel & Machinery Company and the Decatur Bridge Company will furnish 500 tons for the State Hospital at Alton, Ill. On Aug. 4 the price of structural material from mill was advanced $2 per ton, and we quote for Chicago delivery 2.789c.

We quote for Chicago delivery of structural steel from jobbers' stock 3.10c.

Plates.—The inquiry in this market for plates is unimportant except that which comes from the Pacific coast for shipbuilding purposes. A sale of this latter character involving 9000 tons was made last week on the basis of 3c., Pittsburgh. For the local scattering business, the status of the market is illustrated by one sale of tank plates of ordinary width at 3.25c. for delivery in three to four weeks, while another sale of plates, 92 in. wide, was made on the basis of 4c., Pittsburgh, delivery to be made in one month. Prices were advanced Aug. 4 from 2.90c. to 3c., Pittsburgh, and we quote for Chicago delivery from mills at their convenience 3.189c. For prompt shipment we quote 3.439c. to 3.689c.

We quote for Chicago delivery of plates out of jobbers' stock 3.50c.

Sheets.—Prices for galvanized sheets are again lower, and while the major portion of business booked last week was on the basis of 4.20c., Pittsburgh, for No. 28, one sale of No. 20 sheets is reported at the equivalent of 4.10c. Except for the little improvement in the interest attaching to galvanized sheets, little has been added to the activity in other grades. We quote for Chicago delivery, blue annealed, No. 16 and heavier, 3.089c. to 3.339c.; box annealed, No. 17 and lighter, 2.939c. to 3.039c.; No. 28 galvanized, 4.289c. to 4.389c.

We quote for Chicago delivery of sheets out of stock, minimum prices applying on bundles of 25 or more, as follows: No. 10 blue annealed, 3.40c.; No. 28 black, 3.10c. to 3.20c.; No. 28 galvanized, 5c. to 5.10c.

Rivets and Bolts.—The Wabash Railroad, whose inquiry for nuts and bolts was in the market last week, will not contract, it is understood, but will depend upon jobbers at St. Louis for its needs. Inquiry for both rivets and bolts is less than fair, but specifications are holding up well. We quote carriage bolts up to ⅜ x 6 in., rolled thread, 50-10-5; cut thread, 50-5; larger sizes, 40-5; machine bolts up to ⅜ x 4 in., rolled thread, with hot pressed square nuts, 50-10-10; cut thread, 50-10; larger sizes, 40-10-5; gimlet-point coach screws, 60; hot pressed nuts, square, $2.90 off per 100 lb.; hexagon, $2.90 off. Structural rivets, ¾ to 1¼ in., 4c. to 4.15c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

We quote out of store: Structural rivets, 3.75c.; boiler rivets, 3.85c.; machine bolts up to ⅜ x 4 in., 60-10; larger sizes, 50-10; carriage bolts up to ⅜ x 6 in., 60-5; larger sizes, 50 off; hot pressed nuts, square, $3.25, and hexagon, $3.25 off per 100 lb.; lag screws, 65.

Bars.—The announcement of the advance of $2 per ton in the price of bars came in the nature of a surprise to many users. The opportunity presented by some of the Western mills to their trade to contract for first half bars on the basis of 2.50c. was generally neglected, but several negotiations which were under way on the eve of the advance were closed, although the entire quantity of material bought was not large. Additional foreign buying is materializing in an amount tending to support mill statements as to the steel supply available in the first half to a greater extent than was anticipated. There is some improvement in the demand for iron bars, but the interest in rail-carbon steel mentioned last week, and which was followed by a number of sales in small quantities, has not assumed any larger proportions. The excessive heat continues to curtail mill production. A large steel mill reports losing 1000 tons a day, while some of the bar mills are off 25 per cent in their production. We quote mill shipment, Chicago, as follows: Bar iron, 2.35c.; soft steel bars, 2.789c.; hard steel bars, 2.50c.; shafting, in carloads, 25 per cent off; less than carloads, 20 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 3.10c.; bar iron, 3.10c.; reinforcing bars, 3.10c. base with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting 10 per cent off.

Wire Products.—The expected advance in the price of wire has been announced and quotations are up $2 per ton on nails, barb wire and similar products. No advance is announced on fencing or cement-coated nails. We quote as follows per 100 lb.: Plain wire, Nos. 6 to 9, base, $2.939; wire nails, $2.789; painted barb wire, $2.939; galvanized barb wire, $3.639; polished staples, $2.939; galvanized staples, $3.639; all Chicago.

Cast-Iron Pipe.—The pipe business of the week was of little consequence. Additional inquiry includes 200 tons for Sheridan, Mont., and 125 tons for Arnold, Neb. Several lettings scheduled for last week have carried over into the current week. We quote as follows, per net ton, Chicago: Water pipe, 4 in., $33.50 to $34; 6 in. and larger, $30.50 to $31, with $1 extra for class A water pipe and gas pipe.

Old Material.—The scrap market is exceedingly dull. On the one hand the merchandisers of scrap seem not to be especially desirous to sell, while the former apathy of consumers is accentuated by the fact that their operations have been curtailed by the hot weather and their consumption of scrap correspondingly reduced. Shipments of steel scrap to Gary on the recent order for that delivery have been temporarily stopped. Prices, however, reflect the reduced quantity of scrap offered for sale and are higher for a number of grades, particularly those having a sympathy with steel scrap. Railroad offerings include 2000 tons from the Big Four, 3500 tons from the Wabash, of which 2100 tons consists of carwheels, 800 tons from the Milwaukee and 500 tons each from the Soo Line and Pere Marquette. A sale of carwheels was made last week on the basis of $11.50, delivered, Chicago. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	$18.50 to $19.00
Relaying rails	19.50 to 20.50
Old carwheels	11.50 to 12.00
Old steel rails, rerolling	15.50 to 15.75
Old steel rails, less than 3 ft	15.75 to 16.00
Heavy melting steel scrap	15.25 to 15.50
Frogs, switching and guards, cut apart	15.25 to 15.50
Shoveling steel	14.75 to 15.00
Steel axle turnings	9.25 to 9.75

Per Net Ton

Iron angles and splice bars	$18.75 to $19.00
Iron arch bars and transoms	19.50 to 20.00
Steel angle bars	13.75 to 14.25
Iron car axles	25.50 to 26.00
Steel car axles	28.00 to 28.50
No. 1 railroad wrought	15.25 to 15.75
No. 2 railroad wrought	14.50 to 14.75
Cut forge	14.50 to 14.75
Pipes and flues	10.75 to 11.00
No. 1 busheling	12.25 to 12.75
No. 2 busheling	8.50 to 9.00
Steel knuckles and couplers	14.00 to 14.50
Steel springs	14.50 to 15.00
No. 1 boilers, cut to sheets and rings	10.25 to 10.75
Boiler punchings	13.75 to 14.25
Locomotive tires, smooth	20.00 to 20.50
Machine-shop turnings	5.50 to 6.00
Cast borings	6.00 to 6.50
No. 1 cast scrap	11.50 to 12.00
Stove plate and light cast scrap	9.25 to 9.75
Grate bars	10.00 to 10.25
Brake shoes	9.75 to 10.25
Railroad malleable	11.25 to 11.75
Agricultural malleable	10.75 to 11.25

Philadelphia

PHILADELPHIA, PA., Aug. 8, 1916.

The market is strong except in pig iron and old material. In view of the heavy production of finished products, the manner in which these raw materials lag behind, both as to activity and prices, causes much discussion. Pig iron is quiet, and lower prices are heard of in connection with the few transactions consummated. Old material is stagnant, except so far as steel axles for export are concerned. Plates continue to lead in demand. Bars are stronger; likewise billets. Deliveries of structural shapes are some months off, and they maintain their strength despite the lack of new projects involving their use. Some makers have not been able to consider the requirements of the Baldwin Locomotive Works for 26,000 tons of shell steel. Several hundred tons of sheet piling are under inquiry for prompt delivery in this vicinity. Reasonably prompt deliveries can be made of this product.

Pig Iron.—The monotonous quiet of the past few weeks was relieved to a slight extent last week by the purchase of two lots of around 1000 tons each, one consisting of gray forge for prompt delivery, taken at the minimum price, and the other divided among various grades, including some Virginia resale iron. The latter was taken by a Camden consumer, well known as a close buyer. Aside from these transactions, activity was confined to a few small scattering lots of small size. As might be expected, the present dullness has developed some soft spots and the range of quotations is wider than usually prevails. Eastern Pennsylvania No. 2 X is quoted from $19.50 to $20.25, delivered. Producers who are well sold up are inclined to hold their prices steady, but others will make concessions. Producers of Virginia iron, being sold ahead, assert that there has been no reduction in their quotations, but resale iron of their make which has been in speculative hands has been offered at substantial concessions, one sale having been made at $16.75, furnace, equal to $19.50, Philadelphia. Another Virginia brand has sold at $17.50, furnace, or $20.25, Philadelphia, prompt delivery. Basic, at $19, delivered, the price involved in the last sale, is quiet, although rumors of impending buying of moderate proportions are heard. Standard low phosphorus continues firm at $34 Philadelphia, and the supply is insufficient to meet the export demand. In one instance an export inquiry for 10,000 tons was turned down by a producer who did not wish to oversell. The high humidity of the past few days has lessened production. Burnham, Pa., and several points in New England are under embargo with respect to deliveries of iron. On the other hand, many foundries are suffering from a shortage in help which cuts down their melt, a phase of the situation which will enable some producers to give more attention to export requirements. Throughout the trade there is a strong feeling that the fall will bring heavy buying. Quotations for standard brands, delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa., No. 2 X foundry	$19.50 to $20.25
Eastern Pa., No. 2 plain	19.25 to 20.00
Virginia No. 2 X foundry	20.25 to 21.25
Virginia, No. 2 plain	20.00 to 20.75
Gray forge	18.50 to 19.00
Basic	19.00
Standard low phosphorus	34.00

Iron Ore.—Arrivals of foreign ore at this port in the week ended Aug. 5 were confined to 6400 tons from Spain.

Billets.—The only quotation for open-hearth rerolling billets obtainable from an eastern Pennsylvania producer, others being out of the market, is $45, mill. Bessemer billets can be had at the same figure, but at Pittsburgh base.

Ferroalloys.—The quotation for 80 per cent ferromanganese, domestic or foreign, and any delivery, is $175, seaboard, but it is conceded that the price for domestic material might be shaded, probably $5 per ton. The arrival is reported at this port last week of 300 tons of English ferromanganese. Spiegeleisen is quoted at $50, furnace. Fifty per cent ferrosilicon is strong at $86 to $88, Pittsburgh, according to quantity; its strength being due to the fact that, while consumption has greatly increased, production has remained about the same. For 11 per cent ferrosilicon the quotation is unchanged at $34.44, delivered.

Plates.—Mills are getting further behind in deliveries, rather than catching up. One Eastern maker quotes 4.159c., Philadelphia, on sheared plates, delivery in ten months. On universal it can do better, making delivery in six to eight weeks. It can supply flanged and dished heads in eight to ten weeks. Another important maker also asks 4.159c., but one whose output is restricted as to sizes quotes 3.659c. Several large inquiries are in the market, coming from various directions. Norwegian shipbuilding interests having plants in this country want about 20,000 tons.

Bars.—Bessemer bars, which are becoming scarce, have been advanced to 2.759c., Philadelphia. While the nominal quotation for open-hearth bars is also 2.759c., Philadelphia, some makers ask 2.909c. Inquiry for shell steel is coming before this market, one such inquiry from the Baldwin Locomotive Works calling for 26,000 tons of 6⅜-in. bars. Iron bars are strong at 2.659c., Philadelphia. An advance is considered likely in view of the higher quotation for steel bars.

Structural Material.—Inquiry from small consumers is somewhat more active, but projectors of large propositions continue to keep out of the market. As far as can be learned, the Pennsylvania Railroad has not bought against its inquiry for 10,000 tons of plates, shapes and bars for 1917 delivery. The hot weather is interfering with production to a considerable degree. Quotations range from 2.909c. to 3.159c., Philadelphia, although one maker will sell only Bessemer shapes at the lower price. Another specifies December and January shipments only. The naval program of the United States is expected to develop a good bit of work, and the Government is understood to have already done some feeling round in regard to prices and deliveries.

Sheets.—Quotations range from 3.159c. to 3.659c., Philadelphia, for No. 10 blue annealed, according to delivery.

Coke.—Troubles incidental to hot weather continue to affect the trade adversely. There is considerable activity in foundry coke, but most of the buyers want deliveries in box cars, and the men rebel from the hot task of loading such cars. Low grade heating coke has sold at $2.50 per net ton at oven. Spot foundry is quoted at $3.15 to $3.50 per net ton at oven, and contract at about the same figures. Furnace coke is quiet, with spot at $2.75 and contract at $2.50 per net ton at oven. Freight rates from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Old Material.—For a few hours the railroad embargoes against Coatesville plants were raised. A few cars which had been delivered to main lines by branches were disposed of, but the raising of the restriction was of too short a duration to do much good. Cars which have been loaded for months are yet to be delivered. In one case a car loaded in February has just been taken out of the way. Meanwhile no small amount of dealers' money is tied up. Up to $35 is said to have been offered in New York for steel axles wanted abroad. New domestic business continues stagnant. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania, and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$14.75 to $15.25
Old steel rails, rerolling	17.00 to 18.00
Low phos. heavy melting steel scrap	20.50 to 21.50
Old steel axles (nominal)	30.00 to 31.00
Old iron axles (nominal)	28.00 to 29.00
Old iron rails	20.00 to 20.50
Old carwheels	15.50 to 16.00
No. 1 railroad wrought	19.50 to 20.00
Wrought-iron pipe	12.50 to 13.00
No. 1 forge fire	12.50 to 13.00
Bundled sheets	12.50 to 13.00
No. 2 busheling	10.50 to 11.00
Machine-shop turnings	8.50 to 9.00
Cast borings	10.00 to 10.50
No. 1 cast	16.00 to 16.50
Grate bars, railroad	11.00 to 11.50
Stove plate	11.50 to 12.00
Railroad malleable	13.50 to 14.00

Cincinnati

CINCINNATI, OHIO, Aug. 9, 1916.—*(By Wire.)*

Pig Iron.—Buyers are taking more interest, although no transactions of note have featured the past week. The leading steam pump interest is asking for approximately 15,000 tons for first half shipment to be apportioned among its different plants, of which 1700 tons is intended for its Cincinnati foundry. A consumer in southern Ohio wants 700 tons of No. 1 foundry for this year's shipment. A northern Ohio melter is asking for quotations on 3000 tons of malleable for the same delivery, but frankly states that it may not place the order promptly. Another inquiry for 2000 tons of malleable is reported from Chicago territory. A St. Louis firm bought 700 tons of Lake Superior charcoal for shipment in the remainder of the year, and 500 tons of Southern foundry was taken by an Indiana melter with shipments extending into the first quarter of next year. The Southern market is weaker. While prompt furnace prices range from $14 to $14.50, Birmingham basis, it is reported that the lower figure can be shaded on desirable business for nearby shipment. Southern Ohio furnaces are not fighting for foundry orders, and as a consequence have been able to maintain regular market quotations. No additional basic sales have been made in this territory, and users of basic deny that they are in the market for a future supply. The Ohio silvery irons are unchanged at $27, furnace, for an 8 per cent analysis, but no orders have been reported lately. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	$17.40 to $18.40
Southern coke, No. 2 f'dry and 2 soft	16.90 to 17.90
Southern coke, No. 3 foundry	16.40 to 17.40
Southern coke, No. 4 foundry	15.90 to 16.90
Southern gray forge	15.40 to 16.40
Ohio silvery, 8 per cent silicon	28.26 to 28.76
Southern Ohio coke, No. 1	20.76 to 21.26
Southern Ohio coke, No. 2	19.76 to 20.26
Southern Ohio coke, No. 3	19.26 to 19.76
Southern Ohio malleable Bessemer	19.76 to 20.26
Basic, Northern	19.76 to 20.26
Lake Superior charcoal	21.20 to 22.20
Standard Southern carwheel	24.90 to 25.40

(By Mail)

Finished Material.—Galvanized sheets are a little weaker, No. 28 now ranging from 4.40c. to 4.50c., Cincinnati or Newport, Ky., but black sheets are unchanged around 3c. The mills report prompt shipment business as showing some improvement, but no efforts are being made to take long time contracts even at the present figures. The warehouse price on No. 28 galvanized sheets averages about 5.15c. Jobbers of finished material state that the slack is being taken up due to the inactivity in all lines of industry on account of the hot spell in July and that orders are now coming in at a much more satisfactory rate. As a rule, the local warehouses are able to make prompt shipments on twisted steel bars and other commodities, as they had contracted ahead, although there is some complaint as to mill shipments being slow. We quote from local stocks, steel bars and small structural shapes, 3.20c.; twisted steel bars, 3.35c.; plates, 3.50c.; wire nails, $2.75 per keg, base; barb wire, $3.60 per 100 lb., and No. 10 blue annealed sheets 3.50c.

Coke.—The foundries are consuming a slightly larger tonnage than last week's report indicated, but a number of shipments due are still being held up. No interest is taken in furnace coke as far as new contracting is concerned, but furnaces in southern Ohio are taking shipments as fast as they come forward. We quote contract Connellsville 48-hr. coke around $2.50 to $2.75 per net ton at oven and 72-hr. foundry coke around $3.25 to $3.50. Foundry coke in the Wise County and Pocahontas fields is quoted on a level with Connellsville prices with 25c. per ton added for special brands. New River foundry coke is stationary at $4 at oven.

Old Material.—Prices on all kinds of scrap are soft and a few small reductions are quoted on different grades. Business is not satisfactory, more scrap being received than is being shipped out. Both cast borings and steel turnings are hard to get rid of, and as a consequence quotations now are lower than probably in the history of the trade. Iron axles have taken an advance of $1 per ton. The following are dealers' prices to consumers, f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton

Bundled sheet scrap	$10.75 to $11.25
Old iron rails	15.50 to 16.00
Relaying rails, 50 lb. and up	21.00 to 21.50
Rerolling steel rails	14.50 to 15.00
Heavy melting steel scrap	14.00 to 14.50
Steel rails for melting	13.00 to 13.50

Per Net Ton

No. 1 railroad wrought	$13.25 to $13.75
Cast borings	4.50 to 5.00
Steel turnings	5.00 to 5.50
Railroad cast scrap	11.00 to 11.50
No. 1 machinery cast scrap	12.75 to 13.25
Burnt scrap	8.25 to 8.75
Iron axles	22.00 to 23.00
Locomotive tires (smooth inside)	19.75 to 20.25
Pipes and flues	9.25 to 9.75
Malleable and steel scrap	10.75 to 11.25
Railroad tank and sheet scrap	8.25 to 8.75

Cleveland

CLEVELAND, OHIO, Aug. 8, 1916.

Iron Ore.—Prospects continue to brighten for making an extraordinary record for Lake Superior ore movement this year, for several uncertainties appear to be disappearing after threatening to mar the present smoothness of operation. The advance of $10 a month in wages of Lake seamen, announced in the past week, is the second such advance this year, the previous one having been made at the opening of navigation. The regular October advance is also likely to come along as usual, in compensation for the more arduous autumn work. The Mesaba mine strike situation, which has caused some thought among shippers in the past few weeks, is scarcely mentioned now. The receipts of ore at lower Lake ports in July were 7,681,084 tons, out of a total of 9,750,157 tons shipped from Lake Superior mines. While several ore-carrying records were made in July, due to favorable weather, water and loading conditions, it is believed unlikely that further records will be established this year, since the recommended loading depth has been raised by the Lake Carriers' Association. Because of some labor difficulties at Superior, Wis., coal docks, more vessels seem to be available for ore loading this week. We quote ore prices as follows, delivered lower Lake ports: Old range Bessemer, $4.45; Mesaba Bessemer, $4.20; old range non-Bessemer, $3.70; Mesaba non-Bessemer, $3.55.

Pig Iron.—Keener interest is being shown in the pig iron market by consumers in northern Ohio, and is being put into the form of inquiries—the first demonstration of this sort in several months. Some of the inquiries received are for delivery in the last quarter of this year, tending to show expectation of increased melt, since various local labor disputes are being adjusted and foundries are preparing to operate on more extensive scales. One Cleveland consumer has bought several thousand tons of foundry iron at the going market price, while a fair sized inquiry has been put out by a Toledo interest. Southern pig iron is not selling here and quotations are soft. We quote, delivered Cleveland, as follows:

Bessemer	$21.95
Basic	18.45
Northern No. 2 foundry	$18.76 to 18.80
Southern No. 2 foundry	18.00 to 18.50
Gray forge	18.50
Jackson County silvery, 8 per cent silicon	28.62 to 30.62
Standard low phos., Valley furnace	32.00

Finished Iron and Steel.—The recently announced advances in steel bars, plates and shapes have had the effect of bringing upon mill representatives greater pressure for deliveries. Specifications are keeping up and as fast as any buyer lags, his tonnage is cut off the books. The structural steel advance, however, has had the effect of curtailing building somewhat. In the case of the Lasalle & Koch Building, planned for Toledo, and of which A. Bentley & Son are general contractors, it has been decided to turn from steel construction to concrete. In the original inquiry, 3500 tons of steel was asked. Keener competition is developing in blue annealed sheets, and it is understood 2.85c. has

been quoted on No. 10 to Cleveland consumers. Light plates are in good demand from local mills and prompt light plates are bringing 3.25c. to 3.50c.

Nuts, Bolts and Rivets.—Further improvement is noted in the volume of new inquiry for nuts and bolts, especially for prompt shipment. Generally quotations are being maintained on the new business appearing, particularly in the Cleveland district. An active demand for rivets is reported. We quote rivets at 4c., Pittsburgh, for structural and 4.10c., Pittsburgh, for boiler rivets for prompt and contract. Bolt and nut discounts are as follows:

Common carriage bolts, ⅝ x 6 in., smaller or shorter, rolled thread, 50 and 10; cut thread, 50; larger or longer, 40; machine bolts with h. p. nuts, ⅝ x 4 in., smaller and shorter, rolled thread, 50, 10 and 5; cut thread, 50 and 5; larger and longer, 40 and 10; lag bolts, gimlet or cone point, 50 and 10; square h. p. nuts, blank or tapped, $2.90 off the list; hexagon, h. p. nuts, blank or tapped, $2.90 off; c. p. c. and t. sq. nuts, blank or tapped, $2.60; hexagon nuts, all sizes, $3 off; cold pressed semi-finished hexagon nuts, all sizes, 60 and 10.

Old Material.—Extreme dullness still enshrouds the Cleveland market, with consumers of all grades apparently uninterested in what happens. Embargoes continue at various mills in which Cleveland dealers are interested and shipments are slow. Local mills seem well stocked with material and are not in the market. Machine shop turnings especially are weak, at $5.75 per net ton, in some Cleveland dealers' hands, while $5.50 in some cases is quoted. Heavy melting steel is unchanged. We quote f.o.b. Cleveland as follows:

Per Gross Ton

Steel rails	$14.75 to $15.00
Iron rails	18.50 to 19.00
Steel car axles	30.00 to 32.00
Heavy melting steel	15.00 to 15.25
Carwheels	12.75 to 13.00
Relaying rails, 50 lb. and over	22.50
Agricultural malleable	12.50 to 12.75
Railroad malleable	14.00 to 14.25
Steel axle turnings	12.00 to 12.50
Light bundled sheet scrap	12.00 to 12.25

Per Net Ton

Iron car axles	$24.00 to $25.00
Cast borings	6.00 to 6.25
Iron and steel turnings and drillings	5.75 to 6.00
No. 1 busheling	11.00 to 11.25
No. 1 railroad wrought (nominal)	15.00 to 15.50
No. 1 cast	13.00 to 13.50
Railroad grate bars	10.00 to 10.50
Stove plate	10.00 to 10.25

Buffalo

BUFFALO, N. Y., Aug. 8, 1916.

Pig Iron.—Although there is more or less inquiry for export, which, however, furnaces are too well sold up to consider, the domestic market is quiet. A good many melters have not yet bought to cover their full requirements for the last quarter, and when consumers get around to their needs for first half producers expect there will be a firming up. The price situation for the week is about the same as a week ago, with a range of $18 to $19 for foundry grades. We quote as follows, f.o.b. furnace, for last-half delivery, extending in some instances into first half of next year:

No. 1 foundry	$19.00
No. 2 X foundry	$18.50 to 19.00
No. 2 plain	18.50 to 18.75
No. 3 foundry	18.50 to 18.75
Gray forge	18.25 to 18.50
Malleable	18.50 to 19.00
Basic	19.00 to 20.00
Bessemer	21.00 to 22.00
Charcoal, regular brands and analysis	21.00 to 22.00

Finished Iron and Steel.—Some agencies report that the increase in price of steel bars, structural material and small shapes has stimulated interest in buying and considerable business is being offered outright for delivery at mills' convenience. In some lines deliveries are not obtainable under ten months. Inquiry for contract coverings into next year is reported. Quite a little buying of wire products is noted at the advance of $2 per ton. The demand for blue annealed, black and galvanized sheets has increased noticeably in the past ten days. Buffalo will take bids soon for a 1000-ton bascule bridge over Buffalo River at Abbott Road. The Lackawanna Bridge Company has taken 2500 tons for the open-hearth plant of the Brier Hill Company, in addition to the open-hearth extension made last winter.

Old Material.—The market shows about the same degree of activity as reported last week, with good demand for heavy melting steel, largely from outside territory. In other lines most of the sales made were of small tonnages. Prices are practically unchanged from a week ago. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	$15.50 to $16.00
Low phosphorus steel	20.00 to 20.50
No. 1 railroad wrought	17.25 to 17.75
No. 1 railroad and machinery cast scrap	15.50 to 16.00
Steel axles	30.00 to 31.00
Iron axles	26.00 to 27.00
Carwheels	13.00 to 13.50
Railroad malleable	15.00 to 15.50
Machine shop turnings	6.00 to 6.50
Heavy axle turnings	12.00
Clean cast borings	7.25 to 7.50
Iron rails	18.00 to 18.50
Locomotive grate bars	11.50 to 12.00
Stove plate (net ton)	11.00 to 11.50
Wrought pipe	12.00 to 12.50
Bundled sheet scrap	11.50 to 12.00
No. 1 busheling	13.00 to 13.50
No. 2 busheling	11.00 to 11.50
Bundled tin scrap	15.00 to 15.50

St. Louis

ST. LOUIS, MO., Aug. 7, 1916.

Pig Iron.—Buying has been at a standsill, melters continuing disposed to keep out of the market. Moreover, the intense heat which has prevailed in this territory has had the tendency to reduce melting, though there is good evidence that there is business ahead to be cared for later in the fall.

Coke.—No business has appeared involving any considerable tonnage. Melters are well supplied or at least well contracted ahead.

Old Material.—Scrap showed a distinctly better tone and the dealers began to buy during the week, though the steel plants and rolling mills, while nibbling at the market, placed no orders of consequence. It is, therefore, for the present a dealers' speculative market, with the belief strong that prices are going to be higher. For that reason prices are advanced quotably, though the transactions actually taking place do not altogether seem to warrant it as yet at least. Relaying rails are decidedly stiffer and hard to get at any price. Lists out during the week included 2000 tons from the Wabash, 425 tons from the Kansas City Southern, 500 tons from the Vandalia, 3000 tons from the Big Four and 1000 tons from the Union Pacific. We quote dealers' prices, f.o.b., customers' works, St. Louis industrial district, as follows:

Per Gross Ton

Old iron rails	$16.25 to $16.75
Old steel rails, rerolling	14.75 to 15.00
Old steel rails, less than 3 ft.	15.00 to 15.50
Relaying rails, standard section, subject to inspection	23.00 to 24.00
Old carwheels	11.50 to 12.00
No. 1 railroad heavy melting steel scrap	14.50 to 15.00
Heavy shoveling steel	13.50 to 14.00
Frogs, switches and guards cut apart	14.50 to 15.00
Bundled sheet scrap	8.00 to 8.50

Per Net Ton

Iron angle bars	$16.00 to $16.50
Steel angle bars	13.50 to 14.00
Iron car axles	24.50 to 25.00
Steel car axles	27.00 to 27.50
Wrought arch bars and transoms	19.50 to 20.00
No. 1 railroad wrought	14.50 to 15.00
No. 2 railroad wrought	14.25 to 14.50
Railroad springs	14.00 to 14.50
Steel couplers and knuckles	14.00 to 14.50
Locomotive tires, 42 in. and over, smooth inside	19.50 to 20.00
No. 1 dealers' forge	10.25 to 10.75
Cast-iron borings	6.50 to 7.00
No. 1 busheling	12.50 to 13.00
No. 1 boilers, cut to sheets and rings	9.50 to 10.00
No. 1 railroad cast scrap	11.00 to 11.50
Stove plate and light cast scrap	8.75 to 9.25
Railroad malleable	11.00 to 11.50
Agricultural malleable	10.00 to 10.50
Pipes and flues	10.50 to 11.00
Railroad sheet and tank-scrap	9.75 to 10.25
Railroad grate bars	9.50 to 10.00
Machine-shop turnings	7.00 to 7.50

Finished Iron and Steel.—A distinctly better tone is apparent and on structural material several good contracts were closed for future delivery, four in particular aggregating about 7500 tons. Specifications on existing contracts were also more active. At the same time there seemed no disposition to take protective

measures against the situation reported threatened by heavy transactions for export. While there were no inquiries for standard section steel rails, there were some attractive specifications reported on light rail contracts for coal mine use. No lumber road business appeared. Movement out of warehouse has continued good, with prices quoted as follows: Soft steel bars, 3.15c.; iron bars, 3.10c.; structural material, 3.15c.; tank plates, 3.55c.; No. 10 blue annealed sheets, 3.45c.; No. 28 black sheets, cold rolled, one pass, 3.30c.; No. 28 galvanized sheets, 5c.

Birmingham

BIRMINGHAM, ALA., Aug. 7, 1916.

Pig Iron.—The status of the local furnace-iron market is unchanged. Sales are of small lots and they bring around $15. Some metal, stated to be high in sulphur, the result of poor furnace work in July, was disposed of by one interest on a $14.50 basis. A lot of 500 tons for Sweden was booked and a small lot was sold for Norway. Some rush shipments to the Pacific coast have been made to anticipate advance in freight rates of $2.24 per ton Sept. 1. The movement generally is close to production, although the latter was in July, as in the eight preceding months, far ahead of all former records. Accumulations are at the rate of 5000 to 6000 tons per month. The long idle furnace of the Woodstock Corporation at Anniston is about to resume, with orders covering operations for some time to come. Crocker Brothers, New York, are financing and caring for the output. The Alabama Company is about to resume at its Gadsden stack, which will more than make up for the loss in output occasioned by the blowing out of one of the stacks at Ironaton. These furnace changes will add about 300 tons to the daily iron output of Alabama. Nothing further has been heard from the inquirers for round lots, to whom $15 was quoted for this year and $15.50 for next. Warrant iron is still seeking customers under furnace-iron rates. Some furnace metal has gone under $15, but not sufficient to establish a lower basis. Speaking of the future, an iron man in an especially advantageous poistion to observe and to speak disinterestedly, says: "My inclination to be rather pessimistic over the foundry-iron situation in the South has changed to one of something like optimism, and this change is occasioned by special effort to ascertain the situation. The steel trade is in the pink of condition, with order books well filled for months to come. The demand for basic will be immense. This will cause many furnaces to go on basic and restrict foundry production. I have heard of $14 Birmingham furnace iron and I have sent out men to find if this is true. In each instance, I have discovered that the reports were false. Alabama furnaces have for nine months made outputs far in excess of previous records, and, in spite of this, accumulations on yards during the lull in the buying movement have been very gradual. In the light of these conditions I am inclined to look for a maintainance of the $15 basis rather than a lower price. In fact, I would not be surprised to see higher prices for foundry iron prevail the last quarter of this year and the first quarter of 1917." We quote, per gross ton, f.o.b. Birmingham furnace, as follows:

No. 1 foundry and soft	$15.00 to $15.50
No. 2 foundry and soft	14.50 to 15.00
No. 3 foundry	14.00 to 14.50
No. 4 foundry	13.75 to 14.25
Gray forge	13.50 to 14.00
Basic	14.50 to 15.00
Charcoal	22.00 to 22.50

Cast-Iron Pipe.—Several satisfactory Western orders were secured the past week by pipe interests which had not been so active as others, while the more active plants continue to report a considerable volume of small orders. No big buying movement has set in, nor is one expected in the near future, but the water and gas pipe foundries are in good shape. The sanitary shops are on short time. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., $28; 6-in. and upward, $25, with $1 added for gas pipe and 16-ft. lengths.

Coal and Coke.—Coal prices are better than at this time last year. The output of steam mines is around 75 per cent of full production, while domestic mines are scarcely going more than three days per week. Coke has eased off, owing to the accumulations of furnace stocks occasioned by banking of furnaces during floods. Shipments are being rushed to the Pacific coast on account of the advance of $2 per ton in freight rates Sept. 1. Some beehive foundry coke can now be had for $4 per net ton at oven and the prevailing price is $4.25, with some at $4.50. Furnace coke remains at $3.25 to $3.50.

Old Material.—The market is listless except for a demand for export, in which case higher prices are offered, but no available ship room has been secured and hence no shipments have been made. Birmingham prices do not tally with those in the North because the classification here is more elastic. Steel axles would bring much more—as high as $30—were they available in quantities; but they are not. We quote, per gross ton, f.o.b. dealers' yards (prices to mill and foundry consumers), as follows:

Old steel axles	$22.00 to $30.00
Old steel rails	10.00 to 10.50
No. 1 steel scrap	9.25 to 9.75
No. 1 wrought scrap	12.50 to 13.00
No. 1 cast scrap	10.50 to 11.00
Extra heavy cast scrap	9.50 to 10.00
Stove plate and light	9.00 to 9.50
Old carwheels	9.50 to 10.00
Tram carwheels	9.50 to 10.00

New York

NEW YORK, Aug. 9, 1916.

Pig Iron.—An assorted inquiry from the International Steam Pump Company, taking in charcoal iron, Bessemer, low phosphorus, high phosphorus and foundry grades has just been put out for five plants. The total is about 16,000 tons. Deliveries are to be in the first half of 1917 and it is stipulated that the quotation shall remain good until the company is ready to buy. Apart from this there is practically no domestic inquiry, if exception be made of 1000 tons of malleable asked for by a Connecticut foundry for delivery in the next few months. The market for export iron is still interesting. One lot of 10,000 tons of Bessemer has just been asked for and a contracting firm inquiring for 3000 tons, of which 2000 tons is for Switzerland. The Swedish inquiry is for 4000 tons to replace Middlesbrough iron. The Dutch Government is in the market for 1000 tons. A sale of 2000 tons of Bessemer is reported through a New York office at $21, Valley furnace. The difficulty with exports is still that of getting vessel room. Figures have been asked on quite a little Southern iron, to go abroad. The New Haven road put an embargo on all shipments of coke and pig iron last week and this is still in force. We quote at tidewater for early delivery: No. 1 foundry, $20.50 to $21; No. 2 X, $19.75 to $20.25; No. 2 plain, $19.50 to $20; Southern iron at tidewater, $19.50 to $20 for No. 1 and $18.50 to $19 for No. 2 foundry and No. 2 soft.

Ferroalloys.—Some shipments from Great Britain which were made in July have arrived since Aug. 1, but British makers have cabled that thus far no licenses have been issued for August shipments. No urgency exists, however, and the domestic market continues to show a sagging tendency. It is evident that $170 is not the lowest that can be done on contract 80 per cent ferromanganese, and domestic makers have found a slow market. Ferrosilicon is strong, though some variations appear from the recent advance made by one seller, which gave a range of $86 to $88, Pittsburgh, the higher price being on carload lots. Ferrotungsten is easier, and recent offerings are reported on the basis of $4.50 per pound of contained tungsten.

Finished Iron and Steel.—Some of the largely nominal quotations have been advanced $2 per ton, and this fact with a better movement of specifications against contracts since Aug. 1 has given a turn to the sentiment developing in some quarters to the effect that some lopping off of prices would occur. The structural steel demand has not increased, and the sheet market is not active, but the narrower plates are perhaps in better demand. Pressure is developing from three sides: the prodigious demand from the Allies;

definite business from non-belligerent nations, and an increasing interest by the domestic consumer. In the case of the last there is some indication that the present period represents practically the first substantial attempt in a year to contract for a long period. The buying in the interim has been for specific jobs which were made to pay the cost, while up to the present it has still been possible to put into finished products steel which has been delivered under the yearly contract. Steel shapes are obtainable at 2.50c., Pittsburgh, but one mill is getting 2.75c. and higher for Bessemer steel delivered in 60 days. Steel bars seem now to be a minimum at 2.60c., Pittsburgh, with the deliveries at the convenience of the mill, while the Bessemer product lately obtainable at 2.50c., is difficult to secure at less than 2.75c., in 60 days. The situation in bar iron and plates has not changed materially, except less evidence of a search for business by the makers of the narrower plates. Little new work of size in the structural field has developed, but the Pennsylvania is asking prices on 14 bridges involving 1000 tons and Eastern bidding has been asking on 1000 tons for the Federal Rubber Company, at Cudahy, Wis. Other new work includes 430 tons for a power house for the American Gas Company at Waterloo, Iowa; 215 tons for a power house at Paulsboro, N. J., for the Vacuum Oil Company; 200 tons for an addition to the South Ferry Building, New York, and 260 tons for the Baltimore & Ohio at Defiance, Ohio. Structural awards include 600 tons for the Hotel Harrington addition, Washington, to Barber & Ross; 115 tons for the Baltimore & Ohio to the American Bridge Company, and 210 tons for the Bridgeport Savings Bank has been closed. In railroad cars the New York Central is asking for 1000 40-ton box cars. It is reported that the Baltimore & Ohio has bought 1500 second-hand hopper cars, a commentary on the attitude toward high prices of new rolling stock. In respect to the stability of prices in general, mention may be made of the closing of 5000 tons of cold rolled steel at 20 per cent off the list, representing a price twice the sum the buyer paid about a year ago. A firm quotation of 2.50c., Pittsburgh, on 10,000 tons of bars is also noted. We quote mill shipments of plain structural material at 2.669c. to 2.919c., New York; steel plates at 3.069c. to 4.169c., depending on the width of the plate as much as on delivery, and with universal plates easier by $5 to $10 per ton than sheared plates; steel bars at 2.769c. to 2.919c., the lower price for open-hearth steel at the convenience of the mill and little if any this year, with Bessemer bars in 60 days around 2.919c.; bar iron at 2.669c., New York. Out of warehouse we quote iron and steel bars and shapes at 3.25c. to 3.30c., New York, and plates at 4c. to 4.25c.

Cast-Iron Pipe.—The most interesting piece of news this week is the placing of an order for several thousand tons of pipe by the Eastman Kodak Company, Rochester, N. Y., with the Warren Foundry & Machine Company. The volume of business with private buyers generally is very good. Not so much is being done, however, in public lettings. The Department of Water Supply, Gas and Electricity of the city of New York will open bids Aug. 17 for a contractor's job for the Borough of Richmond (Staten Island), requiring about 100 tons. The city of Bloomfield, N. J., opened bids on about 130 tons on Monday evening of this week on which R. D. Wood & Co. were low bidders. No award has yet been made on the pipe for Troy, N. Y. Export inquiries are becoming much more numerous. Prices are firm, with a tendency to ask an advance for quick delivery. Carload lots of 6-in., class B and heavier, are quoted at $30.50 per net ton, tidewater, class A and gas pipe taking an extra of $1 per ton.

Old Material.—Old steel axles have lately been about the only commodity in good demand, being still wanted for export, while the supply is becoming limited. Relaying rails are offered somewhat freely and are lower. Trade generally continues extremely quiet, with practically no demand from steel works and rolling mills. One steel company in eastern Pennsylvania which has been a moderately good buyer for some time announces that its wants are now covered up to the end of this year. Brokers who purchase for the Pittsburgh market quote $13.25 to $13.50, New York, for heavy melting steel scrap of strictly high quality. Brokers quote buying prices for the Eastern trade about as follows, to local dealers and producers, per gross ton, New York:

Heavy melting steel scrap (eastern Pennsylvania)	$11.75 to $12.00
Old steel rails (short lengths or equivalent)	12.50 to 12.75
Relaying rails	27.50 to 28.00
Rerolling rails	16.00 to 16.50
Rerolling rails (for export)	19.00
Iron car axles	28.00 to 29.00
Steel car axles (for export)	34.00 to 35.00
No. 1 railroad wrought	17.50 to 18.00
Wrought-iron track scrap	15.50 to 16.00
No. 1 yard wrought, long	13.50 to 14.00
No. 1 yard wrought, short	11.75 to 12.00
Light iron (nominal)	3.50 to 4.00
Cast borings (clean)	6.75 to 7.25
Machine shop turnings (clean)	4.25 to 4.50
Mixed borings and turnings	4.25 to 4.50
Wrought pipe	10.00 to 10.25
Old carwheels (clean)	15.00 to 15.50
Malleable cast (railroad)	12.00 to 12.50

Foundries are buying little or nothing, their business apparently being limited. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

No. 1 cast (machinery)	$16.00 to $16.25
No. 2 cast (heavy)	14.00 to 15.00
Stove plate	11.00 to 11.25
Locomotive grate bars	10.00 to 10.25

British Steel Market

Some Activity in American 2-In. Billets and in Tin Plates

LONDON, ENGLAND, Aug. 8, 1916.

In pig iron the demand for forward delivery persists. Deliveries are closely regulated. Fears are expressed of greater tightness in hematite iron. Deliveries are quite inadequate and export business is curtailed.

American 2-in. billets have sold at £13 15s. In the tin-plate market, 200,000 boxes of oil plates have been placed at 29s. to 30s. Sales later were made at 30s. 9d. The market is very irregular. Quotations are as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales 29s. to 30s.
Steel black sheets, No. 28, export, f.o.b. Liverpool, £20.
Steel ship plates, Scotch, delivered local yards, £13 17s. 6d.
Steel rails, export, f.o.b. works port, £10 17s. 6d.
Hematite pig iron, f.o.b. Tees, about 140s.
Sheet bars (Welsh) delivered at works in Swansea Valley, £10 7s. 6d.
Steel bars, export, f.o.b. Clyde, £18.
Ferromanganese (nominal), £35
Ferrosilicon, 50 per cent, c.i.f., £29.

The Spanish Iron and Steel Situation

The report of the commissioner appointed by the Spanish Government to study the iron and steel situation in Spain was in substance as follows:

In spite of an abundance of high grade iron ore, iron manufacturers have been unable to increase output owing to the scarcity of coal and lack of facilities at blast furnaces. Of nearly 10,000,000 tons of Spanish ore mined in 1913 only about 1,000,000 tons was used in Spain, the rest having been exported. It is urged that more ore be smelted instead of exporting ore and importing finished iron and steel. One suggestion was embodied in a decree, published May 15, prohibiting the exportation of iron and steel scrap. Under present conditions this is to be permitted only when domestic demand is supplied. Nor can finished products be exported unless local needs are covered. Experts will be employed by the Ministry of Public Works to decide whether or not the domestic supply is sufficient. A board will be appointed to fix the maximum selling price of iron and steel, based on wages paid at different mines and on special local conditions.

The plant of the A. Dewes Company, manufacturer of stampings, dies and auto accessories, will be removed from its present location, 241 Centre Street, New York City, to 199 Lafayette Street, on Aug. 15. This change in location was made necessary by the business outgrowing the present quarters.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, effective from April 10, 1916, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c.; Pacific coast (by rail only), 65c.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 2.60c. to 2.75c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in. on one or both legs	.10
Angles, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive.	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive.	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Plates.—Tank plates, ¼ in. thick, 6 in. up to 100 in. wide, 3c. to 4c., base, net cash, 30 days, or ½ of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras

	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers)	.10
Boiler and flange steel plates	.15
"A B M A" and ordinary firebox steel plates	.20
Still bottom steel	.30
Locomotive firebox steel	.50

Marine steel, special extras and prices on application.

Gage Extras

Rectangular, ¼ in. thick, over 6 in. wide to 100 in. wide	Base
Lighter than ¼ in. to 3/16 in., up to 72 in. wide	.10
*Lighter than ¼ in., including 3/16 in., over 72 in. to 84	.20
*Lighter than ¼ in., including 3/16 in., over 84 in. to 96	.30
*Lighter than ¼ in., including 3/16 in., over 96 in. to 100	.40
*Lighter than ¼ in., including 3/16 in., over 100 in. to 102	.45
Lighter than 3/16 in., including No. 8, up to 72 in. wide	.15
*Lighter than 3/16 in., including No. 8, over 72 in. to 84	.25
*Lighter than 3/16 in., including No. 8, over 84 in. to 96	.35
Lighter than No. 8, including No. 10, up to 60 in. wide	.30
Lighter than No. 8, including No. 10, over 60 in. to 64	.35

Up to 72 in., not less than 10.2 lb. per sq. ft. will be considered ¼ in.

Over 72 in. must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.

Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.

Over 72 in., ordered weight 3/16 in., take No. 8 price.

Over 72 in., ordered weight No. 8, take No. 10 price.

Width Extras

Over 100 in. to 110 in. inclusive	.05
Over 110 in. to 115 in. inclusive	.10
Over 115 in. to 120 in. inclusive	.15
Over 120 in. to 125 in. inclusive	.25
Over 125 in. to 130 in. inclusive	.50
Over 130 in.	1.00

Length Extras

Universal plates 50 ft. long up to 90 ft. long	.05
Universal plates 90 ft. long up to 100 ft. long	.10
Universal plates 100 ft. long up to 110 ft. long	.20

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over

Lengths under 3 ft. to 2 ft. inclusive	.25
Lengths under 2 ft. to 1 ft. inclusive	.50
Lengths under 1 ft.	1.55
Circles 3 ft. in diameter to 100 in.	.30
Circles over 100 to 110 in. (width extra)	.35
Circles over 110 to 115 in. (width extra)	.40
Circles over 115 to 120 in. (width extra)	.45
Circles over 120 to 125 in. (width extra)	.75
Circles over 125 to 130 in. (width extra)	.80
Circles over 130 in. (width extra)	1.30
Circles under 3 ft. to 2 ft. inclusive	.55
Circles under 2 ft. to 1 ft. inclusive	.80
Circles under 1 ft.	1.85

Half circles take circle extras.

Sketches, not over four straight cuts, inc. straight taper	.10
Sketches having more than four straight cuts	.20

Plates sheared to a radius take complete circle extras.

*Including extra for width.

Wire Rods.—Including chain rods, $55 to $60.

Wire Products.—Prices to jobbers effective Aug. 5: Fence wire Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, $2.55; galvanized, $3.25. Galvanized barb wire and staples. $3.45; painted, $2.75. Wire nails, $2.60. Galvanized nails, 1 in. and longer, $2 advance over base price; shorter than 1 in.. $2.50 advance over base price. Cement-coated nails, $2.50. Woven wire fencing, 61½ per cent off list for carloads. 60 off for 1000-rod lots, 59½ off for less than 1000-rod lots.

The following table gives the price per 100 lb. to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	6 to 9	10	11	12&12½	13	14	15	16
Annealed	$2.60	$2.65	$2.70	$2.75	$2.85	$2.95	$3.05	$3.15
Galvanized	3.30	3.35	3.40	3.45	3.55	3.65	4.10	4.20

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect on black pipe from April 21, 1916, and on galvanized from July 24, 1916, all full weight pipe:

Butt Weld

Steel Inches	Black	Galv.	Iron Inches	Black	Galv.
⅛, ¼ and ⅜	63	35½	⅛ and ¼	5	24
½	67	51½	⅜	30	25
¾ to 3	70	55½	½	34	38
			¾ to 1½	60	43

Lap Weld

2	65	50½	1¼	48	31
2½ to 6	68	53½	1½	54	38
7 to 12	67	49½	2	55	39
13 and 14	63½		2½ to 4	51	42
15	51	..	4½ to 6	51	42
			7 to 12	56	41

Reamed and Drifted

1 to 3, butt	68	53½	¾ to 1½, butt	55	37
2, lap	63	48½	1¼, lap	43	25
2½ to 6 lap	66	51½	1½, lap	48	32
			2, lap	50	33
			2½ to 4, lap	52	36

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	59	40½	⅛, ¼ and ⅜	32	34
½	64	50½	½	34	43
¾ to 1½	68	54½	¾ to 1½	61	45
2 to 3	69	55½			

Lap Weld, extra strong, plain ends

2	63	48½	1¼	50	33
2½ to 4	66	52½	1½	54	39
4½ to 6	67	51½	2	54	42
7 to 8	61	44½	2½ to 4	51	45
9 to 12	56	40½	4½ to 6	48	44
			7 to 8	42	38
			9 to 12	45	33

Butt Weld, double extra strong, plain ends

½	55	43½	½	44	31
¾ to 1½	58	46½	¾ to 1½	47	34
2 to 2½	60	48½			

Lap Weld, double extra strong, plain ends

2	55	43½	1½	44	30
2½ to 4	57	45½	2	44	30
4½ to 6	56	44½	2½ to 4	46	35
7 to 8	51	35½	4½ to 6	45	34

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Sheets.—Makers' prices for mill shipments on sheets of U. S. standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Blue Annealed Sheets

	Cents per lb.
Nos. 3 to 8	2.95 to 3.20
Nos. 9 and 10	3.00 to 3.25
Nos. 11 and 12	3.05 to 3.30
Nos. 13 and 14	3.10 to 3.35
Nos. 15 and 16	3.20 to 3.45

Box Annealed Sheets, Cold Rolled

Nos. 17 to 21	2.70 to 2.80
Nos. 22 and 24	2.75 to 2.85
Nos. 25 and 26	2.85 to 2.90
No. 27	2.90 to 2.95
No. 28	2.95 to 3.00
No. 29	3.00 to 3.05
No. 30	3.15 to 3.25

Galvanized Sheets of Black Sheet Gage

Nos. 10 and 11	3.25 to 3.35
No. 12	3.30 to 3.45
Nos. 13 and 14	3.35 to 3.45
Nos. 15 and 16	3.45 to 3.55
Nos. 17 to 21	3.60 to 3.70
Nos. 22 to 24	3.70 to 3.80
Nos. 25 and 26	3.85 to 3.95
No. 27	3.90 to 4.00
No. 28	4.00 to 4.25
No. 29	4.25 to 4.35
No. 30	4.40 to 4.50

Boiler Tubes.—Discounts on less than carloads, freight to destination added, effective from April 15, 1916, are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1¼ in.	35	1¼ in.	27
1½ and 2 in.	47	1¾ and 2 in.	39
2¼ in.	44	2¼ in.	36
2½ and 2¾ in.	50	2½ and 2¾ in.	42
3 and 3½ in.	55	3 and 3½ in.	47
3½ to 4½ in. and 6 in.	56	3½ to 4½ in. and 6 in.	48
7 to 13 in.	46	7 to 13 in.	38

Locomotive and steamship special charcoal grades bring higher prices.

1¼ in. over 22 ft. and not exceeding 24 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin,	Lead		Spelter	
Aug	Lake	Electrolytic	New York	New York	St. Louis	New York	St. Louis
2	26.50	26.25	38.00	6.00	5.85	N.T.	N.T.
3	26.75	26.50	37.75	5.95	5.75	N.T.	N.T.
4	26.75	26.50	37.62½	5.95	5.75	N.T.	N.T.
5	26.75	26.50	... ...	5.95	5.75	N.T.	N.T.
7	26.75	26.50	37.75	5.95	5.75	N.T.	N.T.
8	26.75	26.50	37.67½	5.95	5.75	N.T.	N.T.

NEW YORK, Aug. 9, 1916.

Copper has a better tone, but is yet far from active. Tin is dull and lower, with supply in excess of needs. Lead is easy and does not seem to have been helped by the recent reduction. Spelter is lower in an indifferent market. Antimony has continued to decline, despite two or three good purchases.

New York

Copper.—In the past week there has been a little more doing but the market is far from being active. It is firm, however, and there is a tendency to ask a premium for spot. The resale metal which for some time has been practically making the market is about cleaned up. The trade is optimistic, and it is on this feeling that prices are held more stiffly. In the face of conditions, there has been some discussion as to why the large sheet copper mills should reduce their base price from 37½c. to 35c., as they did in the week. The London market stood yesterday at £124, against £125 a week previous. The exports this month, including yesterday, total 5966 tons. The June imports reached the record-breaking total of 19,500 tons (copper in all forms reduced to fine metal). In six months of this year the imports totaled 103,500 tons, whereas in all of 1915 they amounted to 137,500 tons. Spot and August electrolytic was quoted yesterday at 26.50c., cash, New York, although the real market was more in futures at around 26c. Lake is quoted nominally at 26.75c., cash.

Tin.—Such business as the week brought is hardly worthy of comment. The feature of the situation is that the market is overloaded with tin, especially Banca. One steamer which arrived Aug. 4 brought 1100 tons from Batavia, and this followed other large arrivals. Spot Straits was quoted yesterday at 37.67½c., New York, but Banca was to be had at 36.25c. It is estimated that about 4000 tons of the latter is available, the actual value of which cannot be realized. The arrivals this month total 1887 tons, and there is afloat 3285 tons.

Lead.—The American Smelting & Refining Company on Aug. 2 reduced its New York quotation from 6.50c. to 6c. The independent producers not only followed, but dipped below the new level of the leading interest, and have since been asking 5.95c., New York, with the probability that they would accept 5 points less. The outside quotation at St. Louis is 5.75c. Just after reducing its price the leading interest booked one or two good-sized export orders. The large business that was expected to follow the fixing of the 6c. level failed to materialize, consumers evidently thinking they should be able to buy at less. The exports of the month including yesterday total 429 tons.

Spelter.—The course of this metal has been very disappointing. It is dull and weak, with no signs of bettering in the near future. For the second time in the week, spelter was sold "under the rule" on the New York Metal Exchange, the reason being that buyers had failed to take metal for which they had contracted. Two carloads, or 100,000 lb., of prime Western spelter, en route from Illinois to this city were sold yesterday on the Exhange at 8.15c., St. Louis, which is about 10 points below the market. Spot at New York is quoted at 8.50c., and at St. Louis 8.25c. For November and December about 7.75c. is asked. Of interest is the preliminary report of C. E. Siebenthal, of the United States Geological Survey, on production in six months of this year. Production in that period was 330,922 tons. Deducting foreign and domestic exports, and stock on hand June 30, he figures the domestic consumption in six months at approximately 228,700 tons. Of great significance is the statement that stocks, Jan. 1, totaled 14,253 tons, whereas June 30 they had increased to 24,000 tons. He estimated the number of retorts building or contemplated June 30 at 22,188. The exports in the first week of August totaled 1975 tons.

Antimony.—Despite two or three sales of importance, the trend of the market has been downward, and spot Asiatic grades were to be had yesterday at 11c., a level which might have been shaded according to report. Speculative holders of the metal are anxious to dispose of it, even at a loss.

Aluminum.—Quotations are strong at 58c. to 60c. for No. 1 virgin metal, 98 to 99 per cent pure.

Old Metals.—The market continues somewhat active. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible	23.00 to 24.00
Copper, heavy and wire	22.00 to 23.00
Copper, light and bottoms	18.00 to 19.00
Brass, heavy	13.50 to 14.50
Brass, light	10.50 to 11.50
Heavy machine composition	17.50 to 18.50
No. 1 yellow rod brass turnings	13.75 to 14.75
No. 1 red brass or composition turnings	14.50 to 15.50
Lead, heavy	5.75
Lead, tea	5.25
Zinc	7.00 to 8.00

Chicago

AUG. 7.—Despite the advance in the foreign copper market and the high price of electrolytic, the local market for Lake and casting copper is unchanged. Tin, lead and spelter show decided reductions. Scrap metal prices are holding up strongly. We quote: Casting copper, 24.50c. to 25c.; Lake copper, 26c.; tin, carloads, 38.50c., and small lots, 40.50c.; lead, 5.95c.; spelter, 8.50c.; sheet zinc, 15c.; Cookson's antimony, 50c.; other grades, 14c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 18.25c.; copper bottoms, 16.50c.; copper clips, 17.50c.; red brass, 16c.; yellow brass, 12c.; lead pipe, 4.50c.; zinc, 5c.; pewter, No. 1, 27c.; tinfoil, 27c.; block tin pipe, 32c.

St. Louis

AUG. 7.—Metals have been weaker, closing to-day as follows: Lead, 5.92½c.; spelter, 8.37½c. to 8.75c., according to delivery; tin, 38½c.; Lake copper, 26c.; electrolytic copper, 25.50c.; antimony, 15c. In the Joplin ore district there was a slump of $5 in the price of zinc blende, with the average for the week's output of the district $59 per ton. Calamine averaged $40 and lead ore $66. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 7.50c.; heavy yellow brass, 10.50c.; heavy red brass and light copper, 14.50c.; heavy copper and copper wire, 17c.; zinc, 4.50c.; lead, 5c.; tea lead, 3.50c.; pewter, 25c.; tinfoil, 30c.

German Substitutes for Copper

War substitutes for the 6 per cent by weight of copper, which on the average goes into the manufacture of a German locomotive, are reported to be in part as follows: The fire-boxes and stays, previously of copper, are now made of cast iron. All the smoke and steam tubes and the oiling cocks and thin pipes are of weldless drawn steel. For the rod-bracings, axles, grease-boxes and the bracing parts, the difficulty is believed to have been overcome by using cast iron and a special alloy called flange metal which is a mixture of tin, lead and antimony. It is regarded as possibly dangerous to use this metal unless the pins and axle journals were previously bushed with white metal. Cast iron was used for piston-boxes, side valve rods, frames and lubricators, lubricator covers and step bearings. Bronze covered with vulcanized rubber, which was the standard metal for the various handwheels, is being replaced by cast-iron wheels covered with ordinary string or jute fabric. German engineers are now experimenting with a new rolling process for preparing the flange metal referred to, having an equivalent of bronze which will dispense with antimony. A question is raised as to the life of such engines.

Huge Additional Shell Orders

If there are no duplications in the orders as reported, recent business placed in this country by foreign governments has been distributed as follows: American Locomotive Company, 8-in. shells valued at $15,000,000 and 6-in. valued at $3,000,000; American Car & Foundry Company, 9.2-in. valued at $18,000,000; American Brake Shoe & Foundry Company, 9.2-in. valued at $22,000,000; Midvale Steel & Ordnance Company, 12-in. valued at $10,000,000; American Steel Foundries, contract valued at $20,000,000, and the Baldwin Locomotive Works, 6 and 12 in., valued at $15,000,000, making a total of $103,000,000.

It is to be noted that all of the munition orders now being placed and those still pending are for the large sized shells. In the beginning the great bulk of the orders were for 3-in. shells, but these are being supplied now by England and France. More recently the allies have begun to use the large size shells in greater quantities, especially in the great offensive movement that is now being pressed.

Important Aeroplane Companies Merged

The Wright-Martin Aircraft Corporation, incorporated in New York with $5,000,000 preferred stock and 500,000 shares of common stock of no par value, has taken over the Wright Company, 60 Broadway, New York, and the Glenn L. Martin Company of Los Angeles, Cal. The Wright Company has been making motors and automobiles, and the Martin Company aeroplanes. The merger follows the failure of a proposed consolidation with the Curtiss Aeroplane Company.

The Wright Company possesses the original Wright patents and has acquired the American rights for the Hispano-Suiza motor, which has been adopted as a standard by the French and Russian governments. It has contracts with both to supply 450 motors of that type. According to the announcement, the Wright Company will purchase all the stock of the Simplex Automobile Company which it already does not own. At the same time the Wright-Martin Aircraft Corporation will continue to produce Simplex automobiles.

Edward M. Hagar will be president. He now holds that position with the Wright Company. C. S. Jennison will be an associate vice-president with Glenn L. Martin.

Lake Ore Shipments in July by Ports

As shown in THE IRON AGE of Aug. 3, the shipments of Lake Superior iron ore down the Lakes in July broke all records. The totals by ports, with season shipments, and a comparison with 1915 are given below:

Port.	July, 1916.	July, 1915.	To Aug. 1, 1916.	To Aug. 1, 1915.
Escanaba	1,014,368	813,870	3,647,190	2,062,700
Marquette	680,779	567,359	1,834,919	1,114,360
Ashland	1,302,682	708,285	3,506,945	1,870,077
Superior	1,986,631	1,286,402	5,865,546	3,064,002
Duluth	3,012,492	2,114,649	9,755,482	6,710,460
Two Harbors	1,723,205	1,413,456	5,172,640	3,903,704
Total	9,750,177	7,204,021	29,36[illegible]724	18,725,303
1916 increase		2,546,136		10,640,421

Higher Freight Rates from Alabama to California

Announcement is made that the freight rate on pig iron from Birmingham, Ala., to California points (Pacific coast terminals) is to be advanced, effective Sept. 1, from $10.08 per ton to $12.32 per ton. Effective the same date, the freight rate on coke is to be advanced from $9.35 per ton to $11.35 per ton.

In the last fiscal year, ended June 30, according to statistics recently compiled, Alaska shipped through Seattle, to the markets of the United States, merchandise and precious metals valued at $65,946,000, of which about $17,000,000 consisted of gold and silver. The figures for the fiscal year 1916 were double those recorded for 1912.

Iron and Industrial Stocks

NEW YORK, Aug. 9, 1916.

Midsummer dullness has prevailed in the stock market, and prices have shown little change. The discouraging reports from great grain-growing sections in the West and the imminence of the struggle between railroad managers and employees have proved more effective agents of repression than the buoyant developments in industrial circles have been stimulants. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week has been as follows:

Allis-Chal., com.	21½	Republic, com.	45⅝ - 47⅛
Allis-Chal., pref.	74 - 74¾	Republic, pref.	110
Am. Can, com.	54 - 55⅜	Sloss, com.	42¼ - 43
Am. Can, pref.	110	Sloss, pref.	95
Am. Car & Fdy., com.	56⅛ - 59¼	Pipe, com.	19⅛ - 19½
Am. Car & Fdy., pref.	116	U. S. Steel, com.	86 - 87
Am. Loco., com.	67⅛ - 69⅞	U. S. Steel, pref.	117¼ - 118⅜
Am. Loco., pref.	101¼ - 102	Va. I. C. & Coke	44
Am. Steel Fdries.	50 - 52	Westing. Elec.	56 - 57⅞
Bald. Loco., com.	70¼ - 73⅛	Am. Rad., com.	393
Bald. Loco., pref.	105 - 105⅜	Am. Rad., pref.	133¼ - 135
Beth. Steel, com.	430 - 435	Am. Ship, com.	42 - 48½
Beth. Steel, pref.	126	Am. Ship, pref.	90½ - 91
Case (J. I.), pref.	85 - 86	Chic. Pneu. Tool	67½
Colo. Fuel	43 - 44	Lake Sup. Corp.	10¼ - 10⅞
Deere & Co., pref.	91½ - 92	Warwick	91¼ - 93¼
Gen. Electric	167¼ - 169⅞	Cruc. Steel, com.	66¾ - 68⅝
Gt. No. Ore Cert.	34¼ - 34⅝	Cruc. Steel, pref.	115¾ - 117½
Int. Harv. of N. J., com.	113¼ - 113¾	Harb.-Walk. Refrac., com.	95¼
Int. Harv. of N. J., pref.	118½	La Belle Iron, com.	53 - 54⅛
Lacka. Steel	69¾ - 71⅛	La Belle Iron, pref.	129½
Nat. En. & Stm., com.	21⅞ - 23	Am. Brit. Mfg., com.	18 - 25
N. Y. Air Brake	126 - 129	Can. Car & Fdy., pref.	74
Pitts. Steel, pref.	99½	Carbon Steel, com.	68
Pressed Stl., com.	47⅜ - 48½	Driggs-Seabury	95 - 100
Ry. Steel Spring, com.	43 - 44	Midvale Steel	60¾ - 62
Ry. Steel Spring, pref.	97½		

Dividends

Deere & Co., regular quarterly, 1¾ per cent, payable Sept. 1.

The Pittsburgh Steel Company, regular quarterly 1¾ per cent on the preferred stock, payable Sept. 1.

The American Radiator Company, regular quarterly, 1¾ per cent on the preferred stock, payable Aug. 15, and 4 per cent on the common stock, payable Sept. 30.

The By-Products Coke Corporation, regular quarterly, 1½ per cent and an extra of 1 per cent, payable Aug. 15.

The American Shipbuilding Company, semi-annual, 3½ per cent on the preferred stock, payable Aug. 15.

The American Smelting & Refining Company, regular quarterly, 1¾ per cent on the preferred stock, payable Sept. 1, and 1 per cent and an extra of ½ of 1 per cent on the common stock, payable Sept. 15.

The National Steel Car Company, Ltd., regular quarterly, 1¾ per cent on the preferred stock, payable Oct. 16.

The Studebaker Corporation, regular quarterly, 1¾ per cent on the preferred stock, and 2½ per cent on the common stock, payable Sept. 1.

The Wheeling Mold & Foundry Company, 2 per cent, payable Aug. 25.

The E. W. Bliss Company has issued notice that its $748,800 first mortgage 6 per cent bonds are called and may be redeemed at the Franklin Trust Company, 166 Montague Street, Brooklyn, on and after Oct. 1, at their par value, together with the 10 per cent premium provided for in the bond, mortgage and deed of trust. This is the only bonded indebtedness outstanding against the company. The bonds were dated April 29, 1902, were to become due April 1, 1932, and were issued to acquire the stock of the United States Projectile Company and several other companies.

The Canadian branch of the International Nickel Company, which is to undertake the manufacture of nickel in Canada, has been incorporated by Britton Osler, room 801 Dominion Bank Building, Toronto, W. A. J. Case and others. A meeting of the representatives of the Ontario Government will shortly be held in Ottawa, when the plans of the company and the question of the selection of a site will be taken up. The new plant will probably be built in units and will provide for a production of 12,000,000 to 15,000,000 lb. of nickel per year at the beginning.

Canadian Production of Iron and Steel

The American Iron and Steel Institute, 61 Broadway, New York, has published its special statistical bulletin No. 4 (1916), giving the production of pig iron, steel ingots and castings and all kinds of finished rolled iron and steel in Canada in 1915 and the production of pig iron in the first half of 1916. An abstract of this statistical presentation is given below:

Production of Pig Iron by Grades, Gross Tons, 1910-1915

Years	Basic	Bessemer	Foundry*	All Other	Total
1910...	365,090	221,494	143,986	9,640	740,210
1911...	413,303	186,274	190,324	34,467	824,368
1912...	489,799	228,742	194,208	129	912,878
1913...	558,324	227,662	225,231	3,701	1,015,118
1914...	331,456	184,053	174,346	16,117	705,972
1915...	660,369	13,714	125,769	25,568	825,420

*Includes ferrosilicon.

Production of Pig Iron by Fuels, Gross Tons, 1910-1915

Years	Coke	Charcoal*	Total	Years	Coke	Charcoal*	Total
1910.	724,174	16,036	740,210	1913.	986,848	28,270	1,015,118
1911.	799,716	24,652	824,368	1914.	690,880	15,092	705,972
1912.	886,506	26,372	912,878	1915.	803,646	21,774	825,420

*Includes pig iron made with charcoal and coke, electricity, etc.

Production of Pig Iron in First Half of 1916

Grades	First Half, 1915	Second Half, 1915	First Half, 1916
Basic	292,756	367,813	388,387
Bessemer	7,228	8,476	12,575
Foundry, ferrosilicon, etc.	59,646	66,123	98,802
All other	9,385	16,183	11,186
Total, gross tons	366,825	458,595	507,750

Production of Steel Ingots and Castings, 1910-1915

Years	Ingots	Castings	Total
1910	723,002	18,922	741,924
1911	768,559	22,312	790,871
1912	820,792	32,239	853,031
1913	1,006,149	36,354	1,042,503
1914	724,596	18,756	743,352
1915	873,265	39,490	912,755

The total for 1915 includes about 5000 tons of alloy steel ingots and castings, against about 4800 tons in 1914. In 1915 seven plants made Bessemer, eight open-hearth, two crucible, and three electric steel ingots or castings.

Production of Steel Ingots and Castings by Processes

Years	Open-hearth	Bessemer	Other Kinds	Total
1910	542,354	199,570	....	741,924
1911	601,074	189,797	....	790,871
1912	645,062	207,569	400	853,031
1913	768,663	273,391	449	1,042,503
1914	556,910	186,178	284	743,372
1915	884,736	22,521	5,498	912,755

Production of Finished Rolled Forms by Leading Products

Products	1911	1912	1913	1914	1915
Rails	360,547	423,885	506,709	382,344	209,752
Structural shapes and wire rods	76,617	64,082	68,048	59,050	114,829
Plates and sheets, nail plate, merchant bars, tie-plate bars, etc.	344,760	373,257	392,340	218,125	328,737
Total, gross tons	781,924	861,224	967,097	659,519	653,318

PRODUCTION OF CUT AND WIRE NAILS

We estimate the total production of iron and steel cut and wire nails in Canada in 1915 as amounting to 1,636,000 kegs of 100 lb., as compared with an estimated production in 1914 of 1,144,000 kegs, an increase of 492,000 kegs.

PRODUCTION OF ANGLE SPLICE BARS, ETC.

The production of angle splice bars, tie-plates, fish plates, and other rail joints and fastenings in Canada by rolling mills and steel works in 1915, all steel, not including spikes, bolts, nuts, and similar fastenings, amounted to 9406 gross tons, as compared with 34,165 tons in 1914, 54,839 tons in 1913 and 52,157 in 1912.

PRODUCTION OF CAST-IRON PIPE

We estimate the total production of cast-iron gas and water pipe and fittings and cast-iron soil and plumbers' pipe and fittings in Canada in 1915 as amounting to 53,700 net tons of 2000 lb., as compared with an estimated production in 1914 of 93,200 net tons, a decrease of 39,500 tons.

COKE BY-PRODUCTS IN 1915

Benzol at Record Figures in Output and Value—A Remarkable Showing

A bulletin prepared by C. E. Lesher of the United States Geological Survey deals with the outputs and values of various by-products of coke manufacture in the United States in 1915. The total value is put at $29,824,579, which compares with a previous high water mark of $17,500,000 in 1914. The table below gives the distribution of values and outputs:

	Quantity	Value	Av. Value
Tar obtained and sold, gal.	138,414,601	$3,568,384	$0.026
Ammonia obtained and sold:			
Sulphate, lb.	199,900,487	5,648,958	.028
Liquor, gal.	10,626,612	1,240,473	.117
Anhydrous, lb.	30,002,196	2,978,044	.099
Gas produced, M cu. ft.	213,667,614	.....	....
Surplus gas sold or used:			
Illuminating, M cu. ft.	17,196,426	3,083,311	.179
Domestic fuel, M cu. ft.	27,590,624	3,158,129	.114
Industrial fuel, M cu. ft.	39,568,864	2,383,459	.060
Benzol products:			
Crude light oils, gal.	13,082,678	4,304,281	.33
Secondary light oils, gal.	182,039	28,731	.16
Benzol, gal.	2,516,483	1,428,323	.568
Toluol, gal.	623,506	1,529,803	2.45
Solvent naphtha, gal.	196,151	46,233	.24
Naphthaline, lb.	465,865	46,959	.10
Other products[a]	.....	379,491	....
		$29,824,579	
Coke, net tons	14,072,895	48,558,325	3.45
		$78,382,904	

[a]Includes breeze, retort carbon, domestic coke and coke dust, and aniline oil.

The value of benzol products rose from less than $1,000,000 in 1914 to more than $7,760,000 last year. In 1914 there were 14 benzol plants in the United States, all controlled by one company. Last year 16 additional coke plants were equipped with benzol apparatus. The benzol products obtained amounted to 16,600,657 gal. More than 13,000,000 gal. was reported as crude light oil and had an average value of 33c. Some of the plants have their own stills and refineries, and the pure benzol reported from those sources amounted to 2,516,483 gal., with an average value of nearly 57c., at least three times the value of crude benzol before the war, and 623,506 gal. of toluol, with an average value of $2.45 a gallon. Crude benzol, which in 1914 was used to some extent for motor fuel, contained the toluol, which is now sold at fancy prices.

More than 138,000,000 gal. of tar was obtained from coke ovens and sold for $3,568,384 in 1915. The ammonia, of which nearly 100,000 tons was reported as sulphate and the remainder as liquor (10,626,612 gal.) and anhydrous ammonia (30,002,196 lb.), brought a total of $9,867,475 to the producers. Surplus gas to the extent of 84,356,000,000 cu. ft., valued at $8,625,000, was sold or used. Of that quantity 17,196,000,000 ft. was used as illuminating gas, 27,591,000,000 ft. as domestic fuel, and 39,569,000,000 ft. as fuel for steam raising, open-hearth furnaces, gas engines, and other industrial purposes. These by-products, which had a total value of $29,824,579, were obtained by the carbonization of 19,500,000 tons of coal, from which was also obtained 14,000,000 tons of coke.

It is not stated in the bulletin of the Survey what basis is used to obtain the average valuation of $3.45 for by-product coke. The first impression is that the figure is high, but it has to be considered that by-product coke is generally made at points remote from coal mines and therefore the freight on coal to point of manufacture enters into the valuation of the coke.

The A. P. Green Fire Brick Company, formerly the Mexico Brick & Fire Clay Company, Mexico, Mo., states that it has this year doubled the capacity and output of its plant, and in order better to serve its customers and take care of its greatly increased sales has opened district sales offices as follows: Tulsa, Okla., 312 Gallais Building, with George E. Ford, vice-president, in charge; Chicago, Ill., 208 South La Salle Street, with H. E. Risher in charge; St. Louis, Mo., with Robert H. Miller in charge. The general offices will continue to be located at the plant at Mexico, Mo.

PERSONAL

Fred E. Gage, superintendent of the Central works of the American Steel & Wire Company, Worcester, Mass., has been transferred to the Rankin, Pa., works of the same company. He is succeeded by Edwin F. Barnes, assistant superintendent of the North works, Worcester. Lester W. Perry, superintendent of flat wire departments, succeeds Mr. Barnes and Dennis O'Day assumes the position vacated by Mr. Perry.

C. Lee Cook of Louisville, Ky., gave a dinner on the evening of July 28 in the William Penn Hotel, Pittsburgh, Pa., to A. R. Hunt, former general manager of the Carnegie Steel Company. Mr. Cook is head of the C. Lee Cook Mfg. Company, machine tools, and has a reputation as a lecturer.

C. W. Price, safety expert of the Industrial Commission of Wisconsin since its creation, resigned Aug. 5 to accept the position of field secretary of the National Safety Council, with headquarters in Chicago. He assumes his new duties Sept. 1. He has gained an international reputation by his work in Wisconsin, and it is interesting to note that the National Council has adopted the Wisconsin idea of safety promotion as the basis for its safety program covering the entire country.

Otis C. Friend, sales manager of the Mitchell Motors Company, Racine, Wis., for five years, has resigned to become actively identified with the newly organized United Motors Company, New York, as vice-president and general manager.

H. W. Easterly, general manager of the Sheboygan Gas Light Company, Sheboygan, Wis., has resigned to accept a position as sales and field representative of the Sterling Motor Truck Company, Milwaukee, in Petrograd, Russia. The Sterling Company plans to enlarge greatly its foreign business, which has become an important part of its operations.

Charles E. Hendrixson, for years chief accountant for Robert Wetherill & Co., Inc., builder of heavy machinery, boilers and engines, but now a department of the Sun Shipbuilding Company, Chester, Pa., has been promoted to purchasing agent for the entire corporation. His headquarters will likely be in Philadelphia.

Charles J. Gadd has been appointed chief engineer of the Lebanon plant of the American Iron & Steel Mfg. Company at Lebanon, Pa., a new position created with the introduction of the efficiency system. He was formerly engineer in charge of construction.

Ralph G. Kirk, superintendent of construction for the Steelton plant of the Bethlehem Steel Company, has resigned.

Samuel G. Hoexter of Ann Arbor, Mich., has been made manager of the Engineers' Society of Pennsylvania, Harrisburg, Pa., to succeed Paul Gendell, who has resigned to become manager of the Du Bois, Pa., Chamber of Commerce. Mr. Hoexter, who is a graduate of the Stevens Institute of Technology, was a member of the faculty in the mechanical engineering department of the University of Michigan.

Wilfred G. Astle has been appointed purchasing agent for the Mathews Gravity Carrier Company, Ellwood City, Pa. He was formerly connected with the Canadian Pacific Railway Company, Dominion Power & Transmission Company and Toronto Electric Light Company. Articles by him on storekeeping and purchasing have appeared in some of the leading trade journals.

George T. Snyder, chief engineer at the McKeesport, Pa., works of the National Tube Company, has been transferred to a similar position at the company's Lorain works, Lorain, Ohio. He will be succeeded by A. L. Hoerr, formerly steam and hydraulic engineer at McKeesport.

Walter N. Polakov, formerly superintendent of power for the New York, New Haven & Hartford Railroad, and consulting engineer to the Board of Estimate and Apportionment of the city of New York, is now directing the foreign trade engineering work of David Vershbinsky, Inc., New York City.

Ralph W. Bingaman has resigned as engineer with the Communipaw Steel Company to become associated with the Morris Iron & Steel Company, both of New York City.

George S. Wheatley, instructor of mechanical engineering, University of Pennsylvania, has become associated with the Cambria Steel Company, Johnstown, Pa., in the engineering department.

John W. Morton, formerly connected with the designing department of the McIntosh & Seymour Corporation, Auburn, N. Y., has become chief draftsman of the Baltimore Oil Engine Company, Baltimore.

Henry W. Johnson has been appointed superintendent of the Putnam Machine Company, Fitchburg, Mass. He was formerly efficiency engineer of the Russell Burdsall & Ward Bolt & Nut Company, Port Chester, N. Y.

Conrad R. Adams has resigned his position of assistant engineer with the Chandler Motor Car Company, Cleveland, and has been appointed factory manager of the Sibley Machine Tool Company, South Bend, Ind.

O. C. Skinner has been appointed superintendent of the Standard Steel Works Company, Burnham, Pa.

L. H. Mesker has been appointed sales manager of the Kearney & Trecker Company, Milwaukee. He was formerly in charge of the company's interests in Ohio and will continue to supervise this territory through the Cleveland office in addition to having complete charge of the sales department.

C. H. McMillan, manager of the steel department of the Canada Cement Company, Montreal, has resigned. His successor is C. Stendol, who was formerly with the Dominion Steel Corporation and previously with the Algoma Steel Company.

Merritt H. Barnes, formerly attached to the Boston office of the Prentiss Tool & Supply Company, New York, has been appointed manager of the Scranton territory for the company, succeeding S. A. McFadden.

Melbert W. Taber, formerly manager of maintenance and construction of the Packard Motor Car Company, has resigned to accept a position with the Asbestos Protected Metal Company, Pittsburgh, as manager of its Detroit offices, located in the Penobscot Building, Detroit, Mich.

John Flatley, formerly superintendent of the tube mill at Welland, Ont., has resigned to accept a similar position with the Jones & Laughlin Steel Company at Woodlawn, Pa. Previous to this, Mr. Flatley was employed in the tube mills at Youngstown, Ohio.

D. F. Geissinger, formerly in the machine-tool department of the Baird Machinery Company, has resigned to accept a similar position with the Somers, Fitler & Todd Company, Pittsburgh, effective Aug. 1.

Titanium Exports Large

Exports of ferro-carbon-titanium have assumed large proportions since the war started. Exports to England alone, as given by the Titanium Alloy Mfg. Company, are as follows:

1914	170,240 lb.
1915	471,500 lb.
1916 to June 1	594,756 lb.

In addition, considerable shipments have been made to Japan. The demand is reported large, but expansion of production is dependent on the question of power.

The Secretary of State of Wisconsin awarded the contract for manufacturing approximately 120,000 pairs of sheet metal license plates for automobiles for 1917 to the Green Bay Cornice & Corrugating Company, Green Bay, Wis., at 9½c. per pair. The State paid a St. Paul contractor 9c. per pair for 1916 plates. In 1915 the plates cost 14c.

Pittsburgh and Nearby Districts

The Brier Hill Steel Company, Youngstown, Ohio, has authorized the construction of two 100-ton open-hearth furnaces, to be completed before the end of the year. The contract cost of furnaces and equipment will be $750,000 as compared with $500,000, the cost of two furnaces completed earlier in the year. The new capacity will increase the company's monthly output from 45,000 to 55,000 tons and eliminate it as a merchant pig-iron producer. It now has 10 open-hearth steel furnaces and two 500-ton blast furnaces.

The Apollo Refractories Company, West Apollo, Westmoreland County, Pa., with a capital stock of $10,000, has been incorporated by Walter A. McGeary, Earl A. McKeever, S. A. McKeever and C. R. Stewart, all of Johnstown, Pa., and J. T. Stewart, Twenty-ninth and Montgomery streets, Philadelphia, to manufacture brick, fire-clay and other refractory products.

The Allen Machine Company, Erie, Pa., will enlarge its plant and install some additional machinery.

The Erie City Iron Works, Erie, Pa., is making a number of improvements to its plant and will replace some of its present old crane equipment with new 25, 20, 15 and 5-ton Niles cranes.

The Fawcus Machine Company, Pittsburgh, Pa., is in the market for a horizontal drilling, boring and milling machine, with floor plate complete, having about 60-in. horizontal and vertical movement, a 5-in. spindle and a 48-in. feed for motor drive, either new or second-hand in good condition.

The Kirk Supply Company, Pittsburgh, will open an office in Cleveland, Ohio, in charge of L. J. Saltsman.

Fire of unknown origin destroyed the machine shop of the Carroll Foundry & Machine Company, Bucyrus, Ohio, Aug. 3. The loss is said to be close to $100,000.

Stockholders of the Youngstown Iron & Steel Company have re-elected the old board of directors as follows: John O. Pew, Mason Evans, Henry W. Heedy, C. D. Hine, Charles B. Cushwa, Lucius B. McKelvey, G. F. Danielson and C. A. Cochrane.

The W. B. Pollock Company, Youngstown, has received an order from the Midvale Steel Company, Coatesville, Pa., for four new blast-furnace stoves in connection with the previous order for a new 500-ton stack.

The new by-product coke-oven plant of the Youngstown Sheet & Tube Company will be placed in operation as soon as a sufficient number of laborers can be secured.

The Stimple & Ward Company, Pittsburgh, with a capital stock of $30,000, has been incorporated by George L. Stimple, John C. Ward and William S. Peters, to manufacture electrical machinery.

The Westinghouse Garage & Supply Company, Turtle Creek, Pa., with a capital stock of $16,000, has been incorporated by J. G. McFeathers and J. S., William L. and R. J. Cunningham, to repair automobiles.

The Pittsburgh Paige Company, Pittsburgh, with a capital stock of $65,000, has been incorporated by J. M. Sterling, 3134 Avalon Avenue, Pittsburgh; John M. Martin and Max Harris to manufacture and sell automobiles.

The Universal Inspection Company, Pittsburgh, with a capital stock of $9,000, has been incorporated by Harry G. Clack, 409 Twelfth Avenue, Pittsburgh; James E. Newlands, Crafton, Pa., and Charles N. Turner, Munhall, Pa., to inspect and test structural work, machinery, etc., and to make chemical analyses.

Morris Knowles, Inc., Pittsburgh, with a capital stock of $20,000, has been incorporated by Morris Knowles, John M. Rice and Maurice R. Schraff, 2541 Oliver Building, Pittsburgh, to engage in a general engineering and erection business.

The J. E. Williamson Company, Bellwood, Blair County, Pa., with a capital stock of $10,000, has been incorporated by J. E. and C. H. Williamson and H. E. Giant, to manufacture iron and steel castings.

The J. S. Miller Machinery Company, with a capital stock of $25,000, has been incorporated by John S. Miller, 1420 Barnesdale Street, Pittsburgh; Eugene S. Reilly and J. Frank McKenna, to manufacture machinery, machine tools and equipment.

Standard Metalwork Company's Growth

The Standard Metalwork Company, Thompsonville, Conn., capitalized at $300,000, has assumed the liabilities and business of the old corporation of the same name and retained the same officers, who have had control of the affairs of the business of the company for the past ten years. From the early days of the automobile industry this establishment has furnished engine parts, mainly manufactured from tubing, to nearly all of the better makes of cars of the country and at the present time has more unfilled orders on its books than it has ever been able to manufacture in any one single year. With the recent taking over of the adjoining plant of the G. H. Bushnell Press Company and other large increase of capacity, it proposes to expand its output very considerably.

Besides the automobile trade in which it has long been conspicuous, the company has for the past five or six years been successfully manufacturing specialties in war munitions for the United States and South American governments, and since the present war began for European countries. It now has very desirable repeat contracts in this line. On its books are large orders for other metal specialties.

Torrington Manufacturers Unite

The Employers' Association of Litchfield County is the name of an organization formed by manufacturers in and near Torrington, Conn. It will pursue the usual activities of associations of its type, including an employment bureau. Permanent headquarters have been engaged in the building of the Torrington Chamber of Commerce and a salaried secretary will be employed. Among the members are the Hendey Machine Company, Union Hardware Company, Turner & Seymour Mfg. Company, Coe Brass Branch of the American Brass Company, Torrington Company (including the Excelsior Needle Company), Standard Company, Progressive Mfg. Company, and Torrington Mfg. Company. L. G. Kibbe, president Turner & Seymour Mfg. Company, is president; C. H. Alvord, Hendey Machine Company, first vice-president; Thomas W. Bryant, Union Hardware Company, second vice-president; Frank M. Travis, Torrington Electric Light Company, treasurer; and George D. Lyford, formerly with the Union Hardware Company, secretary. Thomaston, Winsted and other towns of the county will be represented in the association.

Increase in Industrial Accidents

High speed in production and the employment of many unskilled men in the demand for workers are blamed for a considerable part of the increase in the number of fatal accidents in Pennsylvania industries, in a report issued by the Department of Labor and Industry covering the first six months of the year. In this period 1136 persons were killed in Pennsylvania manufacturing plants, compared with a total of 1203 for all of 1915.

A report made by the Maryland State Industrial Accident Commission also shows a large increase in accidents. The report shows that in the twelve months ended Nov. 1, 1915, there were 20,469 accidents in the State, 121 of them fatal, while in the nine months from Nov. 1, 1915, to Aug. 1, 1916, there were 22,309, of which number 127 were fatal.

After a run of 3 years, 7 months and 18 days, during which time it produced 598,245 tons of pig iron, D blast furnace at the South Bethlehem plant of the Bethlehem Steel Company has been blown out for repairs. An effort is being made to have this work completed inside of six weeks instead of the two or three months usually required. Work on the remodeling of B stack, which is being brought up to 500-ton capacity, is being pushed.

OBITUARY

Thomas J. Drummond

Thomas J. Drummond of Montreal, long prominent in the Canadian steel trade, died at his summer home in Castine, Me., Aug. 6. He had been in ill health for several years and since 1912 had not taken an active part in several of the enterprises in which he had been a leading figure. Mr. Drummond became well known as a member of the firm of Drummond, McCall & Co., Montreal iron and steel merchants, which was established in 1881 by George E. Drummond and James T. McCall. He organized the Montreal Car Wheel Company, the Canadian Iron Furnace Company of Montreal and Radnor Forges, Quebec, and the Drummond-McCall Pipe Foundry Company. His most important activities in steel manufacture were in connection with the Lake Superior Corporation, of which he was president; the Algoma Steel Company, its subsidiary, at Sault Ste. Marie, Mich., the Algoma Central Railway and the Canada Iron Corporation. He was a director of the American Iron and Steel Institute, and in its earlier history took a prominent part in its New York meetings. In 1911 he was one of the Institute's representatives in the international steel meeting at Brussels, Belgium. Mr. Drummond was a director of the Royal Bank of Canada, the Western Canada Power Company, the General Accident Insurance Company, the Canadian Car & Foundry Company and the Cockshutt Plow Company. He was born in the County of Leitrim, Ireland, in 1860, and was educated in the public schools of Montreal.



THOMAS J. DRUMMOND

Hugh W. Adams

Major Hugh White Adams, for many years prominent in the pig-iron trade of New York City, died Aug. 7 at his home in Yonkers, N. Y. He was born March 27, 1843, at Barbourville, Ky. In 1861, when but 18 years old, he was offered a commission in the Union Army but declined as he had no military training. He enlisted in July, 1861, as a private, and later was promoted to sergeant-major and then to adjutant. For bravery in assuming command of his regiment and moving it under fire at Vicksburg, Miss., he was made major in February, 1863. At Fort Gibson, May 1, 1863, at the age of 20, he commanded his regiment in battle. Major Adams's connection with the iron trade dates from 1874 when he opened an office for the sale of pig iron at 56 Pine Street, New York. He removed in 1892 to 15 Beekman Street, where his office remained until his death. He was best known in his representation of Southern pig-iron producers, particularly the Sloss-Sheffield Steel & Iron Company, whose iron he sold in the Eastern market for many years. In fact, Major Adams was largely instrumental in introducing Alabama pig iron in the Eastern market. He also had the sale for a time of the pig iron of the Tennessee Coal, Iron & Railroad Company. Among Northern furnaces which he represented some years ago were Wharton, Macungie and Musconetcong, and he also for a time sold the pig iron of the Reading Iron Company.

C. F. AUGUST SCHLUTTER, president Schlutter-Zastrow Machine Company, 1404 to 1410 Thames Street, Baltimore, died in a local hospital Aug. 2, aged 39 years. For a number of years he was connected with the Calvert Machine Company, and last April organized the Schlutter-Zastrow Company. A few weeks after assuming charge of the factory of the new company he was taken ill, but recovered somewhat, and was able to resume his duties, but only for a short time.

GEORGE B. ROBERTS, Cambridge, Mass., for many years a manufacturer of steam boilers, died at Marblehead, Mass., Aug. 3, aged 82 years. He was a partner in the old firm of Kendall & Roberts, and later organized the Roberts Iron Works Company, Cambridgeport.

CHARLES D. PECK, shop superintendent for the H. K Porter Company, Pittsburgh, and his wife were killed when a train struck their automobile at Westfield, N. Y., Aug. 4.

Possible Taxes on All Metals

WASHINGTON, D. C., Aug. 8, 1916.—The Senate Finance Committee has decided to reconsider the action by which the House provision imposing a tax on the production, smelting and refining of copper was recently eliminated from the omnibus revenue bill now under consideration. It is proposed in lieu of abandoning the copper tax entirely to provide a tax on all metals entering into the manufacture of munitions, including iron and steel. These taxes would be imposed in addition to the tax on the profits of munition makers provided for in another section of the pending bill.

No feature of the revenue bill, as passed by the House, has provoked so much controversy as the special tax on copper, and it is now probable that this feature of the bill will not be definitely determined by the majority members of the Finance Committee until after the final caucus of the majority Senators. Inasmuch as this question is under consideration by a special subcommittee and by the full Finance Committee and will be taken up at each of the series of caucuses to be held before the bill is finally reported to the Senate, statements as to the ultimate determination of the matter that may appear in the daily press from time to time should be received with due caution.

It is expected that the Finance Committee will be ready to report the revenue bill to the Senate some time next week but its consideration is likely to be deferred until after the Administration's shipping bill is disposed of. W. L. C.

The Northeast Coast Institution of Engineers and Shipbuilders, Newcastle-on-Tyne, England, has appointed a research committee, which has made a start with its work by acceding to the request of a British firm to investigate and carry out exhaustive tests of apparatus having for their object the more economical production of power by marine steam engines. By its action, the society named will be the first of the influential British technical institutions actively to promote the progress of the industries with which its members are associated by officially making and recording tests of new apparatus developed by them.

The Buffalo Union Furnace Company, which blew out its A furnace at Buffalo for relining in July, expects to have it in operation by Sept. 1.

STRIKES AND SETTLEMENTS

Milwaukee Developments

MILWAUKEE, AUG. 8.—(*By Telegraph.*)—The leaders of the machinists' strike called out the men of the Chain Belt Company to-day, but only 35 walked out. Yesterday the National Brake & Electric and the Wisconsin Motor Mfg. companies were restruck, a total of 22 leaving. Secretary William J. Fairbairn of the Metal Trades and Founders' Association says no change has been made in the policy of employers. All are operating with much less inconvenience than anticipated.

Activity of strike leaders at Milwaukee during the week ended Aug. 5 was of less proportions than in any weekly period since the first walkout on the 8-hr. demand was called on July 18. Enthusiasm appears to be waning, owing to acknowledged dissatisfaction in the ranks of the strikers over the alleged lack of preparedness and organization. Further strikes were declared in the shops of the Bucyrus Company, South Milwaukee, on Wednesday and the National Brake & Electric Company, Milwaukee, on Friday on the claim that the shops affected attempted to put men on work received from shops with men on strike. No walkouts were declared Thursday and none on Saturday. Strike leaders claim that approximately 4000 men from 20 shops walked out between July 18 and Aug. 5. An employment bureau has been established by the union leaders and assessments are now being levied on other divisions of the federated trades for the benefit of striking machinists.

Ohio Labor Conditions

In Cincinnati the machinists' recent strike has proved a complete failure. The majority of shops are now working more men than they were the day before the strike was called.

In Dayton machinists last week made demands on about 40 plants. These demands covered the usual 8-hr. day, with time and one-half for over hours and double time for holidays. Recognition of shop grievance committees is also demanded, which, if granted, would mean a tacit recognition of the union. No strike has yet been called, and it is reported on good authority that the International Association of Machinists promised to give its moral support to the movement but refused financial assistance, so that no serious trouble is feared.

At Springfield and Columbus conditions are unchanged. The few shops previously affected in these cities have been able to fill the places of the men who went out.

Charles Bendheim, commissioner of conciliation of the United States Department of Labor, is in Youngstown, endeavoring to harmonize the striking machinists and their employers.

San Francisco Conditions

The law and order committee of the Chamber of Commerce of San Francisco has decided to assist structural steel erectors in their efforts to open their plants on an open-shop basis "to the extent that they need support." The erectors will take back union or non-union men without discrimination, and there will be no change in wages or hours. The employees of the structural steel firms went on strike July 10, demanding an 8-hr. day at the same wages now paid for 9 hr. On July 25 the Building Trades Employers' Association, with which the structural employers are affiliated, demanded of the Building Trades Council that all strikers return to work under the old conditions on or before Friday morning, July 28. The strikers did not return, and therefore the declaration has been made for the open shop.

Eastern Pennsylvania Note

Negotiations under way for several weeks between the machinists of the Reading Railroad shops in Pottsville and the company's officials came to a satisfactory close Aug. 2, when the men were awarded a wage increase of 5 per cent and time and quarter time for over hours. This is the second 5 per cent increase they have received this year, the working time of all the shop employees having been cut from nine to eight hours without a reduction in wages.

Engine Works to Be Erected in Scotland for Women

A metal-working plant to admit women operatives only is to be erected in Scotland, according to *The Engineer*, of London. It is said the works will be in operation by early autumn and at first parts for aeroplane engines will be made. Later on the plan is to build complete aeroplane engines.

The works themselves will be open only to well-educated women between the ages of 20 and 35 who show a bent for mechanics, and in choosing the workers preference will be given to widows and daughters of officers in the army and navy.

One feature of the working of the scheme is that the amount of remuneration given will be decided by means of examinations. The first six weeks are to be regarded as a probationary period, during which payment will be at the rate of £1 per week. At the conclusion of that time those who have shown that they do not have the necessary mechanical instinct will be told that they cannot remain, and with the others agreements will be made to work for certain periods. The examinations are to be held at the end of each six months, and on the result of these the wages are to be gaged. The actual amounts to be paid are not yet definitely settled, but it is apparently probable that the lowest will not be less than 25s. per week, and that as much as £250 a year may be reached. There are to be night and day shifts, each shift being divided into two periods of 4 hr. each. The interval between the two halves of the day shift will be 2 hr. long, and during one-quarter of it technical instruction will be given in classes which will have to be attended by those in their probationary period, though attendance will be optional for those who have passed it.

Lake Seamen's Wages Raised

At a meeting of the board of directors of the Lake Carriers' Association in Cleveland, Aug. 3, all Lake seamen below licensed officers were granted a raise of $10 per month in wages for the period from Aug. 1 to Oct. 1. The directors recommended that the question of additional remuneration for licensed officers be taken up at a later meeting of the vessel owners, and that they be given proper recognition for their efficiency during the heavy freight movement of this season. This recognition will probably take the form of a distribution of earnings among the licensed officers at the close of the season.

The American Uniform Boiler-Law Society, which was organized to bring about the legal adoption in the different States of the country of the boiler code drawn up by the American Society of Mechanical Engineers, held a meeting of the administrative council on July 11 in New York City. The council was continued with the same representatives of different classes of boiler manufacturers and of the large users, of handlers of boiler materials and of the boiler insurance companies as have directed its affairs up to date. Thomas E. Durban, general manager Erie City Iron Works, Erie, Pa., thus continues as chairman of the council.

Frederic B. Stevens, of Detroit, has published as a pamphlet with an odd cover an address he delivered before the Western Box Manufacturers' Association, a talk before the Rotary Club, Detroit, a contribution to the Michigan *Investor* on "Giving the Credit and Getting the Money" and two or three other articles and sketches from his pen, all being grouped under the title, "That and This." Mr. Stevens's engaging style is familiar to members of various manufacturers' organizations that have visited Detroit, and the present publication adds to the reputation he has gathered as an after-dinner speaker.

Judicial Decisions

ABSTRACTED BY A. L. H. STREET

VARIATIONS FROM SPECIFICATIONS IN MANUFACTURING PARTS.—A buyer of mechanical parts specially manufactured for him will not be heard to complain of variations from the specifications as to dimensions, if they are so slight as to be inconsequential, but there must be literal conformity to the specifications when that is necessary to apply the parts to their intended use. If the buyer accepts parts which do not conform to the specifications, he is entitled to deduct a reasonable amount to cover the cost of making them so conform. Or, if he rejects the delivery, he may recover the excess of the cost of substitute parts purchased elsewhere above the price at which the defaulting manufacturer agreed to sell. (Standard Roller Bearing Company vs. Hub Machine Welding & Contracting Company, 61 Pennsylvania Superior Court Reports, 14.)

EMPLOYER'S DUTY CONCERNING FOUNDRY ELEVATORS.—In an action against a manufacturing company for injury to its assistant foreman in the melting department of the company's foundry, caused by falling of a newly installed foundry elevator, it is decided that he assumed the risk involved in loading the car with a heavy load of pig iron, knowing that the elevator had not been, but was about to be, tested. The company cannot be found to have been negligent in the selection of a bolt, breaking of which caused the elevator to fall, when it is shown that the master mechanic examined the bolt before it was selected, and pronounced it safe; there being no discoverable defect in it. As to the elevator, the company discharged its full legal duty to take reasonable precautions to make it reasonably safe for the employees required to ride on it, by providing for a test before putting the elevator to use. (Vermont Supreme Court, Anderson vs. Howe Scale Company, 97 Atlantic Reporter, 992.)

CONTRIBUTORY NEGLIGENCE CONCERNING TRAVELING CRANES.—An employee who places his hand on the runway of a traveling crane in a foundry, while engaged at work nearby, knowing that the crane is in constant use, is guilty of contributory negligence which bars his right to recover damages for injuries sustained in passage of the crane over his hand. (Pennsylvania Supreme Court, Lowry vs. Baldwin Locomotive Works, 97 Atlantic Reporter, 1049.)

RESERVATION OF TITLE IN SELLER OF GOODS.—Under a contract for sale of a pump, etc., reserving title in the seller until payment of the agreed price, the buyer's act in affixing the articles to leased land did not prevent the seller from recovering possession of them, on the buyer failing to pay therefor. And where the contract is evidenced by a note, with the articles enumerated on the back, the buyer will not be permitted to contradict the written reservation of title by showing a claimed verbal understanding that there was to be no such reservation. (Arkansas Supreme Court, Fears vs. Watson, 187 Southwestern Reporter, 178.)

BUYER'S INSOLVENCY AS GROUND FOR RECOVERING GOODS.—Although a seller of goods on credit may recover possession of them on showing that the buyer purchased them with fraudulent intention not to pay for them, the mere fact of the latter's insolvency will not warrant a finding of such fraudulent intent. The buyer's mere omission to disclose his impaired financial condition does not amount to such fraud as justifies rescission of the contract, unless he is guilty of having made misrepresentations concerning his pecuniary responsibility, or bought without hope or intention of being able to pay. (Massachusetts Supreme Judicial Court, Phinney vs. Friedman, 113 Northeastern Reporter, 285.)

EMERY WHEEL ACCIDENTS.—In affirming a judgment against an employer for injuries to an operator of a revolving emery wheel, attributed to the employer permitting the rest on the machine to become loose, whereby plaintiff's hand came in contact with the wheel, and in permitting the wheel to become and remain irregular in shape, thereby also tending to cause such contact, the Indiana Appellate Court holds that it was open to the jury to find that the defects had remained so long that the employer was chargeable with knowledge of their existence, and with negligence in failing to repair the defective conditions. (Standard Steel Car Company vs. Martinecz, 113 Northeastern Reporter, 244.)

BUYER'S RIGHT TO COUNTERCLAIM DAMAGES FOR DELAY.—A clause in a contract for furnishing equipment, to the effect that the seller should not be liable for delays occasioned by fires, strikes, etc., nor "in any event, for consequential damages," precluded the buyer from asserting a counterclaim for special damages attendant upon the seller's delay, although the delay was not caused by fire, or strike, etc. (Virginia Supreme Court of Appeals, Washington & Old Dominion Railway vs. Westinghouse Electric & Mfg. Company, 89 Southeastern Reporter, 131.)

OVERLOADING OF VESSELS.—A steamship company was negligent and not entitled to limitation of liability for loss of a cargo of steel rails lost in a gale on Lake Superior, with the vessel on which they were loaded, where the vessel was designed for a draft of only 14½ ft., and yet was loaded to a depth of 18 ft., leaving a freeboard of not more than 2 in. (United States District Court, Eastern District of Michigan, The Benjamin Noble, 232 Federal Reporter, 382.)

INFRINGEMENT OF PATENTS.—Innocence of intention is no defense to an action for patent infringement. (United States District Court, Eastern District of Michigan, Kawneer Mfg. Company vs. Toledo Plate & Window Glass Company, 232 Federal Reporter, 362.)

MACHINERY TRADE NAMES.—A person named Deister, on disposing of his interest in the "Deister Concentrator Company," was not precluded from establishing a competing business under the name "Deister Machine Company," there being nothing to show that any confusion in the public mind was occasioned thereby or that any fraudulent intent existed to produce confusion to the first mentioned company's disadvantage. Every person is entitled to use his own name in trade, so long as it is not fraudulently used to divert patronage from an established rival business. But when the name under which machinery is sold and the circumstances of selling it are such as to have a manifest tendency to deceive purchasers, to the disadvantage of a competitor who first adopted the same or a similar name, the latter will be entitled to enjoin continued use of the name as constituting unfair competition, regardless of whether there is a showing of actual intent to defraud. . . . No inflexible rule can be stated as to what conduct will or will not constitute unfair competition. Each case must be decided according to its own peculiar state of facts. (Indiana Appellate Court, Deister Concentrator Company vs. Deister Machine Company, 112 Northeastern Reporter, 906.)

Tests of a Bettington Boiler

Comparative tests of a Bettington boiler and of a Babcock & Wilcox boiler of about the same size are reported in a paper describing the electric power station at Johannesburg, South Africa, read before the South African Institution of Engineers by John J. Dobson. The Bettington boiler, which was illustrated in THE IRON AGE, Oct. 2, 1913, uses pulverized coal as fuel. The fuel is blown into the combustion space by means of hot air and burns as a vertical Bunsen flame. The power required to pulverize the coal and to supply the blast has been deducted in determining the net calorific efficiencies given below.

Results of Tests on the Bettington Boiler and the Babcock and Wilcox Marine Type Boiler

Item	Bettington Tests	Babcock & Wilcox Tests
Duration of test, hr	[illegible]	10
Gage pressure, lb.	173.7	161.9
[illegible]	[illegible]	64.7
[illegible]	[illegible]	746
Water evaporated per hr., lb.	[illegible]	29,370
Coal consumed per hour, lb.	4,477	4,183
Water evaporated per lb. coal from and at 212 deg.	[illegible]	7.014
Equivalent evaporation per lb.	[illegible]	9.140
[illegible]	[illegible]	[illegible]
Equivalent evaporation per sq. ft. of H. S. heating surface, lb.	9.564	9.588
Efficiency on gross calorific value	[illegible]	77.4
[illegible]	[illegible]	1.0
Net efficiency on gross calorific value	[illegible]	76.6
Efficiency on net calorific value	[illegible]	80.0
Net efficiency on net calorific value	[illegible]	79.1

Machinery Markets and News of the Works

QUICK DELIVERIES WANTED

War Buying Not Confined to Big Lathes

Large Group of Automatics Bought—General Conditions Good, but Large Lists Are Few —Hot Weather Slight Detriment

In addition to the large groups of big engine lathes which shell contractors will require for 6 to 12-in. shells, there will be a good movement also for cutting-off machines, and for turret lathes for the manufacture of base plugs and nose pieces. The New York market notes the purchase of 60 machines for cutting steel bars to the required lengths. The Baldwin Locomotive Works is making inquiry for 26,000 tons of 6⅜-in. bars, which is conclusive evidence that it has an order for 6-in. shells. Where lathes have been bought, or inquired for, emphasis has been laid on the quick delivery required, usually two months. A Brooklyn company which has a new fuse contract has purchased 150 automatic machines, of which it already had a large number.

The general domestic demand continues good, although minus large inquiries. Machine tool builders are rushing to catch up on deliveries, and while the hot weather has interfered somewhat, the output of the month of July was greater than some expected.

The Cleveland market is fairly active considering the season. Cincinnati finds that Canadian business is slowing up, but English buyers have been active, taking lathes, mostly.

The demand on gas engine builders in Milwaukee is so heavy that their midsummer slack season will be a short one. Orders from the makers of farm machinery are especially heavy. In the first seven months of this year new building construction in Milwaukee was approximately 57 per cent heavier than in the same period of 1915.

Milling and grinding machines lead the demand in Detroit, although there is a fair movement of miscellaneous machinery. Lack of housing facilities is partly responsible for a shortage of labor in Detroit.

Mining operations in New Mexico and Arizona are creating a heavy call for equipment in Texas. San Francisco reports that machinery is required for many new plants. The Pacific Northwest is suffering from a car shortage.

New York

NEW YORK, Aug. 9, 1916.

Interest continues to be centered to a large extent in the orders which shell contractors have placed for heavy lathes, the value of which will aggregate several hundred thousand dollars. The orders have been largely confined to engine lathes, although a considerable number of cutting-off machines have been bought, and it is probable that turret machines will be purchased for the manufacture of base plugs and nose pieces.

Detailed information as to the distribution of the orders for 6 to 12-in. shells continue to come out slowly. The order reported to have been closed by the American Brake Shoe & Foundry Company calls for 420,000 9.2-in. So far the E. W. Bliss Company and the American Locomotive Company have been the largest purchasers of machine tools for large shell work. A Brooklyn company which has a new order for fuses has placed an order for 150 automatic machines.

Aside from the war demand business has been good, and some attractive sales of machine tools have been made. The General Electric Company has been a large purchaser of late, and has not completed its buying. The American Type Founders' Company, Jersey City, N. J., is extending the facilities of its Kelly Press Department, the Hyatt Roller Bearing Company has been in the market, likewise the Davis-Bournonville Company, Jersey City. The Pennsylvania Railroad has ordered two large turret lathes, the Baltimore & Ohio three or four and the New York Central two. Altogether the daily sales sheets of the larger dealers make a very impressive showing, and at the rate orders are being booked deliveries promise to keep as far away as ever. In many cases inquiries cannot be handled because of the prompt deliveries which are wanted.

The International Elevating Company, Produce Exchange Building, New York, has purchased from the American Coal Company a plot in Jersey City, 100 x 200 ft., including riparian rights and pier facilities. The company operates floating grain elevators in New York harbor and is reported to plan the erection of a repair shop upon the site.

The Canadian Car & Foundry Company has contracted for sixteen new buildings to be added to its munition plant at Kingsland, N. J.

The Metropolitan Motors, recently incorporated in Delaware with a capital stock of $1,000,000, has purchased business and plant of the White Star Motor & Engineering Company, 55 Liberty Street, New York, manufacturer of motor trucks, which operates a plant at 759 Third Avenue, Brooklyn. The new company will produce a one-ton truck in quantity, which will undoubtedly necessitate greatly increased manufacturing space and equipment as the plant has been running at capacity, producing two, three and five-ton units. William C. Mack, one of the founders of the Mack Brothers Motor Car Company, is president, and Charles W. Paget is secretary. The officers, with George A. Baker, formerly editor of the *Railroad Magazine*, Bernard Hoersgen, formerly president of the Krefeld Steel Company and the White Star Motor & Engineering Company; and S. Hirsh, vice-president of the Lock Joint Pipe Company, New York, compose the board of directors.

The P. Trainor Company, 116 Greene Street, Brooklyn, recently took over the steam boiler works of P. Trainor & Co. It has acquired adjoining buildings, which it has added to its plant, and has installed new machinery for the manufacture of boilers, tanks, stacks, and for pipe fitting and oxy-acetylene welding. The company was recently incorporated with a capital stock of $50,000. C. Trainor is president and treasurer; L. B. Concannon is vice-president, and J. W. Holmes is secretary.

The C. & L. Machine Company, 64 Murray Street, New York, recently incorporated with a capital stock of $50,000, has established works at 855 Fourth Avenue, Astoria, L. I., for the manufacture of wrapping, packing and other automatic machinery. Francis D. Canfield, 82 Wall Street, New York, is president; Frank W. Lev is vice-president and Hilarion Escobales is secretary.

The Buffalo Motor Products Mfg. Company has completed a temporary manufacturing plant at Humboldt Parkway and East Delavan Avenue, Buffalo, and is manufacturing pressed steel parts. The company expects to increase its capacity shortly by putting up an additional concrete or brick structure. It was recently incorporated with a capital stock of $50,000. D. Reed is president.

The Wappler Electric Company, 173 East Eighty-seventh Street, New York, has taken over the business of the Wappler Electric Mfg. Company and will manufacture electro-medical apparatus. R. H. Wappler is president; Charles Fayer, vice-president; H. E. Ludewig, secretary and F. H. Wappler, treasurer. The company was recently incorporated with a capital stock of $750,000. The officers, with John Hammer, compose the board of directors.

The Planographic Equipment Company, 52 Duane Street New York, controls the manufacturing and selling rights to perfecting web and sheet-fed offset presses and also controls the same rights to the line of plate-making and plate-developing appliances. At present a full line of associate plate-making machines is in process of build[illegible]

perfecting offset press is being built by the Goss Printing Press Company in Chicago. Allen S. Page is manager.

The Excelsior Steel Ball Company, Buffalo, E. A. Jones, manager, has let contract for a foundry addition 40 x 165 ft., to its plant, located at the New York Central Railroad and Military Road, North Buffalo.

The U. S. Metal Refining Company, Roosevelt, N. J., has awarded contract to Charles Flocken, 123 Liberty Street, New York, for the construction of a two-story laboratory building, 50 x 115 ft.

The Bellco Specialty Company, North Tonawanda, N. Y., has been incorporated by Gustav and Louis Belling and Charles J. Tolkstadt to manufacture wagons and sleds.

The Empire Foundry Company, Port Chester, N. Y., has been incorporated with a capital stock of $5,000 to manufacture cast-iron pipe, gratings, manhole covers, etc. W. A. Braun, J. Fuchs and B. Mills, Port Chester, are the incorporators.

The New York Graphite Company was erroneously credited in THE IRON AGE of July 20 with the purchase of a tract of land on the Niagara River near Buffalo. The land was purchased by the Acheson Graphite Company, Niagara Falls, and comprises 18 acres instead of 20 acres. As far as known, no company named the New York Graphite Company has bought land or been organized.

The Strong Machinery & Supply Company, 21 Walker Street, New York, is in the market for a second-hand boiler for a working pressure of 125 to 150 lb.

Marvin Briggs, Inc., 167 Sixth Street, Brooklyn, N. Y., is in the market for surface and jet condensers of large size.

The American Locomotive Company, Schenectady, N. Y., has completed plans for a one-story wheel shop, 30 x 245 ft., to cost about $20,000. W. M. Dalton is manager.

The Southard-Robertson Company, manufacturer of hot-air heaters, 257 Water Street, New York, is having plans prepared for the erection of a two-story factory building, 100 x 115 ft., to be added to its plant at Peekskill, N. Y. B. S. King & Sons, Inc., 103 Park Avenue, New York, is the architect.

The Bosch Magneto Company, 233 West Forty-sixth Street, New York, has awarded contract to the Casper-Ranger Construction Company, 101 Park Avenue, New York, for a one-story addition, 36 x 46 ft., to its plant at Plainfield, N. J.

New England

BOSTON, MASS., Aug. 7, 1916.

The Bridgeport Crucible Company, Bridgeport, Conn., together with its subsidiary, the Taunton Crucible Company, Taunton, Mass., has been purchased by the Buffalo Copper & Brass Rolling Mill, Buffalo, N. Y. It is understood that the Buffalo company, the largest single user of crucibles in this country, it is stated, has been negotiating for the purchase of the Bridgeport business for some time to protect its crucible supply. The present output of the Bridgeport plant is 1800 crucibles a day and its yearly sales are reported to exceed $4,000,000. The Bridgeport Crucible Company was founded in 1887 by W. T. Macfarlane, who will continue for a period with the new owners in an advisory capacity. His son, W. A. Macfarlane, will continue as active manager of the plant.

H. H. Ashenden, Waterbury, Conn., is seeking power presses and other sheet-metal tools in good condition.

The Barnett Drop Forging Company, Easthampton, Mass., is in the market for a 35 x 50-ton press, plain or geared.

The Revere Rubber Company, Chelsea, Mass., is in the market for a new or second-hand centrifugal feed pump of 100-gal.-per-min. capacity, to operate against 200-ft. head, direct-connected to a 3-hp., 60-cycle, 550-volt motor.

The Connecticut Telephone & Electric Company, Meriden, Conn., has awarded a contract for an addition to cost $25,000 to be erected on Britannia Street.

The New York, New Haven & Hartford Railroad has applied for permission to build an engine house and repair shop in the White Street yards, Danbury, Conn. The repair shop will be 48 x 148 ft., one story.

The National Company, Waterbury, Conn., has awarded a contract for an addition, 70 x 150 ft., one story, with muffler room, 50 x 70 ft.

Work has been started on the new factory at 118 Race Street, Holyoke, Mass., for the Holyoke Valve & Hydrant Company. The building will be 133 x 217 ft., three stories.

Homer F. Livermore, Inc., Boston, Mass., has been incorporated with capital stock of $50,000 to manufacture electrical appliances. The corporators are Homer F. Livermore, president and treasurer; F. E. Babcock and A. E. Borden.

The Stanley Works, New Britain, Conn., have had plans drawn for a new building, 40 x 70 ft., three stories. The first floor will be arranged for hospital and rest rooms, the second floor as a lunch room, and the third flobr for an assembly hall.

The Revere Foundry Company, Revere, Mass., has been incorporated with capital stock of $5,000. The directors are Edward H. Tibbetts, president; George A. Lloyd, Chelsea, treasurer, and D. Carey.

The Simonsville Mfg. Company, Waterbury, Conn., has been incorporated with capital stock of $25,000 to operate a foundry. The corporators are Charles V. Roller, George A. Carney and Roderick J. Perrault.

The City Iron Foundry Company, Lowell, Mass., has been incorporated with capital stock of $10,000. The directors are A. J. Harris, president; James J. Norton, 290 Plain Street, Lowell, treasurer, and M. D. Harris.

Philadelphia

PHILADELPHIA, PA., Aug. 7, 1916.

Some interesting sidelights on the labor problem have been noted in the Philadelphia territory of late. Two thousand men are needed by munition factories in that vicinity. The Remington Arms Company wants 1000 men at its plant at Eddystone, and to-day opened an employment office on North Fifteenth Street. The men must be total abstainers.

The Du Pont Powder Company at Gibbstown also is in the field for hundreds of men and makes the additional condition that "floaters" need not apply.

Chester, Pa., still faces a labor problem, despite the fact that 25,000 people have found work in the nearby industrial towns in the past year. Manufacturers from this district have invaded other cities and have brought workers here by the carloads, and out-of-town companies are now invading this section looking for help.

Owing to the scarcity of labor in Allentown, the Traylor Engineering & Mfg. Company, which is spending $800,000 in extensions this summer, has offered 20c. an hr. for common laborers. A great many college students have taken to this work to earn money during vacation.

Work on the new Sun Shipbuilding Company plant at Chester, Pa., which will cost in the neighborhood of $2,500,000, is progressing rapidly. The largest building will be 506 x 880 ft. Most of the structural work on this has been completed. Work is also moving rapidly on the five shipways, each of which will be 600 ft. long. There are to be several other large buildings and the work on most of them is well under way. A fabricating shop and compressor shop will be built and in it will be an erecting shop and mold loft.

Fire in manufacturing buildings owned by the Empire Brass Company at Stroudsburg, Pa., Aug. 1, is reported to have caused a damage of about $100,000. The Cameron Engineering Company, East Stroudsburg, Pa., manufacturer of cranes, transfer trucks, I-beam trolleys, etc., which occupied part of the premises, has been compelled to seek temporary quarters, in which it is continuing its business as usual. It will, however, erect a new building at once. Its office files were destroyed and it would be pleased to receive reference books from manufacturers. H. S. King is in charge.

The Hoffman Engineering Company, Pennsylvania Building, Pa., has taken out a permit for the erection of a new addition to the foundry of William Cramp & Sons Ship & Engine Building Company to cost about $2,000.

It is reported that the United States Cast Iron Pipe & Foundry Company is receiving estimates for additions to its plant at Burlington, N. J.

The American Manganese Bronze Company, Holmesburg, Philadelphia, plans to erect a small machine shop to relieve the crowded conditions in its present one, which it plans to use for other purposes. It is not in the market for new tools at the present time. T. H. Addie is in charge.

The Keystone Device Company, Harrisburg, Pa., has established aplant for the manufacture of a patented automobile washing device composed of a brush and nozzle.

The Consumers' Ice Company, Chester, Pa., is about to contract for a new cooling system.

The Estate of E. P. Morris, 119 South Fourth Street, Philadelphia, Pa., has awarded contract to the Lansdowne Construction Company, Lansdowne, Pa., for the erection of a two-story stone machine shop and garage, 46 x 112 ft., to cost about $11,000.

The Unit Construction Company, Thirty-first and Chestnut streets, Philadelphia, have established a plant for the manufacture of architectural and cabinet woodwork.

The United Novelty Company, Lancaster, Pa., has established a plant for the manufacture of manicure sets, fountain pens and mountings, etc. Albert Rosenstein is

President, E. R. Rosenstein is treasurer and I. Rosenthal is secretary.

P. J. Collins, 1301 North Seventh Street, Philadelphia, is having estimates taken for a one-story machine shop, 18 x 108 ft. William Lowenthal, 1208 Chestnut Street, is the architect.

The Pennsylvania Railroad Company, Broad Street Station, Philadelphia, has taken bids for one-story powerhouse and scalehouse, 30 x 86 ft., from plans by its architect, William H. Cookman.

Edwin Kirk, 1911 Market Street, Philadelphia, has had bids taken for a two-story factory and garage, 43 x 200 ft., to cost about $25,000.

The Heydt Motor Company, Reading, Pa., has been incorporated with a capital stock of $20,000 by Irvin W. Heydt, Preston L. Beil and Earl L. Auman to manufacture and repair automobiles.

William J. Scott, Inc., Philadelphia, has been organized with a capital stock of $10,000 by Isabella T. and John Porter Scott, 5946 Woodbine Avenue, and Percy M. Harshaw, 939 South Fiftieth Street, Philadelphia, to manufacture scientific instruments.

The Lackawanna Cutlery Company, Nicholson, Pa., has been incorporated with a capital stock of $10,000 by Morris G. Hinkley, Wilder G. Tiffany, Charles W. Dunlap, Thaddeus S. Hibbard, Harry H. Hibbard and James Mulholland to manufacture cutlery.

The West Philadelphia Garage Company, Philadelphia, has been incorporated with a capital stock of $5,000 by Victor Powers, Charles E. Wiley, George Graven, to conduct a garage and repair shop.

The Whittington-Vaughn Company, Easton, Pa., has been incorporated with a capital stock of $10,000, by Joseph H. Whittington, William H. Vaughn and Newton R. Turner to manufacture tools, vises and metal specialties.

The Henry F. Kusel Company, Philadelphia, has been incorporated with a capital stock of $10,000 by Julius Aderer, 3 West Seventy-fifth Street, New York; Henry F. Kusel, 1240 North Fifty-ninth Street, Philadelphia; Joseph Wolff, 308 West 112th Street, New York, and Louis Weckmann, 503 West 121st Street, New York, to manufacture dental supplies.

The I. T. Reitter Company, Philadelphia, with a capital stock of $150,000, has been incorporated by Ivan T. Reitter, 6396 Overbrook Avenue; Alexander K. McCullough, 6308 Drexel Road, and James K. Walker, 5313 Baltimore Avenue, to build bridges, power plants, etc.

The Eastern Top & Body Company, Philadelphia, has been incorporated with a capital stock of $10,000, by William J. Beury, 3432 North Seventeenth Street; A. L. Hastings, 5024 North Fifteenth Street, and Charles E. Buery, 2104 West Tioga Street, to manufacture tops and bodies for vehicles.

Baltimore

BALTIMORE, MD., Aug. 7, 1916.

Plans are being made by the Maryland Metal Cross Tie Company, Munsey Building, Baltimore, for the construction of a plant at Havre de Grace, Md., for the manufacture of metal cross ties.

A mold loft and punch shop to cost $70,000 will be built by the Pusey & Jones Company, Wilmington, Del. It is said further additions will be made later.

The Wilmington Leather Company, Wilmington, Del., plans the construction of a two-story addition at Second and Greenhill streets.

Plans are understood to be under consideration by the DuPont Powder Company, Wilmington, Del., for the construction of a chemical engineering building.

The Harvey Company, 113 South Street, Baltimore, is seeking prices on steam shovels.

Prices on ice machinery are being sought by C. E. Hammer, Narrows, Va.

With $10,000 capital stock the Howard W. Poole Electric Shoe Repairing Company has been incorporated at Newport News, Va. W. B. Howard is the secretary.

Two additions are being built for the Electric Hose & Rubber Company, Wilmington, Del. One is two stories, 300 x 400 ft., and the other, one-story, 50 x 150 ft.

The Coale Muffler & Safety Valve Company, 325 East Oliver Street, Baltimore, has acquired a lot on Oliver Street near Guilford Avenue.

A boilerhouse will be built by the Wilmington & Brandywine Cemetery, Wilmington, Del.

Chicago

CHICAGO, ILL., Aug. 7, 1916.

The prospect of buying pets by our own manufacturers who have taken shell contracts and by others in the interests of foreign clients has been felt very generally by machinery interests. There has also been a very substantial demand for tools for use in shipbuilding plants, purchases being reported as including standard machine tools with machines for steel fabrication. A very considerable aggregate of inquiry for single tools both new and second hand is before the trade. Railroad inquiry continues conspicuous by reason of its absence and with the exception of one or two sales the business in that direction is devoid of interest.

During the week beginning Aug. 7 the Chicago Association of Commerce will have at its offices an exhibit by means of which the complete details and requirements involved in the filling of an export order will be visualized.

The McCauley Belting Company, 412 Orleans Street, Chicago, is about to install a 30-in. power press.

H. P. Nelson, 649 Wellington Avenue, Chicago, is having plans prepared for the erection of a piano factory, 60 x 125 ft., three stories, to cost $35,000.

A. G. Spalding & Bros., Chicago, have awarded the general contract covering the erection of a warehouse and boilerhouse for which a total expenditure of $100,000 is contemplated.

The Lyle National Company, Chicago, manufacturer of electric headlights and kindred equipment, will build a plant on Kostner Avenue near Hirsch Street to cost $250,000.

McClernan & Co., Chicago, have plans completed for a factory building to be erected at North Chicago, Ill., at a cost of $35,000. The company manufactures metal kitchen cabinets.

The Illinois Smoked Meat Company, Chicago, has purchased property at Western Avenue and Forty-fifth Place and will erect a factory and storage building to cost $170,000.

The Quaker Metal Company, Chicago, has been organized with a capital of $1,000 by Arthur H. Lemon, 122 South Winchester Avenue, Ida M. Lemon and W. W. Hoover.

George B. Dryden, Chicago, has purchased a site just north of the Baltimore & Ohio Chicago Terminal Railroad, between West Forty-third and West Forty-fourth streets, upon which he will erect a plant for the manufacture of rubber goods.

The Mackie-Lovejoy Mfg. Company, 1701 West Thirteenth Street, Chicago, manufacturer of metal goods, is adding three stories to its present factory.

The Arnold Company, engineer, 105 South LaSalle Street, Chicago, is preparing plans for new manufacturing buildings for the Pullman Company, the erection of which is estimated to cost $3,000,000.

The Globe Machinery & Supply Company, manufacturer of boilers, pumps, factory supplies, etc., Des Moines, Iowa, advises that the site on which it proposed to erect a six-story factory to cost about $100,000 has been condemned for public service and that this will hold up its building operations for some time to come. F. W. Swanson is general manager.

The American Strawboard Company will make improvements in its plant at Quincy, Ill., involving an expenditure of $350,000.

The Illinois Corrugated Metal Company, recently removed to Springfield, Ill., advises that it expects to be in the market for some additional equipment in the fall.

The Barry Automatic Marker Company, Ottumwa, Iowa, has removed to Davenport, where it will operate a plant to manufacture markers for farm machinery.

Indianapolis

INDIANAPOLIS, IND., Aug. 7, 1916.

The McCray Refrigerator Company, Kendalville, Ind., will build two additions to its plant, one to be used as a wood shop and the other an addition to its tin shop and nickel-plating works. New machinery will be installed.

The Union City Body Works, Union City, Ind., has awarded the contract for the erection of a new factory building which will allow it to double the capacity of its plant.

The Star Generator Company, Logansport, Ind., has been incorporated with a capital of $50,000 by Edgar F. Metzger, Harry C. Metzger and Orpha Carter.

The Indiana Tank & Boiler Works, Indianapolis, Ind., has been incorporated with a capital of $10,000 to manufacture steel plate and sheet-iron products. The incorporators are E. A. Craig, J. E., R. R. and H. E. Bossingham.

Cincinnati

CINCINNATI, OHIO, Aug. 7, 1916.

After preparing statements for the month of July, machine-tool builders as a rule were somewhat surprised at the total production for that month. It seems that the intensely hot weather prevailing in the last two weeks of July did not affect production as much as was estimated. Quite a number of orders have been received lately from England, but Canadian business seems to be slowing up. The English orders call mostly for lathes, but other types of machine tools are included. Domestic manufacturers of munitions continue to buy lathes and other tools, the orders from this source now being limited to a small number of special tools, some of which are for replacement purposes. This only applies to munition makers in the Central West.

Dealers in mill supplies report business on the mend, and expect that it will be as good as the first week in July within the next few days. The hot weather for two weeks curtailed the business to some extent.

The Enger Motor Car Company, Cincinnati, will soon be incorporated with $4,000,000 capital stock to take over the automobile manufacturing business of a firm operating under the same name. The company will greatly enlarge its plant on Gest Street, and expects to double its output of cars. No change will be made in the present officers, and Frank J. Enger will continue as president.

The Union Thread Company, Cincinnati, will double the capacity of its plant in Carthage, a suburb, at an early date.

The Phoenix Caster Company, Hamilton, Ohio, is moving its plant to the building formerly occupied by the Republic Motor Car Company. It expects to increase its manufacturing facilities.

The Cincinnati Sanitarium, College Hill, Cincinnati, will construct an addition to its power plant, for which equipment will be required. Walter G. Franz, Union Trust Building, Cincinnati, is the engineer in charge of the work.

The R. B. Hume Automobile Company, Covington, Ky., has opened a garage on East Fifth Street, in connection with which a repair shop will be operated.

The Belmont Casket Mfg. Company, Columbus, Ohio, is fitting up a plant for the manufacture of lead-coated steel caskets. The company has part of the former plant of the Peters Carriage Company. An addition to the building will be made at an early date.

The McKinnon Dash Company, Troy, Ohio, has purchased the plant of the Peters & Herron Dash Company, Columbus, Ohio, and will remove it to Troy at an early date. Only a small amount of extra woodworking equipment will be required.

The Charles Boldt Glass Company, Cincinnati, reports that work on its new plant at Huntington, W. Va., is progressing at a satisfactory rate and that the necessary equipment will be installed before the end of the present year.

The Lucas-Miller Pump Company, Springfield, Ohio, has been incorporated with $25,000 to manufacture small electric pumps. Clyde C. Miner is one of the principal incorporators.

Detroit

DETROIT, MICH., Aug. 7, 1916.

The heaviest machine-tool demand at present is for milling and grinding machines, with a fair demand for single machines of all kinds. Difficulty is experienced in getting machines, from four to six months being required for delivery. Scarcity of labor, due partly to lack of housing facilities, is working a hardship on the shops, which have capacity orders for a considerable time ahead. Metal-working companies are working to the limit, foundries and brass-working shops being especially overwhelmed with orders. The foreign demand continues strong. Wholesale and retail conditions are excellent.

Incorporating under the laws of New York, the Scripps-Booth Corporation consolidates the Scripps-Booth Company and the Sterling Motor Company, Detroit, manufacturers of motor cars. The new corporation's capitalization comprises 70,000 shares of no par value. W. E. Scripps is president.

Two pieces of construction work for the Detroit Studebaker factories will begin shortly. An extra floor, 50 x 300 ft., will be added to one of the three-story buildings, while a new building of 25,000 sq. ft. floor space will be added for final assembly work. J. M. Studebaker, South Bend, Ind., is chairman of the board of the Studebaker Corporation of America.

Detroit and New York financial interests have purchased and assumed control of the Detroit Weatherproof Body Company, manufacturer of limousine tops, Detroit. The company has secured factory space of 50,000 sq. ft. at 1884 Mount Elliott Avenue. It is understood that it intends to erect a factory to provide for an annual output of from 50,000 to 100,000 tops.

The plant of the Great Lakes Engineering Works at St. Clair, Mich., has been taken over by the Pope Brothers & Cheppu Company, Ltd., for a consideration of $200,000. It is reported that the property has been secured for the Canadian Government, which is also making plans, according to reports, to take over the shipbuilding yards of the C. C. Smith Boat & Engine Works, at Algonac, and the S. C. McLowd shipbuilding plant at Marine City.

Work on the improvement of the Pere Marquette Railroad yards at Flint, Mich., has been started. It is expected that $200,000 will be spent there before fall. The yards are being extended, a new coaling dock is being erected and an engine terminal is to be installed near the Buick automobile factories.

The Monroe Body Company, Pontiac, is to build a new office structure and a plant for pressed steel work. The capital of the company has been increased to $150,000.

Another addition, containing 5000 sq. ft. of floor space, is being added to the Holland Furnace Company, Holland, Mich.

Petoskey, Mich., is enjoying the greatest building boom in its history. The Blackmer Rotary Pump Company has just completed a large addition; the Petoskey Block & Mfg. Company has begun a new addition to its factory, and other companies are contemplating building additions.

Excavation has been begun at Grand Haven, Mich., for the new factory of the Alter Motor Car Company.

The Aspinwall Mfg. Company, Jackson, which specializes in the manufacture of farm machines and tools, has increased its capital from $130,000 to $300,000.

Martin Roskey, William A. Falk and John J. Karcher have incorporated the Premier Machine Company, Detroit, Mich.

The Detroit Steering Gear Company, Detroit, has been incorporated by Henry B. Lewis, Frank Carrico and H. S. Hall with a capitalization of $5,000.

The Bour-Davis Motor Car Company, Detroit, has completed a concrete and steel factory, 150 x 200 ft., four stories.

The Field Motor Company, Grand Rapids, has practically completed negotiations for the erection of a factory building for the manufacture of a new process gasoline and kerosene engine. It will be one story, 50 x 100 ft.

The Adrian Steel Castings Company's plant at Adrian, Mich., which was practically destroyed by fire last week, will be rebuilt at once. The fire loss was $40,000.

Cleveland

CLEVELAND, OHIO, Aug. 7, 1916.

While no round-lot sales or inquiries are reported, the market is fairly active, particularly for the vacation season. Sales during the week were made up of orders for single or two or three machines. The aggregate volume of business was very satisfactory. Second-hand machinery is moving quite well. The supply is adequate but much of it is being held for higher prices. Considerable business is in prospect for equipment for new plants. With the scarcity and high cost of labor the managers of old plants are turning their attention more than ever to the installation of labor-saving equipment. The demand for cranes continues very active.

The Barberton, Ohio, plant of the Babcock & Wilcox Company, has taken another shell order which is reported to amount to $4,000,000. This order is for 9.2-in. shells. The Barberton plant is working on a former order for shells of the same size which will be completed in about two months. It is stated that two more factory buildings will be added to the plant and some additional equipment will be required.

The Steel Improvement & Forge Company, Cleveland, has been organized to take over the plant and business of the Steel Improvement Company and the forging business of the Forest City Electric Company which occupies an adjoining plant. The new company has been incorporated with a capital stock of $150,000. The officers are W. E. Byrnes, president; George N. Chandler, vice-president and treasurer; W. C. Whyte, secretary. The officers with F. W. Starring, S. H. Moore and N. B. Johnson comprise the board of directors. An addition will be built to the heat-treating plant and the capacity of the forge shop will be increased by the installation of additional hammers.

The Morgan Engineering Company, Alliance, Ohio, has commenced the erection of a new forge shop, 70 x 150 ft. Several hydraulic presses and other equipment will be installed.

The machine shop of the Carroll Foundry & Machine Company, Bucyrus, Ohio, was burned Aug. 3, causing a heavy loss in equipment.

The American Auto Trimming Company, Cleveland, has

been incorporated with a capital stock of $100,000 and will establish a plant in the factory building of the Properties Company on East Seventy-ninth Street for the manufacture of automobile accessories. Among those interested are Benjamin Gotfredson and Frank Joyce, both at present engaged in a similar business in Detroit.

The Cleveland Cadillac Company, Cleveland, will shortly begin the erection of a brick building to be used as a service station.

The Powers Mfg. Company, Lima, Ohio, has signed an agreement with the Marion Chamber of Commerce to move its plant to Marion, Ohio, and plans the erection of a new plant, 80 x 500 ft. This company was formerly the Primm Gas Engine Works. Its foundry in Lima was recently burned.

The stockholders of the Rath Aluminum & Brass Foundry Company, New Philadelphia, Ohio, have purchased a foundry building from the New Philadelphia Improvement Company and plan to enlarge it and establish a plant for the manufacture of electric vacuum cleaners.

William Plotz, who operates the William Plotz Iron Works, 401 Champlain Avenue, Cleveland, will build a two-story factory, 50 x 180 ft.

The Motor Products Company, Cleveland, has been incorporated with a capital stock of $35,000 by Clifford S. Goby of the Motor Engineering Company, and others.

The Blomquist-Eck Machine Company, Cleveland, has been incorporated with a capital stock of $100,000 by A. E. R. Blomquist and others.

The Acme Metal Stamping Company, Cleveland, has been incorporated with a capital stock of $10,000 by W. A. Neff, H. A. Yoder, and others.

The Caranaham Tin Plate & Sheet Company, Canton, Ohio, is in the market for a 100-in. plate shear to cut ¼ in. to 5/16 in.

The Ohio Locomotive Train Company, Bucyrus, Ohio, is seeking a three-motor electric overhead traveling crane of 10, 15 or 20-ton capacity and 40-ft. span, to operate on a three-phase, 60-cycle, 220-volt, alternating current.

Milwaukee

MILWAUKEE, WIS., Aug. 7, 1916.

In spite of the vigorous protests voiced by the farm implement and gas engine trade against advanced prices made effective some time ago, Milwaukee and Wisconsin manufacturers of these products report that the fall buying movement has begun. This is the earliest date known in many years for the commencement of buying and is taken in some quarters to indicate that purchasers mean to protect themselves against further possible advances. Gas-engine makers devoting their facilities to machines for farm purposes have been obliged to cut short the usual mid-summer slack period so that work on new bookings may get under way with the least delay.

Conditions in general in Milwaukee are well indicated by the fact that new construction during the first seven months of the year shows a gain of approximately 57 per cent over the same period of 1915. The value of permits issued to Aug. 1 is $8,334,086, against $5,300,540 a year ago. July permits were 150 per cent in excess of July, 1915.

Inquiry for milling machines since Aug. 1 shows a decided revival, and bookings are gaining. The demand for machine tools generally is very satisfactory, and because of improvement in business and the interference of hot weather, some makers are again falling behind on deliveries. The situation, however, is not nearly so serious as it was three or four months ago. The machinists' strike admittedly has affected the output, but not to so great a degree as feared earlier.

The Packard Motor Car Company, Chicago, Ill., will award contracts this week for a machine shop addition to its Milwaukee branch at Thirty-fifth Street and Grand Avenue, of brick and steel, 60 x 70 ft. Brust & Philipp, Milwaukee, are the architects.

The Chippewa Foundry & Machine Company Chippewa Falls, Wis., has completed plans for a new plant, 60 x 221 ft. It has increased its capital stock from $25,000 to $100,000.

The Falls Machine Company, maker of wood-working machinery, motors, engines, engine stops and gray-iron castings, Sheboygan Falls, Wis., which has been acquired by the Falls Motors Corporation, effected an increase in its capital to provide for immediate expansion. The present output of 50 motors will be increased before Oct. 1 to 80, and by Jan. 1 to 100 motors per day, in order to take care of contracts which either have been or are about to be closed. The company has for the past two years specialized in the manufacture of the overhead valve type of motor, although two or three models are still produced of the "L" head construction. A new test department 250 ft. long, which has a capacity of 120 motors daily, has just been completed. Contracts will be let within a few days for an addition to the assembly department, 120 x 180 ft. At present somewhat over 450 men are employed and this number is being increased daily. The officers of the new corporation remain as before; G. Huette, president; R. W. Randall, vice-president; A. R. Clas, secretary; K. F. Schreier, treasurer; with the addition of Leroy Miser as a vice-president and J. G. Lude, formerly purchasing agent, as assistant secretary.

East Troy, Wis., is in the market for one air compressor, one belt-driven suction pump and one 25-hp. motor with shaft, pulleys, etc., for the municipal waterworks system. Bids will be taken until Aug. 14 by O. R. Kurzrock, village clerk.

The North End Foundry Company, West Allis, Milwaukee, is rushing work on its foundry addition and expects to take possession before Sept. 1.

The Gehl Brothers Mfg. Company, West Bend, Wis., maker of gasoline engines and farm implements, has completed the first model of a kerosene-driven tractor which it plans to build in quantity. The design is by William Baumheckl, Detroit, Mich., now associated with the Gehl Company.

The Sheriffs Mfg. Company, 124 Barclay Street, Milwaukee, manufacturer of propeller wheels, resumed operations Aug. 7 after a temporary recess due to a fire which damaged the plant Aug. 2.

The Eureka Grave Maker Company, Stevens Point, Wis., maker of cast-iron and aluminum cemetery goods, is preparing to erect a plant to cost $15,000. It will be of brick and steel, 57 x 75 ft., two stories and basement. The goods have been manufactured up to this time by outside foundries on contract.

The Wisconsin Telephone Company, 183 Fifth Street, Milwaukee, is having plans prepared by A. C. Eschweiler, architect, Goldsmith Building, for a private garage and machine shop on Clybourn Street, between Thirteenth and Fifteenth streets. It will be 100 x 432 ft., two stories and basement, of brick and steel. A complete machine shop equipment and numerous electric elevators will be required. W. D. Hobbins is chief engineer.

Ground has been broken by the Wald Machine Company, Sheboygan, Wis., for its new machine shop, 80 x 100 ft.

The Heil Company, Milwaukee, structural fabricator and tank and boiler manufacturer, is making excellent progress in the erection of its new shop and factory at Twenty-sixth and Montana avenues and will be ready to begin operations in the new plant by about Oct. 7. Julius P. Heil is general manager.

The Warner works at Beloit, Wis., of the Stewart-Warner Speedometer Corporation, Chicago, will be changed into a malleable iron foundry and general castings shop to supply the other factories operated by the company. The Beloit plant has been manufacturing complete instruments up to this time, but it is planned to concentrate the finishing processes at the main plant in Chicago and the making up of raw material at Beloit.

Schauer Brothers, Westfield, Wis., have purchased a site for their proposed new machine and smithing shop, which is to cost about $6,000.

The R. L. Kenyon Company, Waukesha, Wis., maker of camp furniture, etc., is increasing its capacity to turn out an order for 30,000 cots for the United States Government. The company has abandoned its plan to establish a department for the production of fiber furniture.

E. S. Mason, Brule, Wis., puchased the machine shop of J. L. Thrall at Washburn, Wis., and took possession Aug. 1.

The A. O. Smith Company, Milwaukee, manufacturer of automobile parts and trucks, has contracted with the Milwaukee Electric Railway & Light Company for 500 to 800 kw. of current, its own big power plant having been outgrown. An addition will probably be made and several new generating units required. L. Ray Smith is president.

The Beeman Gas Tractor Company, Minneapolis, Minn., is negotiating with the Chamber of Commerce, Oshkosh, Wis., with a view to relocating its works. The concern specializes in a small general utility gas machine weighing only 500 lb.

The Gilson Mfg. Company, Port Washington, Wis., gray-iron foundry, gasoline engines, etc., is working all departments to capacity and may be compelled to make extensions next winter. Its gasoline engine business has opened much earlier than in former years and prospects are for the heaviest demand ever known. An order was booked last week for three carloads of engines for a Texas jobber.

The Lyman-Joseph Grain Company, Milwaukee, is preparing to increase the effciency of its big grain elevator by installing new machinery and overhauling the present equipment.

Floyd Ghastin, Sextonville, Wis., will erect a garage and commercial machine shop.

L. A. Jiranek, Merrill, Wis., is organizing a company with

the assistance of the Merrill Business Men's Association to engage in the manufacture of sanitary baby dressers and other sheet-metal furniture specialties. Factory quarters will be leased.

The New England Supply Company, Providence, R. I., may establish a plant in Green Bay, Wis., to utilize by-products and waste of the Green Bay Stockyards & Packing Company's plant.

The Wisconsin Seating Company, New London, Wis., which is enlarging both wood and metal-working departments to handle extensive cabinet orders from the Edison Phonograph Company, has been offered a large contract by the New York Study Chair Company to manufacture a new type of school desk. If the order is closed, 30,000 desks will be turned out at once, and extension plans will be revised for greater capacity.

The Central South

LOUISVILLE, KY., Aug. 7, 1916.

Business continues generally good, machine-tool and power requirements being well to the front. Small lathes, drill punches and other equipment for small garages are in good demand. Oil-well drilling machinery and shop equipment are moving actively. A good part of the current inquiries relates to replacements and equipment for extensions of existing plants.

Fire destroyed the plants and equipment of the F. C. Miller Planing Mills, Monmouth Street, Newport, Ky., July 30, with a loss of $35,000 and the George L. Lape Furnace Company, with a loss of $12,000.

The Owensboro Ditcher & Grader Company, Owensboro, Ky., has leased a factory building and will shortly occupy it, adding to the present equipment and removing from its existing plant.

Harrison L. Scott, Lexington, Ky., has purchased the Central Garage and will make improvements.

Preliminary work is being done for erection of the redrying plant of the Liggett & Myers Tobacco Company, Lexington, Ky. The contract, which includes a power plant, boiler house, etc., has been let to the Combs Lumber Company, Lexington.

The Cumberland Natural Gas Company, Barbourville, Ky., is in the market for a guy derrick of 10-ton capacity with 40-ft. boom, new or second-hand.

Two mills of the Lucas Land & Lumber Company were destroyed by fire at Paducah, Ky., on Aug. 4, with a loss of $15,000.

The Dixie Foundry Company, Cleveland, Tenn., has been incorporated with $10,000 capitalization by J. C. McKenzie, S. B. Rymer, F. J. Earle and others.

E. B. Ogden, R. G. Pursley, Sam A. Conner and others of Chattanooga, Tenn., are organizing the Union Stock Yards & Packing Company, to be capitalized at $150,000, and to establish and operate a stockyards and meat-packing plant to have a daily capacity of 300 hogs, 50 head of cattle and 50 head of sheep.

J. W. Briscoe of Greenville, Ind., proposes to establish a plant at Bowling Green, Ky., to manufacture boxes and crates.

The Cortrim Lumber Company, organized by George M. Speigle and others with $75,000 capital, has purchased the Peter-McCain Lumber Company, Bristol, Tenn., and will enlarge and install additional machinery.

Birmingham

BIRMINGHAM, ALA., Aug. 7, 1916.

Outside of regular buying of cotton ginning machinery, a specialty in the trade, wholesale machinery dealers report a continuation of the lull in buying which set in four weeks ago. The lumber trade is dullest of all and even electric apparatus is moving slowly. Alabama suffered tremendous losses in cotton and corn on account of the floods. How much of this will be made up by late forage and food crops remains to be seen.

The D. B. Sharp Mfg. Company, Jacksonville, Fla., has been incorporated with a capital stock of $2,000 by D. B. Sharp, F. J. Brock, R. B. Tupper, and others, to manufacture gasoline and oil engines, air compressors, steam pumps, etc. The same interests recently formed the D. B. Sharp Machinery Company.

The Pensacola Maritime Company, Pensacola, Fla., capital stock $25,000, has been incorporated by William H. Knowles, Henry M. Yonge and Ellis Knowles to operate shipyards.

The Western Carolina Power Company, Bridgewater, N. C., subsidiary of the Southern Power Company, Charlotte, N. C., will develop extensive waterpower around Bridgewater at a cost of $3,000,000.

The Carolina Light & Power Company, Raleigh, N. C., is reported as contemplating the expenditure of several millions of dollars in building a hydroelectric plant on the Yadkin River near Badin, N. C.

The machine shop of the Duane Chair Company, Dalton, Ga., was destroyed by fire July 18 with a loss estimated at $145,000. The plant employed about 150 workmen. J. J. Duane is president.

The Giant Furniture Company, High Point, N. C., will erect a finishing room and warehouse, 100 x 125 ft., and an additional machine room, 80 x 120 ft., both two stories, of frame construction. It will install electric motors and other equipment at a total estimated cost of $20,000.

The Mill-Power Supply Company, Charlotte, N. C., is in the market for a second-hand 6-ft. rotary cement kiln.

The Bates-Hudnall-Jetton Company, Tampa, Fla., will build a planing mill. The company has been organized with a capital stock of $50,000.

St. Louis

ST. LOUIS, MO., Aug. 7, 1916.

General business conditions are regarded as justifying optimism, in the opinion of the machine-tool dealers, who report that business in machinery lines is steadily maintained. It is general in its character and widespread as to source. While some apprehension is felt because of the extreme heat and its effect on the crops, reports indicate that business will be maintained at a satisfactory level because high grain prices will cover reductions in production.

A building is to be erected for the Emerson Electric Company, producer of electric fans, etc., St. Louis, Mo., 150 ft. square, seven stories, for the extension of its manufacturing capacity.

The St. Louis Felling Machine Company, St. Louis, Mo., has let contract for the construction of one and two-story factory, at 3763 Forest Park Boulevard, to cost about $12,800. It will be 60 x 177 ft., and is to be completed in 90 days. Charles L. Knower is president.

The Hirsch Rolling Mill Company, St. Louis, Mo. is making additions to its plant which will enable it to produce new specialties including light rails and fastenings for iron and steel.

The United States Engineers' Office, St. Louis, Mo., is in the market for one pair of tandem compound condensing engines for a stern wheel steamboat. Bids will be received until Aug. 16.

R. K. Papin, 325 Locust Street, St. Louis, Mo., is in the market for a locomotive of about 50 tons, of short wheel base, with low drivers.

Urich, Mo., is having plans prepared for the rebuilding of its electric light plant, recently destroyed by fire.

The American Zinc, Lead & Smelting Company, Granby, Mo., will equip a concentrating plant and also install other machinery for 300 tons capacity each shift.

The General Explosives Company, St. Louis, Mo., recently incorporated, with offices in the Railway Exchange Building, will equip a dynamite plant at Joplin, Mo. Albert J. Rawlings, with present headquarters at Connor Hotel, Joplin, is in charge.

The Yellville Machine Shops & Foundry Company, Yellville, Ark., is reported in the market for a gasoline engine, lathes, drill presses, band saws, boiler and engine repair machinery. Ross, J. E. and E. R. Lee are stockholders.

The Helena Gas & Electric Company, Helena, Ark., will expend about $6,000 on additional equipment. W. J. O'Brien is the engineer.

The McNeely Motors Company, Arkansas City, Mo., has been incorporated with a capital stock of $10,000 by T. B. McNeeley, W. J. Massey and F. M. Rogers to conduct a garage.

The Patty Gin Company, Bristow, Okla., will equip a cotton-seed oil-mill and a cotton gin. The company is capitalized at $50,000.

Waynoka, Okla., will purchase an engine and other equipment for its waterworks plant and electric light station.

Cosden & Co. and the Cosden Oil & Gas Company, Tulsa, Okla., will expend about $5,000,000 on improvements to their oil-refining and other plants.

The Westerman Motor Car Company, Tulsa, Okla., has been incorporated with a capital stock of $17,000 by Joseph E. Washington and others.

The Reneau Motor Car Company, Oklahoma City, Okla., has been incorporated with a capital stock of $15,000 by H. W. Reneau and others to operate a garage.

The Sewerage and Water Board, New Orleans, La., F. S. Shields, secretary, will receive bids until Sept. 13 for two 15-ton traveling cranes.

John T. Gibbons, New Orleans, La., will equip a feed and grain mill, including a grain elevator of 250,000 bu. capacity, grain handling machinery, electric motors, etc., about $225,000 being involved. E. R. Bartholomew is superintendent.

Charles F. Rantz, New Orleans, La., will equip an ice factory of 75 tons daily capacity at Myrtle, La.

The St. Louis, Iron Mountain & Southern Railway, E. A. Holley, St. Louis officers of the company, chief engineer, will equip a 15-stall roundhouse, machine and boiler shops, repair shop, turntable, mechanical coal chute, water plant, etc., at Monroe, La., to cost about $142,000.

Shreveport, La., will equip a sanitary sewer system requiring two sewage pumping plants and other mechanical equipment. John B. Hawley is engineer.

The St. Louis & San Francisco Railroad, V. K. Hendricks, St. Louis, Mo., chief engineer, will expend about $450,000 on a 28-stall roundhouse, machine shops, trackage, etc., at Sapulpa, Okla.

The Automatic Carbon & Holder Company, El Reno, Okla., has been incorporated, with a capital stock of $50,000, by Amandes Hunsicker, A. L. Harris, and others, and will equip a manufacturing plant.

The Pailey & Treigle Sash Factory, New Orleans, La., will erect an addition, and install new machinery.

Texas

AUSTIN, TEX., Aug. 5, 1916.

The increase of mining development operations in New Mexico and Arizona has caused orders to be placed for much ore mill machinery. The tool and machinery trade shows an improvement over a week ago.

The Farmers' Gin Company will build a cotton-gin at Nordheim to cost about $9,200. T. F. Mangum is in charge.

The Miami Consolidated Copper Company, Miami, Ariz., is building an electric power plant at a cost of about $300,000. Three Diesel engines will develop 3750 hp., direct-connected to dynamos which are to deliver 2160 kw.

The United Verde Extension Company will soon select a site at Jerome, Ariz., upon which it will construct a new smelter. The company will also install additional hoisting equipment.

The Ray Hercules Mining Company is having plans drawn for a 1000-ton concentrating plant that it will build at Kelvin, Ariz., at a cost of about $300,000.

The Alamogordo Marble Quarries Company, incorporated with a capital stock of $250,000, will operate marble quarries and polishing works near Alamogordo, N. M.

The Department of Public Works of the de facto Government of Mexico in the City of Mexico has placed eight corps of engineers in the field to run surveys for lines of railroads which it has planned to build as soon as the routes are finally located. One of the proposed roads is to run from Campeche to a connection with the National Tehuantepec Railroad, a distance of 450 miles; another is to run from Durango to Concepcion del Rio, in the State of Zacatecas, a distance of about 350 miles; another from Ameca, in the State of Jalisco, to the port of Chamela, on the Pacific coast, a distance of about 125 miles, and another from Saltillo, in the State of Coahuilla, to Orteaga, a distance of about 175 miles.

San Francisco

SAN FRANCISCO, Aug. 1, 1916.

Many machine-tool buyers still regard the future as too uncertain to warrant purchases for six months or later delivery; but orders for future shipment are fully as numerous as for the past two months. While merchants are receiving many tools on old orders, they are unable to accumulate any stock worth mentioning. A number of fairly large orders have been placed recently for the extension of manufacturing plants, and a few new inquiries of this nature are now appearing. The smaller trade is continually in the market for single tools of standard design. Special automatic and labor-saving machinery is finding considerable favor for the newer plants. Aside from shipbuilding, development is especially active in internal combustion engines, including gasoline tractors and pumps. Electric motors for irrigation units also are in active demand in some sections. Oil tools are doing fairly well, though hardly up to expectations.

Six manufacturers are actively engaged in the production of potash from kelp on the southern California coast, having an investment of over $3,000,000 in the aggregate in barges and special harvesting and reduction machinery. The power for propulsion and driving the harvesting machinery consists mainly of gas engines of local make.

The J. D. Barnes Company, 175 Steuart Street, is preparing to build a plant for the construction of wooden ships adjoining the Alaska Packers' Association quarters in Alameda. Contracts have already been received for two vessels, to be equipped with pairs of twin 385-hp. Skandia Diesel engines.

The Honolulu Iron Works, Honolulu, T. H., has received a large machinery order from the Calamba Sugar Estate in the Philippine Islands, which will double its sugar mill capacity.

The plant and all equipment of the California Magnesite Company, Porterville, Cal., was purchased last week at auction by the Joshua Hendy Iron Works, San Francisco, the largest creditor. It is understood that the plant will be completed according to the original plans, to handle crude magnesite on a custom basis.

The Horstman Chemical Company is planning to build an addition to its plant at Redwood City, Cal.

It is announced that the Globe Milling Company will establish several cotton gins at Mexicali, in Lower California.

The American Ever-Ready Company has purchased a large site at Eighth and Brannan streets, San Francisco.

Work has been started for several new factory buildings at Redwood City, Cal., for the Crystoffersen Aircraft Mfg. Company, now in Oakland.

Bids will be received Aug. 9 for hydraulic machinery and electric generators for the Lower Cherry River development of the Hetch Hetchy water project.

San Diego, Cal., is making preliminary estimates on an emergency pumping plant to be built in the Tia Juana River.

The Samson Sieve-Grip Tractor Company has been incorporated at Stockton, Cal., with a capital stock of $400,000, by F. A. Cramblitt, P. T. Cleghorn, V. Cassilis, W. H. Lyons and Fred Lambert. The plan is to take over all the present property of the Samson Iron Works, and increase the facilities for manufacturing traction engines, the demand for which has grown beyond the present capacity. The company, which now employs 200 hands, will increase its force to 300. A Rennerfelt electric steel furnace will be installed, together with a new brass foundry, and the plant will be reorganized.

Work has just been started on the enlargement of the Standard Gas Engine Company's plant in Oakland. Richard Froboese, formerly chief engineer of the Corliss Gas Engine Company, is the company's engineer.

The Ingersoll-Rand Company of California, mining machinery, formerly located in the Harron, Rickard & McCone Building on Townsend Street, has moved its offices to 710 Rialto Building.

The Pacific Northwest

SEATTLE, Aug. 1, 1916.

The car shortage, particularly on the Southern Pacific lines in Oregon, has become alarming, and appeals are being made by manufacturers to the Public Service Commission for relief. It is now so great that unless relief is obtained promptly some plants will have to be shut down. The Pacific coast exporters are facing an unprecedented situation, with the grain season at hand, only about 10 per cent of the usual number of ships engaged for the exportation of the product are now available. It is evident that the greater part of this business will now be handled by combined rail and water shipments.

Reports from the iron and steel working plants throughout the Pacific Northwest indicate an unusually busy spring and summer. Harvesting machinery has been in very brisk demand. The heavy fruit crops have called for steady shipments of canning and similar equipment, and the shipbuilding boom is unabated. The numerous shipbuilding plants recently constructed all report plenty of work ahead to insure continuous operation.

The Northwest Chair Company, Tacoma, has been organized with capital stock of $50,000 by George Henry and Joseph H. Gilpin.

The Colfax Iron Works, Colfax, Wash., reports that its plant is crowded with work. The company is now building 12 Carley roller mills to fill orders already placed. The patterns of the plant were destroyed by fire two weeks ago; but are rapidly being replaced.

The American Fire Escape Company has purchased a site in Hillyard, Wash., where it proposes to establish a factory.

Work has started on the initial unit of the Pacific American Fisheries Company's proposed shops at Bellingham, Wash., which is to be a blacksmith shop.

The Admiral Mining Company, Spokane, Wash., will construct a power plant on Deer Creek. Plant will include dam, pipe line, powerhouse, waterwheel, shafting, compressor, air

receiver, electric generator, etc. E. Tappan Tannatt is the engineer.

The Buehner Lumber Company, North Bend, Ore., according to report, will install electric power in its plant. A deal is under negotiation with the Oregon Power Company.

The plant of the Hanover Gypsum Company, Hanover, Mont., has been purchased by the Three Forks Cement Company, Trident, and it is reported the new owners plan the construction of a 2500-bbl. cement plant at a cost of $1,000,000. The stockholders of the Three Forks Cement Company are also stockholders of the Oregon Portland Cement Company, Portland, which recently opened a large cement plant at Oswego, Ore., near Portland. Clark M. Moore is sales manager of both corporations.

According to statements of D. E. Skinner, president of the Skinner & Eddy Corporation, shipbuilder, Seattle, that company has sufficient work in hand to utilize its new plant to full capacity for more than two years. It has contracts for 10 steam ocean-going carriers, to cost between $750,000 and $1,000,000 each. Two vessels have been started, and the keel of the third will be laid within two weeks. The new plant, recently completed, is equipped with the latest type of machine tools and shipbuilding equipment. Improvements and extensions will be made to the plant from time to time.

Canada

TORONTO, Aug. 7, 1916.

A halt in the manufacture of shells in Canada for the Allies has temporarily been called, as a result of specifications being changed for the steel required which has just been made by the authorities. The change is the requirement of steel of a higher tensile strength than has hitherto been specified. It will, of course, be quite possible to manufacture this steel in Canada as hitherto, but as large orders for steel of the quality formerly suitable have been given, and a large stock is on hand, some inconvenience will be caused if these goods have to be made over again. Large orders for shells of 9.2 in. and other high calibers have recently been placed in the United States, and it is reported that others will be distributed in Canada. The first samples of time fuses produced at the loading plant established in Montreal by the Imperial Munitions Board have successfully passed the tests. No shipments have so far been made, however, it is understood, and it is not altogether likely that the expectations as to early delivery will be realized. Hand grenades, the weapons which are proving so regular and effective in the present war, are now being manufactured in Canada, but are being loaded in England.

The Grand Trunk Railway Company, Montreal, propose to build railway shops at Port Huron to cost $750,000 and has approved a bond issue for this purpose.

The Nova Scotia Steel & Coal Company, New Glasgow, N. S., is contemplating making extensive additions to its iron mines at Wabana, Newfoundland, including new hoisting equipment, boilers, pumps, compressed air plant, power lines, cables, ventilating plant, industrial railroad track, hauling cables, etc. R. E. Chambers is manager of the ore mines and quarries.

M. J. O'Brien, Renfrew, Ont., will build a power plant at Calabogie, Ont., and develop 5000 hp.

The Town Council, Renfrew, Ont., will install a hydroelectric plant at the first chute of the Bonnechere River to develop 1500 hp.

The Canada Spool & Bobbin Company of Walkerton, Ont., is having plans prepared for an addition to its plant which will increase its capacity over 50 per cent.

The Winnipeg Paint & Glass Company's plant at Winnipeg, Man., was destroyed by fire on Aug. 2. The woodworking mill boilerhouse and several dry kilns were a total loss, upwards of $100,000. The company has decided to rebuild.

Negotiations between the Brantford Carriage Company, Brantford, Ont., and the Baynes Carriage Company, Hamilton, Ont., have been completed and the Brantford Company has taken over the plant and stock of the Baynes company. Recent building additions made by the Brantford Carriage Company will now be equipped with machinery and utilized, and an additional 60 hands will be taken on. This company has work in sight to keep the enlarged factory running for over a year.

The M. Brennen & Son Mfg. Company, Hamilton, Ont., is in the market for a 10 to 50-hp. motor.

The McKinnon Dash & Hardware Company, St. Catharines, Ont., will have a boilerhouse built at a cost of $6,000.

The Chatham Electric Company's Plant on Wellington Street, Cheatham, N. B., was destroyed by fire. The loss, including machinery, will amount to $30,000.

P. T. Dodge, representing the International Paper Company, announced recently that his company would establish a plant in Canada because of the present tariff conditions.

The Eau Claire Water Works Company, Tecumseh, Ont., will shortly call for tenders for the erection of a plant for the waterworks system to cost $20,000.

Assiniboia, Sask., has extended the time for receiving tenders for combustion engines, generator, etc., until Aug. 15.

The Alberta Lumber Company, Vancouver, B. C., has been granted a permit for the erection of a lumber mill to cost $100,000.

Lyall, Man., will construct an electric light and power plant at a cost of $8,000.

Bids will be received by the City Council, New Toronto, Ont., until Aug. 14 for the construction of sewers, and a sewage pumping station. T. Lowes, Mimico, Ont., is the engineer.

The West Kootenay Power & Light Company, Nelson, B. C., will construct an 8000-hp. unit at its plant at Upper Bonnington Falls, B. C.

The towns of Richibucto and Recton, N. S., will erect a hydroelectric power plant.

Price Brothers & Co., Ltd., Shipshaw, Que., will install an additional twin-runner turbine of 5000-hp. capacity, together with penstock and other auxiliaries, including a new generator and accessories in its plant. Plans are being prepared by B. S. Kelsch, Power Building, Montreal.

The plant of the Doon Fibre Company, Doon, Ont., recently destroyed by fire with a loss of $45,000, will be rebuilt and new equipment installed. James Huber is owner.

The Dominion Steel Products Company, Ltd., Brantford, Ont., has been incorporated with a capital stock of $500,000 by Willoughby S. Brewster, George D. Heyd, Roy T. McGraw and others to manufacture machinery, tools, shells, guns, etc.

The Quebec Shipbuilding & Repair Company, Ltd., Montreal, has been incorporated with a capital stock of $40,000 by Walter R. L. Shanks, Francis G. Bush, George R. Drennan and others to build ships, torpedo boats, etc.

John Bertram & Sons Company, Ltd., Dundas, Ont., is receiving bids for a pattern shop of reinforced concrete construction.

Government Purchases

WASHINGTON, D. C., Aug. 7, 1916.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until Aug. 15, schedule 9981, for 46 air compressors, f.o.b. works; until date not set, schedule 9988, for four horizontal centrifugal pumps for Brooklyn and Mare Island; and schedule 9990, for one horizontal boring, drilling and milling machine and one vertical slotting machine, for Mare Island.

The purchasing officer of the Panama Canal, Washington, will shortly call for bids for the following motor-driven equipment:

One 20-in. triple geared engine lathe.
One 17-in. hack saw, 160 ton incline frame.
One 24-in. double-head shaping machine.
One 3-in. single bolt cutter.
One 13-in. sensitive drill, with equipment.
One 32½-in. upright drill press.
One 4-ft. radial drilling machine.
One 36-in. engine lathe.
One 12-in. double-head grinding machine.

The following bids were received by the chief of the Bureau of Ordnance, Navy Department, Washington, Aug. 2, for furnishing projectiles for the navy:

The Harrisburg Pipe & Pipe Bending Company, Harrisburg, Pa., 2500 6-in., $12.50 each; 8000 5-in., $11.75; 6000 4-in., $8.50 each; 8000 3-in., $3.75 each.

The Birmingham Machine & Foundry Company, Birmingham, Ala., 1200 14-in., $73 each; 2000 12-in., $58 each.

The Mobile Stove & Pulley Mfg. Company, Mobile, Ala., 2000 12-in., $40.98 each; 1000 8-in., $19.29 each; 2500 6-in., $10.96.

The Bethlehem Steel Company, South Bethlehem, Pa., 1200 14-in., $94.86 each; 2000 12-in., $59.87 each; 1000 8-in., $21.19 each; 2500 6-in., $13.24; 8000 5-in., $9.93; 6000 4-in., $7.45; 8000 3-in., $3.29 each; 75,000 1-pounder, 50c. each.

The Tredegar Company, Richmond, Va., 1200 14-in., $74.95; 2000 12-in., $47.87; 1000 8-in., $20.95; 2500 6-in., $13.74; 8000 5-in., $10.54; 6000 4-in., $8.09.

The American & British Mfg. Company, Bridgeport, Conn., 8000 5-in., $8.93 each.

The Bridgeport Projectile Company, Bridgeport, Conn., 8000 3-in., $3.85 each.

The Raleigh Iron Works Company, Raleigh, N. C., 1200 14-in., $61.95; 2000 12-in., $39.90 each; 1000 8-in., $16.75 each; 2500 6-in., $9.50 each; 8000 5-in., $7.75 each; 6000 4-in., $6 each; 8000 3-in., $3.25 each.

THE IRON AGE

New York, August 17, 1916

ESTABLISHED 1855 VOL. 98: No. 7

Fissures in Rails Laid to Mill Practice

Delayed Crystalline Transformation Near Center of Rail Head; Fracture of This Metal in Gagging and Growth of Fissures in Service

AN explanation of the causes of steel rail failures through the growth of transverse fissures has been offered by Dr. P. H. Dudley, consulting engineer for the New York Central Lines on rails, tires and structural steel. The remedies he has also suggested, and the solution, in his opinion, lies altogether with the rail mills. Briefly, his conclusions are that mill practice occasionally results in a delayed crystalline transformation of the metal near the center of the head, that then this heterogeneous metal is checked by the gagging press in the straightening process, and finally the nucleus of a fracture thus produced develops in service until rupture of the rail occurs.

An important part of his contribution to the transverse fissure problem is his finding that the fissures are of two types: that corresponding to the rail which had a convex curvature of the base, and that corresponding to the rail, the head of which was convex before the gagging. In the case of the former a checking of metal occurs in the head in gagging, while in the case of the latter a longitudinal fissure is developed as well as the more or less vertical transverse fissure, with which fissure it coalesces. The results of Dr. Dudley's investigations were submitted recently to A. H. Smith, president New York Central Lines, and the report is given below.

The emphasis placed on the absence of failures in rails rolled from reheated blooms—this as a means for securing a homogeneous crystalline structure—and a suggestion that the supports of the gagging press should be given a greater span—thus to reduce the gagging pressure—are taken to indicate Dr. Dudley's opinion of the necessary conditions in mill practice.

"My investigations show that interior transverse fissures in rail heads are induced by a combination of two or more exceptional conditions of manufacture in an occasional rail head by direct rolling, which can and should be avoided," begins the report.

"Induced interior transverse fissures in basic open-hearth rails are due in part to an occasional hot rail being cooled so rapidly by the rolls or so chilled by



Fig. 1—Intergranular type of interior transverse fissures. The nucleus is over 5/8 in. in diameter, though smaller in a majority of the specimens. Rail rolled Nov. 8, 1910; failed March 8, 1915.

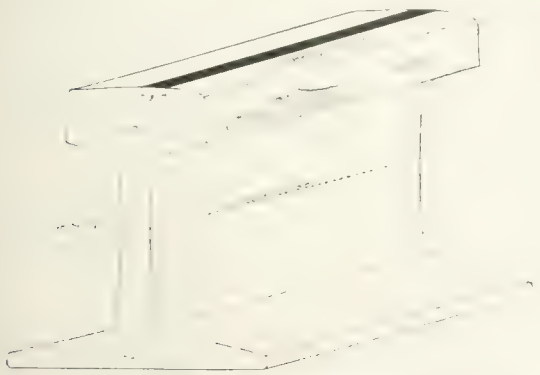


Fig. 2—6-in., 100-lb. section, showing crack common to the type of fissure due to the upsetting of the metal by the gag to shorten the head and lengthen the base. (See Figs. 5 and 10.) The bearing surface of the head shows deformation, and on several railroads it has been found that an entire train may pass over the head without the mark of contact for all of the wheels exceeding ½ in. in width. (See Fig. 6.)

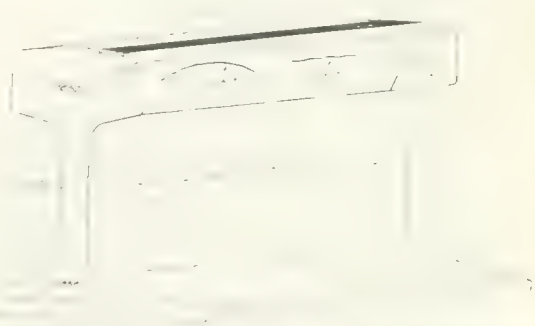


Fig. 3—100-lb. A. S. C. E. section. Crack No. 1 shows a form found in a few rails. Crack No. 2 is general for the coalescent type of fissure, and may be from 2 in. to 3 ft. long. Crack No. 3, showing that the nearly vertical interior transverse fissure has worked out to the surface, has been found in several rail heads. The coalescent type of fissure when uncapped shows what Dr. Dudley calls the imprint of the gag in all cases as indicated in Figs. 5, 8 and 10. A crack similar to No. 3 is sometimes found on the gage side of the head in the intergranular type.

gusts of air before recalescence on the hot beds, as to cause a lag of some of the transformations of the metal in the interior of the head. Induced interior transverse fissures can only develop in the track from the effects of preceding causes, either of which is no longer a mystery, and their progressive stages of development occur in the following order." The rest of the report follows:

Conditions of Manufacture:

First Contributory Cause: Delayed transformations of the metal near the center of the head, and chemical or mechanical defects.

First Effect: Induced loss of strength; initial strains; physically a non-ductile core of heterogeneous metal near the center of the head.

Second Contributory Cause: Mechanical injury to the heterogeneous metal, the nucleus checked by the gag. (See Figs. 2 and 3.)

Second Effect: The produced defect of an interior invisible portion of fractured metal near the center of the head before the rail leaves the steel plant.

Conditions of Service:

Third Contributory Cause: The conditions of ordinary service for the interior fractured metal become abnormal.

Third Effect: The checked interior metal in either type is no longer able to restrict the strains of the wheel loads within the usual range of the elastic limits of the steel, as in the case of sound metal, but there develop by "detail" growth, from and around the checks, the specular surfaces of the induced interior transverse fissures until the section ruptures.

When the induced interior transverse fissures by growth crack through the metal to the air, the specular surfaces discolor and darken, as found in ruptured rails by the trackmen. (See Figs. 2 and 3.)

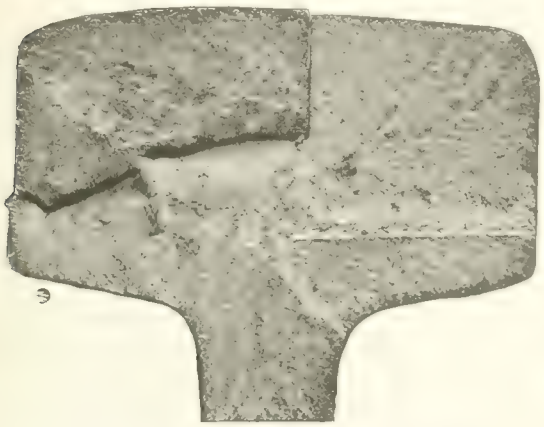


Fig. 4—Full size 100-lb. A. S. C. E. rail, rolled Feb. 23, 1911, failed Jan. 3, 1916. The crack was uncapped for investigation by removing the piece as exhibited in Fig. 5



Fig. 5 Full size photograph of rail and the cap, to show the effect of the gag and the "detail" growth from the checked nucleus caused by the wheel loads. The cap shows the effects of the compressive and shearing strains produced by the gag to shorten the metal of the head

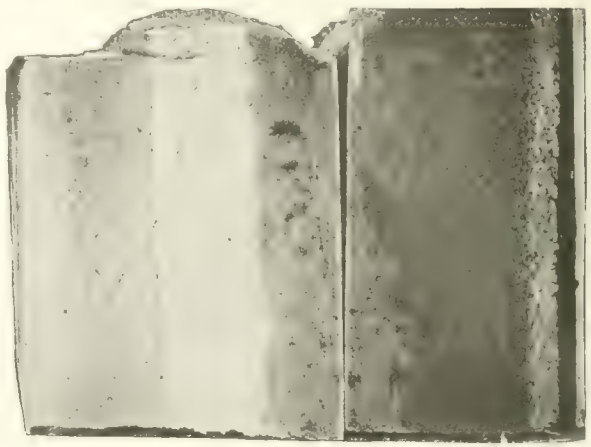


Fig. 6—Full size of the bearing surface of the head in Figs. 4 and 5. Rain had partially rusted the bearing surface of the head before the train had passed over the rail, and the several wheel contacts only made the bright band about ½ in. in width. The crack on the gage side of the head, similar to that in Fig. 2, was found by the trackmen and the rail removed before it broke

Interior transverse fissures have not occurred in the countless thousands of rail heads of physically homogeneous metal for the reason that they do not contain the conditions of the first contributory cause, consequently, while the metal is lengthened or shortened by the second contributory cause. it is not checked.

Basic open-hearth rails of the composition of the New York Central Lines specifications and rolled from reheated blooms have not, to date, developed interior transverse fissures.

INTERGRANULAR TYPE OF TRANSVERSE FISSURES

The specimens in my collection, after investigation, I classified by June 9, 1915, into two general types: intergranular and coalescent.

Intergranular: The nucleus, in effect physically a non-ductile core in the head, which is checked between the grains of the metal by the gag of the straightening press, and may be ⅝ in. in diameter, or as small as ⅛ in. The subsequent development in the track of this type of interior transverse fissure from the checked nucleus is through the grains, a "detail" growth of specular surfaces, in striking contrast to the check between the grains, the effect of the blow of the gag. This type develops in rails or a part of a rail which was cooled "low" on the hot beds, and was then gagged upon the base to shorten its metal and lengthen that of the head. (See Fig. 1.)

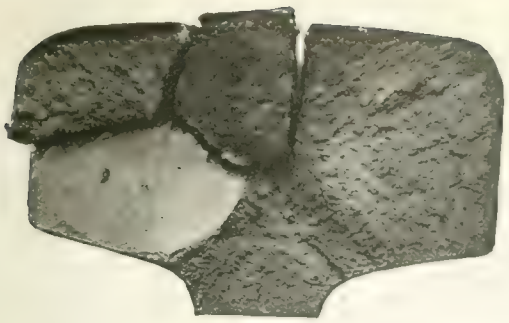


Fig. 7—Full size, 80-lb. A. S. C. E. rail, rolled January, 1905, failed September, 1913. The induced interior transverse fissure did not develop until 8½ years after being rolled. The so-called imprint of the gag is deep and inclined at an angle of about 45 deg., and has been found in several induced interior transverse fissures of the coalescent type

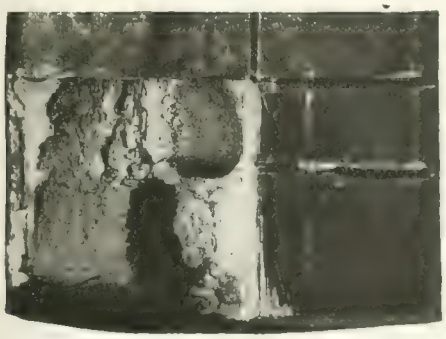


Fig. 8—Full size of the head of rail in Fig. 7, uncapped to show the imprint of the gag on the inclined black spot, nearly in the center and lower half of the head

Three characteristic fractures of the metal appear in the final rupture of the section in the induced interior transverse fissure of the intergranular type.

(1) The nucleus checked between the grains of the metal by the gag.

(2) The "detail" growth through the grains of the specular surfaces.

(3) The final fracture of rupture.

THE COALESCENT TYPE

Coalescent: A checked longitudinal elliptical nucleus, the imprint of the gag on the non-ductile metal, ½ to ⅝ in. under the bearing surface of the head which enlarges to a longitudinal fissure by the passing wheel loads. This fissure coalesces through a transverse or oblique crack at the side of the maximum shearing stresses produced by the gag, and usually develops after two or more years of service in the track into the nearly vertical interior transverse fissure. The fracture is often conchoidal at the junction of the coalescence. The longitudinal fissure, and sometimes the vertical, open on the gage side of the head, and can be discovered by careful inspection before rupture of the rail occurs in the track. (See Figs. 2 and 3.) This type develops in rails or a part of a rail which cooled "high" on the hot beds, and was then gagged upon the head to shorten its metal and lengthen that of the base below the neutral surface of the section. (See Figs. 2 to 10, inclusive.)

The nucleus checked between the grains of the metal of the longitudinal fissure by the gag is not visible to the trackmen, but it coalesces through a transverse or oblique crack to produce the nearly vertical interior transverse fissure which ruptures the rail. The nucleus checked between the grains will be disclosed only by uncapping the head of the rail.

The illustrations do not show all the probable forms of fractures of the coalescent type which may develop in the track in the different brands of rails. The core of non-ductile metal, which becomes the checked nucleus by being gagged upon the head of the rail is practically similar to the core of non-ductile metal in the intergranular type which is checked by being gagged upon the base. The fractures of the two different types appear so dissimilar that their correlations are not easily traced or comprehended without extensive study and research, though the illustrations shown are ample for classification.

Supervisors should instruct trackmen to distinguish the induced interior transverse fissures in the rail heads herein described, from the now rare surface crack which sometimes occurs where the drivers have slipped on the head of the rail and hardened the metal, and then by "detail" growth develops down through the head and web to the base until the section ruptures. Two or more surface cracks may occur in the same rail length at stations and waterplugs. It is now usual to remove rails from the main line tracks where the drivers have slipped on the heads of the rails to a noticeable extent. Such practice is to be commended.

Figs. 2 and 3, one-fourth size, indicate some forms of the cracks of the coalescent type which break through the metal on the gage side of the heads of rails.

The rails in the track should be examined daily for cracks which break through to the outside of



Fig. 9—One-half size, 5⅛-in., 80-lb. rail, rolled Jan. 12, 1912, failed Jan. 16, 1915. The final fracture of rupture extended through the web into the base before the latter failed



Fig. 10—One-half size of the head of rail of Fig. 9, uncapped to show imprint of the gag

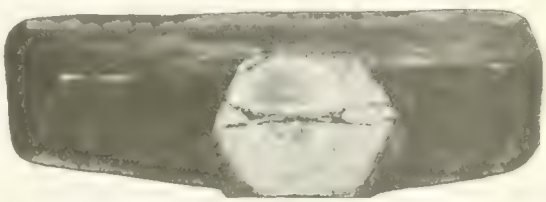


Fig. 11—Full size photograph showing the end of the shank of a pneumatic tamping bar which had broken from an exterior "detail" crack and welded with a "V" weld which developed in service the interior transverse fissure shown from the imperfect welded portions. The unwelded surface in this case is regarded similar in effect to the longitudinal crack with its surfaces of the coalescent type of [illegible] interior transverse fissures found in rail heads

the metal, and when any are found the rail should be removed. These cracks are not all alike in the various brands of rails, owing to the different methods of gagging.

To straighten the present stiff rails, the pressure of the gag is too severe on the metal for supports of only 42-in. spans, which I had increased from 30 in. in 1891. Since then no change has been made. Recent experiments show that with wider spans the rails can be straightened with less pressure of the gag and with consequent less injury to the metal, resulting in an improved line and smoother surface. The half moon breaks in the bases of rails are generally due to the locked-up strains produced by the gag.

The causes which induce interior transverse fissures in an occasional rail head, and the effects, are stated above in their order of combination and the three different places and periods of occurrence. These facts can be utilized to prevent the conditions arising in the manufacture of rails which tend to induce interior transverse fissures in the output.

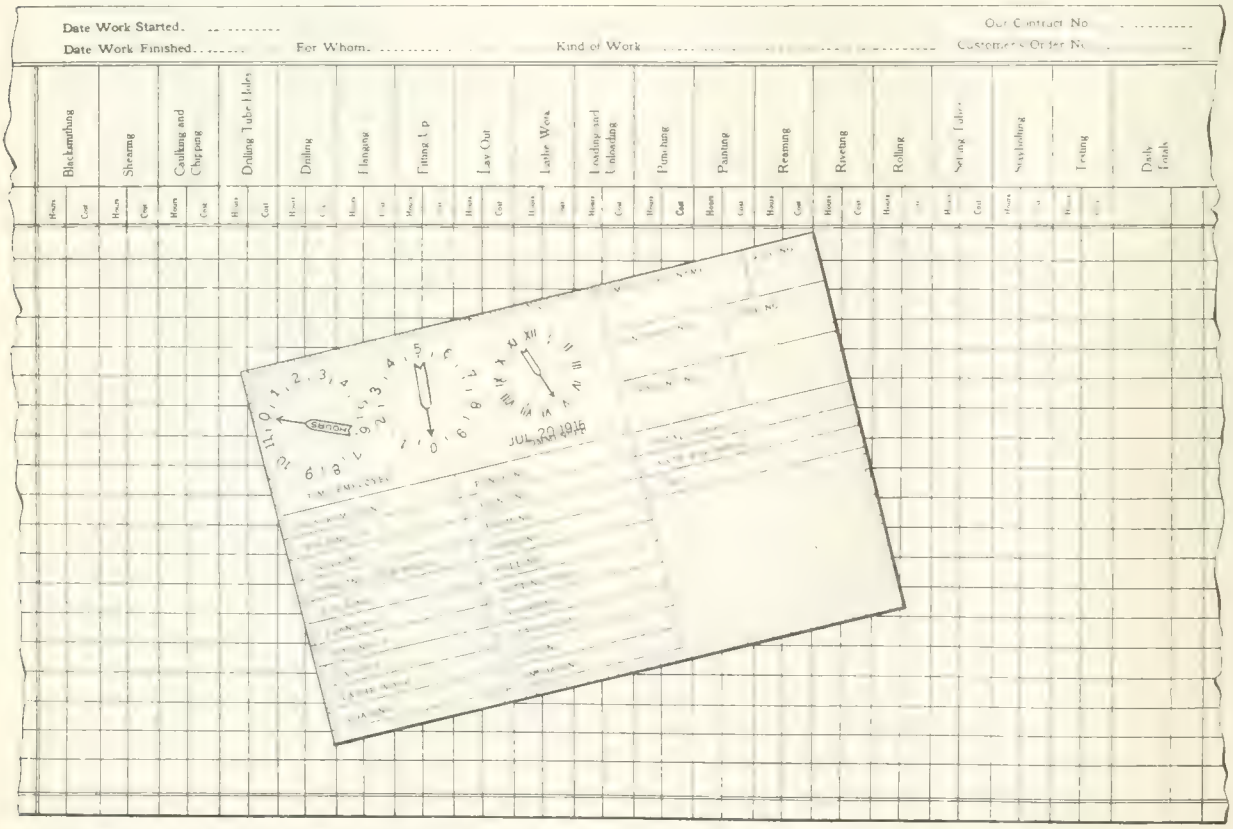
Labor Cost Keeping in a Boiler Shop

The D. Connelly Boiler Company, Cleveland, Uses Only Two Forms and the Work Is Done by a Timekeeper

A VERY simple and accurate method of keeping the labor cost in a boiler shop has been developed by the D. Connelly Boiler Company, Cleveland. While the system was devised for use in this particular plant, it could doubtless be successfully applied to other industries. The system requires very little clerical work and the entire record is kept on two forms, a workman's time card and an itemized time sheet. It requires the employment of only one man, a timekeeper, who keeps the entire record and devotes his whole time to this work.

Each order as it comes into the shop is given a shop number and every workman reports to the timekeeper before he starts on a job that has been given him by the forman. The timekeeper enters the man's name and key number on the time card and stamps it with the date and time the man starts the work. On the card is printed a list of every operation in the shop and a check mark is made opposite the proper word to indicate the operation. This card is kept in the timekeeper's desk.

When the workman finishes an operation he returns the card to the timekeeper's office and it is again stamped with the time actually required. Space is provided on the card for entries of the total hours employed, decimals being used for parts of hours, the rate or man's wages per hour and the total cost. At the time a workman turns in his card after finishing a job he is given a new card properly filled out and stamped with the time of starting work on the next job. It can be seen from this that each man has a different card for each job he works on during the day. At night all cards are rung in and stamped with the time spent on the job whether the particular operation indicated on the card is completed or not. If the work is uncompleted at night a new card is made out the next morning.



Only Two Forms Are Needed in This System, a 4 x 6-In. Workman's Time Card and an $8\frac{1}{2}$ x 14-In. Itemized Time Sheet Containing a Summary of the Cards

The filled-in cards are classified according to the man's key number and the total number of hours on his card, or cards, must equal the number of hours he has worked during the day. The cards are then reassorted, those having the same shop number being grouped together and those covering similar operations on the same job being bunched together. When thus grouped according to jobs with sub-groupings for similar operations, the time spent on the various operations is totaled and recorded on the time sheets. When this record has been transferred from the time cards to the time sheets the former are filed away, all for one date being kept together.

The time sheet provided for each job and filled in from the workman's time cards every day has columns for all the operations that are listed on the time cards and in these spaces are listed the hours spent on each operation and the actual labor cost for each operation during the day. The time and cost for the day are totaled each day in a space provided on the blank and the total hours and costs are carried along each day so that a glance at the card shows the amount of time and labor cost on the job at any time before the work is completed. These time sheets which are filled out by the timekeeper are sent to the manager every morning so that he can quickly see by looking over the sheets every day how much work has been done on every active job. When a job is completed the hours of work and cost of the various operations are added up and a grand total of all operations in time and labor cost is made. The time sheets are kept in a binder in the timekeeper's office until the job is completed. This binder contains a sheet for each job that is going through the shop. These sheets also have spaces for recording the order-book number, shop number, dates of starting and finishing the work, etc.

When the material comes into the shop it is sorted out for the different jobs, each order usually being a special one requiring from 12 to 50 plates. The stock for each job is piled on the floor by itself and given a number corresponding to the shop number of the order. This makes it convenient for the workman to get additional material as it is needed on the job.

A Fire-Resisting Material for Furnaces

A material for use as a mortar for pointing up brickwork, as in furnace walls, gas ovens, retorts, boilers, bridge-walls and places subjected to high temperature has been put on the market by William Clifford & Sons Company, 360 Union Avenue, Elizabeth, N. J. Besides the putty form, it is also obtainable as a paint and has been given the name Resisto. The company has exposed brickwork to temperatures approximating 3000 deg. Fahr. and the putty joint as well as the Resisto paint covering appears to have withstood the conditions without damage to the brick or the brick joint. The company has also experimented with a bolt and nut covered with about ⅜ in. of the putty and put in the blast of a blacksmith's forge. The part of the bolt not covered was fused and burned, while on removing the putty the threads of the bolt were intact and the nut could be screwed by the hand. The material has been tested by the Bureau of Standards. Heated in an electric vacuum furnace, with a temperature measured by an optical pyrometer, the lowest temperature at which the material could be seen flow, which temperature was taken as the melting point, was 1500 deg. C., or approximately 2750 deg. Fahr.

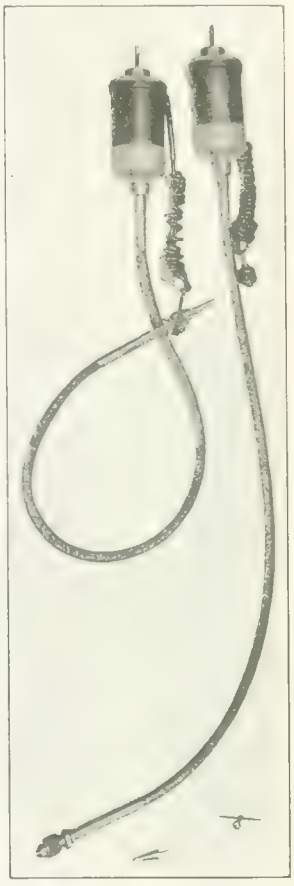
The material is marketed to protect firebrick, fire tile and steel and iron work and, it is stated, requires no drying out. The paint, it appears, vitrifies. The company has issued a little folder which explains the methods of use. For example, in the case of bricks, they can be either dipped in the material or buttered in the usual manner, as it is expressed, but it is desirable that the surfaces should be clean and free from moisture and grease or oil. The material is the invention of Arthur Dunbar of South Melbourne, Australia.

Flexible Shaft Portable Electric Tools

In spite of their small sizes, portable electric drilling and grinding machines cannot always be used in close corners and on some kinds of shopwork. To overcome this manufacturers of these tools are employing flexible shafts. The illustration shows the latest line of portable machines equipped with flexible shafts brought out by the Standard Electric Tool Company, Cincinnati. The ordinary length shaft furnished is 6 ft., but one 10 ft. long can be used when necessary.

As will be noted the motors can be suspended from the ceiling by an eye bolt, but for shopwork, the machine can be mounted on a base with a convenient handle for transporting from one part of the shop to another. The motors can also be suspended from a traveler which in some cases is handier, and as a consequence a time-saving method of transporting the apparatus.

The motors furnished with this outfit operate on either alternating or direct current at an average speed of 1000 r.p.m. The flexible shaft is fitted with a drill chuck and this is interchangeable with a buffing arbor and mandrel for holding emery wheels, so that many different kinds of work outside of drilling can be performed with ease.



The Application of Flexible Shafts to Portable Electric Tools Enables the Motor to be Suspended from the Ceiling or a Traveler and the Power Transmitted in Almost Any Direction

Hardened Steel Gears by a New Method

The production of hardened steel gears as nearly perfect in shape as is possible on gear cutting and boring machines and doing this without subjecting the otherwise finished and hardened gears to a final grinding operation, are the claims made for an invention on which a patent (U. S. 1,152,157) has been granted to Frank H. Farmer of Cleveland, Ohio, and assigned to the White Company of that city. The method consists in rough machining the gear blanks and then carbonizing them. The carbonized gears are heated up, quenched in oil and then annealed. The annealed gears are machine-finished and finally oil hardened. This treatment, it is claimed, does not warp or destroy the accurately shaped machine-finished product.

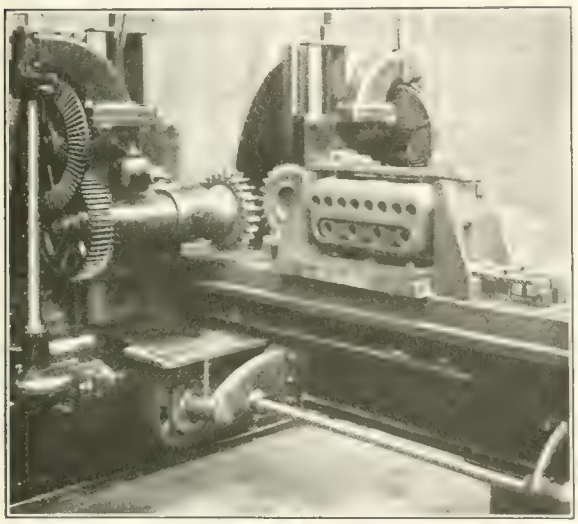
The Burt Mfg. Company, Akron, Ohio, because of greatly increased business, has found it necessary to enlarge its manufacturing facilities. It is just completing two good-sized two-story additions to its already large factory. Much new machinery will be required, orders for which have already been placed. The Burt Mfg. Company has heretofore devoted its efforts exclusively to the manufacture of oil filters, exhaust heads and ventilators, but it now proposes to embark in a general line of sheet metal work.

Making Motor Trucks in the White Plant

Some of the Production Methods Followed —The System of Shop Management, Employing and Paying and the Hospital Service

BY F. L. PRENTISS

In the plant of the White Company, Cleveland, one of the leading makers of automobile trucks, varying specifications have made every truck order practically a special one. This has necessitated a reversal of the practice of building cars first and selling them afterward to the plan of taking orders before construction. This change in conditions would make impracticable many of the production methods followed in plants having a large production of pleasure cars in a few models. In making a motor truck, however, most of the manufacturing methods are not dissimilar from those followed in building pleasure cars. The same motors are used, the transmission is similar and numerous parts that make up the chassis assembly allow the same shop methods and do not necessitate one machining department for car parts and another for truck parts.

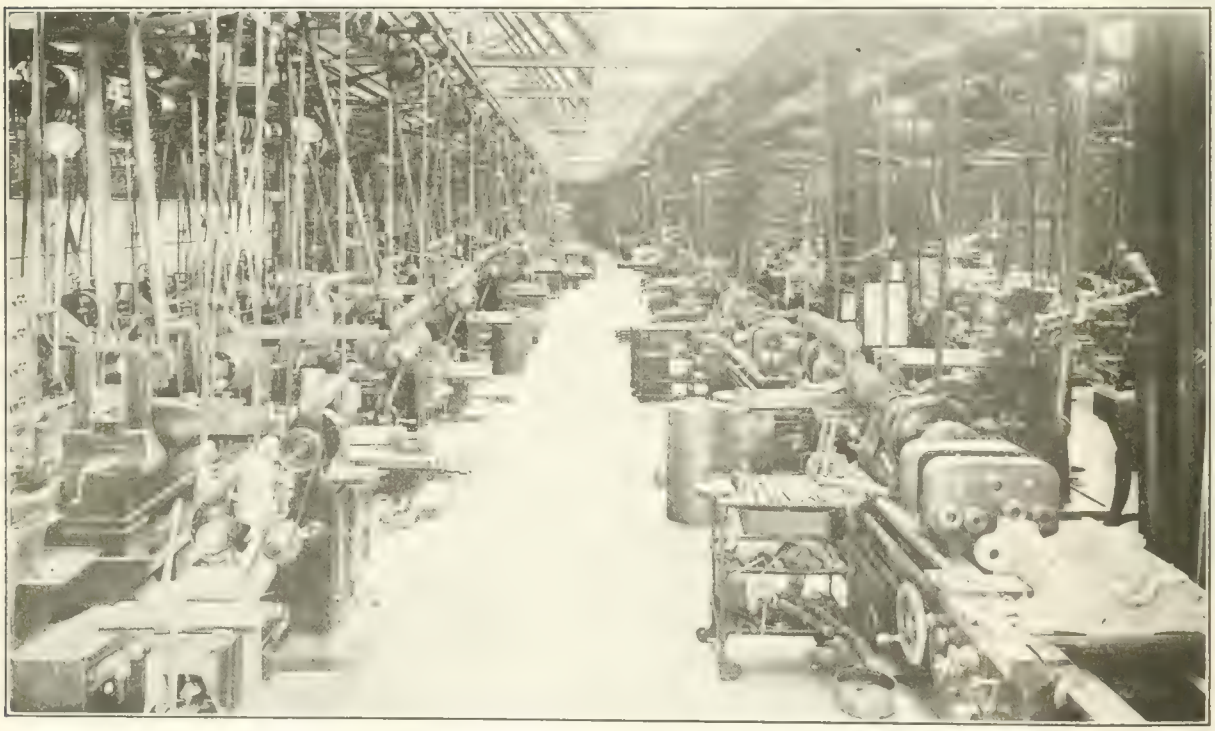


Facing Both Ends of Cylinders on Beaman & Smith Double Head Milling Machine in One Operation

In the White plant accuracy in machine work is emphasized rather than quantity production. But recent developments in the plant have been along the line of using new fixtures for more rapid production and consequently increased output, and the improved production methods have, at this writing, made possible a daily production of about twenty 1 to 5 ton trucks over several months in addition to the regular daily output of about 10 passenger cars. The general plan is followed of doing all machine work on the various parts in their own departments rather than grouping work according to various kinds of machine operations. However, should the machines in one department be unusually busy, work is occasionally transferred to some other department where machines of a similar type are available.

The engine department, which is in charge of a general foreman, is divided into various sub-departments, each in charge of a functional or sub-foreman, who has an assistant to set up the work. These sub-departments include lathe, turret lathe, milling machine, drilling machine and crank turning operations and assembling small parts, assembling motors, cleaning motors and final inspection of motors.

The first operation on the cylinders, facing both sides, is done on a Beaman & Smith double-head milling machine, an adjustable fixture being provided in which cylinders of different sizes can be



Schumacher & Boye Lathe Equipped with a Special Fixture Having Fixed Spindles for Each of the Five Centers for Boring Crank Cases. Cutters removed

mounted. Both ends are faced simultaneously, first being given a roughing and then a finishing cut. Base holes are then drilled on a three-spindle drilling machine and two of these holes form centers for the perfect alignment of the work in all the following operations of boring, drilling, reaming and grinding.

The crankcase is bored on a Schumacher & Boye lathe with a special fixture with five fixed spindles providing for the crankshaft, and the timing gear and camshafts. The crankcases are located on the machines by base holes on the cylinder face.

The first machine operation on the connecting-rod, drilling the piston pin hole, is done on a three-spindle drilling machine. After facing, a special fixture is used in milling the lock on the crank end of the connecting-rod. This operation is performed by clamping four rods in a special fixture and milling the four simultaneously with gang milling cutters.

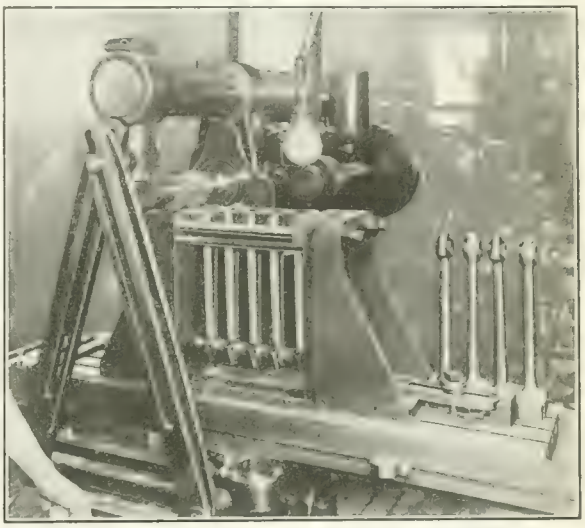
Practically all of the machine screw products used by the company are made in its own screw machine department. Besides the hand machines there are 70 automatic screw machines in sizes from ⅜ in. to 6¼ in. Six tons of steel and brass wire are used in a day and the production has reached as high as 342,000 parts in a week.

Wheels for trucks are machined on Bullard vertical boring mills. The steel casting for a rear wheel for a 5-ton truck weighs 700 lb. and the wheel when finished is 35 in. in diameter and has a 12-in. face. The first operations in their order are chucking, boring, threading and turning. Then the wheel is turned over and the same operations are performed on the other side, and at the same time the face is turned, ½ to ⅝ in. of metal being removed from the face in the machine operation. The machine work on a wheel is completed in 2 hr.

It has been the usual practice to use German tubing for ball bearing ring blanks 1¾ in. and larger, but now that this tubing is not available chrome steel bars are used for ring blanks 4 in. in diameter and under, and hand-forged chrome steel ring blanks are used for larger size rings. These blanks are forged in the steel mills to inside and outside diameter. Bearing rings are made up to 8 in. in diameter for the rear axle of 5-ton trucks

The first operation on a large bearing ring is facing one side of the forged blank. Then the inside is bored, the outer diameter is turned, and the opposite side faced. After these machine operations the rings are hardened and ground. The first grinding is on the sides, which is done on a Heald grinder, the work being held in place by a magnetic chuck. The outer diameters of the rings are then ground on standard grinding machines, first being accurately centered by placing several rings in an arbor in a 90-deg. centering device and being bolted in place and held by a collar at each end of the arbor. The final operation is grinding the ball-bearing race. This is done on a battery of seven special grinding machines built by the company and on a special type of Landis grinding machines that are equipped with ball-bearing spindles.

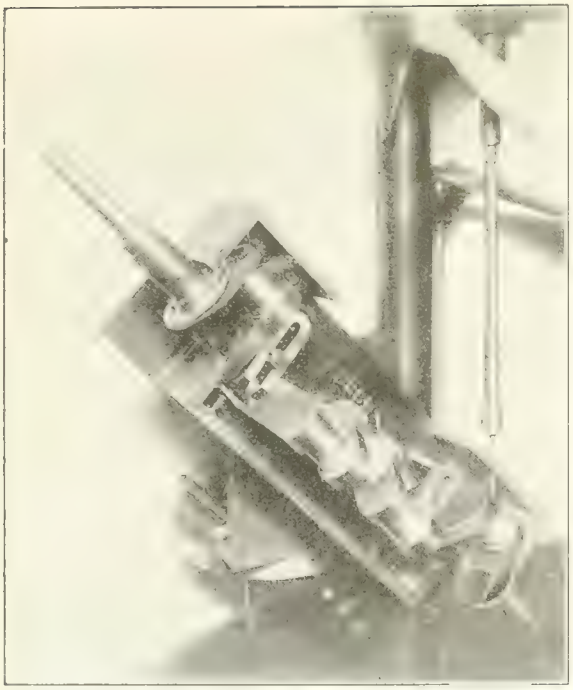
The method of cutting 38 teeth on the large roller chain sprockets is a departure from usual practice. The bulk of the stock is removed with



Milling Lock on Connecting Rods on No. 4 Cincinnati Milling Machine, 5 Rods Being Held in a Special Fixture



One Side of the Heat-Treating Department, Showing Bellevue Case-Hardening and Heat-Treating Furnaces with Fuel and Air Pipes



Special Universal Jig So Holes Can Be Drilled at Proper Angle from Either End. Jig swivels on a center

an eight-spindle drilling machine, the drill holes being made as close to the edge of the blank as possible. The teeth are then finished on a Hendey Lincoln type of milling machine, four blanks being located on an arbor clamped to the face plate of an indexing attachment.

Heat-treatment of parts has been extended so that now nearly every minor part down to bolts and step-irons is case-hardened or heat-treated to secure maximum strength, and where possible to reduce the size and weight of the part. Transmission gear blanks are first rough cut, then carbonized and annealed, after which they are given a final cut and then hardened. By this method of procedure there is only a low heat hardening operation after a final cutting and danger of distortion is eliminated. All forged parts that are liable to breakage are tested with a scleroscope and are kept within certain limits. After being tested with a scleroscope each part is stamped with a number, showing the hardness number. Such parts as steering knuckles and arms, lamp brackets and spring yokes are oil treated so that their strength may be maximum for the weight. For case-hardening and heat-treating, gas and oil-fired furnaces are used. The furnaces are located in the center of the heat-treating department, so that escaping heat is carried through the windows of the monitor above. Oil for quenching is cooled by passing through coils of pipe around which water from the factory water supply circulates.



Bullard Vertical Milling Machine Turning Truck Wheels

Orders from the general office are sent to the car order department in the office of the general superintendent, who is at the head of the production department and under whom are several assistant superintendents. Here the orders are dissected, and each department that has anything to do with the filling of the order is furnished with its part of the order. All the work in the car order department is attended to by its head and four assistants. The one important report or schedule that is prepared and on which the production operations are based is the material and production schedule. This is made out on a typewriter without the use of a printed blank and copies are sent to the various foremen. These schedules classify the various models and special trucks and specify the number of each model to be turned out weekly and sometimes daily for a period extending over several weeks. The totals for each model are carried along from week to week in tabulated form to the close



TO EMPLOYMENT DEPARTMENT
THE WHITE COMPANY

Recommendation for Employment

DATE NO 2

NAME AGE

ADDRESS PHONE

IN TOWN OUT OF TOWN

HOW MUCH EXPERIENCE

HOW LONG ALQUAINTED WITH

RECOMMENDED BY

APPROVED BY

NOTE KINDLY FILL OUT THIS FORM IN DETAIL WITH INFORMATION ABOUT SOME ONE WHOM YOU THINK IT WOULD BE DESIRABLE FOR US TO EMPLOY RECOMMEND ONLY 1ST CLASS MEN

Employees Recommend Men for Employment

of the last week on the schedule. Sometimes these schedules are in effect for several weeks without changes or revisions. Each department has a clerk who acts as an order clerk, and work is planned and material ordered by the foreman and his clerk, according to the requirements as shown on the production schedule.

Assembled and completed parts are taken to the erecting department according to the production schedule. The superintendent's office also furnishes the erecting department an erecting schedule showing the number of cars to be erected each day and the individual number of each car. Efforts are made to keep the erecting schedules made out five weeks in advance. Each order number becomes a car number when it reaches the erecting department and a complete record of each car by number with its specifications is kept by a card index system in the erecting department.

The different departments are kept in close touch by frequent meetings. The assistant superintendents hold a meeting every morning and separate daily meetings are held by the foremen and order clerks. To secure the more frequent co-operation of the men, to arouse their interest and give them a voice in the factory management, each department has a committee of 10 to 20 employees. Each committee meets every two weeks with its foremen and

discusses working conditions, safety matters, improvement in shop methods and various other topics of interest. Suggestion boxes are provided in each department and these suggestions are opened by the committee and discussed. Complete minutes of the proceedings at the committee meetings are made and these are typewritten and sent to the superintendent. In this way matters discussed at the committee meetings are brought to the superintendent's attention and he is kept in close touch with the men all over the plant. Copies of the committee's reports are also posted in the locker-rooms so that employees not on the committees may know what is being done by the committees in their own departments. The committees not only are a medium by which the men reach the superintendent, but a means by which the superintendent reaches the men. Whenever the superintendent has under consideration anything that pertains particularly to the men, he does not make the proposed change without first putting it up to the men through their various committees, and in this way he learns the sentiment of the employees.

The employment department is in charge of an employment manager whose duty is to secure proper men for possible openings. The actual hiring is done by the departments in which the men are to be employed. When a man is wanted the foreman

CLEVELAND, OHIO 19

THE WHITE COMPANY

GENTLEMEN:-

PLEASE NOTIFY MY FOREMAN

MR THAT I WILL BE ABSENT FROM MY WORK

FOR DAYS BEGINNING MY ABSENCE

DUE TO

YOURS RESPECTFULLY,

CLOCK NO

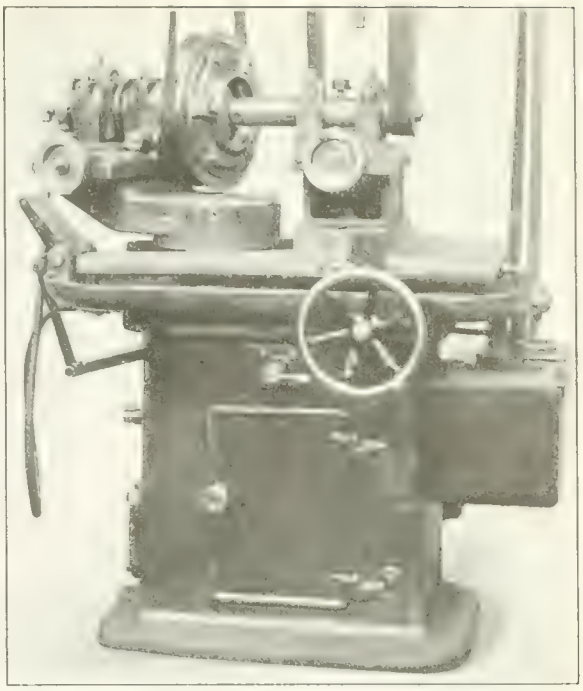
EMPLOYEES MUST SEND IN THIS CARD WHEN THEY ARE UNABLE TO REPORT FOR WORK. TELEPHONE CALLS NOT ACCEPTED

A Postal Card is Supplied for Reporting Absences

makes a requisition to the employment department for men for certain work and the requisition is approved by the assistant superintendent covering the foremen's department. The employment manager secures a man he thinks suitable for the work and turns him over to the assistant superintendent and foreman, who pass on his qualifications. In this way no workman is forced into the department by the employment department. A man seeking work sees the employment manager and if there is a possible chance of needing his services he makes a written application on a blank form provided and his application is put on file. As the requisitions reach the employment department, letters or phone messages are sent to the men having applications on file.

In addition to the application file the company has a plan of having its employees recommend men for places. A recommendation blank has been prepared, copies of which are placed in the hands of foremen of different departments who distribute them to the employees. Any employee having an acquaintance whom he thinks will make a first-class workman can fill out one of these recommendation blanks. One copy of the blank goes to the employment office and the other to the man recommended, who uses the filled out recommendation blank as a reference when calling at the employment office.

Men are paid every two weeks. Complying with an expressed wish of the men, no bills in larger



One of Seven Machines Specially Built by the White Company for Radial Grinding of Ball Races

denomination than $10 are used in paying. A day or two before pay day, the men's time cards are figured out and delivered to them for purposes of checking with their own records. The card is made out for so many hours' pay and not for the actual amount of money. When a man receives his pay, which is distributed while he is at work, he gives up his signed time card as a receipt.

A report on an employee is made out on a blank provided for that purpose when occasion requires; that is, when he is hired, discharged, quits, permanently or temporarily, or is transferred to another department or when his pay is changed. Space is provided on this card for comments on the man's qualifications. One copy of this report is kept by the foreman, one goes to the timekeeper and one is kept in the employment office, where the proper entries taken from this card are made on the employment record kept on the back of the man's application card. Employees are furnished with stamped

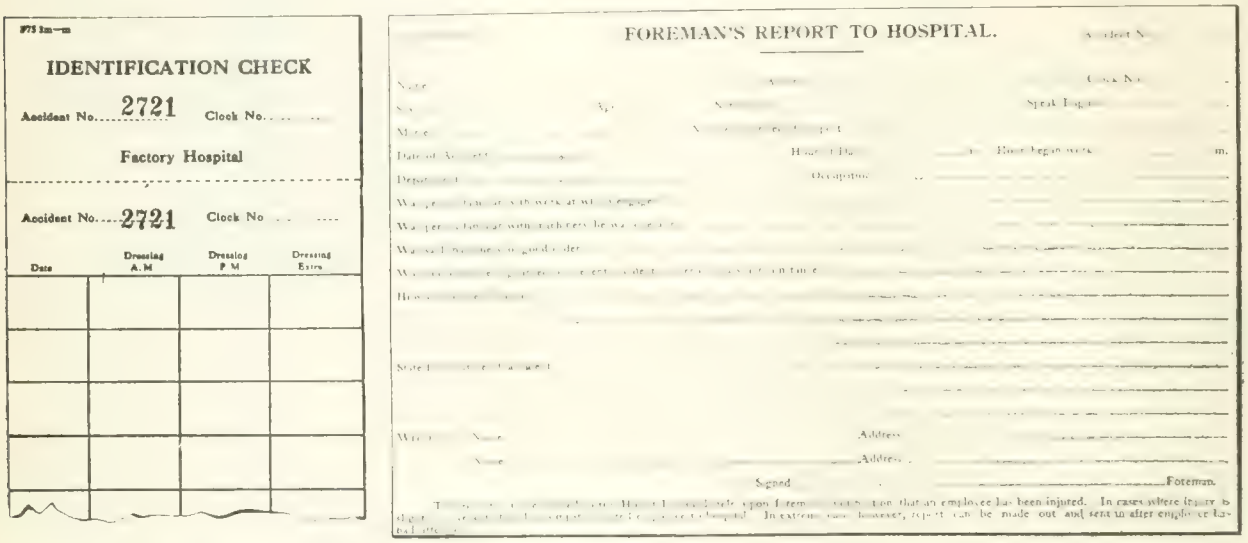


Cutting Teeth of Truck Driving Sprocket on Hendey Machine

postal card forms for reporting to the company when they are unable to report for work, giving the length of time they expect to be absent and the reasons therefor. Notification of absence by telephone is not accepted. To insure prompt delivery without the delay of passing through the regular mail channels at the general office, these cards bear a printed address of a post-office box number and are taken from the post office every morning by a messenger.

The works hospital is fully equipped with first-aid appliances and is in charge of a surgeon and three nurses. No first-aid treatment is allowed in the plant. When a man is injured he is sent to the hospital by the foreman, who makes out a report stating the nature and cause of the accident and other detailed information. Each accident is recorded and every dressing or treatment given is noted on a card that is kept in an ordinary time-card rack. Attached to this card is an identification check stub which the man presents when he calls for treatment. He must report to the hospital daily until released by the nurse in charge. These hospital cards are moved daily from one rack to another so that the nurses can tell by a glance at the rack at the end of the day if any man has failed to report. An automobile is kept in readiness at all times for emergency cases, taking the injured to a hospital or to the surgeon's office. An employee absent on account of sickness or any not reporting to the hospital is kept in close touch with by visits, made usually by his foreman.

Workmen's insurance is carried by the company under a provision of the Ohio workmen's compensation law that allows an employer to conduct its own insurance department, payments for injuries being required to be as much as those allowed by the state for similar injuries. The company finds that the men prefer to have injury claims adjusted directly by the officers of the company with whom



IDENTIFICATION CHECK

Accident No. 2721 Clock No.

Factory Hospital

Accident No. 2721 Clock No.

Date	Dressing A. M	Dressing P. M	Dressing Extra

FOREMAN'S REPORT TO HOSPITAL.

Form of Record Cards of Works Hospital. The foreman's report has rulings on the back for the nurses', expense and other records

REPORT ON EMPLOYEE
TO EMPLOYMENT DEPARTMENT

THE WHITE COMPANY

DATE

NAME DEPARTMENT RATE CLOCK NO.

REQ. No. AGE ADDRESS

KIND OF WORK ACTION TO TAKE EFFECT AT O CLOCK A. M. P. M (DATE)

HIRED DISCHARGED QUIT LAY OFF NEW CLOCK No

TRANSFER TO DEP'T IN NEW DEP'T WORKS AS CHANGE RATE FROM TO

AS A WORKMAN IS HE—POOR FAIR GOOD FIRST CLASS

REASON FOR ACTION

HAVE ALL TOOLS BEEN TURNED IN ALL PERSONAL PROPERTY REMOVED LOCKER KEY GIVEN RETURNED

WOULD YOU RE EMPLOY IN YOUR DEPARTMENT DO YOU THINK ADVISABLE TO EMPLOY ELSEWHERE

—APPROVED BY SUPERINTENDENTS—

FOREMAN

EMPLOYMENT SUPERVISOR

PAYMASTER

F-158 5000 M

One Copy of This Report is Kept by the Foreman, One Sent to the Timekeeper and One Remains in the Employment Office

they come in contact rather than by men connected with the state industrial commission.

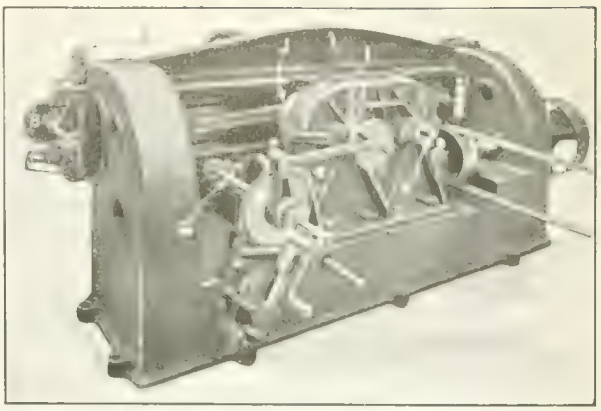
A mutual benefit society is conducted entirely by the employees and has the high executives on its membership list. This society, with an initiation fee of $1 and bi-weekly dues of 25c., pays a sick benefit of $8 per week for the first 12 weeks and $5 a week for the second 12 weeks and $3 a week for the third 12 weeks. A shop store is maintained by the employees and profits have averaged over $400 per month. Of these profits 70 per cent goes to the mutual benefit society and 30 per cent to an amusement fund.

HERRINGBONE GEAR MACHINE

An English Machine Tool Employing Reciprocating Gears as Planing Cutters

A machine capable of cutting double helical or so-called herringbone teeth as well as gears with straight teeth either in a straight line or staggered is being used by the Power Plant Company, West Drayton, Middlesex, England. It is a development of the principle underlying the Fellowes gear-shaping machine and the cutters employed are themselves gear wheels. The teeth of the blank are generated by the rolling action of the cutter upon it and it is claimed that the cutters used in this machine are accurate to a greater extent than is commercially practicable in the case of the hobs used in that type of gear generating machine.

The base of the machine consists of two rigid bed plates bolted together at right angles to each other. The two cutters which are employed, one to cut the teeth belonging to the left-hand helix and the other corresponding to the right-hand helix, together with the mechanism for reciprocating the cutters and twisting them to give the helical motion required are mounted on the longer of the two bed plates, while the blank is mounted on the other. The blank and the cutters are caused to roll together with the velocity ratio corresponding to the number of teeth on each and at each successive revolution of the blank the latter is fed toward the cutter, this process being continued until the full tooth depth is obtained. The reciprocating motion of the cutter, it is explained, eliminates the clearance between the two sets of teeth and at each cut both the cutter and the blank are turned through a small angle by a ratchet mechanism. The blank is rotated by the wormwheel *A*, which in turn derives its motion from the change gears at *B*. To facilitate the operation of the machine the driving

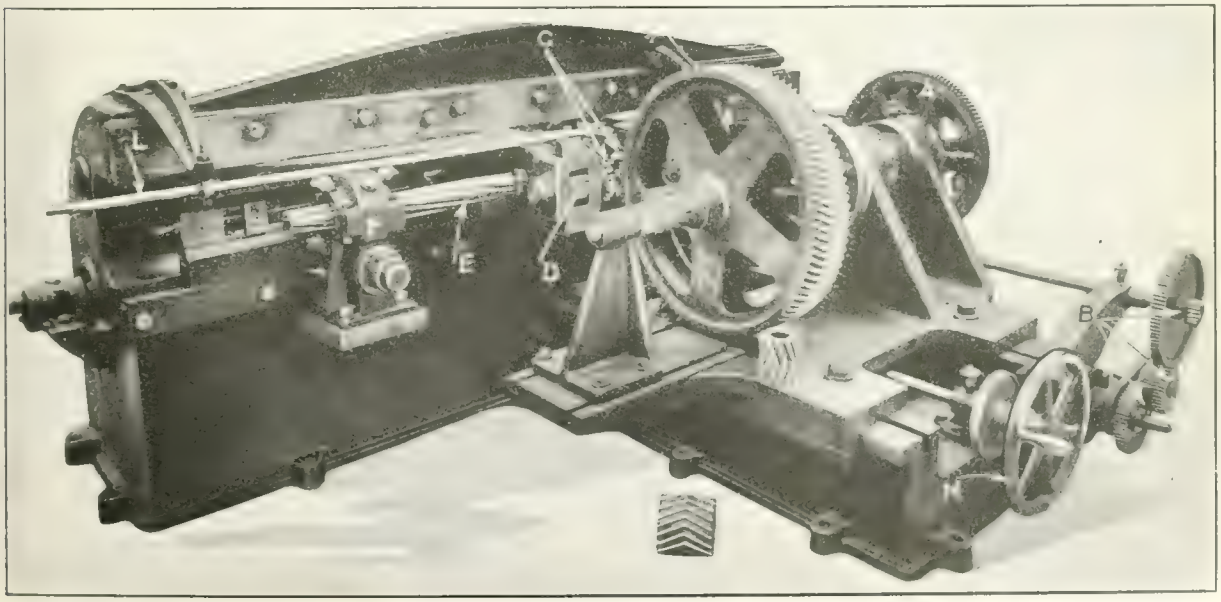


The Reciprocation of the Cutters and the Rotary Feed of the Blank Are Controlled by a Combination of Bevel Gears and a Ratchet and Pawl

wheel of the change gears has the same number of teeth as the cutter, while the number of teeth in the driven wheel corresponds to the number to be cut in the blank.

The two cutter heads *C* are mounted on shafts which are integral with the spur gear *D*. This gear meshes with another mounted on the rifle bar *E*, which passes through a rifled hole in the wormwheel *F*. When the machine is in operation this wormwheel is rotated by bevel gearing deriving its power from the blank rotating mechanism. The driving member of these bevel gears is coupled by a clutch to a shaft which connects through other bevel gearing at its opposite end with the feed shaft *G*, the adjustment of this clutch varying the relative angular position of the two cutters to each other. The feed shaft is actuated by the ratchet wheel *H*, which is driven by a link from the shaft *I*. At the other end of this shaft is a disk crank, *J*, that actuates one of the saddles through which the shaft carrying one of the cutters passes, the other saddle deriving its motion from the shaft *K*. The ratchet wheel *H* is connected to the change gears *B*, which provide for the rotation of the blank, through additional bevel gearing.

As the cutters are essentially planing tools, they require relief on the return stroke which is provided by pivoting the heads carrying them to give enough freedom of motion to supply the desired relief for the tools without interfering with the engagement of the gear *D* with its mate. Reliance is placed upon the friction rod *L* that slides in a fiber bushing, the grip of which can be adjusted by the friction bolt, to insure the cutter clearing the work on the return stroke. The resistance offered by this bushing on the return stroke is employed to swing the cutter clear of the work.



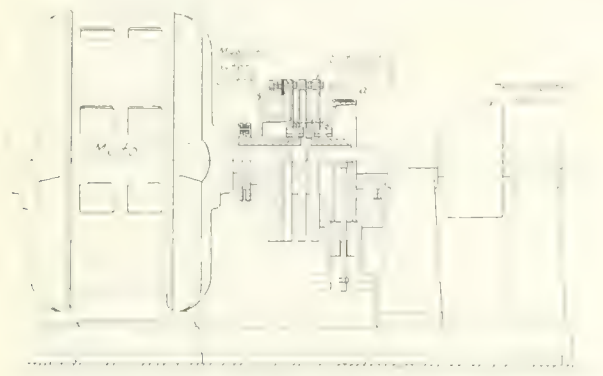
Machine for Cutting the Teeth of Herringbone Gears Ranging from ½ to 25 In. in Diameter with Reciprocating Cutters

The handwheel *M* and the screw which it actuates serve to adjust the work saddle to accommodate various sizes of blanks ranging from ½ to 25 in. in diameter and also to feed the cutters to the correct depth. If desired the interconnection of the cutters can be broken, thus providing for independent adjustment.

It is possible by a slight modification to cut straight-tooth gears, and it is explained that as both cutters operate simultaneously and have a large range of travel, it is possible to turn out a quantity of these gears at one time.

An Extensible Coupling for Mill Drives

The Cutler-Hammer Clutch Company, Milwaukee, has developed a new type of coupling for use with mill drives, particularly where herringbone gears are used. The extensibility of the coupling is independent of the amount of torque transmitted and is the same at no load as when full power is being transmitted. A certain amount of flexibility is also present in the clutch and this too is not affected by the amount of torque transmitted. The coupling was designed for use with a set of rubber calendar rolls but, it is pointed out, is capable of a number of other applications where an extensible



An Extensible Coupling for Mill Drives Designed to Permit the Pinion to Align Itself with the Gear and Remain Unaffected by the End Thrust of the Shaft

coupling is desired. In designing this coupling three factors had to be taken into consideration. The coupling must transmit the necessary power between the motor and the herringbone driving pinion and at the same time leave the latter free to align itself with the gear with which it meshes and also not transmit any end thrust caused by the lateral motion of the driving shaft to the pinion.

The construction of the coupling is simple, consisting of a number of thin disks bolted together to form the disks of the coupling. The use of thin disks was decided upon as the deflection of a thin circular plate under a given load varies inversely as the cube of the thickness. While the torque transmitted by the single disk ⅜ in. thick is the same as that transmitted by three ⅛-in. disks, the flexibility of the latter combination is nine times that of the former. In this coupling, which is 32 in. in diameter, it is stated that the correctness of this theory has been satisfactorily demonstrated, the force necessary to cause a deflection of almost 1 in. being much less than the end sliding friction in the bearings.

Imports of Graphite Much Larger

Graphite or plumbago imports are better than for some time, so that the crucible situation should be somewhat easier. The following table is from Government figures, in gross tons:

		Per Month
Jan. to June, 1916, 6 months	17,711	2,952
Year 1915	20,605	1,717
Year 1914	19,645	1,637
Year 1913	25,785	2,148

The present monthly rate is about 50 per cent larger than the 1913 rate of 2148 tons per month and nearly double the average for 1914.

Machinery and Machine Tools in Peru, Bolivia and Chile

The Bureau of Foreign and Domestic Commerce announces new information now available about the markets for machinery and machine tools in Peru, Bolivia and Chile. This information is contained in a report prepared by Special Agent J. A. Massel, author of a previous work on similar markets in Argentina. Mr. Massel is a mechanical engineer who has been traveling for the bureau in South America for the express purpose of getting together this material. He has made a careful analysis of the industries that use machinery and machine tools and has pointed out all the worth-while opportunities. The prospects for future developments are explained carefully, and lists are given of the principal users and dealers. The report contains 88 pages and may be obtained for 10c. from the Superintendent of Documents, Washington, or from the nearest district office of the Bureau of Foreign and Domestic Commerce.

Pneumatic Tools Used in Restoring Oil Tanks

The pneumatic tools built by the Chicago Pneumatic Tool Company, Chicago, played a prominent part in repairing twelve 17,000-gal. oil tanks recently. These tanks, which were 10 ft. in diameter and 30 ft. long, were damaged in a recent fire at the distributing plant of the Texas Oil Company located at Birmingham, Ala. In addition to being warped by heat, the tanks also had a number of holes in them as a result of the explosions which occurred during the fire. The rivets in the damaged portions of the tanks were removed with Boyer rivet busters, and pneumatic hammers were used to cut the plates and straighten them where they were not too badly damaged. The plates employed in repairing the tanks were riveted with Boyer riveting hammers, and Little Giant pneumatic drilling machines were used. The Johnson & Barry Steel Company, North Birmingham, Ala., had the contract for doing the work.

Making Tungsten Malleable

To render tungsten malleable and ductile is the object of an invention of Alexander Just of Budapest, Austria-Hungary, covered by a patent (U. S. 1,179,009—April 11, 1916), which he has assigned to the General Electric Company. He subjects to fusion a mass comprising metallic tungsten and not more than 2 per cent of boron or boron nitride. It is known that tungsten, when melted or solidified, is not malleable and ductile, so that it cannot be worked or drawn into wire. Boron seems to overcome this property. It is surmised that at the fusing temperature of the tungsten, tungsten boride is formed and that this, either independently or in the form of a fixed solution formed with the tungsten, prevents the formation of large crystals which make the metal especially brittle.

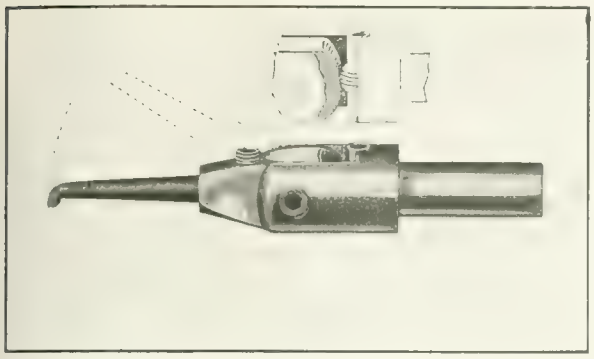
The A. O. Smith Company, Milwaukee, manufacturer of pressed steel automobile frames and other automobile parts, has taken out a group insurance policy covering the lives of its 1800 or more employees. The company is noted for its welfare work. A recent innovation is a provision for motion-picture exhibitions twice a week. Each Monday and Friday, at noon, pictures are thrown on a screen in the main shop, where the men congregate for lunch. The annual outing given by the company to its employees and their families was held at Waukesha Beach, Wis., Aug. 12, and 5000 people were entertained.

H. M. Robinson & Co., Inc., Philadelphia, has been incorporated with a capital stock of $10,000 by Celia and Harris M. Robinson, 3117 Westmont Street, and Lillian R. Dwell, 1418 South Sixth Street, to conduct a general smelting business and to deal in metals.

The Eastern Tool & Mfg. Company, manufacturer of wire shapes and builder of special machines, has moved from 74 Richmond Street, Newark, N. J., to Bloomfield Avenue and Erie Railroad, Bloomfield, N. J.

New Boring Tool with Worm Adjustment

A new boring tool simple in construction and easy to adjust to the exact size and position wanted is being placed on the market by the Clark Machinery Company, 1302 Ontario Street, Cleveland. It is adjusted by a worm and wormwheel accurately fitted and actuated



This New Boring Tool Is Adjusted as Shown by a Worm and Wormwheel Segment

by a wrench, making it unnecessary to tighten the tool after adjustment and eliminating screws to be loosened and tightened in making adjustments.

The point is held in a holder by one set screw, and should it be broken, can be replaced by a new one made from high-speed steel. It is designated as a universal boring tool for the reason that it can be provided with a left-hand point. The tool is made in five sizes and all wearing parts are hardened. It is claimed to be a particularly valuable tool for a tool maker.

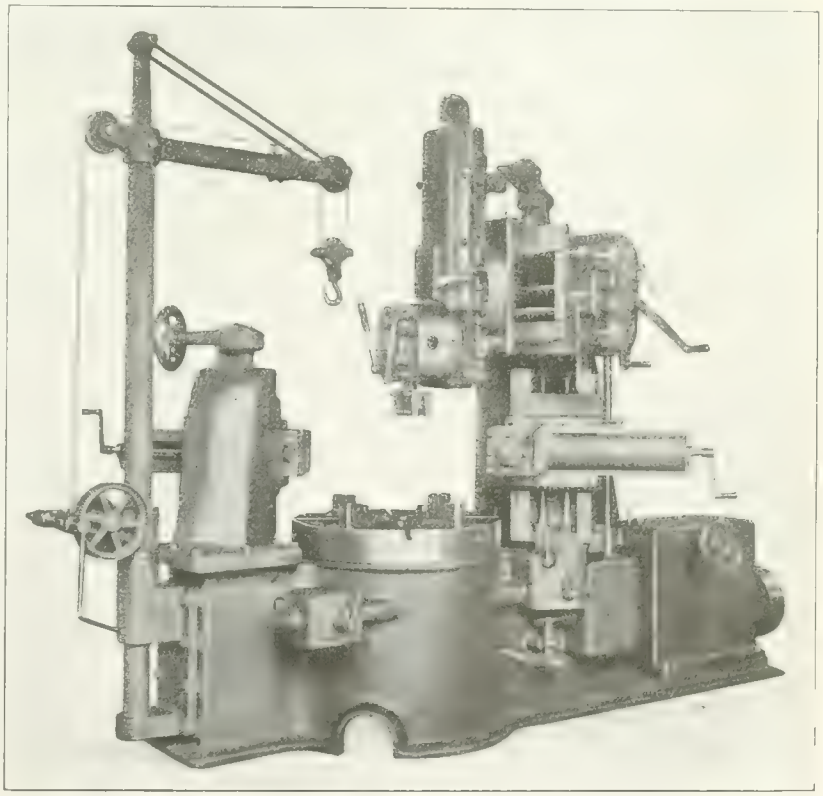
Triple-Turret Boring and Turning Mill

A high-speed, triple-turret vertical turning and boring mill has been built by G. Wilkinson & Sons, Bradford Road Tool Works, Keighley, England. The design of the machine, which was illustrated in a recent number of London *Engineering*, includes change gears for all automatic movements and a crane for placing the work on the table and removing it.

All tools can work simultaneously if desired and one, it will be seen, is carried on a turret head fitted with four tool holders. This head has a spring plunger and lever arrangement to assure alignment with its own slide. Automatic, vertical and horizontal self-acting feeds are provided. Six changes are readily available by manipulating a handle. The other tool holders are mounted on compound slide rests moving on stiff vertical box standards which are firmly bolted to the main body on either side of the table. Hand and automatic feeds are provided for these tools, which can be stopped and reversed as desired.

The table has four openings for chuck jaws and T-slots in its upper surface. A single gearbox provides the power for automatic motions of the machine, and all the gearing required for the purpose has machine-cut teeth.

Two sizes of the machine are built, one handling work up to 30 in. in diameter and a height of 21 in., while the larger is intended for work not exceeding 3 ft. in diameter and 2 ft. in height.



A Triple-Turret Vertical Boring and Turning Mill Having One Head Equipped with Four Tool Holders

Effect of Work on Aluminum

The effect of work on aluminum was discussed by F. J. Brislee before the Faraday Society (British) recently, and his results tend to confirm the amorphous theory advanced in connection with iron and steel. He shows that the specific heat of the metal varies with its structural conditions, being higher for the amorphous state than for the crystalline. The effect of prolonged annealing at as low a temperature as 100 deg. C. is to lower the specific heat and tensile strength, but to increase the flexibility in the case of wire, thus indicating the occurrence of considerable structural changes at this moderate temperature. Emphasis is placed on the fact that the crystalline structure of the metal disappears at a very early stage under cold working, while the reverse change proceeds so gradually that annealing, unless long continued, is ineffective. While annealing for 10 hours at 500 deg. C. renders the metal dead soft with maximum elongation, the structure is still largely amorphous; besides the primitive crystals thus formed are more readily changed into the amorphous state by additional cold working than the large crystals developed by longer annealing. This is regarded by the author as a feature of great interest to makers of structural members which may be exposed to sudden lateral strains, as fracture may easily result unless the metal has been annealed to a sufficient degree.

All steam boilers in Pennsylvania carrying pressure greater than 15 lb. per square inch are to be thoroughly inspected every year, under operating conditions, according to rules made recently by the Industrial Board of the Department of Labor and Industry. Boilers exempted from inspection are those subject to inspection under Federal laws, boilers on automobiles and boilers of steam fire engines brought into Pennsylvania for temporary use. Boilers carrying pressure of less than 15 lb. per square inch must be equipped with safety devices approved by the board. The code adopted recently by the board applies to boilers contracted for on or after July 1, 1916, and to boilers contracted for before that date but which are to be delivered after Jan. 1, 1917.

A BRITISH SHELL FACTORY

Machining Arrangements of One of the Semi-Public Plants—Women Employed

How Great Britain has been enlisting the services of different British manufacturing companies to design, build, equip and operate shell-making plants, on money furnished by the Government, was told in THE IRON AGE of last week, based on information in a late issue of the *Engineer*, of London. In the succeeding number of that journal is given some insight to the type of factory provided for machining the shells, the first article dealing with the shell-forging work. Following is the machine shop end of the story, substantially in full:

The site of the plant described was viewed for the first time on Aug. 30, 1915, then under a crop of oats. The whole factory building was completed by March 20, 1916. Meanwhile, on Jan. 12, twelve women were started on machining shells, and the number was increased as the building progressed and machinery was installed. The structure is of a steel framework with galvanized sheets for the walls. At the date of the visit to the factory, it was employing 1725 girls and 314 men, and the works were running from 6.30 a. m. on Monday mornings to 10.30 p. m. on Saturday nights, with breaks only for meals. The men were very largely engaged on setting up and keeping the machines in order. The majority of the laborers, that is to say, those occupied not on the machining of the shells but on such work as carrying the shells from one machine to another, were women. It is expected that ultimately the number of male employees will fall to something less than 5 per cent of the force.

The accompanying general plan shows how the shels pass in parallel lines through the shop, being received at points at the bottom of the plan and and reaching finally the so-called bonding department shown at the top of the plan. The offices of the works are all on one floor. Their inside, outside and partition walls are made from molded cement slabs 2 ft. square and 2½ in. thick. Primarily intended for pavement making, they form excellent building material, for they become dry and hard very quickly. They are cemented together along their edges, so that the walls are everywhere only 2½ in. thick. In addition to the cement small steel U-shaped pieces are used to bind each neighboring pair of slabs together. The inside and outside walls are stiffened at intervals of 29 ft. by pillars of reinforced concrete, and on the outside, facing the road, the wall is rough cast.

The shells are delivered from the forging plant, say by automobile trucks. They are dumped on so-called rolling ways. As indicated in an accompanying sketch, the rolling way is built part inside the galvanized iron sheeting and part outside. When the side doors of the trucks are let down the shells may be rolled down the incline to the buffer inside the building. From the table within the wall the operators as required can readily carry the shells to their machines.

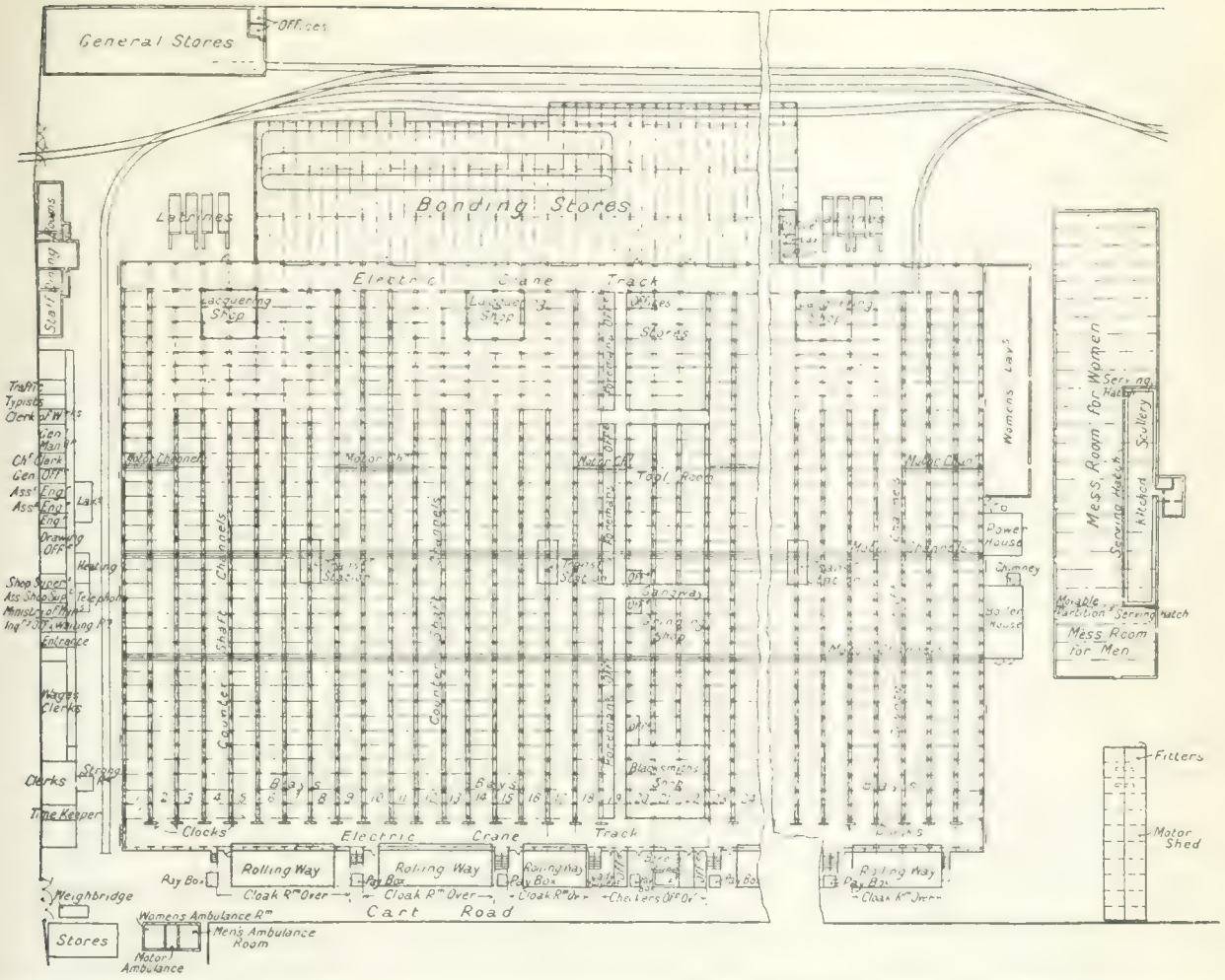
Each bay may be said to be self-contained. Down any bay starting from the rolling-way end, one finds on each side of the central passageway a row of machines, each one performing a specific operation on the shell forging. A shell once taken from the rolling-way into a particular bay remains in that bay and on one side of it until, having been passed from one operator to the next, it emerges at the opposite end completely machined.

If we imagine a line drawn at any point of any bay at right angles to its length and passing through a certain type of machine, all the machines lying on this line will be of the same type and will be performing the same operation. Over each such row of machines a separate foreman is placed, so that each foreman has only one class of machines under his charge. To prevent congestion and to secure the maximum output, the quickest and easiest operations are made to set the pace. The more difficult operations are brought into line by providing more than one machine for them in each bay. Thus walking down any bay in the direction in which the work travels, one may notice in places that two or more successive machines on either side are similar and are performing identical work.

The cutting lubricant used is a soap-and-water



Machines Are Operated by Women. The floors are of wood except at every line of columns with the double rows of machines



Shell Forgings Received from Wagons or Motor Trucks at the Rolling Ways, So-Called, Proceed in Parallel Lines Through Identical Machining Operations to the Bonding Stores, Shown at Top of Plan

compound. A central pumping station is provided for the fluid with overhead delivery pipes having branches to each machine, and there is also provided a trench or gulley under the lines of machines, all leading into a main trench and well, wherein the used fluid is collected ready to be strained and returned by the pumps to the overhead delivery pipe. The trench is of concrete. Each half trench is given a fall of 5 in. toward the center of the shop. At each end of the main trench there is a pumping station and a suds well, 5 ft. in diameter by 18 ft. deep.

The machines are cemented down across the concrete suds trenches, no bolts being used. The accompanying sketch will make the method quite clear. The suds trenches of two adjacent rows of machines are united throughout their lengths by a level layer of concrete. The arrangement gives the operators plenty of room to pass behind their machines for cleaning and adjusting them, and at the same time results in the columns being situated where they are least obstructive of room. The columns in general are supported on concrete foundations, 3 ft. square and 3 ft. deep, and are held thereto by means of bolts 18 in. long. Certain of the columns are heavier than the average. For these the depth of the foundation blocks is increased to 4 ft. It will be gathered, then, that the suds trenches and the foundations for the columns form a continuous mass of concrete, which was laid as far as possible without a break.

The floor of the factory, except at the trenches, is of wood—a point which adds not a little to the comfort of the workers. The ground was first leveled with ashes. Thereafter, old railroad ties were laid down at 3-ft. intervals transversely between the columns. These directly support the floor, which is of 2-in. battens running longitudinally. For heating, steam pipes are carried by each row of columns at a height of about 10 ft. above the floor level. The glazing of the roof has been tinted blue by stippling on the inside with washable distemper, as the *Engineer* calls it. This keeps out the direct rays of the sun, and has a very pleasant effect.

It will be seen that the machines in the bay are all driven from one overhead shaft, which runs down the center of each bay. This shaft is carried from the underside of the roof trusses, which insures as high a position as possible. It is driven by electric motors, which are supported high up in the roof. There are either two or three of these motors in each bay, each driving a portion of the line shafting, which serves from 12 to 20 of the machines below. Each machine has a separate counter shaft, situated slightly to the rear of the machine and quite 10 ft. above the operator's head.

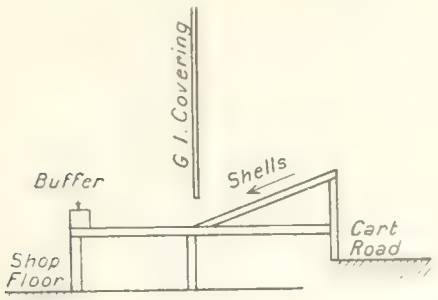
Leaving the lacquering rooms, the shells are conveyed to the bonding store, an adjunct to the main building, which is screened and locked off therefrom. The bonding store may be said to be private government ground. Here government officials take delivery of the shells, which are finally examined and, if found satisfactory, painted externally by women with compressed-air spraying apparatus.

"The control of the girl workers," says the *Engineer*, "so far as what may best be described as domestic matters are concerned, is in the hands of a principal lady supervisor. Under this lady are three sectional lady supervisors, each responsible for a section of the works. Under each sectional supervisor are two assistants. In addition to these, there are one lady canteen supervisor and three canteen assistants. Three fully trained nurses have been engaged, one at least of whom is always on duty. These nurses attend to any cases of accident or sudden illness, and keep a watchful eye on the general health and condition of the girls. Speaking of accidents, it may be remarked that up to the date of our visit none requiring the use of a stretcher had occurred, though these are provided for. As for minor accidents, such as cut and

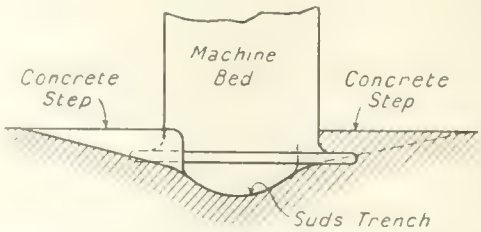
bruised fingers, it is found that on the whole these are more numerous than with men employees."

The hours of the factory are divided into three equal shifts, namely, from 6.30 a. m. to 2.30 p. m., from 2.30 p. m. to 10.30 p. m,, and from 10.30 p. m. to 6.30 a. m. Half-way through each shift there is a break of half an hour for a meal. The figures show, it is stated, that the efficiency of female labor in this factory does not fall off during the night.

The work the women have to do involves lifting weights up to 80 lb. or so and standing for 8 hr., except for the meal-time break. They all seem cheery and happy, and go about their work with a zest.



Shell Forgings Are Rolled into the Building on Ways



The Concrete on Which Machines are Bedded Without Bolts Rests Directly on the Return to a Central Pumping Station of the Lubricating Compound

Private Works and the Army Appropriation

Provisions for Munitions Manufacture Outside of Arsenals — The Work of the Council of National Defense

WASHINGTON, D. C., Aug. 15, 1916.—The army appropriation bill as finally agreed to in conference and adopted by both houses, though a compromise as to the total amount carried, is in several important respects more satisfactory than either the House or the Senate bill. This is especially true of the provisions relating to the manufacture and purchase of ordnance, which have been freed of all ambiguity and now represent a reasonable approximation to the recommendations of General Crozier and the Secretary of War. The terms of the bill have also been so clarified that private manufacturers may easily estimate the amount of business obtainable.

The army budget, as finally accepted, carries $267,597,000, a reduction of about $46,000,000 from the Senate bill but an increase of $85,000,000 over the measure as it passed the House. While the pruning knife was applied to all the appropriations for ordnance material made by the Senate, these figures were not reduced proportionately to other allotments. For the manufacture and purchase of ammunition for small arms for reserve supply, etc., the House appropriated $4,500,000, which the Senate increased to $12,776,000, while the conference bill carries $10,000,000. As to this item the House stipulated that not more than $2,000,000 might be used in the purchase of ammunition, a provision which the Senate struck out, inserting in lieu thereof the vague and unsatisfactory limiting clause that "the Government shall manufacture at its arsenals as much of said ammunition as can be produced, operating said arsenals at full capacity, if necessary, but having due regard to economy and efficiency in operation." This limitation the conferees struck out, substituting a definite stipulation that not more than $5,000,000 of this appropriation may be used in the purchase of ammunition, thus dividing the total appropriation equally between the Government arsenals and the plants of private manufacturers. The so-called Tilson amendment, which has been a bone of contention between the two Houses, was also adopted by the conferees in the form of an additional proviso, as follows:

That $250,000 of this appropriation may be used to procure gages, dies, jigs, tools, fixtures and other special aids and appliances, including specifications and detailed drawings necessary for the manufacture by the Government and by private establishments of ammunition necessary for the use of the land forces of the United States in time of war, and in the purchase of lots of ammunition to complete the object of this proviso the existing laws prescribing competition in the procurement of supplies by purchase shall not govern in orders not to exceed $50,000 in any one case.

For the manufacture and purchase of ammunition and other accessories for small-arms, hand and machine gun target practice, for which the House allowed $1,200,000 and the Senate $3,494,000, the conference bill carries $3,000,000, of which one-half is made available for purchases in the open market or by contract and the stipulation that the arsenals shall manufacture as much of this material as can be economically and efficiently produced was stricken out. The appropriation provided by the House bill for manufacturing, repairing and purchasing arms for the national guard, amounting to $5,000,000, was adopted by the conferees, together with the proviso that $200,000 of the appropriation may be used to procure the equipment for private manufacturing plants to produce these arms. The conferees also agreed that orders not to exceed $50,000 in any one case may be placed under this appropriation without competition.

With a view to bringing up to date a large amount of more or less obsolete ordnance material the conference bill provides $9,500,000, and the Secretary of War is authorized to sell, at prices to be fixed by the Chief of Ordnance, to the Government of Cuba such ordnance and equipment as may be desired by that government and approved by the President of the United States.

An unusual provision is embraced in the conference bill for the purchase or manufacture of automatic machine rifles. The House bill appropriated $5,600,000 for this purpose, and the Senate raised the amount to $14,311,150. The conference measure puts the amount at $12,000,000, and provides that this appropriation shall be available until the close of the fiscal year ending June 30, 1918. It is understood that the object in extending the period in which this money can be used is to enable the Ordnance Bureau to make exhaustive tests of new guns and to take every advantage of the lessons of the European war.

The bill as agreed to in conference carries $500,000 for the purchase and manufacture of armored motor cars, but it is understood that practically all of these cars will be bought from private manufacturers although special equipment may be installed thereon by the Government.

One of the most important items in the army bill provides for the purchase and manufacture of field artillery for the national guard, which will be supplied in unprecedented quantities in accordance with the rec-

ommendations of experts who have acted as official observers for the War Department in the chief theaters of the European war. The House set aside $8,000,000 for this purpose, but the Senate raised the figure to $14,200,000. The conference bill carries $10,000,000 for this purpose, of which one-half may be used for open market or contract purchases. The conference bill also carries $10,000,000 for the manufacture and purchase of ammunition for field artillery, one-half of which may be used to buy ammunition. Both the appropriations for artillery and for ammunition are made available until the end of the fiscal year 1918. The sum of $200,000 of the appropriation for field artillery ammunition is authorized to be spent for special equipment to be installed in private plants, the output of which the Government may buy to the extent of $50,000 in any one case without competitive bidding.

ADVISORS ON NATIONAL DEFENSE

The various propositions for the formation of a so-called council of executive information were debated by the conference committee at some length, and the one finally adopted provides for a council of national defense for the co-ordination of industries and resources for the national security and welfare, to consist of the Secretary of War, the Secretary of the Navy, the Secretary of the Interior, the Secretary of Agriculture, the Secretary of Commerce, and the Secretary of Labor. This council is to nominate to the President for his appointment an advisory commission, consisting of not more than seven persons, each of whom shall have special knowledge of some industry, public utility, or the development of some natural resource. The advisory commission shall hold such meetings as shall be called by the council or be provided by the rules and regulations adopted by the council for the conduct of its work.

It shall be the duty of the Council of National Defense to supervise and direct investigations and make recommendations to the President and the heads of executive departments as to the location of railroads with reference to the frontier of the United States so as to render possible expeditious concentration of troops and supplies to points of defense; the coordination of military, industrial and commercial purposes in the location of extensive highways and branch lines of railroad; the utilization of waterways; the mobilization of military and naval resources for defense; the increase of domestic production of articles and materials essential to the support of armies and of the people during the interruption of foreign commerce; the development of seagoing transportation; data as to amounts, location, method and means of production, and availability of military supplies; the giving of information to producers and manufacturers as to the classes of supplies needed by the military and other services of the Government, the requirements relating thereto, and the creation of relations which will render possible in time of war the immediate concentration and utilization of the resources of the nation.

The bill appropriates $200,000 to be immediately available for experimental work and investigations undertaken by order of the council.

Since July 1 the military establishment has been supported under a joint resolution continuing the appropriations of the fiscal year 1916, but the entire army budget as agreed to by the conference committee is now available. W. L. C.

Siberian members of legislative bodies at a late meeting in Petrograd voted to urge the government to adopt measures for the development of the iron industry in the Kuznetsk, Yenesei and Maritime regions. The conference contended that the government should make certain guarantees to private promoters of blast furnaces and foundries, and should encourage the establishment of machine shops for making agricultural and gold-mining machinery by means of special bounties. According to an article in *Russia*, published by R. Martens & Co., Inc., 24 State Street, New York, investment of foreign capital must be for prolonged terms, and the exploitation and direction of the undertakings must remain under Russian influence.

No. 1 furnace of the Woodward Iron Company, Woodward, Ala., was blown out for relining July 22.

Judicial Decisions

ABSTRACTED BY A. L. H. STREET

PRIORITY OF CONDITIONAL SALE CONTRACT.—Where the owner of a mortgaged mill bought a new boiler to replace an old one, agreeing that title to the new one should remain in the seller until payment of the price, and the mortgagor of the real estate afterward became owner under foreclosure of the mortgage, the seller of the new boiler was still entitled to recover possession as against the mortgagee's claim that the boiler had become a part of the land, especially if it could be removed without substantial injury to the real estate. The intention of the parties to a contract for installation of machinery in a building is one of the strongest elements in determining whether the machinery has become a part of the realty. Notice to a prior mortgagee of real estate of a conditional sale agreement by which the seller reserves title is not essential to preserve the rights of the seller. (Kansas Supreme Court, Bromich vs. Burkholder, 158 Pacific Reporter, 63.)

FIRM'S GOOD WILL AS PARTNERSHIP ASSET.—The good will of a business partnership, including the firm name, constitutes a part of the partnership assets, in the absence of express agreement to the contrary. (New York County Surrogate's Court, In Re Borden's Estate, 159 New York Supplement, 346.)

DUTY TO MAINTAIN LADDER IN SAFE CONDITION.—The section of the New York labor law which makes an employer liable for injury to a workman, resulting from a defect in ways, works or machinery, covers a ladder provided for use of employees as a permanent means of passing from one floor to another in the performance of their duties. (New York Supreme Court, Appellate Division, Mizak vs. Carborundum Company, 159 New York Supplement, 274.)

MISSOURI FOUNDRY LAW VALID.—The law enacted by Missouri in 1913, requiring operators of foundries in which 10 or more men are employed to provide suitable toilet rooms, containing washbowls or sinks provided with running water, hot and cold, water closets connecting with running water and a suitable place where men may change their clothes, properly heated, ventilated and protected with a suitable locker, is valid, and not unconstitutional as a discrimination in favor of other industries not required to furnish similar facilities. (Missouri Supreme Court, State vs. Scullin-Gallagher Iron & Steel Company, 186 Southwestern Reporter, 1007.)

PROOF REQUIRED IN MACHINERY ACCIDENT CASE.—An operator of a metal punching machine cannot recover against his employer for injury resulting from a splinter of metal flying out of the machine, without proving that defects in the machine caused the accident, or that the employer was negligent in some way. Negligence will not be presumed. (Pennsylvania Supreme Court, Kalenski vs. John Wood Mfg. Company, 97 Atlantic Reporter, 939.) But negligence of an owner of a rolling mill in failing to safeguard spindles on it may be inferred to have been the cause of the death of a boss roller who was drawn between them while adjusting set screws or greasing the rolls in the performance of his duties. (Pennsylvania Supreme Court, Sparrow vs. Scranton Bolt & Nut Company, 97 Atlantic Reporter, 941.)

LIABILITY FOR DEFECTS IN STRUCTURAL STEEL.—A contracting builder is not entitled to recover damages against a manufacturer of structural steel on account of latent defects in it, where, on account of having installed it in a building after proper inspection and purchase of the steel from a reputable manufacturer, the builder was absolved from any legal liability to the owner of the building, and hence sustained no damage. (St. Louis Court of Appeals, Flannery vs. St. Louis Architectural Iron Company, 185 Southwestern Reporter, 760.)

INJURIES CAUSED BY DEFECTIVE WRENCHES.—The New York labor law, which makes employers liable for injuries resulting from defective ways, works, machinery or plants, includes injuries caused by defective monkey wrenches. (New Jersey Supreme Court, Hamm vs. Rockwood Sprinkler Company, 97 Atlantic Reporter, 731.)

ESTABLISHED 1855

THE IRON AGE

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A Cure for Transverse Fissures

Failures of steel rails through transverse fissures, which have baffled railroads and steel works, both as to cause and cure, are likely hereafter to diminish. At least Dr. P. H. Dudley of the New York Central Lines believes he has reached the root of the trouble, and he suggests the remedies. His notable contribution elsewhere in this issue is certainly not unconvincing, in spite of the fact that as a railroad man and user he places the burden of solution on the producer; and his authoritative position on rail matters and his long-continued investigations add weight to his opinions.

No question is raised as to segregation in the steel, but instead stress is laid on the need of care in rail manufacture that there shall be a uniformity in crystalline structure. Otherwise a part of the rail head interior may have relatively little ductility and in being straightened in the gagging press, this part may be fractured or checked. The delayed crystalline transformation, it is explained, may be due to rapid cooling of the occasional rail by the rolls, to cooling by gusts of cold air, as on the hot beds, and to rolling without reheating the bloom. By the last is not meant heating the bloom from atmospheric temperature but subjecting it immediately after the blooming passes to an hour's passage through a furnace so that the temperature may be raised, say, approximately 300 deg., before proceeding through the rail mill proper.

Dr. Dudley emphasizes the combination of the rail of imperfect structure and its severe straining by the gagging press as the causes of the check, so that all that remains to bring about ultimate failure is the moving of heavy wheel loads, as in service in the track. In this connection he argues for a wider span than now common in the support of the rail in the gagger, to reduce the strain to which the rail may be subjected, particularly in careless operation of the press. Incidentally, if this contention is admitted, it would seem that a new impetus will be given to the use of special straightening rolls, on which at least one patent has been granted. This comprehends the passage of the rail through a series of rolls which serve to subdivide the bending pressures, being substantially a continuous process and eliminating the judgment of the machine operator.

What appears to be particularly new in the Dudley investigation is the claim of the definite impress of the blow of the gag press in the rail head at the point of the origin of the fissures. This imprint, so called, is a sub-surface one, and the transverse fissures so produced are divided into two classes.

The simple transverse fissure appears to be that caused when the base of the rail has been convex and the metal in the base must be shortened. Specimen rail sections in Dr. Dudley's laboratory in New York indicate a small checking in the head under such a condition, forming the nucleus for the fissure. The other and more complex fissure, he finds, is developed from the gagging of the head—that is, when the head needs the shortening. In this a more or less horizontal check occurs, somewhat central in the head and also a more or less vertical check joining the horizontal. Growth of the fissure then appears to go on in service in both the longitudinal and transverse directions. To prove this contention, the part of the rail over the fissure is removed, showing a nucleus so far below the surface as to make it difficult, in Dr. Dudley's opinion, to regard it as due, for example, to sliding train wheels, which ought to show a fissure growth away from the surface rather than toward it.

An important fact not brought out in the report is that the fissures do not all occur on the gage side of the rail, or under the rolling loads, as has been claimed. The New York Central's records so far indicate that 21 per cent of the transverse fissures have developed from points beyond the central axis of the section. The view is that the location of the nucleus of the fissure is due wholly to the point of application of the gag.

The observations of the rail mills will be of interest. Even if there are those who doubt that Dr. Dudley's discovery is all he believes it to be, the mill practices he advocates are already followed in part in a number of mills or are capable of the modification suggested. But if the mills make the changes in the spirit of forwarding a wholesale experiment, they will probably ask for something above the market price to help pay for the additional investment.

Some idea of the enormous proportions of the shell orders taken in the United States for the Allies is given by a statement in the report of the American Locomotive Company for the year ended June 30, 1916, which appeared in the past week. The war orders on the books of that company on

June 30, with others taken in the past few weeks, are put at $41,642,905. It is understood that "war orders," as used in the report, applies to shrapnel and large shells for which the company bought special equipment in the past year. When it is considered that the American Locomotive Company's business in these lines is but a fraction of the total, it will be seen that the munitions contracts involving the use of steel which are now on the books of manufacturers in this country amount to hundreds of millions of dollars.

Testing the Balance of Steel Mills

It is a common observation in the steel trade that the present time furnishes an exceptional opportunity for testing the "balance" of a steel mill, for with the extremely heavy pressure for output the weak links in the chain are readily disclosed. In times of only moderately full operation the various departments are not usually given a test as to what they could do under pressure, but when the pressure comes it is found that some operations can be speeded up more than ever.

Taking the steel industry as a whole it is evident that blooming and billet rolling capacity is short relative to ingot making capacity. There are offerings of ingots by mills which will not sell blooms or billets, but when the prospective purchaser of the ingots seeks a mill to roll them his quest is usually fruitless. A considerable tonnage of ingots has been exported not because the foreign buyer desired ingots but because that was the only form of unfinished steel he could secure. A somewhat curious fact, however, is that the ingots have brought very nearly the billet price. They have not become a drug on the market. The present surplus of ingots appears to represent the final adjustment after various deals have been made whereby one steel mill, with a surplus of ingots, ships to another mill with a surplus of rolling capacity. When conditions as to labor and equipment make the undertaking feasible both parties will address themselves to the rounding out of their operations, the one increasing ingot-making capacity and the other increasing rolling capacity.

In one respect, however, the present period of high pressure is a poor one in which to determine how the capacities of different departments should be modified in order to meet normal requirements; for present conditions are abnormal not only as to the pressure for steel in general, but also as to the distribution of demand among the different products. The demand for plates is abnormally heavy, while the demand for structural shapes is proportionately light, and there are many other divergences. There is nothing in present experience to show whether the various finishing departments are well balanced with each other.

In the larger plans on the boards for new construction work in the steel industry there is no reflection of the present abnormal demand for specific products. There is no disposition, for instance, to build plate mills for the future, although in substance the current market reflects a premium of $8 a ton on plates for 1917 delivery, that being the extra price commanded above structural shapes and bars when in the past the three products have held at substantially the same level. Nor is there a disposition to increase rail mill capacity, although the rail mills find difficulty in arranging rail deliveries even for the late months of next year, their capacity at present being absorbed so largely in the ephemeral business of rolling large rounds.

It is quite significant, indeed, that the one branch of the finished steel industry that promises the largest expansion in capacity in the next year or two is the one whose export trade has been curtailed by the war, without any compensating advantage of "war orders" of any description. The Steel Corporation is building a complete pipe plant, while one independent is adding a pipe department and another is largely increasing its facilities by building a Bessemer steel plant. While there are no statistics of wrought pipe exports prior to the war there is no question that the exports lately have been less than they were in 1912 and 1913, and the statistics of production of all welded tubular goods in 1915 show a decrease of 15 per cent from the output in 1913, the first year for which production statistics are available, this decrease occurring when the total production of iron and steel was substantially unchanged. The new construction in the pipe industry is thus based purely upon expected conditions after the war, with no consideration of present abnormal conditions.

Europe's Lesson in Industrial Efficiency

European manufacturers are learning rapidly and well the value of a high standard of industrial efficiency. According to the observations of Americans who have been in close touch of late with conditions abroad, production is being carried forward with a degree of intensity which formerly existed only in isolated cases. This is true not only in the metal trades, but in many other lines, for the needs of armies and navies to-day are extremely diversified, and the wants of the civil population must be cared for with a smaller capacity for producing. This progress toward the adoption of what have been called American methods in machinery manufacture will have to be reckoned with when the war is over.

The old way in Europe was for the manufacturer to produce a great variety of product. A machine shop could furnish about anything from a small machine to a steam engine, a practice which naturally held back the best development of individual products, as contrasted with concentrating upon more closely defined lines and constantly striving to bring a few products to a maximum of excellence at a minimum of cost. Also the European manufacturer required of his average employee a greater range of usefulness than is now common in the United States. To take the American machine shop, for example, it has been said over and over that the true journeyman mechanic is becoming rarer each year. He has been succeeded by such specialists as the lathe hand, planer hand, grinding machine hand and so on. Even were a liberal supply of all around machinists available to-day, a very large part of them would be distributed among the several groups of machines, each to specialize in one department of the work. Naturally a man comes to his highest efficiency

under such circumstances. The idea goes much farther, another familiar fact being that the planning department assists production by exact determination of the way in which each individual job can be done most expeditiously and cheaply. It co-operates with the workman to secure maximum production. This concentration of effort extends to the selection of equipment, that output may not be curtailed by machinery and tools not best suited to the work. Such practices have now been introduced into the manufacturing methods of European countries on a scale beyond anything attempted heretofore.

The employment of women and inexperienced men in great numbers to replace workmen who have gone to war has made necessary this specialization of training and employment. Under the conditions obtaining, the average novice could scarcely be taught more than to operate one machine on a limited range of work; a woman could not be made a skilled mechanic in a few months. Skillful planning was imperative.

It is also to be borne in mind that many skilled workers were returned from the armies to the shops in the metal trades, since they could render better service in making munitions than in fighting in the trenches. On the whole, it is entirely reasonable to expect, under the methods now applied, that the total efficiency of the metal-working industries in the belligerent countries after the war will be greater than it was two years ago, in spite of the war's inroads upon the ranks of workers.

Decrease in Steel Corporation's Orders

The monthly statement of the United States Steel Corporation for July showed a decrease of only 46,866 tons in unfilled orders on its books. The total at the close of business July 31 was 9,593,572 tons. The decrease in June was 297,340 tons, which was the first falling off since August, 1915. The following table shows the unfilled tonnage for each month commencing with January, 1913:

	1916	1915	1914	1913
January	7,[illegible]	1,[illegible]	4,[illegible]	7,[illegible]
February	8,568,966	4,345,371	5,026,440	7,656,714
March	9,331,001	4,255,749	4,653,825	7,468,956
April	[illegible]	4,[illegible]	[illegible]	[illegible]
May	9,937,798	4,264,598	3,998,160	6,324,322
June	9,[illegible]	4,[illegible]	4,[illegible]	5,[illegible]
July	9,[illegible]	4,[illegible]	4,[illegible]	5,[illegible]
August	.....	4,908,445	4,213,331	5,223,468
September	.....	5,317,618	2,787,667	5,003,785
October	.....	6,165,452	3,461,097	4,513,767
November		7,[illegible]	[illegible]	[illegible]
December		8,[illegible]	[illegible]	[illegible]

The Steel Corporation's production of ingots in July is estimated at about 1,300,000 tons, a considerable falling off from the rate of June. The shipments of rolled products are put at about 950,000 tons.

A reduction of the freight rate on steel between St. Louis and Kansas City, obtained from the Public Service Commission of Missouri by the Christopher & Simpson Architectural Iron Company, comes before the courts of Missouri, a writ of certiorari having been obtained by the railroads interested on the allegation that the rate is discriminatory against Kansas City and St. Joseph.

The Link-Belt Company, Chicago, Ill., is enlarging its malleable foundry at Indianapolis in order to meet increased demands. The foundry extension will be a one-story building, 70 x 275 ft., with a wing 106 x 140 ft. It will house the company's fifth melting furnace and will provide space for 60 molders.

AMERICAN LOCOMOTIVE'S YEAR

Company's Financial Condition Better Than Ever Before in Its History

The report of the American Locomotive Company for the fiscal year ended June 30, 1916, shows a balance available for dividends of $10,769,429, which surpasses the best previous record by $4,411,222. In the fiscal year 1914-15 operations showed a deficit of $3,241,980. The income account for the past two years compares as follows:

	1915-16	1914-15
Total receipts	$[illegible]	$9,303,298
[illegible] depreciation	[illegible]	10,445,300
Net profits	11,070,421	*1,142,002
Interest [illegible]	301,005	345,379
Surplus	10,769,429	*1,491,980
Preferred dividends	1,750,000	1,750,000
Surplus	9,019,429	*3,241,980
Appropriated for additions and betterments	2,000,000	
Surplus	$7,019,429	*$3,241,980

*Deficit.

In the accompanying remarks to the stockholders, S. L. Schoonmaker, chairman, says in part as follows:

"In arriving at the profit of $10,769,428 there has been deducted from earnings the sum of $1,761,682 for depreciation on all classes of property. There has also been charged against the profits for the year the entire cost of all new equipment of every description purchased for use on munitions work, together with the cost of alterations of plants in connection with such work. In addition to the foregoing a sufficient amount has been set aside from this year's earnings to provide for the cost of eventually restoring the two plants now making munitions to the best conditions for locomotive work when resumed at such plants.

"The net profits for the year exceeded by $4,411,221, or 69 per cent, the profits of the best previous year of the company, which was in 1906-07. This good showing was due to the successful execution of the company's munitions orders.

"On July 1, 1916, there was paid $1,386,000 of gold notes, maturing at that date, leaving a balance of all outstanding gold notes of $1,336,000, maturing July 1, 1917. This shows a reduction of $8,734,000 since 1912, when the notes and loans payable were $10,100,000. The net working capital on June 30, 1916, was $21,482,078, which is ample for the needs of the company to carry on its regular locomotive business.

"Having charged to the 'reserve for liquidation of the automobile business,' all losses incurred to date in the liquidation of the assets and liabilities of the automobile department, there remained an unused balance in the liquidation reserve account of $453,325, which has been restored to the accumulated surplus of the company.

"The Rogers plant at Paterson, N. J., and the Manchester plant at Manchester, N. H., having been retired from the service of the company, are in process of being dismantled. Both are antiquated in construction and equipment and could not be operated economically without the expenditure of large sums. Their book value has been written down in the cost of property account to an amount which, it is conservatively estimated, will be realized from the sale of these properties and the estimated book loss involved, $800,742, charged against the accumulated surplus of the company.

"The amount of unfilled locomotive orders on the books on June 30, 1916, was $19,376,532, as compared with $5,838,235 on June 30, 1915. Practically all of the munitions orders which were on hand at the beginning of the year have been completed and shipped. The unfilled munitions orders on the books on June 30, 1916, together with the munitions orders taken since, amount to $41,642,905."

The Russian Government has bought nine mogul-type locomotives, weighing 37,000 lb., of the American Locomotive Company.

Canadian Metal Imports from United States

Statistics of Imports in Fiscal Year Ended March 31, 1916—Of Total Metal Imports 97 Per Cent Came from United States

BY W. L. EDMONDS

TORONTO, Aug. 12, 1916.—The significant feature of Canada's foreign trade for the fiscal year ended March 31, 1916, was the increase in the imports of iron, steel and other metals and machinery. The total value of merchandise imported for home consumption was $507,783,361, which was an increase of slightly over 10 per cent as compared with the previous year. Of this total $370,497,867, or 73 per cent, came from the United States, being an increase of nearly 20 per cent. But it is when we come to analyze the figures in regard to the imports of iron, steel, other metals and the manufactures thereof that the predominance of the United States in the Canadian market is found to be the most marked as compared with other countries.

Under the wide and general classification of "metals, minerals, and manufactures thereof" Canada last year imported from all countries $103,413,740 worth, as compared with $84,365,978 in 1915, an increase of 18.44 per cent. Of this $3,743,897 was brass and its manufactures; $4,443,077 copper and its manufactures; $1,672,955 agricultural implements; $20,333,966 machinery, and $76,323,832 iron and steel and manufactures thereof.

Under each of these classifications there was a substantial increase in the imports from the United States. The total value of the brass and its manufactures imported from the United States was $3,631,589, an increase of 27¾ per cent; copper and its manufactures, $4,428,729, an increase of 20.82 per cent; agricultural implements, $1,672,955, an increase of 7.41 per cent; machinery, $19,645,894, an increase of 32.52 per cent; iron and steel and manufactures thereof, $71,425,737, an increase of 22.39 per cent.

CANADA WOULD HAVE BOUGHT MORE IF AVAILABLE

Substantial as these increases were, they undoubtedly would have been more so could Canadian importers have obtained all the material they wanted. During the earlier part of the fiscal year they experienced little or no difficulty in this respect, but their experience was altogether of another kind when the home market in the United States developed the extraordinary activity which has characterized it for some time. In spite of the fact that the mills of Canada are turning out a larger and a more varied quantity of steel than ever before, yet metal-working plants, and particularly those engaged in making munitions, have frequently been at their wits' end for supplies. This condition of affairs still largely obtains.

While one cannot speak with certainty upon the point, yet it is no idle venture to say that had the mills in the United States been in a position to supply to the limit the Canadian demand, the imports of iron, steel, other metals and their manufactures from our southern neighbor would have been a great deal nearer the high records of 1913 and 1914 than they were. As it is, notwithstanding the increase over 1915, the value of such imports during the fiscal year 1916 was less by 26.60 per cent than in 1914 and 40.83 per cent less than in 1913, the record year. In machinery the decrease compared with 1914 was about 24 per cent and compared with 1913 about 45 per cent.

But while Canada's imports of machinery and iron and steel and manufactures thereof are in value below those of the fiscal years 1913 and 1914, yet the proportion obtained from the United States as compared with the total from all countries was larger. In machinery the proportion was 96.61 per cent, as against 88.89 in 1914 and 91.61 in 1913. In iron and steel and manufactures thereof the proportion was 93.71 per cent in 1916, compared with 82.78 in 1914 and a little under 87 per cent in 1913.

INCREASE OF 32½ PER CENT IN MACHINERY

Many of the increases in the imports in the fiscal year 1916, as compared with 1915, are most marked. That which is classified as "other machinery" increased by $4,126,945, or nearly 51 per cent. Threshing machine separators and parts increased by over 77 per cent. In engines with portable boilers there was a gain of nearly $500,000; in mining, smelting and reducing machinery, $148,386; in rolling mill machinery, $71,000; in beet root sugar machinery, $37,604. But the highest percentage of gain was in carding, spinning and weaving machinery, the increase being a little over 200 per cent.

The increases in other lines of machinery imported from the United States were as follows: Windmills, $268; washing machines, $9,085; traction ditching machines, $1,384; sewing machines and parts, $35,484; ruling and bookbinding machinery, $6,663; printing and lithographing presses, $14,675; hay presses, $8,765; fodder and feed cutters, $28,376; fanning mills, $17,343; electric dental engines, $4,174. As already pointed out, the total gain in machinery imports from the United States was over 32½ per cent.

The decreases in machinery were: Cement, $17,746; coal-handling, $98,733; concrete mixing, $34,252; cordage, twine and linen machinery, $4,773; cranes and derricks, $62,610; gold mining, $93,448; paper and pulp, $64,543; newspaper printing presses of a kind not made in Canada, $189,519; saw-mill machinery, $3,642; steam and electric shovels, $55,496; type-casting and type-setting machines, $162,834; well-digging machinery of a kind not made in Canada, $207,264; ore crushers and stamp mills, $38,912.

The decrease in the importation of cement and concrete machinery is a reflection of the dullness which has been characteristic of the construction and building trades in Canada for the past two years. Some improvement has, however, taken place in these trades in recent months. The increased attention which is being given to the mining industry should also lead to an increase in the importation of mining machinery. The output of the mines of Canada last year had a total value of $138,513,750, an increase of $9,650,000 over the previous year. That there will be a further increase this year there can scarcely be any doubt.

PRINCIPAL INCREASES IN IRON AND STEEL PRODUCTS

The principal increases in iron and steel and manufactured products were as follows: Pig iron, $111,161; sheets, 14 gage and thinner, $852,356; galvanized sheets, $341,978; tin plates, $675,040; Canada plates and Russian iron and terne plate, $80,431; skelp for pipe manufacturers, $280,712; locomotive tires, $139,684; barb wire, $393,477; galvanized wire, $355,203; plates and sheets, $470,536; structural steel, $254,449; plow plates, $106,337; nuts, rivets and bolts, $49,848; hand tools, $62,940; pumps, hand, $35,107; boiler tubes, $78,458.

The principal increases in copper products were: Rods, $575,142; blocks and pigs, $30,555; tubing, $94,099. In brass products the principal increases were: Rough blanks for cartridge manufacturers, $448,039; wire cloth, $85,532; tubing, $63,542. Spelter imports from the United States increased by $1,551,963.

The recovery in the import trade with the United States, which has been so marked in many lines appertaining to iron and steel, has so far failed to register

in railroad supplies, there having been during the past year a further general decline, except in locomotive tires. Steel rails dropped from $4,901,851 in 1914 and $704,468 in 1915 to $308,188. With the exceptional prosperity which the railroads are now enjoying, the figures for the fiscal year 1917 should chronicle a marked change for the better.

The accompanying table gives the principal imports into Canada from the United States during the fiscal year 1916, together with the total from all countries.

Principal Canadian Imports from United States and All Countries in Fiscal Year Ended March 31, 1916

	From United States	From All Countries
Agricultural implements and parts	$1,656,641	$1,672,955
Angles, beams and channels	2,181,920	3,182,431
Axles and axle parts	1,190,283	1,191,694
Bars, bands, hoops, sheets etc., greater value than 3½c. per lb	1,822,810	2,432,884
Bar iron or steel	2,502,357	2,565,611
Billets of iron or steel	1,086,816	1,087,858
Bridges and parts and structural work	59,450	61,006
Castings and malleable iron	1,257,231	1,266,043
Chain for agricultural implements	118,580	118,690
Chains, n.o.p.	171,302	201,211
Cream separators and parts	492,735	505,614
Cutlery of all kinds	301,925	597,326
Boilers of all kinds and parts	186,450	238,672
Gasoline and gas engines	3,376,288	3,408,649
Locomotives	190,617	195,483
Locomotive parts	76,365	76,365
Motor cars for railroads and tramways	27,014	27,014
Pumps, power, and parts	618,198	637,780
Steam engines	94,933	107,399
Ferrosilicon, spiegeleisen, etc	377,770	1,010,864
Flat eye-bar blanks for bridge and structural work	237,505	237,505
Forgings of iron or steel	759,344	761,329
Guns, rifles, etc	486,259	508,571
Parts of guns, rifles, etc	687,868	689,036
Tools and machinery for manufacture of rifles	459,260	459,416
Builders', cabinetmakers', saddlers' hardware, etc	494,828	534,835
Hoop, band, scroll or strip	731,773	736,427
Ingots, blooms, puddled bars, etc	375,319	384,787
Locks of all kinds	200,020	202,955
Adding machinery	145,815	146,815
Carding, spinning and weaving machinery	979,009	1,028,269
Cement-making machinery	24,321	25,474
Coal-handling machinery	37,748	37,867
Concrete-mixing machinery	29,048	29,048
Cordage, twine, linen machinery	24,822	26,369
Cranes and derricks	275,625	276,396
Engines, portable, with boiler in combination	1,166,967	1,168,345
Fanning mills	34,201	34,201
Fodder or feed cutters	39,209	39,209
Gold-mining machinery	88,940	136,612
Hay presses	38,043	38,043
Mining, smelting and reducing machinery	595,983	607,591
Ore crushers, stamp mills and compressors	328,939	355,126
Paper and pulp mill machinery	319,247	446,866
Portable machinery, n.o.p.	42,793	42,793
Printing and lithographic presses	235,169	246,468
Newspaper printing presses	145,015	159,186
Rolling-mill machinery	179,687	179,687
Bookbinding machinery	158,086	159,294
Saw and planing mill machinery	136,840	137,365
Sewing machines	307,998	328,204
Sewing machine parts and attachments	121,088	135,838
Shovels, steam and electric	99,300	99,300
Threshing machine separators and parts	912,191	912,818
Traction ditching machinery	80,116	80,116
Typecasting and typesetting machinery and parts	322,764	323,063
Typewriters	377,024	377,282
Washing machines, domestic	71,750	72,073
Machinery not specified	12,218,101	12,574,474
Nail rods for horseshoe makers	25,659	25,659
Nails, brads, spikes and tacks	31,851	32,779
Wire nails	36,485	36,529
Needles of all kinds	101,020	170,473
Nuts, rivets and bolts	184,923	187,130
Iron ore	1,735,332	2,518,286
Pig iron	731,583	741,278
Pipe, cast iron	65,927	132,874
Pipe fittings	452,208	457,557
Plates rolled, not less than 30 in. wide and ¼ in. thick	1,092,329	1,092,517
Plates or sheets, rolled n.o.p.	558,518	564,803
Plates or sheets, steel, cold rolled, etc., over 14 gage	25,407	25,407
Plates, universal mill over 12 in. wide	896,074	896,074
Plow plates, etc	241,762	241,799
Pumps, hand, n.o.p.	133,947	134,647
Rails for railroads and tramways	308,188	308,188
Railroad fish plates	49,611	49,611
Railroad spikes	27,410	27,613
Railroad switches, frogs and crossings	44,209	44,647
Railroad tie-plates	10,938	10,938
Rolled rods for chain making	60,691	60,691
Safes and vaults	59,492	59,519
Scales and balances	79,708	85,448
Scrap of iron and steel	59,889	61,529
Screws, iron and steel, n.o.p.	71,941	72,352
Shafting of all kinds	87,132	87,353
Canada plates, Russian iron, terne plates and rolled sheets of iron or steel	524,330	632,228
Sheets, flat, galvanized	1,161,156	1,577,828
Sheets, rolled, polished or not, 14 gage and thinner, n.o.p.	2,095,912	2,181,256
Sheet steel crucible for mower and reaper knives	28,071	28,568
Angles, beams, knees, plates, etc., for ships	388,332	391,939
Manufactured articles of iron and brass for ships	216,674	239,152
Skates of all kinds	33,363	33,363
Skelp for making iron or steel pipe	2,394,305	2,394,305
Springs for railroad and other vehicles	197,233	197,941
Steel, rolled for saws, straw cutters, etc.	108,217	130,243
Stoves of all kinds	220,482	225,468
Surgical and dental instruments	332,035	357,433
Tires, locomotive and carwheel, in rough	263,316	319,322
Hand tools	754,885	801,585
Tubes for boilers	358,518	364,143
Tubing for iron or brass beds	177,308	177,802
Tubing or pipe of iron or steel, plain or galvanized	387,470	389,503
Tubing, seamless, not less than 3½c per lb	75,597	75,597
Tubing, wrought iron or steel, seamless, plain or galvanized	343,176	346,308
Enameled ware	125,918	134,782
Iron or steel hollow ware, n.o.p.	92,480	98,186
Barbed fencing wire	1,020,639	1,020,639
Wire for mattresses	46,703	46,703
Buckthorn strip, woven, and wire fencing not above 9 gage	27,365	30,316
Crucible cast steel wire not less than 6c per lb	65,879	65,879
Galvanized wire, Nos. 9, 12 and 13	1,636,960	1,636,960
Wire, single or several, covered	159,524	165,595
Steel flat corset wire	64,118	64,118
Steel wire, for rope making	71,850	116,905
Wire cloth	146,554	163,631
Wire rope and wire cables	126,284	281,407
Other wire, not specified	176,225	179,130
Wire rods, not over ⅜ in. diameter	1,904,705	1,904,705
Tin blocks, pigs or bars	271,063	1,167,601
Tin plates and sheets	3,256,176	3,415,306
Tinfoil	197,760	201,493
Tinware	425,728	527,939
Zinc blocks, pigs, sheets, rods etc	236,673	237,414
Solder	2,129,172	2,131,566
Aluminum	987,747	988,062
Aluminum in ingots, strips, plates, etc.	584,562	700,365
Aluminum, manufacturers of, n.o.p.	77,142	77,842
Buckles of iron, steel, brass and copper	135,641	137,779
Gas, oil and electric light fixtures	310,097	329,838
Lamps, lanterns and chandeliers	713,212	919,636
Nickel plated ware, n.o.p.	716,418	761,851
Nickel, nickel silver and German silver in bars, rods, etc.	223,846	229,566
Paints and colors	1,724,222	2,056,085
Electric motors, generators and dynamos	863,128	901,158
Electric insulators, sockets, telephone and telegraph instruments	3,366,861	3,581,912
Gunpowder and other explosives	798,186	982,140
Brass and manufactures of	3,631,789	3,743,897
Copper and manufactures of	4,428,529	4,443,077

A MARKED CONTRAST

Comparison of Canada's import trade with the United States during the fiscal year 1916 and that of 1915 shows some remarkable changes. A year ago there was a decrease of 69.42 per cent under the general classification of "metals, minerals and manufactures of." This year there was an increase of 24½ per cent. Iron and steel and manufactures thereof declined 45 per cent in 1915 and gained 22.39 per cent in 1916. In machinery the loss was 43 per cent in the former year and the gain 32.52 in the latter. In the imports of all merchandise from the United States there was an increase in the last fiscal year of about 20 per cent as compared with a decrease of 44½ per cent in 1915. In an article reviewing Canada's import trade of 1915 with the United States the opinion was expressed by the writer a year ago that 1916 would see a return to more normal conditions. The results show that these expectations have been realized.

A SATISFACTORY OUTLOOK

Trade conditions in Canada to-day are on the whole much more satisfactory than they were a year ago. It is true that the area under crop is not so large by about 15 per cent as it was then, but it is considerably in excess of the average of the two or three years pre-

ceding the abnormal crop year of 1915, while the condition of the crops is on the whole good. The factories of the Dominion are much more busily employed than they were a year ago. This is particularly true of the iron-working plants. The chief difficulty at present is not the getting of orders but the getting of a sufficient supply of both labor and material with which to fill the orders which manufacturers have on their books. A year ago the bank clearings and the railroad earnings were at an unusually low ebb; for some months past they have been exceeding all previous records. Commercial failures, on the other hand, are much smaller than they were a year ago. The bank deposits of the Canadian people are at the highest point on record, being $227,000,000 in excess of a year ago. One thing that can scarcely fail to be of some interest to exporters in the United States is the fact that since the outbreak of the war Canada has borrowed between $250,000,000 and $300,000,000 in New York, whereas her loans on that market had never in any one year previous to the war exceded $54,000,000. Naturally, large borrowings favor large international trade.

Protest Against Freight Advances in Pig-Iron and Steel Products

WASHINGTON, D. C., Aug. 15, 1916.—C. S. Belsterling representing the United States Steel Corporation, Traffic Manager R. L. Bentley of the Illinois Steel Company and Traffic Manager C. L. Lingo of the Inland Steel Company appeared before the suspension board of the Interstate Commerce Commission on Aug. 14 to protest against advances in transcontinental rates on iron and steel articles proposed in tariffs filed for the transcontinental carriers by R. H. Countiss, their agent.

Five hundred shippers, traffic managers and attorneys told the members of the suspension board that the advances proposed by the carriers were not in accord with the views of the commission expressed in the decision of the formal complaint of the Spokane Merchants' Association. The railroads used that decision as a foundation for making advances, which, as the shippers asserted, had no resemblance whatever to the views of the commission as expressed in that case.

Among the advances against which the shippers protested is that on pig iron from furnaces in Alabama and Tennessee from 45 to 55 cents per 100 lb. The widely published report that the advance was from $9 to $12 per ton is not accurate. Neither in the old nor in the new tariff is there any rate stated in dollars per ton. As stated in THE IRON AGE of Aug. 10 the proposed advance in pig iron is from $10.08 to $12.32 per ton of 2240 lb. and in coke from $9.35 to $11.35 per net ton.

W. L. C.

The Interstate Commerce Commission has found it necessary to direct the carriers to revise freight rates on wrought-iron and other pipe for the purpose of removing certain disadvantages under which manufacturers located in Denver and neighboring territory compete with Eastern producers. The matter has been taken up on the petition of the Vulcan Iron Works Company, the R. Hardesty Mfg. Company and others who produce at Denver many articles from iron bars, steel bars, steel plates, steel sheets and structural steel, among which are riveted and welded pipe, marketed largely in the territory west of Denver. They point out that the current rate of 52.5c. from St. Louis to Denver on Eastern pipe, which is manufactured from different materials but is nevertheless commercially competitive with the Denver pipe, is lower than the proposed rate of 60c. on the raw materials used in making the Denver pipe. The carriers are therefore ordered to raise their St. Louis-Denver rates on pipe to 60c.

The board of directors of the Harrisburg Pipe & Pipe Bending Company, Harrisburg, Pa., has notified holders of all company bonds to present them for payment at the Central Trust Company, Harrisburg, Sept. 30. The company has handled several large orders for munitions for the Allies.

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Iron and Steel Markets

DOMESTIC BUYING FOR 1917

New Shell Steel Orders for 500,000 Tons

Implement Bar Contracts at 2.50 Cents—Pig-Iron Market Takes a Start

The distinct change in the steel market which came with the closing of the first of the large war and other export contracts late in July has now developed into a volume of domestic buying such as has not been seen in weeks. At the same time the buying on war account has swelled to very large proportions. It is now estimated that 3,000,000 large shells are included in the contracts of the past two weeks, and in addition 500,000 tons of shell steel has now been placed by the Allies, two steel companies taking the bulk of this. On the shell business, deliveries run to April 1, 1917, and on the steel blooms, forgings and rounds for the Allied governments, to July 1.

The significance of the foreign preemption of steel capacity in the first half of 1917 has taken hold of some classes of domestic buyers in the past week, particularly buyers of bars, and considerable sales are reported. At Chicago, following the placing of a contract for 170,000 tons of rounds for export, indicating that Steel Corporation mills more favorably located for export were well sold, implement and car works and other users of bars have placed orders for delivery in the first half of 1917 at 2.50c.

It is becoming apparent that in certain finished products the mills will fall considerably short of delivering before Jan. 1 what is scheduled for this year. Appreciation of this fact and of the forehandedness of foreign buyers accounts for the greater stir the week has brought among domestic consumers.

The tightening of the semi-finished steel market has attracted attention in the Pittsburgh district and it develops that a large producer has been a buyer of ingots from a western Pennsylvania plant. Foreign buyers have scoured the Central West for sheet bars with little success. On a 1000-ton lot $50 was quoted.

Ship plate business has figured prominently in eastern Pennsylvania. Sales made and on the point of closing in that district for home and foreign account are over 40,000 tons, including 12,000 tons for Italy. Two Eastern yards have been buyers and a third is in the market. At Chicago 25,000 tons of plates and shapes were sold to a Pacific coast shipyard.

An interesting sale by a Pennsylvania mill is of 15,000 tons of 6-in. channels for France. Of structural steel for home use Chicago reports the taking by a mill in that district of 30,000 tons for car works and 20,000 tons for fabricating purposes. Building contracts run to numerous small tonnages. The Bridge Builders' and Structural Society puts the July orders for the country at but 47.5 per cent of the fabricating capacity.

Tin plate users in fisheries lines are coming much earlier than usual to the mills with their contracts, though shipments will not be made until March. Fruit and vegetable canners are pressing for deliveries to an unusual degree.

In line pipe the leading mills are sold for eight to nine months ahead, and the unfilled oil and gas country orders exceed the last high record made in 1907.

Another indication of the attitude of steel makers is the refusal of a large producer of sheets to enter reservations of automobile companies for delivery in the first half of 1917, though no question was raised as to price. The apportionment of tonnages, in the way familiar six and nine months ago, is thus forecast.

In the pig-iron market there are signs of activity in Buffalo and in Eastern districts, with indications that the buying movement predicted for September is starting in August. Buffalo has made good sales of foundry iron, and in the East inquiries amount to 60,000 tons, including foundry and malleable grades and steel-making iron for export. Concessions on pig iron have been general in recent weeks, but the tone is firmer to-day, and there is some recovery from the special weakness in Southern irons.

A southern Ohio steel maker has bought close to 25,000 tons of basic pig iron for the first half of 1917. A Chicago steel company is inquiring for basic iron and a considerable lot is under negotiation at Buffalo.

There is enough question as to the ability of Lake ore shippers to meet 1916 requirements to cause even now some sounding out of the situation for next year. Some vessel chartering for 1917 at $1, apart from unloading charge, has stirred Cleveland ore circles. An advance in ore is accepted as a certainty. Against $4.45 for old range Bessemer this year, as high as $5.50 has been discussed, ore men arguing that on a $5 basis the vessel owner would get all the increase.

Pittsburgh

PITTSBURGH, PA., Aug. 15, 1916.

With the scarcity of semi-finished material as the outstanding feature in the market, there has been no decided change in the situation. Close figuring on ore supplies and an offered increase of 50c. per ton for all available wild Lake tonnage during the remainder of the season added a little interest to an otherwise quiet but tense feeling as to the future. Refusal of the leading sheet interest to make reservations to automobile manufacturers for next year, irrespective of price, and a prediction that these interests will be apportioned their share of estimated production have injected a little spice into that branch of the trade. Railroad buying is negligible, but there is an extremely heavy demand for ship material. The pig-iron and scrap markets are simply marking time. Conditions in the coke region are improving, and the advent of cooler weather will increase production there as well as in the steel mills, where the excessive heat of the past two weeks has seriously interfered with output.

Pig Iron.—The market seems to be on a dead level, both as to prices and sales. Furnace stocks of steel-making iron are negligible, 9000 tons at one Mahoning Valley furnace being about the only iron not already on

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

Pig Iron, Per Gross Ton	Aug. 16, 1916.	Aug. 9, 1916.	July 19, 1916.	Aug. 18, 1915.
No. 2 X, Philadelphia	$19.50	$19.50	$19.50	$14.00
No. 2, Valley furnace	18.50	18.50	18.50	13.50
No. 2 Southern, Cin'ti...	19.40	19.40	19.40	13.90
No. 2, Birmingham, Ala.		14.00	14.00	11.00
No. 2, Furnace, Chicago*	18.50	18.50	18.50	13.50
Basic, del'd, eastern Pa..	19.00	19.00	19.00	14.00
Basic, Valley furnace	18.00	18.00	18.00	13.00
Bessemer, Pittsburgh ...	21.95	21.95	21.95	16.50
Malleable Bess., Chgo*	19.00	19.00	19.00	13.50
Gray forge, Pittsburgh .	18.50	18.50	18.50	14.00
L. S. charcoal, Chicago.	19.75	19.25	19.25	16.00

Billets, etc., Per Gross Ton				
Bess. billets, Pittsburgh	**45.00**	45.00	40.00	29.00
Open hrth billets, Pittsburgh.	45.00	45.00	45.00	24.00
Open hrth sheet bars, P'gh	**47.00**	47.00	47.00	24.50
Forging billets, base, P'gh.	60.00	60.00	60.00	29.00
Open hrth billets, Phila.	45.00	45.00	45.00	28.00
Wire rods, Pittsburgh .	47.00	47.00	55.00	27.00

Finished Iron and Steel, Per Lb. to Large Buyers.	Cents	Cents	Cents	Cents
Bess. rails, heavy, at mill	1.47½	1.47½	1.47½	1.25
Open hrth rails, heavy, at mill.	1.56½	1.56½	1.56½	1.34
Iron bars, Philadelphia	2.65	2.65	2.65	1.45
Iron bars, Pittsburgh .	2.60	2.60	2.60	1.30
Iron bars, Chicago .	2.35	2.35	2.35	1.25
Steel bars, Pittsburgh...	**2.60**	2.60	2.60	1.30
Steel bars, New York	**2.769**	2.669	2.669	1.469
Tank plates, Pittsburgh.	2.60	2.60	2.60	1.25
Tank plates, New York	2.669	2.669	2.669	1.469
Beams, etc., Pittsburgh	2.60	2.60	2.60	1.30
Beams, etc., New York	2.669	2.669	2.669	1.469
Skelp, grooved steel, P'gh	2.35	2.35	2.35	1.25
Skelp, sheared steel, P'gh	2.45	2.45	2.45	1.30
Steel hoops, Pittsburgh..	**3.00**	2.75	2.75	1.30

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton

Sheets, Nails and Wire Per Lb. to Large Buyers	Aug. 16, 1916. Cents	Aug. 9, 1916. Cents	July 19, 1916. Cents	Aug. 18, 1915. Cents
Sheets, black, No. 28, P'gh	3.25	3.25	3.25	1.90
Sheets, galv., No. 28, P'gh	4.25	4.25	4.25	3.00
Wire nails, Pittsburgh	2.60	2.60	2.60	1.60
Cut nails, Pittsburgh	2.60	2.60	2.60	1.50
Fence wire, base, Pittsburgh.	3.25	3.25	2.85	1.85
Barb wire, galv., P'gh	3.35	3.35	3.10	2.50

Old Material, Per Gross Ton:				
Iron rails, Chicago	18.50	18.50	18.50	11.00
Iron rails, Philadelphia	19.00	19.00	19.00	16.00
Carwheels, Chicago	11.50	11.50	12.00	11.00
Carwheels, Philadelphia	13.50	13.50	14.00	13.00
Heavy steel scrap, P'gh	16.00	16.00	16.50	14.00
Heavy steel scrap, Phila	14.50	14.50	15.00	14.00
Heavy steel scrap, Chgo	14.50	14.50	14.00	14.00
No. 1 cast, Pittsburgh	16.00	16.00	16.50	13.00
No. 1 cast, Philadelphia	16.00	16.00	16.00	13.50
No. 1 cast, Chgo (cet. toc.)	14.50	14.50	14.50	9.50
No. 1 RR. wrot. Phila.	**20.00**	19.00	19.00	14.00
No. 1 RR. wrot. Chgo (net ton)	15.25	14.75	15.00	10.50

Coke, Connellsville, Per Net Ton at Oven				
Furnace coke, prompt	$2.75	$2.75	$2.75	$1.50
Furnace coke, future.	2.50	2.50	2.50	1.75
Foundry coke, prompt	3.25	3.25	3.25	2.00
Foundry coke, future.	3.50	3.50	3.50	2.25

Metals, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents
Lake copper, New York	26.75	26.75	25.25	19.00
Electrolytic copper, N. Y	26.50	26.50	25.00	16.75
Spelter, St. Louis	**8.75**	8.12½	9.00	11.50
Spelter, New York	**9.00**	8.37½	9.25	11.75
Lead, St. Louis .	**5.90**	5.75	6.10	4.35
Lead, New York	**6.00**	5.95	6.25	4.50
Tin, New York	**39.00**	37.67½	37.25	34.50
Antimony, Asiatic, N. Y	*10.00*	11.00	11.00	36.50
Tin plate, 100-lb box, P'gh	$6.00	$6.00	$6.00	$3.10

the market, and it has been remarked that ineffective labor or a scarcity of labor in the mills is the reason a stringency in the pig-iron market has not developed. No sales of importance have been reported the past week, although there has been an export inquiry for 30,000 tons of Bessemer iron for France and Italy, also an inquiry for 11,000 tons of basic for delivery over the three months beginning September at Newark, N. J., reported in the market. It develops that the recent purchase of basic iron by a southern Ohio steel manufacturer was 40,000 tons instead of 30,000 tons, as previously reported. The most interesting feature in connection with the pig-iron market during the week has been the fact that some of the large makers of steel-making iron have tried to buy Bessemer ore, and that an advance of 50c. per ton was offered for wild Lake tonnage on all the ore that could be taken between this time and the close of navigation. One buyer trying to get 200,000 tons was offered only 50,000 tons of ore. The inquiry showed that considerable non-Bessemer ore is for sale. We quote Bessemer iron at $21; basic, $18; gray forge, $17.75 to $18; malleable Bessemer, $18.50 to $19, and No. 2 foundry, $18.25 to $18.50, all at Valley furnace, the freight rate to the Pittsburgh and Cleveland districts being 95c. per gross ton.

Ferroalloys.—This market is fairly at a standstill, there being very little inquiry because consumers are well covered for some time ahead. Domestic 80 per cent ferromanganese is quoted at $165 to $175 at furnace. We quote 18 to 22 per cent spiegeleisen at $40 to $45, and 25 to 30 per cent, $55 to $65, at furnace. On 50 per cent ferrosilicon we quote $88 to $89 in lots up to 100 tons; over 100 tons, $87 to $88, and over 600 tons, $86 to $87, all per gross ton, f.o.b. Pittsburgh. We quote Bessemer ferrosilicon as follows: 9 per cent, $30; 10 per cent, $31; 11 per cent, $32; 12 per cent, $33; 13 per cent, $34.50; 14 per cent, $36.50; 15 per cent, $38.50, and 16 per cent, $41. Seven per cent silvery is $28.50; 8 per cent, $29; 9 per cent, $29.50; 10 per cent, $30; 11 per cent, $31, and 12 per cent, $32. These prices are f.o.b. furnace, Jackson or New Straitsville, Ohio, or Ashland, Ky., all having a freight rate of $2 per gross ton to Pittsburgh.

Billets and Sheet Bars.—The scarcity of semi-finished steel is more pronounced. Prices are purely nominal, and it is reported that the leading interest some time ago bought all available large lots obtainable within a reasonable radius of Pittsburgh, a good share coming from Eastern mills. A representative of John Lysaght & Co., Newport, Mon., England, has been scouring the country with letters of introduction looking for Bessemer billets or sheet bars, and has offered $47, New York, for any that can be obtained. As far as can be learned, the best proposition offered was by a Cleveland concern for 1000 tons in first quarter at $50, Cleveland. Predictions of a still further scarcity are freely made, and this is largely responsible for the disinclination of finishing mills not amply protected in their supply of raw material to quote for extended delivery. We quote soft open-hearth billets and sheet bars at $47; Bessemer billets, $45 to $47, and Bessemer sheet bars, $45 to $47, maker's mill, Pittsburgh or Youngstown district. We quote forging billets at $69 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take $1 extra.

Structural Material.—No new building projects of importance have been announced. Inquiry for structural material seems to be on industrial plant extension rather than for office buildings or similar commercial enterprises. Among the recent contracts placed are 500 tons for a new power station of the United Gas & Electric Company, Cincinnati, and 2000 tons for extensions to the open-hearth plant of the Brier Hill Steel Company, taken by the Lackawanna Bridge Company. Very little railroad work is coming out. We quote beams and channels up to 15 in. at 2.60c. to 2.75c. at mill, for delivery in third and fourth quarters, and from stock 3.10c. for all shapes and 3.50c. for structural plates.

Steel Rails.—The leading interest is filled up until the third quarter of 1917, and little interest is shown in the rail market, as far as standard sections are concerned. There is a fair inquiry and some sales of light

rails are reported. We quote 25 to 45 lb. sections at $47; 16 and 20 lb., $48; 12 and 14 lb., $49, and 8 and 10 lb., $50, in carload lots, f.o.b. at mill, the usual extras being charged for less than carload lots. We quote standard section rails of Bessemer stock at 1.47½c., and of open-hearth, 1.56½c., Pittsburgh.

Plates.—The inquiry for ship and other plates, except car material, is very heavy and specifications against contracts are reported active. We quote ¼-in. and heavier plates for delivery at convenience of the mill at 3c., and for shipment from stock, or during the next two months, at 3.50c. to 4c., f.o.b., Pittsburgh.

Hoops and Bands.—The leading interest announced last week an advance to 3c. on steel hoops, and reports specifications very heavy, with rollings further behind than has been the case for many years. We quote steel hoops at 3c. and steel bands at 2.75c., steel-bar card extras applying on the latter.

Sheets.—The greatest pressure is on the heavier gages, but more demand is developing on the lighter gages in black sheets. Mills have been able to give some attention to the new inquiry for Bessemer stock, but are practically out of the running on open-hearth. The demand for electrical sheets is particularly heavy. It is stated that a more strict application of the rule of apportioning total tonnages to districts and industries will be put into effect next year, because of the anticipated demand being greatly in excess of all probable production. This came out the past week, due to the action of several of the large automobile concerns, who are getting uneasy as to their supply of sheets for next year and have tried to place blanket contracts for their requirements with some of the large interests, the price being left blank and to be determined when books are opened for the first half of 1917. In these cases, the reservations ordered, for that is all it meant, have been returned with the information that certain tonnages will be assigned to the districts in which heavy users are located, and manufacturers will be allotted tonnages pro rata with their requirements from the bulk allowance to that district or industry. This rule is being applied to a limited extent for the last half of this year, but the prediction is made that strict adherence to this rule will apply if present conditions continue through next year. Nominal prices are unchanged. We quote blue annealed sheets, Nos. 9 and 10, at 3c. to 3.25c., for delivery at convenience of the mill. We quote No. 28 Bessemer and open-hearth black sheets at 2.90c. to 3.05c.; No. 28 galvanized, Bessemer and open-hearth, 4.25c. to 4.35c.; Nos. 22 and 24 black plate, tin-mill sizes, H. R. & A., 2.90c.; Nos. 25, 26 and 27, 3c. to 3.10c.; No. 28, 3.10c. to 3.15c., and No. 29, 3.20c. to 3.25c. These prices are for carloads and larger lots, f.o.b., mill, Pittsburgh.

Tin Plate.—The tin-plate situation is now more acute than it has been at any time this year, due primarily to the early ripening of crops and all users are clamoring for more material, quicker deliveries and anticipated shipments. The immediate stress is with fruit and vegetable canners, who are trying to take care of the unusually heavy crops, and also the heavy demand for canned goods in this country and abroad. Added to this, Alaskan fisheries, that usually do not come in the market much before December, and whose shipments to Western points are not imperative before March, have asked mills to enter their orders early in order that they may be sure of their requirements. It is estimated that present orders on the books, with the carry-over, or tin plate which should be delivered by Dec. 31 but cannot be manufactured because of the pressure, will practically keep the mills busy through the first quarter of next year. We quote primes at $6 to the domestic trade, while for export, $6.25 per base box, or higher, is quoted, wasters of suitable sizes often bringing full price. We quote 8-lb. coated ternes at $8.80 for 200 lb. and $9.10 for 214 lb., all f.o.b., Pittsburgh.

Cold-Rolled Strip Steel.—The past two or three days have developed a number of good inquiries for third-quarter delivery. Nothing of importance was closed, however, because of the filled-up condition of the mills. Prices range from $6 to $6.50 per 100 lb. for specifications placed against contracts for delivery prior to Dec. 31. Smaller buyers are paying from $1 to $3 per ton premium for prompt delivery. Shipment at mill convenience means about February of next year. Manufacturers will not open their books for 1917 delivery until October, or until after it becomes known what semi-finished steel prices will be for the first half of next year. The new contract provisions for cold-rolled strip steel are subject to no decline or cancellation, and discounts are computed from net amount of invoice after freight reductions, the practice heretofore having been to take the discount from gross delivered billing. Extras, standard with all the mills, were printed on page 810 of THE IRON AGE of March 30.

Wire Rods.—This market seems to be in a deadlock, with a decided scarcity of rods, it being almost impossible to get them at any price. Most mills rolling rods have a finishing capacity greater than the rod production and are consuming practically all of their own material. We quote soft Bessemer, open-hearth and chain rods at $55 to $60 per ton, f.o.b. Pittsburgh.

Wire Products.—An increase in specifications is noted, but mills are only taking on such new contracts as are absolutely forced upon them, and in this jobbers are only being taken on for 60 days and manufacturers for the third and fourth quarters. Books have not been opened for next year's business, and mills are confining sales to old established domestic connections. Foreign inquiry has been unusually heavy and as high as $3.70, base, has been quoted on nails and annealed wire for foreign shipment. We quote $3.60, base, on nails; $2.55 on fence wire to jobbers and $2.65 to manufacturers, with an extra of 70c. on galvanizing Nos. 6 to 14, $1.05 for Nos. 15 to 16 and $1.45 for Nos. 17 to 18.

Iron and Steel Bars.—Aside from the heavy demand for large rounds for munition stocks, there has been no change in the bar situation, but the recent advance of $2 per ton has had the effect of steadying the market. A new producer of merchant iron bars, the Roanoke Steel Company, Inc., Roanoke, Va., will be in the market as a seller in about ten days. We quote steel bars at 2.60c. for delivery at convenience of the mill, and small rounds from stock at 3.10c., and for large rounds, 2-in. and over, from stock at 3.75c. We quote refined iron bars at 2.60c., and railroad test bars, 2.70c. to 2.80c. at mill.

Shafting.—This market is as firm as ever and the going quotation of 20 per cent to 15 per cent off is purely nominal and governs future business, which none of the mills is anxious to consider. The demand is more insistent than heavy, buyers being fairly well covered by contracts, but unable to get the material, this being reflected back to the serious situation confronting the mills in getting their supplies of raw material. There is no change in nominal prices, but shafting manufacturers are not inclined to accept new business except at premium prices, which for reasonably prompt delivery run from list to 10 per cent off. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots for delivery in last quarter of this year and first quarter of 1917, and 10 per cent off in less than carload lots, f.o.b. Pittsburgh, freight added to point of delivery.

Merchant Steel.—Conditions continue as they have been for several weeks. Prices on small lots are about as follows: Iron-finished tire, ½ x 1½ in. and larger, 2.50c., base; under ½ x 1½ in., 2.60c.; planished tire, 2.70c.; channel tire, ¾ to ⅞ and 1 in., 2.85c. to 2.95c.; 1⅛ in. and larger, 3.25c.; toe calk, 2.95c. to 3.05c., base; flat sleigh shoe, 2.70c.; concave and convex, 2.75c.; cutter shoe, tapered or bent, 3.25c. to 3.35c.; spring steel, 2.95c. to 3.05c.; machinery steel, smooth finished, 2.75c.

Nuts and Bolts.—The July and August slackening, which this year was not nearly so noticeable as in former years, is apparently over and the demand for material is getting stronger. Manufacturers are trying to take care of current needs of customers by shipping in small lots on contracts and carload shipments are the exception, rather than the rule. Prices are unchanged but firm, and it is reported that nearly as much inquiry is rejected as manufacturers are turning into orders. Discounts in effect from May 19 are as fol-

lows, delivered in lots of 300 lb. or more, where the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days:

Carriage bolts, small, rolled thread, 40 and 10 per cent; small, cut thread, 10; large, 40.

Machine bolts, h. p. nuts, small, rolled thread, 40, 10 and 5 per cent; small, cut thread, 40 and 10; large, 40 and 10.

Machine bolts, c. p. c. and t. nuts, small, 40, 10 and 5 per cent; large, 25 and 5. Blank bolts, 40 and 10 per cent. Bolt ends with h. p. nuts, 40 and 10; with c. p. nuts, 35 and 5. Rough stud bolts, 10. Lag screws, coach or gimlet points, 50 and 10.

Forged set screws and tap bolts, 10 per cent. Cup and oval countersunk set screws, list. Square head set screws, hexagon head cap screws, 55. Flat, button, round or fillister head cap screws, 30.

Nuts, h. p. sq., tapped or blank, $6.50 off list; h. p. hex., $6.50 off list; c. p. sq., tapped or blank, $6.50 off list; c. p. hex., $6.50 off list; semi-finished hex. nuts, 50 per cent; finished hex. nuts, 50 per cent; jam nuts, 50 per cent; check nuts, 50 per cent; flange nuts, 50 per cent; castle nuts, 50 per cent; slotted nuts, 50 per cent; thumb nuts, 50 per cent; wing nuts, 50 per cent; cap nuts, 50 per cent; coupling nuts, 50 per cent; T nuts, 50 per cent; set screw nuts, 50 and 10 per cent; check nuts, 50 and 10 per cent.

Railroad Spikes.—No new inquiries of importance have come out, and the week has been uneventful. Consumers are well covered by contracts for some time ahead. Regular prices are as follows:

Standard railroad spikes, 4½ x 9/16 in. and larger, $2.65 to $2.75; railroad spikes, ½ and 7/16 in., $2.75 base; railroad spikes, ⅜ in. and 5/16 in., $3.05 base; boat spikes, $2.80 base; all per 100 lb., f.o.b. Pittsburgh.

Rivets.—Manufacturers are finding it harder every week to get bar material, and pressure for deliveries continues strong. Several important inquiries, two of them for fairly large tonnages, are in the market this week, for delivery before November. Makers' prices are unchanged, as follows: Buttonhead structural rivets, ½ in. in diameter and larger, $4 per 100 lb., base, and conehead boiler rivets, same sizes, $4.10 per 100 lb., base f.o.b. Pittsburgh. Terms are 30 days net, or one-half of 1 per cent for cash in 10 days.

Wrought Pipe.—The strength of the line pipe and oil and gas country situation is summarized briefly and to the point by showing that, in spite of the fact that oil prices in the mid-West territory have declined about 30 per cent within the past two weeks, there has been no cancellation or suspension of orders, both of which might be expected had operators any doubt as to the future. Mills are practically filled to capacity on this class of pipe for the next eight or nine months, and the amount booked is greater than at any previous time in the history of the industry. The only productive capacity not filled to the extent mentioned is on butt-weld sizes of merchant pipe, 3½ in. and smaller, but it would take only from 30 to 60 days' active buying and a little impetus in building operations to put the smaller pipe on a very extended delivery basis. The marked decline in spelter prices and an inclination to wait for the bottom of the market have held off some buying by jobbers, but the fall buying movement is in evidence. Discounts on black and galvanized iron and steel pipe are given on another page.

Boiler Tubes.—Conditions in this market have not changed materially for several weeks. There is a continued heavy demand, with a large volume of inquiry and heavy specifications against old contracts. Discounts on iron and steel boiler tubes are firmly held as given on another page.

Coke.—The spot coke market is stronger and there is an active demand. With the cooler weather of the past week it is believed that the production of coke in the Connellsville region will greatly improve, and conditions are getting better, with the outlook that the coke situation will be a little easier in a week or ten days. The Koppers by-product coke plant of the Youngstown Sheet & Tube Company will start next week. We quote furnace coke for prompt shipment at $2.50 to $2.75, and on contracts over the remainder of the year from $2.35 to $2.50, depending on the quality. We quote best grades of 72-hr. foundry coke for prompt shipment at $3 to $3.25, and on contracts $3.25 to $3.50 per net ton at oven. The Connellsville *Courier* reports the output of coke in the upper and lower Connellsville regions for the week ended Aug. 5 as 394,200 net tons, a decrease over the previous week of 22,855 tons.

Old Material.—The scrap market continues inactive, but prices are holding very well, considering the absence of all movement in either direction, buying or selling, and practically nothing is being forced for sale. Prices quoted by dealers for delivery in Pittsburgh and nearby districts that take the same rates of freight, per gross ton, are as follows:

Heavy steel scrap, Sharon, Monessen, Midland and Pittsburgh b'ds	$16.00 to $16.50
No. 1 heavy cast	15.00 to 15.25
Rerolling rails, Newark, Del., Cumberland, Md., Franklin, Pa.	16.00 to 16.50
Hydraulic compressed sheet scrap	13.50 to 13.75
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	11.25 to 11.50
Bundled sheet stamping scrap	10.75 to 11.00
No. 1 railroad wrought	13.50 to 14.00
Railroad grate bars	9.00 to 9.25
Low phosphorus melting stock	19.50 to 20.00
Iron car axles	27.00 to 27.50
Steel car axles	27.00 to 27.50
Locomotive axles, steel	28.00 to 28.50
No. 1 busheling scrap	12.00 to 12.25
Machine-shop turnings	8.00 to 8.25
Old carwheels	13.00 to 13.25
Cast-iron borings	8.00 to 8.25
*Short bar crop ends	16.00 to 17.00
No. 1 railroad wrought scrap	17.50 to 18.00
Heavy steel axle turnings	11.00 to 11.25
Heavy breakable cast scrap	12.50 to 12.75

*Shipping point.

Chicago

CHICAGO, ILL., Aug. 16, 1916.—(*By Wire.*)

Yielding up their stubborn hope of lower prices for the first half when confronted with an actual advance and the accumulated evidence of heavy foreign buying, domestic steel users generally have been covering for their first half needs. The implement trade (including the largest interests), fabricators, car builders and railroad supply manufacturers have participated, as well as a large proportion of the consumers in miscellaneous lines. Inquiry running into a large aggregate remains to be considered. While this activity has been widespread, the high prices and irrevocable nature of the contracts insisted upon by most of the mills have limited purchases to conservatively estimated tonnages and have left little inducement to speculation such as featured the buying of last spring. In a number of instances inquiry has brought out refusals to quote or a radical paring down of the amount of steel desired. Some of the mills jumped their prices sharply to 2.60 and 3c., Pittsburgh, and have taken business at the advance, but for the most part regular customers were given opportunity to cover at 2.50c. Illustrative of the character of recent extra-territory bookings that have contributed to the commanding position of the mills are 170,000 tons of shell steel, 25,000 tons for Pacific coast shipbuilding and 6000 tons additional of rails for Russia. These and other like purchases are binding as to quantity and price. Local buying includes 30,000 tons of car shapes, a like amount of structural steel for fabrication, numerous contracts for tank plates in quantity up to 2000 tons and a general round-up of bar tonnage. New producing capacity in this territory will afford but little relief in the last half. At Gary a possible 40,000 tons will be added to production in the last quarter, enhanced perhaps by some duplex steel from the South works, while at Indiana Harbor inability to complete new rolling-mill capacity this year will leave the 30,000 tons increase in steel production to be disposed of as ingots if at all. Pig-iron sales have been too few to test prices fully, but inquiry, increasing somewhat in quantity, bids fair, if it is closed, to bring about an adjustment of the existing wide spread between Northern and Southern quotations. An important user of basic is in the market.

(By Mail)

Pig Iron.—The market is improving as to the amount of inquiry but sales are slow in closing. A local steel maker is in the market for basic iron, and unless Northern furnaces withdraw from their position long held at $19, the Southern quotation of $14, Birmingham, will be low by more than $1 per ton. A like situation obtains in respect of the inquiry of the Milwaukee Railroad for 500 tons of foundry iron, silicon 2.75 to 3.25

per cent, which is still open, but as $18.50 has already been quoted on other business by at least one Northern interest, it seems likely that the desire to secure business normally belonging to Northern producers will prevail over the matter of price. A Milwaukee stove manufacturer is in the market for 500 tons of malleable and 200 tons of silvery iron. Other smaller inquiries of 200 and 300 tons are reported. Sales of spiegeleisen in this market last week included one of 1000 tons. Much iron is being held up because of the curtailment of foundry operations resulting from labor shortage or strikes. There is some improvement in the situation at Chicago, but at Milwaukee there is little or no progress. Users of malleable castings are especially hard pressed, so far has production fallen behind. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of $1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to	$[illegible]
Lake Superior charcoal, No. 1	[illegible]
Lake Superior charcoal, No. 6 and Scotch	[illegible]
Northern coke foundry, No. 1	[illegible] to [illegible]
Northern coke foundry, No. 2	18.00 to 19.00
Northern coke foundry, No. 3	18.00 to [illegible]
Southern coke, No. 1 f'dry and 1 soft	[illegible] to [illegible]
Southern coke, No. 2 f'dry and 2 soft	[illegible] to 18.00
Malleable Bessemer	19.00
Basic	[illegible] to 19.50
Low phosphorus	[illegible]
Silvery, 8 per cent	[illegible]
Bessemer ferrosilicon, 10 per cent	[illegible]

Rails and Track Supplies.—The Russian Government has bought an additional 6000 tons of rails which will, it is understood, be rolled from open-hearth steel at Chicago. There is little other new business coming out in track material and it is unquestionably fortunate in view of the condition of the mills. Quotations are as follows: Standard railroad spikes, 2.75c., base; track bolts with square nuts, 3.25c. to 3.50c., base, all in carload lots, Chicago; tie-plates, $50, f.o.b. mill, net ton; standard section, Bessemer rails, Chicago, $33, base; open-hearth, $35; light rails, 25 to 45 lb., $40; 16 to 20 lb., $41; 12 lb., $42; 8 lb., $43; angle bars, 2c., Chicago.

Structural Material.—The movement on the part of steel users to get under cover at 2.50c., Pittsburgh, following the announcement of the advance of $2 per ton, included many fabricators and a number of carbuilders. Reports of 20,000 tons of miscellaneous business and 30,000 tons of car steel taken by one mill are evidences of the activity. Other mills advanced their price to 2.60c. at once and some little business has been taken on that basis. Car buying included the placing by the New York Central Lines of 1000 cars, the second 1000 remaining open; 1000 cars bought quietly by another road, 500 refrigerator cars for the Illinois Central and a like number for the Soo Line. The German-American Car Company, East Chicago, has taken 200 tank cars, while several lots of cars are reported placed at Western shops for repair. Contracting for fabricated steel continues to be marked by the large number of small jobs. With the exception of 400 tons for further plant extensions at Gary and 720 tons also taken by the American Bridge Company for sugar factories in Idaho contracts reported were for comparatively small amounts. The Fort Pitt Bridge Works will furnish 200 tons for the Milwaukee Railroad and the Wisconsin Bridge & Iron Company, 150 tons. The Morava Construction Company took 230 tons for the National Malleable Castings Company's plant extension and the Rochester Bridge Company, 160 tons for a new steel foundry at Benton Harbor, Mich. We quote for Chicago delivery of plain material from mill 2.789c.

We quote for Chicago delivery of structural steel from jobbers' stocks, 3.10c.

Plates.—Various sales of tank plates by local mills to regular trade for delivery in the last and first quarters, one transaction involving as much as 2000 tons, on the basis of 3c., Pittsburgh, have definitely established the market at the new price level. The increased interest in normal lines continued secondary, however, to the inflow of special business. One order for 25,000 tons of plates and shapes for Pacific coast shipbuilding is noted. For prompt shipment plates, quotations are again tending upward, and 3.50c., Pittsburgh, for ordinary widths is now the general minimum where delivery is required within 30 days. We quote for Chicago delivery of plates from mill at its convenience 3.189c. For prompt shipment we quote 3.689c. to 4.189c.

We quote for Chicago delivery of plates out of jobbers' stocks, 3.50c.

Sheets.—The resumption of domestic buying in the heavier steel lines carried with it a revival of interest in sheets, although no changes in prices were directly involved. Quotations for black sheets are generally firmer, except as applied to roofing sheets, where quality is less rigidly adhered to. For the latter, prices as low as 2.75c., Pittsburgh, are still current on No. 28, as against a minimum of 2.85c. for standard one-pass sheets. Inquiry for blue annealed and galvanized sheets has likewise increased. We quote for Chicago delivery, blue annealed, No. 16 and heavier, 3.089c. to 3.339c.; box annealed, No. 17 and lighter, 2.939c. to 3.039c.; No. 28 galvanized, 4.289c. to 4.389c.

We quote for Chicago delivery of sheets out of stock, minimum prices applying on bundles of 25 or more, as follows: No. 16 blue annealed, 3.40c.; No. 28 black, 3.10c. to 3.20c.; No. 28 galvanized, 5c. to 5.10c.

Bars.—The impressive quantities of steel in bar form booked in the last few days for rolling in this district for export are an unmistakable indication of the well-sold condition of mills more favorably located for export, and will go far toward establishing the position of local mills for the first half. The placing of one contract for 170,000 tons is noted. This and other sales are irrevocable, and not subject to revision in price. In addition to this foreign business, which is generally in excess of expectations, domestic consumers, including the leading implement interests, have been contracting for the first half at 2.50c. Individual companies did not buy heavily as a rule, but the mills again adhered closely to their regular trade, and, as earlier in the year, consumers who have dealt with mills now oversold have been allotted as little as one-half of the steel desired. Implement interests which bought mild steel last week did not buy rail-carbon steel at the same time, apparently continuing the policy of postponing such purchases until the strength of the market has been fully tested. Miscellaneous inquiry for rerolled steel is good, as is the inquiry for bar iron. We quote mill shipment, Chicago, as follows: Bar iron, 2.35c.; soft steel bars, 2.789c.; hard steel bars, 2.50c.; shafting, in carloads, 25 per cent off; less than carloads, 20 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 3.10c.; bar iron, 3.10c.; reinforcing bars, 3.10c. base with 40c. extra for twisting in sizes 1 in. and over and usual card extras for smaller sizes; shafting 10 per cent off.

Rivets and Bolts.—The recent period of extreme quiet in the bolt and nut trade, with its occasional campaign for business by individual manufacturers on the strength of a concession in price, is being followed by a resumption of interest on the part of a number of buyers. Where the placing of contracts has been delayed there is now inquiry, with a disposition to cover for a considerable period in the future. There still remains, however, a considerable diversity in the attitude of various sellers and quotations are marked with irregularity, depending on the business in question. We quote carriage bolts up to ⅜ x 6 in., rolled thread, 50-10-5; cut thread, 50-5; larger sizes, 40-5; machine bolts up to ⅜ x 4 in., rolled thread, with hot pressed square nuts, 50-10-10; cut thread, 50-10; larger sizes, 40-10-5; gimlet-point coach screws, 60; hot pressed nuts, square, $2.90 off per 100 lb.; hexagon, $2.90 off. Structural rivets, ¾ to 1¼ in., 4c. to 4.15c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

We quote out of store: Structural rivets, 3.75c.; boiler rivets, 3.85c.; machine bolts up to ⅞ x 4 in., 60-10; larger sizes, 40-10; carriage bolts up to ⅞ x 6 in., 60-5; larger sizes, 50-5 off; hot pressed nuts, square, $3.25, and hexagon, $3.25 off per 100 lb.; lag screws, 65.

Wire Products.—The wire trade is beginning to move upward from the low point, in volume of business.

While fencing shows little improvement, the demand for plain wire and nails is distinctly heavier. The advance in prices seems to have had little effect other than to accentuate the policy of retail dealers to buy only from hand to mouth. We quote as follows per 100 lb.: Plain wire, Nos. 6 to 9, base, $2.839; wire nails, $2.789; painted barb wire, $2.939; galvanized barb wire, $3.639; polished staples, $2.939; galvanized staples, $3.639; all Chicago.

Cast-Iron Pipe.—The city of Chicago is in the market for about 950 tons of pipe, the awarding of which is scheduled for to-day. Other lettings for the current week include 500 tons for Ravenna, Ohio, and a like amount for Toledo, Ohio. The leading interest will get the order for 300 tons for Lincoln, Neb. Several additional lots of pipe of small quantity are also pending. We quote as follows, per net ton, Chicago: Water pipe, 4-in., $33.50 to $34; 6-in. and larger, $30.50 to $31, with $1 extra for class A water pipe and gas pipe.

Old Material.—Such strength as the market is able to show is largely of a negative character, in that it arises out of the apparent indifference of the selling interests in offering their scrap for sale. While there has been no new buying by the larger consumers since the orders for steel scrap for delivery at Gary and Indiana Harbor were placed, the dealers and brokers who participated in that selling are finding the filling of those orders a slow process. Prices are therefore showing some tendency upward. All of the influences ordinarily bearing upon the market appear to be alike in their contribution to a quiet situation. Current railroad offerings of scrap are negligible. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	$18.50 to $19.00
Relaying rails	19.50 to 20.50
Old carwheels	11.50 to 12.00
Old steel rails, rerolling	15.75 to 16.00
Old steel rails, less than 3 ft.	15.75 to 16.00
Heavy melting steel scrap	16.25 to 17.50
Frogs, switching and guards, cut apart	15.25 to 15.50
Shoveling steel	14.75 to 15.00
Steel axle turnings	9.25 to 9.75

Per Net Ton

Iron angles and splice bars	$18.75 to $19.00
Iron arch bars and transoms	19.50 to 20.00
Steel angle bars	13.75 to 14.25
Iron car axles	25.50 to 26.00
Steel car axles	28.00 to 28.50
No. 1 railroad wrought	15.25 to 15.75
No. 2 railroad wrought	14.50 to 14.75
Cut forge	14.00 to 14.25
Pipes and flues	11.00 to 11.25
No. 1 busheling	12.25 to 12.75
No. 2 busheling	8.75 to 9.25
Steel knuckles and couplers	14.00 to 14.50
Steel springs	14.50 to 15.00
No. 1 boilers, cut to sheets and rings	10.25 to 10.75
Boiler punchings	13.75 to 14.25
Locomotive tires, smooth	20.00 to 20.50
Machine-shop turnings	5.50 to 6.00
Cast borings	6.00 to 6.50
No. 1 cast scrap	11.50 to 12.00
Stove plate and light cast scrap	9.25 to 9.75
Grate bars	10.00 to 10.25
Brake shoes	9.75 to 10.25
Railroad malleable	11.25 to 11.75
Agricultural malleable	10.75 to 11.25

Philadelphia

PHILADELPHIA, PA., Aug. 15, 1916.

The placing of extremely large contracts for steel to be used in the manufacture of war munitions at home and abroad is impressive. The eastern Pennsylvania mills are sharing in this business to the full extent of capacity available for rolling during the first quarter and the first half of 1917. In the last few days orders for about 150,000 tons of shell steel have been accepted. Heavy contracts for ship plates also have been closed on domestic and foreign account for delivery in six to nine months; sales made and now on the point of closing aggregate between 40,000 and 50,000 tons. An Eastern mill also has accepted an order for 15,000 tons of structural shapes for export to France. A stronger tone prevails for all semi-finished and fully finished forms of steel. One result of the heavy buying is to awaken greater interest among some domestic consumers who two weeks ago were inclined to retire from the market.

Pig Iron.—Several large domestic consumers of foundry iron came into the market last week with inquiries for upward of 20,000 tons for forward shipment. There were also more numerous sales of small lots of foundry grades, running from 50 to 250 tons each and aggregating about 6000 tons, mainly for prompt shipment; but while there was an increased tonnage sold there was no improvement in the prices realized. It may be significant, however, that blast-furnace interests are encouraged to anticipate some appreciation in price in the near future. On the other hand, the market is still handicapped by the offering of resale lots and until these are eliminated an upward movement is likely to be delayed. The largest single purchase of foundry iron—about 2000 tons—was made by a local pipe works, including 500 to 1000 tons of No. 2 plain Virginia metal and some low-grade high-sulphur iron, for early delivery. In fact, it is an interesting point that practically all of the purchases of small lots were for prompt shipment, indicating that not a few consumers find that their stock piles are running down. A few small lot sales—100 to 200 tons—of foundry iron were made for export via Baltimore. Steel-making iron was also more active, with one inquiry for 11,000 tons of basic from a Newark, N. J., consumer for shipment at the rate of 2000 tons per month, to begin at once. The market remains steady from the furnace standpoint; in fact, in the face of the recent dullness, prices have been exceptionally well sustained. A resale of 6000 tons of warrant Valley basic at $17.75 furnace, by a Philadelphia speculator, cannot be regarded as having a direct bearing upon eastern Pennsylvania basic, which is now more firmly held at $19 to $19.50 delivered. Export business, present and prospective, is exciting more interest. One lot of 5000 tons of special Bessemer was sold for direct shipment to France, and an inquiry is out for 30,000 tons of Bessemer for the French Government. Italy asks for prices on 10,000 tons of low phosphorus, France wants to buy 2000 tons and Japan needs 3000 tons more. There are also foreign inquiries for 1000 tons and for 1500 tons of special Bessemer iron. The recent sudden advance of $7 to $8 per ton in ocean freight rates militates against the prompt closing of export business. In a few instances special freight rates of $1 to $3 per ton higher than was paid on recent shipments were offered for 2000-ton lots for shipment to French and Italian ports. To-day there was an offer of $30 per ton (against $28 a few weeks ago) to carry 1000 tons of pig iron from New Orleans to Genoa, on a ship to sail Aug. 21. The open rate, however, is $35 per ton or higher. Apparently foreign consuming interests do not fully understand the freight situation, as cables from abroad received yesterday inquired why delivered prices on pig iron are so much higher than 10 days ago. Quotations for standard brands, delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa., No. 2 X foundry	$19.50 to $20.00
Eastern Pa., No. 2 plain	19.25 to 20.00
Virginia No. 2 X foundry	20.25 to 21.25
Virginia No. 2 plain	20.00 to 20.75
Gray forge	18.50 to 19.00
Basic	19.00
Standard low phosphorus	34.00

Iron Ore.—Arrivals of foreign ore at this port during the week ended Aug. 12 included 6111 tons, valued at $31,288, from Sweden and 12,600 tons, valued at $47,883, from Cuba.

Billets.—The demand for billets and other semi-finished forms is more pressing. One large interest, with several blooming mills and another about to go into commission, is anxiously seeking outside blooming capacity. Some Bessemer billets are offered at $45 to $50, Pittsburgh base, and several lots of a few thousand tons of open-hearth steel billets are offered by outside interests.

Ferroalloys.—A little better inquiry for ferromanganese is reported from consumers in the interior but otherwise the market remains quiet and a somewhat easier tone prevails for either domestic or foreign at $170 and $175 per ton, seaboard, and probably further concessions of $5 per ton would be made to effect sales. It is notable, however, that there is some uneasiness because of the failure to make shipments from England against contracts thus far this month. Cables just

received attribute the delay to the withholding of licenses. Another inquiry is reported from Italy. Imports at this port last week were 678 tons, valued at $81,743, from England. Spiegeleisen remains steady at $50, furnace. A better demand for ferrosilicon is evident but mainly for blast-furnace grades. One domestic consumer asks for prices on 2000 tons of 10 per cent for 1917 shipment and another large export inquiry, for 10 to 13 per cent, comes from Japan. Fifty per cent ferrosilicon is strong at $86 to $88 and 11 per cent at $31, Pittsburgh.

Plates.—Shipbuilders on the Atlantic seaboard have placed contracts for 20,000 tons of marine plates, 12,000 tons has been sold for export and 10,000 to 15,000 tons more is under negotiation for domestic and foreign shipment. The Pennsylvania Shipbuilding Company., Gloucester, N. J., is understood to have placed 12,000 tons for five boats with Pittsburgh interests at 3 to 3¼c. per lb., Pittsburgh base for shipment in the second quarter of 1917. The Standard Shipbuilding Company has ordered forgings for five boats, of 5000 to 8000 tons burden, and is also reported to have contracted for 8000 to 10,000 tons of plates. The Sun Shipbuilding Company is on the point of closing for 8000 tons of plates for four tank boats of 10.000 tons each, for delivery over the first quarter of 1917. Two eastern Pennsylvania mills have sold 12,000 tons of plates for export to Italy; one taking 8000 tons and the other 4000 tons at 3¼c. to 3½c. per lb., Pittsburgh base, for shipment in the next six months. Another lot of several thousand tons is reported to have been sold for export to Japan. Two other Eastern mills are holding firmly at 4c., Pittsburgh, and will not promise deliveries under eight to nine months. One mill is still able to make deliveries of universal plates in six to eight weeks.

Bars.—Large contracts for shell bars have been taken for domestic shipment and for export, one eastern Pennsylvania seller being credited with booking orders for upward of 100,000 tons, including 26,000 tons of 6⅜ in. for the Baldwin Locomotive Works, but the largest tonnage was for foreign shipment. The Baldwin interests also are said to have bought 3500 tons of 5⅛-in. rounds. The American Locomotive Company is reported to have ordered 70,000 tons of shell bars from two Pittsburgh mills. A Southern manufacturer of war munitions has bought 12,000 tons of 6⅜-in. bars against an inquiry for 35,000 tons. Structural bars are wanted most urgently in small lots up to 1000 tons for shipment in the next four to six months but bar mills are avoiding orders whenever possible. The nominal price asked is 2.759c., Philadelphia, but some makers ask and obtain 2.909 to 3.59c. Iron bars are in better demand and stronger. The principal demand is from the railroads at 2.659c., Philadelphia.

Structural Material.—J. P. Morgan & Co. have placed a contract for 15,000 tons of plain shapes for export to France, with an eastern Pennsylvania mill, and other foreign business is pending. Steel building work is quiet. The Philadelphia Electric Company, after taking bids on 300 tons of fabricated steel for a building at Tenth and Chestnut Streets, is holding the award in abeyance. The proposed Franklin Trust Company's eight-story building on Fifteenth Street requires 675 to 700 tons of shapes, but the bids submitted are deemed too high to encourage construction now. The Pennsylvania Railroad has placed some small orders for bridges and for a coal trestle calling for about 1200 tons of shapes, and is taking bids on 100 tons for a freight shelter at Connellsville. The Southern Railroad bridge contracts, 7000 tons, are still pending. Prices on plain material continue to range from 2.909 to 3.159c., Philadelphia. The Lackawanna Steel Company has sold 300 to 400 tons of sheet piling for early delivery from stock.

Sheets.—Automobile manufacturers have placed several orders for blue-annealed sheets, one for a substantial tonnage. Prices range from 3.159c. to 3.659c., Philadelphia, for No. 10, according to delivery.

Coke.—The market is steady, with fair sales of foundry coke. Low-grade heating coke sells at $2.50 per net ton at oven. Foundry is held at $2.75 for spot and $2.50 for contract per net ton at oven. Freight rates from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Old Material.—The new features of interest the past week were cable inquiries from Italy for 10,000 tons of old rails and the usual monthly railroad scrap offerings. The Pennsylvania, Baltimore & Ohio, and Philadelphia & Reading have each made awards of various items aggregating 10 000 tons, 7000 tons and 2000 tons respectively. The New Haven, the Southern, the Seaboard Air Line and the Norfolk & Western will make awards in the next few days. The railroad embargoes against shipment to the Coatesville plants is still rigidly maintained. Embargoes also have been placed against several mills in the Pittsburgh territory. There have been several sales of car axles, in lots of 100 to 300 tons. Railroad wrought is firmer and is held 50c. per ton higher, while borings and turnings are 50c. per ton lower. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania, and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$14.75 to $15.25
Old steel rails, rerolling	17.00 to 18.00
[illegible]	[illegible]
Old steel axles (nominal)	30.00 to 31.00
Old iron axles (nominal)	28.00 to 29.00
Old iron rails	20.00 to 20.50
Old carwheels	15.50 to 16.00
[illegible]	[illegible]
Wrought pipe	12.50 to 13.00
No. 1 forge fire	12.50 to 13.00
Bundled sheets	12.50 to 13.00
No. 2 busheling	10.50 to 11.00
Machine-shop turnings	[illegible]
Cast borings	[illegible]
No. 1 cast	16.00 to 16.50
Grate bars, railroad	11.75 to 12.25
Stove plate	11.75 to 12.25
Railroad malleable	13.50 to 14.00

Cincinnati

CINCINNATI, OHIO, Aug. 16, 1916.—(*By Wire.*)

Pig Iron.—Sentimentally, the situation has improved considerably but foundry-iron purchases here have been lately confined to small tonnages urgently needed by a few consumers. The melt of foundry iron is on the increase, however, and shipments are going forward on old contracts at a much better rate. Southern foundry iron continues to be a very strong competitor in this market, and $13.50, Birmingham basis, can be done for some furnace iron for shipment this year, although the majority of furnaces are firm at $14 to $15. Few open inquiries are out, the largest of which is from St. Louis territory for 1500 tons for the last half. It is rumored that a large consumer of basic in this territory has covered for first half requirements. An inquiry from another basic user is also pending. Southern Ohio furnaces have not been entirely successful in resisting pressure from other markets, and $18.50, Ironton, can be done on No. 2 foundry and basic for nearby shipment, while on desirable business it is alleged that this price could be shaded on basic and malleable and probably on foundry iron. A second inquiry has been received from a prominent pump manufacturer for approximately 16,000 tons of foundry iron for delivery to its different plants in the last half of 1917. The furnaces are not disposed to quote for delivery that far ahead. Northern silvery irons are a trifle firmer at $27, furnace, for an 8 per cent analysis, but Southern silvery is unchanged at $24, Birmingham basis. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern [illegible] No. 1 [illegible]	[illegible]
Southern coke, No. 1 [illegible]	[illegible]
Southern coke, No. 2 foundry	[illegible]
Southern coke, No. 1 foundry	[illegible]
Southern gray forge	[illegible]
Ohio silvery, 8 per cent silicon	28.26 to 28.76
Southern Ohio coke, No. 1	20.76 to 21.26
Southern Ohio coke, No. 2	19.76 to 20.26
Southern Ohio coke, No. 3	19.26 to 19.76
Southern Ohio malleable Bessemer	19.76 to 20.26
Basic, Northern	19.76 to 20.26
Lake Superior charcoal	21.20 to 22.20
Standard Southern carwheel	24.90 to 25.40

(By Mail)

Finished Material.—Galvanized sheets have recovered some of the lost ground and are firmer this

week. Nearby mills are quoting No. 28 at 4.50c. to 4.60c., Cincinnati or Newport, Ky., and No. 28 black sheets around 3c. to 3.10c. The local warehouse price on No. 28 galvanized sheets is unchanged at 5.15c. An improvement in business is noted all along the line with one exception and the demand for building materials is especially on a big increase. We quote from local stocks as follows: Steel bars and small structural shapes, 3.20c.; twisted steel bars, 3.35c.; plates, 3.50c.; wire nails, $2.75 per keg, base; barb wire, $3.60 per 100 lb., and No. 10 blue annealed sheets 3.50c. Railroad track material is very dull, and in fact all railroad buying is very slow.

Coke.—The consumption of foundry coke is on the increase, but no new contracts are reported. A few sales have been made of carload lots to fill in, but these are not of sufficient volume to affect the market. Furnace coke is slightly firmer for prompt shipment, but no recent sales have been made in this territory. We quote Connellsville 48-hr. coke at $2.50 to $2.75 per net ton at oven, and 72-hr. foundry coke at $3.15 to $3.50. Wise County and Pocahontas foundry coke quotations range from $3.25 to $3.75, and New River brands at $3.75 to $4.25.

Old Material.—Iron axles have been advanced again and the minimum selling price to-day is around $23 to $24 per net ton. No. 1 railroad wrought is also a little stronger and is quoted around $13.50. Bundled sheet scrap, cast borings and steel turnings are weak. The following are dealers' prices to consumers, f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton

Bundled sheet scrap	[illegible]
Old iron rails	15.50 to 16.00
Relaying rails, 50 lb. and up	21.00 to 21.50
Rerolling steel rails	14.50 to 14.00
Heavy melting steel scrap	14.00 to 14.50
Steel rails for melting	13.00 to 13.50

Per Net Ton

No. 1 railroad wrought	[illegible] to $14.00
Cast borings	4.50 to 5.00
Steel turnings	[illegible] to [illegible]
Railroad cast scrap	11.00 to 11.50
No. 1 machinery cast scrap	12.75 to 13.25
Burnt scrap	8.25 to 8.75
Iron axles	[illegible] to [illegible]
Locomotive tires (smooth inside)	19.75 to 20.25
Pipes and flues	9.25 to 9.75
Malleable and steel scrap	10.75 to 11.25
Railroad tank and sheet scrap	8.25 to 8.75

Cleveland

CLEVELAND, OHIO, Aug. 15, 1916.

Iron Ore.—Shippers of Lake Superior iron ore have been concerned at the announcement that some Lake vessel tonnage has been chartered for the season of 1917 at $1 a ton, free to vessel. While it is believed only a small amount of tonnage has been taken at this figure, and while also it is believed it is a part of a contract which has to do with a block of ore to be carried this season, yet it has been the topic of much interesting discussion this week in ore shipping circles. For some weeks $1 a ton, net, has been paid for some wild tonnage and this rate is likely to remain effective as an offer until the end of the present season. Ore shippers are speculating on what effect such a rate for 1917 would have upon the Lake Superior ore market. It is argued that as iron miners are getting higher wages and other mining costs have advanced, next season's ore price should be advanced. But it is felt by ore interests that while $5 for old range Bessemer might be named, such an increase would be simply handed over to vessels and would not take care of the new mining costs. Hence there is some talk of $5.50, or an advance of $1.05, but nothing at all definite has developed. Old range Bessemer has not brought $5 a ton since December, 1909; and previous to that, since November, 1906. The last time $5.50 was named as the base was in December, 1899. We quote ore prices as follows, delivered lower Lake ports: Old range Bessemer, $4.45; Masaba Bessemer, $4.20; old range non-Bessemer, $3.70; Mesaba non-Bessemer, $3.55.

Pig Iron.—The beginning of a movement of steel works and foundries for the purchase of basic pig iron is becoming apparent in the Cleveland district where more inquiry to-day is coming out for such iron than in months. Malleable iron consumers also have been sounding the market, with several fair sized inquiries in hands of sellers. One inquiry for malleable iron involving 5000 tons has been received here from an Eastern consumer. No sales have been closed recently, although now it is learned a sale of about 1000 tons of foundry iron was made some days ago at the going market. While one Tennessee furnace is offering No. 2 foundry iron for delivery through the last half of this year and first half of next, yet no Southern iron sales have been made in this district recently. Silvery irons are holding to the recent quotations, but this grade also has been quiet. We quote, delivered Cleveland, as follows:

[illegible]	[illegible]
[illegible]	[illegible]
Northern No. [illegible]	[illegible]
Southern No. [illegible]	[illegible]
Gray forge	[illegible]
[illegible]	[illegible]
silicon	28.62 to 30.62
Standard low phos., Valley furnace	32.00

Finished Iron and Steel.—Practically all northern Ohio agricultural implement makers have closed at 2.50c., Pittsburgh, for their steel bar requirements for the first half of next year, and they express their satisfaction at being able to secure these bars. Some makers of steel bars who are able to make deliveries of Bessemer material within six weeks to two months are taking on good business at higher than usual prices. One mill has booked several thousand tons of bars and small shapes, and has secured 2.75c. for the shapes which usually take the bar card, together with the extras even above that price. The sheet market continues to show slight irregularities in price, especially blue annealed. Some mills are asking 3.25c., Pittsburgh, for No. 10 gage, while others are willing to shade 3c.; but these latter will do this only on narrower sheets. Bar iron continues to be quoted at 2.50c., Cleveland. We quote sheets at 2.90c. to 3c., Ohio mill, for No. 28 black; 3c. to 3.25c. for No. 10 blue annealed; and 4.25c. to 4.40c. for No. 28 galvanized. Warehouse prices are 3.25c. for steel bars and structural material, 3.65c. for plates, and 3.20c. for iron bars.

Old Material.—Sales of iron and steel scrap in the Cleveland district are infrequent and mills continue to show little interest in the market. Yet generally quotations are being maintained. Some lots of borings have been sold on the basis of $6 a net ton, Cleveland, to blast furnaces which have been using some quantities of this material. Machine shop turnings are weak, although still quoted at a minimum of $5.75 per net ton, Cleveland. Iron rolling mills are still out of the market. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton

Steel rails	$14.75 to $15.00
Iron rails	18.50 to 19.00
Steel car axles	30.00 to 32.00
Heavy melting steel	15.00 to 15.25
Carwheels	12.75 to 13.00
Relaying rails, 50 lb. and over	22.50
Agricultural malleable	12.50 to 12.75
Railroad malleable	14.00 to 14.25
Steel axle turnings	12.00 to 12.50
Light bundled sheet scrap	12.00 to 12.25

Per Net Ton

Iron car axles	$24.00 to $25.00
Cast borings	6.00 to 6.25
Iron and steel turnings and drillings	[illegible] to [illegible]
No. 1 busheling	11.00 to 11.25
No. 1 railroad wrought (nominal)	15.00 to 15.50
No. 1 cast	13.00 to 13.50
Railroad grate bars	10.00 to 10.50
Stove plate	10.00 to 10.25

St. Louis

ST. LOUIS, MO., Aug. 14, 1916.

Pig Iron.—Increased interest in steel making grades is noted. One inquiry for 10,000 tons of Northern basic may be increased in size if a satisfactory price is obtained. Further inquiries for both Northern and Southern basic are expected. The largest sale was for 500 tons of Northern foundry and an inquiry for 200 tons of the same grade is still pending. The feeling is that Southern warrant iron has been about cleaned up.

Finished Iron and Steel.—The advance recently reported has been accepted quietly by consumers. While no important new business has been brought out, it has

had the effect of convincing consumers that there is no immediate likelihood of a drop in quotations. This territory specified heavily early and material is, therefore, moving satisfactorily on contracts, with fabricators' yards well supplied. Specifications on light rails for coal mine use have been exceptionally heavy in the past week. Track fastenings are sold so far ahead that one user was compelled to purchase 1500 kegs of bolts from outside sources at a stiff premium. Movement out of warehouse continues active with these prices quoted: Soft steel bars, 3.15c.; iron bars, 3.10c.; structural material, 3.15c.; tank plates, 3.55c.; No. 10 blue annealed sheets, 3.45c.; No. 28 black sheets, cold rolled, one pass, 3.30c.; No. 28 galvanized sheets, black sheet gage, 5c.

Coke.—No business of importance has appeared. The small quantities taken are moved largely at a better figure than the ruling quotations on large lots.

Old Material.—The market continues quiet so far as consumer transactions are concerned, but the dealers are continuing their speculation, confident of further advances before long. Relaying rails are the strong item in the list, with a probability of premium prices being paid if only they could be obtained. The only list out during the week was one for 4000 tons from the Southern Railway. We quote dealers' price, f.o.b customers' works, St. Louis industrial district, as follows:

Per Gross Ton	
Old iron rails	$16.25 to $16.75
Old steel rails, rerolling	[illegible] to [illegible]
Old steel rails, less than 3 ft	[illegible] to [illegible]
Relaying rails, standard section, subject to inspection	23.00 to 24.00
Old carwheels	11.50 to 12.00
No. 1 railroad heavy melting steel scrap	14.50 to 15.00
Heavy shoveling steel	13.50 to 14.00
Frogs, switches and guards cut apart	14.50 to 15.00
Bundled sheet scrap	8.00 to 8.50
Per Net Ton	
Iron angle bars	$16.00 to $16.50
Steel angle bars	13.50 to 14.00
Iron car axles	24.00 to 25.00
Steel car axles	27.00 to 27.50
Wrought arch bars and transoms	19.50 to 20.00
No. 1 railroad wrought	14.50 to 15.00
No. 2 railroad wrought	14.25 to 14.50
Railroad springs	14.00 to 14.50
Steel couplers and knuckles	14.00 to 14.50
Locomotive tires, 42 in. and over, smooth inside	19.50 to 20.00
No. 1 dealers' forge	10.25 to 10.75
Cast-iron borings	6.50 to 7.00
No. 1 busheling	12.50 to 13.00
No. 1 boilers, cut to sheets and rings	9.50 to 10.00
No. 1 railroad cast scrap	11.00 to 11.50
Stove plate and light cast scrap	8.75 to 9.25
Railroad malleable	11.00 to 11.50
Agricultural malleable	10.00 to 10.50
Pipes and flues	10.50 to 11.00
Railroad sheet and tank scrap	9.75 to 10.25
Railroad grate bars	9.50 to 10.00
Machine-shop turnings	7.00 to 7.50

Birmingham

BIRMINGHAM, ALA., Aug. 14, 1916.

Pig Iron.—A shipment of 5000 tons of pig iron for Mediterranean delivery, making a total of 25,000 tons since June 15, was made from Birmingham yards the past week. A sale of several hundred tons of high sulphur and other low grades of iron has been effected for Spain. A considerable tonnage of low-grade metal, which went under market prices, has been sold. For strictly graded furnace iron the Birmingham makers get $15, with carload and 100 to 150 ton lots the usual transaction. Where quotations of $15 are made on larger quantities, nothing further is heard. In fact, no large sales are discoverable. Tennessee district furnaces will probably offer metal around $14 and $14.50, Birmingham basis, for some time. It is really a separate district and ought to be so classed on account of its lower freight rates to Northern and Western points. Florence and Sheffield irons are moving regularly by barge line into St. Louis and Chicago territory at a saving on the rail freight rate. The Woodstock Corporation has finally blown in its furnace at Anniston and is understood to be booked fairly well ahead. This is the only furnace in the Gadsden pipe and foundry district and can supply those large consumers of pig iron at minimum freight rates. The Gadsden stack of the Alabama Company is about to resume. Two foundry furnaces are billed to go out for relining in the near future and a third will follow unless the market picks up There is, therefore, no prospect of increased production except in basic, where prior demand and output records are being broken. One large furnace interest is scarcely a factor in the foundry-iron market, nor will it be this fall, due to its great need for self-manufactured basic. The inquiry is really stronger, but no market basis for Birmingham furnace iron for real business has been established. Accumulations were around 20,000 tons in July, but the output was also at maximum. Warrant stocks have gone down about 20,000 tons. A high authority predicts a scarcity of pig iron by March of next year. We quote, per gross ton, f.o.b Birmingham district furnaces, as follows:

No. 1 foundry and soft	$15.00 to $15.50
No. 2 foundry and soft	14.50 to 15.00
No. 3 foundry	14.00 to 14.50
No. 4 foundry	13.75 to 14.25
Gray forge	13.50 to 14.00
Basic	14.50 to 15.00
Charcoal	22.00 to 22.50

Cast-Iron Pipe.—Four of the five pits of the United States Cast Iron Pipe & Foundry Company's plant at Bessemer, Ala., are in operation and the Birmingham plant is making and shipping quantities of 4 to 12 in. pipe to oil fields in Texas, Louisiana and elsewhere. Other water and gas pipe makers report new business as coming in slowly, but still of sufficient volume to justify price maintenance and continuance of present rate of output. Shipments are brisk. Sanitary shops are doing little. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in. $28; 6-in. and upward, $25, with $1 added for gas pipe and 16-ft lengths.

Coal and Coke.—The steam coal trade is reported better. The railroads are taking their full specifications and in many other directions there is improvement, with better prices governing. Maximum furnace operations have for months kept coke production at top notch and it is still there. Standard beehive makes are fetching $4.25 to $4.50 per net ton, f.o.b. oven, with furnace coke at $3.25 to $3.50. Newcastle coke is going to the Woodstock Corporation, Anniston. Foundries are laying in stock liberally.

Old Material.—While there is no improvement generally in the old material market, one dealer secured several hundred tons of steel axles and got $24 for them f.o.b. Atlanta. Another dealer is hopeful of filling an export order at $28 if he can secure favorable freight rates. Lowest ocean rates recently offered were around $28. Steel mills manufacturing shrapnel have a waste of 30 per cent which goes to scrap accumulations and this is affecting the market. Steel scrap is somewhat more active. We quote, per gross ton, f.o.b. dealers' yards, prices to consumers, as follows:

Old steel axles	$24.00 to $30.00
Old steel rails	10.00 to 10.50
No. 1 steel scrap	9.25 to 9.75
No. 1 wrought scrap	12.50 to 13.00
No. 1 cast scrap	10.50 to 11.00
Extra heavy cast scrap	9.50 to 10.00
Stove plate and light	9.00 to 9.50
Old carwheels	9.50 to 10.00
Tram carwheels	9.50 to 10.00

San Francisco

SAN FRANCISCO, CAL., Aug. 8, 1916.

The local iron market is unsettled. The principal matter of interest is the advance in freight rates to Pacific terminals, announced to take place Sept. 1, which is already causing some price revision, and has brought out many requests for prompt shipment. The new advance, added to prices already very high, is not well received, and is expected to curtail consumption perceptibly. Local labor conditions, as well as the threatened railroad tie-up, are rather disquieting and tend to limit activity in several directions, though there are no serious disturbances at the moment. General distributive business continues seasonably quiet, while specifications from manufacturers hold up in good shape.

Bars.—Oriental business is still curtailed by lack of shipping facilities, but the domestic trade is taking all

the local mills can produce for some months ahead. There has been some complaint that deliveries were not well balanced as to sizes, but it is stated that this will soon be remedied. A considerable tonnage has continued to come from Eastern mills, but the new freight rate of 94c. per 100 lb. from Pittsburgh will be a great handicap on shipments from that source. Jobbing business is fairly active for the season, and specifications on contracts are satisfactory. The building demand also holds up well. Prices are unchanged as yet.

Structural Material.—The strike is still in effect. Local fabricating shops are doing practically nothing, while advancing prices and uncertainty as to future deliveries have almost put a stop to new figuring, many jobs being temporarily withdrawn from the market. There is a rather active demand for shapes from stock, and the price on carloads to the trade has been raised to 3.85c. in anticipation of the freight advance. Local mills are rolling some angles over 3 in., but the output is still insignificant. No important new contracts are reported, but there are numerous projects in contemplation, including an 800-ft. steel bridge over the Santa Ynez River in Santa Barbara County, bids to be opened Aug. 21; and some small bridges in San Bernardino County, bids to be opened Aug. 28. Plans are expected soon for the new Fairmount school, this city. There is talk of a large office building on East Seventh Street, Los Angeles.

Plates.—Aside from the usual heavy specifications and efforts to get all the tonnage possible shipped before Sept. 1, there is little to report in the local shipbuilding line. Several vessels have been completed, their places on the ways being immediately taken by new work. As the requirements are well covered by contracts, shipbuilders have taken nothing from stock for some time. Many smaller buyers also anticipated their requirements early in the year, in some cases more than was warranted, and the jobbing trade has narrowed down to rather small limits.

Sheets.—Local prices on galvanized sheets have not changed since the recent decline. The demand is still closely limited, and the outlook is less encouraging than it appeared recently, owing especially to lack of building activity. There is a fair demand for the manufacture of irrigation specialties, but buyers do not take hold readily. Current business in blue annealed also is quiet, though manufacturers are specifying freely.

Wrought Pipe.—Consuming demand in the plumbing trade does not appear very healthy, and building conditions are not encouraging. Stocks of merchant sizes also are in fair shape. In anticipation of the freight advance, the larger buyers at all coast points are trying to rush shipments during the present month. The advance is expected to amount to about $4.60 per ton from Pittsburgh. The call for oil country goods is developing greater strength, with a great deal of new development in prospect.

Cast-Iron Pipe.—This class of material will be most seriously affected by the higher freight rate, the advance expected being about $6.60 per ton from Birmingham, making a rate of $17.70. For the present there is rather a rush of small orders, but after next month a material curtailment of tonnage is expected. Santa Barbara has ordered about 89 tons, and bids have just been opened for 90 tons for Healdsburg, Cal., and 30 tons for Phoenix, Ariz. Glendale, Cal., takes bids Aug. 17 for 10,000 ft. of 20-in. pipe, and Orange is out for a small lot of 4-in. An inquiry is expected shortly from a Los Angeles water district.

Ferroalloys, Etc.—Ferromanganese remains fairly steady, with offerings about sufficient for current needs, and enough new arrivals to prevent any immediate fear of shortage. Some ferrosilicon has arrived recently, but prices are still very firm. A shipment of chrome ore arrived recently from Australia.

Pig Iron.—Current needs have been covered in good shape by old contracts, and melters were rather slow in starting on their second-half contracts. With a freight rate of $12.34 per gross ton from Birmingham, to take effect Sept. 1, however, efforts are being made to get in as much as possible before that time, giving the market a momentary appearance of activity. The new rate would no doubt favor a return to the use of foreign iron if it were available, but except for small scattering arrivals of Chinese iron there is nothing coming from foreign sources. Local agencies quote No. 1 Southern foundry iron at about $26 per gross ton.

Coke.—The coke market is affected in the same way as pig iron by the impending advance in freight, though the current requirements of foundries show little change, being in the aggregate considerably larger than for some years past. There is a little easier feeling as to prices, but most offerings of Southern coke are still held at $15 to $15.50 per net ton, favored brands commanding a premium.

Old Material.—Some of the largest melters have practically withdrawn from the market on steel scrap, having abundant supplies for all nearby requirements either under contract or on hand. There is a rather large tonage held by speculators, which finds a narrow market. Occasional sales are made at about $10 to $12 per gross ton, with lighter or less desirable offerings even lower. Cast-iron scrap holds fairly steady at $16 to $18 per net ton, with a normal demand.

New York

NEW YORK, Aug. 16, 1916.

Pig Iron.—The situation has changed within a week. New inquiries have come up amounting to 35,000 to 40,000 tons. Thus far no great amount of this business has been closed, but the inquiries are live and early buying is expected. The International Steam Pump Company, which came into the market recently for about 16,000 tons of various grades for delivery in the first half of 1917, followed this up by asking for over 18,000 tons for the second half of next year. It is a question if quotations in this case which the buyer desired to have left open until it was ready to close, will be allowed to remain effective indefinitely. Usually a buying movement, after as many weeks of dullness as the pig iron market has seen, starts on concessions. Such concessions may be made in this instance, but in one or two cases sellers have adhered to prices they have quoted recently, and in one important case a quotation has been withdrawn. At Buffalo something under $18.50 for No. 2 X has been quoted, but in other cases $18.50, Buffalo furnace, is adhered to. Among new business is an inquiry for 11,000 to 12,000 tons of basic iron for a New Jersey plant. There is also considerable inquiry for malleable interests in Connecticut and a railroad supply company has asked for 3500 tons of various grades for a Southern plant. Another large inquiry has come up in the New York district which may run above 15,000 tons. The report that France was in the market for 30,000 tons of Bessemer was correct, but it now appears that this business is held in abeyance. Further sales of Southern iron for export have been made and shipments from Alabama are going forward on this account each week. Some concessions have been made recently in eastern Pennsylvania furnace transactions and $19.25 for No. 2 X at Jersey City has been shaded. The New Haven Railroad removed its embargo on pig iron and coke Aug. 11. The amount of Bessemer iron taken by Eastern furnaces for export has been increased lately and in one or two cases furnace operations on such iron will continue to the end of the year. Shipments to Bridgeport, Conn., have been affected by strikes at several foundries there. We quote at tidewater for early delivery: No. 1 foundry, $20 to $20.50; No. 2 X, $19.25 to $19.75; No. 2 plain, $19 to $19.50; Southern iron at tidewater, $19.50 to $20 for No. 1 and $18.75 to $19.25 for No. 2 foundry and No. 2 soft.

Ferroalloys.—Inquiry for ferromanganese is brisker than for many weeks, but the quantity is not large. Probably 1000 tons is before the market. There have also been a few sales of small lots which have gone at $175, seaboard, for nearby delivery, one sale involving 400 tons, though recent reports of $170 sales were authentic. Arrivals continue satisfactory, including a consignment of about 3000 tons for delivery on contract to special consumers. On a rumor that the British

Government may again restrict ferromanganese shipments, confining them to munition makers only, no very definite information is obtainable. One or two producers, it is understood, have obtained no August licenses to ship thus far. Spiegeleisen is very quiet at $45 to $55, furnace, on contract. Fifty per cent ferrosilicon is strong and active, with material for nearby delivery selling in some cases, in small lots, above $90 at furnace.

Cast-Iron Pipe.—Perth Amboy, N. J., will let a contract this week for pipe laying which will involve the purchase of 600 tons of 30 and 36 in. pipe. No other public lettings of importance are announced. Private buying continues in good volume. Prices are firm. Carload lots of 6-in., class B and heavier, are quoted at $30.50 per net ton, tidewater, class A and gas pipe taking an extra of $1 per ton.

Old Material.—While the market is extremely quiet, and the immediate outlook presents little of an encouraging character, dealers are hopeful, looking for a much better demand and higher prices as the fall develops. Eastern Pennsylvania consumers are doing practically no buying in this market. Embargoes prevent shipments to some steel works and others seem to be well stocked. The Pittsburgh market also appears to be closed to local dealers for the present, as requests have been received for further shipments to be held up. On the basis of recent transactions, brokers who purchase for the Pittsburgh market would probably pay $13.25 to $13.50, New York, for heavy melting steel scrap if they could make delivery. Brokers quote buying prices for the Eastern trade about as follows to local dealers and producers per gross ton, New York:

Heavy melting steel scrap (eastern Pennsylvania specifications)	$11.75 to $12.00
Old steel rails (short lengths) or equivalent	12.50 to 12.75
Relaying rails	27.50 to 28.00
Rerolling rails	16.00 to 16.50
Rerolling rails (for export)	19.00
Iron car axles	28.00 to 29.00
Steel car axles (for export)	34.00 to 35.00
No. 1 railroad wrought	17.50 to 18.00
Wrought-iron track scrap	15.50 to 16.00
No. 1 yard wrought, long	13.50 to 14.00
No. 1 yard wrought, short	11.75 to 12.00
Light iron (nominal)	3.50 to 4.00
Cast borings (clean)	6.75 to 7.25
Machine shop turnings (nominal)	4.25 to 4.50
Mixed borings and turnings	4.25 to 4.50
Wrought pipe	10.50 to 10.75
Old carwheels (nominal)	15.00 to 15.50
Malleable cast (railroad)	12.00 to 12.50

Foundries are still doing little or nothing in the purchase of old material. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

No. 1 cast (machinery)	$16.00 to $16.25
No. 2 cast (heavy)	14.50 to 15.00
Stove plate	11.00 to 11.25
Locomotive grate bars	10.00 to 10.25

Finished Iron and Steel.—Price conditions are exceedingly firm, almost wholly because of the large offerings from abroad, closed and closing. Some of these are being executed somewhat secretly and definite facts are for the moment withheld. And inquiry is broadening in scope. Meanwhile the domestic market is dull, as is to be expected at this period, but the evident strengthening of market prices and the indication of an indefinitely long period at the high levels has brought about activity in building projects in New York City. Railroad interest has not yet brightened, about the only rail offerings being 2500 tons for street railroads and 2000 cars placed by the Lake Shore. Foreign inquiry for plates is strong, and sales of several hundred ton lots, part to Japan, have been made, at a shade below 4c., Pittsburgh, for delivery in November and December, and 3c. for the first part of 1917. In bars a sale of 5000 tons at 2.50c., Pittsburgh, is noted. Bar iron mill products are in general no easier, bar iron deliveries being 8 to 10 weeks, but business could easily be placed for the larger size bolts. Warehouse demand has tapered off. The apartment house and loft building activity includes two Herzog apartments mentioned in this column a few weeks ago; two loft buildings for the Holland Realty Company, one at 35 West Forty-fifth Street taking 500 tons and one at 233 West Thirty-sixth Street taking 600 tons; a 600-ton structure for Bing & Bing on West Seventy-first Street; a Tishman loft, for the Jatison Construction Company, Inc., 15 West Thirty-sixth Street, 1000 tons, and the addition to the McAlpin Hotel, 1200 tons. One of the Levy buildings, 600 tons, has been placed with the H. C. Stowe Construction Company, and the Passaic Structural Steel Company has been awarded 1000 tons for the Bronson apartment, Broadway and Ninety-first Street. Decision is early expected on 2500 tons for the Halifax terminal, and new bids are asked on a customs examining warehouse at Toronto, taking 1500 to 2000 tons. We quote mill shipments of plain structural material at 2.669c. to 2.919c., New York; steel plates at 3.169c. to 4.169c., depending on the width of the plate as much as on delivery, and with universal plates easier by $5 to $10 per ton than sheared plates; steel bars at 2.769c. to 2.919c., the lower price for open-hearth steel at the convenience of the mill and little if any this year, and for Bessemer bars in 60 to 90 days for an attractive lot; bar iron at 2.669c., New York. Out of warehouse we quote iron and steel bars and shapes at 3.25c. to 3.30c., New York, and plates at 4c to 4.25c.

Buffalo

BUFFALO, N. Y., Aug. 15, 1916.

Pig Iron.—Sales for the past 10 days have been heavy, both for last quarter and first half delivery, and inquiry is coming in in large volume. This includes 35,000 tons for the leading pump interest, 10,000 tons from Massachusetts foundries and 25,000 tons of steelmaking iron for use in making war munitions. Some orders for the latter grade of iron have been placed. Local users have taken considerable iron for the remainder of the year and are now inquiring for first quarter. It was not expected that a buying movement would commence before Sept. 1, but it has apparently started in some weeks earlier, and it looks as though it might develop to large proportions. Prices are strengthening. Some producers are inclined to anticipate higher prices in the near future and are holding off on making quotations. We quote as follows, f.o.b. furnace, Buffalo:

No. 1 foundry	$19.00 to $19.50
No. 2 X foundry	18.50 to 19.00
No. 2 plain	18.50 to 18.75
No. 3 foundry	18.50 to 18.75
Gray forge	18.25 to 18.50
Malleable	18.50 to 19.00
Basic	19.00 to 20.00
Bessemer	21.00 to 22.00
Charcoal, regular brands and analysis	21.00 to 22.00

Finished Iron and Steel.—Mill conditions are not easing up as regards deliveries, few mills having anything to offer for 1916. Tremendous export tonnages have been booked and a buying movement to take care of pressing domestic needs is under way. Many mills are practically scheduled in full over the first quarter of 1917, and in some instances over the entire first half, and some selling agencies are of the opinion that it would not require a very extensive buying movement to develop a condition where it will be a question of ability to secure steel at all rather than a question of price.

Old Material.—Good demand continues for heavy melting steel, principally for shipment to Pittsburgh and Valley points. Dealers are chary of making large sales in any line, as signs indicate a brisker demand in the near future. The current week, however, shows no change in prices. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	$15.50 to $16.00
Low phosphorus steel	20.00 to 20.50
No. 1 railroad wrought scrap	17.25 to 17.75
No. 1 railroad and machinery cast scrap	15.50 to 16.00
Steel axles	30.00 to 31.00
Iron axles	26.00 to 27.00
Carwheels	13.00 to 13.50
Railroad malleable	14.00 to 15.50
Machine shop turnings	6.00 to 6.50
Heavy axle turnings	12.00
Clean cast borings	7.25 to 7.75
Iron rails	18.00 to 18.50
Locomotive grate bars	11.50 to 12.00
Stove plate (net ton)	11.00 to 11.50
Wrought pipe	12.00 to 12.50
Bundled sheet scrap	11.50 to 12.00
No. 1 busheling	13.00 to 13.50
No. 2 busheling	11.00 to 11.50
Bundled tin scrap	15.00 to 15.50

British Steel Market

Tin Plate Makers Out of the Market—Steel Famine Acute—Pig Iron Strong

(*By Cable*)

LONDON, ENGLAND, Aug. 16, 1916.

The pig-iron market is strong with forward sales curtailed. Pressure for deliveries is unrelaxed and new business in hematite iron is most difficult. American billets are firm, with 4-in. quoted at $63 to $65 for October to December delivery. Tin plates are strong and makers have withdrawn from the market owing to the steel famine. Tin-plate exports are now subject to licenses and 31s. has been paid. Quotations are as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Welsh ports, 31s., against 29s. to 30s. a week ago.
Steel black sheets, No. 28, export, f.o.b. Liverpool, £20.
Steel ship plates, Scotch, delivered local yard, £13 17s. 6d.
Steel rails, export, f.o.b. works, £10 17s. 6d.
Hematite pig iron, f.o.b. Tees, about 110s.
Sheet bars (Welsh) delivered at works in Swansea Valley, £10 7s. 6d.
Steel bars, export, f.o.b. Clyde, £18.
Ferromanganese (nominal), £35.
Ferrosilicon, 50 per cent, c.i.f., £29.

Pig-Iron Output to Be Increased—Permits for All Exports Required

LONDON, England, Aug. 1, 1916.—Evidences of tightness tend to multiply, while operations are certainly interfered with by hot weather. Labor scarcity is another serious drawback apart from the inadequate supplies of raw material. In consequence of the extreme exigencies arising from an unparalleled situation, while munition requirements must be protected, government control has been tightened further. Export prohibitions and restrictions were extended in various directions, including galvanized sheet iron and black plates, except to allied European countries, Spain and Portugal. As far as can be gathered, permits are now required for practically all exports. Merchant business is utterly paralyzed and the negotiation of new orders presents insuperable difficulties.

The pig-iron market continues strong, although there has been no change in prices in either Cleveland or hematite, an increased output being urgently needed in view of the huge requirements. Deliveries continue on a good scale under strict control, while heavy shipments were made to France. New business is severely handicapped by the fact that producers are already heavily booked. Within the next few weeks the working of additional furnaces should afford relief. The Cyfarthfa furnaces in Wales which have been idle for years are coming into operation on hematite, and the Cwmbran furnace is also working, while several more furnaces of the Workington Steel Company are expected to be in operation in Cumberland within the next few months. Everything capable of being turned on the production of hematite iron is being utilized. The blast-furnace people, however, are not at all willing to lay in stocks of ore at present prices, fearing that it will be left long on the market when the war ends.

Demands for war material being ever on the increase, the mills are hard pressed and handicapped by the lack of skilled labor and more especially by the shortage of semi-finished steel, chiefly due to producers being largely engaged in turning out shell steel and other materials required by the British and French Governments. Under the circumstances, the filling of ordinary requirements is more difficult than ever.

Since the announcement of the prohibition of exports to all destinations, the market for galvanized sheets has been brought almost to a standstill, works almost without exception not quoting for, pending developments as to permits. The rolling mills, moreover, find it hard to get sheet bars and the cost of spelter has risen again considerably.

The tin-plate market has remained depressed, the demand being still absolutely lifeless, with one or two works still taking orders near 28s. per box basis, 20 x 14, in order to keep mills going, although makers generally are merely [illegible]. An upward reaction seems due, owing to the serious outlook as regards steel and labor.

Welsh bars are virtually unobtainable at any price, and the efforts made to secure American material have met with but little success, although fair quantities of other American semi-finished material are being secured, billets now [illegible] quoted at about $62 to $63 c.f., September-October shipment.

Iron and Industrial Stocks

NEW YORK, Aug. 16, 1916.

Contrary to general expectation, values of securities have not only shown strength the past week but in the case of some stocks a decided advancing tendency was manifested. The poor crop report and the apprehension of a general railroad strike appeared to have had less influence on stock values than the announcement of more European war orders. The very favorable showing made by the American Locomotive Company undoubtedly made an impression in causing a realization of the profits now being reaped by manufacturers of munitions. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com..	21¼	23⅞	Ry. Steel Spring, pref	93¾	
Allis-Chal., pref..	74¾	79¼	Republic, com. . .	46¾	49
Am. Can, com	55¼	58¾	Republic, pref	116¼	117¼
Am. Can pref	110¾	112	Sloss, com	14½	16
Am. Car & Fdy., com	58	61½	Pipe, com	19¾	21
Am. Car & Fdy., pref.	115¾	117	Pipe, pref.	53	
Am. Loco., com..	69¾	73¼	U. S. Steel, com	86⅝	89⅛
Am. Loco., pref	104¼	104¾	U. S. Steel, pref	118	118⅝
Am. Steel Fdries	31¾	33¼	Va. I. C. & Coke	16	
Bald. Loco., com.	71½	76¼	Westing. Elec...	57¼	59⅝
Beth. Steel, com	430	470	Am. Brd., com	392	393
Beth. Steel, pref	130	135	Am. Ship, com	17	19
Colo. Fuel	13¾	15¼	Am. Ship, pref..	90	90½
Deere & Co., pref	90½	96	Chic. Pneu. Tool	67¾	68
Gen. Electric....	168¾	170¾	Cambria Steel	82	
Gt. No. Ore Cert.	35	36¾	Lake Sup. Corp	10¼	11
Int. Harv. of N. J com.	114	116	Warwick	94	98¾
Int. Harv. of N. J., pref.	118		Cruc. Steel, com	68½	73¼
Lacka. Steel...	70¾	72⅞	Cruc. Steel, pref.	115¼	116½
Nat. En. & Stm., com	22¾	24	Harb.-Walk. Refrac. com	95	101
N. Y. Air Brake	127½	128½	Harb.-Walk. Refrac. pref	102	104
Pitts. Steel, pref	99	100	La Belle Iron, com	53¼	54
Pressed Stl. com	48¾	51	La Belle Iron, pref	130	132
Pressed Stl., pref		99⅞	Bridge Seabury	94	99
Ry. Steel Spring, com	44	46½	Midvale Steel	61	62¾

Dividends

The International Nickel Company, 6 per cent on the common stock, payable Sept. 1.

The Pratt & Whitney Company, regular quarterly, 1½ per cent on the preferred stock, payable Aug. 15.

The Niles-Bement-Pond Company, regular quarterly, 1½ per cent on the preferred stock, payable Aug. 15, and 2½ per cent (an increase of 1 per cent) on the common stock, payable Sept. 20.

The Harbison-Walker Refractories Company, regular quarterly, 1½ per cent, and extra 2 per cent on the common stock, payable Sept. 1.

The General Electric Company, regular quarterly, 2 per cent, payable Oct. 14.

The Moline Plow Company, regular quarterly, 1¾ per cent on the preferred stock, payable Sept. 1.

The Maxwell Motor Company, initial quarterly, 2½ per cent on the common stock, payable Oct. 2 and 6 per cent on the second preferred, payable in four quarterly installments, and 7 per cent on the first preferred, payable quarterly.

The Gulf States Steel Company, regular quarterly, 1¾ per cent on the first preferred stock, payable Oct. 2, and quarterly of 1½ per cent on the common to be paid Nov. 1.

The Ph. van Ommeren Corporation, New York branch of the old Dutch shipping house of Phillippus van Ommeren, established in Rotterdam nearly a century ago and now doing business in London under the name of Phs. van Ommeren, Ltd., also in Amsterdam and Antwerp, has opened offices at 42 Broadway. The business in this country is in the hands of William H. Scholz, for the past two years attached to the American legation at the Hague as commercial adviser. The company plans to divert some of its steamers now plying between New York and the Far East to a direct New York-Rotterdam route, with a view to increasing the trade between the United States and Holland.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, effective from April 10, 1916, per 100 lb.; New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c.; Pacific coast (by rail only), 65c.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 2.60c. to 2.75c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I beams over 15 in.	10
Heavies over 15 in.	10
Angles over 6 in. on one or both legs	10
Angles, 3 in. or over on both legs less than ¼ in. thick, not rolled from Spl. 1 steel	10
Tees, structural sizes (except elevator, handrail, car truck and conduction rail)	10
Channels and tees under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	10
Handrail tees	10
Cutting to lengths, under 3 ft. to 2 ft. inclusive	25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	50
Cutting to lengths, under 1 ft.	1.75

No charge for cutting to lengths 3 ft. and over.

Plates.—Tank plates, ¼ in. thick, 6 in. up to 100 in. wide, 3c. to 4c., base, net cash, 30 days, or ½ of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras

	Cents per lb.
Tank steel	Base
Flanging steel (not flange steel for locomotive)	.10
Boiler and flange steel plates	.15
"A. B. M. A." and ordinary firebox steel plates	.20
Still bottom steel	.30
Locomotive firebox steel	.50

Marine steel, special extras and prices on application

Gage Extras

Rectangular, ¼ in. thick over 6 in. wide to 20 in. wide	Base
Lighter than ¼ in. to 3/16 in., up to 72 in. wide	.10
*Lighter than ¼ in., including 3/16 in., over 72 in. to 84	.20
*Lighter than ¼ in., including 3/16 in., over 84 in. to 96	.30
*Lighter than ¼ in., including 3/16 in., over 96 in. to 100	.40
*Lighter than ¼ in., including 3/16 in., over 100 in. to 102	.45
Lighter than 3/16 in., including No. 8, up to 72 in. wide	.15
*Lighter than 3/16 in., including No. 8, over 72 in. to 84	.25
*Lighter than 3/16 in., including No. 8, over 84 in. to 96	.35
Lighter than No. 8, including No. 10, over 60 in. to 64	.35
Lighter than No. 8, including No. 10, over 60 in. to 64	.35

Up to 72 in., not less than 10.2 lb. per sq. ft. will be considered ¼ in.

Over 72 in. must be ordered ¼ in. thick on edge or not less than 11 lb. per sq. ft. to take base price.

Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.

Over 72 in., ordered weight 3/16 in., take No. 8 price.

Over 72 in., ordered weight No. 8, take No. 10 price.

Width Extras

Over 100 in. to 110 in. inclusive	.05
Over 110 in. to 115 in. inclusive	.10
Over 115 in. to 120 in. inclusive	.15
Over 120 in. to 125 in., inclusive	.25
Over 125 in. to 130 in. inclusive	.50
Over 130 in.	1.00

Length Extras

Universal plates 80 ft. long up to 90 ft. long	.05
Universal plates 90 ft. long up to 100 ft. long	.10
Universal plates 100 ft. long up to 110 ft. long	.20

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over.

Lengths under 3 ft. to 2 ft. inclusive	.25
Lengths under 2 ft. to 1 ft. inclusive	.50
Lengths under 1 ft.	1.75
Circles 3 ft. in diameter to 100 in.	.50
Circles over 100 to 110 in. (width extra)	.25
Circles over 110 to 115 in. (width extra)	.40
Circles over 115 to 120 in. (width extra)	.45
Circles over 120 to 125 in. (width extra)	.75
Circles over 125 to 130 in. (width extra)	.80
Circles over 130 in. (width extra)	1.20
Circles under 3 ft. to 2 ft. inclusive	.75
Circles under 2 ft. to 1 ft. inclusive	.90
Circles under 1 ft.	1.50
Half circles take circle extras	
Sketches, not over four straight cuts, inc. straight taper	.10
Sketches having more than four straight cuts	.25

Plates sheared to a radius take complete circle extras.

*Including extra for width.

Wire Rods.—Including chain rods, $55 to $60.

Wire Products.—Prices to jobbers effective Aug. 5: Fence wire, Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, $2.55; galvanized, $3.25. Galvanized barb wire and staples, $3.45; painted, $2.75. Wire nails, $2.60. Galvanized nails, 1 in. and longer, $2 advance over base price; shorter than 1 in., $2.50 advance over base price. Cement-coated nails, $2.50. Woven wire fencing, 61½ per cent off list for carloads, 60 off for 1000-rod lots, 59½ off for less than 1000-rod lots.

The following table gives the price per 100 lb. to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

No.	0 to 5	6	7	8	9	10	11	12	12½	13	14	15	16
Annealed	$2.60	$2.65	$2.70	$2.75	$2.80	$2.85	$2.90	$2.95	$3.00	$3.05	$3.10	$3.05	$3.15
Galvanized	3.30	3.35	3.40	3.45	3.50	3.55	3.60	3.65	3.70	3.75	3.80	4.10	4.20

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect on black pipe from April 21, 1916, and on galvanized from July 24, 1916, all full weight pipe:

Butt Weld

Steel Inches	Steel Black	Steel Galv.	Iron Inches	Iron Black	Iron Galv.
⅛ and ¼	62	51½	⅛ to ¼		24
⅜ and ½	67	56½	⅜	2	25
¾	70	59½	½	7	38
			¾ to 1	60	43

Lap Weld

	65	54½	1	48	31
2½ to 6	68	57½	1¼	54	38
7 to 12	67	56½	1½	54	39
13 to 14	60		2 to 3	7	42
15	51		3½ to 4	7	42
			4½ to 6	4	42
			7 to 12	56	41

Reamed and Drifted

1 to 3, butt	68	57½	¾ to 1½, butt	48	37
1½, butt	63	48½	1½, lap	47	25
2 to 6, lap	66	51½	1½, lap	49	32
			2	50	33
			2½ to 4, lap	52	36

Butt Weld, extra strong, plain ends

⅛ and ¼	59	48½	⅛, ¼ and ⅜	52	34
⅜	64	53½	½	57	43
½ to 1½	68	57½	¾ to 1½	61	45
2	69	58½			

Lap Weld, extra strong, plain ends

	63	52½	1	50	33
1½ to 4	66	55½	1¼	53	39
4½ to 6	65	54½	1½	57	42
7 to 8	61	50½	2 to 4	59	45
9 to 12	56	46½	4½ to 6	55	44
			7 to 8	51	38
			9 to 12	47	33

Butt Weld, double extra strong, plain ends

¼	55	43½	½	44	31
½ to 1½	58	46½	¾ to 1½	47	34
2 to 2½	60	48½			

Lap Weld, double extra strong, plain ends

	55	43½	1½	44	30
2 to 4	57	45½	2	44	30
4½ to 6	56	44½	2½ to 4	46	35
7 to 8	51	39½	4½ to 6	45	34

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carload are two points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Sheets.—Makers' prices for mill shipments on sheets of U. S. standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Box Annealed Sheets

	Cents per lb.
Nos. 7 to 8	3.15 to 3.20
Nos. 9 and 10	3.05 to 3.15
Nos. 11 and 12	3.05 to 3.20
Nos. 13 and 14	3.10 to 3.35
Nos. 15 and 16	3.20 to 3.45

Box Annealed Sheets, Cold Rolled

Nos. 17 to 21	3.50 to 3.85
Nos. 22 and 24	3.75 to 4.00
Nos. 25 and 26	3.90 to 4.15
No. 27	4.00 to 4.25
No. 28	4.05 to 4.30
No. 29	4.10 to 4.35
No. 30	4.15 to 4.40

Galvanized Sheets of Black Sheet Gage

Nos. 10 and 11	3.25 to 3.35
No. 12	3.30 to 3.45
Nos. 13 and 14	3.35 to 3.45
Nos. 15 and 16	3.40 to 3.55
Nos. 17 to 21	3.60 to 3.70
No. 22	3.70 to 3.80
Nos. 23 and 24	3.85 to 3.95
No. 25	3.90 to 4.20
No. 26	4.10 to 4.35
No. 27	4.25 to 4.50

Boiler Tubes.—Discounts on less than carloads, freight to destination added, effective from April 15, 1916, are as follows:

Lap Welded Steel		Standard Charcoal Iron	
1 in.	35	1 in.	27
1¼ and 1½ in.	41	1¼ and 1½ in.	39
2¼ in.	44	2 in.	36
2½ and 2¾ in.	50	2½ and 2¾ in.	42
3 and 3½ in.	55	3 and 3½ in.	47
4 to 4½ in.	56	4 and 4½ in.	48
5 in.	49	5 in.	41
6 in.	46	6 in.	38

Locomotive and steamship special charcoal grades bring higher prices.

1¼ in. over 18 ft. and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Metal Markets

The Week's Prices

Cents Per Pound for Spot Delivery.

	Copper, New York Electrolytic	Tin, New York	Lead New York	Lead St. Louis	Spelter New York	Spelter St. Louis
Aug. 10	26.50	38.50				
" 11	26.50	38.50				8.12½
" 12	26.50	38.50				8.12½
" 13	26.50	38.50				
" 14	26.50	38.50				
" 15	26.50	38.50				

NEW YORK, Aug. 16, 1916.

Copper is firmer and more active. Tin is higher and strong. Lead is in better demand. Spelter is decidedly more active and advancing. Antimony, while lower, has a better tone.

New York

Copper.—The market has been filled with rumors of a large foreign demand from various European countries, especially Great Britain, the aggregate running to 250,000,000 lb., or more. Thus far this has been mostly talk, but it has had its influence in making the market firmer. Had any large sales actually been made prices would have advanced. There is no question, however, that foreign inquiry is very brisk and that the tone of the market is much stronger. Domestic inquiry is reported as increasing at a rapid rate, caused partly by the desire of consumers to anticipate any large foreign buying. Some sales are reported for both foreign and domestic account. There seems to be no question that a buying movement of considerable proportions is near at hand if not already started. There is no evidence of any weakness and the general attitude is a waiting one. The London market stood yesterday at £126 against £124 the previous week. Exports this month, including yesterday, were 13,456 tons. A typographical error was made last week in reporting the June exports as imports—an obvious mistake. Spot and August electrolytic was quoted yesterday at 26.50c., cash, New York. Lake is nominal at 26.75c. cash.

Tin.—A fair business has been done and the market is more interesting. Improvement began to manifest itself at the end of week before last. On last Tuesday there was a good demand for Banca tin and a fair quantity was sold, as well as some Straits tin for Eastern shipment. Total sales were 200 to 250 tons. On the next day inquiry was fair but on Thursday it became known that sales of about 225 tons were made the day before. Late Friday a moderate boom started and sales of 200 or more tons were reported. There was very little inquiry on Saturday and sales would have been larger had there been more sellers, but at that 100 to 150 tons changed hands. This week moderate sales have been made, mostly for spot, August and September delivery, and yesterday dullness prevailed with spot Straits tin quoted at 39c., New York. The arrivals this month total 2497 tons, with 3135 tons afloat.

Lead.—The position of lead is stronger, and the price has been advancing daily. There was a spurt in demand early this week, and some good sales have been made. The general tone is firm and active, with inquiry increasing from both foreign and domestic sources. While the independents have been underselling the leading interest, yesterday they were nearly up to the latter's price, and had little to offer for prompt shipment. The New York quotation yesterday was 6c., and St. Louis 5.90c. Exports this month, including yesterday, have been 758 tons, against 429 tons a week ago.

Antimony.—It is believed that the market has reached the bottom and that an upward movement is at hand. While spot metal has sold as low as 9½c., duty paid, in the last week, it is now quoted at 10c., with demand better and some business done with Canada.

Spelter.—One broker reports a more active inquiry in the past two days than at any time in several months. It has represented lots of 250 to 1000 tons, from both foreign and domestic interests, with good sales made. The tone is optimistic, and prices have been advancing. Yesterday, spot at New York was quoted at 9c., and at St. Louis 8.75c. For last quarter, 8.25c. to 8.50c., New York, is asked. Galvanizers are reported as entering the market more actively, and the general demand is much better.

Aluminum.—The market is strong at 50c. to 60c. for No. 1 virgin metal, 98 to 99 per cent pure.

Old Metals.—The market is stronger, except on lead and zinc. Dealers' selling prices are as follows:

	Cents per lb.
Copper, crucible	
Copper, heavy and wire	
Copper, light and bottoms	
Brass, heavy	13.50 to 14
Brass, light	
Heavy machine composition	
No. 1 yellow brass turnings	
No. 1 red brass or composition turnings	14 to 14.50
Lead, heavy	
Lead, tea	
Zinc	

Chicago

AUG. 14.—Greater activity in copper has been accompanied by added strength in the market and higher prices. Tin also has moved up, and for prompt spelter quotations are decidedly firmer and at higher levels. We quote: Casting copper, 25c. to 25.50c.; Lake copper, 26.50c. to 27c.; tin, carloads, 39.50c. to 40c., and small lots, 40.50c.; lead, 5.90c. to 5.95c.; spelter, 8.75c. to 9c.; sheet zinc, 15c.; Cookson's antimony, 50c.; other grades, 12.50c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 18.50c.; copper bottoms, 16.75c.; copper clips, 17.75c.; red brass, 16c.; yellow brass, 12c.; lead pipe, 4.50c.; zinc, 5c.; pewter, No. 1, 27c.; tinfoil, 27.50c.; block tin pipe, 32.50c.

St. Louis

AUG. 14.—Non-ferrous metals have been quiet. Quotations at the close to-day were: Lead, 5.92½c.; spelter, 8.25c.; tin, 41c.; Lake copper, 26c.; electrolytic copper, 25.75c.; antimony, 15c. In the Joplin ore district zinc blende dropped another $5 per ton. The basis range for 60 per cent ore was $45 to $65, with the average for the week $55. Calamine was unchanged, ranging from $35 to $45, with the district average about $36. Lead ore was steady at $65. One remarkable feature of the market is that lead ore and choice zinc blende are now quotable at the same figure. On miscellaneous scrap metals we quote as follows, dealers' buying prices: Light brass, 7.50c.; heavy yellow brass, 10.50c.; heavy red brass and light copper, 14.50c.; heavy copper and copper wire, 17c.; pewter, 25c.; tinfoil, 30c.; zinc, 4.50c.; lead, 5c.; tea lead, 3.50c.

The Tivani Steel Company, Belleville, Ont., Canada, which has been experimenting for some time on an electric smelting process for the direct reduction of refractory ores, is now about to engage on a commercial scale in the manufacture of high-speed molybdenum steel. A three-phase electric furnace is used.

A booklet on fire prevention and protection for the use mainly of its employees has been issued by B. F. Avery & Sons, plow manufacturers, Louisville, Ky. Its 40 pages discuss the causes of fire, the company's fire-fighting facilities and what the employees are supposed to do in the emergency.

Exports of tin from the Federated Malay States in June were 3435 tons, against 3729 tons in May and 4048 tons in June, 1915. For the first half of 1916 they were 21,725 tons, against 23,318 tons to July 1, 1915, and 24,902 tons to July 1, 1914.

The International Sales Corporation, Hearst Building, San Francisco, has taken over the sales end of the Moran Paint & Oil Company, manufacturer of preservative paints and compounds, and is now placing these products in international markets.

United States Pig-Iron Production, First Half 1916

The American Iron and Steel Institute, 61 Broadway, New York, has issued its special statistical bulletin No. 5 (1916), which gives the production of pig iron in this country in the first six months of the current year. The total output of all kinds of pig iron in the period was 19,619,522 gross tons, against 17,682,422 tons in the second half of 1915, and 12,233,791 tons in the first half of 1915. The figures show that the production in the first half of this year was 7,385,731 tons greater than in the corresponding period of last year. The details of the half year's output are as follows, compared with the two halves of 1915:

HALF-YEARLY OUTPUT OF PIG IRON BY STATES.

HALF-YEARLY PRODUCTION OF ALL KINDS OF PIG IRON.

States.	Blast furnaces In blast Dec 31, 1915	Blast furnaces June 30, 1916 In.	Out.	Total.	Production—Gross tons (Includes spiegeleisen, ferro-mang., ferro-silicon, ferro-phosphorus, etc.) First half of 1915.	Second half of 1915	First half of 1916
Massachusetts	0	1	1	2	3,087	4,715	4,700
Connecticut	1	0	3	3			
New York	18	20	7	27	921,566	1,183,214	1,214,037
New Jersey	1	1	4	5			
Pennsylvania	125	132	25	157	5,199,421	7,591,247	8,286,076
Maryland	3	4	1	5	85,673	165,875	243,895
Virginia	7	9	12	21	105,244	146,102	202,777
Georgia	0	0	4	4			
Texas	0	0	2	2			
Alabama	27	31	16	47	868,341	1,181,112	1,366,728
West Virginia	3	4	0	4			
Kentucky	3	4	2	6	79,228	211,812	268,859
Mississippi	0	0	1	1			
Tennessee	6	12	6	18	82,992	94,737	162,009
Ohio	62	67	9	76	2,964,211	3,948,751	4,250,790
Illinois	21	23	1	24	801,951	1,645,269	1,938,152
Indiana	10	10	0	10	854,375	1,132,403	1,073,768
Michigan	11	12	2	14			
Wisconsin	7	6	2	8	130,514	242,452	417,542
Minnesota	2	3	0	3			
Missouri	1	1	1	2			
Colorado	2	4	2	6			
Oregon	0	0	1	1	137,188	134,733	190,189
Washington	0	0	0	0			
California	0	0	0	0			
Total	310	344	102	446	12,233,791	17,682,422	19,619,522

HALF-YEARLY PRODUCTION OF COKE PIG IRON.

New York	18	20	3	23	921,566	1,183,214	1,214,037
New Jersey	1	1	4	5			
Pennsylvania	118	124	15	139	5,155,120	7,547,217	8,205,199
Maryland	3	4	0	4	85,578	165,566	243,895
Virginia	7	9	10	19			
Georgia	0	0	2	2	105,244	146,102	202,777
Texas	0	0	1	1			
Alabama	26	29	14	43	853,445	1,169,054	1,346,460
West Virginia	3	4	0	4			
Kentucky	3	4	1	5	79,228	211,812	268,859
Tennessee	6	11	6	17	82,992	94,737	161,128
Ohio	62	67	8	75	2,964,007	3,948,089	4,250,790
Illinois	21	23	1	24	801,951	1,645,269	1,938,152
Indiana	10	10	0	10			
Michigan	2	3	0	3	851,084	1,182,146	1,150,364
Wisconsin	5	5	1	6			
Minnesota	2	3	0	3			
Missouri	0	0	1	1	161,593	180,294	368,274
Colorado	2	4	2	6			
California	0	0	0	0			
Total	289	321	69	390	12,061,808	17,473,500	19,347,935

ANTHRACITE AND MIXED ANTHRACITE AND COKE PIG IRON.

New York	0	0	3	3	42,487	42,266	79,591
Pennsylvania	4	6	7	13			
Total	4	6	10	16	42,487	42,266	79,591

HALF-YEARLY PRODUCTION OF CHARCOAL PIG IRON.

Massachusetts	0	1	1	2	3,087	4,715	4,700
Connecticut	1	0	3	3			
New York	0	0	1	1			
Pennsylvania	3	2	3	5	1,814	1,764	1,286
Maryland	0	0	1	1	95	309	
Virginia	0	0	2	2			
Alabama	1	2	2	4	14,896	12,058	20,268
Georgia	0	0	2	2			
Texas	0	0	1	1			
Kentucky	0	0	1	1			
Tennessee	0	1	0	1	204	662	881
Mississippi	0	0	1	1			
Ohio	0	0	1	1			
Michigan	9	9	2	11	98,856	118,946	132,637
Wisconsin	2	1	1	2			
Missouri	1	1	0	1			
Oregon	0	0	1	1	10,544	28,202	32,224
Washington	0	0	0	0			
California	0	0	0	0			
Total	17	17	23	40	129,496	166,656	191,996

TOTAL PRODUCTION OF PIG IRON ACCORDING TO FUEL USED.

Coke	289	321	69	390	12,061,808	17,473,500	19,347,935
Anthracite*	4	6	10	16	42,487	42,266	79,591
Charcoal	17	17	23	40	129,496	166,656	191,996
Total	310	344	102	446	12,233,791	17,682,422	19,619,522

* Includes mixed anthracite and coke pig iron

HALF-YEARLY OUTPUT OF PIG IRON BY GRADES.

HALF-YEARLY PRODUCTION OF BASIC PIG IRON.

States	First half of 1915.	Second half of 1915.	First half of 1916.
New York, New Jersey	248,725	507,864	573,244
Pennsylvania—Allegheny County	1,468,844	2,111,503	2,309,777
" Other counties	1,421,826	2,133,191	2,578,396
Virginia, Alabama, Kentucky	315,133	467,879	501,225
Ohio	841,226	1,057,677	1,199,267
Indiana, Illinois	809,005	1,418,439	1,416,246
Michigan, Minn., Missouri, Colorado	154,855	137,047	251,930
Total	5,259,614	7,833,600	8,830,085

HALF-YEARLY PRODUCTION OF BESSEMER AND LOW-PHOSPHORUS.

New York	170,149	187,635	223,456
Pennsylvania	1,749,755	2,598,342	2,566,539
Maryland	73,449	151,930	227,652
West Virginia, Kentucky, Tenn., Ala.	70,214	194,378	236,182
Ohio	1,661,516	2,218,905	2,377,073
Illinois, Wisconsin, Colorado	513,504	933,529	1,208,275
Total	4,238,587	6,284,719	6,839,177

HALF-YEARLY PRODUCTION OF FOUNDRY PIG IRON.

Massachusetts, Connecticut	3,087	4,715	4,700
New York, New Jersey	426,023	369,271	331,651
Pennsylvania	405,199	486,968	559,767
Maryland, Virginia, West Virginia	103,409	135,615	192,454
Kentucky	17,328	8,310	43,151
Tennessee	69,558	71,339	132,264
Alabama	529,159	692,317	824,867
Ohio	300,764	419,606	465,106
Indiana, Illinois	65,960	76,370	91,742
Michigan	164,984	187,948	199,600
Wisconsin	77,482	145,078	165,155
Minnesota, Missouri, Colorado	44,422	59,436	75,953
Total	2,207,375	2,656,973	3,086,410

HALF-YEARLY PRODUCTION OF MALLEABLE PIG IRON.

New York	72,815	104,667	74,298
Pennsylvania	19,593	61,986	58,415
Kentucky, Ohio	102,136	207,250	139,682
Indiana, Illinois, Michigan, Wisconsin	83,968	177,506	188,444
Total	278,512	551,409	460,839

HALF-YEARLY PRODUCTION OF FORGE PIG IRON.

New York, New Jersey	3,438	4,307	6,780
Pennsylvania	62,074	94,388	54,807
Virginia	2,673	9,138	16,103
Tennessee, Kentucky	380	706	1,366
Alabama	16,425	16,716	19,570
Ohio	53,799	52,170	70,680
Total	138,789	177,425	169,306

HALF-YEARLY PRODUCTION OF SPIEGELEISEN AND FERRO-MANGANESE.

N.Y., Pa., Md., Ala., Ill., Colo., Wash., Cal.	90,310	136,647	189,046
Total	90,310	136,647	189,046

HALF-YEARLY PRODUCTION OF OTHER GRADES.

New York, New Jersey	416	4,470	2,108
Pennsylvania	4,766	8,128	8,586
Virginia, West Va., Tennessee, Alabama	9,920	20,556	27,984
Ohio	4,770	5,127	5,006
Indiana, Ill., Mich., Minn., Wis., Wash.	732	3,368	975
Total	20,604	41,649	44,659

PIG IRON MADE FOR SALE OR FOR USE OF MAKERS IN THE FIRST HALF OF 1916.

Grades	For sale	For maker's use	Total. Gross tons.
Basic	1,244,907	7,585,178	8,830,085
Bessemer and low phosphorus	801,592	6,037,585	6,839,177
Foundry, including ferro-silicon	3,057,746	48,764	3,086,410
Malleable	460,839		460,839
Forge or mill	87,595	81,711	169,306
Ferro-manganese	23,510	76,441	99,951
Spiegeleisen	74,886	14,209	89,095
All other grades	29,410	15,249	44,659
Total	5,760,385	13,859,137	19,619,522

STRIKES AND SETTLEMENTS

Conditions at Milwaukee

MILWAUKEE, Aug. 15.—(*By Telegraph.*)—Between 60 and 70 union machinists of the Milwaukee Machine Tool Company were called out this morning, being the first walkout in the machinists' strike in five days. Of the Standard Separator Company's men 45 were called out Aug. 10. The inactivity of the strike leaders is arousing much comment, being taken as an indication of waning interest in the contest. A hurry call has been sent to William H. Johnson, Washington, president Machinists' International Union, to come here, and a mass meeting will be held in the Auditorium to-night to receive him. Serious disorder is absent, but nearly every day arrests are made on charges of assault and battery and disorderly conduct, many of which are dismissed for lack of cause.

The Illinois Fluorspar Strike About Over

CHICAGO, ILL., Aug. 15.—(*By Telegraph.*)—Vigorous action on the part of the townspeople and authorities in dealing with the trouble-makers among the fluorspar miners has paved the way for an early resumption of shipments from the southern Illinois properties. The work of pumping out the mines was begun on Monday of this week, and with the departure of that element which has instigated the strike a speedy restoration of the previous operating conditions is expected.

More New England Trouble

The casting shops of the Waterbury Brass and the Benedict & Burnham branches of the American Brass Company, Waterbury, Conn., were closed Aug. 8 on account of a strike of casters' helpers. They demanded an increase in wages.

About 80 machinists and helpers at the plant of the Maxim Munitions Company, Derby, Conn., have quit work pending the adjustment of differences arising over the discharge of some of the night shift. Both sides claim that there is no strike.

There is renewed activity of the machinists' union in several cities, coincident with visits of national officers of the organization and there are threats of renewed demands for the 8-hr day.

Imports and Exports of Aluminum

Aluminum is the principal non-ferrous metal which still maintains its high war price level, being close to 60c. per pound. Decrease in imports has been an important factor. For the 11 months ended May 31, 1916, imports of crude and scrap aluminum were only 7,551,063 lb. as against 11,978,283 lb. and 14,868,574 lb. for the same periods of 1915 and 1914 respectively. In 1915 the imports were only 8,534,834 lb. as compared with 23,185,775 lb. in 1913.

Exports of aluminum and its manufactures on the contrary have decidedly increased. For the 11 months ended May 31, 1916, they were valued at $5,156,342 as against $2,994,476 and $1,040,686 in 1915 and 1914 respectively.

Personal reminiscences of the late James Mapes Dodge, chairman of the Link-Belt Company, by Charles Piez, president of the company, have been compiled in an attractive booklet. The author tells of the struggles, early failures and final successes of Mr. Dodge, and as the synopsis says "shows us the genial, charming personality of one who did much to shape our present day industrial ideals." One part is devoted to the development of the conveying and coal storage business and the other to Mr. Dodge's part in the Taylor system of management. The illustrations, some of them reproductions of early photographs, are interesting studies.

Hanging Rock furnace, at Ironton, Ohio, operated by Rogers, Brown & Co., blew out Aug. 7 for relining. It is expected to resume activity by Sept. 1.

An Iron Ore Fleet on the Hudson

An interesting development in connection with the movement of ore from the Port Henry district this season is that a number of shipments have been made by rail and water route. The New York & Western canal line has two fleets in this traffic, each consisting of a steam canaler and four consorts. The ore is loaded in the usual way into Delaware & Hudson cars at Witherbee, Sherman & Co's mines at Mineville, N. Y., and the initial rail haul is to Albany. Here the cars are run upon the Albany coal trestle and the ore, which is in drop-bottom cars, is unloaded into chutes from which it drops into the canal boats. These latter take it to Elizabethport, N. J., where it is unloaded into cars of the Central Railroad of New Jersey, going over this route into the Lehigh Valley. The canal boats, which are 98 ft. long, 17 ft. 6 in. beam and 11 ft. depth of hold, carry from 350 to 375 tons and the steamer 225 tons. The trip from Albany to Elizabethport and return requires about five days. About 10,000 tons a month is carried by the two fleets. Later in the season one or two experimental trips may be made from Whitehall, which is at the northern entrance to the new Champlain Canal, and it is possible a testing trip will be made this year from Port Henry to Elizabethport, all by water.

St. Louis Blast Furnace Started

The Mississippi Valley Iron Company, St. Louis, Mo., on Aug. 8, began the operation of its blast furnace. This is the rehabilitated and enlarged stack of the old St. Louis Blast Furnace Company. It is operating on ore from the Mesaba district and its capacity will be for the present about 300 tons of pig iron per day. Basic iron will be the principal product, though spiegeleisen and ferromanganese are being considered in plans for intermittent periods. The company controls about 285 acres of ore land near Waukon, Iowa, with an estimated ore supply of 10,000,000 tons, on which a concentrating plant is being equipped with a capacity of about 1000 tons per day. By the time this plant is in operation the company hopes to have barges, self-propelled, which it is building, ready for water transportation to the furnace which is located on the bank of the Mississippi. The plant at Waukon is under the superintendency of R. W. Erwin and that at St. Louis of Daniel Bontecou, Jr. The officers of the company are: Edward F. Goltra, president; Thomas S. Maffit, vice-president, and Jesse D. Dana, secretary and treasurer. The company is capitalized at $5,000,000.

Germany's Larger Pig-Iron Output

Germany's pig-iron output for June was 1,081,507 metric tons against 1,112,574 tons in May. The daily average in June was 36,050 tons, which is the highest for the war, the rate in May having been 35,890 tons per day. The June output was made up of 176,222 tons of foundry iron, 14,650 tons of Bessemer iron, 706,214 tons of Thomas iron, 167,171 tons of steel-making iron and spiegel and 17,250 tons of forge iron. The total production to July 1, 1916, was 6,497,032 tons against 5,534,333 tons to July 1, 1915. For the six months ended June 30, 1914, the output was 9,287,915 tons.

The Manitoba Steel Foundries, Ltd., McArthur Building, Winnipeg, Canada, states that its new foundry is nearing completion, and that one furnace will probably be in operation Sept. 1. The company will make electric steel, both in the form of castings and ingots for rolling, and when in full operation will have an annual capacity of 8000 to 10,000 tons. A. M. Tirbutt is secretary and treasurer.

The Munning-Loeb Company, Matawan, N. J., manufacturer of electroplating and polishing machinery and supplies, has opened an office in the Madison Terminal Building, 9 South Clinton Street, Chicago. All the business of the Middle West territory will be handled from this point and a stock of material will be carried. F. T. Taylor has charge of the office.

PERSONAL

Walter A. Barrows, Jr., of Brainerd, Minn., has been elected president and general manager of the Thomas Iron Company, Easton, Pa., to succeed Ralph H. Sweetser, whose resignation of several months ago becomes effective Aug. 31. Mr. Barrows has had an extended experience in blast-furnace and iron-mining work. Graduating from Rutgers College, New Brunswick, N. J., in 1886, he was engaged in the next ten years as chemist and pig-iron salesman for the Sharpsville, Claire, Leetonia and Mabel furnaces successively. He then became superintendent of the Hannah furnace of the Mahoning Valley Iron Company at Youngstown, Ohio. Later he had charge of furnaces at Sharpsville, Pa., and at Everett and Saxton, Pa. From 1901 to 1908 he was general manager of the furnaces and iron-ore properties of the Shenango Furnace Company (W. P. Snyder & Co.). Since 1908 he has been engaged in iron-ore exploration and development, consulting work in iron mining and in metallurgical practice.

Charles M. Schwab, chairman, and E. G. Grace, president, of the Bethlehem Steel Corporation, will be guests of honor at the annual meeting of the Chamber of Commerce of Harrisburg, Pa., Oct. 3.

C. K. Cairns, formerly in the sales department of the American Tool Works Company, Cincinnati, Ohio, has been appointed sales manager of the Cincinnati Pulley Machinery Company, Covington, Ky.

W. F. Rockwell has resigned his position as chief industrial engineer of Clinton H. Scovell & Co., Boston, to become assistant general manager in charge of manufacturing with the Torbensen Gear & Axle Company, Cleveland. As a consulting engineer, Mr. Rockwell has established a reputation in this country and Canada for efficiency work in manufacturing and power plants. He is also well known as a contributor to the technical press.

Charles R. Putnam, superintendent of the Waukegan plant of the American Steel & Wire Company, was seriously injured and his wife instantly killed as the result of their automobile being struck by an interurban car.

John I. Mange has been elected vice-president of the J. G. White Management Corporation, New York City. He has been associated with the corporation since 1912. Born in Pembroke, Maine, in 1876, Mr. Mange attended the public schools there and in Kingston, Mass., and was graduated in 1899 from Tufts College, with the degree of bachelor of science. He has been connected at various times with electric, electric light and other companies as chief electrician, electrical engineer or general manager.

The Merritt Mfg. Company, Lockport, N. Y., has elected the following officers: L. G. Merritt, president; H. M. Merritt, secretary; S. N. Neubecker, superintendent; A. R. Armer, draftsman; R. G. Morgan, sales manager.

Alfred J. Brooks, for years a draftsman at the old Roach shipyard, Chester, Pa., has been made superintendent of the Morse Shipbuilding Corporation, Noank, Conn.

E. W. Richey has been appointed assistant to President George E. Van Hagen of the Standard Forgings Company, Chicago.

A. C. Garrison, president; A. L. Johnson, vice-president and general manager; W. H. Kennedy, vice-president and treasurer; R. McCarty, secretary, and A. E. Lindau, manager of sales, are the officers of the Corrugated Bar Company, Mutual Life Building, Buffalo, under a reorganization which is effective Sept. 1.

Sydney S. Mowat is secretary to Vice-president and General Manager Ward B. Perley of the Canadian Steel Corporation, Ltd., at Ojibway, Ontario. It was incorrectly stated in a recent paragraph in this column that Raymond McLaughlin had gone from Youngstown, Ohio, to Ojibway to fill this position. Mr. McLaughlin is secretary at Ojibway to I. Lamont Hughes, general superintendent.

Carpenter Steel Company's New Officers

Robert E. Jennings, for 12 years president of the Carpenter Steel Company, Reading, Pa., has resigned his position in pursuance of his desire to retire from all industrial activities. For many years he was well known in the steel industry as the founder and active head of the Spaulding & Jennings Company, Jersey City, N. J. Upon its purchase by the Crucible Steel Company of America, Mr. Jennings became for a time vice-president of that company. Since his connection with the Carpenter Steel Company the production of alloy steels in the United States has had a phenomenal development. With this development Mr. Jennings has been closely identified, his company being among the leaders in the manufacture of this class of material. He will remain a director of the Carpenter Steel Company, but with his retirement as president the company announces the election of the following officers:

W. B. Kunhardt, president; F. A. Bigelow, vice-president and general sales manager; J. H. Parker, vice-president and metallurgist; J. S. Pendleton, treasurer; W. D. O'Gorman, secretary. Mr. Kunhardt, the new president, has long filled the position of treasurer of the company but has taken an active part in its management.

New England Foundrymen at Pomham Club

The annual midsummer outing of the New England Foundrymen's Association took place Aug. 9 at the Pomham Club on the shore of Narragansett Bay, R. I. Members and guests to the number of 120 participated in the entertainment provided. The Providence members were the hosts, and the committee of arrangements consisted of Henry A. Carpenter, William A. Viall and A. J. Miller. A program speckled with humorous drawings set forth the troubles of the committee in the selection of sports and recited that the Roman Circensian games first selected were abandoned because of their immoral and brutal character and the suggested Clan-Na-Gael games of Scotland had to be given up because the appropriation was not large enough to permit of sufficient liquid stimulation for such performances. At a short business meeting three new members were added to the membership roll. During the dinner an orchestra, a quartet and an impromptu contest between a professional and several amateur entertainers enlivened the waits between courses.

Ingot Molds Lined with Steel

Lining ingot molds with steel is the suggestion offered by Harry E. Sheldon of Pittsburgh in a patent (U. S. 1,185,252—May 30, 1916). He claims to prolong the life of the mold and to insure a steel uncontaminated by impurities from the cast iron of the mold. The steel inner surface of the mold is recommended to be of the same carbon content as that of the molten steel to be cast in it. Details of the formation of the molds are given in the patent.

The H. H. Franklin Mfg. Company, Syracuse, N. Y., has placed a further order for a battery of 12 Gehnrich indirect heated radiator type ovens with the Gehnrich Indirect Heat Oven Company, 60-62 Franklin Avenue, Brooklyn, N. Y. This order duplicates the Gehnrich ovens installed in the same plant a year ago.

Jefferson furnace, at Oak Hill, Ohio, owned by the Jefferson Iron Company, blew in Aug. 9, making charcoal pig iron. This is one of the oldest furnaces in Ohio, having begun operations in 1853, but it has been idle in recent years. Its capacity is 12 tons a day.

The Kelly & Jones Company, Greensburg, Pa., manufacturer of cast-iron, malleable, brass and steel valves, fittings, cocks, etc., poured the first castings in its new steel foundry on July 22.

Pittsburgh and Nearby Districts

John O. Pew, president Youngstown Iron & Steel Company, after going over the steel works of the corporation at Lowellville, Ohio, with the insurance adjusters, states that the loss from the fire on the night of Aug. 11 will not be more than $8,000 to $9,000. The greatest damage was done to electric wiring and accessories, which compelled the management to close down the rolling-mill department for the first part of this week. The steel-making department continued in operation, not being damaged in the least. The board of directors of the company has organized by the election of the following officers: President and general manager, John O. Pew; first vice-president, Henry W. Heedy; second vice-president and secretary, C. A. Cochran.

Employees of the Youngstown Sheet & Tube Company, Youngstown, Ohio, will hold their annual outing at Southern Park Sept. 4, Labor Day. J. M. Woltz, safety director, is chairman of the arrangement committee. There will be band concerts, native folk dancing by Servian, Hungarian, Roumanian and Austrian teams, prizes for various games, etc.

The offices of the Garland Nut & Rivet Company have been removed from Pittsburgh to West Pittsburgh, Lawrence County, Pa.

The American Steel Foundries will build two new open-hearth furnaces at its works at Sharon, Pa., which will nearly double the output of steel ingots. Work on the first furnace will be started within 30 days and on the second soon after. The plant is now turning out steel ingots almost exclusively. These are to be converted into shells for the Allies. Improvements are also to be made at the Franklin plant.

The American Brake Shoe & Foundry Company has awarded contract to the Austin Company, Cleveland, for a one-story building, 75 x 800 ft., to be erected at Twelfth and Payne Streets, Erie, Pa., at a cost of about $80,000.

A check for $500 for the endowment fund of the National McKinley Birthplace Memorial Association has been received by President J. G. Butler, Jr., Youngstown, from the John A. Roebling's Sons Company, Trenton, N. J.

Cost System for Manufacturers

The Federal Trade Commission, Washington, D. C., has issued, for general distribution, a pamphlet of 31 pages entitled "Fundamentals of a Cost System for Manufacturers," which sets forth a system by which costs of manufacture can be determined. This is intended for the use of manufacturers, particularly the smaller ones, who have no adequate system for determining the cost of their products, and who, therefore, price them arbitrarily. An introductory note by Edward N. Hurley, chairman of the commission, states that it is evident that there must be improvement in this direction before competition can be placed upon a sound economic basis.

The Roanoke Steel Company, Inc., Roanoke, Va., has been organized to succeed the Louks Iron & Steel Company. After a few minor repairs have been made, the plant will be ready for operation, probably within the coming week. The company will specialize on high grade merchant iron bars and rerolled rails. The equipment consists of 30 double puddling furnaces, a 20-in. muck bar mill, one 18-in. and one 12-in. finishing mill, one rerolling rail mill and a machine shop. John Robinson is president and general manager, and W. L. Jack is secretary-treasurer.

A tin-concentrating and smelting plant for the An-Yuan mines in Hunan Province, southern China, is shortly to be placed in commission by the Wah Chang Mining & Smelting Company, Ltd., which will offer the product for sale in New York (offices in the Woolworth Building) and through agencies in Europe. These mines are in the Ichanghsien district and contain both oxide and sulphide ores.

OBITUARY

RALPH D. WILLIAMS, editor of the *Marine Review*, Cleveland, from 1900 to 1910, died Aug. 14, aged 48 years. He was born at Nottingham, Eng., and when he was about 10 years old his family removed to Cleveland. He was successively reporter on the Cleveland *Plain Dealer*, city editor, managing editor and Washington correspondent, resigning in 1900 to become editor of the *Marine Review*. Ill health compelled his retirement in June 1914. He was an authority on statistics and history of the Great Lakes trade, and much of this information he embodied in a biographical book, "The Honorable Peter White," published in 1907, a real contribution to the history of the Lake Superior iron ore region.

GEORGE M. NASH died July 28 at Newton, Mass., aged 62 years. He was born in Abington, Mass., and was graduated from Harvard College in 1877. For a few years he taught school in Cleveland, and, returning to Massachusetts, he engaged in business with the Lamb & Ritchie Company, Cambridgeport, Mass. Two years ago, with one of his partners, he established the Lamb & Nash Company, for the manufacture of sheet metal machinery and sheet metal goods. He leaves his widow, three sons and one daughter. One of his sons, Russell K., was engaged in business with his father.

Another Large Elevator for Buffalo

Buffalo's grain-handling facilities are to be increased by the construction of a new 2,500,000-bu. elevator, with three legs for vessel unloading and fast shipping legs for railroad cars and canal boats. It will be located on the Buffalo River, adjacent to the grain terminal yards of the New York Central Railroad, and adjoining the present 2,000,000-bu. elevator of the Eastern Grain, Mill & Elevator Corporation. It will be built by the Central Elevator Corporation, a recently incorporated auxiliary of the Eastern Grain, Mill & Elevator Corporation, of which Nisbet Grammer is president, and will be operated in connection with the elevator of the latter company, giving a total grain storage capacity of 4,500,000 bu., an unloading capacity of more than 1,000,000 bu. a day and a railroad and canal loading capacity of equal amount. Contract for the construction has been let to the Monarch Engineering Company, Buffalo. The entire elevator is expected to be ready for use in August, 1917, when the heavy fall movement of grain usually begins.

Structural Business in July

The records of the Bridge Builders' and Structural Society, as collected by its secretary, George E. Gifford, 50 Church Street, New York, show that in July 47½ per cent of the entire capacity of the bridge and structural shops of the country was put under contract. This indicates that about 82 000 tons of fabricated steel work was awarded in July against about 100,000 tons in June, which month, incidentally, was the leanest in new fabricated projects since February, 1915.

The August number of the *Modern Hospital*, published at St. Louis, is devoted to a symposium on welfare work among the industrial corporations of the country, including papers written by welfare directors in some of the most important industrial corporations. Among the topics discussed are first aid, industrial nursing, lunches and diets for industrial employees, safety devices in factories, and athletic and social clubs for employees. Dr. Thomas Darlington, in charge of welfare work of the American Iron and Steel Institute, discusses the present scope of such work in the iron and steel industries.

The Chamber of Commerce of Frankfort, Ky., will shortly undertake an industrial survey and will then begin a campaign for new manufacturing establishments.

Machinery Markets and News of the Works

BRISK BUYING CONTINUES

Slight Improvement in Deliveries a Help

Many Small Lots of Standard Tools Bought—Rebuilt Lathes Readily Sold—Canada Spends a Million a Day for Munitions

The aggregate of purchases of machine tools is maintained at its recent high level by the closing of orders for additional equipment needed to handle the new shell orders, as well as by a uniformly strong demand for a few standard tools from all classes of shops the country over. A slight improvement in deliveries has been of assistance in keeping up the demand from the general industrial field.

For handling its contract for 9.2-in. shells the American Brake Shoe & Foundry Company has ordered a lot of large engine lathes, and has taken a number of small turret lathes for making nose pieces and base plugs. Inquiries before the trade include machines for manufacturing shells of from 6 in. to 12 in. caliber.

Large appropriations are also being used in adding to the United States arsenals, notably at Watervliet, N. Y., where $680,000 is being spent to increase the machine shops.

Factory expansion everywhere is, however, the backbone of the machine-tool trade. Each day adds to the list of expanding manufacturers, whose plants are growing apace.

In Michigan automobile makers continue to consolidate and expand their factories by additions that follow in many cases one right after the other. The Fisher Body Corporation of Detroit has been formed to take over the Fisher Body Company and allied interests with an initial estimated capital of $10,000,000. In the East the Emerson Motors Company has let contracts for the first of ten units of a plant to be erected at Long Island City, N. Y., at a cost of about $2,500,000; and the Edward G. Budd Mfg. Company of Philadelphia has arranged to add three more buildings to its automobile body works.

The recently-organized Moore Steam Turbine Corporation of Wellsville, N. Y., is placing orders for machine-tool and power-plant needs amounting to close to $35,000.

The Canadian war account now amounts to about $1,000,000 a day, and may continue indefinitely. Business flourishes nevertheless in the Dominion, new operations running to large figures appearing nearly every week.

New York

NEW YORK, Aug. 16, 1916.

Orders for large engine lathes have been placed by the American Brake Shoe & Foundry Company for the execution of its contract for 9.2-in. shells. The company also bought a number of small turret lathes for making nose pieces and base plugs. A tentative inquiry before the trade calls for machines for turning out 12-in. shells, and other business of the same character is pending. Altogether, the amount of business brought out by the recent orders for 6 to 12-in. shells has reached large proportions, but its aggregate is difficult to gage for the reason that all concerned seem adverse to publicity.

Russian buyers, including the Russo-Baltic Car Works, 1 Madison Avenue, New York, have been eagerly contracting of late for machine tools which can be delivered before October 15. A ship scheduled to sail on that date is the last which, it is believed, can reach Archangel, Russia, before that harbor is closed by ice for the season.

From the general industrial field there is a good steady demand, which is helped by a slight improvement in deliveries, although standard machines are still a considerable distance off in many caes, and there is frequent mention of sales being lost because tools cannot be delivered when wanted.

The General Electric Company has been a liberal buyer for its various plants.

The Emerson Motors Company has awarded contract for a factory to be completed within four months at an estimated cost of $250,000. It is to be located at Orton Street and Borden Avenue, Long Island City, N. Y., and will cover two blocks. The building is to be the first unit, and is planned to produce 100 motor cars per day. At the same time additional space has been provided adjoining this first building for ten similar units to produce when, completed 1000 automobiles every 24 hr. The total final cost of the 10 units, it is stated, will be $2,500,000.

Important additions will be made to the Government Arsenal at Watervliet, N. Y., including additions to the machine shop and the installation of new machine tools for which a total appropriation of $680,000 has been made. A grant has been made also for the construction of an assembly shop and powder plant for the arsenal at Dover, N. J.

The General Optical Company, 538 First Avenue, New York, has purchased the plant of the Max Ams, Inc., Mount Vernon, N. Y., which was vacated by that company when it removed to its new plant in Bridgeport. The purchaser will make extensive alterations, expending about $50,000, and will remove its plants at New York and Toledo, Ohio, to this plant. About 500 employees will be engaged.

The city commissioners, Bayonne, N. J., are working on a plant for the city to join in partnership with the Bush Terminal Company, 100 Broad Street, New York, in the carrying out of a plan to construct steamship and rail terminals covering a site of about 126 acres on New York Bay; but before any definite action is taken the citizens will express their opinion at a referendum election.

The Empire Axle Company, maker of worm drive axles, Dunkirk, N. Y., has purchased 3½ acres at Buffalo on Lamphere Street, adjoining the Nickel Plate, Pennsylvania, New York Central and Buffalo & Lake Erie Traction Company lines. It has let contracts for a building, 80 x 100 ft., for assembling and machining worm-drive axles, etc., with leanto for furnaces. O. F. Baker is president.

The Standard Aero Corporation, Plainfield, N. J., has awarded contract to the Anchor Corrugating Construction Company, 140 Washington Street, New York, for a one-story machine shop, 65 x 160 ft.

Due to increasing demand the Binghamton Light, Heat & Power Company has recently purchased about 20 acres, bordering the Susquehanna River near Johnson City, N. Y., adjacent to the Lackawanna Railroad, upon which it will erect a new power plant, 60 x 80 ft., of brick. It will be equipped with machinery capable of supplying the needs of the City of Binghamton. The initial capacity will be 7500 hp., with provision for greater capacty, as requirements may demand. W. S. Barstow & Co., Inc., 50 Pine Street, New York, is the contractor. The equipment has been purchased.

The Samuel L. Moore Sons Corporation, Elizabeth, N. J., has had plans completed for carpenter shop, powerhouse and office building, 50 x 75 ft., two stories, and 60 x 140 ft., one story. The architect and engineer, the Ring, Cleaves, Graham Company, 280 North Broad Street, Elizabeth, is about to take bids.

The Hunter Car Sign Company, Flushing, N. Y., has let contract for the construction of a one-story addition 85 ft. square to cost about $10,000.

The Cataract Refining & Mfg. Company, Marine National Bank Building, Buffalo, N. Y., has awarded contract for a one-story cooper shop, 32 x 70 ft., to cost about $3,500.

The Carborundum Company, Niagara Falls, N. Y., has awarded contract to the Turner Construction Company, 11 Broadway, New York, for the erection of a grading and crushing building, four stories, 54 x 166 ft.

The F. J. Rooney Lamp Company, Fourteenth Street and Willow Avenue, Hoboken, N. J., has let contract for a three-story frame addition, 30 x 70 ft., estimated to cost $10,000.

The Driver-Harris Wire Company, Middlesex Street, Harrison, N. J., has awarded contract for the construction of an annealing house to cost $5,000. The F. A. Ogden Company, Newark, N. J., is the engineer.

The Schaeffer & Budenberg Mfg. Company, Berry and South Fifth streets, Brooklyn, N. Y., is in the market for a Pratt & Whitney No. 1 two-spindle gun barrel drilling machine.

The Jay Street Terminal, 71 Water Street, New York, is seeking a 45-ton electric trolley locomotive.

Claudius Ash Sons & Co., 1 Union Square, New York, makers of dental supplies, have let contract to the William H. Connolly Company, 295 Twelfth Street, Newark, N. J., for the erection of a one-story factory at a reported cost of $85,000.

The American Concrete Steel Company, Essex Building, Newark, N. J., has been awarded contract by Thomas A. Edison, Inc., West Orange, N. J., for the construction of a two-story and basement factory, 56 x 220 ft., to cost about $75,000.

The LeRoy Salt Company, Leroy, N. Y., is having plans prepared for a one-story engine room, 32 x 65 ft., to cost about $8,000.

The Carle Motor Parts Company, Buffalo, N. Y., has filed incorporation papers to manufacture motors and engines for automobiles and motor trucks. Harold Carle, 652 Humboldt Parkway; Arthur L. Dixon, and Joseph F. Mehr, all of Buffalo, are the incorporators.

The Multi-Machine Company, Buffalo, capitalized at $500,000, has been incorporated to manufacture special tools, machines, engines, boilers, and supplies. A. E. Davenport, H. J. Ernst, 1056 Elliott Street, and W. E. Goebel are the incorporators.

Incorporation papers have been filed by the Syracuse Forging & Machine Works, Syracuse, H. F. Butler, F. M. Hennesey and C. H. Goebel, Syracuse, directors, to do a forging and foundry business. The company is capitalized at $550,000.

The Standard Furniture Company, Herkimer, N. Y., has let contract for erection of a powerhouse, 50 ft. square, one story.

S. Lichtman, Buffalo, has purchased the building formerly occupied by the Niagara Machine & Tool Company at Superior and Randall streets, 55 x 135 ft., four stories, and will remodel and equip it for handling scrap metals.

The Magnus Beck Brewing Company, Buffalo, has let contract for a cooperage plant adjoining its brewery on North Division Street.

The Peerless Husker Company, 82 The Terrace, Buffalo, has purchased the factory of the Lunan Metal Enamelling Company at Cornwall Avenue and the Erie Railroad, and will equip it for the manufacture of corn-huskers and other farm implements.

New England

BOSTON, MASS., Aug. 14, 1916.

While no diminution in production is yet apparent, many machine-tool builders are reporting a decided slackening in orders. Some plants are filled with orders which will keep them busy for many months; but foundries are reporting that they are in receipt of instructions not to rush orders which they have in hand for machine-tool castings. Several machine shops are beginning to let some of their least competent help go and it is believed that in another month or two this action will become quite general.

Two weeks of embargo on incoming freight on the New Haven Lines has caused some bother, but this condition was relieved when freight was again moved on Aug. 11. An embargo on export goods for New York harbor points is in force except where steamer space has been engaged.

The Philbrick-Booth Foundry Company, Hartford, Conn., has filed a certificate of organization with authorized capital of $15,000. The directors are Halsey R. Philbrook, Hartford, president; H. R. Philbrook, Hartford, secretary and treasurer; Thomas T. Booth, Worcester, Mass., vice-president; and F. T. Williams, Worcester. The company is building a foundry on Homestead Avenue, Hartford.

The American Brass Company, Waterbury, Conn., has been granted permits for the erection of four buildings on Crane and Freight streets: 111 x 203 ft., 22 x 57 ft., 105 x 140 ft. and 35 x 37 ft.

Appropriations have been granted for the erection of new buildings at the Government Arsenal, Watertown, Mass., as follows: Gun carriage manufacturing building to cost $40,000; proof house, to cost $21,000, and power plant to cost $12,000.

The Progressive Tool Equipment Company, New Haven, Conn., has been incorporated with capital stock of $50,000 to do a general machine shop and manufacturing business. The corporators are Knut L. Bergren, New Haven; Robert H. Chirgwin, Shelton, and Harry B. Thomson, New Haven.

The Bantam Anti-Friction Company, Bantam, Conn., has awarded the contract for an addition, 50 x 100 ft., three stories.

The Southington Hardware Company, Southington, Conn., has awarded contract for the erection of two one-story additions, 50 x 241 ft. and 50 x 241 ft.

Work has been started on an addition, 25 x 101 ft., to the plant of the American Pin Company, Waterville, Conn.

The Metal Specialty Company, Waterbury, Conn., has placed a contract for a building, 98 x 170 ft., one story, to be erected on East Aurora Street.

The American Graphophone Company, Bridgeport, Conn., has begun the erection on Somerfield Avenue of a power-house, 50 x 57 ft., with an ell, 15 x 50 ft.

The American Chain Company, Bridgeport, Conn., has awarded a contract for an addition to its plant on Connecticut Avenue.

The American Brass Company has awarded a contract for an addition, 60 x 300 ft., one story, to its Ansonia Brass & Copper Company plant at Ansonia, Conn.

The Advance Machine Company, Boston, Mass., has been incorporated with capital stock of $150,000 to manufacture type and die-embossing machines. The directors are William E. Choate, president; Frederick Somes, 31 Ames Street, Cambridge, treasurer; and J. W. Morton.

Philadelphia

PHILADELPHIA, PA., Aug. 14, 1916.

The Edward G. Budd Mfg. Company, manufacturer of sheet-metal shapes, automobile bodies, etc., Twenty-fifth Street and Hunting Park Avenue, Philadelphia, has purchased a site at Wissahickon and Hunting Park avenues, 600 x 700 ft., and is having plans drawn for the erection of brick and reinforced-concrete buildings; 75 x 300 ft., five stories; 125 x 150 ft., one story and 50 x 200 ft., one story. Ballanger & Perrot, 1701 Arch Street, Philadelphia, are the architects.

The recent report that the Chrestadt Machine Works, owned by Charles Bond, 520 Arch Street, Philadelphia, is to be enlarged, is untrue. The company states that it does not contemplate any changes, although the plant is fairly busy.

The McCaa Radio Company, Lancaster, Pa., is now perfecting a manufacturing organization which will establish a plant there for the manufacture of wireless telegraph apparatus. D. G. McCaa is in charge.

The Pottstown Machine Company, Pottstown, Pa., manufacturer of special automatic machinery for tapping and threading pipe fittings, is erecting an office building, 36 x 40 ft. The company has built 195 heavy-duty lathes for an Eddystone manufacturer, under, and is building six for another company, all weighing about 9000 lb. each. Recent orders for its tapping machines includes one for Scotland.

The Champion Blower & Forge Company, Lancaster, Pa., manufacturer of blowing, thread-cutting, forging and other machinery, has acquired several acres adjoining its plant and plans to erect an addition. H. P. Keiper is president.

The Allen Street Sweeper & Auto Company, Allentown, Pa., will open a plant this month for the manufacture of motor trucks and street-cleaning machines, the latter employing a vacuum device. Howard S. F. Barner, 1421 Munroe Street, Allentown, general manager, was connected for 12 years with the Mack Brothers motor car manufacturing business at Allentown.

The Parker Brass Company, Strasburg, Pa., advises that it will not rebuild its three-story brass shop, recently destroyed by fire Aug. 1 with a loss of about $50,000, inasmuch as the lessee, the Cameron Engineering Company, has removed to another location.

The Pennsylvania Equipment Company, 1500 Chestnut Building, Philadelphia, is in the market for a 15-ton standard gage locomotive crane, with 40-ft. boom, preferably 8 wheels.

With $75,000 capital stock John Roach & Co., Inc., Bridgeport, Pa., has been incorporated to conduct a general foundry and iron and steel manufacturing business. The incorporators are Joseph H. Roach, Brookline; B. F. Evans and J. C. Laird, Norristown, and B. C. Trimble, Philadelphia.

The new buildings of the Consolidated Chemical Co., Hook, Pa., are nearing completion. It will install the

they are in operation the output of the company will be increased about 25 per cent.

The Common Council, Reading, Pa., authorized Aug. 11 the vacating of four streets to provide a tract of land for the International Money Machine Company, Terre Haute, Ind., which will move its plant to Reading. All of the proposed factory buildings will be one story, requiring a large site.

The Vacuum Oil Company, 61 Broadway, New York, is taking bids for a one-story powerhouse, 100 x 115 ft., to be erected at Paulsboro, N. J.

The Reading Steel Casting Company, Reading, Pa., is reported to be taking bids through its engineers, William H. Dechant & Son, Reading, for a one-story foundry addition, 60 x 220 ft.

The Electric Storage Battery Company, Philadelphia, has awarded contract for a one and two-story manufacturing building, 100 x 220 ft., to cost $45,000.

The Easton Machinery Company, Drake Building, Easton, Pa., is in the market for high-pressure water-tube or horizontal return-tubular boilers.

The Keystone Equipment Company, Philadelphia, has been incorporated with a capital stock of $5,000 by Augustus C. Buzby, Harold A. Buzby, Warren F. Buzby, Morgan R. Shafer and Victor F. Shafer, to manufacture machinery, specialties and lubricating devices.

The Luster-Jordan Company, Philadelphia, has been incorporated with a capital stock of $25,000 by Fred J. Lynch, Jr., Mongolia, Pa.; William E. Blair, Philadelphia, and Fletcher W. Stitler, Nazareth, Pa., to manufacture machinery, tools and appliances. C. H. Stoer, 4615 North Broad Street, Philadelphia, is treasurer.

The Pennsylvania Gage & Tool Company, Bellevue Court Building, Philadelphia, has been incorporated with a capital stock of $10,000 by Max A. Sherrett, James S. Aber and C. H. Stoer, 4615 North Broad Street, to manufacture tools, machinery and appliances.

The Mifflin Chemical Corporation, Philadelphia, has been incorporated with a capital stock of $100,000 by David Berg, 1715 Jefferson Street, Philadelphia, and others, to manufacture chemicals.

The Elgin Sales & Service Company, Philadelphia, has been incorporated with a capital stock of $30,000 by William Folwell Yerkes, Jenkintown, Pa., L. Peters Merritt and Samuel Webb, Forty-sixth and Walnut streets, Philadelphia, to operate a garage and repair shop.

The Herbert Cook Company, Philadelphia, has been incorporated with a capital stock of $10,000 by William P. Herbert, Bala, and Ralph W. Cook, Hamilton Court, Philadelphia, and Nathan G. Herbert, Somerton, Pa., to manufacture automobile accessories.

The Rishel Phonograph Company, Williamsport, Pa., has been incorporated with a capital stock of $10,000 by John K. Rishel, Ralph T. Smith, Benjamin H. Hamner, and the J. K. Rishel Furniture Company, Williamsport, Pa., to manufacture musical instruments.

The Bloch Go-Cart Company, Philadelphia, has been incorporated with a capital stock of $5,000, by Lester M. Bloch, 1633 North Thirty-third Street; Gustav L. Bloch, Glenside, Pa., and Augustus R. Lamplugh, 5113 North Thirty-third Street, to manufacture go-carts and other small vehicles.

The Lanz Jewelry Company, Norristown, Pa., capital stock of $40,000, has been incorporated by Elizabeth Lanz, 725 W. Marshall Street, Norristown, Pa.; Gustav Lanz, 638 Stanbridge Street, Norristown, and Ralph L. Lanz, 131 Stanbridge Street, Norristown, to manufacture jewelry.

The Mee-Tu Tire & Rubber Company, Chester, Pa., capital stock of $5,000, has been incorporated by Thomas G. Meeley, 5000 Pine St., Philadelphia; George G. Meeley, 5000 Pine Street, Philadelphia, and Lester W. Weaver, 5447 Lansdowne Avenue, Philadelphia, to deal in junk.

Indianapolis

INDIANAPOLIS, IND., Aug. 14, 1916.

The Teetor-Hartley Motor Car Company, Hagerstown, Ind., is building an addition of brick and steel, 32 x 135 ft., adding about 8640 sq. ft. of floor space, which it plans to have completed about Oct. 1, at a cost of $12,000. It will install machinery to cost $10,000, and will add 50 more employees. It plans to double its output of motors, producing about 20 per day. John H. Teetor is president.

The West Liberty Milk Condensing Company, Goshen, Ind., has been incorporated with a capital stock of $50,000. It plans to start the construction of a factory about Sept. 1, and desires to get in touch with manufacturers of building materials, machinery, etc. Edward W. Neidig is manager.

The Indiana Tank & Boiler Works, Indianapolis, Ind., has taken over the business of the National Boiler & Sheet Iron Works. J. E. Bossingham is manager of the new company.

The Metzger & Wright Machine Shop, Lafayette, Ind., will remove from its present location to a building on South Third Street, which will be remodeled and in which new machinery will be installed.

The Ross Machine Company, Lafayette, Ind., will erect a factory building.

The Universal Tool & Die Company, Indianapolis, Ind., has been incorporated with a capital of $10,000 by Charles J. McHugh, Edward W. Hohlt and Durward Rivers. It will manufacture castings, machinery and dies.

The Nordyke & Marmon Company, Morris Street and Kentucky Avenue, Indianapolis, Ind., has taken out a permit for an addition to its plant, 225 x 600 ft., one story, to cost about $30,000. It has completed two other buildings, 200 x 400 ft. and 100 x 200 ft.

The Haynes Automobile Company, Kokomo, Ind., has increased its capital stock from $1,400,000 to $4,000,000.

The Globe Accessories Company, Greensburg, Ind., has been incorporated with $100,000 capital stock to manufacture household specialties, and auto accessories. The directors are J. W. Judkins, R. E. Edwards and L. W. Gillespie.

The Harold King Wrench Company, Indianapolis, has been incorporated with $50,000 capital stock to manufacture wrenches and other tools. Harold King, H. King and M. King are the directors.

The Meadows-Jones Mfg. Company, Indianapolis, has been incorporated with $50,000 capital stock to manufacture floor clamps. The directors are Harvey M. Meadows, J. H. Jones and Wm. H. Simmons.

The Terre Haute Paper Company, Terre Haute, Ind., will build an additional plant, to cost $300,000. Edward B. Weston, Dayton, is president.

The Indianapolis Drop Forging Company, Indianapolis, has increased its common stock from $95,000 to $160,000 and preferred stock from $160,000 to $210,000.

The Frankfort Handle Mfg. Company, Frankfort, Ind., has filed preliminary articles of dissolution.

The Wabash Basket Company, Wabash, Ind., has been incorporated with $50,000 capital stock to manufacture baskets and other ware. The directors are W. B., Isadore E. and Abraham Loewenberg.

The American Public Utilities Company will make improvements to the plant of the Danville Heat, Light & Power Company, Danville, Ind., which it recently purchased.

The Michigan City Ice & Cold Storage Company, Michigan City, Ind., has increased its capital stock from $150,000 to $200,000.

The Gas Oil Company of Hammond, Ind., has been incorporated with $25,000 capital stock to manufacture drip oil holders, etc. The directors are Edward G. Pratt, W. D. Patton and H. M. Curtis.

The American Wood Register Company, Plymouth, Ind., has been incorporated with $10,000 capital stock to manufacture novelties and specialties. The directors are J. C. M. Keith, Chas. J. Scott and C. B. Hallooday.

Chicago

CHICAGO, ILL., Aug. 14, 1916.

The Western Electric Company, Hawthorne, Ill., will erect a one-story factory addition, 75 x 168 ft. The company's engineer and superintendent of construction, C. Barnes, is taking bids.

Wheaton, Ill., has taken bids for the erection of a one-story pumping station, 50 x 90 ft., from plans by Paul F. Olsen, 127 North Dearborn Street, Chicago. L. Ellsworth is city clerk.

The Chicago, Burlington & Quincy Railroad is having plans prepared for an addition to its repair shop at Beardstown, Ill. T. E. Colbert, 547 West Jackson Boulevard, Chicago, is chief engineer.

The Sanitary District of Chicago, 910 South Michigan Avenue, Chicago, has completed plans and will take bids shortly for a pumping station to be erected near Wildwood, Ill., at an estimated cost of $2,000,000. Thomas A. Smyth is president of the board.

The Midland Metal Company, 1269 Campbell Avenue, Chicago, will build a one-story brick factory at 1269-73 South Campbell Avenue to cost $12,000.

The Hughes Electric Heating Company, Chicago, will erect a factory building at Taylor Street and Waller Avenue to cost $150,000.

The Cribben & Sexton Company, stove manufacturer, Chicago, has awarded contracts for a one-story plant extension, 100 x 102 ft., to cost $18,000.

W. Gibbons Uffendell, architect, 39 South State Street,

Chicago, has taken bids for factory extensions to cost $30,000, including a forge shop addition, 70 x 71 ft.

Henry A. F. Lueders, 2213 Sunnyside Avenue, Chicago, will build a one-story garage and machine shop, 6 x 12 ft.

The Centaur Motor Company, Wabash Avenue and Twenty-ninth Street, Chicago, will erect a service building and machine shop, 80 x 140 ft., to cost $60,000.

The Illinois Steel Company, Chicago, is about to erect a large extension to its machine shop at its Gary Works.

The New York Central Railway Company will erect a new air compressor building at its Root Street yards at Chicago. H. W. Fenno, 402 La Salle Street Station, is the architect.

The plant of the Fitz Hugh-Luther Company at Hammond, Ind., has been purchased by the Railway Motor Car Company of America, 110 South Dearborn Street, Chicago, and will be operated for the manufacture of gasoline motor propelled passenger cars. The company expects to purchase $20,000 worth of machinery.

The International India Rubber Mfg. Company, a million dollar corporation recently organized, will build a factory at South Bend, Ind.

The Brown Portable Elevator Company, North Chicago, Ill., will build an addition to its plant which will double its present floor space.

The Holt Mfg. Company, East Peoria, Ill., will erect a one-story foundry building, 116 x 250 ft., in addition to the machine shop now being built. The company manufactures tractors.

The E. M. Smith Company, machinist, Peoria, Ill., is building an addition to its plant.

The Orbon Stove & Range Company, Belleville, Ill., will build an addition to its foundry to cost $1,230.

The Strickler Mfg. Company, manufacturer of automatic self-binding hay balers, Keokuk, Iowa, will be in the market shortly for equipment for manufacturing its product. It is in the market for a second-hand milling machine, shaping machine, drilling machine, lathes, etc., available in the Central West.

Cincinnati

CINCINNATI, OHIO, August 14, 1916.

Second-hand machinery dealers report that they are having little trouble in disposing of rebuilt machine tools, especially the larger sizes of lathes. The break in the extremely hot weather that has prevailed in the Central West for some time has improved shop production to a considerable extent. Scattered orders for new machine tools continue to come in at a satisfactory rate, but large lists are absent. Railroad buying has been cut off, due, it is stated, to the impending strike. It is also said that many manufacturers are holding up purchases of machinery of all kinds pending the settlement of this serious labor trouble.

Makers of sugar machinery will probably be able to report one of the biggest year's business in the history of their organizations. A number of large contracts are under way, most of which business is from Cuba. Portable electric drilling machine manufacturers are somewhat handicapped in getting material on time. Both the domestic and export demand for these machines is very good.

The large addition to the plant of the Elmwood Castings Company, Elmwood Place, Cincinnati, has been completed and practically all of the equipment installed.

It is reported that the Cincinnati Home Brewing Company, Cincinnati, is having plans prepared for an addition to its plant in West End, for which refrigerating equipment will be required.

Plans for the new refrigerating and cold-storage plant of the Frenche Brothers Bauer Company, Cincinnati, have now been completed. The building will be 126 x 225 ft., four stories and basement, of brick and steel.

The Springer-Wood Company, Cincinnati, has been incorporated with $200,000 capital stock to erect refrigerating plants. H. C. Wood and M. E. Springer are the principal incorporators. Nothing is yet known as to the company's manufacturing plans.

The Recording & Computing Machines Company, Dayton, Ohio, suffered a fire loss last week due to an explosion in one of its munitions factories. Repairs are already under way, and it is understood that only a small part of the machinery in that department was badly damaged.

The Dayton Co-Operative Iron & Metal Company, Dayton, Ohio, incorporated with $10,000 capital stock by J. Sandmel and others, will not fit up a scrap iron plant as was currently reported.

The Mead Pulp & Paper Company, Dayton, Ohio, has let contract to the Frank Hill Company, Dayton, for the erection of addition to its plant on Third Street.

The Western Foundry & Mfg. Company, Springfield, Ohio, has been incorporated with $50,000 capital stock by Clarence O. Lutz, John C. Howell and others. No details as to manufacturing plans are now available.

The Lucas Miner Pump Company, Springfield, Ohio, whose incorporation was recently noted, has secured quarters in the Shaw Factories Building and will begin operations at an early date.

The Bartlett Engineering Company, Columbus, Ohio, recently incorporated with $100,000 capital stock by Malcolm Bartlett and others, is fitting up a plant at 172 West Long Street for the manufacture of machines to make ice cream cones.

It is reported that the Columbus Forge & Iron Company, Columbus, Ohio, has tentative plans under way for an addition to its plant.

The Great Western Sewer Pipe Company, New Lexington, Ohio, has been incorporated with $75,000 capital stock by William Gunkler and others and will soon begin work on a new plant.

Milwaukee

MILWAUKEE, WIS., Aug. 14, 1916.

Machine-tool builders report improvement in domestic inquiry the last fortnight. The slight slackening in demand noted early in July has been overcome. The demand is confined almost entirely to standard types for replacement, and orders specify one or two tools, large lot business being conspicuously absent. Some shops contemplating extensions next fall and winter have put out inquiries for considerable lots. In spite of the machinists' strike, production is fairly well maintained, but the question of prompt delivery is a source of worry, especially in view of the insistent demands of buyers for immediate shipment. Opinion seems to be that the strike may already be declared a failure, and it will not be long before most of the men will be back at their jobs.

Due to the rapid development of the tractor the gasoline and kerosene engine industry is anticipating the busiest season in history, orders already booked taking up a very large percentage of available capacity. Foundries are meeting with difficulty in filling orders, due to the shortage of labor. Structural shops are keeping busy for the most part on a large volume of small orders.

The J. Greenebaum Tanning Company, North Milwaukee, Wis., is taking bids for a two-story addition, 55 x 141 ft., of brick.

Articles of incorporation were filed Aug. 10 in behalf of the Sanitary Refrigerator Machinery Company, Milwaukee. The capital stock is $100,000 and the corporators are Louis Pierron, C. F. Schimmel and A. C. Lingelbach.

The Northwestern Bridge & Iron Company, Milwaukee, has taken the contract for fabricating and erecting the steel work on the new Hugh Agner garage and machine shop at Burlington, Wis. Reinforcing steel will be furnished by the Paul J. Kalman Company, St. Paul, Minn. The architects are Leiser & Holst, Milwaukee.

The W. E. Williams Company, Traverse City, Mich., has completed arrangements for a hardwood flooring and woodworking plant at Oconto, Wis., consisting of a main building, 70 x 240 ft., one story and basement, an engine and filing room, 20 x 80 ft., and boiler and shavings room, 30 x 55 ft. The dry kilns will be in a separate building, 83 x 100 ft., divided into four compartments. The annual capacity will be 9,000,000 ft. of flooring on a 300-day operation with 75 workmen. W. L. DeWitt is local manager.

A report from Calumet, Mich., states that the Mohawk Mining Company has broken ground for a machine shop to supplant its present shop, which has been outgrown. The new shop will be located near the No. 4 shaft. Much new equipment will be required and obsolete machinery replaced.

The Yale Steel Stamping Company, formerly operating a plant at Oostburg, Wis., has filed articles of dissolution.

Articles of incorporation have been filed by the Broadway Garage, DePere, Wis. The capital stock is $10,000 and the corporators are George T. Bridget and Margaret McGeehan. A garage and machine shop will be equipped at once and machinery is now being contracted for.

The Ahnapee Veneer & Seating Company, Algoma, Wis., is ready for bids for several additions to its plant. Plans prepared by De Long & Son, Appleton, Wis., consulting engineers, call for a three-story addition to the main mill, 32 x 75 ft., and a one-story addition, 48 x 80 ft., to the seating shop. M. W. Perry is president.

Herman L. Bergstrom, DePere, Wis., broke ground Aug.

1 for a garage and machine shop 60 x 120 ft., at Broadway and Charles streets. The shop alone will be 60 x 80 ft.

The Wisconsin Seating Company, New London, Wis., has accepted a contract for manufacturing 30,000 frame and sheet-steel school seating units for the New York Study Chair Company. A new 50-hp. electric motor is being installed and additional equipment will be purchased immediately.

The Turbo Carburetor Company, Milwaukee, has been organized with a capital stock of $10,000 to manufacture gasoline engine devices and specialties. The corporators are Ivan M. Smith, M. L. Fykes and Gladstone Cherry.

The Cedarburg Foundry Company, Cedarburg, Wis., has been purchased from Gustave Zunker and E. J. Groth by Frank Walsh and J. Hyde, West Allis, Wis., and possession has already been taken. The foundry has been operating on a limited scale for several years but the new owners have sufficient orders to keep it running at capacity for a long time. Beginning Aug. 1, 30 men will be employed.

The Detroiter Garage Company, Platteville, Wis., is breaking ground this week for its new garage and repairshop to be 40 x 115 ft. in size, part two-story.

The Terrio Mfg. Company, Waupaca, Wis., recently incorporated with a capital stock of $15,000, to manufacture butter testers, egg-candling machines, etc., has elected Nathan Cohen, president; H. P. Mortenson, vice-president; Louis C. Larson, secretary, and Joseph Terrio, treasurer. Leased quarters will be equipped for temporary operations, pending the erection of a factory.

The Jaeschke Brothers Foundry Company, Thirtieth Street and Cawker Place, Milwaukee, awarded contracts Aug. 11 for a brick and steel foundry addition, 70 x 90 ft.

The Modern Garage Company, Milwaukee, has awarded contracts for a garage and repairshop at West Twenty-fourth and State streets, 47 x 135 ft., one and two stories and basement, to cost $10,000 complete.

Several thousand dollars worth of damage was done by fire in the foundry of the Sheet Mfg. Company, 124 Barclay Street, Milwaukee, Wis.

J. W. Wilkinson has purchased the machine and smithing shop of C. A. Pope at Darlington, Wis., and will install new equipment.

Charles Byse, Red Granite, Wis., has broken ground for a new garage and machine shop, 56 x 110 ft.

On July 30 fire destroyed the plant of the F. C. Miller Planing Mill Company, Newport, Ky., involving an estimated loss of $75,000. Rebuilding plans have not yet been announced.

Detroit

DETROIT, MICH., Aug. 14, 1916.

Machinery trade remains good in spite of the ordinary summer decline. The gradual improvement of the housing conditions in Detroit has made it possible to secure more laborers, with the result that many factories are pushing additions to their plants. Dealers report a good call for tools needed in construction work. In the general market single machines are in the greatest demand, especially grinding and milling machines which are difficult to obtain for early delivery. Delivery of all high grade machines call for from four to six months. All metal-working shops are running to capacity.

Plans for the construction and the machinery lay-out are being made for the proposed plant of the Detroit Seamless Steel Tube Company, Detroit, to cost $2,000,000. Work on the building will not begin for a year. A. A. Templeton is president.

The Wallace Motor Mfg. Company has been incorporated with a capital of $25,000. Francis J. Wallace, 600 Michigan Avenue, Detroit, is head of the corporation.

The Auto Light Control Company, care of Marshall D. Ellis, 234 Charles Avenue, Detroit, has incorporated for $25,000, taking over the business of the Grand Rapids Dimmer Company. It expects to manufacture and sell auto light controls and specialties.

The Imperial Welding Company, Detroit, has organized with a capital of $15,000. George Christopulus, 150 Lafayette Avenue, Detroit, is president.

The new machine shops being constructed for the Oakland Motor Company, Pontiac, will call for the employment of 600 additional men. W. C. Durant, 600 West Fifty-seventh Street, New York, is president of the General Motors Company, of which the Oakland Company is a subsidiary.

The Holland Ladder Company, Holland, Mich., are planning to erect another building. Thomas H. Tasker is president.

The Republic Motor Truck Company, Alma, has quadrupled its capital to $1,000,000 and plans to triple its output.

The Pentwater Machinery Company, Pentwater, Mich., has been organized to conduct a general machine shop and manufacturing business. The capital stock is $25,000.

The L. O. Gordon Mfg. Company, Muskegon, Mich., has practically completed its plant for the manufacture of cam shaftings and other motor specialties. The company was organized by L. O. Gordon and two Cleveland men. It is planned to start deliveries next month.

A $250,000 company is being formed in Detroit to manufacture the Stearns ware-proof tube. A. F. Howard, 728 Penobscot Building, Detroit, is in charge.

The Detroit Truck Company has been incorporated with a capitalization of $50,000. James M. Hibbard, president of the Accessory Forgings Company, 1440 Orleans Street, Detroit; Fred L. Paterson and Robert M. Brownson are the organizers.

The Detroit Battery Company, manufacturer of storage batteries, Detroit, is moving into a new three-story building at 104 High Street West, constructed to meet its growing needs. Sidney W. Ellston is president.

The Continental Motor Mfg. Company, 2935 Jefferson Avenue East, Detroit, is planning an addition to its automatic screw machine department at Muskegon, which will increase the floor space devoted to that department 30,000 ft. Extensive enlargements are also being made at the Detroit plant. B. F. Tobin is president.

Hallgarten & Co. and Eugene Myer, Jr., & Co. have contracted to purchase the $5,000,000 preferred stock and part of the 200,000 common shares of the Fisher Body Corporation, a consolidation of the Fisher Body Company and the Fisher Closed Body Company, both of Detroit, Mich., and the Fisher Body Company of Canada, Ltd., Walkerville, Ont.

The Enterprise Brass Works, manufacturer of plumbers' brass goods, brass, bronze and aluminum castings, Muskegon, Mich., has started a three-story brick and steel addition, 50 x 150 ft., making a total addition of 22,500 sq. ft. of floor space to be devoted to the casting and machining of plumbing fixtures. Hitherto the company has been limited, by lack of room, to the making of the castings, but hereafter the finished product will be turned out here. F. W. Burgstahler & Sons, builders, Grand Rapids, are constructing the building.

The Flint Cushion Spring Company will commence work at once on the first unit of its factory system to be erected at Flint, Mich.

The Central South

LOUISVILLE, KY., Aug. 14, 1916.

An all-round activity characterizes the local trade without the rush that was everywhere in evidence a few weeks ago, but with the demand still insistent. Power equipment, both electrical and steam, continues to be wanted, wanted, but it is said that deliveries are being promised for earlier dates.

The Globe Tanning Company, Ninth and Dumesnil streets, Louisville, is building and will equip [illegible].

Improvements and additions to the municipal power plant at Owensboro, Ky., to cost $20,000 to $25,000 are to be made. Superintendent Breidenbach of the power plant may be addressed.

The Owensboro Forging Company, Owensboro, Ky., is installing [illegible] and will operate on gas when completed. Ridley Ewing, general manager, is considering changing the plant over to electric drive.

The tipple and equipment of the Central Coal & Iron Company, Central City, Ky., were destroyed by fire at an estimated loss of $2,000. [illegible] plans to rebuild immediately.

The Louisville local [illegible] of the Barrett Manufacturing Company, [illegible], has been for four months, being renovated and will [illegible].

The Elam Power Hoist Company, has been organized at Lexington, Ky., and will arrange for the manufacture [illegible] Walter Elam [illegible].

Contract for construction of the [illegible] tobacco prizing and rehandling plant of the Kentucky Leaf & Transit Company, Hopkinsville, Ky., has been let to the Forbes Mfg. Company of that city. Heating, [illegible] and special machinery will be installed.

The Kentucky Prison Commission will at once begin preparations for rebuilding the prison chair factory at Frankfort destroyed by a recent fire. A building, 50 x 130 ft., will be erected.

Oil-development companies being organized in Kentucky and in the market for drilling and power equipment include The Chenault Oil & Gas Company, Fort Estill, $25,000 capital, incorporated by Harvey and Walter Chenault; the Cow-

Creek Oil Company, Salt Lick, capital $100,000, T. B. Staggs, A. W. Sanderson, and others, incorporators. The Puckett Oil Company, Irvine, $32,000 capital, B. H. Henderson, B. J. Shaw, and others, incorporators.

The Algonquin Oil Company, Barbourville, Ky., C. P. Kennedy, president, has increased its capital from $1,000 to $2,000 and is in the market for a 25-hp. steam traction engine, new or second-hand.

A second-hand 400 cubic foot steam-driven air compressor and a well-drill, 1000 to 1200 ft. capacity, walking beam steam tractor, second-hand, are wanted by the American Metallic Packing Company, Lexington, Ky.

Fire destroyed the garage and contents of Buster & Sons at New Harmony, Ind., at a loss of $10,000.

McNutt & Co. have established an electrical automobile supply house at 813 South Gay Street, Knoxville, and will conduct a general repair shop.

An addition, to give 30,000 more sq. ft. of floor space, will be built to the Southern Coffin & Casket Company, Knoxville, Tenn., C. G. Childress president.

A. R. Pryor, Jasper, Tenn., will establish a garage and machine shop for automobile repair work and other machine shop operations.

The barytes mill of John T. Williams & Son, Bristol, Tenn., built and equipped at a cost of more than $250,000, and idle for several years, is being overhauled and the machinery repaired preparatory to resuming operations.

The John G. Duncan Company, 305 West Jackson Avenue, Knoxville, Tenn., is asking for prices for immediate delivery on a second-hand, internally-fired return-tubular boiler, or marine type boiler, of 100 to 150 hp., for 100-lb. pressure.

The Dixie Foundry Company, manufacturer of gray-iron castings, Cleveland, Tenn., plans to put its foundry in operation not later than Oct. 1. J. C. McKenzie is manager.

St. Louis

ST. LOUIS, MO., Aug. 14, 1916.

Transactions in machine tools continue fairly satisfactory, though there has been some let up in the demand. The business moving is of sufficient volume to have been called very large in the days before the European War began. The call is from all sources. Single-tool demand prevails. Second-hand tools are very scarce and are in somewhat better demand. Collections are very good and investment as well as commercial funds available at good rates.

Contracts have been let by the Anheuser-Busch Brewing Association, St. Louis, Mo., for the construction of a plant to cost in all $2,500,000. It will be equipped for the manufacture of a new non-intoxicating beverage. The building will occupy an entire city block, and will be seven stories high, 250 x 580 ft. Trains will enter the basement, by underground tunnels, for transportation purposes.

The Laundry Dryer & Heater Company, St. Louis, Mo., has been incorporated with a capital stock of $15,000 by A. P. Mathey, A. P. Schaefer and A. M. Graham to manufacture heating machinery.

The M. A. Morris Mfg. Company, St. Louis, Mo., has been incorporated with a capital stock of $12,000 by M. A. Heimann, Hellmuth M. Kinner and Henry Zeiss to manufacture store equipment.

The Scudder Motor Truck Company, St. Louis, Mo., has been incorporated with a capital stock of $10,000 by Charles M. Polk, Clifton R. Scudder and Leclare M. Amrine to equip a machine shop and garage.

The East St. Louis Water Company, the Belleville Water Supply Company and the Granite City Water Supply Company, in Illinois, have been consolidated with a capital stock of $5,000,000 and some plant revision is contemplated to effect more economical operation.

The A. B. D. Company, Kansas City, Mo., has been incorporated with a capital stock of $50,000 by A. W. Aylor, K. L. Day and M. E. Groom to equip a machine shop and garage.

The Valley Mfg. Company, Ironton, Mo., has been incorporated with a capital stock of $12,500 by H. N. Brown, Jacob W. Time and Oka M. Brown to manufacture handles and other wood products.

The Midland Milling Company, North Kansas City, Mo., organized by Fred O. and George C. Shane of Philadelphia, Pa.; George Innes, Saskatchewan, Can., and J. A. Innes, Eagle Grove, Can., will equip a flour mill of 1500 bbl. daily capacity. Power will be derived from Diesel engines. J. A. Innes will be manager.

The Moberly Artificial Ice Company, Moberly, Mo., plans to equip a cold storage plant of 1000 tons capacity and will also install a 25-ton ice-making unit.

H. Scott, Joplin, Mo., will equip a concentrating mill of 100 tons capacity per shift.

The Mid-West Iron Company, Commerce Building, Kansas City, Mo., is in the market for gauge track and double-truck locomotive cranes, one 200-kw. belted generator, one 20 to 30-ton locomotive of 24-in. gauge, and other allied equipment.

J. F. Gardner & Co., Jelks, Ark., will equip a three-stand, 70-saw gin outfit requiring about $5,000 of machinery.

The Harrison Lumber Company, Lewisville, Ark., will equip a three-stand cotton gin requiring about $4,500 of machinery.

The People's Gin & Ice Company, Marvell, Ark., has been incorporated with a capital stock of $10,000 by F. R. Garner, Sr., and F. R. Garner, Jr., and others and will equip a cotton gin and an ice making plant.

The McNeely Motor Company, Arkansas City, Ark., will purchase at once machine shop and garage equipment, including electric motor, lathe, drill press, etc. T. B. McNeely is president and manager.

C. C. Epps, Bristow, Okla., will equip a cotton gin plant including a 6-stand, 80-saw outfit, two cold presses for oil pressing, etc.

The Crescent Refining Company, Tulsa, Okla., has been incorporated with a capital stock of $200,000 by J. R. Utterback, M. E. Utterback and W. A. Doty and will equip an oil refinery.

The Altus Ice & Fuel Company, Altus, Okla., will install equipment to increase its ice-making capacity from 60 to 100 tons daily. W. H. Echols is manager.

The Gas Burner Mfg. Company, Tulsa, Okla., has been incorporated with a capital stock of $10,000 by M. J. and T. J. Flanagan and others to manufacture gas burners and other devices.

Tulsa, Okla., has voted $180,000 for a filtration plant and to improve its water works pumping plant. H. H. Wyss is city engineer.

J. C. Penn will equip a welding plant at Laurel, Miss., and is in the market for machinery.

The Bay Creek Lumber Company, Purvis, Miss., will install additional power and kiln equipment, steam log turner and system of rolls.

St. Martinsville, La., will receive bids until Aug. 22 on one 100-hp. crude-oil engine, one 80-kw. generator, one 250-gal.-per-min. and one 500-gal.-per-min. electric pumps, transformers, etc. Albert Bienvenu is mayor.

Westwego, La., will install waterworks equipment to cost about $17,500. V. A. Pitre is in charge. A 60-hp. engine and 500-gal.-per-min. underwriters' pump are included.

The Humason Superheater Company, Shreveport, La., has been incorporated with a capital stock of $100,000 by George F. Gallagher, H. R. Ratcliff and Gilbert W. Williams to manufacture a superheater for motor cars.

The Louisiana Alabama Sulphur & Oil Company, J. E. Brady, president, Biloxi, Miss., will install about $25,000 equipment on its property in Calcasieu Parish, La.

The Developers Oil & Refining Company, Shreveport, La., has been organized with capital of $1,000,000 and will equip an oil refinery of 1000 bbl. per day capacity. R. M. Hyams, New Orleans, La., is president. A pipe line and oil pumping stations will be equipped also.

Birmingham

BIRMINGHAM, ALA., Aug. 14, 1916.

While the volume of machinery business has not reassumed normal proportions, inquiry is increasing and indicates gradual recovery. Ginning and cotton-mill machinery is being shipped in large quantities. Machine tools are in brisk demand and deliveries have improved. Gasoline engines are active. Appliances for structural work are dull in the extreme. The agricultural section shows signs of recovery from the setback created by flood losses.

The Commercial Hardwood Company, Demopolis, Ala., capital $50,000, has been incorporated by Clarence Kirvin, H. L. Wood and others, to establish band mill and manufacture hardwood lumber.

The Jefferson Mfg. Company, Savannah, Ga., has been incorporated by Harry J. Kuhr, Savannah, and Crester V. Joseph, Indianapolis, with a capital stock of $25,000, to manufacture iron and steel bridges, culverts, etc.

The Great Southern Lumber Company, Bogalusa, La., W. H. Sullivan, general manager, will establish a new mill at a cost of $1,000,000, supplementing a plant already said to be one of the largest in the world.

The Andrew Ramsay Company, Mount Savage, N. C., capital stock $150,000, has been incorporated by Andrew Ramsay, J. James Gardner and others to manufacture clay products.

The B. Mifflin-Hood Pottery Clay Products Company, Daisy, Tenn., organized by B. Mifflin-Hood, Atlanta, Ga., C. L. Krager and others, will build a plant to manufacture shale acid tower rings and blocks, roofing tile, etc.

Russe & Burgess, Memphis, Tenn., have purchased 7000 acres of timber land on Honey Island in Holmes County, Miss., and will build a band sawmill to cut oak and gum timber.

Texas

AUSTIN, TEX., Aug. 11, 1916.

Revival of oil development operations in the different Texas fields is causing an increasing demand for well-boring outfits and other equipment. The machinery and tool trade is holding up remarkably well through the heated term.

Mrs. C. W. Post, Battle Creek, Mich., will build both meat-packing and ice-making plants at Post at a cost of about $100,000.

The Oatman Water & Sewer Company, Oatman, Ariz., plans to pipe water from the Colorado River, a distance of 11 miles, and to pump it into a large storage reservoir which it will build for the purpose of supplying the town and adjacent mines with water. The same company will construct an electric light and sewer system. More than $500,000 will be expended in these public utility projects. V. S. Rowley is president.

The American Smelting & Refining Company will install pumps at its Morgan mine, near Tucson, Ariz.

The El Paso & Southwestern Railway has purchased the cement and brick-manufacturing plant at Ancho, N. M., and will install additional machinery to increase its capacity.

The Pacific Coast

PORTLAND, ORE., Aug. 8, 1916.

Waterfront activities are now proceeding in about the normal manner, and coastwise lumber trade has been actively resumed, with a strong demand. The movement of machine tools is about all that could be expected under present conditions, many of the smaller shops and garages through the country being anxious to buy, but reluctant to pay current prices for new tools. Deliveries show little improvement, and the number of firms in a position to order for distant delivery is limited. Few tools either new or second-hand, are offered for prompt shipment. Buying of miscellaneous equipment on the part of mines and smelters shows little abatement, though large single orders are perhaps less numerous. Electric and water-power machinery is in fairly active demand, and some substantial inquiries are appearing for irrigation work. Grain crops are moving slowly, but with high prices the agricultural districts are in good shape, and the demand for implements and farm machinery is good. Foreign demand for machinery is active, but shipments are limited by lack of space.

Statistics prepared by the Pacific Lumber Inspection Bureau, Seattle, show that North Pacific tidewater mills shipped 689,491,666 ft. of lumber the first six months of 1916 as compared with 620,530,974 ft. the first six months of 1915, and 672,672,710 ft. the first six months of 1914. Exports amounted to 1,515,699,355 ft. for the first half of the current year. The Australian market, which ordinarily takes the largest amount of lumber cut for export in the North Pacific district, shows a loss of 82.50 per cent as compared with 1914 and a gain of 9.01 per cent over the first half of 1915.

The owners of Fanning Island, in the South Pacific Ocean, are planning to establish a coaling station.

It is reported that the Corliss Gas Engine Company's plant at Petaluma, Cal., has been acquired by the Standard Gas Engine Company and will be consolidated with its plant at Oakland, Cal. This plant is being equipped for the manufacture of Southwark-Harris Diesel engines.

J. H. Hansen, of J. H. Hansen & Co., San Francisco, agents for Skandia Diesel engines, has just returned from New York and announces plans to manufacture the engines for Pacific territory in the vicinity of San Francisco.

A building contract has been let for a cement plant at Darrington, Wash., of 2200 bbl. per day capacity. C. H. Bacon, Seattle, is in charge, and H. Bittman, Securities Building, Seattle, is construction engineer.

The Colfax Iron Works, Colfax, Wash., has replaced most of the patterns destroyed in its recent fire, and is working on numerous orders for grain mills for points from Oregon to Montana.

The Albina Engine & Machine Company, Portland, has taken a contract for repairs to the steamer Kenkon Maru amounting to about $235,000.

The Port Commission, Astoria, Ore., is taking figures on a locomotive crane for the port docks.

The Warrenton Clay Company, Warrenton, Ore., has begun construction work on its tile and clay manufacturing plant, to be completed by Nov. 1 at a cost of $75,000.

Work has already begun on driving piles and laying foundations for the shipbuilding plant to be constructed at Youngs Bay on the Columbia River by the American Shipbuilding Company, Spokane, Wash., headed by H. B. Spear. It is estimated that preliminary work will be completed within 30 days. About five wooden schooners for transporting lumber are planned to be completed this year.

The properties of the Butte & Bacorn Copper Mining Company, Butte, Mont., have been sold to the Great Butte Copper Mining Company, owned by capitalists of Pittsburgh and New York, and capitalized at $1,000,000. The mine will immediately be equipped with a steam hoist, to be replaced later with electrical equipment, and it is stated that $185,000 will be expended in development work. F. W. Bacorn, Butte, is president; Charles Hyde, Pittsburgh, is treasurer.

The Richards Brush Company, Seattle, Wash., plans the construction of a factory on Dearborn Street, 50 x 90 ft., of reinforced concrete.

Frank B. Mitchell, Baker, Ore., has recently purchased timber holdings and plans the establishment of a planing and saw mill in Baker, a saw mill in Austin with a capacity of 50,000 to 75,000 ft. a day, etc. It is stated the work now planned will cost $100,000.

The Great Western Sugar Company has recently secured 150 acres near Missoula, Mont., where a sugar plant will be erected to cost about $1,000,000. W. L. Lawson is Montana manager.

City Purchasing Agent Wood, Portland, Ore., will receive bids until Sept. 1 for one multi-stage turbine pump, direct connected to a 200-hp. motor.

The Ashland Mining Company, Ashland, Ore., plans the installation of electric power throughout its plant.

It is announced in Portland, Ore., that Swift & Co. interests of Chicago contemplate the construction of a shipbuilding plant in Portland. It is reported the company has secured contracts for three vessels to be built immediately.

The Trail Lumber Company, Medford, Ore., has recently completed plans for the installation of new machinery at its plant, and an up-to-date lumber mill and box factory will be operated. G. T. Gagnon is manager.

Canada

TORONTO, Aug. 14, 1916.

War expenditure in Canada is now $1,000,000 per day. The budgets of 1915 and 1916 are both working out satisfactorily, so that it is possible that a portion of war expenditure will be paid out of the government revenue. The balance of war expenditure of the year will be defrayed partly out of the domestic war loan, issued in November last and from future war borrowings.

The Montreal Locomotive Company, subsidiary of the American Locomotive Company, has been doing an increasingly large shell business in its Montreal plant. Although not a great deal has been said about this company's output of munitions it is reported to be one of the largest producers of shells on the continent. A shipment of machinery from the United States company to the Canadian plant recently was construed to mean that the company was contemplating an extension. The management, however, asserted that such shipments are part of a development which has been in progress for some time.

The Imperial Oil Company, Montreal, has secured 400 acres at Dartmouth, Nova Scotia, and has commenced the erection of a refining plant to cost $2,000,000, to cover a site of 40 or 50 acres. The plant will consist of storage tanks, refinery, machine shops, warehouses, etc. S. S. Shatford is manager.

Beatty Brothers, Fergus, Ont., manufacturers of carwheels, etc., propose to erect a plant at a cost of $50,000.

Fire destroyed the machine shop and brick plant of the Dominion Stove & Foundry Company at Penetanguishene, Ont.

H. G. James, Sherbrooke, Que., proposes to build an addition to his machine shop at a cost of $7,000.

Bids will be called by A. F. Macallum, city commissioner, Ottawa, for the construction of a civic workshop estimated to cost $14,000.

The contract for extensions to the roundhouse of the Canadian Northern Railway at Port Arthur, Ont., has been let to J. Brown, Winnepeg, Man., at a cost of $47,000.

The Collingwood Packing Company's plant at Colling-

wood, Ont., which was erected some years ago at a cost of $1,000,000 was damaged by fire Aug. 6, with a loss of $100,000.

The Stinson-Reed Builders' Supply Company, Ltd., 903 Read Building, Montreal, is in the market for a 75-hp. 550 volts, 60 cycle motor.

Hamilton, Ont., is contemplating the spending of $100,000 on a new steam turbine for the waterworks and other improvements to the plant. City waterworks engineer Milne of Toronto will submit a report in a few days.

Six new pumps will be purchased for the Horton Street pumping station by the Public Utilities Commission of London, Ont. E. V. Buchanan is manager.

Bids for the erection of an addition to the machine shop of the Canadian Ingersoll-Rand Company, Commissioners Street, Sherbrooke, Que., are being received by H. W. Haight, the company's engineer. The addition will cost $70,000. H. G. James, Whiting Block, is the architect.

T. J. Davidson has received the contract for the erection of a large addition to the premises of the Canadian Briscoe Motor Car Company, Brockville, Ont.

J. D. Young & Son, 835 College Street, Toronto, has received general contract for three buildings for the Chevrolet Motor Company of Canada, at Oshawa, Ont.

The Adams Brothers Harness Mfg. Company, Ltd., 204 King Street East, Toronto, is having a site cleared at 781 King Street West, for a reinforced concrete factory to cost $75,000.

The Russell Motor Car Company, King and Duncan streets, Toronto, will build an addition to its foundry to cost $3,000.

The Canadian Steel Foundry, Welland, Ont., will erect a forge shop at a cost of $6,000, and has awarded the contract to Ryan & Gardner, Main Street East.

The Electric Steel & Metals, Ltd., Welland, Ont., will erect an addition to its foundry to cost $10,000.

Fire totally destroyed the transformer station at Dundas, Ont., owned by the Provincial Hydro Electric Power Commission, of which F. A. Gaby, University Avenue, Toronto, is chief engineer. The loss to the building will amount to $25,000 and to the machinery $100,000.

The building at 126 Garden Avenue, Toronto, occupied by the Fordel Callender Company, the Dame Metal Company and the Reliance Weather Stripping Company was damaged by fire with a loss of $9,000.

The Milton Foundry, Ltd., Milton, Ont., has been incorporated with a capital stock of $40,000 by Alexander Faskin, Excelsior Life Building, Francis H. Hurley, 32 Aberdeen Avenue; Duncan McArthur, and others, all of Toronto, to manufacture machinery, implements, etc.

The Standard Ideal plant at Port Hope, Ont., has been sold to L. M. Wood, president of the Standard Chemical Company, and associates, among whom are W. D. Ross. The new company will take possession at once, and in addition to carrying on the present line of business, propose to manufacture shells.

The City Council, London, Ont., proposes to install waterworks equipment, including a waterwheel, electric generator and a 250-hp. pump, estimated to cost $15,000. E. V. Buchanan is manager.

The Essex Border Utilities Commission, Windsor, Ont., will construct a sewer and waterworks system at a cost of $2,000,000. E. Brien, city engineer, is chairman; Leonard Rice, Ojibway, Ont., is secretary.

The Dominion Steel Products Company, Brantford, Ont., proposes to build a plant at a cost of $50,000. W. P. Kellett, 266 Park Avenue, is president.

The Canadian Pacific Railway, Montreal, Que., will receive bids shortly for the construction of a powerhouse, coaling plant, blacksmith shops and a storage building of steel and concrete at McAdam, N. B.

Additional machinery will be installed by the Toronto Paper Mfg. Company, Cornwall, Ont., which will bring the capacity of the plant up to 30 tons per day. R. S. Waldie is president and W. Wallace is manager.

The Joliette Steel Company, 903 Read Building, Montreal, is in the market for a new or second-hand three to five-ton suspension scale for weighing steel castings.

The recent fire at the plant of the O'Brien Munitions, Ltd., Renfrew, Ont., was the second, not the third, at the plant since it has been in operation, and the loss is confined to three buildings valued much under $100,000, recently stated to be the loss. J. L. Murray is managing director.

The Snyder Desk & Table Company, Ltd., Waterloo, Ont., has been incorporated with a capital stock of $75,000 by Herbert M. Snyder, Alfred H. Snyder, Clayton H. Snyder and others to manufacture desks, tables, furniture, etc.

Government Purchases

WASHINGTON, D. C., Aug. 14, 1916.

The purchasing officer of the Panama Canal, Washington, will open bids Sept. 1 for furnishing under circular 1072, class 11, one electrically controlled refrigerating plant; class 14, one sliding head drill press.

The lighthouse inspector, Boston, Mass., will receive sealed proposals until 2 p. m., Aug. 22, for furnishing two air compressing outfits.

The chief of ordnance, War Department, Washington, will receive bids until noon Aug. 29 for [illegible] model 1911; 1750 12-in. shells, model 1912; 200 14-in. shells, model 1915, and 14,500 12-in. shells of 700 lb., model 1911.

The commanding officer of the Frankford Arsenal, Philadelphia, will receive proposals until Aug. 30, under proposal No. 38, for furnishing 30,000,000 gallery practice cartridges, 22 caliber.

The chief of the Bureau of Ordnance, Navy Department, Washington, will receive proposals until 12 noon Aug. 23 for the following projectiles: 9000 14-in. armor-piercing [illegible] 14-in. class B, 31,500 6-in. common, 185,600 5-in. common, 139,529 4-in. common, 300,000 3-in. common, 87,500 one-pounder anti-aircraft and 187,500 one-pounder common.

Bids were received by the Bureau of Supplies and Accounts, Navy Department, Washington, Aug. 8, for supplies for the naval service as follows:

Schedule 9894, Construction and Repair.

Class 62, Brooklyn—Two motor driven bolting lathes—Bid 87, $730; 99, $644, $553.70 and $496.80; 125, $441 and $675.

Schedule 9902, Ordnance.

Class 93, Washington—One boring, milling and drilling machine—Bid 126, $13,750.

Schedule 9903, Construction and Repair.

Class 101, F.o.b. works—Six air compressors—Postponed to Aug. 15.

Schedule 9904, Construction and Repair.

Class 102, Philadelphia—One power brake—Bid 13, $5,273, $5,799, $6,225, $6,765, $8,131 and $9,897; 89, $11,677; 99, $7,125, 125, $7,000, 130, $6,195, 166, $7,013.30, 183, $7,081.

Schedule 9905, Steam Engineering.

Class 111, Brooklyn—One motor-driven tool room lathe—Bid 99, $1,980, 125, $1,870, 183, $1,799.75.

The names of the bidders and the numbers under which they are designated in the above list, are as follows:

Bid 13, Bertsch & Co.; 87, Kemp Machinery Company; 29, Loy & Nawrath Company; 99, Manning, Maxwell & Moore, Inc., 125, D. Nast Machinery Company, 126, Niles-Bement-Pond Company; 130, George A. Ohl & Co., Inc.; 166, Sherritt & Stoer Company, Inc., 183, Vandyck-Churchill Company.

No Compensation for Injuries in "Horse Play"

Employees injured while engaged in "horse play" during hours of employment cannot be considered as coming under the workmen's compensation act in Pennsylvania, according to a decision just handed down by the Compensation Board, in the case of the Pressed Steel Car Company and Franciska Tomosoka, an employee. The decision sustains the referee in the Pittsburgh district, who refused to award damages to Tomosoka's heirs. He and a fellow employee were cooling themselves with a compressed air hose and Tomosoka's death ensued.

The decision says that the board regards the case as one concerning injuries "from sportive acts of fellow workmen in which the injured himself indulged," and "it seems to us that it would be at variance with common sense to find that, where the deceased invited his companion to do what he did, he was in course of his employment."

Losses paid by workmen's compensation insurance companies in Wisconsin in the year ended June 30 amounted to more than one-half of the premiums received, according to the annual report issued by the insurance commissioner of Wisconsin. The loss ratio of the entire country is 46.1 per cent. In Wisconsin the total amount paid as premiums for the period was $2,273,298, and losses paid were $1,224,616, a loss ratio of 52.9 per cent. Steam boiler premiums for the period were $84,439, and losses were $6,315. Flywheel premiums were $6,174 and losses $2,736.

NEW TRADE PUBLICATIONS

Lathes.—Lodge & Shipley Machine Tool Company, Cincinnati. Collection of bulletins. Illustrations and descriptive matter explain the operation of the company's lathes and the various uses to which they may be put. The bulletins are arranged so that the several parts of the lathes are illustrated and described first, followed by bulletins dealing with the completed tool. The lathes listed include engine lathes with cone pulley and selective head arrangements for securing different spindle speeds, a portable lathe and one for heavy forgings. A bulletin giving examples of the work that has been done on the various machines is included.

Steam Heating.—Warren Webster & Co., Camden, N. J. Catalog. Size, 8 x 10 in.; pages, 144. Illustrates and describes the Webster vacuum system of steam heating and the apparatus employed in connection therewith. The application of vacuum in steam heating and the advantages of the system are discussed, followed by a chapter on its design and installation. A typical system is next described, followed by illustrations and descriptions of the various appliances used. Mention is made of the other apparatus manufactured, such as feed water heaters, steam separators and traps, air conditioning apparatus, etc. Views of the buildings in which the company's heating system has been installed are included.

Motor Trucks.—Packard Motor Car Company, Detroit. Motor truck bulletin No. 27. Points out the advantages of using a motor truck for transporting brick and clay products of all kinds as compared with a horse and wagon. In the case cited the truck earned nearly $4,000 from April, 1911, to Dec. 31, 1915, and completely paid for itself in 5 years.

Induction Motors and Air Compressors.—Allis-Chalmers Mfg. Company, Milwaukee. Four bulletins. The first, No. 1087A, mentions a line of polyphase induction motors which are built in a great variety of sizes. The design and construction of the motors are gone into at some length, being supplemented by engravings of the various parts. A number of views of installations of the motors are included, as well as engravings of the motors themselves. Bulletins No. 1525A and No. 1530A, supplementing No. 1525 and No. 1530, describe two types of compressors for airbrake or stationary and portable work. The last bulletin, No. 1536, superseding No. 1523, presents data on industrial applications of stationary and portable air compressor equipment.

Balancing Washer.—Manning-Loeb Company, Matawan, N. J. Booklet. Describes a balancing washer which serves both as a safety device and timesaver in the balancing of buffing and polishing wheels, being designed as a substitute for the method of balancing by attaching pieces of lead, nails and screws to the light side of the wheel. A view of the washer in use is given, and directions for balancing a wheel with it are presented. Mention is made of the other products of the company which include a complete line of platers' and polishers' machinery, apparatus, chemicals and supplies.

Vacuum Drying Apparatus.—J. P. Devine Company, Buffalo. Three bulletins. The first, No. 101, covers a line of vacuum chamber units adapted for drying materials that can be handled on trays or pans. The second, No. 102, refers to the drum type machine for drying liquid solutions containing solids to a powder and the third, No. 103, gives general description and specifications for rotary dryers for use in connection with materials that can be mixed or tumbled in the drying process. Details of the construction of the various types and tables of the several sizes of each that can be supplied are included.

Electric Hoists.—Euclid Crane & Hoist Company, Euclid, Ohio. Catalog No. 18. Devoted to a line of electric hoists and monorail trolleys. After a short introduction pointing out the advantages of using electric hoists and trolleys in industrial plants of various kinds, a brief general description of the construction of the hoists is given. This is followed by illustrations and condensed descriptions of the various standard types of hoists and the controllers and brakes used. A number of engravings of installations of the hoist are included.

Machine Tool Controllers.—Cutler-Hammer Mfg. Company, Milwaukee. Folder. Describes a line of controllers for machine tools that are made in three different types, plain starting, speed setting and speed regulating, designed for use with machines where the necessary speeds are obtained by gears, where the motor is automatically started and the field rheostat is employed to provide the various running speeds and where it is desired to give the operator control of the starting, setting, speed regulating and reversing from one point respectively. Brief descriptions of the three different types are given and emphasis is laid upon the fact that the company's magnetic lockout switches are used in all, thus eliminating all interlocking contacts and circuits, series relays, protective resistances, etc. A number of illustrations of applications of the controllers to machine tools are included.

Hose Couplings and Throttle Valves.—Dixon Valve & Coupling Company, 19 North Seventh Street, Philadelphia. Folder. Pertains to a line of hose couplings for steam, air drill and other severe high pressure services. Illustrations of the coupling complete and also disassembled are given, together with a list of the sizes that can be supplied. Mention is made of a throttle valve of extra heavy construction for rough service.

Reinforced Concrete Industrial Buildings.—Turner Construction Company, 11 Broadway New York. Bulletin No. 18. Calls attention to the record that has been made by the company in the past 14 years in executing 573 contracts for 125 different industries within the time limit specified in the contracts. A number of views of various contracts are given, showing some of the different buildings completed, and in a number of cases progress pictures of an operation are presented.

Overhead Carrying Devices.—New Jersey Foundry & Machine Company, 90 West Street, New York City. Catalog No. 88. Covers a line of overhead carrying devices which includes tracking, trolleys, hoists, cranes, buckets, cars, etc. Illustrations and brief descriptions are presented together with tables giving the sizes of each that can be supplied. A number of engravings of actual installations is included.

Air Compressors.—Chicago Pneumatic Tool Company, Fisher Building, Chicago. Bulletin No. 34-N. Deals with single inclosed self-oiling steam and belt driven air compressors. After a longitudinal section showing the details of construction and engravings and specification tables of the various types of compressors, the construction is gone into at some length, the text being supplemented by numerous engravings of the different parts. Illustrations are presented of a motor-driven air compressor mounted on a steel truck for portable use and one that is mounted, together with the receiver, on a mine car. A table of the various sizes of air receivers that can be supplied is included.

Cutters.—National Tool Company, Cleveland. Catalog C. Gives illustrations, brief descriptions and size tables of various kinds of high-speed and carbon steel milling cutters. The cutters shown include the plain, side, face and angular types, in some cases with nicked and inserted teeth. End mills and cutters for keyways, T-slots, taps, reamers, twist drills, chains and sprockets and gear wheels are also shown. Formulas for determining the dimensions of gears by the metric pitch are given, together with tables showing the tooth depth and thickness in spur gears and the corresponding diametrical and circular pitches. Mention is made of stocking cutters for involute gears, hollow or lathe mills and counterbores and a comprehensive index is included.

Wing Nuts.—National Screw & Tack Company, Cleveland. Folder. Relates to a line of forged steel wing nuts which are made in a number of different shapes and in tap sizes ranging from 5/32 to ⅝ in. Illustrations of the regular designs of nuts are given together with two of the more special shapes. Mention is made of the other products of the company, which include screws, bolts, rivets, cotters, keys and nuts.

Portable Electric Tools.—United States Electrical Tool Company, Cincinnati. Catalog No. 15. Shows a great variety of portable electric tools, including hand and breast drilling machines for wood and metal, combination hand and bench drilling machines, two types of radial drilling machines, an electric screw driver and grinding machines of the center, external, internal, surface, portable, bench and floor types. In connection with the various machines brief descriptions and tables of the sizes that can be supplied are included. A number of views of installations are given and mention is made of a line of motor-driven tire pumps and special machines for grinding the knives of woodworking machinery without removing them. Instructions on the care of electrical tools are given and a telegraph code is included. An illustrated description of the electric screw driving machine appeared in THE IRON AGE, May 13, 1915.

Gas-Engine-Driven Pumps and Hoists.—Domestic Engine & Pump Company, Shippensburg, Pa. Bulletin No. 16C. Size, 6 x 9 in.; pages, 28. Treats of a line of gas-engine-driven diaphragm, centrifugal, combination and force pumps, geared and chain driven hoists and special outfits for applying power to hand derricks. Illustrations, brief descriptions and condensed specification tables of the various hoists and pumps are included.

THE IRON AGE

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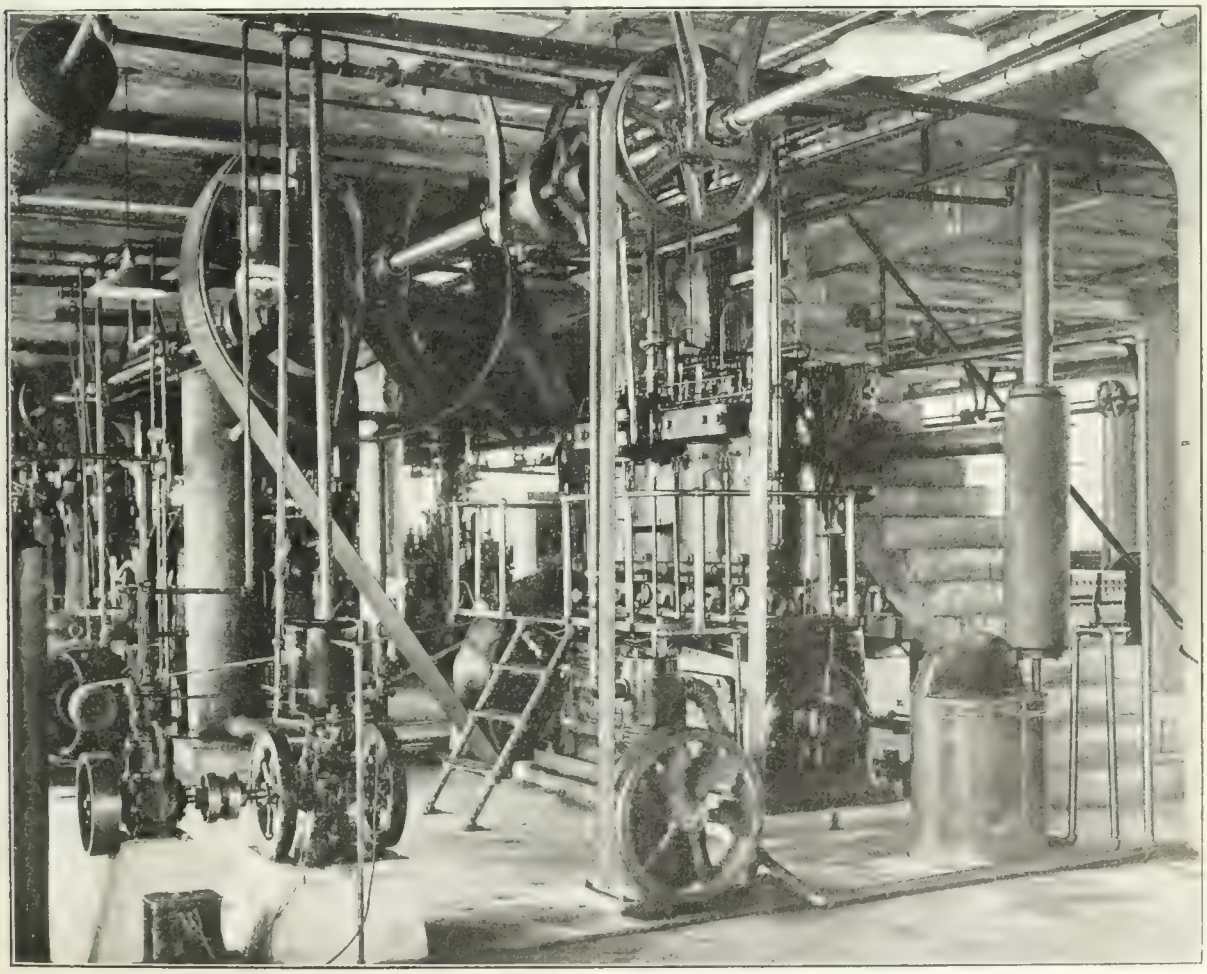
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Gas Engine Drive in Large Machine Shop

Installation in Turner-Moore Plant at Detroit to Cut Power Cost—Water Jacket Heat Converted Into By-Product Steam

BY F. L. PRENTISS

OPERATING a large machine shop with a gas engine is a departure from the usual practice, and for this reason in particular the power plant installation in the new factory of the Turner & Moore Mfg. Company, Detroit, is of unusual interest. From the standpoint of economy there is an additional interest in this power plant because of the fact that the gas is not supplied at a specially low price but is costing the consumer 55 cents per 1000 cu. ft. In spite of this rather high rate the company decided that the cost would be lower with gas than by installing a steam power plant or by purchasing electric current from a commercial lighting and power plant and states that its conclusions are substantiated by actual operation. At present, with considerable machinery to be installed, the engine is being operated at 75 to 80 per cent of its capacity; the plant is now using about 115 hp. and is consuming 1800 to 1900 cu. ft. of gas per hour, making the cost considerably less than it would be were steam power or electric current from a commercial circuit used. The heat ordinarily lost



The Main Gas Engine Is Located in the Center of the Shop on the First Floor with a Smaller One Operating an Air Compressor for Starting It. The Larger Air Compressor for the Cleaning System, the Lighting Dynamo and the Steam Process Tank Are All Grouped Around It

through the cylinder walls of the engine becomes a by-product and is used in the form of steam for heating a soda kettle and will also be used for providing the domestic hot-water supply. The power is furnished by a 150-hp., four-cylinder vertical gas engine located directly in the center of the first floor of the plant.

The plant occupies a two-story standard reinforced-concrete building of the flat slab type, 325 ft. long and 75 ft. wide, the most modern practice being followed in its design and arrangement. It is divided into four bays by 16-in. round concrete columns spaced on 18-ft. 9-in. centers. The ceilings are 12 ft. 6 in. in height. The floors are of 8-in. concrete slabs, the building being designed to carry a second floor load of 175 lb. per square foot. A basement 19 x 75 ft. is provided at each end, one basement section being used for lockers and a washroom and the other for the heating plant. Continuous window space is provided between the curtain walls extending from about 4 ft. above the floor to the ceilings. The entire plant is used for machine work in connection with automobile parts, the first floor being devoted to cylinders and crankcases and the second floor being used for machining smaller parts.

The gas engine, which was furnished by the Bruce-Macbeth Engine Company, Cleveland, is provided with apparatus for utilizing the heat of the jacket water according to the Meriam steam process, illustrated in THE IRON AGE, Oct. 1, 1914. A closed circulating system is provided which includes a centrifugal pump that forces the water over the engine cylinder walls at a high velocity to prevent the formation of bubbles on the surface of the cylinder jackets and thus promote the flow of heat or the cooling effect of the water. The water passes into an inclosed tank, which is connected to the suction side of the centrifugal pump, and a constant circulation is maintained between the cylinder jackets and the tank. A pressure of 4 to 5 lb. is maintained on the tank and the pressure on the cylinder jackets is about 25 lb., this higher pressure being due to the resistance caused by forcing a large volume of water through the jackets rapidly.

The power plant equipment includes in addition to the gas engine and centrifugal circulating pump, a small Novo gas engine operating an air compressor for supplying two small air tanks on which a 250-lb. pressure is maintained for starting the engine on air pressure, an air compressor that provides the air supplied for cleaning work and for water compression of cylinders, this being belt driven from the lineshaft, and a dynamo driven from the crankshaft for providing current for the lighting circuit. The steam process tank is 20 in. in diameter and 8 ft. in height. Adjoining the tank is a soda kettle which is heated by steam coils from the tank. Although only one soda kettle is used at present it is stated there is sufficient steam to heat four or five similar ones. The steam not required is carried out through the side of the building by an exhaust line. The entire power equipment is compactly located, the smaller units and steam process tank being placed at the side of the large engine. A domestic water heater will be installed shortly and a portion of the by-product steam will be run through coils in this heater to provide a supply of hot water for the washroom.

The drive from the engine is from a 60-in. flywheel on the crankshaft that drives a 72-in. pulley on the lineshaft. The flywheel runs at 275 r.p.m. and the lineshaft pulley at 200 r.p.m. Adjoining the large lineshaft pulley is a smaller one that drives the main lineshaft on the second floor, the belt extending from this pulley up through the floor



The Main Lineshaft Is in the Center of the Second Floor and Transmits Power to the Lineshafts in the Other Three Bays Through Belting

to the lineshaft above. A clutch is located on each side of the lineshaft pulley so that either one or both ends of the main lineshaft may be run at one time. Three lineshafts in addition to the main lineshaft are provided in each half of the building on each floor so that the lineshafts extend the length of the building in the center of each bay. The lineshafts are cut in two at the center, making sixteen separate shafts, any or all of which may be in operation at one time. The belt drive from the main lineshaft to the lineshaft in the bay farthest away from the main lineshaft requires a long belt as these two shafts are on 37-ft. centers. The lineshaft hangers are attached to short stringers as shown in the second floor illustration, instead of having continuous stringers as is the general practice. The main lineshaft is 3 12/16 in. in diameter at the driving pulley and tapers down to 2 3/16 in. near the ends.

The plant is arranged for the convenient handling of material. There is an elevator at each end, one 8 x 14 ft. and the other 5 x 8 ft. At the rear of the shop is a railroad siding and a concrete loading platform, the latter being on a car floor level and extending into the plant 4 ft. above the first floor level. One of the elevators adjoins this platform, making it convenient for the handling of material to and from the platform. This elevator serves the basement where the heating plant is located, in addition to the first and second floors.

Chill Molds for Non-Ferrous Castings*

Three materials are available for chill molds for non-ferrous metals, viz. cast iron, steel and malleable iron. Of these the most satisfactory is cast iron. With cast iron molds a generous allowance should be made for machining the casting and also for the removal of surface defects. For small castings the thickness of the walls of the molds need not exceed 2 in., but should be increased with the size of the casting. The iron most successfully used for molds had the following composition:

Table 1—Composition of Iron for Chill Molds

	Per Cent
Combined carbon	0.84
Graphitic carbon	2.76
Silicon	2.02
Sulphur	0.07
Phosphorus	0.89
Manganese	0.29

The high phosphorus is justified by the sharper outlines produced in the castings. Iron high in combined carbon would probably grow and become deformed under repeated heating. It is to be remembered that phosphorus increases the brittleness, and a cast iron of low phosphorus may be preferable, even at some sacrifice in the sharpness of outline.

Steel cores are preferable to sand cores in chill molds. The gate must be designed with care, as the rapid chilling effect of the iron mold permits of little or no constriction at the junction of the head and the casting. Otherwise the metal is likely to set at this point before the feeding has been completed. A sand gate made in a detachable ring attached firmly to the top of the mold has given satisfactory results. The lower thermal conductivity of the sand enabled the smaller head made possible by this method to do all the feeding. A small riser was also used to secure free egress of air and gas from the mold. In one experiment the weight of the head was only 8 per cent of the weight of the casting.

To protect the surface of the mold and to facilitate the extraction of the casting, a coating of seal oil mixed with fine plumbago was found to be satisfactory. Just sufficient coating is required to form a gaseous envelope between the casting and the mold to give a clean surface to the former, in order to facilitate its extraction from the mold. If carbonaceous coatings are undesirable, an emulsion of bone ash and water applied to the surface of the mold with a brush will give good results.

The elimination of dross from the surfaces of brass castings in chill molds has proved to be the greatest difficulty. The position of the mold has some bearing on the problem. The best way to secure clean casting is to prevent all dross and oxide from entering the mold. A suitable flux which will dissolve zinc oxide is useful. Aluminum added to copper-zinc alloys has a more marked effect in checking oxidation of the zinc than any other deoxidizer.

Table 2 compares the properties of alloy castings made in sand and chill molds respectively, and shows the superiority of those made by the latter process.

Table 2—Comparison of the Physical Properties of Alloys Cast in Sand and Permanent Molds

Composition	How Cast	Yield Point Tons Per Sq. In.	Breaking Strength Tons Per Sq. In.	Elongation, Per Cent	Reference
Copper, 85 per cent.; aluminum, 5 per cent.	sand	4.3	18.1	75.0	Eighth report of the alloys research committee, 1907
Copper, 85 per cent.; aluminum, 5 per cent.	chill	7.1	18.1	60.5	
Copper, 90 per cent.; aluminum, 10 per cent.	sand	11.3	31.7	21.7	
Copper, 90 per cent.; aluminum, 10 per cent.	chill	12.4	36.93	30.5	
Copper, 88 per cent.; aluminum, 10 per cent.; manganese, 2 per cent.	sand	13.2	34.44	24.0	Ninth report of the alloys research committee, 1910
Copper, 88 per cent.; aluminum, 10 per cent.; manganese, 2 per cent.	chill	16.8	37.0	25.0	
Copper, 56 per cent.; zinc, 41 per cent.; iron, 1.5 per cent.; tin, 0.9 per cent.; aluminum, 0.45 per cent, and manganese, 0.15 per cent.	sand	. .	33.44	20.0	
The same alloy as given above	chill	. . .	38.4	25.0	

The Most Desirable Size of Sand Blast Sand

A recent inquiry addressed to a number of manufacturers and large users of sand blast apparatus brought out the fact that shot or grit mixed with the sand is not desirable because one is already round and the other will have the sharp corners rounded off very quickly, thus giving the effect of hitting the casting with a dull tool. One user of this type of machinery employs sand that will pass through a No. 10 mesh sieve, while one builder recommends that heavy grain sand only be used as a general rule, unless a fine finish is desired, in which case fine sand can be mixed in.

The location of the plant is a factor in determining the kind of sand that is used. Cape May sand, which can be obtained in different grades, is generally employed in the East, while in the Middle West very fine silica sand is employed with equally good results. Another user brings out the point that various types of machines require different grades of sand, a steel grit being used to better advantage with some machines than the sand, while in others it is out of the question to use the grit at all.

Oglebay, Norton & Co., Cleveland, have published a map of the Menominee iron range of Lake Superior. It is 21½ x 42 in. and with the sectional and tract plotting gives in color the demarkation of the ore formation and the associated greenstone and other rock. The various districts are indicated—Menominee (including Iron Mountain, Quinnesec, Norway, Vulcan and Loretto), Florence, Crystal Falls, Iron River, Felch Mountain and Sturgeon River. The Iron River and Crystal Falls districts in particular have shown important developments in recent years.

The Industrial Corporation of Baltimore City, United States Fidelity and Guaranty Building, Baltimore, of which C. C. Pusey is secretary, has been so successful in securing new industries that its scope is to be enlarged. At a meeting to be held in September it is expected that the capital will be increased from $100,000 to $500,000.

*Abstract of a paper read before the British Foundrymen's Association, by F. Johnson

New Method of Determining Factory Costs

Every Variable Considered — Ordinary Methods of Distributing Factory Expense Burden, the Author Holds, Do Not Take Account of All Factors

BY DR. WILLIAM KENT

THE troublesome problem of the proper distribution of expense burden has been a source of controversy among factory accountants for many years. In 1885, Capt. Henry Metcalfe published a most valuable book on "Cost of Manufactures and the Administration of Work Shops," which is now in its third edition, and is still considered a standard work. In that book he illustrated the forms of labor and material cards and the systems of keeping records that are still in vogue, but his method of apportioning the expense burden was that of the "man-hour," which is now commonly discredited. In the many books on cost accounting that have appeared during the past thirty years, numerous methods of allocation of burden are described, such as (1) percentage of cost of material; (2) percentage of direct labor cost; (3) percentage of "prime cost," that is, the sum of labor and material cost; (4) a fixed rate per man-hour; (5) a fixed rate per machine-hour, or machine rate, which Hamilton Church in his book on the "Distribution of Expense Systems," calls the "ichthyosaurus of expense systems, belonging to the Silurian epoch of shop accounting"; (6) Mr. Church's so-called "scientific rate" and supplementary rate.

Captain Metcalfe in describing the man-hour method says that the running expenses of a factory are incurred only to organize its labor for profit. The method is to divide the total general shop expense for the preceding year by the total number of hours of shop work done during that year, and thus to "obtain a load by which to increase the charge for each hour during the present year."

The method of distributing burden in proportion to direct labor costs is stated to be the best of all systems and the one generally adopted, in a book on "Factory Accounts," by Hathaway and Griffith, published as recently as 1910, by the American School of Correspondence, Chicago. Mr. Church's method with the supplementary rate is approved by Prof. Dexter J. Kimball in "Auditing and Cost Finding," Vol. 7, of the Modern Business Series of the Alexander Hamilton Institute, New York, but he treats all the systems impartially, showing both their advantages and disadvantages and showing that one system may be best for one kind of business and not for another.

The writer, in *Iron Trade Review*, Feb. 14, 1909, in a review of Mr. Church's book condemned the supplementary rate, saying it not only introduces great confusion in bookkeeping but may give the management erroneous ideas as to what the real shop efficiency is.

Most other authors agree in stating that all systems are imperfect, that the best one gives only an approximation of true costs, and that some systems are much worse than some others.

VARIABLE RESULTS GIVEN BY DIFFERENT METHODS

As an example of the different results that may be obtained as the apparent cost of the same job by using different cost systems, let us assume that there are three jobs, A, B, and C; A and B being single jobs on single pieces of material costing $1, while C is really ten different jobs on ten pieces of material of different shapes, the cost of the raw material for the whole ten adding up to $1. The labor cost on A is five hours at 40 cents, on B ten hours at 20 cents and on C eight hours at 25 cents. In each case, the labor cost is $2. A is worked by a high-priced workman with a vise, chisel and file; B by a low-priced man watching an expensive boring mill going around; C by a man with a small lathe.

By the man-hour method of distributing burden, the burden rate of the shop is 25 cents per man-hour, by the percentage on direct labor method the burden is 100 per cent, by the "scientific" machine-hour rate, the rate for A is 20 cents, for B 50 cents and for C 40 cents. By the three different methods, the burden then appears as follows:

	Man-hour	Percentage on Labor Cost	Machine Rate
A.....	5 × .25 = $1.25	$2.00	5 × .20 = $1.00
B.....	10 × .25 = 2.50	2.00	10 × .50 = 5.00
C.....	8 × .25 = 2.00	2.00	8 × .40 = 3.20

Adding $3 to each job for material and labor, we find that A costs from $4 to $5; B, from $5 to $8, and C, from $5 to $6.20, according to the system that is used in computing the cost.

All three systems are objectionable; both the man-hour rate and the percentage on labor cost, because they fail to take into account the difference in cost of machines and their cost for floor-space, power, depreciation, repairs, etc.; and the machine-hour rate in that it fails to take into account the fact that the cost of superintendence, clerk hire, transportation and certain other fixed charges have no relation to machine costs. The per cent on labor costs is especially objectionable in that it puts too high a burden on the work done by a skillful high-priced man and too low a burden on that done by a slow and unskilled man.

None of the three systems takes into account the fact that job C, which is in fact ten different jobs, may require ten times as much supervision on the part of the foreman and ten times as much time of the store-keeper and bookkeeper as either one of the other jobs requires.

From the statistical facts above given, how can we arrive at a cost figure of these three jobs which may be used in the inventory of finished material, or as a basis of predicting the future costs of jobs of the same kind, or as a basis on which we can fix the selling price?

THE VARYING INFLUENCE OF DIFFERENT PARTS OF THE BURDEN

It would appear that in an accurate, or in even an approximately accurate, cost system, certain portions of the burden, such as interest, depreciation, cost of floor space, cost of power and of supplies, and assistance given by the tool maker and by the foreman in keeping the machines running, should be distributed on the work done in the several machines by a machine-hour rate (not a uniform rate, but one which varies with the machine), and that this rate should be independent of certain other classes of factory expense which are not related to the cost of machines.

Of these other expenses, those relating to the purchasing and storing of material and to transportation, belong to material alone. Another portion of the expense seems to depend, or is properly apportioned to, the number of jobs that pass through the factory in a day. For example, if a man has ten jobs a day, he takes a great deal more of the foreman's time to prepare his work for him and see that he knows how to do it, and more of the time of the planning and cost departments, than if he did only one job in a day. Other parts of the total factory expense are related neither to machines nor to number of jobs nor to weight or cost of material, but are related to the number of men in the shop and the number of hours they work irrespective of their wages. That is, they are related to a man-hour rate.

It does not appear that any portion of the burden should be divided in proportion to direct labor cost, notwithstanding the fact that most factory accountants approve of this method of division. For example, suppose that in a certain factory it has been shown that the total annual burden equals the annual cost for direct labor. The burden charge then is 100 per cent of the direct labor cost. A job on which one man works for 10 hours at 20 cents per hour is charged with a burden of $2, while another job, on which a more skilful man, requiring no more floor space, heat and light than the other, and not as much of the foreman's time, works at 40 cents an hour, has a burden of $4 charged against it. It seems that the percentage-on-labor-cost method is wrong in principle, and that the only thing that can be said in its favor is that it is an easy method for the accountant.

There thus remain four separate parts into which the total annual burden should be divided, relating respectively to (1) material, (2) man-hours, (3) number of jobs, (4) cost of keeping machines in operation, including floor space, interest, depreciation, etc.

A PROPOSED METHOD OF DISTRIBUTION

The writer offers the following, tentatively, as a proposed method of distributing burden and figuring costs, taking a hypothetical case in which the total annual burden to be distributed is $50,000, and in which the classification under four heads is made roughly in round figures:

Related to Man-hour	
Shop superintendent	$2,500
Asst. superintendent	1,500
Bookkeeper	1,500
Asst. bookkeeper	800
Blacksmith	1,000
Helper	700
1 Laborer	600
Millwright	900
Helper	700
Apprentice	600
Draftsman	1,500
2 Assistants	1,600
Boy	400
Patternmaker	1,200
Asst. patternmaker	800
	$16,300

Related to Material	
Storekeeper	$1,500
Asst. Storekeeper	500
Stenographer	1,000
File Clerk	700
Stationery and postage	500
Truckman	900
Watchman	800
Craneman	800
Laborer	600
Apprentice	600
Boy	400
Interest and depreciation on $20,000 stores, at 8 per cent	1,600
Interest on $10,000 cash reserves at 5 per cent	500
	$10,400

Related to Jobs	
Cost clerk	$1,200
Assistant	600
Planner	1,500
2 Assistants	1,200
2 Foremen	2,400
	$6,900

Related to Machine Rate	
Tool maker	$1,200
Assistant	900
Oil, waste, and other supplies	1,200
1 Foreman	1,200
Interest and depreciation, taxes and insurance on machinery, $50,000, at 13 per cent	6,500
On real estate, $20,000 at 9 per cent	1,800
Power	7,500
Light	480
Heat	840
	$21,620

Totals	Less Charged Directly to Jobs	To Be Distributed in Proportion to Man-hours Material, Jobs, Machine-hours
$16,300	$1,300	$15,000
10,400	1,400	9,000
6,900	900	6,000
21,620	1,620	20,000
$55,220	$5,220	$50,000

The statistics of the preceding year, a year of normal business activity, showed that there were 250,000 man-hours of direct labor; also 250,000 machine-hours (considering any place where a man worked, whether a machine, bench or floor, as equivalent to a machine); 100 men, 300 days in the year, averaging four jobs per man per day = 120,000 job cards per year; material $60,000 per year. Dividing the several burden costs by these figures we have:

Man-hour cost, $15,000 ÷ 250,000 = 6 cents per man-hour.
Job cost, $6,000 ÷ 120,000 = 5 cents per job card.
Material cost, $9,000 ÷ $60,000 = 15 per cent (average).
Average machine-hour cost, $20,000 ÷ 250,000 = 8 cents per machine-hour (average).

The machine-hour cost would range from 4 cents (a floor or bench space) to 60 cents, depending on the class and size of the machine and on the number of hours it runs in a year. Some machines might run 80 or 90 per cent of full time, and others, such as key seaters, broaching machines and hydraulic presses, only 5 or 10 per cent. A list of machines, benches, etc., should be made and the proper charge per hour for their use calculated, taking into consideration their cost, depreciation, and repairs, and the floor space, power, light and heat required for them, and also the number of hours per year they are expected to run. The material cost, averaging 15 per cent, may be classified and converted into different rates for different classes of material, as, for example, iron castings 15 per cent, forgings 10 per cent, steel bars and plates 20 per cent, brass and copper 3 per cent.

It may seem that this system of distributing burden is more complicated and may require more clerical work than any of the other systems, but it may be made no more complicated than the old machine-rate system. It requires the same preparatory work of listing the machines and establishing their hourly rate, and the extra calculation required on the job card for obtaining the cost is a mere trifle. Thus a card on the ordinary machine-rate system would have on it:

Hours × rate	Labor cost
10 × 25	$2.50
Burden rate 19, Burden	1.90
	4.40

while on the combination system it would have

Hours × rate				Labor cost
10 × 25				$2.50
Burden rate	Job	M-hr	Mach	
		06	12	
Burden amt	05	60	1 20	1 85
				4.35

The figures 0.05 and 0.06 could be printed on the card, for they would be constant for a year; the figure 0.12 would be obtained from a card showing the machine-hour rate for the different machines in the factory. The only extra clerical work actually needed would be multiplying the hours by the man-hour rate, writing down 0.60 and adding together 0.05, 0.60 and 1.20.

The calculation may be made still shorter by omitting from the card the man-hour rate, 0.06, and adding this figure once for all to the figures on

the list of machine-hour rates. The burden figures then will be

Job	Mach.	Man-hour	Total burden
—		0.18	—
0.05		1.80	$1.85

For statistical purposes, however, it is well to keep the man-hour rate separate from the machine-hour rate so that the total charges for each rate on all the cards for a given period may be compared with the actual expenditures for burden, and so that the total charges for each rate on two jobs of the same kind done at different times may be compared with reference to the two kinds of burden. For example, suppose this same job were to be done on a more expensive and faster running machine, whose hourly burden was 20 cents instead of 12, and the job was done in 8 hours instead of 10. The card would show

Hours × rate			Labor cost
8	25		$2.00
Job.	Man-h.	Mach.	Total burden
—	0.06	0.20	—
0.05	0.48	1.60	2.13
			4.13

The cost is 22 cents lower on account of saving on the labor cost and on the man-hour burden, notwithstanding the higher machine burden.

The writer believes that the proposed system, which he calls the "combination system" until a better name can be found for it, is a more accurate method of distributing burden than any of the methods described in the books. He hopes before long to elaborate it in greater detail, and in the meantime he will be glad to receive any comments upon it.

Britons to Prepare for After-War Conditions in Iron and Steel Industries

To consider the position of the iron and steel industries after the war, especially in relation to international competition, the following committee of the British Board of Trade has been appointed: G. Scoby Smith, chairman; Sir Hugh Bell, Bart.; Archibald Colville, Dalzell Steel & Iron Works, Motherwell, Scotland; John Hodge, M.P.; James Gavin, George Mure Ritchie, Henry Summers, Benjamin Talbot, John King, and John E. Davison, Lanarkshire Steel Works, Motherwell.

To carry out its investigations, the committee plans to secure detailed information from a number of representative and individual firms, and from industrial, commercial and labor organizations, with respect to:

1. The extent and area of trade, and capital normally employed.
2. The dependency upon resources external to this country for supplies of material and plant.
3. Labor relations, labor restrictions (if any), and comparative conditions in the industry.
4. British methods of conducting foreign business contrasted with foreign methods of conducting export business.
5. The effects of manufacturing and commercial co-operation upon trade at home and abroad.
6. The extent to which British industry is adversely affected whether as regards (a) the retention of business hitherto or previously secured, or (b) its capacity for expansion, by the existence of foreign tariffs, preferential arrangements, bounties, subsidies, or special facilities granted by foreign governments, railroads, or trade combinations, to their manufacturers or exporters.
7. Terms of payment and of credit.
8. Technical education, skill, and nature of employees.
9. The effect, if any, of rights-of-way and mining or other royalties upon the industry, either as regards home or export trade.
10. The effect, if any, of railroad and shipping rates upon the industry, as regards home, or export trade.
11. General information.

The Oregon Industrial League, Portland, Ore., is to begin a campaign to secure additional manufacturing enterprises. The sum of $500,000 is being raised for loan purposes.

Chemists and Technical Men to Meet

The American Chemical Society will meet in New York, Sept. 25 to 30, in conjunction with the Second National Exposition of Chemical Industries. Dr. Charles H. Herty, of the University of North Carolina, president of the society, will open the exposition on Monday, Sept. 25, at 2 p. m., with an address reviewing the history of chemistry and the chemical industries in this country and outlining developments since the outbreak of war in Europe. The presidents of co-operating societies, such as the American Electrochemical Society, the American Institute of Mining Engineers and the American Paper and Pulp Association, will follow Dr. Herty with speeches of welcome and reviewing the progress made in the industries represented by them.

The first general session of the American Chemical Society will open at Columbia University on the following morning. Arrangements are being perfected for a public meeting in the large hall of the College of the City of New York in the afternoon, when addresses will be made of general public interest pertaining to the interesting developments in the field of applied chemistry during recent years. The program of the week's meetings will provide for general conferences on subjects in which the chemists of the country are now interested and it is intended that the lecture hall of the Grand Central Palace and Rumford Hall in the Chemists' Club building will be occupied each afternoon at the same time by one or other of the different divisions of the society for the discussion of such industrial topics as the production of dyestuffs, medicinal chemicals, industrial alcohol, the manufacture of paper pulp and by-products, oils and motor fuels, glassware and porcelain, steel alloy metals, new developments in chemical industries, etc.

The American Electrochemical Society has also planned a series of interesting meetings. The electrochemical group will open its meeting later in the week, on Thursday, with a technical session devoted to a review of American progress in the electrochemical industry. One of the sessions will be devoted to "Made in America" products of the electric furnace and electric cell. These products include many of our most important staples, such as copper, aluminum, abrasives, bleaches, graphite, magnesium and ferrosilicon and other alloys. A complimentary smoker will be held on Thursday evening and on Friday evening there will be a joint subscription banquet at the Waldorf-Astoria of the members of the American Chemical Society, the American Electrochemical Society, and the Technical Association of the Pulp and Paper Industry. Further information can be obtained from Allen Rogers, chairman Press and Publicity Committee, Pratt Institute, Brooklyn.

Great Britain to Help Finance Italian Trade Development

The British-Italian Corporation, Ltd., has been formed to develop trade between Great Britian and Italy, with a capital of £1,000,000, which has been subscribed privately, chiefly by banks. The British Government agrees to contribute to the company, by way of subsidy, in each of the first ten years after its incorporation, the annual sum of £50,000, or the equivalent of 5 per cent on its paid-up capital. The company, on its part, agrees to pay to the government amounts equal to any dividend, above accumulated dividend of 5 per cent per annum, which the directors may distribute to the shareholders in any year. The repayment of contributions to the government is to terminate when the government has received the amount paid by way of subsidy to the company, but without interest. The counterpart of this British corporation is to be a company in Italy, formed under the Italian law, with a capital of £400,000, one half of which is to be taken up by the British-Italian Corporation, Ltd., and the other half by the Credito Italiano and its friends. The British directorate is to include representatives of British banking and industry with three representatives from Italy, and, similarly, of the nine directors of the Italian company three will be British.

Three-Stage Centrifugal Boiler Pump

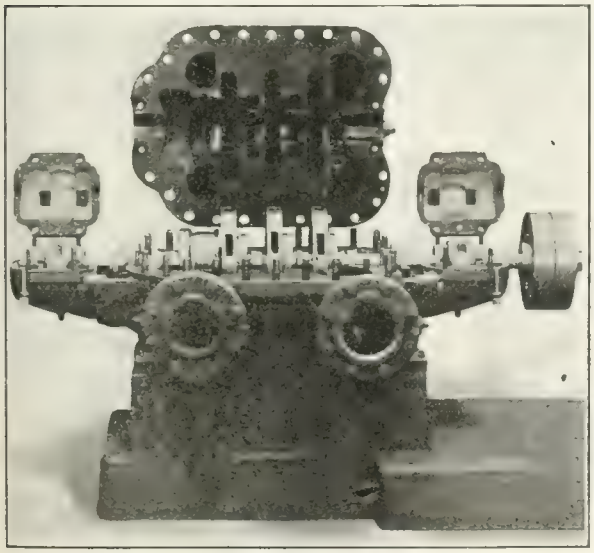
Orders for several of its three-stage centrifugal boiler feed pumps with direct-connected steam turbine drive have been received by the A. S. Cameron Steam Pump Works, 11 Broadway, New York City, from the United States Government. The pump can operate at the speed of the turbine, 3100 r.p.m., it is explained, because of the design of the impeller, in which the vanes are brought well down into the hub.

As will be noted from one of the accompanying illustrations, the casing is divided horizontally along the center line. The upper half is readily removable, thus giving access to the revolving element and both the suction and discharge connections are in the lower portion of the casing. The inlet and outlet nozzles in the pump illustrated are on the same side of the casing, which is an advantage where the space available for installation is limited, although if desired the nozzles can be placed on opposite sides. Openings for draining the pump and for displacing the air when starting are also provided in the casing.

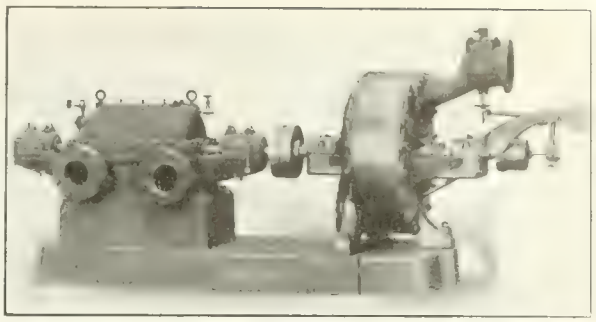
The shaft is a steel forging finished by grinding and protected by bronze sleeves where it comes in contact with the water. This arrangement is relied upon to prevent the stuffing box packing from scoring the surface of the shaft. The impellers, which are of the inclosed type, are each a one-piece casting. The vanes are brought well down into the hub, thus, it is explained, giving small external diameter and the desired length of vane. They are also turned to guide the incoming water smoothly and with little loss into the other portion of the vanes where the velocity is generated that is finally converted into useful pressure by the external diffusion vane. Each impeller hub is surrounded by two rings, one of which is attached to and revolves with the impeller, while the other, which is attached to the casing, is stationary. This arrangement is relied upon to restore the tightness of the joint between the low and high pressure sides of each stage without employing a special fitting. The diffusion ring surrounding the impeller at its periphery contains a series of openings, the areas of which slightly increase toward the periphery. In this way, it is explained, the water is received from the impeller at high velocity, which is reduced to pressure, and advanced to the next impeller with little loss of energy.

An internal hydraulic balancing device, consisting of a revolving disk attached to the shaft at the high pressure end opposite a stationary drum of the same diameter, is provided to take care of the thrust. The space between the disk and the drum is filled with water at high pressure, which it is pointed out causes the former to react against the thrust, neutralizing it and holding the rotor in proper relation to the casing. The slight amount of leakage involved in this process is piped back to the suction. Two self-aligning bearings equipped with ring-oiling devices are provided, one on each side of the casing. The bodies of the bearing, which have removable caps, and the bushings are split horizontally. Brackets cast integral with the lower casing support the bearings and are relied upon to counteract any tendency toward vibration. Felt washers are employed to prevent the escape of oil from the chambers in the bearings and space is left between the brackets and the stuffing boxes to provide for the adjustment of the gland in each box. Water seals, consisting of a lantern gland in each box connected to the water from the discharge side of the pump, are provided. Swing bolts with which the gland is fitted provide quick and easy access to the stuffing box.

The bedplate used under the pump and the turbine is of one-piece box construction, reinforced by cross ribs. The connection between the shafts of the turbine and pump is made by a coupling of the flexible type, which enables any slight variation in alignment to be compensated for.



The Internal Parts of the Pump Are Rendered Readily Accessible by Raising the Cover



A Three-Stage Centrifugal Boiler Feed Pump Having Capacity of 350 Gal. Per Minute, Which Is Driven by a Direct-Connected Steam Turbine at 3100 r.p.m.

Failures of Crankshafts in Diesel Engines

That the engineer in charge is primarily responsible for the life of the crankshafts of Diesel engines is the opinion expressed in a paper read before the Diesel Engine Users' Association recently, according to the London *Times Engineering Supplement.* The paper states that certain reasonable and simple precautions will prolong the period of usefulness indefinitely. A number of failures cited in the paper were attributed to lack of alignment of the main bearings, which generally resulted from unequal wear of the several shaft bearings, although this same result was brought about in some cases by negligence in the erection of the engine, or to defective foundations in some of the older ones.

A four-cylinder engine is most likely to suffer shaft breaks, with the two-cylinder types having heavy flywheels, a close second. The shafts almost always fail through the throw arms, the crack starting at the center and working outward. With the four-cylinder engine the throw arm nearest the flywheel fails in most cases and this is also true of the two-cylinder units. Either throw of the single-cylinder type may fail and with a three-cylinder engine, which is the least likely to be affected, the failures are equally divided between the two end throws.

The American Brass Forging Company, Inc., will remove its offices on Sept. 1 from 120 Broadway to its plant at 168 Southern Boulevard, New York.

Iron-Boron and Iron-Carbon Alloys

Russian Comparison Giving the Properties and Preparation of the New Compounds as Well as Their Equilibrium Diagram

A PAPER taken from the *Journal* of the Russian Metallurgical Society, 1915, has just reached this country which gives an account of work done on the iron-boron alloys, at the Tomsk Institute of Technology, Tomsk, Siberia, by Prof. N. Tschishewsky and A. Herdt. While the whole field is not thoroughly covered the results obtained are very interesting, particularly as showing a similarity between these alloys and those of iron and carbon. This similarity was expected to some extent in the case of boron which exhibits many of the properties of carbon and occurs close to the latter in the periodical classification of Mendelejeff.

PREPARATION OF THE ALLOYS

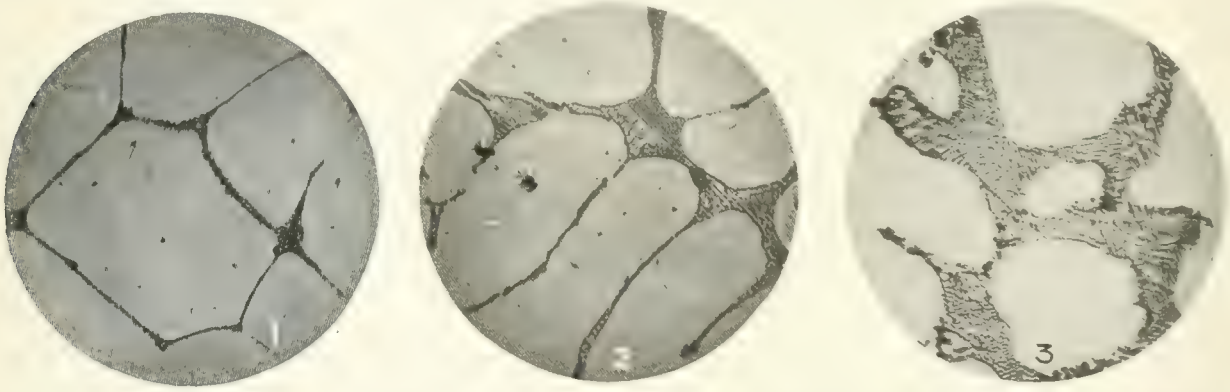
As in work by previous investigators it was found that pure amorphous boron could not be used because of its rapid oxidation. After a series of preliminary experiments with various protective gases the best method was found to be the use of ferroboron, containing a large percentage of boron. In this way oxidation does not take place as easily and the melting proceeds much more quickly. The materials used were Swedish nail iron, containing carbon, 0.1 per cent; manganese, 0.14 per cent; sulphur, 0.012 per cent; phosphorus 0.008; and silicon 0.014 per cent; as well as the ferroboron. The full analysis of the latter is not given but it contained 23.69 per cent boron, and very small amounts of other impurities.

Melting was carried out in a porcelain tube in a Tammann furnace, the amounts of ferroboron required being added in pea-size to the molten iron. The charge in each case was 100 gr. (0.22 lb.), with the intention of having enough material for chemical and metallographic examination and mechanical tests. After the necessary temperature was obtained (1500 deg. C. up to sometimes 1550 deg. C.) the metal was thoroughly stirred with a silica rod. Further heating was then stopped and the alloy cooled slowly in the furnace. By means of special insulating arrangements the time of cooling to 650 deg. C. took about 30 to 35 minutes. A carefully calibrated Le Chatelier pyrometer was used, and cooling curves obtained with a recording apparatus of Professor Kurnakow.

The investigation of the cooling curves was not carried lower than 650 deg. C. because several experiments with alloys containing different amounts of boron down to 270 deg. C. all showed completely smooth curves below 650 deg. C. Separate cooling curves need not be given, because the data found is brought together in the equilibrium diagram.

ANALYZING FOR BORON

The paper then gives in detail the method used to determine the boron in the alloys. It is volumetric and is very similar to that used by Prof. H. Moissan, modified by that of L. C. Jones. Further analysis of the alloy is not given, the work in this respect being therefore open to criticism. Apparently mechanical tests of the alloys were not made, but the microstructure was carefully examined, picrate of sodium being used as the etching medium.

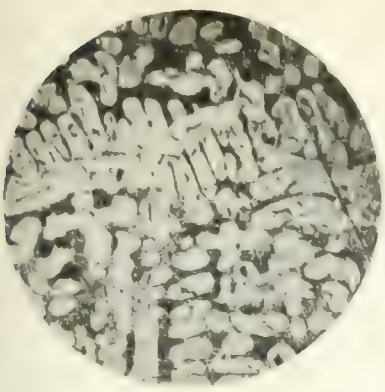


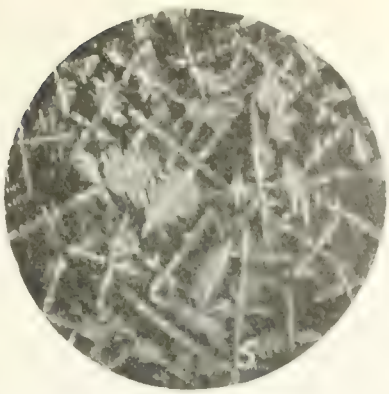
Photomicrographs of Iron-Boron Alloys. Fig. 1 is from an alloy containing 0.33 per cent boron; Fig. 2, from one having 0.61 per cent boron, and Fig. 3, from one which showed 1.21 per cent boron. They are slightly reduced from an original of 250 diameters for Fig. 1 and 350 diameters for Figs. 2 and 3

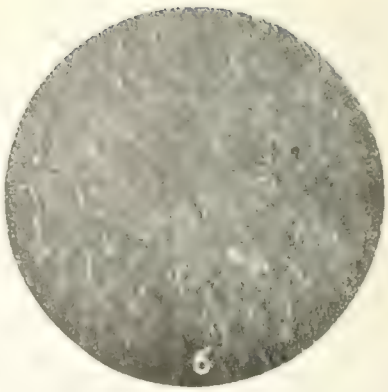
A pearlitic constituent is found even with as little as 0.08 per cent boron. In these slowly cooled alloys it is even more marked, in pearlitic effect, than that of ordinary carbon steels. It may be called boric pearlite. Figs. 1 to 6 show how it increases. Fig. 5 is said to be characteristic of the alloys close to the eutectic ratio, the ferrite being found in fir-tree like crystals. The eutectic alloy, shown in Fig. 6, contains about 3.1 per cent boron, the average of three analyses giving 3.11 per cent.

With further increase in the percentage of boron free boride of iron is found, often in beautiful crystals, as shown in Fig. 7. As the boron increases to more than 8 per cent it is extremely difficult to prepare sections, the crystals of boride are only loosely held together by the eutectic. The alloy with 8.5 per cent boron is so brittle that it can be crumbled in the fingers. This boride is extremely insoluble in boiling hydrochloric or sulphuric acids whether strong or dilute. By heating a sample containing 8.85 per cent. boron for two days, with twice normal hydrochloric acid, crystals were obtained having a steel-gray color. Three determinations showed them to contain 8.39 per cent. boron, while theoretically the boride Fe_2B should have 8.96 per cent.

When more than 9 per cent. boron is present, the alloys show a differentiated structure, with better mechanical properties. It is however very diffi-







Photomicrographs of Iron-Boron Alloys. Fig. 4 is from an alloy containing 1.84 per cent boron. Fig. 5, from one having 2.90 per cent boron, and Fig. 6, from one which showed 3.10 per cent boron. They are all slightly reduced from an original diameter of 200 for Figs. 4 and 5 and of 750 for Fig. 6

cult to prepare sections, and no photomicrographs are given. The alloys with more than 11.5 per cent. boron could not be investigated because of their very high melting point. Pyrometer tubes of electro-quartz softened while being sunk in the molten metal.

THE EQUILIBRIUM DIAGRAM

From the results of the thermal, chemical and micrographical analysis an equilibrium diagram was plotted as is shown by Fig. 8. A eutectic alloy is formed with 3.1 per cent boron. The ferrite portion of this eutectic is a solid solution of Fe_2B in iron, containing only about 0.08 per cent boron. In the area *AEB* there may be noticed a transformation in the alloy, proved by a series of points on the line *kz*, and shown by a slight evolution of heat during cooling. It is probably caused by the change of the iron from the gamma to the beta condition.

The point *C* corresponds to the crystallization of the compound Fe_2B, and with further increase in the amount of boron a eutectic Fe_2B—FeB is observed. Below the period of solidification some transformations were noticed as shown by the lines *GS* and *PK*. The heat effect of these changes was very small and some of the arrests could hardly be noticed. This part of the diagram is to be more carefully explored in the future by still more delicate apparatus, and results published later.

G. B. W.

Contract for the construction of six barges, each 207 x 305 ft., and equipped with coal-handling devices, has been received by the recently formed Coastwise Shipbuilding & Lighterage Company, Locust Point, Baltimore, from the Philadelphia & Reading Railroad Company. It is stated that only wooden vessels will be built by the company.

Workmen's Compensation Increases Malingering

That the effect of the workmen's compensation act in Great Britain has been to increase the malingering of workmen who were but slightly injured is the conclusion reached in a paper read by Sir John Collie, M.D., before the Assurance Medical Society and the Medico-Legal Society. The paper is commented on in the *Engineer*, of London, of July 28.

With similar numbers employed in 1908 and 1913, the total number of fatal and non-fatal accidents has risen from 326,701 to 472,408. Of these the increase in fatal accidents was only 7 per cent, while the non-fatal cases increased 45 per cent. The significant fact in this connection is the increase in the comparatively unimportant cases. Slight accidents, necessitating three to four weeks' absence from work, have increased 46 per cent, while very slight cases incapacitating the worker for but two to three weeks have increased 76 per cent.

The author of the paper lays this condition in part to the crudities of the compensation act itself. At present a worker does not draw compensation for the first seven days of his incapacity unless he is laid up for a period of two weeks or more. In the event of a worker receiving an injury that will incapacitate him for 12 days, entitling him to but five days' compensation, it is natural that instead of returning to work on the thirteenth day he should prolong his injury for two days more, and thereby receive compensation for 14 days instead of five. This contention is supported by the fact that in a large district where the practice has obtained for some time of paying compensation from the first day of injury, the total annual amount disbursed was less than would have been the case if payments had been made in strict accordance with the legal provisions.

The Maryland Culvert & Metal Company, Baltimore, has been incorporated by William M. Baker, 1031 Munsey Building, E. McClure Rouzer and Roland H. Brady, to deal in steel, iron, etc.

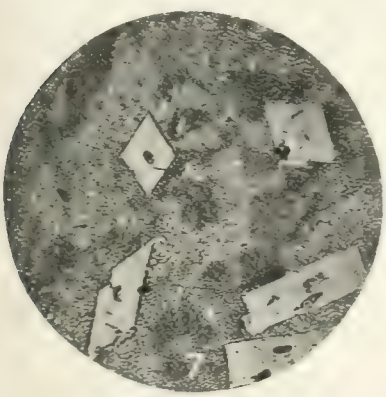


Fig. 7

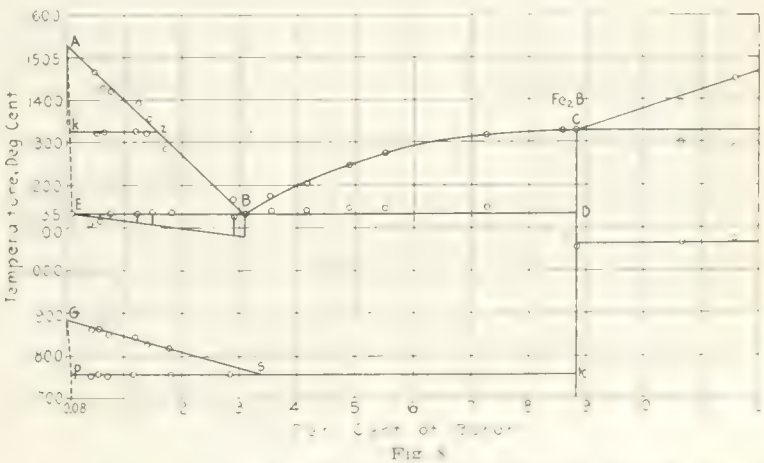


Fig. 8

Fig. 7 Is a Photomicrograph of an Iron-Boron Alloy Containing 4.1 Per Cent Boron. [illegible] Is Slightly Reduced [illegible] Original of 350 Diameters. Crystals of iron boride are visible. Fig. 8 represents the iron-boron equilibrium diagram

Oxygen Gas in Blast-Furnace Operations

Examples of Its Effective Use in Opening Hard Tap Holes, Frozen Cinder Notches or Tuyeres That Are Plugged with Iron

BY DAVID F. BAKER

Oxygen gas under high pressure in cylinders, coupled with a very simple apparatus for using it efficiently, is to my mind one of the most efficient tools in use on any blast-furnace plant as an aid in keeping the furnace on time with its casts and in minimizing the extremely hard work attending the recovery of a furnace that for any reason has run off cold.

The apparatus in use on the blast furnace at the Broken Hill Proprietary Company's steel works in Newcastle, New South Wales, Australia, consists of two gages with a reducing valve between them, such as is used with the oxy-acetylene blowpipe, a heavy ½-in. rubber tubing about 30 ft. long with a ¼-in. bend in one end, and a number of ¼-in. pipes about 18 ft. to 20 ft. long. A sleeve is kept on the end of the bend not in the tubing, which allows of a quick connection with the pipe.

OPENING A HARD TAP HOLE

To describe the use of this apparatus we will take as an example a condition that every furnaceman has met with at times and which in extreme cases causes a good deal of anxiety, namely, a hard hole.

We have drilled in, say, with a hand drill until it seems as if we have struck a granite wall through which we are making very little if any headway. The drill is kept going until it is seen that it will mean possibly hours of work to cut through. Probably by this time we have struck a thick iron skull, though not necessarily so. The hole is very likely to show a dull red by this time. Then a container of oxygen, such as has been before described, is brought up and put at the side of the cast house where it will not be exposed to too much heat. The gages with the rubber tube attached are screwed into the proper place in the container and a ¼-in. pipe will be connected to the bend at the other end of the rubber tube. Now we are ready to open the hole. If the hole is a bright red, it will probably be hot enough to cause the oxygen to set the end of the ¼-in. pipe to burning and this will quickly burn the hole out. If the hole is too cold for this, a small coke fire may be started in the cinder run and the end of the pipe may be thrust into this and started burning in this way. Once started the pipe is quickly thrust into the hole and held up against the skull before it stops burning. It may take a number of pipes before the hole is burned through for, of course, the pipe quickly melts off, but it practically never fails to bring the iron.

It must be kept in mind that the ¼-in. pipe must be kept burning to have any effect. After one pipe is burned off the remaining short piece is unscrewed from the bend and another long piece is screwed on. This time, if the first pipe has failed to bring the iron, it is not necessary to light the end of the pipe, for there will be a certain amount of molten iron which has come from the first pipe lying in the hole. Therefore, the pipe will simply be thrust into the hole and the oxygen will be turned on. The pipe will immediately light up from the molten material lying in the hole. This is kept up, replacing the tubes as quickly as they are burned off, until the hole is burned through; and it is a very bad case that will not yield to this treatment in 15 to 20 minutes.

I have used this apparatus to burn out a hole that has run a good deal of iron and has closed up again. Of course, here the hole is lying full of molten iron and the pipe burns up very quickly, but by quick work and frequent changes of pipe I have succeeded in reopening the hole. This, however, is a case that requires skillful handling.

It sometimes happens that a tapping bar is driven into the hole and cannot be withdrawn and becomes frozen into the hole. With this orygen apparatus it is not even necessary to try to pull the bar off, leaving part in the hole as can be done with a gang of men pulling a ball against a ring and wedge. It is only necessary to get the oxygen apparatus to work, for when there is a clean iron or steel plug in the hole the oxygen burns it out in no time.

The apparatus works best, of course, where the hole is plugged with iron or at least where there is a big percentage of iron in the hole. However, I have at times burned through a foot or 15 in. of slag and clay, with very little iron if any in it, and have opened a hole in 20 min. to half an hour that by ordinary methods would have taken three to four hours of the hardest kind of work.

The tools that I have regularly used to open the hole consisted of an electric twist drill with which to open the hole to the skull and a hand drill operated by the whole furnace crew to punch through the skull, keeping the oxygen apparatus as the final word in case of trouble. With these tools the opening of the iron notch no matter what the condition of the furnace was always the least of my troubles.

OPENING A FROZEN CINDER NOTCH

A second use to which the oxygen was put, and very successfully, was that of opening the cinder notch. On every furnace I have ever seen there is trouble at times in getting into the cinder notch; and when a furnace needs to be flushed this is a very awkward thing to have happen. In such a case I have always been most successful with the use of oxygen. Care should always be exercised when burning out the cinder notch to avoid burning the monkey. If the pipe is entered carefully, so as not to touch the monkey, there is very little danger of injuring it. At times the skull in back of the monkey was just pure cinder, in which case my method was to have a sharp steel tapping bar ready, and after using the oxygen until the slag was at a yellow heat and just at the melting point, quickly pull out the pipe, enter the tapping bar and drive as quickly as possible. This method failed only where the slag would not run. Of course, if there was iron in the monkey the oxygen took care of it very easily.

At times, at the end of the flush just before cast, the furnace may slip or the notch begin to blow heavily, picking up the iron and throwing it heavily through the monkey. Then if the notch is stopped quickly, the monkey is quite likely to be plugged with iron. Such a case causes no trouble if this

oxygen apparatus be used, for when ready to flush again the notch may be quickly burned out, care being used, as said before, to enter the pipe properly.

Another use for this apparatus at the cinder notch is the following: In getting a furnace around after having chilled up the tuyeres, it is frequently necessary to cast through the cinder notch for awhile. When the furnace is normal again and it is time to put back the cinder coolers, a great deal of difficulty is frequently found in cutting out the clay and brick which were used to plug up the notch. I have found that the use of the oxygen apparatus has aided very materially when cutting that part which has been most subjected to the intense heat of the furnace and to the action of the slag and iron. This material has a good deal of iron run through it, perhaps not in large quantities, but at least in shots and veins. The oxygen attacks these shots and veins and tends to honeycomb the structure so that it is easier to cut it out.

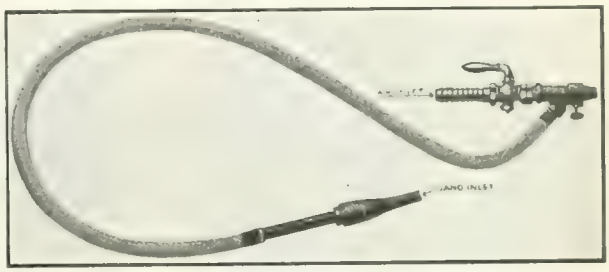
A third and no less important use to which oxygen may be put is in burning out tuyers which have been plugged with iron. Let us suppose a case. The furnace has run off cold for one reason or another, and is very sloppy at the tuyers. Then by reason of a breakout or a tuyere burning, or any one of a dozen different things, it is necessary immediately to pull the wind off the furnace. Of course, the tuyeres are flooded, and of course the caps are immediately knocked open, and the blow pipes dropped as soon as possible, but in spite of this it is quite likely that some if not all of the tuyeres will be plugged with iron. Say that the pipes are down and a plug of iron is found in each of the tuyeres. One or more of these oxygen apparatuses are put to work, and in half to three-quarters of an hour each has succeeded in not only burning a hole through to the coke, but in cutting around the plug in the tuyere so that it can be pulled out or enough of it so that the remainder will be at the nose of the tuyere where it will quickly melt under the action of the blast. The hole that has been burned through to the coke is plugged with clay to keep any melting due to drafting through this hole from closing it again. Then replacing the blow pipes, the furnace may be started upon as many tuyeres as is deemed advisable, it being possible, however, to open all the other tuyeres at any time with the wind on by merely driving a bar through the clay plug. The advantage of this method in quickness over that of the ordinary oil blow pipe or even the electric arc is really amazing.

Another slightly different case might arise in that it might be found necessary for one reason or another to plug a tuyere and keep it plugged for some little time. In this case, very frequently when it is desired to open the tuyere again a more or less heavy skull will be found after cutting through the clay and brick bat plug. I have repeatedly found this skull so hard that it would turn the point of many steel tapping bars as I cared to drive into it without any effect on the skull. In such a case, a small coke fire is built on the floor near the tuyere, the pipe is started burning and then as soon as it is burning well the eyesight slide is knocked up, the burning pipe is shoved through the hole in the cap and up against the skull, cutting a hole through to the coke in a very few minutes and opening the tuyere without having to take the wind off the furnace. This, of course, is rather a ticklish thing to de because it is hard to put the end of the pipe through the hole in the cap without hitting the cap itself, in which case the pipe is snuffed out and you have to start over again. Also very frequently the pipe is put out after it gets in by hitting the skull too hard at first. Still, if the skull is laid bare by chopping out as much of the clay plug as possible, and if a man holds the pipe near the end with a pair of tongs and guides it through the hole, with a little perseverence the tuyere can be opened as I have stated.

The secret of this apparatus is to my mind this: If oxygen is used as I have described on an open face of a size to allow of a great deal of radiation the result is failure; but if it is used in a pocket where the heat is generated much faster than it can be radiated or carried away, then an intense melting action takes place, the burning of the iron furnishing the heat.

A Suction Type of Sand Blast Nozzle

A sand blast nozzle employing the injector principle has been developed by W. F. Stodder, 218 South Geddes Street, Syracuse, N. Y. It is designed primarily for cleaning castings or parts in a foundry or similar plant,



A Sand Blast Nozzle Operating on the Same Principle as a Locomotive Injector and Designed as a Substitute for the Tank Generally Employed in Connection with the Cleaning of Castings in a Foundry

for removing scale from boiler tubes and boilers and removing rust and paint from structural steel, cars, bridges, etc. The special feature upon which emphasis is laid is that as the sand travels slowly through the hose there is little wear with a corresponding reduction in cost. An advantage claimed for the nozzle is that there is no sand tank to be filled.

The air pressures used with the nozzle are the same as those employed for other classes of compressed air work. To operate the nozzle it is simply necessary to attach the air hose, place the end of the sand hose, which it will be noticed is of special shape, in the sand pile or a pail containing the sand if that is more convenient, and open the air valve. The suction of the air passing the end of the sand hose produces a suction, as in the locomotive injector, and then serves to propel the sand through the tip and out against the work.

Painting of Iron and Steel Surfaces

A single coat of paint affords greater protection to iron and steel surfaces than two or more coats, according to an article in the *Railway Engineer* of June. This is due to the action of the paint in drying. Upon the application of a moderately thin layer of paint, it dries with open spaces around its larger granules. There are also tiny cellular cavities where free oil or globules of air have been present, narrow undergrooves and scattered particles of fairly large size. To all appearances the surface is hard and firm, while in reality this is not true. Upon the application of a second coat the surface is partially redissolved, and the under parts of the first coat are softened. The soluble granules are dissolved and fresh passages are opened up. The second coat, while apparently tight, has in reality made the first coat more porous, and the effect is increased by each succeeding coat. A single thick coat of paint laid on without too much brushing will afford better protection, as the larger particles sink to the bottom, the solvent flows above them, and the gradual oxidation prevents the formation of empty spaces.

Why American Water Pipes Are Best*

British, Canadian and American Products Compared—What an Experience in Egypt Brought Out as to Manufacture and Packing

BY PERCY G. DONALD†

RECENTLY, at the request of the British War Office, I bought pipes for the Government, and afterward undertook the laying of pipe lines in Egypt, a task which has proved most instructive of manufacturing and exporting methods. With many of the points disclosed in the course of the undertaking I was already conversant, and these, together with others that presented themselves, I now present with the sincere hope that in this trade as in others we may take time by the forelock and scrap systems of the obsoleteness of which we have



Fig. 1

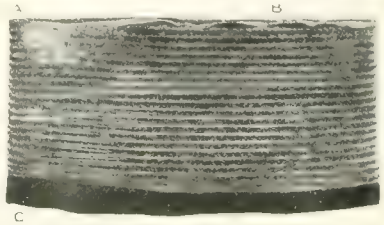


Fig. 2



Fig. 3

Fig. 1—The usual method of packing British water pipe.

Fig. 2—A photographic reproduction of an end cut from a pipe damaged through relying on a useless protector. Note that the pipe is entirely knocked in on one side and that the damage to the thread at the end is most apparent. *A*, is the damaged end; *B*, the broken end; *C*, cross-threading.

Fig. 3—Alternative method adopted by British manufacturers, the protector, which was supplied at an extra charge, being only a piece of a coupling cut off and screwed on the end of the pipe. This method effectually prevented the bending in of the pipe at the end shown in Fig. 2, but as will be observed the end of the thread on the pipe burred over making it very difficult to remove the protector and increasing the possibility of cross-threading when fitting the pipe into the coupling of the preceding pipe.

SOME BRITISH TYPES OF THREAD PROTECTION AND THE RESULT

early stage of unloading from the ship there was going to be a lot of trouble with damaged threads. The supplies from Britain came from different manufacturers, but with all of them the method of protecting the thread was of the crudest, necessitating over 15 per cent. of the pipes having the stocks and dies run over the thread, or being renewed entirely. In the case of 6-in. pipe, and when the only threading method available is handcutting and threading apparatus, this is a pretty serious matter.

The packing of Canadian pipe was quite as bad so far as protectors were concerned, but the proportion of damaged pipe was not so high, owing to the heavier character of the pipe itself. On the other hand, although at least three-fourths of the pipes laid were American, there was not a single instance of an American pipe having to be rethreaded or requiring to have its thread touched in any manner. The necessity for protectors that really do protect will be realized when it is stated that the American 6-in. pipes go 5½ to the ton and the British 7 to the ton. In such a job as that on which I was engaged in Egypt, pipes are not dropped gently to the ground. They are carried on three or four men's shoulders and thrown off from shoulder height, and this is repeated many times before the pipe arrives at the spot where it has to be laid.

This handling of 3 to 6 in. pipes is, however, by no means peculiar to the pipe line in question. Every manufacturer, when sending out pipes of such large diameters, should assume that they will be handled a number of times, and roughly at that.

prima facie evidence. I will divide the points under four headings:

1. Export Packing Methods.
2. Threads.
3. Manufacturing Methods.
4. Costs.

Probably the construction of this pipe line in Egypt is the only occasion on which opportunity has occurred of testing under equal conditions, side by side, British, American and Canadian pipe. The inaccessibility of the sites in which the pipe was laid necessitated manhandling for the bulk of the pipe, and this, with other conditions, normal and abnormal, gave opportunity of noting results such as no other job could have given. My remarks and general experience apply more to pipe in sizes running from 3 to 6 in. than to the smaller sizes.

EXPORT PACKING METHODS

Unloading was, of course, a preliminary to all other work. It was quickly seen that even in the

VARIOUS METHODS OF PACKING

I will show by illustration the various methods

*From an abstract in *American Industries* of an article printed in the *Ironmonger* (London).

†Secretary Rownson, Drew & Clydesdale, Ltd., London, iron merchant

of dealing with the difficulty. Figs. 1 and 3 show the most usual methods of packing British pipe. These methods are not only quite useless, but it is difficult to imagine any manufacturer with a knowledge of threads conceiving such a packing as shown in Figs. 1 and 3. In the packing shown in Fig. 1 not only was the canvas cut right through upon arrival, but as in unloading from a ship one end always touches the ground first, the method was responsible for the bulk of the damaged pipes (Fig. 2). The ends of these had to be cut off and the pipe rethreaded. This distinction was shared, in a lesser degree, by the Canadian pipe, of which the method of packing is shown in Fig. 4.

I now illustrate (Fig. 5) the protector found on the bulk of the American pipes. This protector consists of a sheet-steel stamping. It will be observed that there is very little threading on the protector. The first two threads fit easily to the pipe, and the last three bite hard, preventing the protector coming off on the journey, while for removing one turn with the wrench is sufficient, the rest of the removal being done by hand. The swelled-out part which

few days. The American pipes were filled in with a heavy fat mixed with blacklead, which even a hot sun did not melt.

THREADS

The foregoing remarks explain partly why one gang of men working on British pipe could only fit 756 ft. of 6-in. pipe in one day, and that figure was a record, while the same gang working on American pipe fitted well over double the length in the same time. The rest of the explanation is in the shorter length of the British pipes and the type of thread adopted by British makers. For 2½ to 6 in. pipe the British standard is 11 threads, and the American 8, to the inch.

No doubt, when the British Engineering Standards Committee set up its standard pipe thread, some arguments must have been brought forward in recommendation of that thread, but, in view of my practical experience,, I am tempted to think that the committee's decision may have been guided by the fact that the thread adopted was being largely used at the time by certain makers rather



Fig. 4



Fig. 5

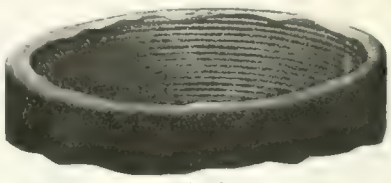


Fig. 6



Fig. 7

Fig. 4—The narrow strip of thin hoop iron employed by Canadian manufacturers to protect the threaded end of the pipe and which performed its function in only a few cases, a large number of the bands being found loose in the steamer's hold when the cargo was unloaded.

Fig. 5—Typical protector found on the American pipes.

Fig. 6—Condition of the thread of the British coupling on arrival.

Fig. 7—An American coupling with recessed end.

CANADIAN AND AMERICAN TYPES OF THREAD PROTECTORS AND BRITISH AND AMERICAN COUPLINGS

does not screw down on to the thread takes the shock of any drop, and the turned-in portion at the top effectually protects the end of the thread from such trouble as shown in Fig. 3.

The end of the coupling next calls for attention. Fig. 6 shows the British method of making couplings and dispatching pipes. It will be observed that the thread is badly broken at the top, owing to the threading starting from the end of the coupling. About 2½ per cent. of the British couplings were damaged in this manner. The Americans have an effective method of overcoming this difficulty.

The American coupling has the inside slightly bevelled before the thread starts, with the result that when the pipe is knocked about the thread is not damaged, as in Fig. 6.

This bevelling is clearly shown in Fig. 9. In the American pipe (Fig. 7) the coupling is invariably recessed, which effectually prevents any damage, but the bevelling above referred to is cheaper and quite effective.

The British pipes were sent out with the thread quite dry with the result that where they were not already rusted upon arrival, rust set in within a

than by consideration of what was the best thread for the purpose.

On a water test with the two threads on the same pipe line, it was possible to look at the defects in a comparative manner. Had the whole lines been of British thread, any defects shown might possibly have been ascribed to faulty threading or to insufficient use of red lead. In the case under review a considerable degree of contraction and expansion took place before the pipes could be buried. Owing to the lack of material and for other reasons, no arrangements could be made for expansion joints; in fact, such joints were unnecessary once the pipes were buried. Pending the burying there were a number of breaks, and in every case but one these were at a British joint, despite the fact that only about 25 per cent of the pipes in the line were British. The one instance of a break in an American pipe was caused through a faulty coupling.

When water was pumped through, a very large proportion of the British joints leaked, but one could travel for miles along the American pipe without finding one leaking joint, and this notwithstanding the free use of red lead with the British

thread, while in many cases no red lead was used at all with the American thread.

THE RESULTS OF THE WATER TEST

The result of a close investigation made by myself is shown in illustrations, made from photographs. The pipes shown were all cut open at the same time.

Fig. 8 shows pins driven into the thread at the end of a British steam pipe. This was made possible because the pipe was tapered in the threading, but had the coupling straight. It is obvious that if a tapered screw thread is passed into a parallel coupling, a "bite" can only really be secured on one or two threads, where the diameter is largest. The remainder can only secure a partial "bite"—hence the openings which admit the pins.

The American threaded pipe, shown in Fig. 9, has one pin driven into the end thread. The remainder of the threads would not even admit a pin point.

CROSS-THREADING

With the British thread cross-threading is the hardest thing in the world to avoid when fitting

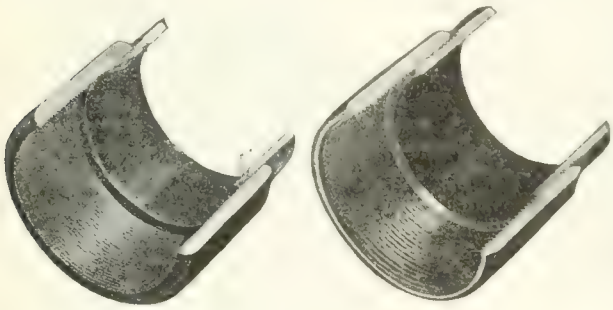


Fig. 8 Fig. 9

Fig. 8—Steam quality British pipe.
Fig. 9—American pipe used on an Egyptian pipe line.

pipes of from 3 to 7 in., and by no means easy to avoid when threading them.

It will be noticed that Figs. 2, 6 and 8 all show cross-threads. The British thread, while possibly suitable for 1 to 2 in. pipes, is, in fact, much too fine for large pipes. In endeavoring to fit together pipes with British thread on the Egyptian job, it was found that unless the pipes were started off exactly straight the only result was to cross-thread, and thereby ruin either the thread of the pipe that was being fitted or the coupling of the pipe that had already been fitted or both.

In laying a pipe line the static head and the friction head both have to be considered. The friction head is increased by obstructions or bends in the pipe, and when a burr such as is left on the British pipes (see Fig. 6) occurs every 18 ft., the matter is serious, especially when the pumps provided are only just equal to their work. That such a defect may jeopardize a whole scheme is shown by the fact that a large section of a job in London had actually to be taken out entirely through this cause.

This is a strong indictment, but when one undertakes work such as this Egyptian pipe line, possibly the largest of its kind, and hears British sappers and engineers, after experience with British and American pipe, cry with one voice, "Give us Yankee pipe"—one feels strongly on the point.

MANUFACTURING METHODS

Under this heading the question of standardization undoubtedly comes foremost. Britain has an Engineering Standards Committee, but that body lacks the power of enforcing its findings. Its standard allows a "nominal" inside diameter and an "approximate" outside diameter for pipes, and any maker who complies with these two very elastic conditions may claim that he is making pipe to "British standard."

It is noteworthy that, although representatives of the Admiralty, the War Office, the railroad companies and the shipbuilders were serving on the committee, yet all these bodies, apparently convinced of the uselessness of the "British standard," set up their own special standard when asking for quotations!

In the United States standardization is on a very different basis, and owing to this fact the States can produce pipes of a higher quality and greater weight at prices considerably below those of the British manufacturer, although the latter gets his labor at about half the cost the American maker pays.

It will be seen that the American practice calls for a greater length of thread in the socket than does the British. This is a very necessary precaution. The fact that the United States pipe is tested to a higher pressure than our steam pipe is worthy of note. The main point, however, is that while our works are tinkering about with three different weights to manufacture, three different stocks to carry, and a costly system of painting to differentiate the pipes, the Americans have reduced their costs of manufacture by producing one pipe only, and a pipe that is apparently better than our steam and cheaper than our gas pipe.

American pipes are made in lengths of about 20 ft.; ours in lengths of 16 to 18 ft. As the cost of making a 20-ft. pipe is about the same as that of making one of 16 ft., they get a big pull over us here.

Apart from this specialization the American manufacturer will have nothing to do with fittings. He holds that the making of fittings is a separate industry altogether, and that his time is fully and most remuneratively employed in turning out pipe at the lowest cost by scientific manufacturing processes. Again, the American manufacturer does not want orders for less than a carload, or 16 to 18 tons.

Such a thing as a pipe manufacturer opening stocking branches to increase his "on costs" or running a number of small works is unknown in the United States. Indeed, the first thing that is done when a number of small works are amalgamated is to scrap the lot and build one large new works to manufacture on the most modern labor saving lines.

COMPARATIVE COSTS

Apart from the labor costs in America being nearly double ours, the distance from the American works to the shipping port is three to five times that of British works. The statement given below is based on the huge purchase for the British Government which I had to handle in December, 1915, and which for the sake of comparison I will place as amounting to £126,000, based on American discounts. All prices are f.o.b. The British makers' figures do not take into account the charge for thread protectors (see Fig. 3), which are supplied free with all American pipes.

		U. S. A.	British Combine*
December 1915, purchase	Gas	£126,000	£180,000
	Water		197,000
	Steam		217,248

*Allowance has been made for deferred rebate.

What better time than the present to create a proper standard, to scrap our absurd differentia-

tions between gas, water, and steam pipes, to scrap such unnecessary sizes as ⅝, 1¼, 1¾, and 2¼ in., to adjust our threads for the larger sizes, to leave to the fittings manufacturer the job of turning out fittings at competitive prices, and to make our profits on low costs?

Up to the present the Americans have not got into other markets owing to the differences in their threads. But what is to-day's position? The export of pipe to foreign countries is prohibited. This means that the greater part of the world is bound to go to America for this line, and where once the United States pipe and its thread are adopted the British opportunity of regaining the market would appear to be remote, unless the price and the goods are right.

Prices of Galvanized Sheets from 1898 to 1916

The table below gives the monthly average prices, f.o.b. Pittsburgh, in cents per pound, of galvanized sheets, as quoted in each week's issue of THE IRON AGE from the beginning of 1898 down to the present month. It has been a tedious task to compile these prices, as the quotations for many years were given in percentages of discount. It was the custom, in marketing galvanized sheets, up to a comparatively recent period, to observe the usage in the hardware trade of maintaining a standard list for the several gages, and, in making prices, to name a discount from this list. It was therefore necessary, in compiling the greater part of this table, to convert discounts into net prices. The undertaking was one which involved so much labor that work on it was only prosecuted whenever a favorable opportunity developed. Now that the compilation has been completed, we have no doubt that the table will be appreciated by those who have anything to do with selling or buying galvanized sheets.

Average Prices of No. 28 Galvanized Sheets, at Pittsburgh, in Cents per Pound

	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916
Jan..	3.12	3.08	3.83	4.36	4.64	3.40	3.36	3.35	3.45	3.67	3.59	3.55	3.50	3.20	2.90	3.46	2.87	2.79	4.75
Feb..	3.06	3.62	4.09	4.36	4.36	3.70	3.25	3.40	3.45	3.75	3.55	3.51	3.50	3.20	2.87	3.50	2.95	3.16	4.75
Mar.	3.15	4.17	4.32	4.84	4.36	3.78	3.23	3.45	3.43	3.75	3.55	3.26	3.50	3.20	2.80	3.50	2.95	3.40	4.75
Apr..	3.10	4.25	4.78	4.84	4.36	3.89	3.23	3.45	3.40	3.75	3.55	3.25	3.50	3.20	2.86	3.50	2.91	3.29	5.00
May.	3.06	4.25	4.66	4.74	4.36	3.88	3.23	3.45	3.40	3.75	3.55	3.25	3.50	3.20	2.90	3.42	2.80	3.50	4.94
June.	3.06	4.52	4.59	4.59	4.23	3.81	3.18	3.35	3.55	3.75	3.55	3.25	3.50	3.00	2.90	3.38	2.75	4.28	4.69
July.	3.06	4.72	4.53	4.48	4.26	3.73	3.14	3.36	3.55	3.75	3.55	3.25	3.39	3.00	3.00	3.33	2.75	4.40	4.38
Aug..	3.10	4.85	4.43	4.74	4.18	3.66	3.14	3.32	3.55	3.75	3.55	3.25	3.30	2.99	3.12	3.24	2.85	3.71	4.21
Sept.	3.15	4.59	4.33	4.73	3.99	3.66	3.14	3.30	3.55	3.75	3.55	3.28	3.21	2.93	3.21	3.16	2.95	3.56	...
Oct..	3.15	4.53	4.25	4.75	3.87	3.73	3.14	3.30	3.58	3.75	3.55	3.35	3.20	2.85	3.36	3.08	2.95	3.50	...
Nov.	3.06	4.21	4.16	4.84	3.85	3.51	3.23	3.32	3.65	3.75	3.55	3.43	3.20	2.85	3.40	2.98	2.88	3.89	...
Dec..	3.06	3.88	4.36	4.84	3.78	3.40	3.31	3.35	3.65	3.75	3.55	3.50	3.19	2.89	3.40	2.90	2.78	4.75	...

The highest prices realized for galvanized sheets were obtained in April of this year, following the spectacular performances of spelter, when prices of that metal soared to an unprecedented height. At that time, No. 28 galvanized sheets sold up to 5.30c. per lb., Pittsburgh, or higher, although the average for the month is placed, in the table, at 5c. It is interesting to know that in 1901, in a period of great activity in the steel trade, No. 28 galvanized sheets were regularly quoted at 5.10c., Pittsburgh, for two weeks, namely, the first half of September. The lowest price realized, as shown by the table, was 2.75c., Pittsburgh, which price ruled in June and July, 1914. The price did not run below 3c., Pittsburgh, in the years covered in this table until 1911, although in 1893 it dipped close to that level.

American Foundrymen's Meeting

The tentative arrangement for the sessions of the annual meeting of the American Foundrymen's Association, to be held in Cleveland, shows that the first session will be held on Monday afternoon, Sept. 11, instead of having the meeting begin on a Tuesday morning, as has usually been the case. This year a one-meeting-per-day plan is to be inaugurated, and on this account the opening session had to be placed on Monday, owing to the crowded program, which will involve some forty papers and addresses and eleven committee reports. A number of simultaneous sessions have also been arranged. However, the only afternoon meeting is the opening session. The chronological order of events is as follows:

Monday, Sept. 11: 2.30 p. m., opening session.

Tuesday, Sept. 12: 11 a. m., general topics; 3 p. m., ball game; 8.15 p. m., theater party.

Wednesday, Sept. 13: 10 a. m., general topics; 2.30 p. m., inspection tour of the Cleveland Furnace Company's plant; 7.30 p. m., trip to Euclid Beach Park.

Thursday, Sept. 14: 10 a. m., malleable session; 10 a. m., steel session; 7 p. m., annual banquet at the Hotel Statler.

Friday, Sept. 15: 10 a. m., gray-iron session; 10 a. m., steel session.

Besides the tour of the Cleveland furnace plant, visits are planned to the plants of the Allyne-Ryan Foundry Company, the Ferro Machine & Foundry Company and the Westinghouse Electric & Mfg. Company.

The exhibition of foundry supplies and equipment and of machine tools and accessories will be held in the Coliseum, one block from the Hotel Statler. The 60,000 sq. ft. of floor space in this building proved inadequate to the needs and the erection of a temporary building has been made necessary, which will provide an additional 10,000 sq. ft. of floor space. In this annex will be located the large operating exhibits and this building will be converted into a model foundry.

On Aug. 15, 135 manufacturers had reserved space and the indications are favorable to an increase of this total to 150. Last year, at Atlantic City, 102 manufacturers were represented, and the Cleveland show will have a numerical increase of individual exhibits of nearly 50 per cent.

This is the first show that will be conducted directly under the management of the American Foundrymen's Association. Upon presentation of their 1916-17 membership cards, those affiliated with the American Foundrymen's Association will be admitted free to the exhibition throughout the week.

The Tax on Munitions and Their Materials

Evasion of the 5 Per Cent Proposed on the Latter Would Not Be Difficult—From This Source $10,000,000 Is Reckoned

WASHINGTON, D. C., Aug. 22, 1916—The Omnibus revenue bill, which was reported to the Senate on Aug. 16 after nearly a month's consideration by the Finance Committee, has been made the unfinished business of the Senate and will probably pass that body within a week or ten days. The leaders, therefore, hope to bring about an adjournment of Congress in the first week in September.

NO PROVISION AGAINST EVASIONS

The chief feature of the bill of interest to readers of THE IRON AGE is the provision for a tax on the manufacture of war munitions, which the Finance Committee has completely rewritten, abandoning the copper tax incorporated by the House and providing a flat charge of 10 per cent of the profits of munition manufacturers and 5 per cent of the profits arising from the production of materials used in the manufacture of munitions. For reasons wholly inexplicable, but not through oversight, as the committee's report draws attention to the fact although it does not explain it, the bill provides that the tax on the profits of both munition manufacturers and the producers of raw materials therefor shall be levied only on "corporations, joint stock companies and associations" and not upon individuals. It is therefore apparent that wholesale evasions of the law may be accomplished through the interposition of jobbers or middlemen carrying on business as individuals or partnerships. Manufacturers of material intended to be used in the production of munitions may escape the 5 per cent tax by selling to jobbers and the latter, if their business is conducted as individuals or partnerships, will incur no tax liability when selling direct to munition manufacturers even if the latter are incorporated. It is the opinion of legislative experts that the tax on the profits of corporations manufacturing materials will prove almost a dead letter because of possible evasions and will produce only a fraction of the $10,000,000 originally estimated to be derived from this source.

A provision exempting from tax profits resulting from the manufacture of munitions for the United States Government was inserted in the bill at one stage of its consideration by the Finance Committee, but this was afterward stricken out, members of the committee fearing that if the tax should be made to apply only to war material intended to be shipped abroad the courts might invalidate the entire munitions section on the ground that it imposed a tax on exports, which is expressly forbidden by the constitution.

Owing to the marked differences between the House and Senate munitions tax provisions, it is evident that this feature of the bill will finally be perfected in conference committee; hence it is quite probable that in its ultimate form the munitions tax feature may be wholly unlike that drafted by either the Ways and Means or the Finance Committee.

TEXT OF THE MUNITIONS TAX SECTIONS

Following is the text of those sections of the Finance Committee's bill imposing taxes on manufacturers of munitions and materials therefor:

SEC. 41. (1) That every corporation manufacturing (a) gunpowder and other explosives, (b) cartridges, loaded and unloaded, caps or primers; (c) projectiles, shells, or torpedoes of any kind, including shrapnel, loaded or unloaded, or fuses, or complete rounds of ammunition; (d) firearms of any kind and appendages, including small arms, cannon, machine guns, rifles and bayonets; (e) electric motor boats, submarine or submersible vessels or boats; (f) any part of any of the articles mentioned in (b), (c), (d), or (e); shall pay for each taxable year an excise tax of ten per centum upon its entire net profits actually received or accrued for said year from the sale or disposition of such articles manufactured within the United States.

(2) And every corporation selling to or manufacturing for any corporation mentioned in paragraph (1) any material entering into and used as a component part in the manufacture of any of the articles enumerated in (a), (b), (c), (d), (e) or (f), shall pay for each taxable year an excise tax of 5 per centum upon its net profits actually received or accrued for said year from the sale or disposition of such material so entering into or used as a component part in the manufacture in the United States of the articles so enumerated as aforesaid.

(3) This section shall cease to be of effect at the end of one year after the termination of the present European war, which shall be evidenced by the proclamation of the President of the United States declaring said war to have ended.

SEC. 42. Every corporation manufacturing or selling in the United States any of the articles mentioned in section 201 shall, on or before March 1 of each year, make a return under oath to the collector of internal revenue of the district wherein the principal office or place of business in the United States is located, stating the amount of capital invested in such business and the amount of net profits from the sale and disposition of such articles during the preceding taxable year, the names and locations of the corporations, and the amounts, character, and values of the materials obtained from such corporation for use in manufacturing the articles mentioned in paragraph (1) of this section. Where the corporation has separate capital invested in the manufacture of such articles its return shall be made on the same form as that used for income tax returns, and its net profit for the year shall be the gains or the profits assessed and taxed by the income tax authorities:

Provided, that in case such corporation has undivided capital invested in the manufacture of the articles specified in section 201 and of other articles, the return herein provided for shall be in such form and shall set forth such particulars as the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, may require, and the tax herein provided for shall be imposed only on the net profits resulting from the manufacture and sale of the articles specified in section 201 and the profits shall be determined from the books and accounts of such corporation:

Provided, however, that if the amount invested in the manufacture of, and the net profits resulting from the sale or disposition of, the articles so specified can not be determined, the amount invested in the manufacture of these articles, and the net profit therefrom, shall be considered as in the same ratio to the total amount invested and the total net profits as the gross receipts from the sale and disposition of such articles bear to the total gross receipts from the sale and disposition of all articles manufactured.

SEC. 43. All such returns shall be transmitted forthwith by the collector to the Commissioner of Internal Revenue, who shall, as soon as practicable, assess the tax found due and notify the corporation making such return of the amount of tax for which such corporation is liable, and such corporation shall pay the tax to the collector on or before thirty days from the date of such notice.

SEC. 44. If the Secretary of the Treasury or the Commissioner of Internal Revenue shall have reason to be dissatisfied with the return as made, or if no return is made, the commissioner is authorized to make an investigation and to determine the amount invested in such business, and the amount of net profits, and may assess the proper tax accordingly. He shall notify the corporation making such return and shall proceed to collect the tax in the same manner as provided in this title, unless the corporation so notified shall file a written request for a hearing with the commissioner within thirty days after the date of such notice; and on such hearing the burden of establishing to the satisfaction of the commissioner that the amount invested and the amount of net profits as determined by the commissioner is incorrect shall devolve upon such corporation, and the decision of the Commissioner of Internal Revenue, if approved by the Secretary of the Treasury, shall be conclusive.

SEC. 45. The tax may be assessed on any corporation for the time being owning or carrying on the business, or on any person acting as agent for that corporation in carrying on the business, or where a business has ceased, on the

corporation which owned or carried on the business, or acted as agent in carrying on the business immediately before the time at which the business ceased.

SEC. 46. For the purpose of carrying out the provisions of this title the Commissioner of Internal Revenue is authorized, personally or by his agent, to examine the books, accounts and records of any corporation subject to this tax.

SEC. 47. For the expense connected with the assessment and collection of the taxes provided by this act there is hereby appropriated $100,000, or so much thereof as may be required, out of any money in the treasury not otherwise appropriated, and the Commissioner of Internal Revenue is authorized to appoint and fix the compensation of such officers, clerks, messengers, janitors, and other necessary employees in the enforcement of the provisions of this act for duty in the District of Columbia, or in any collection district of the United States, or any of the territories thereof.

SEC. 48. No person employed by the United States shall communicate, or allow to be communicated to any person not legally entitled thereto, any information obtained under the provisions of this title, or allow any such person to inspect or have access to any return furnished under the provisions of this title.

SEC. 49. Whoever violates any of the provisions of this title or the regulations made thereunder, or who fails or refuses to make the return required, or who knowingly makes false statement in any return, or refuses to give such information as may be called for, is guilty of a misdemeanor, and upon conviction shall, in addition to paying any tax to which he is liable, be fined not more than $10,000, or imprisoned not exceeding one year, or both in the discretion of the court.

SEC. 50. All administrative, special, and general provisions of law, including the laws in relation to the assessment and collection of taxes not specifically repealed, are hereby made to apply to this title so far as applicable and not inconsistent with its provisions.

SEC. 51. The Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, shall make all necessary regulations for carrying out the provisions of this title, and may require any corporation subject to such provisions to furnish him with further information whenever in his judgment the same is necessary to collect the tax provided for herein.

The munitions tax is estimated by the Finance Committee to produce $40,000,000 per annum. W. L. C.

Heat Losses Through Galvanized Roofing

Loss of heat through a roof of galvanized steel sheets is less than that through roofing consisting of cement and fibrous material compressed to sheets about ¼ in. in thickness, according to experiments made last year by the National Physical Laboratory at Teddington, England. A model hut was built up of walls of cork slabs, 2 in. thick, and a roof of the new material or of galvanized sheet iron. The air inside was heated by electrical resistance which was not allowed to get sufficiently hot to set up appreciable radiation, and the air was agitated by a fan. The air temperature inside and outside differed by 30 deg. F. Contrary to expectation, the heat loss through the cement, measured per square feet, was 20 per cent greater than through metal, the reason being that the emissivity loss from the surface, and not the thermal conductivity of the material, is the decisive factor.

When the iron was painted black the heat transmission increased, becoming equal to that of the cement; when the cement slabs were painted with aluminum they behaved like the iron; the gradient in the material was only 2.5 deg. F.

The Driggs-Seabury Ordnance Company, Sharon, Pa., has completed an addition to its No. 2 boilerhouse and will finish, in a few days, the work of adding the second story to its pattern shop.

DIESEL-STEAM PLANTS*

Extending Steam Plants with Oil Engines—Lower Costs and Higher Efficiency

BY GEOFFREY PORTER

The Diesel engine is capable of effecting great economies in the operation of power stations that are close to their maximum capacity. The expense of extending the existing steam plant can be materially reduced if the Diesel engine is adopted instead of putting down additional boilers and steam generating equipment. It has also been found more economical in many cases to operate the Diesel engines in the enlarged plant to carry the regular load, reserving to the steam plant the peak and extraordinary loads.

The statistics of three combined steam and oil engine plants are offered for consideration. The first, A, is a small one on the south coast of England, B is in London, while C is a riverside station in the provinces. A and C are condensing plants while B is non-condensing. The capacity installed in both steam and Diesel engines in the last completed financial year in all stations is shown in the accompanying table, as is also the capital expenditure required for both types of prime mover.

The most noticeable feature of this table is the low capital expenditure for the Diesel engine plants compared with that for the steam plants, and also the great increase in the over-all efficiency of the combined plants as compared with that of the steam plant alone. The capital expenditure for the steam plant includes engines, dynamos, foundations, condensing plant and piping in the engine rooms, and boilers and settings, feed pumps, injectors and piping, chimneys, economizer and flues in the boiler house. The capital figures for the Diesel engine plant include the engines and dynamos, foundations and accessories.

The relative efficiencies of the stations, and the reduction obtained in the cost of generating power by the use of Diesel engines, depend of course, upon the proportion of the power that is generated by the Diesel engines. Station B, whose steam plant was five times the size of the Diesel plant was obviously unable to make as great a reduction in cost as was station A where the ratio of steam to oil was roughly as 1 to 1.

In selecting a Diesel engine certain general principles may be observed as a guide. The writer personally prefers that engine that has (1) a low piston speed, (2) a low mean effective pressure from the full load card, and (3) a low piston and crank pin loading. The general design of the crank shaft and its bearings, the gudgeon pin and the general lubricating arrangements throughout must also be examined. By preparing a schedule of the various engines on which bids are received, in which are tabulated for each engine the number of cylinders, the brake horsepower per cylinder, the revolutions per minute, the cylinder diameter and stroke, the piston speed, and the ratio of stroke to bore a "speeded up" engine may be discovered.

Statistics of Combined Steam and Diesel Engine Plants

Station	Steam Capacity, kw.	Capital Expenditure per kw., Steam	Over-all Thermal Efficiency, Steam, Per Cent	Diesel Capacity, kw.	Capital Expenditure per kw., Diesel	Kw.-hr. Generated in Last Completed Financial Year: Steam Plant	Kw.-hr. Generated in Last Completed Financial Year: Diesel Plant	Over-all Thermal Efficiency of Combined Plant, Per Cent	Reduction in Cost of Fuel with Combined Plant, Cents per kw.-hr.
A	538	$141.00	4.93	510	$88.00	11,312	591,784	22.6	0.756
B	3500	135.80	6.1	600	129.50	2,133,214	2,429,214	10.5	0.092
C	860	193.00	2.6	540	90.80	403,131	1,127,557	6.5	0.552

G. W. Thompson, chief chemist of the National Lead Company, has issued a pamphlet entitled "Why Highly Oxidized Red Lead Is Superior." This pamphlet discusses the use of red lead in the preparation of paints for the preservation of iron and steel. Results of tests are given, in which the protective value of composite paints applied to iron and steel was determined, showing results in favor of those containing red lead.

*Abstract of a paper read at the meeting of the Diesel Engine Users' Association, Great Britain, June 23.

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The President and the Labor Question

Woodrow Wilson has seriously injured the standing of the President of the United States with regard to disputes between employers and employees. The railroad controversy now pending—perhaps the greatest crisis in labor troubles ever known in this country—has very properly been taken before the chief executive in the hope that the parties to the disagreement may be brought together. All other efforts to effect a settlement of the trouble have failed—not because the railroad managers have not been willing to meet the men before some tribunal qualified to arbitrate their differences, but because the labor leaders have autocratically refused to submit their case for such an adjustment. Mediation, conciliation, arbitration—all have been rejected. None of the means provided by our laws has proved adequate to meet the situation, and the President, as a last resort, summoned the representatives of both sides to Washington, that he might make a personal appeal to them.

When the possibility of the matter being taken to the President loomed up a few weeks ago, it was regarded on all sides as an excellent thing to be done. It was then supposed that, by virtue of his high office, and the respect paid to the chief executive of the nation, attention would be given by both parties to the President's suggestions, and that a way out of the difficulty would be found. The President, however, has failed to maintain an impartial position in this critical emergency. He has made himself an advocate of one of the most disputed points in the labor program of recent years in announcing his belief in the general approval of the eight-hour work day and endeavoring to compel the railroads to concede this to their employees, arbitrating less important matters. His efforts have since then been so directed as to make it appear that the railroads were placing themselves in an attitude of defiance of his attempts to secure a peaceful outcome to the controversy.

By Mr. Wilson's pronouncement in support of the eight-hour workday he has undoubtedly endeared himself to the hearts of the labor leaders, but he has arrayed himself in opposition to a vastly more important section of the country, namely, the great body of all classes of employers and consumers. It is foreseen by them that if the railroads of the country should adopt an eight-hour day, either voluntarily or through stress of circumstances, it would be exceedingly difficult to resist the demand which would then rise all over the country from all classes of wage earners for a similar shortening of working hours. This would further greatly increase the cost of living. It would so increase our manufacturing costs that it would be more difficult than ever for us to maintain our footing in the export trade. This country, by paying higher wages, has long had a higher standard of living than foreign countries, which has been a considerable handicap in building up our exports. To shorten the working day in all factories would make still greater the inequality between working conditions here and abroad. To use Mr. Wilson's own language in speaking to the railroad managers on Monday, such a contingency should by all means be avoided, as the time is coming when "every ounce of American energy has to be mobilized to meet the extraordinary situation which will emerge out of the European war."

Eight-Hour Day "Sanction"

Between 1,000,000 and 1,500,000 wage earners of the 30,000,000 engaged in gainful occupations in the United States work eight hours a day, according to John B. Andrews, secretary of the American Association for Labor Legislation, New York City. He says that about 10 per cent of the wage earners are organized and of these about 2,500,000 are identified with the American Federation of Labor. His estimates are based upon information from various sources. None of these placed the number of persons working eight hours a day at more than half of the total membership of the labor organizations and most of them considered it less than half. Yet President Wilson in his statement to the nation on the railroad crisis says that "the eight-hour day now, undoubtedly, has the sanction of the judgment of society in its favor." Whence the "sanction," and where has any pronouncement been made of the judgment of society"? On the contrary, the eight-hour day is the exception. For the United States to go to an eight-hour basis, with its competitors in the international race working from 25 to 50 per cent more hours and paying from 50 to 75 per cent less wages would be comparable in folly with the dead and buried proposal of 1896 to establish the 16 to 1 ratio between gold and silver "without the consent of any other nation."

Anti-Efficiency Fight Still to Come

Congress has put props under an anti-efficiency structure in industry. It will now doubtless attempt to make the underpinning permanent. The riders forbidding the use of some of the machinery of advanced industrial management are on appropriation bills having force for one year. Too much opposition evidently was feared to try for like measures of permanent application, such as the dormant Tavenner bill. The spotlight was too certain, in considering the specific act, to show up weaknesses in the argument supplied by the short-sighted union labor champions in the galleries. Passing over the belief widely held that the action of Congress represents the Administration's desire, the belief is strong that the Tavenner and similar bills will be brought up on the adjourned sessions of the present Congress, say in December. Thus a fight over a fresh and greater crime against industry is again threatening.

The individual Congressman's stand after election may show a reversal, but a change of front on such a well-discussed subject leaves too much to explain. Thus the immediate step for the employer in his everlasting vigilance campaign is to consult his candidates for Congress in the present campaign. If the latter has swallowed the bait of the labor lobby he needs enlightenment; if he has been numbered among the minority, he needs help to avoid defeat at the polls, for it is said of one valiant exponent of efficiency that organized labor has determined on his downfall and has sent emissaries to his district. It is no time for any resting on the oars.

A British View of American Exports

The London *Engineer*, which has long cultivated a philistine attitude toward American industry and commerce, has expressed the view, fathered by the wish, that American export trade will not be important after the war. The writer of the article is probably the same who at intervals since the Steel Corporation was formed has gravely told his readers that the corporation had such high costs and heavy fixed charges that it could never compete with Great Britain in foreign markets and would probably be beaten at home by the independent steel companies which hadn't so many bonds and hadn't run their necks into any such noose as the Hill ore deal.

After assuring British manufacturers that the activity of Americans in South America and in Australia and South Africa need not cause apprehension "so long as the former [Americans] continue the business policy which has been their special characteristic for many years past," the *Engineer* finds one indication that may prove important:

> American firms are beginning to inquire more in foreign markets as to the actual requirements of these markets with a view to the production of goods which will actually meet their needs. We cannot say how far this movement has extended, but it is certainly developing.

That is interesting; indeed, from an American standpoint it might even look promising. But still there is no cause for alarm; as witness:

> This expansion in adaptability, however, will not overcome the most formidable difficulty of all, namely, the question of credit, and so long as the Americans insist on cash payments in New York against the shipping documents or the definite availability of foreign credit in New York at the end of one month, so long will they be hampered in the promotion of the export trade on the scale which is hoped for from the accumulation of wealth arising solely from the existing artificial situation.

This should be final, even though the writer be innocent of the propaganda that has gone on since the war began, for the use of acceptances in American trade abroad, and in spite of the full appreciation here of the part it must play in the extension of the country's foreign trade. But this good friend of American industry, to make complete the demolition of any air castles that may now be building upon our war prosperity, finally assumes that our manufacturers extend credit to foreign buyers and give them the goods they want. Still all is vain; for

> unless the Americans are able to manufacture more cheaply than other countries and actually sell more cheaply, even the incipient adaptability and possible extension of the credit system will not give them the great hold which they hope to obtain in external markets as a result of the present international situation. Except under extraordinary circumstances and conditions the Americans have not beaten us in the past, nor will they do so in the future unless they are prepared to sacrifice a considerable amount of their profits arising directly or indirectly through the war; but as a general rule wealthy companies in the United States trade for the purpose, not of throwing money away, but of earning it, and there is nothing to show so far that any change in this direction may be expected.

That is to say, British companies owe their success in foreign markets to their passion for "throwing money away," and when Americans can be cured of the habit of looking on trade as something out of which to make money, they may be considered fairly on the way to the capture of world markets.

There is one sage remark in all these sententious and semi-sententious utterances, but it has been made many a time in practically the same terms by our own manufacturers, and that is that this country must rely for the extension of its trade abroad on being "able to manufacture more cheaply than other countries and actually sell more cheaply." Two classes of citizens appear to think these economic facts can be dodged; they are the labor unions and the men in public life who put hobbles on industry and label them the "new freedom."

Connellsville and By-Product Coke

The by-product coke ovens are not sounding the death knell of the Connellsville coke industry so rapidly. In the past few weeks the Connellsville operators have had great difficulty in maintaining shipments at the rate required by their contracts, and coke for prompt shipment has been at a premium as compared with contract prices. Last September it was the market appraisement that in the second half of this year Connellsville coke would be very plentiful through many by-product ovens having been completed, that appraisement being shown in the fact that coke contracts for the year were made at lower prices than

contracts for the first half of the year, coke being regarded as less valuable for the second half.

It is pertinent to note that the check to Connellsville coke production, when it does come, cannot be regarded as sudden, for the Connellsville region has been losing ground, relatively, for years. An interesting comparison can be made. In 1906 the output of the Connellsville and lower Connellsville region was reported at about 20,000,000 net tons. The production of pig iron in that year was 25,300,000 tons. In general terms, the production of pig iron at this time may be taken at about 39,500,000 tons, there being a lower rate during the hot weather, but without corresponding decrease in the coke consumption. By the rule of three, based on the statistics of 1906, Connellsville should now be producing 600,000 tons of coke a week instead of the 400,000 tons a week reported lately by the Connellsville *Courier*. By that amount the Connellsville coke industry has lost ground in the past ten years, relative to the industry of the country. The actual production per week, however, is practically the same as in 1906. Any check that may come, therefore, cannot be regarded as so very sudden.

The scarcity of labor is dampening the effect of the by-product coke oven projects upon the Connellsville coke industry. This labor scarcity has both delayed the completion of the by-product ovens and has restricted the output of Connellsville coke, which appears to be at a rate 10 to 15 per cent less than could be accomplished were there a full supply of men willing to do a full week's work every week.

A further softening of the effect of the new by-product coking capacity occurs through the relatively high prices now obtainable for coal, whereby the Lower Connellsville coke operators see before them a market for raw coal which may be more profitable, per ton of coal mined, than has been a considerable portion of the coke sold in the past. Thus, altogether the shock to the Connellsville coking industry by the spectacular rush to build by-product coke ovens is not proving so great as was expected.

The Tungsten Market Falling

The tungsten market has taken a decided drop in the past week until ferrotungsten can be obtained as low as $2.75 per lb. of contained tungsten. A short time ago it was as high as $4.50, with the top price at $8 to $10 at the peak of the movement. Tungsten concentrates, 60 per cent WO_3, are also lower, some fair-sized sales having been made at $17 to $19 per unit of tungstic oxide. The foreign demand from both France and Russia is reported strong, with sales of 100 to 200 tons at the above figure. England is also said to have bought 80 tons of concentrates in the past week. The foreign demand for ferrotungsten is also more active than for some time. Domestic buying is expected to increase.

A wireless message from Berlin to Sayville, N. Y., dated Aug. 17, says that the Roumanian State Railroads have contracted with the German Steel Works Union for 25,000 to 30,000 tons of rails. On the same date it was announced by wireless from Berlin that the pig-iron production in Germany in July was 1,134,000 metric tons, against 1,047,000 tons in July, 1915, and 1,561,000 tons in July, 1914.

Thomas Iron Company's Report

The Thomas Iron Company, Easton, Pa., has issued its sixty-second annual report, which covers operations for the fiscal year ended June 30, 1916. This report is signed by the retiring president, Ralph H. Sweetser.

The income statement for the year shows a net profit of $72,512.99. This profit, however, was brought about by the company's income from investments, amounting to $171,885.08, as a net loss was realized on pig-iron sales of $99,116.43, and on ore sales of $255.66. The investment income was derived mainly from dividends by railroad companies in which the Thomas Iron Company is interested. The net profit the previous year was $37,901.97.

The total revenue from pig-iron sales was $2,428,777.32, while the expense of operating furnaces was $2,527,893.75. The balance sheet shows a surplus at the close of the year of $1,515,634.51.

From the accompanying remarks by the retiring president the following extracts are taken:

"The fiscal year just ended has seen some remarkable changes in the iron business, and especially in the costs and prices of iron, raw materials, supplies and labor. During July, 1915, our company was operating two blast furnaces and Richard mine, and shipped 7565 tons of pig iron; during a part of the month of June, 1916, we were operating five blast furnaces, and we shipped 17,884 tons of pig iron. The great advances in the market prices for pig iron during the year have been almost equaled by the increase in the cost of production. Wages were advanced three times, with a total increase in the rates amounting to 27 per cent. During the same time the cost of raw materials and supplies increased even more than wages.

"The average number of furnaces in blast during the year ended June 30, 1916, was 3⅛ out of a total of 7. The number of furnaces owned by the company was reduced from 8 to 7 by the dismantling of No. 6 at Hokendauqua. The quantity of pig iron produced was 152,737 tons, an increase of 100,081 tons over the previous fiscal year. The stock of pig iron on hand was reduced from 10,010 tons on July 1, 1915, to 5360 tons on June 30, 1916. Richard mine has produced 49,673 tons of ore this past year, all of which was shipped to our own blast furnaces. This makes a grand total of 3,204,028 tons shipped from this mine.

"The great increase in the export business of our country this past year, and more especially in munitions of war, has added much to the prosperity of industrial corporations and railroads, but the prosperity has not been evenly divided. Many troublesome features incident to the increase in traffic beyond the capacity of the railroads and vessels have put hardships and increased costs on many industries, which have not benefited by correspondingly high prices for their own products. The greatest drawback was the inflation of the labor market, bringing about scales of wages abnormally high, and a scarcity of mechanics, semi-skilled labor and common labor. This was especially burdensome on the manufacturers of pig iron, because the price of pig iron did not keep up with the great increase in the price of finished materials.

"All these rapid fluctuations in market prices show conclusively that a merchant pig-iron company should either have some outlet for its iron through finished products, or else should control extensively its own sources of raw materials. The Thomas Iron Company has no mills for the consumption of its own pig iron, but it does have iron-ore mines. Unfortunately, these mines are not far enough advanced in equipment and development to furnish a large enough percentage of the ore required to greatly reduce the cost of making pig iron. It is absolutely necessary that the company should spend enough money at its Richard mine to put the mine in condition for producing ore at a lower cost than is now possible. On account of the lack of working capital, the work on the new shaft is already ten months behind. I strongly advise that the new shaft be completed at the earliest possible moment.

"Although we have gained at our blast furnaces by the installation of improvements from time to time, we cannot expect to reap large enough benefits unless

we expend considerable money. There is no question as to the plan of centralizing at the Hokendauqua plant. No. 3 furnace is much better equipped than ever before, but is not yet complete. No. 1 furnace needs to be rebuilt so as to put it in condition to economically make pig iron. The strategic location of the Hokendauqua plant in regard to railroad facilities is a very strong feature in favor of the continuance of the iron business of our company.

"The $400,000 of bonds authorized by the stockholders March 10, 1916, can be used only for improvements, and are not available for the present urgent need of more working capital. Of this additional issue, $34,000 of bonds have been certified.

"The option on all the property of the Thomas Iron Company granted to Nils L. C. Kachelmacher last October expired Feb. 11, 1916, without being exercised.

"Because of the urgent need of working capital, your board of directors deemed it inadvisable to declare a dividend at this time."

The Orient as a Market for American Railroad Equipment

WASHINGTON, D. C., Aug. 22, 1916.—The Department of Commerce announces the appointment of a special agent to undertake an investigation of the field for American railroad equipment and supplies in the markets of the Far East, Australia and South Africa. Frank Rhea, of the Division of Valuations of the Interstate Commerce Commission, has been appointed special agent to make the investigation and is already engaged in making arrangements, which will be held during a preliminary trip to the principal manufacturing centers in this country. This preliminary trip will be made in September.

When the special agent has learned what information the manufacturers in this country want concerning railroad conditions across the Pacific, he will go abroad and make a careful study on the ground of the conditions as they affect railroad construction, equipment, traffic, the probable extension or reconstruction of ralroads, tramways, etc. While all specific opportunities for securing orders will be promptly reported, the real purpose of the investigation is to gather together the fundamental facts and conditions that will enable the American manufacturer to consider intelligently the different fields and to determine whether it is to his advantage to enter any of them.

Manufacturers and others who wish to get in touch with Mr. Rhea before he leaves this country should address the Division of Commercial Agents, Bureau of Foreign and Domestic Commerce, Custom House, New York. This is the new office opened in New York by the bureau to keep in closer touch with business houses interested in foreign trade. W. L. C.

The National Industrial Traffic League, whose headquarters are in the Tacoma Building, Chicago, has issued a circular announcing the failure of negotiations between its committee on car demurrage and storage and a committee of the American Railway Association in respect to demurrage rates. The League has notified the Interstate Commerce Commission that the agreement between the carriers and shippers, as represented by the League, has been broken by the carriers, and it appeals for a thorough investigation of the question of car demurrage in case the carriers should file the increased tariffs contemplated by them.

The growth of manufacturing interests at Los Angeles, Cal., is impressively set forth in a bulletin issued in July by the Los Angeles Chamber of Commerce. This bulletin gives illustrations of 11 important factories built in the first six months of this year. The total number of new factories and plants started or projected in this period was 37, involving an expenditure of over $12,000,000 for machinery and equipment. The American Can Company has just completed a plant for the manufacture of cans involving a total expenditure for land, buildings and machinery of $500,000.

STEEL COST TO IMPLEMENT MEN

Manufacturers' Committee Finds "Supply and Demand" Making the Market

As has been well known, the National Implement and Vehicle Association has had at work for some time a special committee on materials. Its particular duty has been an investigation of the situation in finished steel, particularly as affecting prices implement makers will have to pay for steel bars for 1917. The report of the committee has just been sent out to the membership. In the accompanying letter E. W. McCullough, secretary and general manager of the association, says that "steel has advanced 125 per cent base since purchases were made which enter into implements sold to the trade this spring." He adds that further advances in prices of implements will be necessary to cover the higher prices of materials and labor. The report of the committee on materials is as follows:

"Your special committee charged with the investigation of the material situation held their last meeting on the 3d inst., to consider the results of three conferences with representative steel interests, during which our condition, both as to the present and the outlook of the future, was most carefully placed before them. Our conclusions, reluctantly arrived at, are briefly as follows:

"1. The market is being regulated by 'supply and demand.' The extraordinarily large demands for steel from every branch of domestic trade and from all parts of the world naturally have resulted in advanced prices and a stiff market.

"2. Because of the unusual world-wide conditions, there is nothing reliable on which to base any expectation of early relief in steel prices, and each manufacturer should choose his own course as to contracting at the present market.

"3. Because of expectations up to this time of some relief as to materials, present prices of implements and other farm equipment reflect only a partial recognition of the increased and increasing cost of production.

"4. That in view of the reasonable certainty of having to pay present prices for steel and other materials, ordinary prudence suggests that manufacturers figure their costs of production anew on the current market prices for material, labor and all other items entering into their present manufacturing costs, and base their selling prices upon these new costs.

"5. That we must frankly report our inability to secure special consideration for our industry in the way of concessions in the price of material, due to the unparalleled and world-wide demands of other consumers who are willing to pay current market prices.

"6. That this situation, over which it is evident we have no control, should be frankly placed before your dealers, and by them, in turn, before their customers—the farmers; and it is suggested that those dealing both with trade and farm papers should acquaint them with these facts, namely, that farm equipment is worth more because it costs more to produce.

"7. That the necessity for these advances should be presented without apology, for the earning power of up-to-date farm equipment will fully justify purchases as freely as in the past, and the increased price of farm products which has come through the same causes is naturally offsetting much or all of this increased cost. Your sales force should not overlook these facts. More and more liberal purchases and use of farm equipment is justified in these times than in any previous era of farming.

"Your committee found in a careful canvass of representative manufacturers among our membership who answered our secretary's inquiry on this point that only three out of 82 had contracted steel for 1917, and those for a quantity not exceeding 5000 tons—all reports to the contrary notwithstanding; yet as to what should now be done, each must weigh the facts and judge for himself.

"If due regard is given to actual conditions existing and to your own best interest, and also to the effect your actions will have in the direction of cheerfully

and constructively promoting business conditions in your lines, we think that matters will in their natural course work out satisfactorily for all concerned. It is a time for prudent, deliberate and courageous action."

American Commission to France Sails Saturday

The American Industrial Commission to visit France on the basis of unsolicited proposals made to the American Manufacturers' Export Association sails for that country on Saturday, Aug. 26, on the steamship Lafayette. As noted in THE IRON AGE of July 20, the object of the commission is to make a technical investigation of present conditions in France looking to the reconstruction and reorganization of her communities and industries now and after the war. It is to determine also how the United States may contribute, as in largely increased purchases of French products. The French government is to aid the commission, partly through providing for transportation, and the itinerary, which includes some 25 cities, was given in the earlier article. In the composition of the commission the effort has been to secure men of broad experience in some nine general classifications of industry and at the same time of a caliber calculated to lend dignity and standing to the enterprise. A printed report of the results of the commission's visit is promised.

W. W. Nichols, assistant chairman Allis-Chalmers Mfg. Company, Inc., heads the commission as chairman. J. G. Butler, Jr., vice-president Brier Hill Steel Company, Youngstown, Ohio, and director of the Commercial National Bank, Youngstown, is scheduled to represent the iron and steel industry. Ambrose Swasey, Warner & Swasey Company, Cleveland, is also numbered in the party. Among others of the commission, some fifteen in all, are the following: A. B. Farquhar, president A. B. Farquhar Company, Ltd., York, Pa.; James E. Sague, former vice-president American Locomotive Company and Public Service Commissioner, New York; F. J. LeMaistre, consultant, E. I. du Pont de Nemours & Co., Wilmington, Del.; John R. MacArthur, MacArthur Brothers Company, New York; Dr. C. O. Mailloux, consulting engineer, New York; E. A. Warren, vice-president Universal Winding Company, Boston; Samuel W. Fairchild, vice-president Fairchild Brothers & Foster, chemists, 76 Laight Street, New York; Noble Foster Hoggson, president Hoggson Brothers, Inc., contractors, New York; E. E. Russell, J. I. Case Threshing Machine Company, Racine, Wis., and George Burdett Ford, Geo. B. Post & Sons, architects, New York. E. V. Douglass, secretary American Manufacturers' Export Association, 160 Broadway, New York, and secretary of the commission, arrived in France this week.

Central Iron & Steel Company's Report

Receivers of the Central Iron & Steel Company, Harrisburg, Pa., have filed their report of the operations of the plant from March 1, 1915, to Feb. 29, 1916. The report shows that the year's operations resulted in an increase in the net assets of $202,750.97, after allowances for interest, receivers' expense and taxes. The gain was brought about, the report declares, by the earnings of the last three months of the period covered.

The open-hearth department produced 86,985 gross tons of ingots, comparing with 55 446 tons in 1914 and 88,948 tons in 1913. The rolling mills produced 91,398 net tons of plates, which compares with 62,055 tons in 1914 and 89,109 tons in 1913. The rate of operation was 59 per cent of capacity as compared with 40 per cent in 1914. The blast furnaces were not in operation.

The total sales during the year amounted to $2,940,-378.13 compared with $1,899,426.06 in the preceding period.

Among the plant improvements were a new and modern ladle crane of 150 tons capacity in the open-hearth department, and two waste heat boilers, together with boiler house building, at No. 1 mill. Other improvements are being planned to increase the ingot production.

COMBINES FOR FOREIGN TRADE

An Effort to Pass the Webb Bill at This Session of Congress

WASHINGTON, D. C., Aug. 22, 1916.—Chairman Webb of the House Judiciary Committee has filed in the House a favorable report upon the bill drafted by the Federal Trade Commission and designed to exempt from the operation of the Sherman anti-trust law and acts amendatory thereof, combinations of American manufacturers and merchants engaged solely in the export trade. A strong effort will be made to pass this measure in the House before adjournment, and should the present session be protracted a similar attempt will be made in the Senate, the enactment of the bill at this time depending largely upon the legislative exigencies of the closing days of an extraordinary session.

In urging the passage of this important measure the committee expresses the opinion that it will be "much needed to meet trade conditions which are likely to follow a declaration of peace among the great commercial nations of Europe now at war," and adds that it "earnestly recommends its enactment at an early date in order that our exporters may fortify themselves in time to meet the expected competition." The report describes the methods employed by British syndicates, German cartels and French comptoirs, and the fact is emphasized that these combinations receive governmental recognition. A significant illustration of the effectiveness of combinations is given in the case of a large electrical contract in Chile two years ago, where a German combination, during a period of three or four years, spent no less than $60,000 in drawing plans and specifications for submission to the Chilean government in competition with three American concerns, all of which spent large sums of money on three different sets of plans. The cost to the American firms, the report points out, was approximately three times the amount they would have had to spend if the pending bill were enacted into law.

An important chapter of Mr. Webb's report deals with the legal aspect of the measure as it modifies existing statutes. In this connection he says:

> The bill is drawn so as to leave in full force our anti-trust laws as applied to our own markets and as affecting different American exporters in their dealings with each other. Export trade is, by force of the methods adopted by other leading nations, largely a matter of competition between nations. Our home market is to be determined by competition between the several producers and manufacturers.
>
> In order to safeguard the home market it is provided in the bill that the associations authorized by the bill must be for the "sole purpose of engaging in export trade and actually engaged solely in such trade, or an agreement made or act done in the course of export trade by such association, provided such association, agreement or act is not in restraint of trade within the United States."
>
> Permission is granted to own the whole or any part of the stock of a corporation organized solely for the purpose of engaging in export trade, etc., under the terms of the Clayton Act, only when such acquisition does not have the effect of restraining trade or substantially lessening competition within the United States in articles of the kind exported by the association whose stock is acquired or controlled. And, further, by section 5 it is required repeatedly to inform the Government of the manner in which it is availing itself of the privileges granted by the bill

Many great lawyers, Mr. Webb says, think there is nothing in existing laws to prevent American manufacturers and exporters from combining in whatever manner they please in foreign countries to dispose of their products; but other lawyers take the position that there is doubt about this power, and, in order absolutely to clarify the situation and in common fairness to all American exporters, many of whom are not in a position to maintain costly law departments, the committee presents this bill, which "prohibits the slightest violation of our anti-trust laws within the United States, but makes it clear that American exporters doing business in foreign countries are to be allowed to proceed in accordance with foreign laws." Few, if any, foreign countries, Mr. Webb says, compel their exporters to ob-

serve business standards prescribed by our anti-trust laws; hence there would seem to be no reason for requiring our exporters to observe a higher and stricter standard of conduct than their foreign competitors are required to observe. W. L. C.

BRITISH STEEL EXPORTS

June Shipments Large Despite Restrictions—A Record in Export Values

British iron and steel exports in June, excluding iron ore and including scrap, were 310,595 gross tons comparing with 395,750 tons in May, the record month for the war, making the average for the first half of 1916 313,864 tons per month. The 1915 average was 270,858 tons. The bulk is made up of exports to Great Britain's war allies.

June pig-iron exports were 66,150 tons against 83,839 tons in May. To July 1, total pig-iron exports were 439,703, tons against 126,521 tons to July 1, 1915. Of the former total France took 267,893 tons and Italy 81,940 tons. Ferromanganese exports in the first half were 67,000 tons; to July 1, 1915, they were 40,000 tons.

Steel-bar exports to July 1, were 361,366 tons (of which 308,755 tons went to France), against 228,552 tons to July 1, 1915.

Rail exports in June were only 3243 tons as against 23,728 tons in June, 1915. To July 1, this year, they were 28,278 tons comparing with 123,966 tons to July 1, 1915. The shipments of galvanized sheets continue at about 50 per cent of the movement a year ago. In June they were 10,861 tons against 25,091 tons in June, 1915. To July 1, 1916, they were 84,834 tons against 167,415 tons in the same period in 1915. Tin-plate exports are about stationary at 30,351 tons in June, against 33,986 tons in June, 1915. The total to July 1, was 188,598 tons against 198,335 tons to July 1, 1915.

June iron and steel imports, excluding iron ore and including scrap, were 86,303 tons, which compares with 89,089 tons in May, the record month this year. Imports of blooms, billets and slabs were only 11,223 tons in June comparing with 64,882 tons in June, 1915. For the half year to July 1, 1916, they were only 75,996 tons as against 207,289 tons to July 1, 1915. The United States furnished 59,097 tons of this year's total. Iron-ore imports were 645,559 tons in June against 687,742 tons in May. To July 1, they were 3,389,590 tons as against 3,063,515 tons to July 1, 1915.

An interesting fact in connection with the exports of iron and steel is that the value for the total to July 1, 1916, was close to £29,000,000 or at the rate of £58,000,000 per year. In 1913, the high water mark in value but not in tonnage was reached at £54,000,000. Present export values are therefore a record.

A British Contract for 200,000 Shell Forgings

The Harrisburg Pipe & Pipe Bending Company, Harrisburg, Pa., has received an order from the British Government for 200,000 4.5-in. steel forgings for high-explosive shells. The contract calls for the completion of deliveries by Dec. 31, 1916. The forgings will be finished into shells in England.

J. E. Rhoads & Son, 12 North Third Street, Philadelphia, recently shipped one of the largest leather driving belts ever manufactured from their plant in Wilmington, Del. It was consigned to the Diamond State Fiber Company, West Conshohocken, Pa. The belt, endless and of water-proof construction, is 146½ ft. long and three-ply in thickness. It weighs about 1800 lb. and is worth approximately $5,000.

The Elyria Iron & Steel Company, Elyria, Ohio, has placed a contract for the erection of an addition to its plant in Cleveland, but the cost will be less than $75,000, as reported. The product of the company at its Cleveland plant is light gage oxy-acetylene welded tubing of high grade.

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BRITISH WORKSHOP NEEDS

Shortcomings for After-War Competition with America and Germany

A severe arraignment of the British industrial situation, particularly as regards the metal-working trades, all looking toward the changes which must be effected for after-war competition, was made in a late issue of *Engineering* of London by H. F. L. Orcutt, managing director of the Gear Grinding Company, Ltd., Hansworth, Birmingham, England. The following passages making comparisons between British and American, and British and German methods and practices will be of interest.

Germany and America's trade supremacy has not been built up by passing chambers-of-commerce resolutions and legislative protection, but by systematic, hard, slogging work. The two countries which England must meet as rivals in trade and industry are the United States and Germany.

Some special features of American industrial life should be first considered, for the reason that the most important progress made in Germany is due to the slavish copying of American manufacturing devices and methods.

In the United States the manufacturer is favored by two unique circumstances. He has the largest home market in the world. He can put his wares on the market practically with no regard to his customers' fads. This makes it easy for him to follow a policy of preparing for turning out goods in large quantities and of a standard pattern—two essentials to low costs combined with good quality. No better example can be found to illustrate than the American motor-car. Estimates for the near future are for an output of 1,000,000 per annum. An outside estimate for the total production of motor-cars in Great Britain is probably 25,000 annually. The American public take the car offered by the maker with standard body and fittings, rarely questioning even the color. The customer in England demands individual details and fads until manufacturing in the real sense is impossible. In the United States the maker leads the public; in England the public strangle the maker.

As to the home market, in which large quantities of goods are absorbed, this is a difficult situation to meet. It probably can be met, however, by co-operation with the Colonies and Dependencies of Great Britain. In respect to individual demands of customers there should be no difficulty. The British public take the standard American article without murmur.

AMERICAN SUPERIORITY

With but few exceptions, in every line of manufacturing in the United States the mechanical equipment is superior to that of Great Britain. To reform completely the equipment of British workshops is merely a matter of having the money to purchase plant. It is the profitable *operation* of good plant that is not generally understood in England and in which America leads. The production of standard articles in large quantities naturally calls for the best mechanical outfit.

The best mechanical outfit naturally demands the highest skill to work it efficiently. There are plenty of good workmen in England, but there is a lack of skilled men who understand the operation and management of automatic machinery and refined methods of production. Even in the United States conditions are not satisfactory in respect to the quantity of skilled mechanics, who cannot be trained in less than from three to five years.

THE MATTER OF SOCIAL STATUS IN WORKS

The superior productive capacity of the average American manufacturing establishment as compared with the English shop is largely due to the type of man mainly responsible for output. In the States this type is cultivated by the capitalist. In England he is usually a casual growth. In America his opportunities for advance are unrestricted. In England he is a fixture in his class as much as the working man or the tradesman. It naturally follows that in the one case he is the social and technical equal of other officials, in the other he is of inferior rank, neither consulted nor considered in many matters directly relating to his responsibilities. In the one case his authority is unlimited in his department, in the other he is too often the subject of interference and restriction. Responsibility is in the one case wide, in the other narrow, high remunerations as compared with low salaries, social standing with no barriers as compared with boundaries distinctly difficult to break through. There is not much doubt as to which country offers the highest inducement to efficiency.

The American is willing to pay for training the men; the Englishman is not. The result is that in the United States we find apprentices paid high wages, in Great Britain little or nothing (often a premium is required). The American pays for technical training directly connected with workshop practice. The Englishman is shouting for State aid and technical school assistance paid for out of the rates.

The results in industry are well known. American labor is the most efficient and the highest paid. That is, any article which can be produced in quantities on specially arranged machinery can usually be turned out in the United States at a lower cost than in Great Britain. This would be impossible without the assistance of the highly trained worker.

GROWTH OF SCIENTIFIC MANAGEMENT

One of the most important developments in the United States affecting costs and output is what is known as scientific management. It is comparatively new and not generally adopted. It is a success beyond question. Its methods are really scientific and far reaching. It will be condemned at sight by trade unionism. Its relation to manufacturing is the same as that of chemistry to the production of dyes.

The leading principles of the experts in this science are well worth recording.

1. Changes in methods of manufacturing to be undertaken slowly, only as rapidly as they can be kept in hand, absorbed and operated by management, staff, and workers.
2. Increased output.
3. Increase in wages.
4. Lessened fatigue.
5. Selecting the task the individual is best suited to undertake.

The leaders in scientific management insist over and over again that the above is their aim. Their order of work is, first, a complete study of conditions; second, compiling, tabulating, and digesting facts; third, suggesting new methods; fourth, training staff and workers in improved methods. Scientific management already has a large literature. It is in full swing in a number of works. Its future is assured. It is only a matter of time when it must be universally adopted. Successful competition without it is difficult, in many cases impossible.

FREE INTERCHANGE OF INFORMATION

One peculiar characteristic of the American which contributes not a little to his all-round progress is worth mentioning, that is, the free interchange of opinions and information even among those producing the same article. They visit each other's factories, compare notes, write papers giving details of processes and methods with a freedom that certainly makes for progress. It cannot be said that the American attitude in this matter is dictated by patriotism or public interest. It is rather the natural accompaniment of rapid changes and freedom from conservatism. The opposite condition exists, generally speaking, in England, with obvious results; contentment with old methods and out-of-date plant being the rule instead of the exception.

GERMANY AND AMERICA COMPARED

Germany's manufacturing position which she holds to-day is the result of studying, absorbing and copying American machines and methods. Broadly speaking, her mechanical outfit is superior to that of Great

Britain, second only to the United States. During the last 25 years she has bought heavily of American machines. She has copied them, and now produces in her own machine-shops the counterpart of nearly every one which is worth having. In the proper equipment of her workshops alone England has a task before she can run parallel with Germany and be in a position to turn out manufactured articles to compete in price and quality. Unlike America, Germany has not the large home market. She has made, however, a large foreign market, which, combined with her home consumption, gives her the first requisite of cheap production—*i.e.*, large quantities.

Broadly speaking, although the mechanical equipment of the German is pretty well on a level with the American, he lags somewhat, for the reason that the American is more original, bolder and more practical. The American always will lead. His methods of working are sounder. He is first of all practical. The men from whom improvements come have a training superior to the German. This training is acquired in actual working conditions. The Germans rely on, in fact, make a fetish of, book-learning. In his mechanical and scientific work the German is spoon-fed, as in all other things. He relies principally on some government official for guidance, control and assistance. Without doubt the pre-war admirers of German methods of training and education will not be so much in evidence in the future.

STATE TRADE SCHOOLS NOT THE BEST

State-controlled continuation and trade schools of Germany have little in them worth imitation compared with the systems of apprenticeship and manual training arranged and maintained by many American manufacturers out of their own pockets. Even the technical and scientific institutions of Germany are not the equal of similar organizations in the United States.

Comparison of the individual scientist in Germany and America is distinctly in favor of the latter. The American is broader, willing to take wisdom wherever it may be found and apply it wherever it pays. The German is restricted by government regulations and low wages. One merit is common to both countries—that is, the scientific expert is looked upon as indispensable to industrial progress and efficiency. The training of engineers and workmen in Germany, as in the United States, is undertaken thoroughly and systematically.

The introduction of improved methods of management are directly and openly opposed by the English trade unionist. Whether this is justifiable or not, competition on the part of British manufacturers in the world's market is impossible as long as it continues.

STATE AID TO GERMAN INDUSTRY

Rightly or wrongly, the backing which the banks have given to industrial enterprise in Germany has been a most important aid to her development. Practically speaking, extension of manufacturing has never languished for want of money, banks advancing for capital expenditure as well as working funds. In the extension of her foreign trade German merchants have been assisted by low inland freight rates charged on goods for export. The opposite extreme is found in Great Britain, where inland freight rates on all goods are the highest in the world. The lowest all-round rates are in the United States.

FORCED USE OF AUTOMATIC MACHINERY

We can take advantage of a condition forced upon us by the crisis with which we are now struggling—that is, the enormous amount of new machinery which we have been obliged to install for the production of war material. This country has never within such a short space of time bought and put into operation such vast quantities of up-to-date machinery. Manufacturers who have for years followed hand methods of production find themselves the possessors of automatic machinery which they never would have purchased. They have few men who understand the machinery which they are forced to operate and with which they must turn out articles which must pass inspection and be made to gage. They are learning the lesson and getting paid for doing it.

The high wages being earned by both the skilled and unskilled worker really dominate the whole situation and may at once put obsolete or antiquated machinery out of commission. High wages combined with up-to-date plant (properly worked) usually means low production costs. This fact the English manufacturer has never fully grasped, although it has been established for years in the United States.

The present high wages will be a blessing to all. They will never go back to the pre-war standard. Exactly what the worker will be when this crisis is over depends on how long the crisis lasts. If it lasts long enough, he will have learned that it is not to his own interest to do as little in a given time as possible, that he will be better off when he has learned his trade thoroughly and encouraged and helped others to become skillful craftsmen; that to be subject to discipline is not a degradation or a hardship, but a duty and a necessity to which all must submit; that he will always be the subject of suspicion and distrust unless he adheres to his written or spoken word; and that the happiness of one man at the expense of another is not good citizenship.

British Electric Steel in 1915

Supplementary statistics of the British steel industry, recently made public by the Iron and Steel Allied Trades Federation, state that in addition to the 8,350,944 gross tons of steel ingots originally reported as the 1915 output, as given in THE IRON AGE, May 4, 1916, the following was also produced:

	Gross Tons
Electric steel ingots	29,000
Electric steel castings	3,000
Steel castings	177,071

This brings the total steel output to 8,550,015 tons, as compared with 7,835,113 tons in 1914, and 7,663,876 tons in 1913.

The production of ferroalloys in electric furnaces in 1915 is given as 1500 gross tons of ferrosilicon, 1250 tons of ferrotungsten, 2000 tons of ferrochrome, and 500 tons of other ferroalloys. The same report gives the following table of the number of electric furnaces actually operating and being built in Great Britain in 1915:

	Operating	Under Construction
Heroult	15	10
Electro-Metal (Gronwall-Lyon)	4	8
Stassano	2	0
Snyder	0	4
Reinnerfelt	1	2
Stobie	1	0
Total	23	22

The review of the electric steel industry in THE IRON AGE, Jan. 6, 1916, credited England with 46 furnaces operating or under contract.

To Take Australia's Spelter

A London cablegram dated Aug. 17 states that an agreement has been reached between Great Britain and Australia under which Great Britain contracts to buy 100,000 tons of zinc concentrates and 45,000 tons of spelter annually from Australia during the period of the war and for ten years afterward.

The effect of the agreement will be to insure the transfer of the smelting industry from German to British hands. The amount involved in the agreement exceeds £25,000,000 (nearly $125,000,000,) covering more than half of Australia's annual output. The rest of the output is expected to be taken over by France and Belgium.

Considerable additions to its New York Harbor equipment have just been ordered by the Lehigh Valley Railroad. Contracts have been let for a steel steamlighter with a capacity of 582 tons; one 25-car capacity steel car float; two 12-car capacity steel car floats; 10 grain boats, each of 1000 tons capacity, and six 90-ft. covered barges for the transportation of general merchandise.

Iron and Steel Markets

LARGE SALES OF PIG IRON

Many Steel Works in the Market for Basic

Much More War Steel Wanted—Implement Makers Must Pay High Prices

Pig iron rather than steel has been the market leader of the week. The spectacular orders for shell and other war steel, with deliveries running six to ten months ahead, having been put on producers' books, interest in the steel trade centers on the balancing of supply and demand in the domestic market for the first half of 1917. Yet it is evident that the Allies want much more steel from the United States. Producers have been solicited again in the past week, in dragnet letters, to say what rounds or rounded billets they could furnish, with what deliveries and at what prices.

Many orders now on the books of leading steel companies for this year's delivery must go over to 1917. Weeks of almost unbroken hot weather have aggravated an oversold condition, and consumers have not yet felt the full effect of this exceptional curtailment.

The recent increase in domestic buying for the first half of 1917 still leaves the total much short of what some steel makers had expected. But at present high prices consumers are cautious, in spite of warnings that they may overstay.

Noteworthy in this connection is the report of the agricultural implement makers' committee which has been working to get lower prices on steel bars. The committee did not succeed, and it tells the associated buyers that each must now decide for himself how he shall provide for his steel for next year.

There are signs in the building trade that the high prices for steel have now fastened themselves in buyers' minds as likely to last longer than was counted on only lately. Work is to go forward, for example, on hotels at Washington and Baltimore, requiring about 8000 tons, and at St. Louis on a building calling for 6500 tons. The American Bridge Company has the contract for 10,000 to 12,000 tons for new Carnegie mill buildings in the Youngstown district.

Car rebuilding is a factor, rather than new car orders, 25,000 to 30,000 tons of steel being wanted for the former. The St. Paul is considering 5000 new cars, and the Pennsylvania Railroad has ordered 11,000 tons of plates and 4000 tons of shapes for car building.

Pittsburgh reports a tendency to exaggerate the shortage in semi-finished steel. Sheet and tin-plate works have been getting a satisfactory supply, and attention is called to the large amount of new steel capacity that has come into operation this year, with more to follow in the next sixty days. On the other hand strikes in equipment plants have held up the completion of new rolling mill capacity.

Black and galvanized sheets are weaker and the latter have sold at 4.15c. or under. For a Los Angeles aqueduct 9000 tons of blue annealed sheets will be wanted.

Chicago steel works are getting orders from unusual sources. An Ohio mill placed there a round tonnage of ingots for this year, paying $40 at Chicago mill.

Pig-iron buying has been on a large scale, particularly in steel-making grades. A Youngstown steel company bought 15,000 tons of Bessemer and is in the market for basic. At St. Louis three consumers took 50,000 tons of basic, 35,000 tons going to Northern furnaces, in part on the basis of $18 at Chicago. Southern Ohio purchases of basic have been a large factor in a total of 128,000 tons of pig iron through Cincinnati offices since Aug. 1. At Pittsburgh a steel foundry interest is in the market for 20,000 tons of basic and an eastern Pennsylvania steel works for 18,000 tons. Buffalo sales of foundry and basic irons were nearly 50,000 tons for the week, with as much still pending.

Pig-iron prices have been irregular. As usual there were low figures out. Chicago prices were revised downward to meet Southern competition. Southern Ohio iron sold at $18, Ironton, as against $18.50 only recently. In eastern Pennsylvania $19, delivered, for basic iron was done, but $19.50 is asked to-day. Some Buffalo sellers have advanced prices, also. At Cleveland large sales have been made—70,000 tons by one interest since Aug. 1, against 9000 tons in all July. Alabama iron is stronger. While $13.50 iron has not disappeared, furnace sales are generally at a $14 minimum.

Some reservations of Lake Superior ore for 1917 have been made—perhaps the earliest on record—and the bulk of buying for next year, it is now believed, will be done before navigation closes. Ore shippers insist that $1 will not be generally paid for contract vessel room for next year and point to 2,500,000 tons additional ore that will be carried by new vessels ready by 1917.

Pittsburgh

PITTSBURGH, PA., Aug. 22, 1916.

Much publicity is being given to a reported shortage in the supply of semi-finished steel, but it is believed the reports are exaggerated. Sheet and tin-plate mills say they are getting quite satisfactory deliveries on sheet bars; in fact, better than two or three months ago. Although the excessively hot weather for nearly all of August has cut down the output of mills materially, a large amount of new open-hearth steel-making capacity has come in the market since the first of the year, and this is bound to help the situation, as much of it is already active, and more will be within the next 60 days. Nearly all buying negotiations now in pig iron, steel and finished products are for first quarter and first half of next year. There has been some buying of foundry iron for first quarter and first half, also some sales of tin plate to Pacific coast packers for first quarter, the price to be fixed later. The local situation seems stronger at this writing than it was Aug. 1, and sellers say there is no trouble in selling almost anything at good prices if they can make the deliveries. The foreign inquiry for semi-finished steel has fallen off. Prices on all finished lines of steel are firm, with the exception of black and galvanized sheets, while nuts and bolts have been advanced about 5 per cent. The output of coke is being

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

Pig Iron, Per Gross Ton	Aug. 23, 1916.	Aug. 16, 1916	July 26 1916	Aug. 25, 1915
No. 2 X, Philadelphia	$19.50	$19.50	$19.50	$15.50
No. 2, Valley furnace	18.25	18.25	18.25	14.50
No. 2 Southern, Cin'ti	16.40	16.40	16.90	13.90
No. 2, Birmingham, Ala.	13.50	13.50	14.00	11.00
No. 2, furnace, Chicago*	*18.00*	18.50	19.00	13.50
Basic, del'd, eastern Pa.	19.00	19.00	19.00	15.50
Basic, Valley furnace	18.00	18.00	18.00	14.50
Bessemer, Pittsburgh	21.95	21.95	21.95	16.45
Malleable Bess., Ch'go*	19.00	19.00	19.50	13.50
Gray forge, Pittsburgh	18.70	18.70	18.70	14.45
L. S. charcoal, Chicago	19.75	19.75	19.75	16.25

Billets, etc., Per Gross Ton				
Bess. billets, Pittsburgh	45.00	45.00	42.00	23.50
O.-h. billets, Pittsburgh	45.00	45.00	45.00	24.00
O.-h. sheet bars, P'gh	*45.00*	47.00	45.00	24.50
Forging billets, base, P'gh	69.00	69.00	69.00	29.00
O.-h. billets, Phila	**46.00**	45.00	45.00	32.00
Wire rods, Pittsburgh	55.00	55.00	55.00	28.00

Finished Iron and Steel, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.47½	1.47½	1.47½	1.25
O.-h. rails, heavy, at mill	1.56½	1.56½	1.56½	1.34
Iron bars, Philadelphia	2.659	2.659	2.659	1.459
Iron bars, Pittsburgh	2.60	2.60	2.50	1.30
Iron bars, Chicago	2.35	2.35	2.35	1.25
Steel bars, Pittsburgh	2.60	2.60	2.50	1.30
Steel bars, New York	2.769	2.769	2.669	1.519
Tank plates, Pittsburgh	**4.00**	3.50	3.50	1.30
Tank plates, New York	**4.169**	3.669	3.669	1.469
Beams, etc., Pittsburgh	2.50	2.50	2.50	1.30
Beams, etc., New York	2.669	2.669	2.669	1.519
Skelp, grooved steel, P'gh	2.35	2.35	2.35	1.30
Skelp, sheared steel, P'gh	2.45	2.45	2.45	1.35
Steel hoops, Pittsburgh	3.00	3.00	2.75	1.35

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire, Per Lb. to Large Buyers	Aug. 23, 1916.	Aug. 16, 1916	July 26 1916	Aug. 25, 1915
Sheets, black, No. 28, P'gh	3.50	3.50	3.50	1.90
Galv. sheets, No. 28, P'gh	4.75	4.25	4.25	3.40
Wire nails, Pittsburgh	2.60	2.60	2.60	1.65
Cut nails, Pittsburgh	2.60	2.60	2.60	1.60
Fence wire, base, P'gh	3.25	3.25	3.25	1.80
Barb wire, galv., P'gh	3.45	3.45	3.35	2.10

Old Material, Per Gross Ton:				
Iron rails, Chicago	18.50	18.50	18.50	17.25
Iron rails, Philadelphia	20.00	20.00	20.00	17.00
Carwheels, Chicago	11.50	11.50	12.00	11.75
Carwheels, Philadelphia	15.50	15.50	15.50	13.50
Heavy steel scrap, P'gh	16.00	16.00	16.25	14.00
Heavy steel scrap, Phila	14.75	14.75	15.00	14.00
Heavy steel scrap, Ch'go	15.25	15.25	15.25	11.75
No. 1 cast, Pittsburgh	*14.50*	15.00	15.00	13.00
No. 1 cast, Philadelphia	16.00	16.00	16.00	13.50
No. 1 cast, Ch'go (net ton)	11.50	11.50	11.50	10.00
No. 1 RR. wrot, Phila	20.00	20.00	19.50	15.50
No. 1 RR. wrot, Ch'go (net ton)	15.25	15.25	15.25	11.00

Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	**$2.85**	$2.75	$2.75	$1.50
Furnace coke, future	2.50	2.50	2.50	1.75
Foundry coke, prompt	3.25	3.25	3.25	2.00
Foundry coke, future	3.50	3.50	3.50	2.25

Metals, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents
Lake copper, New York	**27.25**	26.75	25.25	19.00
Electrolytic copper, N. Y.	**26.87½**	26.50	25.00	16.00
Spelter, St. Louis	**9.50**	8.75	10.25	12.25
Spelter, New York	**9.75**	9.00	10.50	12.50
Lead, St. Louis	**6.50**	5.90	6.00	4.35
Lead, New York	**6.62½**	6.00	6.20	4.50
Tin, New York	*38.50*	39.00	38.00	33.75
Antimony, Asiatic, N. Y.	**13.50**	10.00	13.50	28.50
Tin plate, 100-lb. box, P'gh	$6.00	$6.00	$6.00	$3.10

cut down by hot weather and scarcity of labor, and prices on spot coke are higher. The scrap market is showing a better feeling, and prices are firmer though no higher. The continuance of the present situation over the remainder of this year seems assured, and the outlook for the first half of 1917 is showing up stronger.

Pig Iron.—There is a decided scarcity in supply of Bessemer and basic iron, and prices are very firm, though showing no signs of advancing. Sales of about 3000 tons of basic have been made at $18, Valley furnace. The American Steel Foundries, which bought early in the month 10,000 tons of basic iron for its Sharon and Alliance plants, is reported in the market for 20,000 tons or more, and the Standard Steel Works Company, Burnham, Pa., is also inquiring for basic. In foundry iron there has been a fairly heavy movement for the first half of 1917, the Westinghouse Air Brake Company being credited with buying 20,000 to 25,000 tons and other consumers probably 15,000 tons. Most of this went on the basis of about $18.25, Valley, for No. 2, and some brought $18.50, while sales of 2500 to 3000 tons of No. 2 for this year's delivery were made at $18.50, Valley furnace. An active inquiry is in the market from Italy for 28,000 tons of Bessemer, but nothing has yet been done, owing largely to the uncertainty of ocean freights. When the inquiry was first received, the freight from New York to Italy was $28, but when the inquiry became known the rate advanced to $35. The Republic Iron & Steel Company has bought 15,000 tons of Bessemer iron for delivery over the remainder of this year to be supplied from Claire furnace of M. A. Hanna & Co. at Sharpsville, Pa., at the reported price of $21 at furnace. It is stated the company is also in the market for a round lot of basic iron. We quote Bessemer iron at $21; basic, $18; gray forge, $17.75 to $18; malleable Bessemer, $18.50 to $19, and No. 2 foundry, $18.25 to $18.50, all at Valley furnace, the freight rate to the Pittsburgh and Cleveland districts being 95c. per gross ton.

Ferroalloys.—The local market is very dull, and prices on all grades are only fairly strong. The scare as regards the future supply of ferromanganese has passed, and domestic 80 per cent can readily be bought at $165 to $175 at furnace, but there is very little new inquiry. Prices on the lower grades of ferrosilicon are only fairly strong. We quote 18 to 22 per cent spiegeleisen at $40 to $45, and 25 to 30 per cent, $55 to $65, at furnace. On 50 per cent ferrosilicon we quote $88 to $89 in lots up to 100 tons; over 100 tons, $87 to $88, and over 600 tons, $86 to $87, all per gross ton, f.o.b. Pittsburgh. We quote Bessemer ferrosilicon as follows: 9 per cent, $30; 10 per cent, $31; 11 per cent, $32; 12 per cent, $33; 13 per cent, $34.50; 14 per cent, $36.50; 15 per cent, $38.50, and 16 per cent, $41. Seven per cent silvery is $28.50; 8 per cent, $29; 9 per cent, $29.50; 10 per cent, $30; 11 per cent, $31, and 12 per cent, $32. These prices are f.o.b. furnace, Jackson or New Straitsville, Ohio, or Ashland, Ky., all having a freight rate of $2 per gross ton to Pittsburgh.

Billets and Sheet Bars.—The foreign inquiry for semi-finished steel in the form of billets and sheet bars has quieted down, no important inquiries having come out recently. There is a scarcity in the immediate supply of semi-finished steel, but this has been probably overestimated, as consumers report they are getting better deliveries on both billets and sheet bars than for some time. Much new capacity in open-hearth steel at Johnstown, Youngstown, Monessen and Pittsburgh has lately come in the market, and it is believed this will, to some extent at least, relieve the shortage. Prices on billets and sheet bars depend entirely on the necessities of the buyer and the kind of steel that is offered. A sale of 500 tons of sheet bars was made here a few days ago at considerably less than $45, but most mills quote that figure when they quote at all. Three or four of the larger steel makers are badly oversold and are buying steel in the form of ingots wherever they can find it. We quote soft open-hearth and Bessemer billets and sheet bars at $43 to $45, maker's mill, Pittsburgh or Youngstown. Possibly odd lots could be picked up from dealers at the lower price. We quote forging billets at $69 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take $1 extra.

Structural Material.—New inquiry is fairly heavy. The American Bridge Company has taken 5500 tons for

a new power house for the Union Gas & Electric Company, Cincinnati, and will also furnish 10,000 to 12,000 tons for the new hoop and bar mills being built by the Carnegie Steel Company at McDonald, Ohio. Some of this material is already fabricated at its Ambridge shops. The Jones & Laughlin Steel Company has taken 150 tons for a theater building in San Francisco, and about the same quantity for Panama Canal work. Active jobs in the market include about 5000 tons for a hotel in Washington, D. C., and 3000 to 4000 tons for a hotel in Baltimore. The navy yard at Norfolk, Va., is also inquiring for 4000 tons. We quote beams and channels up to 15-in. at 2.60c. at mill for such deliveries as the mill can make, while small lots from stock for prompt shipment bring 3c. to 3.25c., Pittsburgh.

Steel Rails.—Very little is doing in the local market. The Carnegie Steel Company is filled to third quarter of 1917 on both standard sections and light rails, and, therefore, is not in position to quote for prompt delivery. The rerolling rail mills are taking a good part of the new business being offered in light rails by shading prices on new steel rails from $1 to $2 per ton. We quote 25 to 45 lb. sections at $47; 16 and 20 lb., $48; 12 and 14 lb., $49; and 8 and 10 lb., $50, in carload lots, f.o.b. at mill, the usual extras being charged for less than carload lots. We quote standard section rails of Bessemer stock at 1.47½c., and of open hearth 1.56½c., Pittsburgh.

Plates.—While there is very little demand from the car builders, the shipyards and boilermakers are specifying heavily, and plates are probably the scarcest item on the whole list. Leading mills have their entire output sold for this year, and have taken large contracts for delivery in first quarter and first half of 1917. About 3000 tons of plates are wanted for caissons for the Panama Canal, but it is doubtful if local mills can take any of this business and make the desired deliveries. The minimum mill price on plates is 3c. for such deliveries as the mills can make, which would be in first quarter and first half of next year, while for shipment in two to three months 4c.. and even higher, is being paid. We quote ¼-in. and heavier plates for delivery at convenience of the mills at 3c., and for shipment in two to four months at 4c. to 4.10c., Pittsburgh.

Sheets.—The output of sheets is being materially cut down by the shortage in labor, many of the hands refusing to work more than four days a week. Some large inquiries for blue annealed and special grades of sheets are in the market from automobile builders for last quarter and first half of next year. The new demand for sheets from carbuilders is quiet, but on blue annealed and electrical sheets the mills are sold up for four and five months ahead. On thin black and galvanized, fairly prompt deliveries can be made by some mills. The lower prices on spelter are affecting galvanized sheets, which have sold in some cases at 4.15c. or less. Prices on Bessemer black sheets are not quite so firm, 2.90c. having been shaded in some cases. We quote blue annealed sheets, Nos. 9 and 10, at 3c. to 3.25c., for delivery at convenience of the mill. We quote No. 28 Bessemer and open-hearth black sheets at 2.90c. to 3c.; No. 28 galvanized, Bessemer, and open-hearth, 4.15c. to 4.25c.; Nos. 22 and 24 black plate, tin-mill sizes, H. R. & A., 2.90c.; Nos. 25, 26 and 27, 3c. to 3.10c.; No. 28, 3.10c. to 3.15c.; and No. 29, 3.20c. to 3.25c. These prices are for carloads and larger lots, fo.b. mill, Pittsburgh.

Tin Plate.—This is the height of the canning season and pressure on the mills for deliveries of tin plate is enormously heavy. There is a good deal of inquiry for first quarter and first half of 1917, and some has been sold to Pacific coast packers for first quarter, the price to be determined when prices are fixed on the 1917 business. Makers of tin plate have had a severe lesson this year in selling for a year ahead, and it is likely that determined efforts will be made, when the time comes to fix prices, to make them good only for the first six months of 1917. Foreign demand is heavier, one inquiry being for 90,000 boxes for England, presumably for shipment to the Orient. To regular customers, mills are quoting tin plate from stock at $5.50, while production tin plate is quoted at $5.75 and up to $6 to the domestic trade. For export, $6 to $6.25 per base box is quoted. We quote 8-lb. coated ternes at $8.50 to $8.75 for 200 lb., and $8.75 to $9 for 214 lb., all f.o.b. Pittsburgh.

Skelp.—New inquiry is quiet, but the two or three local mills that make skelp are sold up for the next several months. Prices are firm, but without change. We quote grooved steel skelp at 2.35c. to 2.40c.; sheared steel skelp, 2.45c. to 2.50c.; grooved iron skelp, 2.70c. to 2.80c., and sheared iron skelp, 3c. to 3.10c., all delivered to consumers' mills in the Pittsburgh district.

Cold-Rolled Strip Steel.—Nearly all consumers are covered for the remainder of this year, and there is a good deal of inquiry for delivery in first quarter and first half of 1917. So far the makers have not sold into next year, but may agree to do so in the near future. All contracts contain a very tight non-cancellation clause, and in the event of a decline in the market the consumers will likely be compelled to take the material. On contract we quote cold-rolled strip steel at $6 per 100 lb., base, and on small lots for fairly prompt delivery, from $6.50 to $7. Extras, standard with all the mills, were printed on page 810 of THE IRON AGE of March 30.

Wire Rods.—To a few of the very largest consumers some contracts for soft Bessemer and open-hearth rods have recently been taken by the mills at $50, but for current demand the mills report no trouble in getting $55 to $60 at mill. We note sales of 1000 to 1200 tons of soft Bessemer and open-hearth rods for delivery over the next two or three months at $60. We quote soft Bessemer, open-hearth and chain rods at $55 to $60 per ton, f.o.b. Pittsburgh.

Nuts and Bolts.—Prices of nuts and bolts have again been advanced about 5 per cent, due to the increased cost of steel and also to the heavy demand, which makers state is much beyond their capacity. Most large consumers are covered for the remainder of this year and some into the first quarter of 1917, at lower than the new prices, and specifications are active. Deliveries are back six to eight weeks or longer, and all makers are running to as full capacity as the supply of steel and labor will permit. The very hot weather of the past month or more has cut down the output, and makers are not catching up on back deliveries. The new discounts are as follows, delivered in lots of 300 lb. or more, where the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days:

Carriage bolts, small, rolled thread, 50 and 5 per cent; small, cut thread, 40, 10 and 5 per cent; large, 35 and 5 per cent.

Machine bolts, h. p. nuts, small, rolled thread, 50 and 10 per cent; small, cut thread 50 per cent; large, 40 and 5 per cent.

Machine bolts, c. p. c. and t. nuts, small, 40 and 10 per cent; large, 35 per cent. Blank bolts, 10 and 5 per cent. Bolt ends, h. p. nuts, 40 and 5 per cent; with c. p. nuts, 35 per cent. Rough stud bolts, 15 per cent. Lag screws (cone or gimlet point), 50 and 5 per cent.

Forged set screws and tap bolts, 10 per cent. Cup and round point set screws, case hardened, 60 per cent. Square or hexagon head cap screws, 55 per cent. Flat, button, round or fillister head cap screws, 30 per cent.

Nuts, h. p. sq., tapped or blank, $2.40 off list; hex., $2.70 off. Nuts, c. p. c. and t. sq., tapped or blank, $2.40 off; hex., $2.80 off. Semi-finished hex. nuts, 60 and 5 per cent. Finished and case-hardened nuts, 60 and 5 per cent.

Rivets, 7/16 in. in diameter and smaller, 45, 10 and 5 per cent.

Rivets.—Most consumers are covered over this year and some into first quarter of 1917, but the new demand is fairly active. Makers report specifications coming in freely. There is still much delay in getting deliveries of steel from the mills, and this, with the hot weather, is cutting down the output. Foreign inquiry is fairly active. Makers' prices, but which are being shaded in some cases by jobbers, are as follows: Buttonhead structural rivets, ½ in. in diameter and larger, $4 per 100 lb., base, and conehead boiler rivets, same sizes, $4.10 per 100 lb., base, f.o.b. Pittsburgh. Terms are 30 days net, or one-half of 1 per cent for cash in 10 days.

Railroad Spikes.—No large inquiries are in the market, and specifications from railroads are not coming

in very freely. Spikes are probably the quietest item in the whole list of finished steel. Makers are diverting the steel that ordinarily would go into spikes to other products for which there is a better demand and at good prices. In the absence of new buying, prices are as follows:

Standard railroad spikes, 1/2 x 9/16 in. and larger, $2.65 to $2.75; railroad spikes, 1/2 and 7/16 in., $2.70 base; railroad spikes, 3/8 in. and 5/16 in., $3.00 base; boat spikes, $2.80 base; all per 100 lb., f.o.b. Pittsburgh.

Wire Products.—Mills report prices very firm and state that specifications are active. As is usual in the wire trade, customers covered on their needs for some time ahead before the recent advance. In spite of the high prices ruling, it is believed the fall trade in fence wire will be normal. The new demand for wire and wire nails is not very active, but there is practically no barb wire to be had, the heavy foreign and domestic demand having taken the available supply over the remainder of the year. Foreign demand for barb wire has quieted down. Prices to the large trade, effective from Aug. 7, are as follows: Wire nails, $2.60, base, per keg; galvanized, 1 in. and longer, including large head barbed roofing nails, taking an advance over this price of $2, and shorter than 1 in., $2.50. Bright basic wire is $2.65 per 100 lb.; annealed fence wire, 6 to 9, $2.55; galvanized wire, $3.25; galvanized barb wire and fence staples, $3.45; painted barb wire, $2.75; polished fence staples, $2.75; cement coated nails, $2.50, base, these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. No change was made in discounts on woven wire fencing, which remain at 61½ per cent off list for carload lots, 60½ per cent for 1000 rod lots and 59½ per cent for small lots, f.o.b. Pittsburgh.

Iron and Steel Bars.—Local steel-bar mills disclaim having taken any of the orders placed lately by the implement makers for delivery for the first half of 1917, and it is believed most of this business was placed with Chicago and other Western mills. The new demand for steel bars is fairly active, and specifications are very heavy. We quote merchant steel bars at 2.60c. at mill for delivery at convenience of the mill, which would be in last quarter of this year or first quarter of 1917, while for prompt shipment from warehouse 3c. to 3.10c. is quoted. We quote refined iron bars at 2.60c. to 2.70c., and railroad test bars, 2.70c. to 2.80c., f.o.b. Pittsburgh.

Shafting.—The new demand for shafting is reported heavier than for several months. Nearly all consumers are covered over the remainder of this year, and large inquiries are out from automobile builders and the screw stock machine trade for first half of 1917 shipment. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots for delivery in last quarter of this year and first quarter of 1917, and 10 per cent off in less than carload lots, f.o.b. Pittsburgh, freight added to point of delivery.

Merchant Steel.—Mills are sold up over the remainder of this year and specifications are heavy. Prices on small lots are about as follows: Iron-finished tire, ½ x 1½ in. and larger, 2.50c., base; under ½ x 1½ in., 2.60c.; planished tire, 2.70c.; channel tire, ¾ to ⅞ and 1 in., 2.85c. to 2.95c.; 1⅛ in. and larger, 3.25c.; toe calk, 2.95c. to 3.05c., base; flat sleigh shoe, 2.70c.; concave and convex, 2.75c.; cutter shoe, tapered or bent, 3.25c. to 3.35c.; spring steel, 2.95c. to 3.05c.; machinery steel, smooth finished, 2.75c.

Hoops and Bands.—The minimum mill price on steel hoops is 3c. and on steel bands 2.60c. for such deliveries as the mills can make, with extras on the latter as per the steel-bar card. For prompt shipment steel bands bring 2.75c. and higher.

Wrought Pipe.—The Royal Dutch Company, Ltd., which has very extensive oil operations in Kansas, Oklahoma and California, is reported to have closed an option with a Youngstown mill for 470 miles of 10-in. line pipe. It is also said that the Sinclair Oil & Refining Company, a large operator in the Oklahoma district, is contemplating erecting warehouses in Chicago and St. Louis, and it is reported will buy 800 miles or more of 8-in. line pipe, but the inquiry has not yet come to local mills. On lap-weld sizes of iron and steel pipe, mills are sold up for five to six months, but can make prompt deliveries on butt-weld sizes. It is stated that as yet there have been no cancellations of contracts for oil-well supplies, despite the severe decline in prices of crude oil, but the new demand has fallen off considerably. Discounts on galvanized and black iron and steel pipe are given on another page.

Boiler Tubes.—On both locomotive and merchant tubes the mills report they are sold up for eight to ten months or longer, and specifications against contracts are very heavy. Discounts on iron and steel boiler tubes are given on another page.

Coke.—The hot weather and shortage in labor are cutting down the output considerably, and prices on the best grades of spot furnace coke are higher. Sales of 5000 to 6000 tons have been made at $2.85, and it is said $3 has been done in a few cases. The Youngstown Sheet & Tube Company has started half of its 204 Koppers by-product ovens, and the remainder will be started about Sept. 10. We quote best grades of blast-furnace coke for prompt shipment at $2.75 to $2.85, and on contracts about $2.50, but there is no inquiry on the latter, as furnaces covered some time ago. We quote best grades of 72-hr. foundry coke, for prompt shipment, at $3.10 to $3.25, and on contracts $3.25 to $3.50 per net ton at oven. The Connellsville *Courier* reports the output of coke in the upper and lower Connellsville regions for the week ended Aug. 12 as 403,340 net tons, a slight gain over the previous week, but a loss of about 50,000 tons on the normal output.

Old Material.—There is a better feeling in the local scrap trade, especially on steel-making scrap. For several weeks there has been an embargo on steel scrap routed to the Carnegie Steel Company at Munhall, Pa., and much of this material has been pressed on the open market. The market on turnings is dull and prices are weak and lower. There is some movement in low phosphorus melting scrap. We note sales of about 2000 tons of the latter at about $20, delivered, and also sales of 4000 to 5000 tons of selected heavy melting steel scrap at about $16.25, delivered at Sharon, Pa. Prices now being quoted by dealers for delivery in Pittsburgh and points that take the same rates of freight, per gross ton, are as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	$16.00 to $16.25
No. 1 foundry cast	14.50 to 14.75
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	16.50 to 17.00
Hydraulic compressed sheet scrap	13.50 to 14.00
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	11.25 to 11.50
Bundled sheet stamping scrap	10.25 to 10.50
No. 1 railroad malleable stock	14.50 to 14.75
Railroad grate bars	10.25 to 10.50
Low phosphorus melting stock	19.75 to 20.00
Iron car axles	28.00 to 28.50
Steel car axles	28.00 to 28.50
Locomotive axles, steel	33.00 to 35.00
No. 1 busheling	14.00 to 14.25
Machine shop turnings	7.00 to 7.25
Old car wheels	13.75 to 13.50
Cast-iron borings	8.00 to 8.25
*Sheet bar crop ends	17.00 to 17.50
No. 1 railroad wrought	18.00 to 18.50
Heavy steel axle turnings	10.50 to 10.75
Heavy breakable cast scrap	13.00 to 13.50

*Shipping point.

Chicago

CHICAGO, ILL., Aug. 22, 1916.

As obligations pile up on the mill books, production steadily falls behind expectations. The full measure of curtailed output chargeable to the prolonged high temperatures has not yet been felt by the consumer. Equipment manufacturers, hampered by labor shortage and strikes, are also holding up mill construction work, delay in the completion of which will wreck many delivery promises. The outpouring of inquiry for st— in all forms continues. Shell steel orders, in seemingly endless quantity, may still be had almost for the asking. Domestic inquiry defies all geographical disadvantages, and Chicago mills are asked to quote for delivery in

all parts of the country. A revival of interest in pig iron has developed to parallel that in steel. Buying of the past week was not without interesting features. Surprising inquiry for rail fastenings brought out wants aggregating 27,000 tons of tie-plates, of which 7000 tons has been placed. An Ohio sheet mill took a round tonnage of ingots from a local mill for last half delivery, paying $40 per ton. Figures are being sought on 9000 tons of blue annealed sheets for a Los Angeles aqueduct. Recent activity in carbuilding involves about 12,000 cars of various types, and last week's buying of car steel was an important part of the tonnage placed. Steel-bar sales ran into large totals, but individual buyers are but meagerly covered on the basis of their normal requirements. Price changes include an advance of 5 per cent in bolt discounts, a reduction of $7 per ton in the store price of galvanized sheets and an adjustment of Northern pig-iron quotations to the level of competition with Southern prices.

Pig Iron.—The steady increase of inquiry marks a general awakening of buyers to the protection of their requirements for the fourth and first quarters. The scattered inquiry for foundry and malleable iron, which preceded recent large sales of basic iron, has grown into a very general interest. Of approximately 25,000 tons of basic iron bought for St. Louis delivery, a part was placed in the South, a part bought from the Mississippi Valley Iron Company at St. Louis, and the balance placed at Chicago. For the Northern basic $19.50, delivered, was paid, which is equivalent to a Chicago furnace quotation of $18. The concession made by the Northern furnaces in connection with this business also indicates their attitude on other grades of iron. Recent quotations on foundry iron, where Southern competition has been encountered, have been on the basis of $18 at furnace. Inquiry now in the market ranges from 500 to 2000 tons, and represents prospective buying in a large number of lines of trade. In the period during which Southern prices have been relatively low, a considerable quantity of iron has been placed in the South made up largely of export iron and miscellaneous small lots for domestic consumption. The situation there has been accordingly strengthened and, having touched $13.50, the market has reacted to $14 for prompt shipment and $14.50 for future delivery, some furnaces asking as much as $15 for the first quarter. Charcoal producers have shared in the selling, one transaction of 1000 tons being noted. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of $1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 7	$19.75
Lake Superior charcoal, No. 1	20.25
Lake Superior charcoal, No. 6 and Scotch	20.75
Northern coke foundry, No. 1	$18.50 to 19.00
Northern coke foundry, No. 2	18.00 to 18.50
Northern coke foundry, No. 3	17.50 to 18.00
Southern coke, No. 1 f'dry and 1 soft	18.50 to 19.00
Southern coke, No. 2 f'dry and 2 soft	18.00 to 18.50
Malleable Bessemer	19.00
Basic	18.00 to 18.50
Low phosphorus	34.00
Silvery, 8 per cent	29.50
Bessemer ferrosilicon, 10 per cent	32.50

Rails and Track Supplies.—An interesting and unexpected feature of the changed tone in the steel market has been a revival of interest on the part of some of the railroads in the matter of track supplies. Inquiry for tie-plates, track bolts, spikes and angle bars now current outruns ability of the steel mills to meet it. An order for 7000 tons of tie-plates was placed last week, and there remain in the market the inquiries of the Rock Island and Sante Fe railroads for a total of about 20,000 tons. Quotations are as follows: Standard railroad spikes, 2.75c., base; track bolts with square nuts, 3.25c. to 3.50c., base, all in carload lots, Chicago; tie-plates, $50, f.o.b. mill, net ton; standard section, Bessemer rails, Chicago, $33, base; open-hearth, $35; light rails, 25 to 45 lb., $40; 16 to 20 lb., $41; 12 lb., $42; 8 lb., $43; angle bars, 2c., Chicago.

Structural Material.—A résumé of the activity of the railroads in the matter of car buying presents a total of no small proportions. The New York Central Lines have bought an additional 1000 cars; the Chicago, Milwaukee & St. Paul is considering the taking of prices on 5000; the Kansas City Southern is in the market for 1900, the St. Louis & San Francisco for 1500, the Nickel Plate for 1000 (in addition to which it is having 500 cars rebuilt), while the Illinois Central has placed 1000 cars with the American Car & Foundry Company for rebuilding. In evidence of this activity a large proportion of the steel placed last week consisted of structural shapes and plates suitable for carbuilding. Among the contracts for fabricated steel the more important were the Burlington's bridge requirements amounting to 1500 tons, placed with the American Bridge Company, and 1000 tons for the new buildings of the Arizona Hercules Copper Company, awarded to the El Paso Bridge & Iron Company. The South Halstead Street Iron Works will supply 450 tons for Kling Brothers' new foundry at Chicago, and the Minneapolis Steel & Machinery Company took 360 tons for the Montana Power Company. The Minneapolis & St. Louis Railroad placed 115 tons of bridge steel with the leading fabricator. In the matter of delivery of plain material from mill, better delivery quotations are being offered in this market by some of the Eastern mills than can be had from local interests. Recent bookings by local mills have not offered anything better, even to regular trade, than fourth and first quarter rolling, which delivery is also predicated very largely upon the completion of new capacity. We quote for Chicago delivery of structural shapes from mill 2.789c.

We quote for Chicago delivery of structural steel from jobbers' stocks 3.10c.

Plates.—The amount of inquiry for plates was less important last week, although there is a continuous demand for materials for shipbuilding. Sales of tank plates 108 in. wide, for prompt delivery, at 4c., Pittsburgh, and other lots of plates of average width at 3c., for fourth quarter delivery, indicate the range of the market. There is every indication that the shortage of plates is likely to be accentuated rather than relieved. We quote for Chicago delivery of plates from mill at its convenience 3.189c. For prompt shipment we quote 3.689c. to 4.189c.

We quote for Chicago delivery of plates out of jobbers' stocks 3.50c.

Sheets.—While a sympathetic strengthening of the market is in evidence, prices are not quotably higher. For roofing sheets, 2.75c., Pittsburgh, can still be done and for No. 28 standard black sheets 2.85c. Inquiry for blue annealed sheets includes one lot of 9000 tons for the Los Angeles aqueduct. There is no great change in galvanized sheets, prices being still too high to be attractive in the unsettled condition of the market. We quote for Chicago delivery, blue annealed, No. 16 and heavier, 3.089c. to 3.339c.; box annealed, No. 17 and lighter, 2.939c. to 3.039c.; No. 28 galvanized, 4.289c. to 4.389c.

The price of galvanized sheets out of store has declined to a basis of 4.65c., an adjustment of $7 per ton from the previous minimum quotation. We quote for Chicago delivery of sheets out of stock, minimum prices applying on bundles of 25 or more, as follows: No. 10 blue annealed, 3.40c.; No. 28 black, 3.10c. to 3.20c.; No. 28 galvanized, 4.65c. to 4.75c.

Bars.—The quantity of steel bars on the books of the mills continues to roll up at an impressive rate. There remains a large amount of export steel which may be had for the taking, while domestic inquiry is circulating from mill to mill in an effort to find lodgment on someone's order book. How many consumers are to be satisfied is a problem. Unless the demand for agricultural implements, for example, shall shrink well within the conservative estimates of implement manufacturers, their purchases thus far can hardly prove adequate, and predictions are general that the keenest shortage will prevail before the end of the first quarter. Rail-carbon bars and iron bars are in fair demand, and in the latter case the mills are well filled for the immediate future, but no special activity has been manifested. We quote mill shipment, Chicago, as follows: Bar iron, 2.35c.; soft steel bars, 2.789c.;

hard steel bars, 2.50c.; shafting, in carloads, 20 per cent off; less than carloads, 15 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 3.10c.; bar iron, 3.10c.; reinforcing bars, 3.10c., base, with 4c. extra for twisting in sizes 4 in. and over and usual card extras for smaller sizes; shafting 10 per cent off.

Rivets and Bolts.—Following the advance in bars and wire rods, bolt makers have advanced their prices approximately 5 per cent, though the new discounts have not yet been announced. Following a resumption of interest on the part of buyers in the last few weeks, this advance is expected to result in a sharp increase of inquiry. Subject to the above advance we quote carriage bolts up to ⅜ x 6 in., rolled thread, 50-10-5; cut thread, 50-5; larger sizes, 40-5; machine bolts up to ⅜ x 4 in., rolled thread, with hot pressed square nuts, 50-10-10; cut thread, 50-10; larger sizes, 40-10-5; gimlet-point coach screws, 60; hot pressed nuts, square, $2.90 off per 100 lb.; hexagon, $2.90 off. Structural rivets, ¾ to 1¼ in., 4c. to 4.15c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

We quote out of store: Structural rivets, 3.75c. to 4.10c.; boiler rivets, 3.85c.; machine bolts up to ⅜ x 4 in., 60-10; larger sizes, 50-10; carriage bolts up to ⅜ x 6 in., 60-5; larger sizes, 50 off; hot pressed nuts, square, $3.25, and hexagon, $3.25 off per 100 lb.; lag screws, 65.

Wire Products.—The wire market presents one of the incongruities of the situation in that plain wire is held at a higher price than nails. There is a suggestion in the fact that as the plain wire quotation covers fourth quarter deliveries, wire nails, which are not sold so far ahead, may by that time reach a relatively normal basis. The wire nail trade shows some improvement, but the demand for fencing is exceedingly light. We quote as follows per 100 lb.: Plain wire, Nos. 6 to 9, base, $2.839; wire nails, $2.789; painted barb wire, $2.939; galvanized barb wire, $3.639; polished staples, $2.939; galvanized staples, $3.639; all Chicago.

Old Material.—The prolonged inactivity of the scrap market appears to be chargeable to circumstances not commonly experienced. Melters of scrap, other than steel, while they appear willing to buy at a price, seem not sufficiently in need of further material to make the necessarily attractive offers. On the other hand, sellers of scrap apparently have no interest whatever in disposing of their holdings on the basis of any prices in line with the market. This indifference is making the filling of outstanding short orders for steel scrap a tedious process, and is responsible for a slight stiffening of prices for these grades. In the coincidence of the very limited buying by consumers in the open market and the unusually limited offers of scrap by the railroads there is found the suggestion that an unusual amount of scrap is moving from producer to consumer on an exchange basis. The only important railroad list of the week comes from the Rock Island and carries nearly 5000 tons. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	$18.50 to $19.00
Relaying rails	19.50 to 20.50
Old carwheels	11.50 to 12.00
Old steel rails, rerolling	15.75 to 16.00
Old steel rails, less than 3 ft	15.75 to 16.00
Heavy melting steel scrap	15.25 to 15.50
Frogs, switching and guards, cut apart	15.25 to 15.50
Shoveling steel	14.75 to 15.00
Steel axle turnings	9.25 to 9.75

Per Net Ton

Iron angles and splice bars	$18.75 to $19.00
Iron arch bars and transoms	19.50 to 20.00
Steel angle bars	13.75 to 14.25
Iron car axles	25.50 to 26.00
Steel car axles	28.00 to 28.50
No. 1 railroad wrought	15.25 to 15.75
No. 2 railroad wrought	14.50 to 14.75
Cut forge	14.50 to 14.75
Pipes and flues	11.00 to 11.25
No. 1 busheling	12.50 to 12.75
No. 2 busheling	9.00 to 9.25
Steel knuckles and couplers	14.00 to 14.50
Steel springs	14.50 to 15.00
No. 1 boilers, cut to sheets and rings	10.25 to 10.75
Boiler punchings	13.75 to 14.25
Locomotive tires, smooth	20.00 to 20.50
Machine shop turnings	5.50 to 6.00
Cast borings	6.00 to 6.50
No. 1 cast scrap	11.50 to 12.00
Stove plate and light cast scrap	9.25 to 9.75
Grate bars	10.00 to 10.25
Brake shoes	9.75 to 10.25
Railroad malleable	11.25 to 11.75
Agricultural malleable	10.75 to 11.25

Cast-Iron Pipe. Bids [illegible] tons of pipe for Chicago, with one exception, exceeded the estimates, and new bids are likely to be asked. All bids were rejected at Toledo, Ohio, and no award has been made at Ravenna. Prospective municipal lettings include 1300 tons at Hamilton, Ind., and 1800 tons at St. Louis. We quote as follows, per net ton, Chicago: Water pipe, 4-in., $33.50 to $34; 6-in. and larger, $30.50 to $31, with $1 extra for class A water pipe and gas pipe.

Philadelphia

PHILADELPHIA, PA., Aug. 22, 1916.

A less heavy tonnage of steel was placed under contract in this district last week and less feverishness attended sales, but specifications against contracts with some of the larger mills were in greater volume than for several weeks. The market is still flooded with inquiries for steel to be used in the manufacture of war munitions, especially for export, exceeding 250,000 tons; but two of the largest eastern Pennsylvania companies, having sold their capacity for shell bars up to June and July of 1917, will no longer entertain such propositions, while a third mill steadily adheres to the attitude of reserve that it has maintained on shell steel since the beginning of the war. Shipyards and railroads have placed additional contracts for plates and shapes aggregating between 30,000 and 40,000 tons. British interests closed for a moderate tonnage of marine steel for export to Hong Kong, and Japanese interests bid urgently for marine boiler plates. Several orders for forging and rerolling billets, aggregating probably 25,000 tons, were taken for domestic shipment. Foreign interests, still urgently in the market, found it difficult to buy either ingots or semi-finished steel in appreciable tonnages. The position of blast-furnace interests was further improved by more numerous small sales, larger shipments and reduced stocks, together with a substantial gain in inquiries for both steel-making and for foundry grades.

Pig Iron.—At the regular monthly meeting of the Eastern Pig Iron Association, held last week, it was shown that stocks on furnace banks at the beginning of August were the smallest in several years, shipments on contracts having made substantial gains on current output. Sales during the first half of August were greater than the total sales in July. More interest in the market was evidenced by consumers through increased buying of small lots and by frequent inquiries for shipment over the first quarter and first half of next year. Sales for the week in this immediate district amounted to about 13,000 tons, including 6000 tons of basic taken by a Schuylkill Valley steel maker at $19, delivered, for this year's shipment. Little basic, however, is now available under $19.50, delivered. Two lots of 1500 to 2000 tons of basic are reported to have been sold at $18, Valley furnaces. The other sales were made up of small lots of foundry grades, the largest being 1000 tons. Two Buffalo furnaces have advanced prices and the Virginia Iron, Coal & Coke Company has put out a higher schedule for shipment over the remainder of 1916 and also for shipment over the first quarter or first half of 1917. No. 2 X Virginia is now quoted at $18.50, No. 2 plain at $18, No. 3 foundry at $17.75 and No. 4 foundry at $17.50, furnace. As the market hardens, Eastern furnaces are more indifferent about selling for shipment after Jan. 1 next, except at higher prices. In the Eastern territory there is scarcely a large consumer that is not in the market, tentatively or otherwise, and inquiries are out for about 100,000 tons, one-fourth of which comes from melters in the territory tributary to Philadelphia. It is a significant fact that some Virginia furnaces need prodding to make shipments on orders taken several weeks ago for prompt delivery. On the other hand, some founders with pressing orders for castings are unable to assemble enough molders to execute contracts promptly and consequently are holding back or diverting shipments of pig iron. The labor problem continues serious in most branches of the industry. In some quarters uneasiness is again developing regarding the ore supply. The offerings of resale iron are less annoying, but a

few lots remain to be absorbed. Less is heard of export sales, but a few substantial inquiries for steelmaking grades are still in the market. Quotations for standard brands, delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa. No. 2 X foundry	$19.50 to $20.00
Eastern Pa. No. 2 plain	19.25 to 19.75
Virginia No. 2 X foundry	20.50 to 21.00
Virginia No. 2 plain	20.25 to 20.75
Gray forge	18.50 to 19.00
Basic	19.00 to 19.50
Standard low phosphorus	24.00

Iron Ore.—Arrivals of foreign ore at this port in the week ended Aug. 19, included 7600 tons from Cuba, valued at $22,800; 6900 tons from Chile, valued at $8,185, and 5104 tons from Sweden, valued at $26,286.

Billets.—Crude and semi-finished steel is urgently wanted for both domestic and foreign shipment and prices are higher. Two eastern Pennsylvania mills have been disappointed in a search for ingots. Rerolling billets are difficult to buy under $46 and sales have been made up to $50, while small lots are held at $55. Several lots of forging billets have been sold at $65, f.o.b. Eastern mill. Sales of rerolling and forging billets have aggregated 25,000 tons or more, and there are numerous other inquiries for lots ranging from 1000 to 25,000 tons each from domestic consumers and from exporters. One interesting foreign inquiry is for 7-in. square billets and another for 10½-in. diameter forgings, the latter for 10-in. shells.

Ferroalloys.—The market is quiet for ferromanganese and spiegeleisen, but there is still a fair demand for ferrosilicon, especially for the lower grades. Foreign ferromanganese is held at $170 to $175 per ton, seaboard, and domestic is quotable at the same prices. Italy and Japan are still in search of alloys. During the week ended Aug. 19, 400 tons of English ferromanganese, valued at $26,009, were imported at Philadelphia. Bids have been submitted on 1500 to 2000 tons of 10 per cent ferrosilicon for 1917 shipment. Fifty per cent ferrosilicon is firm at $86 to $88 and 11 per cent at $31, Pittsburgh. Spiegeleisen is held at $50, furnace.

Plates.—Shipyards and railroads placed orders in the last few days for 20,000 tons of plates and prospective orders for 10,000 to 15,000 tons are developing. The Sun Shipbuilding Company offered a contract for 14,800 tons of plates and shapes for four tank boats to a Pittsburgh mill. Half was accepted for delivery over the first five months of 1917 and the other half is reported to have gone to two eastern Pennsylvania mills. Of the total, 10,000 tons were plates. Another Atlantic coast yard is asking for prices on 8000 to 10,000 tons of plates for shipment over the first half of 1917. There is a more active demand for small lots of boiler and tank plates for prompt shipment, and among the small sales was one lot of 1000 tons of tank plates at 4c. for shipment within 60 days. The Cramp Shipbuilding & Engine Company is reported to be keeping open several ways to build battleships for the Government. The largest interests and one eastern Pennsylvania mill are said to have reserved plate rolling space for a heavy tonnage for Government needs. Among the foreign orders taken were 4000 tons for Italy, which went to a Pittsburgh mill, and 1000 tons sold to a British interest for export to China. Japanese shipbuilders, after placing an order for several thousand tons of hull plates, are pressingly bidding for a few hundred tons of marine boiler plates. The Pennsylvania Railroad placed orders for 11,000 tons of plates and 4000 tons of shapes for car construction at Altoona, half of the tonnage to be rolled at Pittsburgh and the other half in eastern Pennsylvania; deliveries are to be made over the first half of 1917. Sales for next year's delivery were made at 3 to 3.50c., the outside price for export.

Bars.—Although the market is still flooded with inquiries for shell bars—some estimates exceeding 250,000 tons, with billets and forgings—for direct export and for domestic shipment, one Eastern interest having taken an additional contract for loaded shells in the past few days, few sales of importance have been made, as bar-mill capacity in this section has been sold up to July, 1917. Several options on structural bars have been exercised in the past week and additional sales made at 2.75c., base, Pittsburgh. Marine bars have been sold at 2.75c. to 3c. for early shipment. Shell bars have sold in a small way at 4c.; the recent large contracts are said to have commanded 3.75c. to 4c., base, Pittsburgh. Small manufacturers are meeting increasing difficulty in obtaining even small tonnages for shipment over the first half of 1917. Iron bars are selling more readily to railroads, to shipyards and to structural concerns, at 2.50c., base, Pittsburgh, or 2.659c., Philadelphia.

Structural Material.—Included in the Sun Shipbuilding purchases, referred to elsewhere, were 4800 tons of structural shapes. Other shipbuilders also placed orders, and contracts for 5000 to 6000 tons plain shapes are now pending. The Pennsylvania Railroad bought about 4000 tons for car construction. Tank ships ordered several hundred tons of shapes, with plates, at 2.75c. for prompt shipment. A few fabricators and manufacturers exercised options at 2.50c., base, Pittsburgh, during the past week, but other sales were made at 2.60c., base, for shipment over the first quarter of 1917. Some of the western Pennsylvania mills are refusing to accept new contracts under 2.80c., base, or $2 per ton over the recognized official base. In fact, the mills are disposed to discourage structural business for any delivery because other rollings are more lucrative. The Southern Railroad is reported to have placed orders for 1500 tons of bridge work, but the balance of the 7000 tons upon which tenders were made is still held in abeyance. The general contract for the Franklin Trust Company building has been awarded to Nixon & Dugan. Plans for the Southern Hotel, to be constructed at Baltimore, are now going to fabricators; 1000 to 1200 tons of steel will be needed.

Sheets.—The demand for blue annealed sheets continues active and the market is strong at 3.159c. to 3.659c., Philadelphia, for No. 10, according to tonnage required, time of delivery and the character of the specifications. Automobile manufacturers are still prominent among buyers.

Coke.—The tone of the market is firmer, with some improvement in the demand for foundry grades for early shipment. Operators still experience difficulty in obtaining forkers in ample number, and the supply of open cars is inadequate to meet the demand. Foundry coke for prompt shipment sells at $3.25 and contract coke at $3.50 to $3.75 per net ton at oven. Furnace coke is quiet at $2.75 for spot and $2.50 for contract. Freight rates from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Old Material.—The market still suffers from the effect of railroad embargoes against many steel plants in both eastern and western Pennsylvania. In this section the congestion is particularly severe. It is estimated that fully 50,000 tons of steel scrap has been accumulated, with very little outlet at the moment. It is notable, however, that low phosphorus scrap is firmer and higher. A few sales of heavy steel melting scrap have been made at $15. Wrought pipe is firmer and 50c. per ton higher, while cast borings have suffered a further decline of 50c. per ton. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania, and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$14.75 to $15.25
Old steel rails, rerolling	17.50 to 18.00
Low phos. heavy melting steel scrap	21.25 to 23.75
Old steel axles (mill)	30.00 to 31.00
Old iron axles (Connaut)	28.00 to 29.00
Old iron rails	20.00 to 20.50
Old carwheels	15.00 to 16.00
No. 1 railroad wrought	20.00 to 21.00
Wrought-iron pipe	13.00 to 13.50
No. 1 forge fire	12.50 to 13.00
Bundled sheets	12.50 to 13.00
No. 2 busheling	10.50 to 11.00
Machine shop turnings	8.00 to 8.50
Cast borings	9.00 to 9.50
No. 1 cast	16.00 to 16.50
Old iron bars, railroad	11.75 to 12.25
Steel plate	11.75 to 12.25
Railroad malleable	13.50 to 14.00

Cleveland

CLEVELAND, OHIO, Aug. 22, 1916.

Iron Ore.—Some ore reservations have been made for 1917 and there is considerable additional inquiry, especially for non-Bessemer steel-making ore. This inquiry is for the most part for high grade ore. When business is booming in the steel industry many furnace interests try to secure the best ores in order to get the maximum production from their furnaces, and that policy is doubtless the reason for the present efforts to cover for next year's ore requirements thus early. An unusually early buying movement is expected by ore shippers, a number expressing the opinion that the bulk of next season's requirements will be covered in November. If conditions in the steel industry continue as they are at present, sellers will probably not try to hold off longer than that time. It is practically certain that ore interests will not agree to pay $1 a ton for vessel tonnage for ore for next season. While ore prices will be advanced shippers will be unwilling to allow the vessel men all or nearly all of the increase. What the advance in ore prices will be is at present problematic, but in naming next season's prices the fact may be taken into consideration that this season's advance of 70 cents a ton over the low prices of 1915 was disappointing to some of the ore men who thought the advance should have been $1. New Lake vessel capacity to come out late this season or early in 1917 will increase the Lake ore-carrying capacity next year about 2,500,000 tons, and that fact may make the vessel situation for the ore people somewhat easier than it is at the present time. We quote ore prices as follows, delivered lower Lake ports: Old range Bessemer, $4.45; Mesaba Bessemer, $4.20; old range non-Bessemer, $3.70; Mesaba non-Bessemer, $3.55.

Pig Iron.—A fairly active buying movement is in progress in Northern foundry, basic and malleable iron, although sales are largely outside of this immediate territory. Considerable tonnage has been sold during the past few days, and a number of new inquiries are pending, particularly from the Pittsburgh district and from the East. Some of the foundry iron sales were for the fourth and first quarters and others for the first half. One Cleveland interest reports August sales amounting to 70,000 tons as compared with 9000 tons during July. Prices are unchanged. Foundry iron sales are being made at $18, Cleveland, for No. 2, for outside shipment and at the same Valley furnace price by one interest for delivery through at least the first quarter, but other producers are asking higher prices and sales are reported at $18.50, Valley furnace. Ella furnace of Pickands, Mather & Co., at West Middlesex, Pa., which has been out for relining, was blown in Aug. 17 on Bessemer iron. We quote, delivered Cleveland, as follows:

Bessemer	$21.95
Basic	18.95
Northern No. 2 foundry	$18.70 to 18.80
Southern No. 2 foundry	18.00 to 18.50
Gray forge	18.50
Jackson County silvery, 8 per cent silicon	28.62 to 30.62
Standard low phos., Valley furnace	32.00

Coke.—The market is quiet but very firm. Standard Connellsville foundry coke is quoted at $3.15 to $3.50 per net ton at oven for prompt shipment and $3.25 to $3.50 for contracts. Connellsville furnace coke for prompt shipment has brought $2.65 to $2.85.

Bolts, Nuts and Rivets.—Bolt and nut manufacturers have advanced prices about 5 per cent on bolts and have shortened the discounts on nuts by 20 cents. The demand is quite active for this season of the year. Rivet prices are unchanged at 4c., Pittsburgh, for structural and 4.10c. for boiler rivets. Bolt and nut discounts are as follows:

Common carriage bolts, ⅝ x 16 in., smaller or shorter, rolled thread, 50 and 5; cut thread, 40, 10 and 2½; larger or longer, 35 and 2½, machine bolts within h. p. nuts, ⅝ x 4 in., smaller and shorter, rolled thread, 50 and 10, cut thread, 50; larger and longer, 40 and 10; lag bolts, gimlet or cone point, 50 and 5; square h. p. nuts, blank or tapped, $2.70 off the list; hexagon h. p. nuts, blank or tapped, $2.70 off; c. p. c. and t. sq. nuts, blank or tapped, $2.40; hexagon nuts, all sizes, $2.80 off; cold pressed semi-finished hexagon nuts, all sizes, 60 and 5

Finished Iron and Steel.—New inquiry is plentiful, but consumers are having difficulty in finding mills in a position to take on additional orders for the deliveries wanted. Mills able to deliver are booking considerable business for early shipment and for fourth quarter. There is considerable inquiry for steel for the automobile trade for the first half, and this industry would cover for the entire year if mills would sell that far ahead. One shop making automobile forgings is in the market for 1000 tons of forging bars per month on a sliding scale basis. New local inquiries for shell steel aggregate about 18,000 tons, mostly for the fourth and first quarters. The demand for plates is very heavy and the market is firm, quotations ranging from 3c. to 4c., Pittsburgh, depending on the deliveries and sizes. Inquiry for sheets is very active and the market is firmer. One Ohio mill yesterday advanced prices $2 a ton on all grades. Consumers are anxious to cover for their first half requirements, but most mills are taking only definite orders for delivery at their convenience. We quote black sheets at 2.90c. to 3c., Ohio mill, for No. 28; blue annealed sheets, 3c. to 3.50c., for No. 10, and galvanized 4.25c. to 4.45c. for No. 28. Iron bars are quoted at 2.45c. to 2.50c., Cleveland. Hard steel bars are irregular. While the general quotation is 2.50c. at mill, this price is being shaded about $2 a ton. Warehouse prices are 3.25c. for steel bars and structural material, 3.65c. for plates and 3.20c. for iron bars.

Old Material.—Aside from the buying of a fair tonnage of heavy melting steel by a Canton mill the market is inactive. Mills generally are well supplied and two consumers, Corrigan, McKinney & Co. and the Brier Hill Steel Company, are holding up on shipments. Mills will not buy except at low prices, and dealers are forced to make concessions to move material on the track. However, there is a firm undertone in the market and many dealers are unwilling to sell at present prices, but are holding for an advance. Borings and turnings have declined and the large production of the latter keeps their price below that of borings. There is no demand for busheling scrap. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton

Steel rails	$14.75 to $15.00
Iron rails	18.50 to 19.00
Steel car axles	32.00 to 33.00
Heavy melting steel	15.00 to 15.50
Carwheels	12.75 to 13.00
Relaying rails, 50 lb. and over	22.50
Agricultural malleable	12.50 to 12.75
Railroad malleable	14.00 to 14.25
Steel axle turnings	12.00 to 12.50
Light bundled sheet scrap	12.00 to 12.25

Per Net Ton

Iron car axles	$24.00 to $25.00
Cast borings	5.75 to 6.00
Iron and steel turnings and drillings	5.25 to 5.50
No. 1 busheling	11.00 to 11.25
No. 1 railroad wrought (nominal)	15.00 to 15.50
No. 1 cast	13.00 to 13.50
Railroad grate bars	10.00 to 10.50
Stove plate	10.00 to 10.25

Buffalo

BUFFALO, N. Y., Aug. 22, 1916.

Pig Iron.—Buffalo furnace sales for the week have aggregated between 45,000 and 50,000 tons, principally foundry grades and malleable, with some basic and Bessemer, and the tonnage under negotiation will nearly equal this total. One furnace interest, which has booked quite a heavy aggregate tonnage in the past two weeks, announces that it intends to hold off on further quotations for about 60 days, feeling confident that higher prices will then prevail. Another interest reports that indications point to more or less of a scramble for iron in the next 60 days. It is reported that the General Electric Company has covered for its 1917 requirements. We quote as follows, f.o.b., furnace, Buffalo:

No. 1 foundry	$19.50 to $19.75
No. 2 X foundry	19.00 to 19.25
No. 2 plain	18.50 to 18.75
No. 3 foundry	18.00 to 18.25
Gray forge	18.25 to 18.50
Malleable	18.50 to 18.75
Basic	19.00 to [illegible]
Bessemer	19.50
Charcoal, regular brands	[illegible]

Finished Iron and Steel.—Mills have again been hampered by the heat in the matter of output. One

interest reports that in the last few days it has been unable to turn out more than 50 per cent of its capacity. On the smaller sizes of shapes most interests are booked solid to the end of the second quarter of 1917. Consumers seeking to have orders booked are ready to buy subject to mills' convenience as to delivery. Cold rolled steel has shown signs of strengthening. Most sellers are quoting only 15 per cent off. The Monarch Engineering Company, Buffalo, for the 2,500,000-bu. grain elevator for the Central Elevator Company, is this week placing orders for 100 tons of plates for hopper work, 1200 tons of concrete reinforcing bars and 1200 tons of structural steel.

Old Material.—The market shows a strong undercurrent of strength, influenced by the prospective large demand for heavy melting steel, which, according to dealers, is due in the next six weeks. The heavy export demand for steel car axles has caused a further advance in price of that commodity. The increase of $2 per ton is nominal, as this line of material is practically an absent quantity. While schedules hold generally to the list quoted last week, dealers are not disposed to sell other than small amounts at these figures. We quote dealers' asking prices, per gross ton, f.o.b., Buffalo, as follows:

Heavy melting steel	$15.50 to $16.00
Low phosphorus steel	20.00 to 20.50
No. 1 railroad wrought scrap	17.25 to 17.75
No. 1 railroad and machinery cast scrap	15.50 to 16.00
Steel axles	26.00 to 26.50
Iron axles	24.00 to 24.50
Carwheels	13.00 to 13.50
Railroad malleable	15.00 to 16.00
Machine shop turnings	6.00 to 6.50
Heavy axle turnings	12.00
Clean cast borings	7.50 to 7.75
Iron rails	18.00 to 18.50
Locomotive grate bars	11.50 to 12.00
Stove plate (net ton)	11.00 to 11.50
Wrought pipe	12.00 to 12.50
Bundled sheet scrap	11.50 to 12.00
No. 1 busheling	13.00 to 13.50
No. 2 busheling	11.00 to 11.50
Bundled tin scrap	15.00 to 15.50

Cincinnati

CINCINNATI, OHIO, Aug. 23, 1916.—(*By Wire.*)

Pig Iron.—A total of 128,000 tons of basic iron has been bought in this immediate territory since Aug. 1. Approximately 30,000 tons was booked by Southern producers, and the remainder will be shipped from Ironton and Columbus, Ohio. Deliveries extend through the first half of next year on a large part of this iron. It is rumored that further basic purchases are pending that will swell the total some 20,000 tons. Foundry iron has been more active in the past few days, but concessions in prices have been made by a number of furnaces in some recent contracts closed. Hanging Rock furnaces have taken some business at $18, Ironton, and in the South $13.50, Birmingham basis, for this year has been openly quoted for shipment into next year. The majority of Southern makers are holding out for $14 to $14.50, and these figures are generally understood to be satisfactory for iron to be shipped in the first half of next year. The inquiry for foundry iron is much improved. In southern Ohio two concerns want 500 tons each of Southern No. 2 for first quarter shipment. Central and northern Ohio foundries also furnish several requests for prices on both foundry and malleable, and to-day's report includes a sale of 1500 tons of malleable to a northern Ohio manufacturer. A southern Illinois consumer bought 1500 tons of Southern foundry for first half. A Michigan melter has purchased 2000 tons of Lake Superior charcoal iron for first half. Nearly all pig-iron salesmen are back on the road and are making many small sales for delivery into next year. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	$16.90 to $18.40
Southern coke, No. 2	[illegible]
Southern coke, No. 4 foundry	15.40 to [illegible]
Southern gray forge	[illegible]
Ohio silvery, 8 per cent silicon	[illegible]
Southern Ohio coke, No. 1	[illegible]
Southern Ohio coke, No. 2	[illegible]
Southern Ohio coke, No. 4	[illegible]
Southern Ohio malleable Bessemer	[illegible]
Basic, Northern	19.26 to [illegible]
Lake Superior charcoal	[illegible]
Standard Southern carwheel	[illegible]

(By Mail)

Coke.—Spot shipment foundry coke prices fluctuate almost daily. Buying is just as irregular as the available surplus supply to take care of prompt orders. Connellsville 72-hr. coke for prompt shipment ranges all the way from $3 to $3.50 per net ton at oven, with the average contract figure around $3.25. Wise County and Pocahontas quotations on foundry grades are unchanged at $3.25 to $3.75, and New River approximately 50c. per ton higher. Except for domestic purposes, no recent furnace coke contracts have been reported. We quote Connellsville 48-hr. coke at $2.50 at oven, but carload lots for prompt shipment have brought as high as $2.90.

Finished Material.—The local warehouses report quite a brisk demand for steel bars, structural shapes and galvanized sheets. Orders are being filled promptly from stocks except in cases where mill shipments have been curtailed. This condition exists as far as twist drills are concerned and jobbers are complaining that they are not able to get a sufficient supply promptly to take care of some of their customers. The jobbers' price on wire nails has been advanced to $2.85 per keg, base, and barb wire is quoted at $3.65 per 100 lb. Although the mill prices of steel bars and small structural shapes have been advanced, local store quotations remain at 3.20c. Twisted steel bars are quoted at 3.35c. and plates at 3.50c. A marking up of all warehouse prices is predicted before the end of the present month. The demand on the warehouses is said to be more than double that in the corresponding period of July. Mill quotations on No. 28 galvanized sheets are unchanged and strong at 4.40c. to 4.50c., and on No. 28 black, 3.05c. to 3.10c., Cincinnati or Newport, Ky.

Old Material.—Reports that large tonnages of scrap have been lately taken by the rolling mills are unconfirmed. The difference in costs of basic pig iron and scrap is so great that consumers of the latter are using more than formerly. This applies also to the foundries. Prices have not changed, but both iron axles and locomotive tires are said to be firmer at the prices given. The following are dealers' prices to consumers, f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton

Bundled sheet scrap	$10.25 to $10.75
Old iron rails	15.50 to 16.00
Relaying rails, 50 lb. and up	21.00 to 21.50
Rerolling steel rails	14.50 to 15.00
Heavy melting steel scrap	14.00 to 14.50
Steel rails for melting	13.00 to 13.50

Per Net Ton

No. 1 railroad wrought	$13.50 to $14.00
Cast borings	4.50 to 5.00
Steel turnings	4.75 to 5.25
Railroad cast scrap	11.00 to 11.50
No. 1 machinery cast scrap	12.75 to 13.25
Burnt scrap	8.25 to 8.75
Iron axles	23.00 to 24.00
Locomotive tires (smooth inside)	19.75 to 20.25
Pipes and flues	9.25 to 9.75
Malleable and steel scrap	10.75 to 11.25
Railroad tank and sheet scrap	8.25 to 8.75

Birmingham

BIRMINGHAM, ALA., Aug. 21, 1916.

Coal and Coke—Bunker demand for coal at New Orleans has improved and steam coal prices are stiffer. Warrior River movements to the gulf are increasing. Alabama mines are finding a larger outlet, owing to improved business in States to the north. Standard beehive coke is selling at $4.25 to $4.50 per net ton at oven and furnace coke at $3.25 to $3.50, with every feature of the market strong.

Pig Iron.—The first real selling that has taken place in this market for weeks occurred around Aug. 18, when one furnace interest is stated to have sold in one day 8000 to 10,000 tons on the basis of $14.50 for spot and $15 for the remainder of the year. The same interest also disposed of some high manganese iron at $16.50. The Tennessee Company will not figure greatly in the foundry market this autumn in all probability. A stack at Bessemer, Ala., is soon to go off basic and [illegible]mence making ferromanganese from Brazilian and [illegible]gia ores. Another Bessemer foundry stack will [illegible]ut for relining. The heavy demand for shell steel will require an immense amount of basic iron. The

leading interest and the majority of other furnace operators report the regular sale of small lots at $14 for the remainder of the year. However, it remains that the only interest reporting large sales quotes spot at $14.50. Confidence has returned in a remarkable degree, considering the small business done. Car shortage is affecting the movement of iron. Shops making heavy castings were never busier. One has just secured an order from our Government for cast-iron shells for target practice after having completed an order for $200,000 worth of lathes for the British Government. Skilled labor has become scarce, owing to superior inducements offered by munitions factories, and conditions are very uneven in this respect. The Bessemer rolling mill of the Tennessee Company will have completed certain enlargements by Sept. 1. The Birmingham Commercial Club and the Tennessee Company are in correspondence with regard to prices charged in Birmingham for steel products of the Bessemer mill. In a general way the prices charged at that mill are Pittsburgh prices with one-third of the freight rate from Pittsburgh to Birmingham added. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	$15.00 to $15.50
No. 2 foundry and soft	14.50 to 15.00
No. 3 foundry	14.00 to 14.50
No. 4 foundry	13.75 to 14.25
Gray forge	13.50 to 14.00
Basic	14.50 to 15.00
Charcoal	22.00 to 22.50

Cast-Iron Pipe.—While orders for water pipe have not increased, the tone of the market is much better. There are indications that some very good contracts will be offered in the near future. Soil pipe remains quiet. The rush of shipments to the Pacific coast, incident to the raise in rates effective Sept. 1, has been considerable. The raise is to be from $11 to $17.60 per ton, the Spokane rate. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., $28; 6-in. and upward, $25, with $1 added for gas pipe and 16-ft. lengths.

Old Material.—Owing to the continued large production of steel scrap at mills producing shrapnel shapes, and to other causes tending to make old material a bargain counter proposition, the market has not improved. Sales at low figures have been made. The export demand for axles at high prices is interesting the dealers, but very few have been able to secure sufficient to make shipments. The result is that axles frequently go in mixed steel scrap. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old steel axles	$24.00 to $30.00
Old steel rails	10.00 to 10.50
No. 1 steel scrap	9.25 to 9.75
No. 1 wrought scrap	12.50 to 13.00
No. 1 cast scrap	10.50 to 11.00
Extra heavy cast scrap	9.50 to 10.00
Stove plate and light	9.00 to 9.50
Old carwheels	9.50 to 10.00
Tram carwheels	9.50 to 10.00

St. Louis

ST. LOUIS, Mo., Aug. 21, 1916.

Pig Iron.—Exceptionally heavy buying by the larger interests has convinced the smaller melters that a lower market is not likely. In consequence inquiries are appearing of 1500 tons and downward, aggregating probably 15,000 tons. Sales of the week aggregated about 50,000 tons, taken by three of the largest consumers of basic, of which about 35,000 tons was Northern and 15,000 tons Southern, deliveries to be through the first half of next year.

Coke.—No sales of importance were made in either bee-hive or by-product and no inquiries of consequence have appeared.

Finished Iron and Steel.—Consumers of structural material are evincing a disposition to enter the market, though for the moment they are deterred by the extended deliveries. A sale of 500 tons of 90-lb. steel rails was made for delivery a year hence. Announcement of a 14-story building requiring 6000 to 7000 tons of structural material, with construction to begin within 30 days, is leading to some speculation as to where the material is to come from. Movement out of warehouse continues active with prices held firmly. We quote for stock out of warehouse as follows: Soft steel bars, 3.15c.; iron bars, 3.05c. to 3.10c.; structural material, 3.15c.; tank plates, 3.55c.; No. 10 blue annealed sheets, 3.45c.; No. 28 black sheets, cold rolled, one pass, 3.30c.; No. 28 galvanized sheets, black sheet gage, 4.80c. to 5c.

Old Material.—Scrap has shown a much better tone and both steel foundry and rolling mill grades are decidedly firmer, though consumers have not yet actively entered the market. Most of the transactions have been among the dealers. We quote dealers' prices, f.o.b., customers' works, St. Louis industrial district, as follows:

Per Gross Ton

Old iron rails	$16.25 to $16.75
Old steel rails, rerolling	14.00 to 15.50
Old steel rails, less than 3 ft.	15.00 to 15.50
Relaying rails, standard section, subject to inspection	23.00 to 24.00
Old carwheels	11.50 to 12.00
No. 1 railroad heavy melting steel scrap	14.50 to 15.00
Heavy shoveling steel	13.50 to 14.00
Frogs, switches and guards cut apart	14.50 to 15.00
Bundled sheet scrap	8.00 to 8.50

Per Net Ton

Iron angle bars	$16.00 to $16.50
Steel angle bars	13.50 to 14.00
Iron car axles	24.50 to 25.00
Steel car axles	27.00 to 27.50
Wrought arch bars and transoms	19.50 to 20.00
No. 1 railroad wrought	14.50 to 15.00
No. 2 railroad wrought	14.25 to 14.50
Railroad springs	14.00 to 14.50
Steel couplers and knuckles	14.00 to 14.50
Locomotive tires, 42 in. and over, smooth inside	19.50 to 20.00
No. 1 dealers' forge	10.25 to 10.75
Cast-iron borings	6.50 to 7.00
No. 1 busheling	12.50 to 13.00
No. 1 boilers, cut to sheets and rings	9.50 to 10.00
No. 1 railroad cast scrap	11.00 to 11.50
Stove plate and light cast scrap	8.75 to 9.25
Railroad malleable	11.00 to 11.50
Agricultural malleable	10.00 to 10.50
Pipes and flues	10.50 to 11.00
Railroad sheet and tank scrap	9.75 to 10.25
Railroad grate bars	9.50 to 10.00
Machine-shop turnings	7.00 to 7.50

New York

NEW YORK, Aug. 23, 1916.

Pig Iron.—The greater activity noticed last week in the pig iron market continues. Buying is by no means general, but a number of important companies have been in the market and the position of sellers is generally firmer. In a number of cases advances have been made, though as a matter of fact a good deal of the business thus far closed has been at the low prices recently prevailing. The General Electric Company has bought for its Eastern plants, the total being 13,000 tons to 14,000 tons, and largely Southern iron. The malleable inquiry from Connecticut referred to a week ago is still before the market. There is another Connecticut inquiry for 2000 to 3000 tons. A New Jersey foundry has asked for 5000 tons for delivery in the first half of 1917. This may already be closed. For a Southern railroad supply interest the purchases for the last quarter of this year and the first quarter of 1917 have amounted to 3200 tons of coke iron and 550 tons of charcoal iron. The International Steam Pump Company's schedule, which involved about 35,000 tons for 1917, is still unfilled, though some nearby delivery iron has been taken. In this case some bids both on Northern and Southern iron have been withdrawn, due to advances of 50c. by certain furnaces which bid. Of the 11,000 tons of basic iron wanted at Newark, about half was placed with an eastern Pennsylvania producer and the remainder is about to be closed. Southern iron has strengthened and warrant iron could hardly be had below $13.50 now, while furnaces quote $14 at furnace as minimum for No. 2. Buyers are finding difficulty in having duplicated some of the quotations made them in the past two or three weeks. For example, several thousand tons of No. 3 iron was offered at $18.50, delivered in New Jersey. There is a 10,000-ton inquiry for special Bessemer iron for export, silicon being from 1 to 2 per cent and phosphorus and sulphur limits 0.05 per cent. A sale of 1000 tons of Southern foundry iron for export was made in this market and one of 500 tons of Bessemer

iron. A South American inquiry involves 500 tons of foundry iron. We quote at tidewater for early delivery: No. 1 foundry, $20 to $20.50; No. 2 X, $19.50 to $20; No. 2 plain, $19.25 to $19.50; Southern iron at tidewater, $19.50 to $20 for No. 1 and $18.75 to $19.25 for No. 2 foundry and No. 2 soft.

Ferroalloys.—Some concern is felt in the market over the report that several British producers have thus far been unable to secure August licenses to ship ferromanganese. This is taken to mean a possible restriction of shipments which have recently been only enough to satisfy demands on contract. It is believed by some brokers here that some important move is in the air. Specifications on contract are heavy and indications are that some consumers are sailing close to the wind on supplies. New inquiry is not active and sales are very few. The market is a little firmer and it is believed that $175, seaboard, is the best that can be done now for any delivery. Spiegeleisen is quiet at $45 to $50, furnace. Ferrosilicon, 50 per cent, is very active and scarce, with specifications on contract very brisk. The last quotation was $86 to $88, Pittsburgh, on contract, with $90 and upwards for nearby delivery.

Finished Iron and Steel.—The Allies have not yet secured all the steel they desire for next year's campaign, and they are seeking to have makers quote any quantities and deliveries they can make up to the end of the first half. In a number of cases mills have been approached more than once. Meanwhile the domestic buyer, believing that there is no danger of immediate runaway prices, limits his purchases to his needs, thus minimizing his engagement of capital. Jobbers covered about the first of the month for their fourth quarter requirements, securing about their normal quantities, which, indeed, was all the mills cared to bind themselves for. New structural work appears to consist chiefly of plant additions, but few individually large jobs are being placed. In about a month a buying movement is expected in general building lines, and at the moment some recently pending jobs are quite active; and shortly following this it is expected that the railroads, having strike difficulties behind them, will come in rather heavily for bridge work. The buyer is getting used to figuring in terms of present prices, so that those of 15 and 18 months ago seem to be of the distant past. Railroad car buying cannot yet be considered promising and, as has been the case in late weeks, the car builders get chiefly car repairs and repair parts. Buying for shipbuilding has not been notable in this locality. Numerous inquiries still appear to be unsatisfied. A sale of 600 tons to Japan is noted, half at 4c., Pennsylvania mill, and for the last two months of this year, and half at 3c., Pittsburgh basis, for the early months of next year. Among the week's structural awards, the McClintic-Marshall Company is prominent, securing 1600 tons for the Southern Railway, leaving 5300 tons to be bought by this road at some later time, and 1700 tons for subway work in Fifty-ninth Street and the East River. Other bridge work includes 500 tons for the Piedmont & Northern, placed probably with the Virginia Bridge & Iron Works; 130 tons for three bridges for the Boston & Maine to the Phoenix Bridge Company; 250 tons for the Baltimore & Ohio at Defiance, Ohio, to the American Bridge Company, and 180 tons to the Boston & Maine divided between the Pennsylvania Steel Company and the Boston Bridge Works. The Pennsylvania Railroad has fresh inquiries for 300 tons of bridge work following recent awards for about 1000 tons. In building work, the Hinkle Iron Company has taken two Herzog apartments, 600 tons each, recently mentioned in this column; the Eastern Bridge & Structural Company, Worcester, Mass., has 280 tons for Y. W. C. A., Troy, N. Y.; the Hay Foundry & Iron Works, 300 tons for the Boys' Club, Tenth Street and Avenue A; the Lackawanna Bridge Company, 400 tons for the American Gas Company at Waterloo, Iowa, and the American Bridge Company, 300 tons for a locomotive shop for the Boston & Maine at East Deerfield, Mass., and 300 tons for the Williamsport Wire Rope Company. The International Steam Pump Company is in the market for a 300-ton structure at Holyoke, Mass. In railroad cars, the Western Pacific is asking prices on 1200 cars and the Indianapolis & St. Louis is expected to buy 1000 box cars. The general character of the car business is indicated by an inquiry for 1900 center constructions for the Kansas City Southern, and by contracts of the Atlantic Coast Line with the Pressed Steel Car Company for 100 underframes and of the Michigan Central with the same company for 500 center constructions and of the Illinois Central with the American Car & Foundry Company for steel repairs to 1000 cars. The stronger situation regarding prices is indicated in a new minimum of 3.019c., New York, for deliveries from one company in, say, 60 days, while 2.669c. is the best price on deliveries in 90 days; wide and sheared plates take 4.419c. to 4.669c., New York, in small lots, with 4.169c. as minimum on attractive lots for delivery this year; the minimum for sheared and the narrower plates appears to be 3.169c., New York, with some mills holding for 3.669c. for this year's delivery; steel bars are quoted at 2.769c., New York, with the Bessemer product obtained earlier than the open hearth, and bar iron continues at 2.669c., New York. Out of warehouse, steel and iron bars and shapes take 3.25c., New York, and plates 4 to 4.25c. Movement out of warehouse is again quite active.

Cast-Iron Pipe.—Public lettings are few and small, but the demand from private buyers continues to hold up satisfactorily. Pipe founders are carefully watching the pig-iron market, as any advance in pig iron will probably make it necessary to mark up the price of pipe. Carload lots of 6-in., class B and heavier, are firm at $30.50 per net ton, tidewater, class A and gas pipe taking an extra of $1 per ton.

Old Material.—A better demand has come from the iron rolling mills of eastern Pennsylvania. Some good quantities of No. 1 railroad wrought and wrought pipe have been bought, and prices on these commodities have stiffened. The demand, however, has not extended to all classes of rolling-mill stock, while the steel companies of both eastern Pennsylvania and the Pittsburgh district have done practically nothing in this market. Embargoes at steel works are still interfering with deliveries on contracts. Brokers purchasing for the Pittsburgh market quote $13 to $13.25, New York, for heavy melting steel scrap. Buying prices for the Eastern trade are quoted about as follows, by brokers to local dealers and producers, per gross ton, New York:

Heavy melting steel scrap (eastern Pennsylvania specifications)	$11.75 to $12.00
Old steel rails (short lengths) or or equivalent	12.50 to 12.75
Relaying rails	27.50 to 28.00
Rerolling rails	16.50 to 16.75
Rerolling rails (for export)	19.00 to 20.00
Iron car axles	29.00 to 30.00
Steel car axles (for export)	35.00 to 36.00
No. 1 railroad wrought	18.00 to 18.50
Wrought-iron track scrap	15.50 to 16.00
No. 1 yard wrought, long	13.50 to 14.00
No. 1 yard wrought, short	11.75 to 12.00
Light iron (nominal)	3.50 to 4.00
Cast borings (clean)	6.75 to 7.25
Machine shop turnings (nominal)	4.25 to 4.50
Mixed borings and turnings	4.25 to 4.50
Wrought pipe	10.75 to 11.25
Old carwheels (nominal)	14.00 to 15.50
Malleable cast (railroad)	12.00 to 12.50

Foundries continue to purchase but sparingly. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

No. 1 cast (machinery)	$16.00 to $16.50
No. 2 cast (heavy)	14.50 to 15.00
Stove plate	11.00 to 11.25
Locomotive grate bars	10.00 to 10.25

The Hoffman Heater Company, Lorain, Ohio, has acquired the sales organization of the Beeler Water Heater Company, Pittsburgh, as an expansion of its business. An increase in capital stock from $100,000 to $300,000 has been authorized. W. J. Langenheim, formerly president of the Beeler Water Heater Company, will be sales manager; John Ellis will succeed Fred Oehlke as superintendent and engineer, and F. J. Zinkle will be purchasing agent. The officers of the Hoffman Heater Company are as follows: A. H. Babcock, president; S. A. Ault, vice-president and manager, and J. M. Jones, secretary-treasurer.

British Steel Market

All Sheet and Plate Exports Prohibited—Record Quotation for American Billets

LONDON, ENGLAND, Aug. 23, 1916.—(*By Cable.*)

Pig iron is in strong demand, with new business in hematite iron difficult. There is more inquiry for American billets with an increasing scarcity and bids ranging from £13 to £15 have been made for 4-in. billets for last quarter delivery.

Exports have been prohibited of tin plates, terne plates and all iron and steel sheets and plates. Tin plates are disorganized except for merchant business, which is subject to permits, with quotations about 32s. to 35s., though Government orders have been booked at 30s. Quotations are as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 32s to 35s., against 31s a week ago.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £20 5s., against £20 a week ago.

Steel ship plates, Scotch, delivered local yards, £13 17s 6d.

Steel rails, export, f.o.b. works, £10 17s 6d.

Hematite pig iron, f.o.b. Tees, about 140s.

Sheet bars (Welsh) delivered at works in Swansea Valley, £10 7s. 6d.

Steel bars, export, f.o.b. Clyde, £18.

Ferromanganese (nominal), £35.

Ferrosilicon, 50 per cent, c.i.f., £29.

Greatest World Petroleum Output

That 1915 was the most successful year of production in the history of the petroleum industry is shown by statistics just compiled under the supervision of J. D. Northrop, of the U. S. Geological Survey. The total quantity of crude petroleum entering the world's markets in 1915, which amounted to 426,892,673 barrels, exceeds the former record, established in 1914, by 28,194,307 barrels, or 7 per cent. The bulk of the increase came from the United States and Mexico, though Russia, Argentina, and Japan recorded significant gains. The distribution of this production is shown in the following table:

	Barrels of 42 Gal.	Metric Tons	Per Cent of Total
United States	*281,104,104	37,480,547	65.85
Russia	68,548,062	9,139,077	16.06
Mexico	32,910,508	4,388,068	7.71
Dutch East Indies†	12,386,808	1,710,145	2.90
Roumania	12,029,913	1,673,145	2.82
India	‡7,400,000	986,667	1.73
Galicia	4,158,899	578,388	.98
Japan and Formosa	3,118,464	414,785	.73
Peru	2,487,251	331,633	.58
Germany	995,764	‡140,000	.23
Trinidad	‡750,000	100,000	.18
Argentina	516,120	75,900	.12
Egypt	221,768	29,569	.05
Canada	215,464	28,729	.05
Italy	39,548	5,500	.01
Other	‡10,000	1,333	
Total	426,892,673	57,298,786	100.00

*Marketed production. †Includes British Borneo. ‡Estimated.

German Steel Shipments and Prices

June shipments of the German Steel Works Union were 298,753 metric tons, as against 311,620 tons in May. This brings the average shipments for the first half of 1916 to 293,471 tons per month; in 1915 the average was 270,510 tons per month. The June shipments were made up of 77,483 tons of semi-finished steel, 134,584 of railroad material, and 86,686 tons of shapes.

For the fiscal year ended with June, 1916, the total shipments are reported as 3,280,838 tons, against 3,393,537 tons for the year ended June 30, 1915. At the end of the same fiscal year of 1913 the total shipments were 6,124,310 tons. The total allotment for the year was 6,459,313 tons, making this year's deliveries 50.6 per cent of the allotments. The decline in the last fiscal year is attributed to decrease in railroad material and shapes which enter normally so largely into export trade.

In the last year, shapes advanced from 130 marks for the first three-quarters of the year to 140 marks for the last quarter. In 1914-15, the price was 110 marks for the corresponding period and 120 marks for the last quarter. Billets advanced from 107.50 marks at the beginning of the fiscal year of 1915-16 to 122.50 marks at the close; blooms from 107.50 marks to 112.50 marks; sheet bars from 117.50 marks to 127.50 marks; and ingots from 102.50 to 107.50 marks. Since this report prices have been further advanced by 20 marks for both semi-finished steel and shapes.

Iron and Industrial Stocks

NEW YORK, Aug. 23, 1916.

The stock market has permitted the railroad controversy to exert very little influence, notwithstanding the fact that the greatest strike ever known may at any day be precipitated upon the country. Under the leadership of United States Steel common, which has established a new high record, much above its previous high point of 94⅞ in 1909, all stocks have been much more active and at higher prices. The way in which they have advanced naturally suggests that the great financial interests of the country do not seriously expect a break between the railroad managers and their men. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com.	22⅞ - 26¼	Republic, com.	48⅞ - 54⅞
Allis-Chal., pref.	79¼ - 80½	Republic, pref.	112½ - 113¾
Am. Can, com.	57⅞ - 61¾	Sloss, com.	46 - 50½
Am. Can, pref.	110 - 111¾	Sloss, pref.	90⅞
Am. Car & Fdy., com.	60⅜ - 65	Tenn. Coal	21 - 22⅛
Am. Car & Fdy., pref.	.117	Tol. pref.	63 - 63⅝
Am. Loco., com.	71⅛ - 79½	U. S. Steel, com.	89½ - 97½
Am. Loco., pref.	104 - 106	U. S. Steel, pref.	117¾ - 118
Am. Steel Fdries.	54 - 57	Va. I. C. & Coke.	47 - 48
Bald. Loco., com.	75¼ - 82⅜	Westing. Elec.	59½ - 61½
Bald. Loco., pref.	105	Am. Rad., com.	390 - 392
Beth. Steel, com.	460 - 480	Am. Rad., pref.	132 - 134
Case (J. I.), pref.	84	Am. Ship, com.	48⅜ - 50
Colo. Fuel	15 - 51½	Am. Ship, pref.	98
Deere & Co., pref.	90 - 91	Chic. Pneu. Tool.	67⅞ - 69
Gen. Electric	169⅝ - 172	Cumb. Ltd. Steel	82
Gt. No. Ore Cert.	36¾ - 41	Lake Sup. Corp.	10½ - 11½
Int. Harv. of N. J., com.	114 - 116	Cruc. Steel, com.	71½ - 79
Int. Harv. of N. J., pref.	119	Cruc. Steel, pref.	116⅞ 118
Int. Harv. Corp., com.	78½ - 79	Harb.-Walk. Refrac., com.	101 - 104
Lacka. Steel.	72¼ - 78½	Harb.-Walk. Refrac., pref.	104
Nat. En. & Stm., com.	23 - 24⅜	La Belle Iron, com.	54 - 60
N. Y. Air Brake.	136⅞ - 140	La Belle Iron, pref.	131⅝ - 133
Pitts. Steel, pref.	99 - 101	Can. Car & Fdy., com.	50 - 52
Pressed Stl., com.	51½ - 55½	Can. Car & Fdy., pref.	70 - 77
Pressed Stl., pref.	98½ - 100	Central Fdry., com.	8
Ry. Steel Spring, com.	46⅛ - 50⅞	Driggs-Seabury	94 - 99
Ry. Steel Spring, pref.	99⅜ - 100⅝	Midvale Steel	62 - 64⅞

Dividends

The Gulf States Steel Company, quarterly, 1½ per cent on the second preferred stock, payable Nov. 1. This statement should have appeared last week instead of the erroneous announcement that a dividend had been declared on the common stock.

The New York Air Brake Company, regular quarterly, 2½ per cent, payable Sept. 22. This is an increase of ½ of 1 per cent over the last dividend declaration.

The Republic Iron & Steel Company, regular quarterly, 1¾ per cent on the preferred stock, and extra 4 per cent on account of accumulated dividends on the same issue, both payable Oct. 2. This payment of back dividends reduces the amount yet to be paid to 4 per cent.

The Crucible Steel Company of America, regular quarterly, 1¾ per cent on the preferred stock, and extra 1¼ per cent on account of accumulated dividends on the same issue, both payable Sept. 30. This payment of back dividends will reduce the amount yet to be paid to 23¼ per cent.

Fairbanks, Morse & Co., Inc., regular quarterly, 1½ per cent on the preferred stock, payable Sept. 1.

In a campaign which the Hyatt Roller Bearing Company, Newark, N. J., is inaugurating to emphasize the importance of anti-friction bearings in industrial use, the company has decided to call its commercial sales division the Industrial Department. This will be located at Newark. The underlying idea is that the time is coming fast when throughout the industrial world the advantage of anti-friction equipment will be accepted just as it has been by the automobile builder. This covers bearings for lineshafts, industrial trucks, mine cars, machine tools, electric motors, cranes and trolleys, blowers and fans and conveyors.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, effective from April 10, 1916, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c.; Pacific coast (by rail only), 65c.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 2.60c. to 2.75c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs	.10
Angles, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Plates.—Tank plates, ¼ in. thick, 6 in. up to 100 in. wide, 3c. to 4c., base, net cash, 30 days, or ½ of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras

	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers)	.10
Boiler and flange steel plates	.15
"A. B. M. A." and ordinary firebox steel plates	.20
Still bottom steel	.30
Locomotive firebox steel	.50

Marine steel, special extras and prices on application.

Gage Extras

	Cents per lb.
Rectangular, ¼ in. thick, over 6 in. wide to 100 in. wide	Base
Lighter than ¼ in., to 3/16 in., up to 72 in. wide	.10
*Lighter than ¼ in., including 3/16 in., over 72 in. to 84	.20
*Lighter than ¼ in., including 3/16 in., over 84 in. to 96	.30
*Lighter than ¼ in., including 3/16 in., over 96 in. to 100	.40
*Lighter than ¼ in., including 3/16 in., over 100 in. to 102	.45
Lighter than 3/16 in., including No. 8, up to 72 in. wide	.15
*Lighter than 3/16 in., including No. 8, over 72 in. to 84	.25
*Lighter than 3/16 in., including No. 8, over 84 in. to 96	.35
Lighter than No. 8, including No. 10, up to 60 in. wide	.30
Lighter than No. 8, including No. 10, over 60 in. to 64	.35

Up to 72 in. not less than 10.2 lb. per sq. ft. will be considered ¼ in.
Over 72 in. must be ordered ¼ in thick on edge, or not less than 11 lb. per sq. ft. to take base price.
Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.
Over 72 in., ordered weight 3/16 in., take No. 8 price.
Over 72 in., ordered weight No. 8, take No. 10 price.

Width Extras

Over 100 in. to 110 in. inclusive	.05
Over 110 in. to 115 in. inclusive	.10
Over 115 in. to 120 in. inclusive	.15
Over 120 in. to 125 in., inclusive	.25
Over 125 in. to 130 in., inclusive	.50
Over 130 in.	1.00

Length Extras

Universal plates 80 ft. long up to 90 ft. long	.05
Universal plates 90 ft. long up to 100 ft. long	.10
Universal plates 100 ft. long up to 110 ft. long	.20

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over	
Lengths under 3 ft. to 2 ft. inclusive	.25
Lengths under 2 ft. to 1 ft. inclusive	.50
Lengths under 1 ft.	1.55
Circles 3 ft. in diameter to 100 in.	.30
Circles over 100 to 110 in. (width extra)	.35
Circles over 110 to 115 in. (width extra)	.40
Circles over 115 to 120 in. (width extra)	.45
Circles over 120 to 125 in. (width extra)	.55
Circles over 125 to 130 in. (width extra)	.80
Circles over 130 in. (width extra)	1.30
Circles under 3 ft. to 2 ft. inclusive	.55
Circles under 2 ft. to 1 ft. inclusive	.80
Circles under 1 ft.	1.80
Half circles take circle extras.	
Sketches, not over four straight cuts, inc. straight taper	.10
Sketches having more than four straight cuts	.20

Plates sheared to a radius take complete circle extras.

*Including extra for width.

Wire Rods.—Including chain rods, $55 to $60.

Wire Products.—Prices to jobbers effective Aug. 5: Fence wire, Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, $2.55; galvanized, $3.25. Galvanized barb wire and staples, $3.45; painted, $2.75. Wire nails, $2.60. Galvanized nails, 1 in. and longer, $2 advance over base price; shorter than 1 in., $2.50 advance over base price. Cement-coated nails, $2.50. Woven wire fencing, 61½ per cent off list for carloads, 60½ off for 1000-rod lots, 59½ off for less than 1000-rod lots.

The following table gives the price per 100 lb. to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	6 to 9	10	11	12&12½	13	14	15	16
Annealed	$2.60	$2.65	$2.70	$2.75	$2.85	$2.90	$3.05	$3.15
Galvanized	3.30	3.35	3.40	3.45	3.55	3.65	4.10	4.20

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect on black pipe from April 21, 1916, and on galvanized pipe from July 24, 1916, all full weight:

Butt Weld

Steel Inches	Steel Black	Steel Galv.	Iron Inches	Iron Black	Iron Galv.
⅛, ¼ and ⅜	63	35½	⅛ and ¼	52	24
½	67	51½	⅜	53	25
¾ to 3	70	55½	½	57	38
			¾ to 1½	60	43

Lap Weld

2	65	50½	1¼	48	31
2½ to 6	68	53½	1½	51	38
7 to 12	65	49½	2	55	39
13 and 14	63½	..	2½ to 4	57	42
15	51	..	4½ to 6	57	42
			7 to 12	56	41

Reamed and Drifted

1 to 3, butt	68	53½	¾ to 1½, butt	55	37
2, lap	63	48½	1¼, lap	43	25
2½ to 6, lap	66	51½	1½, lap	49	32
			2, lap	50	33
			2½ to 4, lap	52	36

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	59	40½	⅛, ¼ and ⅜	52	34
½	64	50½	½	57	43
¾ to 1½	68	54½	¾ to 1½	61	45
2 to 3	69	55½			

Lap Weld, extra strong, plain ends

2	63	49½	1¼	50	33
2½ to 4	66	52½	1½	55	39
4½ to 6	65	51½	2	57	42
7 to 8	61	45½	2½ to 4	59	45
9 to 12	56	40½	4½ to 6	58	44
			7 to 8	52	38
			9 to 12	47	33

Butt Weld, double extra strong, plain ends

½	55	43½	½	44	31
¾ to 1½	58	46½	¾ to 1½	47	34
2 to 2½	60	48½			

Lap Weld, double extra strong, plain ends

2	55	43½	1½	44	30
2½ to 4	57	45½	2	44	30
4½ to 6	56	44½	2½ to 4	46	35
7 to 8	51	35½	4½ to 6	45	34

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Sheets.—Makers' prices for mill shipments on sheets of U. S. standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Blue Annealed Sheets

	Cents per lb.
Nos. 3 to 8	2.95 to 3.20
Nos. 9 and 10	3.00 to 3.25
Nos. 11 and 12	3.05 to 3.30
Nos. 13 and 14	3.10 to 3.35
Nos. 15 and 16	3.20 to 3.45

Box Annealed Sheets, Cold Rolled

Nos. 17 to 21	2.70 to 2.85
Nos. 22 and 24	2.75 to 2.90
Nos. 25 and 26	2.80 to 2.95
No. 27	2.85 to 3.00
No. 28	2.90 to 3.05
No. 29	2.95 to 3.10
No. 30	3.15 to 3.30

Galvanized Sheets of Black Sheet Gage

Nos. 10 and 11	3.15 to 3.25
No. 12	3.25 to 3.35
Nos. 13 and 14	3.25 to 3.35
Nos. 15 and 16	3.35 to 3.45
Nos. 17 to 21	3.50 to 3.60
Nos. 22 and 24	3.60 to 3.70
Nos. 25 and 26	3.75 to 3.85
No. 27	4.00 to 4.10
No. 28	4.15 to 4.25
No. 29	4.30 to 4.40

Boiler Tubes.—Discounts on less than carloads, freight to destination added, effective from April 15, 1916, are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1½ in.	35	1½ in.	27
1¾ and 2 in.	47	1¾ and 2 in.	39
2¼ in.	44	2¼ in.	36
2½ and 2¾ in.	50	2½ and 2¾ in.	42
3 and 3¼ in.	55	3 and 3¼ in.	47
3½ to 4½ in.	56	3½ to 4½ in.	48
5 and 6 in.	49	5 and 6 in.	41
7 to 13 in.	46	7 to 13 in.	38

Locomotive and steamship special charcoal grades bring higher prices.

1¾ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin,	Lead		Spelter	
		Electro-	New	New	St.	New	St.
Aug.	Lake	lytic	York	York	Louis	York	Louis
16	26 75	26 50	38 75	6 00	5 90	9 25	9 00
17	26 87	26 50	38 75	6 25	6 15	9 40	9 15
18	27 00	26 75	38 50	6 50	6 35	9 50	9 25
19	27 00	26 75		6 75	6 40	9 50	9 25
21	27 25	26 87½	38 50	6 62½	6 50	9 60	9 37
22	27 25	26 87½	38 50	6 62½	6 50	9 75	9 50

NEW YORK, Aug. 23, 1916.

Copper is higher because of large buying. Tin is quiet but steady. Lead has advanced on active buying. Spelter is quiet and steady after an active market. Antimony has risen.

New York

Copper.—Prices have again advanced, and a large amount of buying has been reported. At present, demand has slackened, and the market is quiet but steady. Consumers have evidently covered their present needs pretty extensively, but prices are still strong. The buying has been for both foreign and domestic account, and considerable of it has been for delivery this year, though there has been some inquiry and possibly sales for early 1917 delivery. It is estimated that fully 25,000,000 lb. were sold during the week, and it is reported that the pending order for the Allies of 125,000 tons has also been arranged for. The market is really a sellers' one, and they are inclined to make no concessions. The London market yesterday was £127, against £126 a week ago. Exports this month, including yesterday, were 22,544 tons. Spot and August electrolytic were quoted yesterday at 26.87½c. cash, New York, with spot copper very scarce. Lake copper is higher, but nominal at 27.25c. cash.

Tin.—The market is quiet, and there seems to be no anxiety to buy or sell. Some business has been done to protect contracts and to cover short sales, but the quantity has not been large. On the whole, the week has been quiet, a feature being that prices have held well, with no indications of ease anywhere. Yesterday, Straits tin was quoted at 38.50c., New York, with Banca obtainable at 37.50c. The arrivals this month total 3137 tons, with 3110 tons reported afloat.

Lead.—A heavy demand was prevalent all of last week, with probable sales running as high as 10,000 tons. Buying came from all directions, and it was for both foreign and domestic consumption. The demand seemed to be especially for prompt and August delivery, caused probably by the fact that buyers' stocks had run low, so that they could not hold off any longer. The demand was finally of such proportions that the outside price was advanced above that of the leading interest, which at once raised its quotations on Thursday to 6.25c. The demand continuing, another advance was made on Friday to 6.50c. Sellers are evidently well sold up, and it is estimated that there is not much lead left for shipment within a month. In the present week the market has been quieter, with sellers apparently not willing to sell, or perhaps buyers disinclined to come into the market. A small tonnage was reported sold as high as 6.55c., St. Louis, with a smaller quantity changing hands at 6.65c. Special conditions probably attended the latter transaction. One report insists that the leading interest is now out of the market for early delivery. The New York quotation yesterday was 6.62½c., with St. Louis at 6.50c. Exports this month, including yesterday, have been 768 tons, against 758 tons a week ago.

Spelter.—Prompt spelter is now quoted at 9.75c., New York, and 9.50c., St. Louis, the market having advanced rather steadily all the week. There has been heavy buying reported both for foreign and domestic account, but just now the demand seems to have slackened and the market is quiet. There is evidently less metal in second hands and producers are sold up better than when the last advance was on. Quotations for the balance of the year are about ¼c. per month below the present spot quotation. Large quantities of high grade spelter, which for so long was in poor demand, have been sold the past week. It is announced that Great Britain has entered into an agreement with Australia under which about 100,000 tons of zinc concentrates and 45,000 tons of spelter are to be taken yearly for the period of the war and 10 years thereafter. Exports to Aug. 22 inclusive have been 6990 tons.

Antimony.—As forecasted last week, the market has advanced and the quotation yesterday was 13.50c., duty paid. Sales have been large, some estimates placing them from 500 to 1000 tons. Demand continues good for prompt and September delivery.

Aluminum.—The market is dull and quiet, with No. 1 virgin metal, 98 to 99 per cent pure, quoted at 58c. to 60c. Sheets for delivery in five or six weeks are held at 80c. to 85c., delivered.

Old Metals.—The market is much more active. Old copper, brass and lead are higher. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible	24.00 to 24.75
Copper, heavy and wire	23.00 to 23.75
Copper, light and bottoms	19.50 to 20.00
Brass, heavy	14.00 to 14.50
Brass, light	11.00 to 12.00
Heavy machine composition	18 25 to 18 75
No. 1 yellow rod brass turnings	14 25 to 15.00
No. 1 red brass or composition turnings	15.00 to 16.00
Lead, heavy	5 75
Lead, tea	5 25
Zinc	6 50 to 7 50

Chicago

AUG. 21.—The continuance of domestic demand for copper has made for a strong market, with prices high, though subject to some variation. Lead and spelter are likewise firmer, but the tin market is quite dull. We quote: Casting copper 25.50c.; Lake copper, 27.25c. to 27.50c.; tin, carloads, 39c., and small lots, 41c.; lead, 6.60c.; spelter, 9.75c.; sheet zinc, 15c.; Cookson's antimony, 50c.; other grades, 16c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 18.50c.; copper bottoms, 16.75c.; copper clips, 17.75c.; red brass, 16c.; yellow brass, 12c.; lead pipe, 4.75c.; zinc, 5c.; pewter, No. 1, 27c.; tinfoil, 28c.; block tin pipe, 33c.

St. Louis

AUG. 21.—Metals have been rather quiet, with the close to-day as follows: Lead, 6.50c.; spelter, 9.50c. to 9.75c.; tin, 39c.; Lake copper, 27.50c.; electrolytic copper, 27c.; antimony, 15.50c. In small lots the quotations were: Lead, 7c.; spelter, 11c.; tin, 42c.; Lake copper, 29c.; electrolytic copper, 28.50c.; antimony, 15c. In the Joplin ore district prices stiffened about $5 per ton on zinc blende with the average for the week's production of the district, $61. On calamine the average for the week was $40. Lead ore was firm at $65 for 80 per cent. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 7.50c.; heavy yellow brass, 10.50c.; heavy red brass and light copper, 14.50c.; heavy copper and copper wire, 17c.; pewter, 25c.; tinfoil, 30c.; zinc, 4.50c.; lead, 5c.; tea lead, 3.50c.

American Vanadium Company Changing Hands

It is stated that as soon as experts pass on the properties of the American Vanadium Company, Pittsburgh, whose vanadium ore mines are located in Peru and reduction works are at Bridgeville, Pa., control of the company will pass into new hands at the price of $1,000 per share. The company was organized in 1906 with 7000 shares of stock at $100 par value. James J. Flannery, Pittsburgh, is president of the company, and it is said that he, with members of his family, owns the controlling interest in the company. It is understood that this deal is being put through by J. Leonard Replogle, third vice-president, who left the Cambria Steel Company more than a year ago to become manager of sales of the Vanadium Company.

The Waynesboro Foundry & Machine Company, Waynesboro, Pa., is contemplating installing a new line of foundry equipment for the manufacture of a brass specialty. William H. Strauss is general manager.

THE WEEK'S LABOR TROUBLES

Molders' Property Attached by Bridgeport Foundries

An interesting phase of the week in New England is the action of four Bridgeport, Conn., foundry companies in attaching the funds of the local molders' union, and real and personal property of many of the strikers, in four suits, each for $50,000 damages. The defendants in each suit are Local Union No. 110, International Molders' Union of North America; J. R. O'Leary, Worcester, Mass., the active agent of the national body in the local strikes; James A. Loveday, a local leader, and several employees of the various plaintiffs. The suits are brought by the Pequonnock Foundry, the Monumental Bronze Company, the Bridgeport Deoxidized Bronze & Metal Company, and the Manufacturers' Iron Foundry. Funds of the local union and a check of $1,000 for strike relief, from the national body, deposits of strikers, and many parcels of real estate owned by the latter, have been attached.

The complaints recite in detail charges of conspiracy to prevent the operation of plants and of intimidation of men who seek to work. The writs are returnable at the September session of the superior court. An effort will be made to secure a decision on the basis of conspiracy, a decision which would be as sweeping in its results, if sustained in the higher courts, as was that in the famous Danbury hatters' case in regard to the boycott.

The various foundries affected by the trouble will endeavor to reopen their plants this week, being hopeful that the court action will produce a favorable result. It is understood that the majority of the men now out, most of whom are of foreign birth, are desirous of returning to work, but are kept away by threats which it is alleged are being made not only against them but against their wives and children.

Various New England Strikes

Serious trouble has developed at the Westfield Mfg. Company's works, Westfield, Mass., where over 800 men are on strike. An agreement with the company expires Aug. 31, and demands had been formulated and presented. The men claim that they are on strike because of discrimination against their leaders and because the agreement has been ignored. The new demands are for the eight-hour day, the usual overtime which accompanies such demands, and there is a distinct effort to make the plant a "closed shop," the strikers claiming that the shop is 98 per cent organized. It is believed that if the matter of discrimination can be cleared away the men will return under the old agreement pending the drafting of a new one.

A new sort of strike has taken place at the Abbott Ball Company, Hartford, Conn., where the entire force has gone out as a protest against the attitude of President George E. Abbott toward the general superintendent, Charles Koehler, and the shop superintendent, John W. Bryce. It is reported that the introduction of efficiency experts as workmen is at the root of the trouble.

Trouble has broken out in the Reece department of the F. E. Wells & Son plant, Greenfield, Mass. On Aug. 17, 31 out of the 64 men in that department walked out, upon the refusal of the company to reinstate three men who had been discharged. The next morning the strikers picketed the department, which is in a building by itself, preventing some of the others from going to work. On Aug. 19 there were 22 men at work, and on Monday of this week 32. It is stated by the company that the three men were discharged for poor workmanship.

Eight-Hour Demand Refused at New Haven

The local machinists' union at New Haven, Conn., has started an extensive eight-hour campaign among the machine shops of the city. Demands were first made upon the Eastern Machine Screw Company, where the eight-hour day was asked for in place of the present 55-hour week. On the company's refusal, about 30 men walked out. It is reported that all these were from the die-head department, and none from the screw-machine department. Over 80 men left the plant of the Geometric Tool Company after demands that the present bonus be made permanent and that a shop committee be recognized had been refused.

The greatest effort was made at the Winchester Repeating Arms Company. On Wednesday, Aug. 16, a shop committee waited on the company and presented demands for an eight-hour day, which it was understood had been prepared for them by an organizer who had been speaking and holding meetings for some weeks. These demands were refused. The next noon a group of organizers of the machinists' union called a strike, but less than 200 men, according to an officer of the Winchester Company, responded. On Thursday, Aug. 17, all the local newspapers carried a full-page announcement, signed by 51 New Haven manufacturers, which contained this concluding paragraph:

Under present conditions, we will not make any general changes in our schedule of working hours nor grant any general demands that are being promoted by such agitators.

Since the publication of this advertisement many of the Winchester employees have asked to be reinstated. More than 100 men have already returned to work, and the company is looking over with care the records for ability and efficiency of many of the others who have asked to return. The Winchester Company has over 18,000 employees, and conditions at the plant are satisfactory, the present trouble having caused but little annoyance. It is noteworthy that a less number of men left these works at this time than when the strike of last fall was called.

Milwaukee Machinists' Strike Weakening

MILWAUKEE, Aug. 22.—(*By Telegraph.*)—Reports from various shops ordered struck by the machinists' union on the demand for an 8-hr. day indicate that strikers are returning to work in considerable number. It is also reported that several hundred have left for employment in other cities. The situation is exceedingly quiet, and the impression prevails that the strike will fall flat. Only one additional shop was struck last week, about 60 machinists leaving the plant of the Milwaukee Machine Tool Company in West Allis, owned and operated by the Kearney & Trecker Company, where a strike was previously declared. Like other shops in which walkouts have been declared, operations are being continued with much less inconvenience than anticipated, the number of strikers forming only a small part of the total working force. Officials of several large employers are being examined under the discovery statute by attorneys of the unions in an attempt to support conspiracy charges and allegations that a blacklist exists. Evidence indicates that many strikers apply for work in competitive shops. Efforts are being made to induce the patternmakers and molders to undertake sympathetic strikes. The molders, however, are said to be very apathetic because of the blow they received in the strike 15 years ago.

Dayton Machinists' Strike a Failure

Union machinists made demands last week on practically every manufacturing plant in Dayton, Ohio, and the refusal of all employers to concede the eight-hour day with time and a half for overtime and double time on holidays caused a strike on Monday, Aug. 21. Reports from authentic sources are that less than 700 out of a total of 17,000 quit work Monday. The employers state that the demands made cannot be met at the present time and that they will not consider meeting them under any circumstances now. The strike is conceded to be a failure.

Other Localities

Statements have been issued by the Harlan & Hollingsworth Corporation, Wilmington, Del., and J. D. Calloway, secretary of the Boilermakers, Iron Shipbuilders and Helpers of America, to the effect that the strike which has been in progress for eight weeks has been settled to the mutual satisfaction of both sides.

Prospects for an early settling of the longshoremen's

strike, which has crippled shipping in all Puget Sound ports since June, are now somewhat brighter, although no definite agreement has been reached. The United States Department of Labor is taking energetic measures to bring about an arbitration.

Judicial Decisions

ABSTRACTED BY A. L. H. STREET

CONDITIONAL SALES OF MACHINERY IN NEW YORK.—The New York statute which authorizes the buyer under a conditional sale contract to recover amounts paid on the price of an article when the seller retakes possession under reservation of title, on the buyer's default in making payments, unless the seller retain possession for 30 days after the retaking, during which time the buyer may redeem, and unless the seller at the expiration of such period sells the property at public auction, was designed to mitigate the harshness to which buyers are sometimes subjected under conditional sales contracts. Hence, it is held that, after becoming in default, a buyer cannot validly waive compliance on the seller's part with the mentioned provisions of the law, unless the waiver agreement be based upon some new consideration. But when, after default, the parties enter into a new contract, and attempt in good faith by such contract to settle the differences between them, a different case is presented, which is not within the protection of the statute. (New York Court of Appeals, Adler vs. Weis & Fisher Company, 112 Northeastern Reporter, 1049.)

RIGHT TO FREIGHT OVERCHARGE REFUND.—When a railroad company has collected freight overcharges on a series of shipments between the same parties, and a refund is made, it belongs, as between the seller and the buyer, to the one who bore the freight charges primarily. So, it appearing that goods were sold under contracts requiring delivery at the destination, the buyer's place of business, the seller is entitled to the refund, although the buyer paid the freight charges in the first instance, they being credited to him on the agreed purchase price of the goods. (Minnesota Supreme Court, Jennison Brothers & Co. vs. Chicago & Northwestern Railway Company, 158 Northwestern Reporter, 398.)

MISTAKE IN DRAWING SIGHT DRAFT.—When several articles are sold under agreement that they are to be shipped under bill of lading attached to draft for the price, the seller's mistake in omitting to include the price of one of the articles prevents the buyer from acquiring title to that article notwithstanding the actual delivery, and the seller is entitled to treat the buyer's resale of that article without payment of the price as a wrongful conversion, especially when the buyer knows of the mistake. (Alabama Supreme Court, Finney vs. Studebaker Corporation of America, 72 Southern Reporter, 54.)

TITLE DOES NOT PASS TO BUYER FROM THIEF.—An employee intrusted with his employer's goods, but without authority to sell them in his own name (for instance, a shipping clerk), cannot pass title to a third person under such a sale. Hence, the employer is entitled to recover the value of the property from the third person, regardless of that person's innocence in the matter. (Kansas Court of Appeals, Pittsburgh & Midway Coal Company vs. Laning-Harris Coal Company, 187 Southwestern Reporter, 263.)

INVALIDITY OF VERBAL SALES CONTRACT NOT WAIVED.—On being sued for claimed breach of a contract to buy goods of the value of $500 or more, defendant's right to defeat recovery on the ground that the contract was not in writing, and that there was no partial delivery or payment on the price—required by statute to make the agreement valid—is not affected by any general trade custom of any usage between the parties of treating oral contracts as being valid. The parties may waive compliance with the statute in a particular instance, but that does not preclude reliance upon it as to another and unperformed contract. (Rhode Island Supreme Court, Webster-Tapper Company vs. Eastern Hay Company, 98 Atlantic Reporter, 50.)

AN INDUSTRIAL RAILROAD CASE

Trunk Lines May Divide with a Steel Corporation Switching Road

WASHINGTON, D. C., Aug. 22, 1916.—Some important principles to be observed in the determination of the constantly recurring question as to the status of so-called industrial railroads in the iron and steel trade are laid down by the Interstate Commerce Commission in a report dealing with the interchange switching charges of the Johnstown & Stony Creek Railroad Company, a short line controlled by the Federal Steel Company, a steel corporation subsidiary. The principal questions considered in this case are, first, whether the Johnstown & Stony Creek may lawfully be paid any divisions by its trunk line connections, and second, whether its connections may properly refuse to accord points on the Johnstown & Stony Creek as low rates as they maintain to and from points on their own rails in the same vicinity.

This railroad is a short switching line that interchanges traffic with the Baltimore & Ohio Railroad and the Pennsylvania Railroad at Johnstown, Pa. It was originally owned by the Lorain Steel Company, but at present all but six shares of its stock are in the name of E. H. Gary, the six excepted shares being held by officers of the Lorain Steel Company. Fifteen industries beside the steel company are served directly and many more indirectly through tracks maintained by the Johnstown & Stony Creek, and the commission, therefore, holds that it is a common carrier industrial line, and may lawfully be paid allowances or divisions by the trunk lines with which it connects on all traffic including that to and from the plant of the proprietary company. Excessive divisions, however, the commission holds, would constitute rebates to the Lorain Steel Company. The general principles applicable for the determination of fair divisions in the cases of individual lines are thus set forth in the Commission's report:

> In so far as the industrial line serves the plant in interplant switching and other purely plant service the cost of such service and the investment in facilities used exclusively to perform that service must be excluded in calculating the cost of the switching service to and from the trunk lines. The investment in facilities used both for plant service and interchange switching can only be included in the proportion that they are used in interchange switching. Interior plant switching or any other service differing radically in nature from the general work of switching cars between industries and connections should be segregated as to investment and operating costs of the industrial line so far as this may be feasible. The engine hour will usually be found a safer guide than cars handled for making this general separation. For interior plant switching the industry benefited should be charged with the allocated capital and operating costs. The remaining operating and capital costs measure the maximum which may be received net for other switching either in the form of switching charges or allowances, there being a minimum charge for the shortest switching and a somewhat higher charge for the longer distance switching. From its entire business the industrial line should not earn more than a fair return on the property devoted to the public use, less reserve for accrued depreciation, and including material and supplies in the investment.

The Commission decides that the evidence fails to establish that the Pennsylvania Railroad would unduly prejudice shippers on the Johnstown & Stony Creek by refusing to apply its Johnstown locality rates to and from points on the Johnstown & Stony Creek, and that, in the absence of discrimination, such action would not be improper. The Commission adds that the possible application of the commodities clause of section 1 of the Interstate Commerce act, restricting the transportation of commodities owned by the railroads transporting them, has not been considered in this case, and is not decided. W. L. C.

Powdered coal is to be used as the fuel for puddling, heating and annealing furnaces by the Schuylkill Iron Works of the Alan Wood Iron & Steel Company at Conshohocken, Pa. The Holbeck system, installed by the Bonnot Company, Canton, Ohio, is to be used.

Pittsburgh and Nearby Districts

The 127-in. plate mill at the Shoenberger works of the American Steel & Wire Company at Pittsburgh, which has been undergoing alterations and improvements for several weeks, is expected to start about Sept. 1. It will roll plates up to 120 in. wide, and will turn out about 4000 tons per month. The American Steel & Wire Company will operate the mill in connection with its other departments at the Shoenberger works, but the output of plates will be sold in the open market by the Carnegie Steel Company, Pittsburgh, and the United States Steel Products Company, New York City, the latter handling export orders. At the Donora, Pa., zinc works of the American Steel & Wire Company, eight out of ten zinc furnaces are running, while the sulphuric acid department is in full operation.

Francis L. Arensberg, formerly connected with the McCullough-Dalzell Crucible Company, Pittsburgh, has bought a site, 45 x 240 ft., near Hawkins Station, on the Pennsylvania Railroad, a few miles east of Pittsburgh, on which he proposes to build a plant for the manufacture of crucibles for melting brass for making brass castings.

A. Foster, Park Building, Pittsburgh, is in the market for one 4-in. and one 12-in. standard pipe machine.

The Petroleum Iron Works Company, Sharon, Pa., builder of steel plate construction, has recently bought 66 acres adjacent to its works and now owns a total of 108 acres. No use will now be made of the new property, but in time it will likely be utilized for large plant extensions. The company has received an order from the Petroleum Refining Company for the erection of a refinery near Houston, Tex., to cost about $1,000,000, and its entire capacity is now about sold up for the next six months in the production of tank cars and oil and gas tanks and similar products.

The National Foundry Company, Erie, Pa., is seeking one 5 or 10 ton three-motor crane, in good condition, to operate on 220 volt direct current and having a span of 38 ft. 6 in.

The Warren Tool & Forge Company, Warren, Ohio, has awarded contracts for the erection of a new warehouse and machine shop, and is contemplating installing two departments which will require additional buildings and equipment. The additions under contract will increase the capacity of the plant about 20 per cent. About Jan. 1 the company will add equipment to include an axe plant and will also manufacture handle hammers, beam-peen hammers and a line of machinists' hand tools. These additions will about double the capacity of the plant. A drop forge department is also contemplated.

The Follansbee Brothers Company, Pittsburgh, which operates an open-hearth steel plant and sheet and tinplate mills at Follansbee, W. Va., and has been considering the erection of a new plant at some other location near the Pittsburgh district, has been offered several free sites in West Virginia and Ohio. The citizens of Toronto, Ohio, raised $37,000 for the purchase of a site which was offered free to the company in order to secure the new plant. As yet, however, no decision has been made as to whether a new plant will be built.

The McKeesport Tin Plate Company, McKeesport, Pa., is starting this week eight more of its new tin mills. Five were started about a month ago. The remainder of the 22 new mills will probably be started in September. All the mills are electrically driven. The company will have a total of 42 hot tin mills when all are completed, constituting the largest individual tinplate plant in the country.

Arthur Weisberg has purchased, through the Exchange National Bank, Pittsburgh, receiver for the H. Adler Company, manufacturer of stoves and ranges, four acres and a manufacturing plant at Carnegie, Pa. He contemplates the incorporation of a company under the name of the Acme Stove & Range Company to continue the manufacture of stoves and ranges. The plant has been operated under a receivership for some time.

The copartnership of Dilworth, Porter & Co., Pittsburgh, manufacturers of railroad spikes and tie plates, which has existed since 1852, being one of the oldest manufacturing concerns in the Pittsburgh district, will be changed to a corporation to be known as Dilworth, Porter & Co., Inc. The incorporators of the new company are J. Dilworth Beggs, Walter F. Schleiter and Joseph Dilworth.

Reports that a number of Youngstown steel manufacturers are interested in a project to build a new steel plant at Michigan City, Ind., to employ 5000 or more men, are denied. None of the leading officials of steel companies in the Youngstown district knows anything of such a project.

Youngstown Sheet's By-Product Coke Plant

The by-product coke plant of the Youngstown Sheet & Tube Company at East Youngstown, Ohio, contains four batteries of 51 Koppers cross-regenerative ovens, each with the necessary apparatus for the recovery of tar and the manufacture of ammonium sulphate by the Koppers direct process. On Aug. 18 two of the four batteries, or 102 ovens, were put in operation, and the other two are expected to start about Sept. 10.

The special feature of this plant is the installation of large units in the by-product building; *i.e.*, large capacity in tar extractors, exhausters and saturators. The by-product recovery units are said to be the largest ever built. Each set of units is to handle the total gas of 102 12½-ton ovens operating on 15 hours' coking time. The plant has three sets of these units, one for each two batteries, while one is held in reserve. The coal-handling plant was built by Fairbanks, Morse & Co., and the coke-handling equipment by the Robins Conveying Belt Company. The plant was started without any difficulty and worked very smoothly.

The whole design and construction of the plant are stated to represent the latest development and highest standard of by-product coke plants. A large machine shop has been installed, which is equipped to do any work required on the coke plant, and there is also modern boiler equipment, the boilers being equipped with Parsons blowers and feeders for burning coke breeze and with gas burners for burning natural and coke-oven gas.

The plant as built will each month consume 100,000 tons of coal and will turn out about 67,000 tons of coke, 750,000 gal. of tar, 2,200,000 lb. of ammonium sulphate and 600,000,000 cu. ft. of gas. The above outputs are based on an operation of 18 hours' coking time, but the plant is designed to operate on as low as 15 hours coking time.

Spot Welding Patent Decision

A decision was given July 11, 1916, and an interlocutory decree was issued July 17, by the United States District Court, District of Massachusetts, in the case of the Thomson Electric Welding Company, et al., vs. Barney & Berry, Inc., holding that the defendants had infringed the Harmatta patents on the process of spot welding. The Universal Electric Welding Company, licensee under the Harmatta patents, was associated with the Thomson Electric Welding Company as complainant. The decision thus given was in pursuance of an opinion given by the United States Circuit Court of Appeals for the First Circuit, on Oct. 5, 1915, in which a decision in the district court was reversed and the case remanded for further proceedings. The plaintiffs did not seek recovery of profits for any use of the process before the patent issued on Dec. 3, 1912, nor for any articles produced before that date. The decree of July 17 provides for a referee to determine profits derived by the defendant from infringing machinery and to assess damages. An injunction was also issued restraining the defendant from practising the process of electric welding. One of the questions raised in the litigation was whether the operation of welding skates, as practised by the defendants, came under the designation "spot welding." The early Thomson patents on electric welding, including the process of butt welding, were not involved in the action.

PERSONAL

The American Steel & Wire Company announces the following appointments: F. C. Gedge, who died July 28, and was manager of the wire mills of the company in the Chicago district—including Anderson, Joliet, Waukegan and DeKalb—has been succeeded by W. L. Hayes, formerly assistant manager of the Cleveland district. W. C. Stone, formerly assistant manager of the Chicago district under Mr. Gedge, succeeds Mr. Hayes, as assistant to R. W. Ney, manager of the wire mills in the Cleveland district. George W. Sells, formerly superintendent of the North works at Worcester, Mass., has been made assistant manager of the Chicago district, succeeding Mr. Stone. E. H. Broden, formerly superintendent of the Braddock, Pa., works, has been made superintendent of the Rankin, Pa., works, succeeding H. S. White, who is absent from duty on account of ill health. F. B. Hill, formerly superintendent of the Donora wire works, succeeds Mr. Broden as superintendent of the Braddock works. F. E. Gage, formerly assistant superintendent of the Rankin works, has been appointed superintendent of the Donora works, succeeding F. B. Hill.

Arthur E. Woolsey, formerly manager of the Tata Iron & Steel Company's steel works at Sakchi, India, who returned to the United States some months ago, has become manager of the plant of the Anniston Steel Company at Anniston, Ala.

Irving A. Sibley, Jr., has been appointed secretary and treasurer of the Decatur Malleable Iron Company, Decatur, Ill.

W. E. Schaeffer, formerly manager of the Duluth Corrugating & Roofing Company, has resigned to become general superintendent of the Racine Mfg. Company, Racine, Wis.

A. C. Johnson, president Gisholt Machine Company, Madison, Wis., will take an extended vacation in the Canadian Rockies.

Robert MacDonald, formerly president of the Associated Foundry Foremen, and manager of the Samuel L. Moore & Sons Company, Elizabethport, N. J., for the past four years, has been appointed assistant to General Sales Agent D. A. Barkley, Lehigh Coke Company, South Bethlehem, Pa.

Milton O. Knauss, superintendent Empire Iron & Steel Company's furnaces at Catasauqua, Pa., was severely injured Aug. 17, when struck by a heavy hammer swung by a workman.

Arthur King, president Middletown Car Company, Middletown, Pa., is critically ill.

Harold Lomas, for over 13 years a member of the sales department of the Crocker-Wheeler Company, Ampere, N. J., was killed July 1 in an engagement between the British and Germans at Friecourt, France. He had served the Crocker-Wheeler Company as manager of its Denver office and also as manager of its Baltimore office. At the time of his death he was holding the rank of first lieutenant in the 20th Manchester Regiment.

Nov. 21 has been set as the date for a public dinner which will be given in Baltimore, in honor of Charles M. Schwab and in recognition of the great improvements which will be made by the Bethlehem Steel Company at its Sparrows Point plant.

Creditors of the L. P. C. Motor Company, Racine, Wis., builder of pleasure automobiles, which made a voluntary assignment in November, 1915, have received checks for 100 per cent of their claims, although the actual realization from the assets was something less than 25 per cent. The full payment was accomplished by the personal sacrifice of Capt. William Mitchell Lewis, president and chief stockholder of the company, who gave his check to the assignee to cover every claim in full.

W. F. French has been appointed purchasing agent of the Bour-Davis Motor Car Company of Detroit by President Charles J. Bour. Mr. French was formerly in the mercantile and commercial field in Chicago in a similar capacity.

N. E. Wahlberg, chief engineer of the Oakland Motor Car Company, Pontiac, Mich., has resigned to become chief engineer of the Nash Motors Company, Kenosha, Wis., the former Thomas B. Jeffery Company. In making the change Mr. Wahlberg becomes associated again with his former chief, C. W. Nash.

Charles A. Goodspeed, formerly secretary and manager of the Goodspeed-Detroit Mfg. Company, Ltd., and more recently with the Timken-Detroit Axle Company, has resigned to take charge of the factory of the Nelson-Blanck Mfg. Company, Detroit.

H. E. Miller, Jr., formerly with the Pittsburgh Plate Glass Company and the Lilly Varnish Company, is now representing the Moller & Schumann Company, Hilo varnish manufacturer, Brooklyn, in eastern Massachusetts, Rhode Island, and eastern Connecticut, covering both the retail paint trade and the manufacturers of wood and metal products.

O. W. Cook, who has been manager of works of the Canadian Cartridge Company, Ltd., Hamilton, Ont., has recently been appointed manager of the company.

C. M. Barron, who for the past five years has been studying and cultivating the Australasian market for railroad supplies, machine tools and raw materials, has become connected with Charles M. Terry, Inc., of Sydney, Australia, as consulting and purchasing engineer in the company's offices at 23-25 Beaver Street, New York.

Lake Superior Mining Men to Visit South

The Lake Superior Mining Institute will hold its twenty-first annual meeting in Alabama, from March 13 to 17, 1917, with headquarters at Birmingham. A circular has been issued by A. J. Yungbluth, secretary, Ishpeming, Mich., which advises the members that the party will assemble in Chicago on March 10 or 11, and travel to Birmingham by special train, providing a sufficient number shall signify the intention to take the trip. It is proposed that one day's stop be made at Chattanooga and Chickamauga, to visit points of interest, and possibly other stops as may be arranged later. At Birmingham, two or three days will be spent in visiting mines and manufacturing plants, with business meetings for the reading and discussion of papers. Cordial invitations have been received from members of the Southern iron trade.

Machine Tool Builders' Convention

The National Machine Tool Builders' Association will hold its fall convention on Tuesday and Wednesday, Oct. 24 and 25, at Hotel Astor, New York City. The officers of this organization are as follows: J. B. Doan, president, Cincinnati; D. M. Wright, first vice-president, Hartford, Conn.; A. H. Tuechter, second vice-president, Cincinnati; Albert E. Newton, treasurer, Worcester, Mass.; Charles L. Taylor, secretary, Hartford, Conn.; Charles E. Hildreth, general manager, Worcester, Mass.

The Henry A. Hitner's Sons Company, Huntingdon Street and Aramingo Avenue, Philadelphia, has purchased at public auction the property of the Lancaster & Southern Traction Company, Lancaster County, Pa., for $20,575. The line is 7 3/10 miles long and was chartered in 1903 for ninety-nine years with stock of $100,000 and bonds of $109,000. The rails are 60 lb. to the yard and it is possible that they will be sold for export. Plans are on foot, however, looking toward the reorganization of the company.

The ore steamer ordered by M. A. Hanna & Co. for the service of the Donner Steamship Company, now under construction in the yard of the American Shipbuilding Company at Lorain, Ohio, will be launched Sept. 9. The steamer will be named the H. F. Black.

Machinery Markets and News of the Works

MANY SMALL ORDERS

Bulk of Business Is for a Few Tools

Railroad Shops Busy, but Little Buying Results—Gas Engine Builders Consolidate—Canadian Munition Labor Shortage

The market is very active, but the bulk of the business is being done rather quietly. Some large-lot orders have been placed, both for shell contract work and for expanding home manufactures. Russian interests have closed for one lot of 70 engine lathes, and the Russo-Baltic Car Works bought about 60 tools, about half its requirements, including 20 turret lathes and 30 automatics. In Chicago, besides a multitude of small orders, lists totaling 30 turret lathes and 20 miscellaneous tools were contracted for by shell manufacturers.

The greatest demand is now principally for grinding and milling machines and similar equipment. Special machinery is sought in quantities much greater than such tool builders can begin to produce. In the Cincinnati territory, however, lathe business predominates.

Railroad shops are reported very busily engaged in repairing rolling stock, particularly around Cincinnati; but neither here nor elsewhere has it resulted in much if any buying.

Jobbers' stocks of twist drills and high-speed cutting tools have been drawn on in some centers, so much so that it is difficult to meet deliveries on current orders; and the rapid rise in the cost of materials makes it hard to fix correct selling prices for these commodities.

In California important activity is developing in the gas engine-building industry. The Standard Gas Engine Company bought the Corliss plant at Petaluma, and the Imperial Gas Engine Company and the Atlas Gas Engine Company have been consolidated.

To the list of oil-refining and other interests which have gone into the shipbuilding business in the past year is now added the meat-packing company, Swift & Co., which will put in a plant at Flavel, Ore. The shipbuilders are the largest machine-tool buyers at the present time on the Pacific coast.

The Canadian munition shops are hampered by a scarcity of labor, and it is possible that mechanics will be kept out of the ranks, even though enlisted, in order to prevent delay in producing vitally needed war supplies.

New York

NEW YORK, Aug. 23, 1916.

While the last delivery sheets from the shops show that machine-tool builders are steadily catching up with orders, they promise little assistance to dealers in a market in which the demand for quick delivery is growing more urgent. The surplus of newly-completed machines with many in the trade is not sufficient to meet the strong demand for a few tools now coming from many sources, and these dealers report deliveries worse off with them. One lot of automatics, for instance, promised for Aug. 15 has been put over to Sept. 15. The present need is principally for automatics, grinding and milling machines and allied equipment. Lathes are plentiful.

The effort to get equipment to Archangel before the close of shipping in the White Sea is a prominent factor in hurrying Russian buyers. In addition to the short time remaining, a scarcity of bottoms, especially in the Pacific, is still seriously interfering with export orders. In one case over $100,000 worth of automatics are held in warehouse awaiting permit from the Russian Government to forward to Vladivostok.

The Russo-Baltic Car Works, 1 Madison Avenue, New York, which is equipping a plant at Petrograd to produce about 10 automobiles a day, has purchased about half of its requirements, including 20 turret lathes, 30 automatics and several other machines. Another Russian manufacturer closed last week for 70 engine lathes.

The General Electric Company remains in the market and is adding to its requirements gradually.

The Baltimore & Ohio Railroad has just bought four turret lathes and some other tools. Its purchases in the past few weeks amount to about 20 tools. Other railroads are doing little.

The Downs-Slater Foundry Company, Wharton, N. J., has secured a site at Dover, N. J., from the Dover Board of Trade, at Salem Street and the Central Railroad of New Jersey, on which it will erect several buildings, including a main plant, 40 x 100 ft.

The Moore Steam Turbine Corporation, Wellsville, N. Y., has let contract for its new plant, 90 x 140 ft., of brick and steel, and for a boiler plant and test floor. The plant is to be completed by Oct. 1. It will manufacture steam turbines and double helical reduction gears.

The Secretary of State, Albany, has recorded the following increases in capital stock recently: The Highlander Machine Company, Rochester, N. Y., $20,000 to $50,000; the Evans Addressing Machine Company, $20,000 to $50,000; the Salisbury Wheel & Mfg. Company, Jamestown, N. Y., $500,000 to $1,000,000; the National Bridge Works, Review Street, Long Island City, N. Y., $225,000 to $300,000, and the Planographic Equipment Company, 52 Duane Street, New York, $75,000 to $500,000.

The business of the Covert Motor Vehicle Company, Lockport, N. Y., was recently reincorporated as the Covert Gear Company and its capital stock was increased to $1,000,000. It is erecting an additional factory building at a cost of over $50,000, and on completion about Oct. 1 will devote it to the manufacture of its line of transmissions. The present officers of the company are B. V. Covert, president, F. A. Clum, treasurer, E. F. Fritton, secretary, and F. E. Mesner, general manager.

The Ferguson Steel & Iron Company, Buffalo, James E. Ferguson, president, has purchased 16 acres of land at Greene and Stanley streets and the New York Central Railroad, adjoining its plant, to provide for contemplated plant additions.

The Thomas Millen Cement Company, Jamesville, N. Y., Roger Williams, manager, has let general contract to the W. J. Burns Company, Syracuse, for the rebuilding of its cement manufacturing plant, including a new four-story building.

The Guarantee Construction Company, 140 Cedar Street, New York City, has the general contract for the erection of powerhouse, 83 x 86 ft., two stories, for the New York Air Brake Company, at Watertown, N. Y. Charles A. Starbuck is president.

The United States lighthouse inspector, Federal Building, Buffalo, is receiving sealed proposals for furnishing new boilers, boiler circulators and sludge removers for the lighthouse tender Crocus.

The Peerless Husker Company, Buffalo, will build a brick and tile addition to cost $12,000, to the factory it recently purchased at Cornwall and Northumberland avenues and the Erie Railroad. Equipment for the manufacture of corn huskers and canning machinery will be installed.

The Syracuse Gage & Valve Company, Syracuse, N. Y., capitalization $100,000, has been incorporated to manufacture gages, faucets, valves, etc. E. A. McDonald, H. J. Crane and H. E. Newell, Syracuse, are the incorporators.

The Delaware, Lackawanna & Western Railroad is erecting at South Michigan Avenue and the Buffalo River, Buffalo, a concrete powerhouse to cost $18,000 for use in connection with its new passenger terminal.

The Taber Pump Company, manufacturer of rotary

pump, Buffalo, is building an addition to its factory at Elm and Sycamore Streets.

The Warsaw Construction Company, Warsaw, N. Y., has received contract for rebuilding the sewage pumping station at Batavia, N. Y., which was recently destroyed by an explosion.

The Binghamton Brick Company, Binghamton, N. Y., has filed articles of incorporation to manufacture bricks, clay and shale products, artificial stone and building materials. The capital stock is $30,000. The incorporators are C. M. Crook, 120 Chenango Street; F. W. Welsh and W. T. Couper.

The Niagara Emery Mills, Inc., Lockport, N. Y., will erect an addition to its manufacturing plant on Garden Street to cost $16,000.

The Heller Brothers Tool Company, 879 Mount Prospect Avenue, Newark, N. J., is seeking a No. 1 Pratt & Whitney die-sinking or profiling machine.

J. L. Osgood, Buffalo, N. Y., is in the market for machinery including shaping, milling, grinding and drilling machines and lathes in first-class condition.

Philadelphia

PHILADELPHIA, PA., Aug. 21, 1916.

The Jonathan Bartley Crucible Company, Oxford Street, Trenton, N. J., has awarded contract for the construction of a three-story addition, 75 x 100 ft., which will add about 38,000 sq. ft. to its drying space. The company will add equipment to double its present producing capacity, and will add another kiln. The cost of the improvements will be about $25,000. Lewis H. Lawton is secretary and general manager.

The Brass Specialty Mfg. Company, 1641 North Tenth Street, Philadelphia, Pa., plans to enlarge its plant to meet an increasing demand for pressed and spun metal specialties, and will also put on a night shift. G. W. Ullman has joined the company and will be export manager.

The Ertel Brothers Company, Williamsport, Pa., incorporated with a capital stock of $50,000, has taken over the plant formerly operated by Ertel Brothers, and is continuing the business of manufacturing cigar and other boxes. Henry O. Ertel is president and general manager.

The American Auto Tire Company, 154 North Broad Street, Philadelphia, has purchased the old Patterson textile mills in Chester, Pa. The mills will be enlarged and converted into an automobile tire manufacturing plant. George G. Meeley is president, and associated with him is Hugh B. Turner, secretary and treasurer of the American Auto Tire Company, and several Californian capitalists. The sale of the Patterson mills is significant in its demonstration of the industrial progress of Chester in the last year. About six months ago E. B. Dorsett of Mansfield, Pa., who held a $57,000 mortgage on the property, paid $2,000 for it. It is authoritatively stated that Mr. Meeley paid $90,000 for the same property. The Patterson mills were erected at the close of the Civil War. They are on a tract of six acres on Chester River and the line of the Philadelphia, Baltimore & Washington Railroad. The structures consist of the main building, of stone, 76 x 316 ft., three stories; a two-story brick building, 80 x 188 ft.; a brick and frame building, 64 x 123 ft., a brick building, 33 x 74 ft.; a brick boiler and engine house and a two-story brick and stone office building.

The Thermoid Rubber Company, Trenton, N. J., has under way construction work designed to double the present capacity of the plant.

The plant at Fourteenth and Ford streets, Lebanon, Pa., formerly occupied by the Lebanon Forge & Machinery Company, has been leased by Gerdes & Co., Inc., manufacturer of patterns, castings, forgings, machine and plate work, 30 Church Street, New York. The company is now equipping it with machine tools to operate on special and jobbing work. In addition to general machine shop work it will specialize in gear cutting. Used machine tools in good condition are being sought by the company, which is also desirous of receiving catalogs and literature. H. T. Gerdes is treasurer.

The Macungie Brass & Mfg. Company, Macungie, Pa., will erect an additional building, 50 x 120 ft., to be devoted to jobbing work. It will give employment to about 30 additional workmen.

The Puritan Mfg. Company, Ellenton, Pa., capitalized at $6,000, is building a plant, 30 x 50 ft., three stories, metal clad. It is equipping it with new machinery, including a 100-hp. power plant, and will employ about 30 workmen for the manufacture of clothes pins. It is contemplating installing machinery for manufacturing wooden thread spools. J. F. Clark, Canton, Pa., is president and treasurer. Curtis W. Potter, Ellenton, is secretary and general manager.

The Whitney Glass Works, Bullitt Building, Philadelphia, owing to the great and growing demand for glass bottles, has decided to augment its plant at Glassboro, N. J., by building a new factory to occupy an entire city block. It will be 264 x 111 ft., and it is expected to be ready to operate in about six months. The building will be one story, of brick, steel and concrete. The great domestic demand at this time is due to the stoppage of the foreign supply. There is a large export trade for American made bottles now, but the company has few foreign orders, and the decision to build another factory was due to the natural growth of its domestic business. Charles Y. Yost is secretary and treasurer.

The York Ice & Mnfg. Company, York, Pa., has decided to install two more refrigerating units of 50 tons capacity every 24 hr., and will start construction work about Oct. 1.

New England

BOSTON, MASS., Aug. 21, 1916.

The Howe Scale Company, Rutland, Vt., has awarded a contract for a machine shop and assembling building, 60 x 204 ft. The new shop will have a 10-ton crane.

The Abrasive Machine Tool Company has been granted tax exemption for ten years in East Providence, R. I., on a plant which it proposes to erect opposite the plant of the Eastern Bolt & Nut Company. Frank N. Macleod, Providence, represented the company and stated that it would build a plant about 50 x 150 ft., with ell, 25 x 30 ft., for the manufacture of machine tools, particularly grinding machines, and that the company would be incorporated soon and expected to be in operation within three months.

The Metals Production Equipment Company, Springfield, Mass., suffered a loss of $5,000 by a fire in its pattern-storage house.

The Associated Tanning Machinery Company, Salem, Mass., which was recently organized and leased one floor of the new Ceedon Building, has taken a lease of the entire structure.

The Norris Noiseless Pedal Action Company, Stoughton, Mass., has opened an iron foundry in a new addition to its plant. The company manufactures iron and brass piano hardware.

The Millers Falls Company, Millers Falls, Mass., is installing in its plant the machinery of the Ford Auger Company, Holyoke, Mass., which it recently purchased.

The general and experimental machinery business of Ira A. Smith, Beverly, Mass., has been purchased by Edward R. Fallon and John F. Conley, who have opened a new machine shop at 87 Rantoul Street.

The City Foundry Company, Plain Street, Lowell, Mass., is building an addition, 80 x 80 ft.

The Atwood Machine Company, Stonington, Conn., has purchased land adjoining its plant for further expansion of its facilities.

The brass novelty shop, at Roxbury, Conn., of Murray & Sorenson, New York City, was burned Aug. 12 with a loss of about $30,000.

Edward E. Bartlett, Hyde Park, Mass., manufacturer of presses, is to remove his business to the plant formerly occupied by the Flather Planer & Shaper Company, at Nashua, N. H.

The Watts Laundry Machine Company, Willimantic, Conn., organized a few months ago, has purchased a site in Willimantic on West Main and Winter streets, where it will build a factory for the manufacture of a new mangle invented by Timothy Watts. The company is now occupying a portion of the plant of the Vanderman Mfg. Company.

The Cone Automatic Machine Company, Windsor, Vt., has been incorporated with capital stock of $200,000 by Frank L. Cone, Cecilia F. Gillrais and Harry M. Davis.

The Brown & Sharpe Mfg. Company, Providence, R. I., has been granted a permit for an addition, 72 x 170 ft., one story.

H. J. Keating and P. L. Grimes, Milford, Conn., have opened a factory on Gulf Street for the manufacture of aeronautical instruments for this and other governments.

The National Scale Company, Holyoke, Mass., is building a concrete building which will be used for a newly established metal stamping department. It will cost $30,000.

The foundry of Charlette Brothers, Blackstone, Mass., was burned Aug. 17 with a loss of about $15,000.

The North & Judd Mfg. Company, New Britain, Conn., has purchased land opposite its present factory as a site for a future building.

The Smith & Winchester Mfg. Company, Sonth Windham, Conn., has awarded the contract for its new factory building, 50 x 150 ft., one story.

The permit for the first of the additions to be made at the plant of the American Chain Company, Bridgeport, Conn., has been granted. The size is 50 x 122 ft., one story.

The American Graphophone Company, Bridgeport, Conn., has awarded a contract to the Austin Company for the erection of another addition to its new plant on Barnum Avenue. The new structure will be 70 x 200 ft., one story.

The Bridgeport Housing Company, Bridgeport, Conn., has been incorporated with capital stock of $1,000,000 by Charles G. Sanford, H. H. DeLoss and DeVer H. Warner. This company is an outcome of the work of the Bridgeport Chamber of Commerce to promote adequate means for solving the pressing housing problem of this rapidly growing community. It has been estimated by experts that homes for 9000 families must be provided before the cold weather.

Chicago

CHICAGO, ILL., Aug. 21, 1916.

The recent group of orders for shells in which the larger manufacturers have chiefly participated has been followed by the distribution of a large number of machine-tool orders. One order for 30 turret lathes, another for 20 machines, an increased demand for boring mills and a renewal of the buying of shell-finishing automatics are some of the evidences. Tool grinding and milling machines are still the object of seemingly insatiate inquiry. Automobile manufacturers are continuously in the market for equipment in quantity second only to the requirements of the munitions manufacturers. Machine-tool builders are finding a large demand for special machinery, the number of shops equipped for such work and willing to undertake it being far from adequate for the work offered. Miscellaneous trade in machinery lines is without feature and rather limited in volume.

The Simpson-Frisch Company, Chicago, an organization recently effected by Paul Frisch, formerly associated with the National Lamp & Brass Mfg. Company, and Mr. Simpson of the Klemp & Simpson Company, will operate an ornamental iron shop at Franklin and Ontario streets. The capital authorized is $5,000.

The Johnson Motor Company, Chicago, has been organized with a capital of $25,000 and will conduct a manufacturing plant. The incorporators are Jay M. Johnson, Walter W. Gardiner and Philip Woodworth, 7 South Dearborn Street.

The Sheet Metal & Conveyor Company, Chicago, has been incorporated with a capital of $5,000 to manufacture conveyors and operate a general sheet-metal shop by A. J. Thompson, Georgiana Thompson and Herman F. Kroeplin, 8026 South Peoria Street.

The Stewart-Warner Speedometer Company, Chicago, which has been operating a machine shop at Beloit, Wis., will remove all operations to its Chicago plant, converting the Beloit shop into a foundry.

The Donahue Steel Products Company, Chicago, formerly in the First National Bank Building, has removed to 454 Peoples Gas Building. The company is the manufacturers' representative in a variety of lines, including power hammers, drop forgings, screws, bolts and conveyors.

The Perfection Sand Blast Company, Chicago, has been organized, and will have a capital of $2,500, by G. W. Miller, 38 South Dearborn Street; Edward, Robert and E. G. MacLane.

The Velie Engineering Company, Moline, Ill., is about to erect a factory for the building of trucks, the plant to cost $50,000. C. B. Rose is chief engineer

The W. T. Rawleigh Company, Freeport, Ill., has acquired a new factory site and has had plans prepared for the erection of a plant which will include machine shop, foundry and a power plant with capacity sufficient for the sale of light and power for municipal consumption.

The Canedy-Otto Mfg. Company, Chicago Heights, Ill., Charles H. Thomas, president, manufacturer of blowers, has added 40,000 sq. ft. to the floor area of its plant.

The North Chicago Foundry Company, North Chicago, Ill., has been sold to Chicago interests, representing, it is understood a large Chicago foundry now tied up by labor troubles.

J. J. Welsh and E. C. Shaw, Galesburg, Ill., have acquired the foundry and shop of G. D. Colton & Co., the equipment of which they will enlarge, continuing in the manufacture of furnace grates and castings.

Harold King Wrench Company, Indianapolis, Ind., has been organized with a capital of $50,000. The directors of the company are Harold King, H. and M. King.

The Eclipse Dump Box Company, Hammond, Ind., a Chicago suburb, is contemplating the removal of its business to Beloit, Wis., where it proposes to erect a plant to cost $20,000

The National Car Coupler Company, Attica, Ind., is completing the addition to its foundry, 150 x 300 ft. [illegible] $50,000. Among the new equipment installed are three cranes.

The capitalization of the Haynes Automobile Company, Kokomo, Ind., has been increased from $1,200,000 to $4,000,000, half of which is in common stock, and half in 7 per cent preferred. Proceeds of the sale of the preferred stock will be used for the erection of extensive additions to the company's factory.

The Amalgamated Machinery Corporation, 72 West Adams Street, Chicago, Ill., plans to exhibit one of its machines for boring and finishing the inside of large, high explosive shells at the American Foundrymen's Association Exhibit at Cleveland, Sept. 11 to 16, in order to show its large frame, which consists of a 5-ton casting, with a view to getting in touch with additional foundries who can supply these castings.

The Litchfield Mfg. Company, manufacturer of steel farm wagons, spreaders and loaders, Waterloo, Iowa, has started the erection of an addition to its main building, 50 x 80 ft., of concrete and steel, for which it has purchased machinery for cold rolling shafting. This department was added to take care of its own requirements, but its capacity will be several hundred tons in excess of present needs. The company is also building its own parts, including steel wheels. H. L. Litchfield is president.

The plant of the German-American Portland Cement Company, La Salle, Ill., has been damaged by fire, about $125,000. The destroyed equipment will be replaced at once.

The Herrick Auto Supply Company, Champaign, Ill., has been incorporated with a capital stock of $20,000 by Harry Herrick, Ray C. Sparks and others and will equip a machine shop and garage

The branch plant of the American Fork & Hoe Company at Fort Madison, Iowa, T. T. Hitch, local manager, will erect a factory having a total of 80,000 sq. ft. of floor space. Electric power will be purchased for the operation of the plant and electric drive installed throughout.

The Grinnell Electric & Heating Company, Grinnell, Iowa, will erect and equip a new power station with a capacity of 1200 kw. Coal and ash-handling equipment will be installed.

The North Star Refrigerator & Fixture Company, St. Paul, Minn., William Manteuffel, president, has acquired property at Austin, Minn., where a manufacturing plant will be built.

John Whisler, Gibson, Iowa, is seeking a 1 or 1⅛-in. automatic screw machine.

The Chicago-Cleveland Car Roofing Company, 535 Railway Exchange, Chicago, is in the market for a good second-hand belt-driven air compressor of recent type and of 300 ft. per min. capacity at 100 lb. pressure. It will also buy a second-hand 12-ft. squaring shear in good condition.

Detroit

DETROIT, MICH., Aug. 21, 1916.

With the past year registering the greatest annual growth in population in Detroit, and the year's construction record over the $40,000,000 mark, the machinery trade has prospered proportionally. Additions to factories have called for the installation of many machines, and the dealers are finding difficulty in filling orders. In the past week unusually large orders for lathes and grinding machines have been placed, and the demand for drilling machines has increased. Wood-working machinery for construction work is finding a ready market. Deliveries are still from four to six months behind.

The use for a large quantity of steel placed in New York last week by the Ford Motor Company has not been announced definitely. While reports state that it is for the construction of a steel plant, it is more likely intended for the down-river tractor plant which has been contemplated for some time. Some credence is given the report that it is to be used to enlarge the present Ford factory in Highland Park, the officials of the company having stated some time ago that the capacity of the plant would be doubled.

The Armored Motor Car Company, Detroit, has been incorporated at $100,000 capitalization by Harry W. Frost, 50 West Kirby Street, Detroit; Waldo S. Ross, 623 South Main Street, Sioux Falls, S. D.; Webb C. Artz, 50 West Kirby Street, Detroit, and A. Lester Mancourt, 720 Jefferson Avenue, Detroit. The object of the new company is the manufacture and sale of armored motor cars and devices accessory to them.

Work is well under way on the erection of a new $30,000 foundry building by the Lakeside Foundry Company, Muskegon, Mich. The structure will be completed Nov. 1 at a cost of $30,000.

The Piston Ring Company, Muskegon, Mich., has completed

its new four story factory building and is at present installing machinery. A large number of lathes adapted to the work of making piston rings are being set up. A complete machine shop will occupy the greater part of the new building. A production of more than 100,000 rings a day will be possible with the new factory.

The John Knape Machine Company, Grand Rapids, Mich., has purchased land upon which will be built immediately an addition. Contracts will be awarded within two weeks.

Delivery of wire wheels from the new factory of the Hayes Wheel Company, Jackson, Mich., will start in September, the new plant having just been brought to completion.

The Motor Horse Company, Detroit, has been incorporated with a capitalization of $100,000 by Sidney B. Winn, 930 Brush Street, Patrick J. Power and August J. Bloom.

Announcement of plans for the erection of a four-story office building at the plant of the Buick Motor Company at Flint, Mich., has been made by Walter P. Chrysler. The building, which will be a reinforced concrete structure, will cost $250,000.

A large municipal garage, capable of housing 42 cars, will be constructed by the post office authorities in Detroit. The building will be of concrete construction. William J. Nagel is postmaster.

The Grand Rapids Blow Pipe & Dust Arrester Company, Grand Rapids, Mich., is about to erect a new factory.

The Piston Ring Company, Muskegon Heights, Mich., is completing its new machine shop and fouudry and is about to install considerable new equipment.

The Lakeside Foundry Company, Muskegon, Mich., is beginning the erection of a new foundry at a cost of $30,000.

Milwaukee

MILWAUKEE, WIS., Aug. 21, 1916.

The establishment of new industries directly and indirectly allied with the metal-working industry and the extension of existing shops furnish a continuous demand upon machine-tool builders, who appear to be again approaching a situation like that of six and eight months ago, when orders were taken with indefinite assurances or guaranties of deliveries. The demand, however, is of a different nature, being for domestic purposes and offered in small lots, with single-tool orders predominating. Buyers appear satisfied to get delivery of one or two machines at a time, but put in new bids as old orders are filled, which forms a continuous draft upon the manufacturers.

At this time there is much activity in electric public utility circles, and the general movement of small units into syndicate hands greatly strengthens the likelihood of much-needed improvements and extensions being undertaken at once instead of awaiting the garnering of sufficient capital. Evidence is already at hand of the revival of purchasing of heavy generating equipment and appurtenances.

A somewhat disturbing factor in the aluminum goods industry is the serious shortage of raw and semi-finished materials, wnich has already forced a small interest to close shop temporarily to await new stocks. The construction of new garages and shop additions to existing buildings continues at a rapid rate and in large volume. A feature of the demand from these sources is the heavy and more expensive equipment desired, compared with the requirements for these purposes in past years. In the smaller cities, at least, the garages have taken the place of the commercial machine shops, or the shops are made to form the nucleus of garage businesses, so that more elaborate and extensive equipment is required for the dual purposes.

Alfred C. Clas, architect, Colby-Abbot Building, Milwaukee, is closing bids this week for the erection of a new shop unit for the Falls Motors Corporation, Sheboygan Falls, Wis. It will consist of a motor assembly shop, 120 ft square, with a motor repair shop wing, 72 x 85 ft.

The Nash Motors Company of Maryland, organized by C. W. Nash and an Eastern syndicate to take over the Thomas B. Jeffery Company, maker of automobiles and commercial cars, Kenosha, Wis., has been granted a license to do business in Wisconsin. The statement says the capital stock is $5,000,000 and the Wisconsin interest is $2,500,000.

The Worden-Allen Company, Milwaukee and Chicago, has been awarded the contract for erecting the new 25,000-kw. auxiliary power plant for the Wisconsin Power, Light & Heat Company at Portage, Wis. It will be of steel and brick, 100 x 180 ft., one-story and basement. The order for turbines has been placed with the Allis-Chalmers Mfg. Company. The engineers are Woodmansee & Davidson, Chicago and Milwaukee.

The Brand Stove & Range Company, 303 Sixth Street, Milwaukee, filed articles of incorporation on Aug. 15. The authorized capital is $25,000 and the corporators are William F., William A. and Clarence F. Hyde. The company is not ready to announce its plans.

The Green Bay Avenue Garage, 1459 Green Bay Avenue, Milwaukee, owned by Otto Ladwig, is preparing to build a machine shop addition, 70 x 50 ft., two stories and basement. John Roth, Jr., is architect.

The Federal Engineering Company, Stephenson Building, Milwaukee, is taking bids on steel trusses, sash, a gas producer outfit and hand power crane for the garage and repair shop of Richard Mokros at Mineral Spring Road and Downer Avenue, East Milwaukee, Wis.

The Central Wisconsin Public Service Company, 425 Wells Building, Milwaukee, is taking figures on two 75-kw. units for its plant at Marshall, Wis.; one 75-kw. unit at Reeseville, Wis., and waterwheels, switchboards and transformers at both plants. Estimates on 100-hp. oil engines are also being asked. Philipp Grossman is vice-president in charge.

The Chesbrough-Moss Company, Ltd., Beloit, Wis., wholesale grocer, is having plans prepared for a grocery warehouse and cold storage plant, 60 x 120 ft., two stories and basement.

The Claus Automatic Gas Cock Company, 2601 Vliet Street, Milwaukee, has awarded general contract for its new plant at Franklin and Booth streets to the Raulf Company, 53 Patton Building, Milwaukee. A building permit was granted Aug. 17. The building, planned by Robert A. Messmer & Bro., architects, is 81 x 149 ft., of reinforced concrete and brick.

The Stoughton Wagon Company, Stoughton, Wis., maker of farm machinery and vehicles, has increased its capital stock from $250,000 to $500,000. William C. Hegelmeyer is secretary.

The Thomas S. Watson Company, Majestic Building, Milwaukee, consulting engineer, is preparing plans for enlargement of and new equipment for the municipal waterworks system at Plymouth, Wis. A 1,500,000-gal. per day pumping engine, air compressor, etc., will be required.

F. G. Martin, proprietor of the Mosinee Garage, Mosinee, Wis., has purchased a site, 40 x 120 ft., and will erect a new fireproof garage and machine shop to cover the lot. A full equipment of shop tools will be purchased.

The Kissel Motor Car Company, Hartford, Wis., is making out an extensive building program for the coming winter and the first units, to be undertaken at once, will be an addition, 77 x 123 ft., to the sheet-metal shop, and an addition, 40 x 100 ft., to the new three-story body and finishing shop erected last spring. Details of other additions have not been completed.

Escanaba, Mich., has engaged A. Arntzen, architect, to prepare plans for an addition to high school, to be used for a manual training department.

The Sharp & Denicke Garage Company, Mauston, Wis., will build an addition to its garage, 40 x 100 ft., for repair shop purposes.

The Overland-Green Bay Company, Green Bay, Wis., awarded general contract for its garage and service station, 100 x 120 ft., two stories and basement, to the Hagemeister Company. W. L. Calahan is general manager.

The Wisconsin Motor Mfg. Company, Milwaukee, is now on a regular production of Diesel oil engines for marine purposes. The standard model is rated at 60 hp. and is a two-cylinder, two-cycle design, worked out by A. F. Milbrath, chief engineer.

R. J. Clark, Coloma, Wis., is erecting a garage and repair shop, 40 x 80 ft., one-story and basement.

The Jersild Fire Escape Company, Neenah, Wis., has determined to establish its works and headquarters at Waupaca, Wis., and will lease quarters until it can erect and equip its own plant. Offices will also be maintained in Neenah. The corporation perfected its organization by the election of the following officers: President, J. N. Jersild, Neenah; vice-president, Gustave Kalfabs, Neenah; factory secretary, Ingolf Uvron, Waupaca; home secretary, G. G. Barlow; treasurer, John Madsen, Waupaca. The production will require a considerable tonnage of light structural material and wire cable.

Sheboygan, Wis., is taking bids for the erection and complete equipment of a municipal garage.

B. H. Kleinert, Morrisonville, Wis., will open a machine and automobile repair shop at Keyeser, Wis.

The Gehl Brothers Mfg. Company, West Bend, Wis., has placed its foundry on overtime schedules and is employing a night shift because of the demands from its gasoline engine and farm machinery production departments. The com-

pany, like other founders, is complaining over the serious shortage of skilled foundry labor, which restricts production to a great extent.

S. A. McLean, Richland Center, Wis., will erect a two-story brick and concrete building, the first floor and basement to be used as a garage and machine shop.

The West Bend Aluminum Company, West Bend, Wis., kitchen utensils, drawn work, etc., has been obliged to close its plant for at least three weeks because of the lack of raw material. The company has large orders on its books which would keep a normal capacity fully occupied for nearly 18 months.

The Sheboygan Railway & Electric Company, Sheboygan, Wis., has been purchased by the American Public Utilities Company, Grand Rapids, Mich., and the name has been changed to Sheboygan Electric Company. It is understood that important improvements projected by the former owners will be carried out as planned. The purchase price is said to be $2,110,000.

The Chicago, Milwaukee & St. Paul Railway Company has been granted a permit to build a private machine shop at its elevator E in Milwaukee, the capacity of which is being increased from 1,000,000 to 1,600,000 bu. The lessee is the Taylor-Bournique Company, Milwaukee.

The DePere Electric Light & Power Company, DePere, Wis., which started work recently on changing its system from direct to alternating current, is meeting with great difficulty in getting prompt delivery of machinery and equipment and probably will not be able to complete the project before Jan. 1.

The Sanitary Refrigerator Company, Fond du Lac, Wis., owned by the same interest operating the Fond du Lac Church Furniture Company, and using part of the latter's works, will immediately build a plant of its own, 80 x 100 ft., three stories and basement, to be ready Nov. 1. The refrigerator interest has been incorporated as a separate company, with a capital stock of $200,000. William Mauthe, H. R. Potter and D. D. Sutherland are the promoters.

Cincinnati

CINCINNATI, OHIO, Aug. 21, 1916

Press reports of the activity in railroad shops in this vicinity are correct; urgent efforts are being made to repair rolling stock. The activity, however, has not brought out any large lists of machine tools from any of the different railroads; buying is still confined to single tools. Purchasing on the part of automobile and auto-truck manufacturers is still keeping up, but most of this business is transacted quietly. Lathes are in better demand than any other kinds of machines and one maker, it is stated, is sold up to Jan. 1.

The shortage of finished material was only temporarily relieved, and jobbers' stocks of twist drills and high-speed cutting tools have been drawn on to such an extent that it is difficult to make deliveries on orders now received. As a rule, the manufacturers have been compelled to cut down specifications on many articles in an effort to evenly distribute shipments to their many customers. The rapid advance in costs in the past 18 months has made it difficult for some manufacturers to correctly gage manufacturing expenses and to fix selling prices accordingly. This probably applies more directly to makers of portable electric tools and boiler and tank manufacturers. The foundries are busier, although weather conditions still have an effect on the labor supply.

The Central Brass & Fixture Company, Springfield, Ohio, manufacturer of automobile accessories, has purchased a manufacturing building, 50 x 350 ft., from the Winters-Coleman Scale Company, and will shortly add considerable equipment.

The Ohio Storage Battery Company, Columbus, Ohio, recently incorporated with $20,000 capital stock, will be located at 79 East Spring Street. It will not manufacture batteries, as was rumored, but will act as distributors for the National Carbon Company.

The John W. Brown Company, manufacturer of automobile accessories, Columbus, Ohio, is installing several electric ovens in its plant on Marion Road.

The Lancaster Lens Company, Lancaster, Ohio, is making an addition to its plant estimated to cost $35,000.

The new plant of the American Tool Works Company, Cincinnati, is now well under way, and is expected to be in operation by Nov. 1.

The Pfau Mfg. Company, Norwood, Cincinnati, will soon commence construction of its new addition to be 60 x 350 ft., three stories, of concrete and steel. A power plant will also be added. Most of the building will be devoted to the manufacture of plumbing pottery ware, and it is reported that very little of the equipment has yet been purchased.

The Cincinnati Coffin Company, Cincinnati, has let contract for an addition to its plant in West End. Some special wood-working equipment will be installed.

The Vail-Rentschler Tractor Company, Hamilton, Ohio, will soon be incorporated by Gordon S. Rentschler, J. A. Vail, and others, and will establish a plant for the manufacture of lightweight farm tractors. Equipment details are not yet available.

The Domestic Engineering Company, Dayton, Ohio, has completed the foundations for its new plant at Moraine City, a suburb. A part of the equipment has been purchased.

It is reported that the Lindley Box & Paper Company, Dayton, Ohio, intends to remove its plant to Marion, Ind.

The Metals Machining Company, Dayton, Ohio, has been incorporated with $10,000 capital stock by Charles F. Dye and others.

The Bickett Machine & Mfg. Company, Cincinnati, recently closed contract with the Montague Mailing Machine Company, Chattanooga, Tenn., to manufacture its automatic mailing machines. The Bickett Company is adding equipment to its plant, most of which has been purchased; but it is in the market for a nickel-plating outfit.

The United States Motor Truck Company, Cincinnati, at its recent annual meeting, voted to increase the capital stock from $300,000 to $1,000,000, divided into preferred and common. The preferred is cumulative 7 per cent, but participates in earnings with the common up to 10 per cent. The directors declared the regular annual dividend of 7 per cent on the preferred, and placed quite a large sum to the credit of surplus from the excess earnings of the company. R. C. Stewart, president of the company since 1914, has ably directed and developed the business to its present prosperous condition.

The Central South

LOUISVILLE, KY., Aug. 21, 1916

Business holds up well with prices stiff and tending upward in the increase in prices of steel. Contractors' oil well, quarry and rock-crushing machinery, mine equipment and sawmill and wood-working machinery are all in demand, while electric motors, machine tools, etc., are active. Labor shortage is being felt in this territory and there is not a manufacturer who could not use more skilled workers.

The United States Motor Truck Company, Covington, Ky., a suburb of Cincinnati, has increased its capital stock from $300,000 to $1,000,000. Additional machinery will be installed sufficient to more than double the present output of motor trucks.

The Louisville Veneer Mills, Louisville, Ky., will install mechanical veneer drivers and lumber dry kilns. D. E. Kline is manager.

Purchase of the B. F. Meed & Sons Company, manufacturer of fishing reels, by the Horton Mfg. Company, Bristol, Tenn., has been announced. The Louisville factory, 1450 South Eighteenth Street, will be continued for the present.

The Columbia Motor Car Company, authorized to manufacture and sell motor trucks, has been incorporated with $10,000 capital by F. R. Hodapp, E. E. Miller and J. L. Saylor.

Instead of selling its plant, the Flemingsburg Light & Ice Company, Flemingsburg, Ky., will call for an additional $8,000 of stock, which has been authorized, and will install new alternating current machinery.

To manufacture a device designed to save gasoline in internal combustion engines, the Glover Fuel Economizer Company has been incorporated in Louisville with $10,000 capital by Oscar C. Glover, Hugh VanArsdale and Robert W. Polley.

The McFerran Smoke Abater Company has been incorporated with $30,000 capitalization to manufacture smoke prevention devices by B. W. Cornelison and J. J. Roberts.

E. L. Binns, superintendent of the Southern Foundry Company, Owensboro, Ky., has announced acceptance by his company of a contract to manufacture fittings for marine engines for the Duplex Engine Governor Company, 36 Flatbush Avenue Extension, Brooklyn, N. Y. The first order on the contract called for 6000 pieces.

The Ferguson Hardwood Company will take over and re-equip the former Ferguson-Palmer Lumber Mill on South Third Street, Paducah, Ky., and plans to begin operations Jan. 1, specializing in steamboat, furniture and railroad timbers, in lengths up to 60 ft. John K. Ferguson is president.

Operations are to be resumed at the Lenanna Shipyards, ten miles below Maysville, Ky., on the Ohio River, with work enough booked to keep the plant going for the balance of the year.

The Elkhorn Coal Company, Mateel, Ky., will build an incline and tipple, the latter to be equipped with a retarding conveyor of the rope-and-button pattern.

It is reported in Jeffersonville, Ind., that the United States Government will build a plant at that point for the manufacture of military supplies. Major T. B. Hacker is Quartermaster of the United States Army Depot at Jeffersonville.

The Southern States Warehouse Company, Chattanooga, Tenn., by C. S. Kinney, general manager of the Gulf Compress Company, Memphis, Tenn., will build a compress of 250,000 bales, a season capacity, and a warehouse of 12,000 bales capacity.

The King Fuel & Economy Company, with $25,000 capital, incorporated at Chattanooga by J. B. King, E. H. Hunter, O. W. Reeves, and others, has contracted with the Eagle Mfg. Company, Cincinnati, for the manufacture of a fuel saving device, and later will equip a plant of its own.

J. E. Waldron, E. E. Bean, Sr., and John R. Evans are among the incorporators of the Chattanooga Handle Company, Chattanooga, Tenn., which has $10,000 authorized capital.

William Whiting, Elizabethton, Tenn., is in the market for a 250 to 400-kw., 440-volt, three-phase, 60-cycle non-condensing steam turbine and four 150-hp. induction motors for the same current.

Baltimore

BALTIMORE, MD., Aug. 21, 1916.

A pattern shop of reinforced concrete will be built at the plant of the Maryland Steel Company, Sparrows Point, Md.

Extensive refrigerating and heating systems will be installed at Richmond Market by the City of Baltimore.

The Central Hard Fibre Company, West Somerville, Mass., is understood to be planning to locate in Wilmington, Del.

Two blocks adjoining the plant of the Midvale Steel Company, Wilmington, Del., which was formerly the plant of the Diamond State Steel Company, have been purchased by the Midvale Company and it is stated that the capacity of the plant will be greatly increased by the construction of additional mills. Arrangements are in the hands of the Philadelphia office of the company.

Engineers have begun the survey of the Battery Park tract of land at New Castle, Del., which will be the location of the newly-formed Delaware Shipbuilding & Engineering Corporation. It is understood that T. Coleman DuPont, Wilmington, is interested in the new organization. J. S. Bowden has charge of the company's affairs at New Castle.

The Brunswick Motor Company, Lawrenceville, Va., has been incorporated with $10,000 capital stock. E. W. Ligon is secretary.

With $25,000 capital stock the Seaboard Broom Company, Petersburg, Va., has been incorporated. Bartlett Roper, Petersburg, is secretary.

The Appomatox Iron Works & Supply Company, Petersburg, Va., has been incorporated with $100,000 capital stock. L. B. Shakelford is secretary.

The Garrison-Walbrook Garage, Inc., Baltimore, has been incorporated by Herbert B. Stimpson, 400 Equitable Building; George M. Zingsheim and George D. F. Robinson. It is capitalized at $40,000.

An accident to a large electric crane at the plant of the Baltimore Tube Company, Wicomico and Ostend streets, Baltimore, damaged it to the extent of about $3,000.

St. Louis

ST. LOUIS, MO., Aug. 21, 1916.

Machine-tool inquiry continues good in all lines. No lists of any considerable size have appeared. Dealers report, however, a marked stiffening in deliveries, being now unable to contract for as favorable datings as in the recent past. The exact cause for this is not known, aside from the fact that demand reported in other centers is responsible. Business continues mostly for single tools. The aggregate is satisfactory and the outlook is good. Collections are reported very excellent, with business conditions all through the St. Louis trade territory satisfactory. Money is easily obtainable both for commercial loans and investment.

The Bilgers-Kavanaugh Automobile Company, St. Louis, Mo., has been incorporated with a capital stock of $15,000 by George A. Bilgers, Edward P. Wachter and J. Beggs Kavanaugh to manufacture automobile accessories, and equip a garage and machine shop.

The St. Louis Independent Packing Company, St. Louis, Mo., has begun the erection of a [illegible] cooling plant to cost about $100,000.

The Winter Garden & Ice Company, St. Louis, Mo., has been incorporated with a capital stock of $125,000 by Harry C. Wood, Cincinnati; L. A. Hedges and C. B. Engelmann, both of St. Louis, and will equip a large building already acquired for an ice-skating rink, installing an ice plant costing about $100,000, capable of freezing 125 tons daily. A storage plant will also be equipped. Thomas P. Barnett is architect.

The Luxora Cooperage Company, St. Louis, Mo., has been incorporated with a capital stock of $40,000 by Charles Wunderlich, George W. McBride and Paul T. Bolz, St. Louis, and George E. Carter, Luxora, Ark., to manufacture cooperage.

The Auto Devices Company, St. Louis, Mo., has been incorporated with a capital stock of $27,500 by Charles W. Price, R. L. McDonald and Louis F. and Fred Abel to manufacture automobile accessories.

The Monsanto Chemical Company, St. Louis, Mo., will erect and equip two additions to its plant, one 60 x 156 ft., three stories, and one 60 x 142 ft., two stories.

The Mineral Refining & Chemical Corporation, Railway Exchange Building, St. Louis, Mo., and 80 Wall Street, New York, will equip a plant at St. Louis with a first unit capable of producing 50 tons daily of a zinc product to substitute for white lead and zinc oxide in paint. Jose Marimon, president, is president of the Spanish Bank of Cuba, Havana.

The St. Louis & San Francisco Railroad, V. K. Hendricks, St. Louis, chief engineer, will build and equip a roundhouse and machine shop at St. Louis to cost about $25,000.

The Kansas City Oakland Auto Company, Kansas City, Mo., has been incorporated with a capital stock of $15,000 by E. W. and Otto M. Arrasmith and W. E. Myers to equip a garage and machine shop.

The G. L. Mining Machinery Company, Kansas City, Mo., has been incorporated with a capital stock of $15,000 by Charles H. Goetsche, W. J. Coonrod and H. G. Schuler.

The Automatic Turntable Company, Kansas City, Mo., has been incorporated with a capital stock of $50,000 by J. Tinsley, William P. Kerl and T. E. Wallin to manufacture turntables for railroads.

The Browning-Purdin Electric Company, Brookfield, Mo., has been incorporated with a capital stock of $14,000 by P. W. Harry, Lou W. Markham, and others, to equip an electric light and power plant.

The city of St. Joseph, Mo., will issue $85,000 of bonds for the reconstruction and re-equipment of its electric light plant. Stevens & Stile, Kansas City, Mo., are the engineers.

The American Explosive Company, George W. Qualls, Carthage, Mo., and A. B. McAbee, Pittsburgh, Pa., interested, will install about $100,000 of equipment for the manufacture of dynamite, near Sarcoxie, Mo. The capacity of the plant is to be 30,000 lb. per day.

The Grossenbacher Mfg. Company, Overland, Mo., is reported in the market for equipment for making sheet-metal stampings, spinnings, etc.

The Planters Gin Company, Garland, Ark., has been incorporated with a capital stock of $18,000 by Allen Winham, E. J. Wilson, J. D. Williams and J. W. Cronk, and will install cotton-ginning equipment, with power plant.

The Farmers' Gin Company, Oklahoma City, Okla., has been incorporated with a capital stock of $50,000 by R. T. Harriss, Glen C. Hart and J. H. Wamsley, and will equip a plant at once.

The Mid-West Glass Casket Company, Wichita, Kan., will equip a plant at Fort Smith, Ark., at a cost of $200,000 to manufacture glass caskets, bath tubs, etc.

The Allen Portable Hoister Company, Madille, Okla., has been incorporated with a capital stock of $15,000 by R. M. Harris of Madille, W. P. Allen and C. H. Brown of Russet, Okla.

The Planters' Gin Company, Ebenezer, Miss., will install three 70-saw gin outfits at once. S. E. Sample is president and B. W. Humphrey secretary.

The Anderson-Tully Company, Vicksburg, Miss., will equip a sawmill at Hattiesburg, Miss., the equipment being estimated to cost $25,000.

R. F. Learned & Son, Natchez, Miss., will build and equip a sawmill and are in the market now for the machinery.

Brookhaven, Miss., will drill a deep well and install 500 gal. per min. pumping machinery.

Winter & Ford, Starkville, Miss., will equip a mill for the manufacture of handles.

The Pan-American Shipbuilding & Salvage Company, [illegible]

Whitney Building, New Orleans, La., has been organized with $1,000,000 capital and will install wood-working machinery and shipyard equipment. T. W. Kracke should be addressed.

The City Commission, Shreveport, La., will receive bids until Sept. 5 for equipment for a waterworks pumping station filtration plant, engines, boilers, etc. John B. Hawley is consulting engineer.

The Crescent Bed Company, Broad and Gravier streets, New Orleans, La., is in the market for two shaping machines, one 16-in. stroke and one 18-in. or 20-in. stroke.

Texas

AUSTIN, TEX., Aug. 19, 1916.

The new law requiring all cities and towns located upon running streams to install sewage disposal plants within a given period is causing a big demand for machinery of this character by the different municipalities of Texas. Crop conditions continue most favorable and the machinery and tool trade is satisfactory.

The Bencini Cotton Oil Company, Dublin, will install machinery to crush peanuts in its cotton-seed oil mill. The improvements will cost about $18,000.

The West Texas Sulphur Company plans to install machinery for mining and refining sulphur at its sulphur mines near Toyah.

The Beeville Ice, Light & Power Company which has been incorporated with a capital stock of $30,000, will build an electric light and power plant and ice factory at Beeville. H. Hamilton is a stockholder.

San Francisco

SAN FRANCISCO, CAL., Aug. 15, 1916.

While local shops are well occupied and some are expanding, business within the city is curtailed by the uncertain labor outlook. In other quarters, also, machine-tool orders come through slowly owing to unsatisfactory prices and deliveries, although inquiries are abundant. On the east side of the bay, from San Leandro to Richmond, and at some interior points, foundries and shops are generally running at utmost capacity, putting on extra shifts rather than add to their equipment. Similar conditions are reported around Los Angeles, where the machine-tool business is relatively better than here. The largest buyers have been shipbuilders, who are still figuring on additions. Railroad buying has been fairly good, but is slowing down now. Some substantial orders have been placed by traction engine manufacturers. Engine builders are making many improvements, but their purchases of new tools have been limited.

Local gas engine consolidations are receiving considerable attention. The Standard Gas Engine Company, which last week bought out the Corliss plant at Petaluma, is building a 135-ft. addition to its Oakland works to accommodate the equipment, which will give a much larger output than both plants running separately. This week a deal has been closed for the consolidation of the Imperial Gas Engine Company and the Atlas Gas Engine Company, in a corporation capitalized at $1,000,000. Axel Warenskjold, former president of the Atlas Company, is president; E. R. Moffitt, of the Imperial Company, vice-president; L. A. Moberry, secretary; M. E. Wright, treasurer; and John Lorimer, superintendent. An addition, 80 x 250 ft., will be built at the Atlas plant in Oakland, to accommodate the equipment of the Imperial shop now in this city, which was materially increased last year. No new equipment is contemplated. Diesel engines will be added to the output.

The Hall-Scott Motor Company, West Berkeley, Cal., manufacturer of aeroplane engines, is making further additions to take care of numerous foreign orders.

The American Corrugated Culvert Company has secured permission to issue 210 shares to C. K. Doak and T. Weyburn in exchange for the plant of the Standard Corrugated Pipe Company, San Francisco, with agency contracts in northern California; also to sell 150 shares at par, $100 net.

The Standard Oil Company has secured a site at Los Angeles Harbor for a ship repair plant, to take care of its tank steamers calling at that port.

The Samson Sieve-Grip Tractor Company, Stockton, Cal., has been granted permission to issue 250,000 shares of common stock to the Samson Iron Works for its plant and assets, and to sell 150,000 shares at par, $1, to net the company 90 cents. The announced intention is to install $50,000 worth of new machinery. The property, not including patents, is valued at $454,000, and liabilities amounting to $215,000 will be assumed.

Plans are being drawn for a three-story office building for the Union Iron Works, Twentieth and Illinois streets, San Francisco. This company has arranged for a large addition to its Alameda waterfront holdings, and announces that its plant there will be made one of the best equipped shipbuilding plants in the country.

The Monarch Foundry Company, Stockton, Cal., has installed a 3000-lb. Heroult type electric steel furnace.

The Santa Maria Gas & Power Company has leased a site for a machine shop at San Luis Obispo, Cal.

The Board of Trade of Bakersfield, Cal., announces that a new beet sugar factory is to be built at that place early next year.

The California Delta Farms Company has taken a contract for building a drainage system on 26,000 acres in Reclamation District 999, below Sacramento. The contract will include the installation of a number of large pumps.

The Public Service Commissioners, Los Angeles, have been taking figures on a lot of machine tools.

The Union Tool Company, Los Angeles, has received permission to sell 2500 shares of preferred stock at par, $100, to net the company $90.

The Pacific Northwest

SEATTLE, WASH., Aug. 15, 1916.

Production of lumber in the great fir district of western Washington and Oregon is still below normal; orders and shipments of lumbers are also below the usual standard. Actual production for the past week amounted to 68,423,657 ft., from 121 mills, or 10.30 per cent below normal. Harvesting in eastern Washington is at its height and estimates place the wheat crop at high figures. Machinery men have been very busy the past month supplying harvesting machinery. The fruitgrowers throughout Oregon and Washington are very optimistic.

Despite strike conditions in the Puget Sound country, Seattle's waterborne commerce in July again exceeded $1,000,000 per day, totalling $32,511,410 for the month, a gain of $10,979,168 over July of last year. This gain was due directly to foreign trade, the domestic trade only holding its own. The greatest gain in foreign imports was piled up by the Oriental trade. The export trade to Vladivostok made the sensational record of $3,186,617, as compared with nothing for July, 1915. Despite the longshoremen's strike, a total of 3,233 cargoes arriving or departing in offshore, local, Puget Sound and Alaska vessels have been worked at the Seattle port between July 1 and July 22.

It is announced that the shipbuilding plant to be erected by Swift interests of Chicago will be built in Portland, Ore., instead of Flavel, as at first indicated.

The American Soda Products Company, Lakeview, Ore., has made its first shipment of soda ash from Alkali Lake. The company is installing machinery that will increase its output from 14 to 60 tons a day.

The Bloedel Donovan Lumber Mills, Bellingham, Wash., has recently secured an order from the British Government for cutting 78,000 railway ties. The order will contain about 2,000,000 ft. of timber, and will require the cutting of between 5,000,000 and 6,000,000 ft. of logs. The ties, which will be used in British railway construction, are 5 x 10 in. by 9 ft. long. The order is the largest tie order ever placed in this country. The British Government is sending two ships to transport the order.

The Port of Astoria, Ore., is in the market for a traveling locomotive crane.

The pumping plant of the Rogue River Public Service Commission at Grants Pass, Ore., was wrecked in a recent dynamite explosion. The 6-ft. drive pulley and 41-in. belt operating the large centrifugal pump were also destroyed.

A. W. Hayland and August Lovgren, Stanwood, Wash., proposes to erect a shingle mill, with four upright machines, etc.

Marsh-Hutton Powers Company, New Westminster, B. C., plans the construction of a five-machine shingle mill at a cost of $30,000.

Work on enlarging the Asotin Roller Mills, Asotin, Wash., has been started. The entire equipment and machinery now in use is to be replaced. The improvements will increase the output from 50 bbl. to 125 bbl. a day.

The China American Motorship Company, Astoria, Ore., recently incorporated, has announced its intentions of constructing a fleet of five-masted wooden vessels of 4000 tons capacity each, equipped with Diesel engines. The vessels will cost $315,000 each, and will operate on the Columbia River and Puget Sound.

The Safety First Brake Shoe Company, Seattle, has been incorporated for $25,000 by W. H. Cook and L. H. Markham.

The Harden Pump Fountain Company, St. Johns, Ore., has begun work on its plant, which will manufacture fountains and playground apparatus. The structure will be 36 x 72 ft., two stories, and is to be ready for operation about Sept. 15.

The Motor Parts Mfg. Company, Portland, Ore., has been incorporated with a capital of $20,000 by W. H. Chambers, J. O. Gillen and G. N. Smith. A plant is to be erected at Portland.

Contract for the sugar plant to be built in Missoula, Mont., by the Great Western Sugar Company has been awarded to the E. H. Dyer Mfg. Company, of Cleveland, Ohio. The company has also awarded contract for a complete pulp-drying plant to be built in Billings, to the Larrowe Construction Company of Detroit. The sugar plant at Missoula will have a daily capacity of 1200 tons and will cost approximately $1,000,000.

The Hawley Pulp & Paper Company, Enterprise, Ore., has postponed construction of the second additional unit to its paper mills which have been announced. It is probable work will begin about Jan. 1. The completed plant will cost $1,000,000 and will have daily capacity of 50 tons of paper.

The Sutherlin Brick & Tile Company, Sutherlin, Ore., idle for more than a year, has resumed operations to its full capacity. It is equipped to manufacture 5000 6-in. tile and 12,000 4-in. tile per day.

Canada

TORONTO, Aug. 19, 1916.

In spite of the stimulus to the steel industry in Canada by the demand for munitions, exports of iron and steel and the manufactures of those metals from the Dominion have been far below imports for the past year. The returns for the fiscal year ending March 31, 1916, show that exports of iron and steel and their products totalled $54,663,597, as against $14,555,262 in 1915. On the other hand, the amount of imports, principally from the United States, has grown from $64,758,853 in 1915 to $76,323,832 at the end of the fiscal year 1916.

An increase of nearly $500,000,000 in the total trade of Canada in the 12 months ended with May last is indicated by preliminary figures which have been issued by the Trade and Commerce Department, at Ottawa. The amount was $1,563,230,513. The exports reached a value of $820,000,000, against $432,000,000 in 1915 and $358,000,000 in 1913. The greatest increase was in the export of manufactured goods, which rose from $45,000,000 to $261,000,000. The greatest movement to any country was to Great Britain, mostly of war supplies, the total being $518,000,000 as compared with $180,000,000 the previous year. However, that this prosperity is not all war-produced is evident from the fact that the exports to the United States increased from $167,000,000 to $337,000,000. There was also an increase to France from $3,000,000 to $37,000,000. Imports of dutiable goods decreased, dropping from $447,000,000 the year before the war to $321,000,000. The chief decrease was in imports from Great Britain, which fell from $143,000,000 before the war to $86,000,000.

The Angus shops of the Canadian Pacific Railway, at Montreal, are exceedingly busy making repairs, manufacturing munitions and turning out special orders.

Shortage of labor is the explanation given by Ontario munitions making plants for failure to keep abreast of contracts. Some 40 replies have been received to the letters sent to the various factories by the Provincial War Resources Committee. The shortage of labor is particularly complained of in plants which have recently received contracts for the manufacture of high-explosive shells. In certain of these plants at least 100 skilled workers could be used. Several of the replies advocate the adoption of some plan by which munitions plants would not be deprived of skilled labor by recruiting campaigns. It is suggested that such workers be enlisted and return to work with full recognition of the fact that they are doing their bit as fully as by going to the front. A minority complaint that the profits of war orders are not large enough to warrant them neglecting their regular business.

An issue of £1,000,000 6 per cent debentures is being arranged in London, England, for the Vickers Canadian Company. This will be the first Canadian offering in London this year. The issue indicates extensive additions to the company's plant at Montreal.

J. C. Wilson & Co., Glenora, Ont., are in the market for an overhead traveling crane, hand power or electric driven, capacity 5 to 10 tons, to span from 40 to 50 ft.

Plans have been prepared by Henschien & McLaren, 431 Dearborn Street, Chicago, Ill., for abattoir buildings to be erected for the William Davies Company, Ltd., [illegible] Street East, Toronto. The buildings will cost about $200,[illegible]

The E. M. Nesbitt Company, Ltd., 10041 118th Street, Edmonton, Alta., has received the contract for erecting a machine shop and storehouse at Edmonton for the Canadian Northern Railway at a cost of $[illegible],000.

Work has been commenced on the erection of a plant at Falls View, Ont., for the Canadian Aloxite Company, Ltd.

Snyder & Gillette, Niagara Falls, N. Y., have been awarded contract for a foundry for the Pollard Mfg. Company, Ferguson Street, Niagara Falls, Ont., at a cost of $40,000.

Negotiations for the purchase of the Standard Ideal Company, manufacturer of bath tubs and porcelain goods, Port Hope, Ont., have been completed, and the plant and assets have passed into the hands of a new company to be known as the Port Hope Sanitary Mfg. Company. The vendor was the Montreal Trust Company, and the price paid for the company's assets is said to be in excess of $1,000,000. The new company is capitalized at $1,250,000 and its directors include L. M. Wood, president; R. J. Cuff, vice-president; W. D. Ross of the Nova Scotia Steel Company; W. J. Cuff and M. L. Davies. It is reported that the management of the business will be in the hands of R. J. and W. J. Cuff.

The British-Canadian Refining Company has been granted a license by the Ontario Government for the development of power on the Wahnapitae River, to be used in connection with the smelting works to be established near Sudbury, Ont. The Hon. G. Howard Ferguson, who made the announcement, stated that between $4,000,000 and $5,000,000 will be invested in the property.

The Canadian Hanson & VanWinkle Company, Ltd., 15 Morrow Avenue, Toronto, will build an addition to their foundry to cost $7,500.

The foundry owned by La Fonderie re Thetford, Ltd., at Thetford Mines, Que., which was destroyed by fire with a loss of $75,000, will be rebuilt.

The Augustine Rotary Engine Company, Ltd., Buffalo, N. Y., is contemplating the erection of a plant at Bridgeburg, Ont.

The Dominion Hardwood Company, Deseronto, Ont., whose plant was recently destroyed by fire, proposes to erect a new plant.

The French Cable Company of Paris, France, has awarded contract to The Standard Construction Company, Halifax, N. S., for cable buildings to be erected on the North Dartmouth Shore, N. S. The contract calls for the construction of wharf and building involving an expenditure of $70,000.

The Ford-Smith Automobile Truck Manufacturers is contemplating the erection of a plant at Hamilton, Ont.

The International Molybdenum Company is planning equipping an electrically operated refining plant at Renfrew, Ont., at a cost of $150,000. J. L. Murray is president.

The Toronto Furniture Company, Ltd., Toronto, has been incorporated with a capital stock of $500,000 by Joseph M. Bullen, 21 Grenadier Road, James H. Fraser, 592 Sherbourne Street; Percy Shulman and others.

The Lincoln Paper Mills, Merritton, Ont., will build a sulphite plant at a cost of $200,000.

The Doty Foundry, Goderich, Ont., which has been closed for some time will be re-opened shortly. An arrangement has been reached between W. J. Thorold and the Town Council whereby the former will continue operating the plant.

Government Purchases

WASHINGTON, D. C., Aug. 21, 1916.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until date not set, schedule 17, for one precision bench lathe for Brooklyn; schedule 33, for one vertical tubular boiler for Philadelphia; schedule 39, for miscellaneous aeroplanes and power plants, complete, for Pensacola; schedule 41S22, for lever shears.

Bids were received at the Bureau of Supplies and Accounts, Navy Department, Washington, August 15, for supplies for the naval service as follows:

Schedule 9898, Steam Engineering

Class 1, Puget Sound—One engine lathe—Bid 107, $641; 125, $585; 158, $646.20; 196, $910 and $790; 239, $902; 268, $877.82; 341, $1,073 and $627.

Schedule 9924, Yards and Docks

Class 121, Portsmouth—One pipe-cutting-[illegible] machine—Bid 109, $1,200; 158, $1,200; 195, $1,147.

Schedule 9935, Steam Engineering

Class 171, Charleston—Four sets [illegible] blowers—Bid 273, $1,[illegible]; 291, $1,[illegible] and $1,[illegible]

Schedule 9940, Ordnance

Class 211, Washington. One apparatus for [illegible] oxygen and hydrogen—Bid 32, $8,161 145, $12,187

Names of the bidders and the numbers under which they are designated on the above lists are as follows:

Bid 32, Burdett Mfg. Company; 105, Federal Sales & Service Company; 109, Fairbanks Company; 145, International Oxygen Company; 158, Kemp Machinery Company; 195, Manhattan Supply Company; 196, Manning, Maxwell & Moore; 239, Perine Machinery Company; 268, Sherritt & Stoer Company; 273, E. B. Sturtevant Company; 291, Terry Steam Turbine Company; 341, Universal Trading Company.

The following bids were opened Aug. 10 by the chief of ordnance, Army Department, Washington, for furnishing target projectiles.

Item 1, 100 8-in. gun cast-iron shell; 2, 900 10-in.; 3, 600 12-in. gun shell; 4, 400 14-in.; 5, 100 16-in.; 6, 1700 12-in. mortar shell, 700 lb.; 7, 1800 12-in. mortar shell, 1046 lb.

Raleigh Iron Works, Raleigh, N. C., item 1, $21.48, boxing 75c. extra; 2, $32.82, boxing $1; 3, $47.43, boxing $1.50; 6, $33.53; 7, $39.76, boxing $1.50.

Birmingham Foundry & Machine Company, Birmingham, Ala., item 2, $41 unboxed, $42.50 boxed; 3, $55.40 and $57; 4, $75.90 and $78; 5, $109.75 and $112; 6, $39.85 and $41.50; 7, $44.90 and $46.50.

Bethlehem Steel Company, South Bethlehem, Pa., bid is for steel in place of cast-iron shell, item 1, $46.27; 2, $69.49; 3, $98.58; 4, $157.21; 5, $214.99; 6, $71.66; 7, $88.34.

Tredegar Company, Richmond, Va., item 1, $24.13, deduct for omission of boxing 60c.; 2, $30.91, deduct 75c.; 3, $49.46, deduct $1.28; 4, $64.21, deduct $1.50; 5, $110.15, deduct $2; 7, $34.07, deduct $1.20; 6, $33.61, deduct $1.

Mobile Pulley & Machine Works, Mobile, Ala., item 1, $20.23, 2, $29.75; 3, $42.67, 4, $65.65; 6, $28.75; 7, $28.96

NEW TRADE PUBLICATIONS

Cooling Systems and Flow Meter.—Spray Engineering Company, 93 Federal Street, Boston. Bulletin No. 201 and two folders. The bulletin relates to a system of cooling water for condensers, water jackets, evaporators or transformers by the use of nozzles to throw the water into the air and cool it before it falls into the cooling pond. A description of the system is given and a number of views of installations are included. The first of the folders relates to the use of the system to supply cold circulating water for ammonia condensers in ice plants and also for the steam condensers. Special emphasis is laid upon the low cost of installation and operation and the space economy, two views of a plant equipped with a cooling tower and with the spray system being presented to emphasize the latter feature. The other folder deals with a flow meter for indicating the flow of liquids in pipes. Illustrations and a brief description of the meter are presented.

Chains and Sprockets.—Link-Belt Company, Chicago. Book No. 275. Contains prices for a complete line of chains, sprocket and traction wheels, gears and malleable iron elevator buckets, and supersedes the lists given in general catalog No. 110. A few illustrations and brief descriptions are presented, but for the most part the book is given over to tables of prices, the reader being referred to the general catalog for dimensions and further information about the different products. At the bottom of each page of the book is a reference to the page in the catalog which is superseded.

Iron Cements.—Smooth-On Mfg. Company, 572 Communipaw Avenue, Jersey City. Instruction book No. 16. Shows a number of examples of the uses of the various Smooth-On iron cements. After a brief description of the different cements and their uses, detailed instructions for their application are given. The illustrations of repairs that have been made by them are supplemented by brief descriptions of the work that has been done. The repairs made include pipe joints, pumps, tanks, water jackets, boilers, cylinders, castings, iron stairs, concrete floors, etc. Mention is made of a line of gaskets that can also be supplied.

Air Compressors, Drill Sharpening Machines and Condensers.—Ingersoll-Rand Company, 11 Broadway, New York City. Three bulletins. The first, No. 3033, describes a duplex steam-driven air compressor designed especially to operate with high-pressure superheated steam as well as under ordinary conditions. The operation of the piston valve furnished is explained in detail and engravings of the various sizes of compressors are included. Bulletin No. 4122, superseding No. 4022, explains and illustrates a machine for sharpening rock drilling bits. The special feature claimed for this machine is that the bits are uniform and are made more cheaply than can be done by hand. A number of engravings of the various types of bits that can be sharpened are included. Bulletin No. 9024 treats of the Beyer barometric condenser, which was illustrated in THE IRON AGE, July 6, 1916. The fundamental principles of steam condensing plants are described in detail and this condenser, which is of the counter-current type, is compared with the low-level jet and surface types. Auxiliary apparatus, such as vacuum and centrifugal water pumps, are also shown.

Motor Controllers.—Allen-Bradley Company, Milwaukee. Bulletin B-16. Gives general description and specifications for a motor controller designed for intermittent duty, which was illustrated in THE IRON AGE, March 2, 1916. An illustration and a dimension diagram and table of the controller are presented.

Bronze Bushings.—Bunting Brass & Bronze Company, 723 Spencer Street, Toledo, Ohio. Folder. Pertains to a line of machined bronze bushings and bearings consisting of 8766 standard sizes. These range from 9/16 in. outside diameter and $\frac{1}{2}$ in. in length to $5\frac{1}{4}$ in. outside diameter and 9 in. long. Illustrations of a number of different sizes and styles of bushings are presented.

Carbon Dioxide Indicator.—Bacharach Industrial Instrument Company, Pittsburgh. Circular. Refers to a pocket carbon dioxide indicator which was illustrated in THE IRON AGE, March 2, 1916. The special advantages claimed for the indicator are the rapidity and accuracy with which the amount of carbon dioxide in flue and furnace gases can be determined even by inexperienced men, and the fact that it may be carried in the pocket.

Portable Conveying Apparatus.—Jeffrey Mfg. Company, Columbus, Ohio. Bulletin No. 184. Illustrates a line of portable conveying and stacking machinery for handling barrels, bags, boxes and miscellaneous packages. The equipment illustrated and described is adapted for use wherever large quantities of material have to be handled in packed form, for stacking purposes, for delivering material to shipping platforms, for loading it into freight cars, etc. For the most part, the illustrations in the bulletin are of actual installations and the principal features are briefly given in the caption.

Gas and Oil Burning Industrial Heating Equipment.—Tate, Jones & Co., Pittsburgh. Circular No. 155. Describes and illustrates several different types of burners and equipment for industrial heating using either gas or oil as fuel. The descriptions are somewhat brief and a table of the sizes and capacities that can be supplied is included. Mention is made of the motor and steam driven pumping equipment used to supply the oil to the burners at a uniform pressure and illustrations of them are included.

Scrap Baling Press.—Standard Pressed Steel Company of Ohio, Cleveland. Pamphlet. Calls attention to a press for baling iron and steel sheet scrap. Illustrations of the press are presented and a brief description of its construction and operation is given. Views of the product of the press are included.

Sand Blast Nozzle.—W. F. Stodder, P. O. Box 717, Syracuse, N. Y. Circular. Devoted to a sand blast nozzle of the suction type for cleaning castings and removing rust and paint from iron and steel structures. The special feature of this nozzle is the slow rate of speed at which the sand travels through the hose, thus reducing wear. A brief statement of the way in which the nozzle operates is given, and an engraving showing the construction of the nozzle and the arrangement of the air and sand inlets is included.

A brief description of the practice and application of oxy-acetylene welding and cutting in the metal trades is presented in an instruction book, issued by the Prest-O-Lite Company, Inc., Indianapolis. Simple language is employed, technicalities being avoided as far as possible. An effort has been made to condense the available material and give the welding operator only such facts as are necessary to a clear understanding of the process. After a brief introduction dealing with the origin of the process and a description of the materials used, instructions on the setting up of the welding outfit, the care of the blowpipe, and the work that has to be done preparatory to welding, are given. This is followed by instructions as to the use of the apparatus with various metals and different types of blowpipes. Tables of the results that are obtained when the apparatus is used for cutting are presented and a number of safety precautions are included.

THE IRON AGE

New York, August 31, 1916

ESTABLISHED 1855 VOL. 98: No. 9

Truing Devices for Grinding Wheels

Use Made of Black Diamonds and Ordinary Wheel Dressers—Means Employed to Bring New Cutting Edges into Play

BY F. B. JACOBS

GRINDING wheels are in reality cutting tools revolving at high speed whereby countless sharp points remove minute chips by what we call, for want of a better term, the action of abrasion. In the strictest sense of the word, this is not correct because the word abrasion means to wear or rub, whereas a modern grinding wheel actually removes material, be it hard or soft, by a cutting instead of a wearing action. To obtain the best results the innumerable cutting points on the surface of the grinding wheel should be kept sharp and the periphery concentric with the spindle; otherwise the efficiency of the wheel is materially lowered. In this article a few simple methods for truing grinding wheels will be briefly considered.

The tools used for this purpose are of two kinds, diamonds and ordinary emery wheel dressers. There are two varieties of diamonds used, that is to say, bortz stones, which are nearly white in color, and the darker variety called black diamonds. Bortz stones are comparatively inexpensive when compared with black diamonds but they are not so

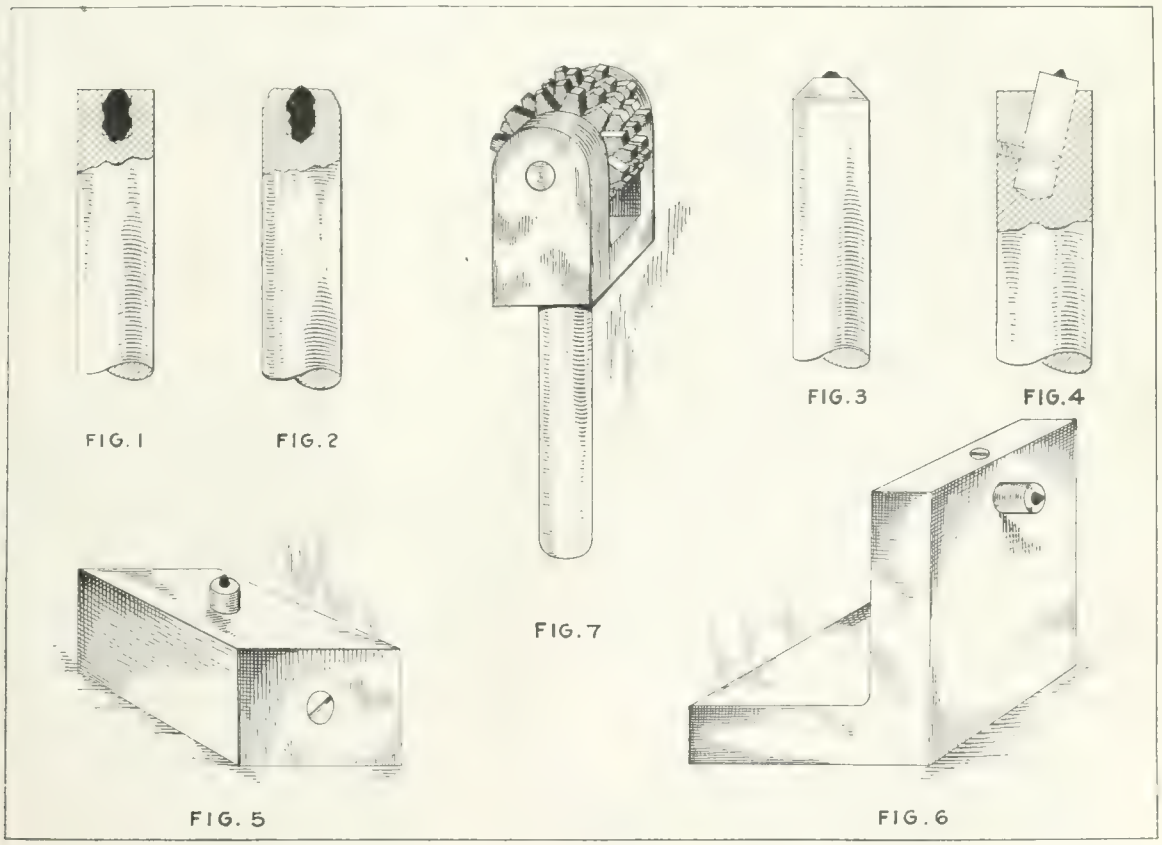


Fig. 1—The Diamond Set in a Hole in the End of a Rod
Fig. 2—The Metal of the Rod Peined Over the Stone
Fig. 3—The Completed Setting with the Metal Turned Off
Fig. 4—An Arrangement Employing an Auxiliary Plug Capable of Adjustment to Bring a New Cutting Edge Into Action
Fig. 5—Simple Device for Surface Grinding Machine Wheels
Fig. 6—Arrangement for the Wheels of Small Cutter Grinding Machines
Fig. 7—Grinding Wheel Dresser Consisting of Five Cutters Mounted in a Holder and Intended for Use Where It Is Desired Merely to Keep the Wheel Rough

GROUP OF DEVICES FOR TRUING THE WHEELS OF GRINDING MACHINES

hard and consequently are shorter lived. It is, therefore, more economical to buy black diamonds. Both varieties are sold by the carat and can be bought loose or already mounted in steel or copper holders. The majority of manufacturers prefer to buy loose stones, as by this method flaws are more readily detected, and since these stones are never guaranteed it is important to see that only good specimens are selected.

The operation of setting the stones is comparatively simple and can be intrusted to any tool maker who has the reputation of being a careful workman. In setting a stone, all workmen do not proceed along the same lines, but the following method, which is used by many tool makers, is simple and satisfactory. First select a drill of the same size as the stone. This is readily accomplished by passing the stone through the holes in an ordinary drill gage. As stated before, both steel and copper holders are used but in actual practice the latter makes the better holder for two reasons.

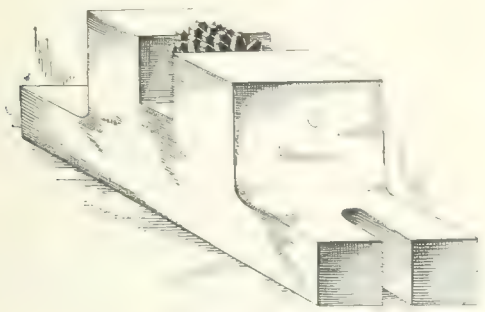


Fig. 8—Wheel Truing Device for Large Surface Grinding Machines

First it is very malleable and thus is easily worked, and also copper is an excellent conductor of heat and readily absorbs superfluous heat, thereby tending to prevent overheating the stone, which often causes it to fracture. The rod should be about 6 in. long and of the correct diameter to fit the holder on the machine where it will be used, ½ in. being a good diameter for the average sized stone. A hole is drilled in the end of the rod deep enough to bury the stone, as shown in Fig. 1. The next step is to pein over the metal which holds the stone firmly in place. This is done with a light hammer and a small staking chisel, the result being shown in Fig. 2. Care should be exercised as a diamond is quite brittle and easily broken by a chance blow. The completed setting is shown in Fig. 3, the superfluous metal having been turned away. Some tool makers prefer to braze the stone in position, and while this method no doubt holds the stone firmly in place, the heat necessary to melt the spelter is liable to crack the stone. However, as this method of brazing stones in place is often used by reliable manufacturers there certainly is some authority for employing it. The process consists of filling the hole about half full of spelter and flux, and when it has reached a molten state the stone is pressed in place, which causes the spelter to rise in the hole, thus forming a matrix that grips the stone firmly. It may be well to add that the work should under no circumstances be cooled in water, as the sudden contraction of the diamond will in many cases cause it to fracture.

Even the hardest stones will wear flat in time. Thus it is necessary to reset them occasionally, which brings a new cutting edge in position. This is done by turning the stone upside down or canting it sideways. The holder shown in Fig. 4 accomplishes this end in a very simple manner. It consists of an auxiliary plug in which the stone is mounted, fitting in a hole the axis of which is at a slight angle with that of the main holder. The plug is held in place by a set screw. When the stone becomes flattened the plug is turned slightly, which brings a new cutting edge in position. This device is covered by patents and it is not public property.

Care should be exercised while using a diamond as an undue strain caused by gouging it into the wheel often results in tearing the stone from its setting, in which event it is generally lost. In truing wheels on cylindrical grinding machines water should always be used to keep down frictional heat and several light cuts are to be preferred to a few heavy ones. It is hardly necessary to state that the tool should never be guided by the hands, as it is impossible to do a satisfactory job in this manner. Nearly all grinding machines are equipped with suitable holders to accommodate truing devices and they should always be used. The device illustrated in Fig. 5 is excellent for truing wheels on surface grinding machines. It is very simple, consisting of a diamond set in a holder 1½ in. long, which is fastened in a block of cast iron by a set screw. It can be held on a magnetic chuck or clamped in the vise. For truing wheels on various types of small cutter grinding machines an angle iron, as shown in Fig. 6, gives good results. The diamond holder is fastened by a set screw and the angle iron is clamped to the platen of the machine by a strap, bolt, or other convenient means.

We are sometimes inclined to look askance at ordinary emery wheel dressers in connection with wheels for precision grinding, but under certain limited conditions they are productive of excellent results. In ordinary cylindrical grinding it is customary to rough out several hundred pieces before taking any finishing cuts, and as we are removing stock only, paying absolutely no attention to finish, all that we desire is a fast cutting wheel. In cases of this kind a few emery wheel cutters mounted in a holder, as shown in Fig. 7, will prove a revelation to the man who has never used them. They keep the wheel rough and free cutting, which is just the condition required. For truing the wheels used on large surface grinding machines a holder, as shown in Fig. 8, will be found a valuable accessory. It should be provided with slots for clamping it in place. On a magnetic chuck, however, the force of the magnetism is sufficient to keep the holder in place. It must be borne in mind that cutters of this kind are practicable for roughing wheels only, but when we stop to consider that even a comparatively small diamond costs several dollars, whereas a set of emery wheel cutters can be purchased for a few cents, their merits are well worth consideration.

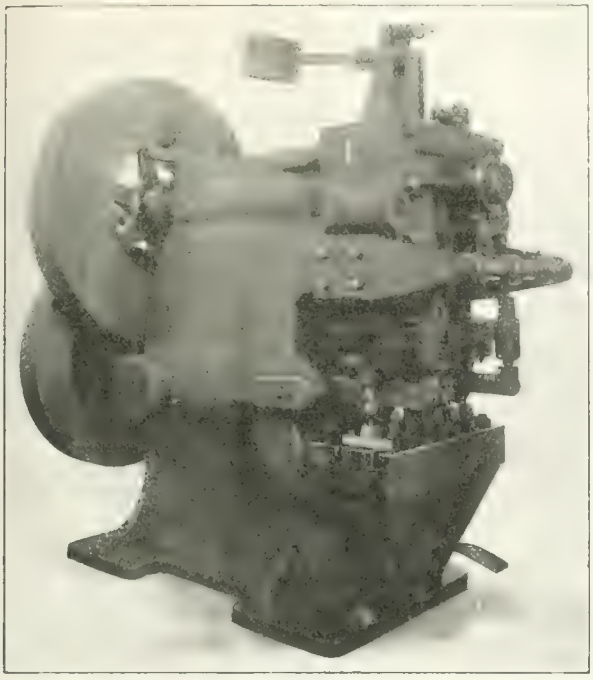
British Iron-Ore Output in 1915

An estimate of 5,100,000 tons of iron ore obtained from quarries in 1915 brings the total iron ore mined in Great Britain to 12,976,105 gross tons which includes the 6,080,218 tons mined under the Coal Mines act and the 1,795,887 tons under the Metalliferous Mines act. The total in 1914 was 14,867,582 tons, and in 1913 it was 15,997,328 tons.

The Cutler-Hammer Mfg. Company, Milwaukee, owing to its steadily increasing Eastern business, has leased larger offices in New York City. The new offices are on the nineteenth floor of the Hudson Terminal, 50 Church Street, the space being nearly double that previously occupied. W. C. Stevens is manager of this office.

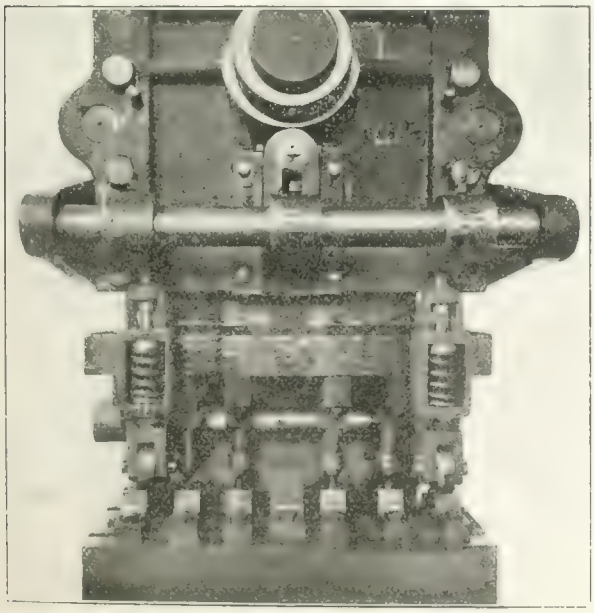
Punching Machine for Ends of Rails

For punching the bolt holes in the ends of two light rails simultaneously, the Covington Machine Company, Covington, Va., has brought out a special machine. It is intended for use where the material handled does not weigh more than 40 lb. per yard, this type of rail being used principally for industrial and mine railroads and for the third-rail of electrified lines. The design of the machine, which makes it possible to punch opposite ends of two rails simultaneously, it is explained, gives the equivalent of punching both ends of the same rail in a single operation.



Machine for Punching the Bolt Holes in the Ends of Two Adjacent 40-Lb Rails Simultaneously

The machine is a special adaptation of a vertical punching machine, and has four punches, two for each rail, although the machine is heavy enough to take care of an additional punch for each rail. A stop is provided between the two gangs of punches.



The Machine Is Equipped with Four Punches, Two for Each Rail and a Stop in the Center

The die blocks are designed to fit in between the rails for punching.

A special clamping arrangement is employed, the design of which can be readily seen from the accompanying illustration. The two clamping arms employed, each having an extended lug which drops down between the flange and the bulb of the rail. An arrangement is provided for adjusting these clamping arms to any desired point near the end of the rail. A cam mounted on the main eccentric shaft controls the actual clamping. This cam engages with a roller that in turn is connected with another arm on the outer rock shaft to transmit the motion to the two arms which engage the clamping arms through a spring connection. The motion of the cam is timed to release the clamp and provide time for the rail to be slid in position for punching before the cam causes the clamping mechanism to take hold.

Belt drive is provided for the machine illustrated, although direct-connected motor drive can be employed if desired. The cross shaft of the machine is mounted in bearings and is attached to the frame back in the throat, the balance weight being keyed to this shaft. The bearings of the eccentric and driving shafts have bushings that are readily removable when desired.

American Glass Equal to the Famous Jena Glass

The forthcoming gathering of chemists and technical men in connection with the annual meetings in September in New York of the American Chemical Society, the American Electrochemical Society, the Society of Chemical Industry, and the Technical Association of the Pulp and Paper Industry, will reveal to the American public the preeminence of chemistry as a factor in the great national industries. The great scarcity of potash, due to the war, has almost crippled many of our industries, notably our fertilizer industry and some of our glass industries. However, American ingenuity and enterprise have been equal to the occasion. At the Second National Exposition of Chemical Industries, which opens concurrently with the meetings of the chemical and technical societies, the accomplishments of American glass chemists will be shown.

Germany has built up a great glass industry just as she has built up a great dyestuffs industry, producing certain qualities of glass that were formerly the despair of chemists to imitate. Nearly all the lenses for microscopes, telescopes, field glasses, cameras, etc., and almost all the glassware suitable to special chemical and philosophical purposes have been produced in Germany. The Jena glassware is famous throughout the world as the acme of perfection, and it is only within the last two years that certain American glass chemists have grasped the secret of making it. Glass for chemical use the equal of that produced in Jena, is now made in the United States, thus putting America in a position of economic independence in another great field of industry.

In its ability to produce war orders completely within its own plant, the Nova Scotia Steel & Coal Company occupies a unique position. Out of the many thousands of cars built in America, in the past year for the Russian Government, that company, with its order for 2000 cars, is probably the only builder which mined the ore, fabricated the material and delivered the cars in Asiatic Russia without calling in the aid of any other concern, either for raw material, the manufacturing or the transportation.

The Southern Foundry Company, Owensboro, Ky., has been awarded a contract for the manufacture of fittings for marine engines by the Duplex Engine Governor Company, Brooklyn, N. Y. The contract is said to be sufficient to keep the foundry busy for the next six months.

Australasian Trade with the United States

Volume Second Only to That of Great Britain—Good Promise in Machinery Lines—Zinc Concentrates and Other German Losses

BY H. M. DAVIS

IN the fiscal year ended June 30, 1915, New South Wales, Australia, imported from Great Britain articles to the value of nearly $65,000,000. The next largest imports came from the United States, amounting to $26,000,000, which represented more than the imports from all parts of the British Empire outside of the United Kingdom itself, and exceeded the imports from all of the remaining countries of the world put together. Of the total imports into this one State of Australia, the United States supplied over 19 per cent. The volume of imports into Victoria was slightly larger, with practically the same relative proportions maintained.

From Queensland, South Australia, West Australia, the Northern Territory, Tasmania, New Zealand and the outlying islands, which are counted in when considering Australasian trade, the complete figures are not available at this writing, but the total volume of imports of American goods approaches a total of $100,000,000, without counting those re-exported from England.

While imports into Australasia declined about 23 per cent as a whole, due to retrenchments caused by the war, purchases from the United States were 16 per cent greater.

The continent and islands of Australasia exported to other parts of the British Empire, including the United Kingdom, just about enough in excess of the total of imports to offset the balance of trade against the Commonwealth of Australia, Tasmania and New Zealand in the United States.

These are striking facts, and show the importance of this great market to American manufacturers. Our imports from Australasia are raw materials, while our exports represent almost entirely manufactured articles.

AMERICAN MACHINERY

The machinery and metal working trades of the United States have the greatest interests at stake in developing trade with Australia, New Zealand and the outlying islands of Australasia, as well as with the great Melanesian archipelagoes now dominated by the two commonwealths. These include mining machinery, power and electrical equipment of all kinds, blast furnaces for iron, copper, gold and silver ores, rolling mill machinery, metal and woodworking tools, saw mill machinery, flour mill machinery, well drilling outfits, pumps of every type, pipe, agricultural machinery and implements, shovels, spades and trenching tools, contractors' appliances, building and domestic hardware, auto and horse-drawn vehicles, railroad equipment and supplies of every description, for both steam and electric tramway lines; steam shovels, drag line excavators, cableways, and aerial tramways, wire rope, wire and wire products of all kinds, leather belting, rubber belting, packing and mechanical rubber supplies; in fact, almost everything which is used in any considerable quantity by a nation which depends upon the products of the ground rather than upon manufacturing.

The importation by Australia of blast furnaces for reducing iron ore and of rolling mill equipment has made a beginning through the enterprise of the Broken Hill Proprietary Company, Ltd. How far this will tend to restrict imports of heavy steel products only the future can show, but the net effect thus far seems to have been to open up a new market for material used in iron smelter and steel mill construction and equipment for the operation of such plants without lessening the volume of steel products called for, as the Australian output hardly suffices to cover the normal growth in the local demand. The company above mentioned mines its own iron ore in the celebrated Broken Hill district of South Australia. The deposits are those known as the Iron Knob and Iron Monarch, situated 30 miles inland from the west side of Spencer's Gulf, which can be readily located on any map of Australia. These were worked primarily to provide iron ore for use as flux in the company's copper smelting works at Port Pirie. Latterly, however, the ore has been shipped to blast furnaces and steel works erected near Newcastle in New South Wales, which represent an expenditure of over $7,000,000. All construction material and machinery for them were shipped from the United States.

One 350-ton blast furnace, four open-hearth furnaces and a combination structural steel and rail mill have been completed, and 60 by-product coke ovens are operated. The rail mill is rolling sections up to 100 lbs. to the yard. Billets are made from 4 x 4 up to 6 x 6 in. and 24 in. long, blooms up to 10 x 10 in. and 10 ft. in length. In structural shapes, I beams up to 15 in. deep will be rolled, together with fish plates, etc. The normal capacity is 50,000 to 60,000 tons per month. Equipment installed at present does not provide for the production of sheets, rods or wire, but the plant is so laid out that the capacity can be readily extended in any direction on the unit system.

A smaller plant, belonging to G. & C. Hoskins, exists at Lithgow, New South Wales.

According to estimates and figures recently prepared in Australia, the total yearly requirements of steel rails are considered to be about 150,000 tons, while the total imports of iron and steel in various conditions of manufacture were for 1914-15 over 400,000 tons, with a local value of about $36,500,000 based on the prices prevailing when imported, which would be greatly exceeded now. The principal items were: Pig iron, $1,080,000; plain sheets, corrugated, $4,550,000; galvanized not corrugated, $4,900,000; steel rails and fish plates, $6,230,000; bars rods and angles, $5,730,000; iron and steel wire, $3,110,000; pipe and tubes, $4,230,000.

Australian metal working plants are more important than is generally supposed by people in the United States or even in Great Britain. The volume of production from these naturally restricts imports in the lines which their activities represent; on the other hand, such production means purchases of machine tools and other shop's equipment and supplies, including tool steel, which stand for important classes of trade with American exporters.

Among Australian machinery building plants,

that of Thompson & Co., Proprietary, Ltd., of Castlemaine, Victoria, is prominent. It manufactures locomotives, boilers, dredges, air compressors, blowing engines, complete ore reduction plants, pumps, pumping engines, etc. At Brunswick, in Victoria, is the Steel Company of Australia, which makes a specialty of such work as roll shells, hydraulic cylinders, gearing of all kinds, shoes and dies, cams, tappets, slag pots and ladles, metal and matte molds, converter tops, truck and tram wheels, sprocket wheels, colliery castings, etc. Mephan Ferguson, Proprietary, Ltd., turns out wrought iron, cast iron and steel pipes and accessories from works located at Footscray, Victoria. Steel forgings are produced by the Austral Otis Engineering Company, Ltd., South Melbourne, Victoria. Trucks and cars for railroad and industrial service, up to the largest sizes, are built by Morison & Bearby, Ltd., Newcastle, New South Wales. In South Australia, at Gawler north of Adelaide are the locomotive works of James Martin & Co., who also manufacture mining machinery and heavy equipment of other kinds on order. Queensland plants are represented by the establishment of Walkers, Ltd., at Maryborough, which builds steam engines and produces special machinery for factory or other industrial uses. The above are typical of the best modern engineering works in the various States of the Australian Commonwealth. There has been complaint lately, however, that "lack of protection" prevented the development of a greater number of such local metal working industries. Difficulties which serve as present handicaps were mentioned in this paper February 10, page 383.

For the present, and during the remainder of the war, Australian machinery building plants will be practically withdrawn from competition with American or other manufacturers who have agencies in the country, owing to the fact that their facilities have been organized for the manufacture of munitions and other army and naval equipment. Even the railroad shops are using every possible tool for that purpose. Now shops are also being established for the purpose, among them being that of the Barrier Munitions Company at Broken Hill and a rifle factory at Lithgow, New South Wales. The entire equipment of that plant was ordered from the United States, and munitions work in general has opened up an entirely new line of imports from American manufacturers. Even Tasmania is providing for a munitions plant to be operated by the island government.

COAL AND ZINC

The mining of coal in Australia has reached large proportions, the center of operations being the Newcastle fields in New South Wales. The largest coke plants, copper smelters, etc., and the new iron and steel plant are consequently located within easy haulage distance. Australian coal not only competes with other coals in the Far East, but is also extensively shipped to the west coast of South America. The coal mines of Australia were on the verge of being furnished with a great deal of new equipment at the time the war started. The need for modern electrical equipment is shown by the fact that only two electric hoists are in service in the New South Wales fields, viz., at the Abermain and Richmond Main collieries.

A most noteworthy event in relations between the United States and Australia was the permission given by the authorities of the Commonwealth to ship 100,000 tons of zinc concentrates from the Broken Hill mines by Amalgamated Zinc (de Bavay's) to the United States Steel Corporation for treatment in the new 9120-retort smelter at Donora, Pa.; also 16,900 tons to other American interests. One of the principal factors in the world's zinc industry after the war will be the future disposition of these Australian ores, which are now going to the United States, France and England, instead of principally to Germany as formerly. A considerable percentage is now being stocked in Australia. If the movement to the United States continues and increases, it will confirm this country in its position as the dominant spelter producer of the world. The situation as it affects Australia was discussed in detail in THE IRON AGE of Nov. 4, pages 1050-51.

ANTI-GERMAN TRADE FEELING

Without expressing any bias or judgment in the matter, it will be in order to state that German and Austrian trade in Australia appears to be indefinitely doomed, even for many years after the conclusion of peace. Nowhere in the British Empire does feeling on this point appear to be so bitter and so unanimous as in Australia. Convictions and penalties under the "Trading with the Enemy" act have been very rigidly enforced. What is further proposed is made very clear in the following extract from speech made in November by the Prime Minister of the Commonwealth, Hon. W. M. Hughes:

> Germany came to this country and received a hearty welcome. In our foolish trustfulness we gave her of our best. She spied out the fruitfulness of the land and gradually wormed her way into the inmost citadels of trade and industry. The best of Australian trade had fallen into her hands. But our eyes have been opened. We see the danger: the way to safety is not less plain. Toward this every man must play his part. Let every man do the job that is in front of him; in this way shall the nation be saved. The job in front of the business men of Australia is to attack German trade and destroy its every vestige. They must see that Germany has no trade in Australia from now onward. We must get rid of it, no matter what the cost . . . . Whatever legislation is necessary, so far as it lies within the power of the commonwealth, will, you may be sure, be passed. But legislation alone is not enough. What Australia expects from every Australian is this: No matter whether it profit him, no matter whether it involves risk, they must destroy this thing wherever it exists . . . To firms and companies that have German shareholders I say, 'Cut them out.' So far as the law can protect you, so far as the commonwealth can throw its mantle over you, it will be done, but it is only by a wholesouled effort on the part of the nation that German trade can be swept out of Australia.

The feeling indicated by the above seems likely to endure for a long time. One specific act taken to carry it into effect has been the suspension of "all enemy trademarks."

While most Americans will hardly agree that it is good policy to shut out any former belligerent from peaceful intercourse after the present European war is over, they cannot be blind to the fact that Australia will turn to this country for a large share of the commerce which was formerly carried on with Continental nations; and it will be the part of good business to encourage this trade in every possible way.

In general it may be said that Australians, New Zealanders and other residents of the South Pacific have a hearty liking for Americans; other things being equal, they are disposed to give us preference over any other nation outside of the British Empire or possibly its present allies. Our trade with the Australian continent, with New Zealand and with the islands under their control has already attained proportions second to that of Great Britain,

and it also has the advantage of being carried on through a large number of branch houses, agencies and special representatives familiar with the local conditions. Among these, any American manufacturer, who has not already made sales in the Australasian market, can readily find efficient representatives; and it is not at all difficult to inaugurate a trade which will be both profitable and enduring.

A Set of Error-Saving Production Forms

Five Blanks Typed at One Time Include Invoice, Acknowledgment of Order and Authority to Production Department

BY HORATIO S. MITCHELL

THE unusual feature of the set of forms shown herewith is the fifth and last copy.

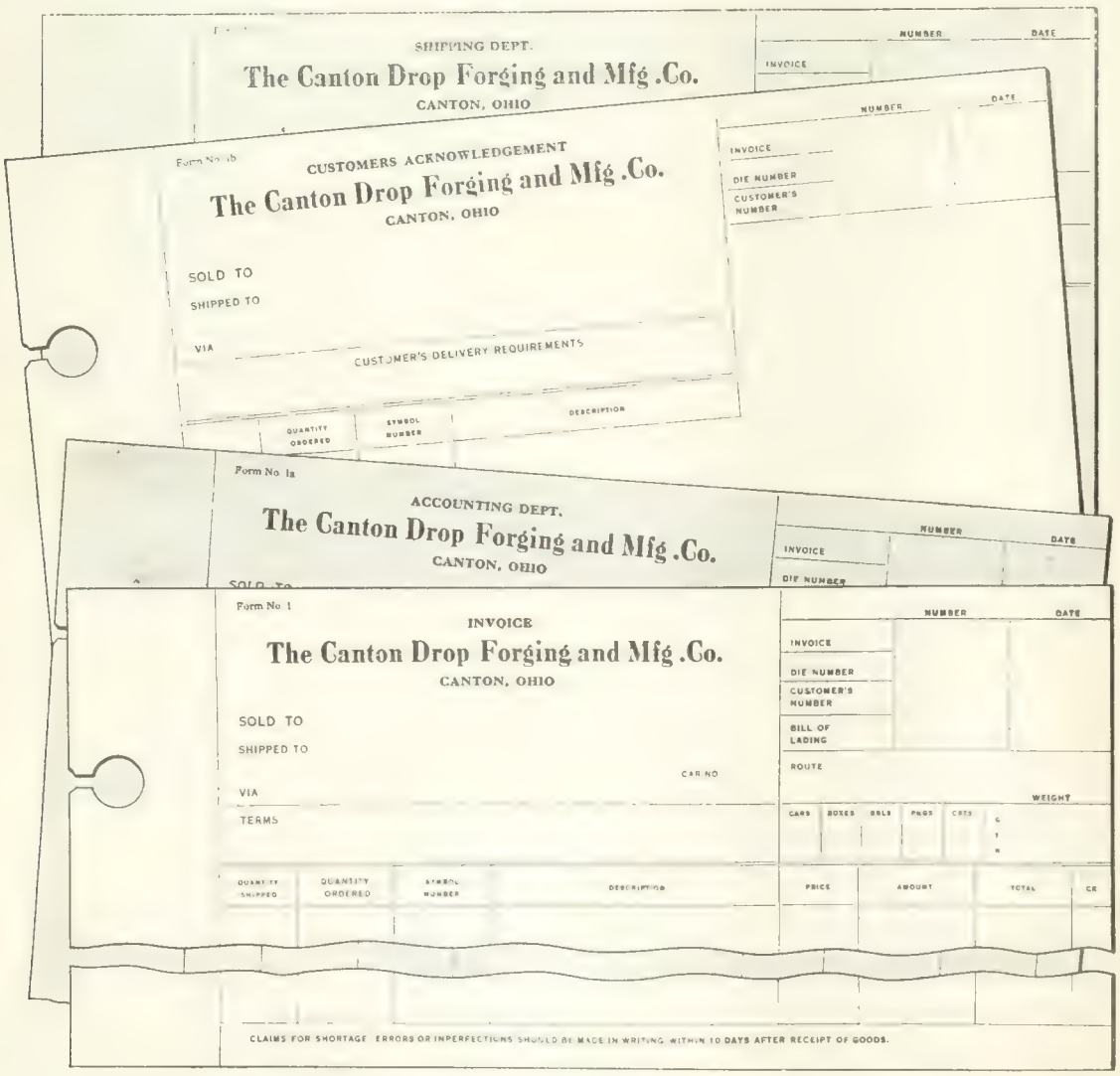
The first sheet of the set, and the second, are the outgoing invoice, and cashier's copy thereof, respectively. When an order for forgings is accepted, these two forms are filed vertically, by invoice number, to await the first shipment on that order.

The third sheet is mailed the customer, who is thereby furnished an exact copy of the order as the Canton Drop Forging & Mfg. Company, understands and accepts it.

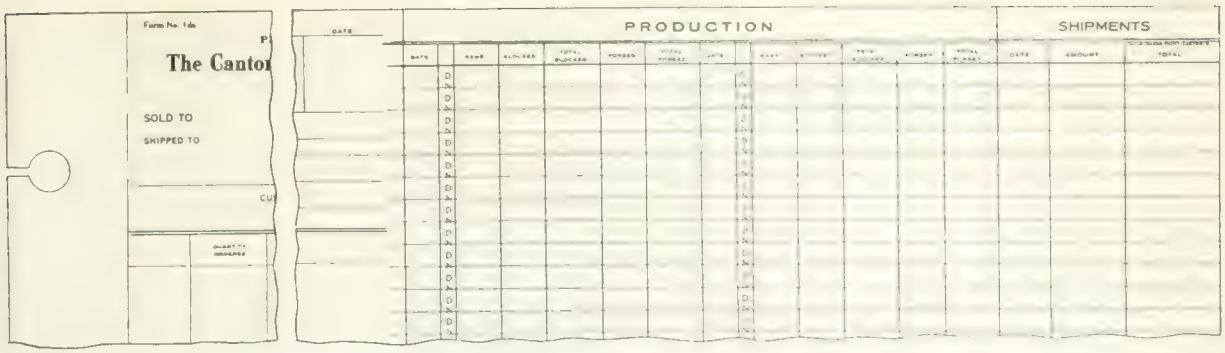
The fourth sheet is the shipping clerk's instructions, and authority to ship the forgings as they are delivered to him. He cannot ship anything without written authority, as embodied in one of these copies, and he enters his shipments upon this form, turning same over to billing department as fast as he fills out the bill of lading.

If the order is only partially filled by the first shipment, the shipping clerk receives his authority for future shipments upon much the same form, but printed on a different color paper and called a "back order." This, and the two invoices covering same, are also made at one and the same time, and show the quantity previously shipped, the balance due, as well as providing for the shipment that will be billed thereon.

The fifth copy is the production department's authority to place the work in the hammer. The



Four of the Five Forms Made Out at the One Time, Covering the Invoice and Also the Production Department's Authority



The Fifth Form Folds Double and Is Printed on Both Sides with the Same Black Ruling. Spread out in the production department office, the production and shipping records are on the same sheet with the original copy of the order.

printer pads this copy so that the half marked A receives the carbon impression of the order, when, and at the same time that the other four copies are written. Production and shipments are recorded upon the half marked B, after this form has been unfolded.

The value of this set of forms lies in the absence of any necessity for transferring the original order information except in the billing department, and there only when shipments are partial. The fifth copy, and the third as well, are only made out for the original order entry. Successive shipments are designated by retaining the original invoice number, but suffixing letters to each succeeding shipment.

Records are made upon copies of the customer's invoice, as he receives same. This makes reference easy all along the line, saves checking, and does away with the need of reference to original sources of information when orders are in process.

Meeting of Iron and Steel Electrical Engineers

Central station power for steel mills, the operation of the Heroult electric furnace, the electric reversing blooming mill and portable electric tools in the iron and steel industry are among the subjects to be discussed at the coming annual meeting of the Association of Iron and Steel Electrical Engineers, to be held at the Hotel La Salle, Chicago, Sept. 18 to 22, inclusive. Following a business session on Monday morning, Sept. 18, there are to be afternoon and morning technical sessions and plant visitations as follows:

Sept. 18, 2 p. m.: "The Value of Records to an Operating Engineer," by Ray S. Huey and "Cost Versus Upkeep of Direct-Current Motors," by A. M. MacCutcheon.

Sept. 19, 9.30 a. m.: "Central Station Power for Steel Mills," by the Central Station Power Committee, and "Design of Structures for Steel Mills," by Charles A. Randorf. Arrangements have been made to visit the power stations of the Commonwealth Edison Company in the afternoon.

Sept. 20, 9.30 a. m. (joint session with American Institute of Electrical Engineers): "Underground Distribution Systems," by George J. Newton, and "The Unaflow Engine," by Prof. W. Trinks. 2 p. m.: "Steel Conductors for Transmission Lines," by H. B. Dwight, and "The Advantages of Modern Types of Direct-Current Machines," by David Hall. 7 p. m.: Annual banquet and ball.

Sept. 21, 9.30 a. m.: "Mechanical and Electrical Operation of the Heroult Electric Arc Furnace," by George W. Richardson, electrical superintendent American Bridge Company, Pencoyd, Pa., and "Operating Characteristics of an Electric Reversing Blooming Mill," by E. S. Jefferies. 2 p. m.: "Control of D-C and A-C Motors as Applied to Cranes," by Paul Caldwell, General Electric Company, Pittsburgh, and "Portable Electric Tools as Applied to the Iron and Steel Industry," by A. M. Andresen.

Sept. 22: Arrangements have been made to inspect the following steel plants: Illinois Steel Company at Gary and South Chicago; American Sheet & Tin Plate Company at Gary; Wisconsin Steel Company at South Chicago, and Inland Steel Company at Indiana Harbor.

Meeting of National Safety Council

The annual meeting of the National Safety Council will be held at the Hotel Statler, Detroit, Mich., Tuesday, Oct. 17, with the opening session at 10 a. m. The third annual report of the secretary, W. H. Cameron, which will be presented at that time, devotes itself in part to the record for the year 1915-16.

The council started work in October, 1913 with $1,400 and 40 members. At the end of June, 1914, there were 731 members and at the end of the second fiscal year 1211 members. The council gained 1102 new members this year, an increase of 91 per cent over last year's record, and the present membership is 2120, with over 10,000 representatives and 3,500,000 employees. The income from dues has been something over $46,000 for the year. Five service and bulletin board bulletins have been sent out regularly each week and in all the National Safety Council has distributed over 3,000,000 copies of over 270 different pieces of literature and bulletins.

At the last annual meeting of the Council in Philadelphia, some 1700 representatives attended, fifteen sections were organized and the publication of the separate reports of the sectional meetings as well as of the congress itself required a book of 771 pages. Twenty local councils have conducted regular meetings, safety rallies, inspection of plants, etc.

At the Detroit meeting 25 directors are to be elected to fill vacancies of an equal number at that time, and among the nominations for this office are the following:

C. L. Close, manager bureau of safety, sanitation and welfare, United States Steel Corporation, New York; J. B. Douglas, manager claim dept., United Gas Improvement Company, Philadelphia; F. L. Hoffman, statistician, Prudential Insurance Company, Newark; Melville W. Mix, president Dodge Mfg. Company, Mishawaka, Ind.; Arthur T. Morey, assistant to president Commonwealth Steel Company, Granite City, Ill.; L. R. Palmer, chief inspector, Department of Labor and Industry, State of Pennsylvania, Harrisburg; R. C. Richards, chairman, Central Safety Committee, Chicago & North Western Railway Company, Chicago; H. H. Robertson, president Asbestos Protected Metal Company, Pittsburgh; W. D. Ryan, general commissioner of labor, U. S. Bureau of Mines, Kansas City, Mo.; F. C. Schwedtman, manager foreign department, National City Bank, New York; Francis P. Sinn, superintendent of safety, New Jersey Zinc Company, Palmerton, Pa.; Edw. C. Spring, manager Lehigh Valley Transit Company, Allentown, Pa.; S. W. Tener, manager accident and pension department American Steel & Wire Company, Cleveland; Franklin H. Wentworth, secretary National Fire Protection Association, Boston; Arthur Williams, president American Museum of Safety, New York; J. M. Woltz, safety director, Youngstown Sheet & Tube Company, Youngstown, Ohio; Earl B. Morgan, safety engineer, the Norton Company, Worcester, Mass.

Meily furnace of the Lebanon Blast Furnace Company at Lebanon, Pa., was blown in Aug. 19 on foundry iron.

Evolution of American Open-Hearth Practice

Early Developments Recalled by a Leading Exponent of the Process — More Scrap To-day, But Less Dependence on Scrap Supply

BY H. H. CAMPBELL

IT was in 1857 that Siemens invented the regenerative furnace, but not until 1861 did he take out a patent for what we now know as the open hearth; and even then he did not see that a new problem had arisen and that his furnace had almost miraculously appeared just when it was needed, for the Bessemer process had just come into use and large quantities of steel scrap were being produced. Numerous attempts were made to "pile" and weld this scrap, just as always had been done with wrought iron, and schemes of this kind were quite common even in the early eighties; but the welding of Bessemer scrap at that time was out of the question, because practically all the output was rail steel, while a large proportion was in sizes too large to be made into any ordinary "bundle."

THE SIEMENS-MARTIN PROCESS

For a long time after the regenerative furnace had been in operation for heating purposes, it was not realized that steel scrap could be melted on an open hearth, and large piles of crop ends and defective blooms accumulated without any practicable method in sight for their utilization. But in 1864 two brothers named Martin operated a furnace at Sireuil in France and worked out the method which is so familiar to us to-day of melting pig iron and scrap together. They obtained patents a year later and so for a long time it was the general custom to speak of the Siemens-Martin or more briefly the S. M. process; but to-day we more commonly refer to it as the open-hearth.

These patents for many years were the subject of litigation in this country and it was not until after 1880 that the decision was finally given against the patentees. The American steel makers who contested the suit were upright and honorable men, who in private matters would not defraud anyone of his just dues; yet in this case they fought against what they knew was right. When a witness during the trial was asked a question, he did not give a simple, straightforward reply, but consulted with his attorney; and the answer was written out on paper, revised and re-revised so as to make it just as meaningless, ambiguous and misleading as possible, while local shop terms were used to puzzle the opposing experts.

By the private confessions of the steel makers the patentees had invented a new and valuable process and should have been paid a royalty, but these same men considered it their duty to their stockholders to contest the case. The final act of the drama was not staged until a few years ago, when, at an advanced age, Pierre Martin died in an obscure French village, where for many years he had lived in poverty. His last days were made comfortable by money raised by public subscription in Europe, not a dollar coming from America.

EARLY FURNACES IN THE UNITED STATES

The first open-hearth furnace in the United States was built at Trenton, N. J., in 1868, but its life was brief owing to faulty design. One was started at South Boston in 1870 and another at Nashua, N. H., in 1873. The Otis Steel Company in Cleveland was put in operation in 1874 and made a name for itself in the production of high-grade boiler steel. These furnaces as well as some others ran almost exclusively on low phosphorus stock, the pig iron coming either from Sweden or from the West Coast of England, and costing perhaps $30 per ton. To this was added either charcoal blooms that cost sometimes $65 per ton, or puddled wrought iron blooms made from selected low phosphorus pig iron.

In addition to these works using special melting stock, there were furnaces at Bessemer steel plants which were built to take care of the scrap that could not be used by the Bessemer; for the converting department had first claim on whatever material it could take. The operating cost might be higher in the furnace than in the Bessemer, but, after all, the final cost of the ingots was determined by the price paid for the scrap, and this was simply a matter of bookeeping; so that steel was made in these furnaces even when it cost more than the Bessemer product.

These plants were badly constructed and poorly equipped, because at first men did not appreciate the importance of big chambers and proper valves, while no one had yet dreamed of charging machines and electric cranes. At a plant where the writer was foreman in 1881 the furnaces had been planned to hold 5 tons, but later the hearths were enlarged to 10 tons without any change in ladle or regenerators, and then by keeping the lining thin the charge was increased to 15 tons.

The ladle stood on a truck which ran on a track and was moved by hand. Two nozzles were used, and pouring began when the ladle was about one-quarter full, the truck being moved twice and six ingots poured while the stream was still coming from the furnace. By this time the ladle was completely full of steel, making it necessary to knock a hole through the furnace runner to let the slag escape. If the tap hole were too big, the stream must be partially checked by a big plug which was always ready and often used, for otherwise the ladle would overflow; while if the least splash, even from a nozzle, got on the track, the ladle car could not be moved and it would take two or three days to clean up the mess that was bound to follow.

THE DUTIES OF A FOREMAN

So manifold were the dire possibilities that, acting under orders, the foreman came down to the works by night or by day, at least half an hour before the heat was ready, for it was his duty to set both stoppers, go through a rehearsal of the ladle operation to be sure everything was free in the driving gear, hold the bar that opened the tap hole and then jump down and act as tapper at the ladle. If everything went right he looked up to see if the wooden roof had caught fire and hoped for good luck next time. Perhaps it was 8 o'clock in the evening, when everybody else was at a party; but this foreman must go home and sleep, for there would be another heat at 4 o'clock in the morning and he

would be called out of bed an hour before and go back home at 5 o'clock, and get up again at 6, so that he could be at work when the whistle blew an hour later. For everybody from water boy to general manager was at work at 7 o'clock in the morning. This was the rule even in big cities like Pittsburgh half a century ago.

Such was the program for years, and operations went on continuously Saturday night and Sunday, and every day in the year. The writer received the royal salary of $70 a month, and could find not find fault, because his predecessor, who now occupies a high position in the steel world, had taken care of two furnaces which made together from four to six heats a day. We did not need to play golf in those days to get exercise.

The day laborers in the yard had their burden, for seven nights in the week they were called out of bed to help charge a furnace by hand, receiving 10 cents per hour for the most exhausting work that we know. This was before any immigrants had come from southern or eastern Europe, so that these men were all English speaking, while many were American born. It is well to put these facts on record, because we hear a good deal to-day about the exploitation of foreign laborers, who get twice as much as American workmen were paid before they came.

It may incidentally be remarked that just at this time the steel company paid a 75 per cent stock dividend. This was done in a way quite different from the custom nowadays, for the distribution was kept absolutely secret, and the facts only came to light a long time afterwards through a case in court over a contested will. But the foreman just mentioned did not get any of this dividend; so that, after all, things were just about the same then as they are to-day.

THE SUPPLY OF SCRAP

The normal output of finished material to-day is 76 per cent of the ingot weight; so, allowing for oxidation, the scrap output is about 20 per cent of the total steel made; and as the acid open-hearth furnace uses two tons of scrap for every ton of pig iron, it is plain that if all the scrap goes to the melting furnaces, the tonnage of open-hearth steel will be about 30 per cent of the total output. Yet we find that in 1880 the open-hearth steel production formed only 8 per cent of the steel tonnage, while in spite of a steady increase from year to year the proportion in 1890 was only 12 per cent.

This is easily explained, because for many years after the introduction of the Bessemer process into this country practically every pound of the product of the converters went into rails, and all the rail ends were used as vessel scrap, while a considerable portion of the blooming mill crops, as well as the scrap from the drop, was charged in the cupola, since all the iron was remelted. From this we see that an acid open-hearth plant 30 years ago was a sort of side show, which disposed of scrap that the more important Bessemer department found it inconvenient to use.

THE MARKET FOR OPEN-HEARTH STEEL

As before stated, there were open-hearth plants between 1873 and 1893 making low phosphorus metal which commanded a high price; but the melting furnaces at Bessemer steel works used ordinary stock and made very little soft steel, because they could hardly compete with the makers of wrought iron. A considerable business, however, developed in making high carbon steel, as it was found that the product of the melting furnaces was more uniform and more dependable than hard steel made in the converter from the same stock.

At many places the principal product was rail steel, and as late as 1884 a large open-hearth plant was built at one of our steel works where the arrangement of ladles and pit was designed on the assumption that rail and spring steel were to be made almost exclusively, as had been the rule for ten years before. Yet year by year the demand for soft steel increased as engineers demanded open-hearth plates and shapes for bridges; but the higher cost was a bar to its wider use, and until recently the Bessemer converter made most of our soft steel.

THE BASIC OPEN HEARTH

In 1879 experiments were made in Russia with a basic lining in an open-hearth furnace, and the results were published broadcast in metallurgical literature; so no patent right could even have been asked for. It is very doubtful if any claim would have been allowed, since the basic open-hearth process simply combined the well-known practice of the acid furnace and the recently invented basic lining for the converter.

The first experiments in the United States with a basic hearth were conducted at the Otis Steel Company's works in 1886, but it was two years later that regular and commercial operations were carried on at Homestead, while Steelton followed soon after; yet in 1890 the output of basic open-hearth steel was only 10,000 tons. From that time production rapidly increased, for by pure coincidence it happened that the Mesaba beds were opened in 1892 and the market was flooded with ore a little above the Bessemer limit in phosphorus, which was offered at a price which made it very attractive. Pure lump ore, which now cannot be bought in the open market, was also cheap, so that it was profitable to use the pig and ore process when scrap was not available.

INCREASED SCRAP SUPPLY

During the more than 20 years that have gone by since then, changes have been going on which have been slow and gradual, but they have tended to increase the open-hearth output by increasing the supply of scrap. The following are the most important of these changes:

1. The Bessemer plants which once used more than half the visible supply of scrap now absorb only a small fraction of it; because the converter to-day makes only one-quarter of our steel, instead of nearly all of it, as was the case a generation ago.

2. The iron blown in the Bessemer vessel is lower in silicon, as a rule, so that less vessel scrap is needed; while direct iron is used so that very little scrap can be melted in Bessemer cupolas.

3. Large quantities of old scrap are constantly coming back to the melting furnaces, whereas in the early days all wornout material was wrought iron.

4. The basic furnace requires less scrap for a ton of steel than the acid hearth, since a larger proportion of pig iron is charged; while the duplex process has put an end to all calculations about available scrap, since it produces more than it consumes.

5. This independence of the scrap supply has made possible the building of large, perfectly equipped open-hearth plants, where steel can be made as cheap as in the converter, and this decrease in cost, coupled with the superior quality of basic open-hearth steel, has pushed the Bessemer vessel into second place.

In Germany a little over 40 per cent of all the steel is made in open-hearth furnaces, and in France

about 30 per cent, which is what we would expect if all the scrap goes to the melting furnaces. In Belgium for many years the product of the open-hearth furnaces has been less than 8 per cent of the total production, so that much scrap must either be exported or used in Bessemer cupolas. In these three countries the basic furnace is used almost exclusively.

In Great Britain in 1915 the acid furnace made 49 per cent of all the steel produced, the basic hearth making 35 per cent. In the United States the acid furnace has been pushed into the background and in 1915 it made only 4 per cent of our tonnage. We have given ourselves over to the basic furnace, which last year made 69 per cent of all our steel, with prospects of a still greater proportion in the future, owing to the development of the duplex process. Taking the records for the whole world for 1913, which was the last normal year, we find that 60 per cent of all the steel coming from open-hearth furnaces was basic, and the proportion is increasing every year.

French Specifications for Shell Steel

Physical Tests and Corresponding Chemical Composition Required Under Recent Purchases —What Must Be Followed in the Mills

THE specifications covering purchases recently made, and yet to be closed, of round shell steel and round-cornered billets for the shells of the largest diameters for the French Government, are substantially in full as follows:

The bars are to be of rolled or forged steel of the best quality and manufactured by the "acid, basic open-hearth process or electric furnace process." homogeneous throughout, and free from seams, flaws, piping and porosity.

PHYSICAL TESTS FOR EACH HEAT

Four test bars shall be taken from a portion of the head end of the first bar of one ingot close to the discarded portion, or from a small ingot poured in the middle of the pouring, having such a section as to have the same reduction of area between ingot and test bars, as between the regular ingot and the bars contracted for. The test bars after forging, machining and heat treating are to be finished to the following measures: diameter, 13.8 mm. (0.543 in.); length between marks, 100 mm.

Said test bars are to be annealed, say heated to a temperature between 875 and 950 deg. C. for 20 min. and slowly cooled off in ashes or lime. Out of these four annealed bars, two are to be heated 20 min. at 825 to 875 deg. C., then quenched in water at 15 to 24 deg. C. (60 to 75 deg. Fahr.), and heated again 20 min. at 500 to 536 deg. C. in a bath of molten metal.

Such treatment will give two bars, *b*, annealed and two bars, *c*, temper-drawn after quenching. The bars *b* and the bars *c* to be treated for tensile results, as follows:

	Bars *b*	Bars *c*
Breaking load per sq. mm.	55 to 65 kg.	85 to 105 kg.
(Breaking load per sq. in., lb.	78,000 to 92,500	120,000 to 150,000)
Elongation, minimum on 100 mm.	18 per cent	9 per cent

Occasionally the inspector will take out of the finished material, two test bars, which will be treated as above and tested either in the plant, or in another place for verification, at the convenience of the inspector, it being understood that the ordinary variation between head and foot of ingot is to be allowed for.

CHEMICAL COMPOSITION

Chemical specifications are to be subordinated to physical tests, which are to govern. Inspectors are instructed to accept slight alterations to the subjoined requirements when physical tests and soundness of steel prove to be satisfactory. Composition of each heat is to be determined by analysis of a sample cast at about mid run. Apart from the iron, the following chemical elements may occur on the percentage shown.

	Min.	Max.
Carbon, per cent	0.30	...
Silicon, per cent	0.15	0.25 aiming to 0.18
Manganese, per cent	0.50	0.80
Phosphorus, per cent	0.03	0.08
Sulphur, per cent	...	0.05

DISCARD

The ingots must preferably be top-poured and a discard of 28 per cent off the top end and a discard of 4 per cent off the foot end of each ingot must be rejected. Such discards must be made after the ingots have been rolled into blooms or bars. Said minimum proportion of ingots, blooms or bars to be discarded is not allowed to be reduced without a written authorization from the head of the French Commission, and no reduction will be considered by him until the maker has given satisfactory proofs, through special inspection of the discards for at least fifty consecutive heats, made upon maker's application, that a new figure can be proposed. The new per cent of head discard which may be agreed upon by the head of the French Commission upon due reports of the inspection, will be thereafter a compulsory minimum for all the following heats of the same fabrication. The new per cent will not be in any case under 20 per cent, except when a special process of casting with sinkhead on inverted molds or similar is used.

In case the current fabrication should show that the adopted per cent of discard is not sufficient to remove practically all piping and porosity from the mill products, a new higher constant proportion of discard shall be adopted in order to obtain the result.

In order to ascertain whether the steel is free from piping, there will be left in the center of the section, between the discard and the utilisable part of the ingot, a core, which shall be broken cold in the presence of the inspectors. If the first discard is not sufficient, there will be made one or several others, under the same conditions, and until complete disappearance of the defects. This operation may be made at the choice of the contractor, either on the ingot, or on the bars rolled completely, or not, up to their final size.

For the large section bars (diameter of 200 mm. and upward) it may furthermore be exacted that the hot or cold sawing of each bar shall leave in the center of the section, a core to be fractured cold, in order to examine the grain of the metal and to make sure of the absence of any piping. This cold fracture is to be made in the presence of the inspectors. The inspectors shall also have at any time the right to have cold broken, for examination of each ingot, one bloom or one bar to be selected in any part of the ingot, and particularly when the ingots are bottom poured and likely to be spoiled by secondary piping. The Inspector shall in addition have the right to have, for each heat, a maximum number of eight parts of the bar acid pickled or etched to verify at sight the condition as to porosity and piping and as to surface defects.

CONDITION OF BARS

The bars are not to be submitted to any heat treatment; only the ordinary good straightening of bars on the cooling bed is called for. But they must be clean enough from scale after rolling so that the surface of the bars may be thoroughly inspected.

The area of the section of the ingot must be at least four times the area of the section of the finished bars, when the section of bars is under 9 sq. decimeters; and at least, three times, when section of finished bar is over 9 sq. decimeters (140 sq. in.)

REMOVAL OF SUPERFICIAL DEFECTS

Superficial defects as seams, folds, etc., are allowed to be chipped out by chiselling widened edges, the width of the chipping being at least 6 to 7 times the depth of the defect, and the bottom of the chipping being rounded under the following conditions:

Diameter of Round Bars, Mm.	Maximum Depth of Chipping Allowed, Mm.	No Chipping Necessary for, Mm
82	4	1
90	4	1
105 and 110	5	1.5
136 and 160	7	2
225	8	2.25
278	9	2.5

Square Bars, Mm.	Maximum Depth of Chipping Allowed, Mm.		No Chipping Necessary for, Mm.
	On Flat Faces	Right on Corners	
105 and 110	3.5	6	1.5
145	5	8	2
200	9	12	2.25
250 and 265	10	15	2.5

It is understood that if the defect on the corner has a length greater than the diagonal it can be only chipped to the depth provided for flat faces. If the defect exceeds the above depth, the bar is to be rejected, or the defective part cut out, in accordance with the rule of specified lengths to be accepted, said rule being annexed to the contract.

PUNCH AND PAINT MARKING

The inspector will make a punch or stencil mark on every accepted bar. The maker will stamp every bar at one end with the heat number and the special mark of the works. On the other end, a mark of paint will be made, as directed by the inspector, with a color indicating the works and a form indicating one of the three classes of hardness to which the heat belongs.

INSPECTION

The mill shall take the necessary steps to give the inspector every facility for the inspection of the bars. Special arrangements must be made in view of the specified tests. A sufficient number of inspectors will be attached to the makers' works, in order that the inspection will not bring a costly delay to the shipment.

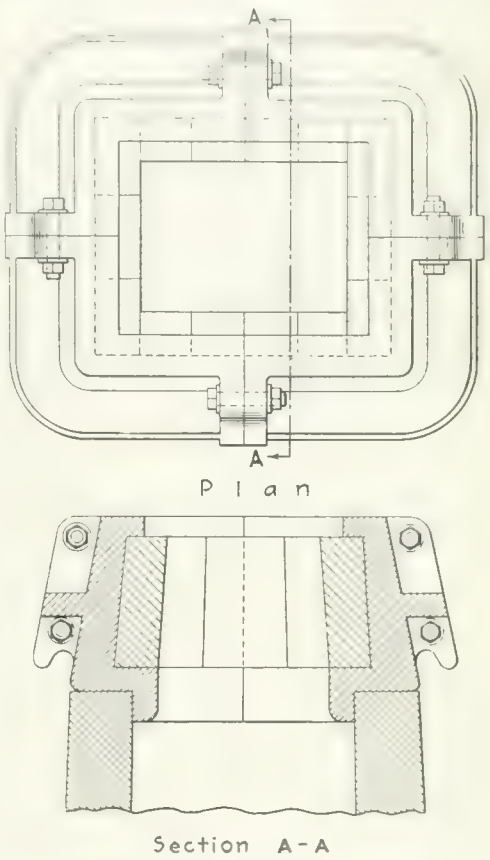
The maker shall, on the other hand, assist in the inspection of the bars, by presenting only bars selected by his own inspection after due chipping and repairs, and giving all necessary help for handling. Bars are to be left at the disposal of the inspectors 48 hr. if necessary. The maker is to advise the buyer a full fortnight in advance about the beginning of fabrication. He shall provide suitable desk and office for the inspectors and furnish them with a statement in duplicate, signed by the proper officer, of the physical tests and chemical analysis; a working diary concerning each heat, the total weight of the ingots, head discard and foot discard, number and weight of bars presented to inspection, and shipping documents.

The inspectors shall have at any time free entrance to parts of works where fabrication, testing and loading and shipment of steel bars are performed, and they shall be given the right to discard or reject any bars or heats which do not comply with the specifications.

Two electric annealing furnaces of the Baily type are in use at the Buffalo plant of the Otis Elevator Company for annealing steel castings. They are rectangular and a car with the castings piled on it is run into the furnace. Owing to the fact that no flow of air or gas through the furnace occurs, it takes but a short time for the confined air to become inert. The source of electric heat is made up of two troughs, one on each side and toward the top, of granulated graphite or carbon. The passage of the current gives rise to an innumerable number of miniature arcs and the heat is radiated to the arched roof of the furnace and thence to the castings.

A Hot Top for Ingot Molds

A hot top for ingot molds, which employs ordinary size firebricks, is in use at the plant of the Donner Steel Company, Buffalo, N. Y. It is the invention of C. E. Duncan, general superintendent of the company, and application has been made for a patent. Its simple construction is indicated in the accompanying drawings. Four corner castings are bolted together forming the cap, which rests on the top of the ingot mold. The cap is lined with the bricks, and an important feature is that no special shapes are required but regular commercial bricks suffice. The refractory and non-heat conducting property of the brickwork serves, of course,



Duncan Hot Top for Ingot Molds in Use at Plant of Donner Steel Company

to keep hot as long as possible the upper part of the freshly cast ingot, thus serving as a sink head and as a means for minimizing piping in the ingots. The experience at the Donner plant shows that it is efficacious in this regard. The head is readily removed, lugs projecting from the casting to allow use of crane hooks, and it is used over and over again until it becomes necessary to reline the top with fresh bricks.

The Determination of Aluminum as Oxide

Scientific paper No. 286 of the Bureau of Standards, entitled "The Determination of Aluminum as Oxide," gives the results of a research to define the conditions for the determination of aluminum. From observations made with a hydrogen electrode and with suitable indicators, the conditions for the quantitative precipitation of aluminum hydroxide by ammonium hydroxide were determined. In practice the completion of precipitation may be defined by means of methyl red or rosolic acid. The effect of various factors upon the precipitation, washing and ignition of the precipitate was determined. The procedure for obtaining accurate results is also described.

The Brown Instrument Company, Philadelphia, Pa., will open offices at 612 and 613 Chamber of Commerce Building, Detroit, Sept. 1, to be in charge of William Printz, formerly assistant sales manager.

Fig. 1—The Lower Crane Unloads the Cars and Fills the Charging Buckets. The upper crane takes the filled buckets to the charging platform, where they are dumped by means of the dumping racks at the left



Plant Improvements of Ashland Steel Works

Economies in Handling Raw and Finished Materials — Improvised Water Pumping Plant Accommodating Itself to Changing River Levels

THE Ashland Steel Company, Ashland, Ky., adopted some time ago an arrangement of its stock yard which enabled it to dispense with the services of about 20 laborers on each shift, as well as to effect other economies in the operation of the plant. Formerly the stock was loaded into buckets by hand, and these were then elevated to the charging platform of the furnaces by pneumatic hoists. The buckets were dumped by hand, requiring the services of two men on the charging platform. The new arrangement of the yard provided for the handling of material by traveling cranes and lifting magnets, and not only eliminated the greater part of the labor item, but also materially increased the speed of handling.

The stock yard is spanned by two 5-ton Morgan cranes, whose runways extend the entire length of the yard, a distance of 600 ft., and also span the railroad tracks on which the pig iron and scrap are brought into the plant. The cranes are fitted with lifting magnets for unloading the raw material and also for reloading it into the charging buckets. The charging buckets have a capacity of about 2500 lb. each, and whenever possible they are loaded directly from the cars, the rest of the carload going to the stock pile. At a higher level than the unloading cranes, and extending at right angles to them is a third 5-ton crane which serves as the charging crane. The charging buckets have lugs fitted to each side, which the crane operator swings against the dumping racks which may be seen in Fig. 1, about opposite the end of the runway of the lower level crane runway. By means of these racks he is enabled to dump the charging buckets entirely through manipulation of the crane. The charging crane is also used as a skull cracker.



Fig. 2—The Centrifugal Pump with Flexible Wire Connections to the Direct-Connected Motor Can Be Raised and Lowered with the Rise and Fall of the River



Fig. 3—A Short Length of Rubber Hose Connects the Delivery Outlet of the Pump with the Nearest Y-Connection in the Discharge Main

Another, though not uncommon, labor-saving arrangement, is illustrated in Fig. 4. Billets and slabs from the shears are discharged into buckets sunk in pits in the ground, the buckets when filled being removed by the crane. An arrangement of switches, which is clearly shown in the illustration, permits the slabs and billets to be diverted at will to either of the pits or to be continued along the table to another point of discharge. The sheared pieces are loaded directly from the buckets in the pits to the railroad cars for shipment, being cooled while in the pit.

Probably the most interesting change that has been made at the plant is the method of providing water for steam-making purposes. This is drawn from the Ohio River, which has a difference in level of about 60 ft. at high and low stages. If the pumps were situated above high water the lift would be too great for them at the extreme stages of low water, while if located at a point where they could draft water at the lowest stage they would be drowned at even moderate stages of high water. The problem was solved as shown in Figs. 2 and 3. Three Delaval centrifugal pumps, direct connected to electric motors were mounted on trucks, as shown. These trucks travel on tracks laid across the river bank, and are raised and lowered with the rise and fall of the water by means of electric winches. The suction pipe of each pump extends beyond the pump truck some distance, as shown, the end being carried on an auxiliary two-wheeled truck. Alongside the track for each pump is laid a discharge main, with Y connections set in at intervals. These Y connections are normally blank flanged, but the flanges are removed whenever it is desired to connect the main with the pump. A short section of rubber hose serves to make the connection between the discharge outlet of the pump and the nearby Y connection in the discharge main. This is shown in Fig. 3.

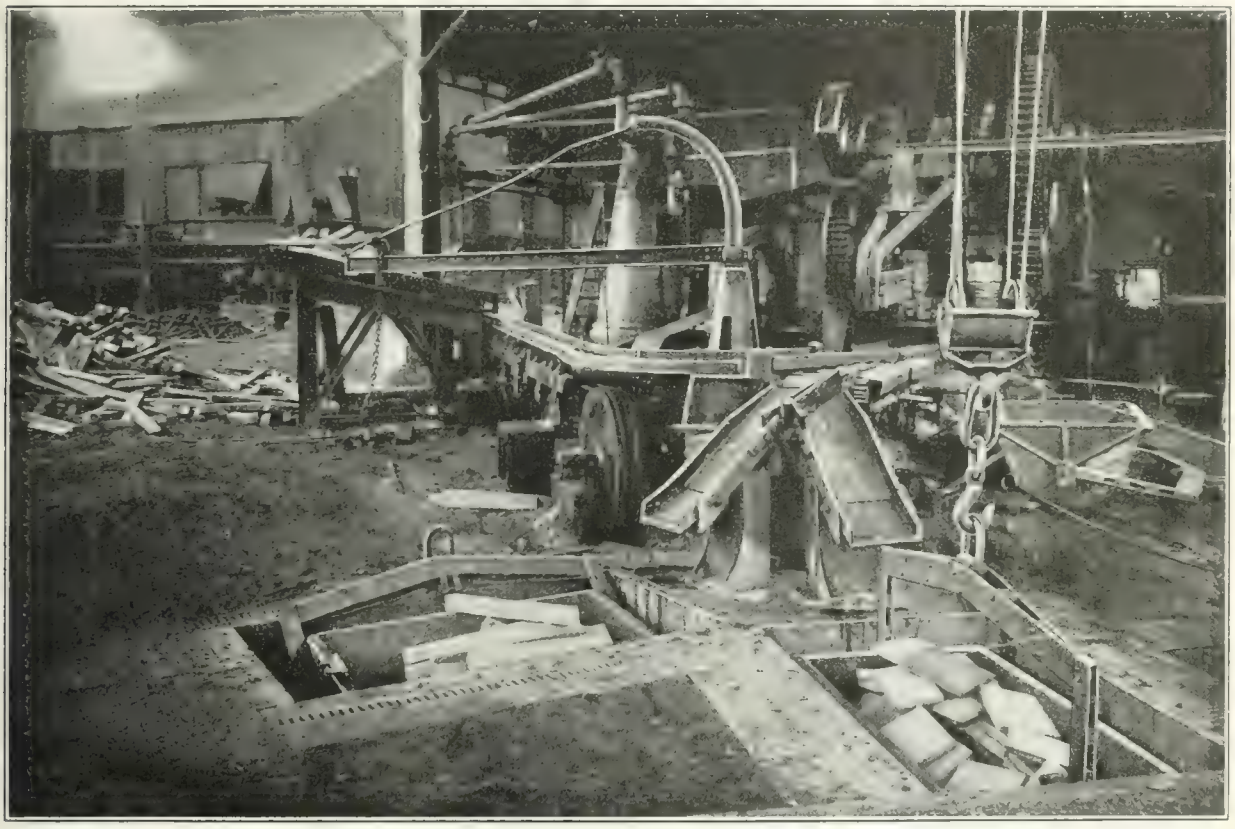


Fig. 4—Sheared Slabs and Billets from the Shears Are Collected and Cooled in the Buckets Before Being Transferred to Railroad Cars for Shipment. Switches on the chutes divert the sheared pieces as desired

More Time for Filing Patent Applications

WASHINGTON, D. C., Aug. 29, 1916.—A statute of importance to inventors and owners of patents has just been passed by Congress and approved by the President, extending temporarily the time for filing applications and fees and taking action in the United States Patent Office in favor of nations granting reciprocal rights to United States citizens.

Under the law heretofore in force an applicant for a United States patent, who had filed and obtained a patent in a foreign country, was required to make application here within 12 months of the date of the granting of such foreign rights on the penalty of losing his right to obtain a patent in this country. With the outbreak of the war the interruption of mail communication resulted in delays which prevented many persons, who had obtained foreign patents, from securing protection in this country and this condition has grown more acute with the passing of time. It is now estimated that a literal enforcement of the law heretofore in existence would destroy the American rights to thousands of important inventions patented abroad.

The statute just enacted provides that any applicant for letters patent or for the registration of any trademark, print or label, "if unable on account of the existing and continuing state of war to file any application or pay any official fee or take any required action within the period now limited by law," shall be granted an extension of nine months. Another provision of the act limits its operation to "citizens or subjects of countries which extend substantially similar privileges to the citizens of the United States, and no extension shall be granted under this act to the citizens or subjects of any country while said country is at war with the United States."

In order that the law may be retroactive as to cases of hardship that have arisen since the beginning of the war, it is provided that its terms shall be operative to relieve from default under existing law occurring since Aug. 1, 1914, and before Jan. 1, 1918, and all applications and letters patent and registrations in the filing or prosecution of which default has occurred are given the same force and effect as if timely action had been taken. W. L. C.

PURCHASING AGENT'S PLACE

His Important Responsibilities in the Modern Business Organization

Having had a very considerable experience as an iron and steel salesman, and later having had charge of purchases for important consumers of iron and steel, F. W. Rowe writes from an unusual acquaintance with both sides of the market in an article in the August *Purchasing Agent*. Mr. Rowe was connected with the sales department of the Bourne-Fuller Company, Cleveland, for sixteen years, then was appointed purchasing agent for the Aultman & Taylor Machinery Company, Mansfield, Ohio, manufacturer of water-tube boilers and threshing machinery, and from 1907 to 1914 was a buyer for the General Electric Company at Schenectady, N. Y. For the past two years he has been general purchasing agent of the H. W. Johns-Manville Company, New York, and he is chairman of the executive committee of the Purchasing Agents' Association of New York. His estimate of the purchasing agent's responsibilities and his place in modern business organization, as given in the article referred to, is as follows:

"I believe in the purchasing agent as an aggressive unit in an organization. The purchasing agent should work with the well-defined idea that he can make money for his company. While he should not be a gambler, he should be willing to back the opinions he forms by vigorous, well-supported recommendations to his superiors as to investment in material of good quality and of known continued use. He should make of himself something much more than a mere writer of orders for material that has been requisitioned. While always scrupulously fair, he still has play for strategy and diplomacy of high order.

"In the clerical division of his department he should not run to excessive system and detail, but he should have enough of these to tell him what prices have been, what he uses, and how much. The simplest system is the best; almost a skeleton system, provided at relatively short notice it can be made to produce essential facts.

"The purchasing agent for an industrial concern should, first of all, recognize the right and authority of the mechanical departments and engineering forces to specify the quality and characteristics required in raw material and supplies, and should never on his own volition depart from these specifications. However, there is still the opportunity for much conservative exploitation on the part of the purchasing department, meaning by this the constant search for approved safe substitutes for previously used material, but which may be bought at a lower price. Many surprising things happen when this idea is studiously followed, even though the new material may have to prove its case by the most drastic tests.

THE LOW PRICE FALLACY

"But, while always searching for less costly material, the purchasing agent should never allow his judgment to be clouded by the fallacy of low price. Poor raw material will bring to naught the best work that can be put on it, and will make a losing proposition out of the most skilled manufacture and salesmanship. Good buying is the getting of full value for expenditure related to the purpose to be served. The purchasing agent who has not a very good knowledge of the performance in service of the material he buys is blind. Intelligent decision on quality should precede judgment on price.

"In the operating department, the oil at 10 per cent less in first cost that requires 50 per cent more to lubricate; the belt at 20 per cent less that runs half as long; the coal at $5 less per car that burns out $150 worth of stokers and shuts down the boiler, are primitive examples of the fallacy of low price. They are obviously more than dear, and they lose money faster than bad debts. It takes good material to make good product; it takes good material to operate a plant economically. It is the purchasing agent who starts the process that ends with right quality goods in the hands of a satisfied customer.

"However, the purchasing agent who goes on the principle that he must pay the first price asked, and pay a good price to 'insure quality,' so that he may know that his material is the 'same as last,' is apt to fall a victim to his own trusting complacence. While his first obligation is to get the right material, he has an equal obligation to get it for the lowest price. Despite certain present manifestations in the business world, it will always be true that he who has anything to sell will get all he can for it, whether it be cheese or chisels.

"The one-time popular conception of the purchasing agent expressed by the adage, necessarily paraphrased, 'Once a purchasing agent always a "purchasing agent,"' does not, in justice, apply to the modern representative of the buying fraternity.

"The purchasing agent need not be a cold and haughty personage; on the contrary, he should cultivate human feeling and pleasant relationship. At the same time, the very nature of his position precludes for him special friendships in his business life. He must, perforce, keep such relations with others that no one has the right to expect specially favorable treatment. The grafter is gone, but even an undue amount of acceptance of the courtesies of business sets up obligation.

"The purchasing agent should remember that while he has a very important part of his company's success to answer for, he has by no means all of it, and it may be profitable at times to answer the call of reciprocity at some cost in the purchasing department to make it up in the whole business. This becomes a matter of proper discriminating judgment.

FOLLOWING A MARKET DOWN

"The peculiar part of the purchasing agent's job is that often his best work is done when he really does nothing; in other words, by knowing when not to buy. The purchasing agent who contracts just before a sharp advance is credited with having done a clever thing. Without detracting from this class of performance, it may require keener judgment and greater courage to refuse a considerable reduction in price because he believes that he may yet buy lower. The purchasing agent who can steadily follow a market down, and so time his purchases that his plant is always supplied with material, is doing the ablest work that falls to his lot.

"No doubt the purchasing agent wields considerable power. The argument of future business is a powerful one, but when he uses his power for the arbitrary, unjust settlement of controversies, rather than patiently arguing these on the merits of each case, he makes a mistake that will ultimately work to his disadvantage. Though he is powerful, he must still be fair. He needs the good will of the selling fraternity.

"The importance of the purchasing agent seems to be increasingly recognized. Of the triangle of expenditures that makes the cost of any product—namely, material, labor, overhead—he is responsible for that part which is the most susceptible to control through good judgment and selection. Very little bargaining can be done with labor. Overhead expense is apt to be set by conditions. Neither labor nor overhead can be bought on a low market for a profit, nor in any great degree bought on bad judgment in a high market for a loss; but material can.

"For every sale there is a purchase. If selling is important, why is not purchasing?"

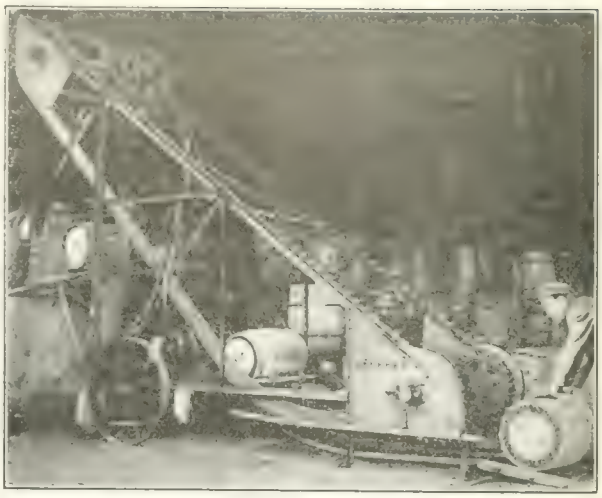
Workmen's compensation to be paid dependents of 290 workers killed in industrial accidents in Pennsylvania during the first six months of this year—the first the present act was in effect—aggregated $742,962.75. The total number of fatalities was 862, of which 157 occurred in the iron and steel trades. The total amount of compensation for all causes during this initial period is estimated at $1,500,000.

Portable Conveying Machines

A line of portable conveying and stacking machines has been developed by the Jeffrey Mfg. Company, Columbus, Ohio. They are designed to meet the requirements of practically all industries where bags, barrels, boxes and bales have to be handled and piled. Two styles of conveyors are built, one a portable arrangement, consisting of 20-ft. sections mounted on wheels, while the other, which is designed primarily for barrels, has two points of discharge, thus enabling it to be used for the delivery of barrels to the shipping platform or for stacking them in tiers, one upon the other.

In the portable conveyor for boxes, which is illustrated, the work is done by a belt 18 in. wide traveling at the rate of 125 ft. per minute. This conveyor has sprockets on the end shafts of each section to enable the adjacent one to be driven, all of the sprockets and chains being protected by guards. The conveyor rolls have flexible jointed bearings, and the channel stringers are mounted on ball-bearing casters, which are relied upon to make the sections readily portable. The driving motor is mounted either above or below the belt, and the driving section can be placed either at the ends or at any intermediate point. This conveyor has a total length of 140 ft., and will handle hourly 1500 packages weighing 80 lb. each, spaced at 5-ft. intervals on the belt.

The barrel conveyor is designed to engage the barrel after it enters the guideways, by cross bars and rollers. In this way, it is pointed out, the barrels are not dragged up the incline, but are rolled to the discharge points at heights of 5 and 8 ft. respectively above the ground, which permits the barrels to be placed on the shipping platform or stacked in tiers. This arrangement effects a considerable reduction in the amount of power required, as the friction of the cross bars is decreased by their rolling on the barrel. A 2-hp. motor drives the conveyor, which will handle 500-lb. barrels at the rate of 180 per hour. The entire mechanism is contained in a steel frame balanced on wheels 36 in. in diameter, and it is possible for one man to move the machine.



Another Form of Portable Conveyor Handling 500-Lb. Barrels at the Rate of One Every 20 Sec.

A stacking machine has been developed for handling miscellaneous freight on an apron 24 in. wide. This stacking machine will deliver to a greater height than the barrel-conveying machine illustrated, the delivery limits being 6 and 14½ ft. respectively. Bags and boxes weighing 340 lb. each can be handled, and it is stated that three men are required at the discharge end to prevent congestion.

Negotiations for the merger of the Railway Steel Spring Company with the American Locomotive Company are said to have taken tangible shape. The consolidation is a natural business evolution. The Baldwin Locomotive Works has plants manufacturing the products which the American Locomotive Company buys from the Railway Steel Spring Company. It was at first planned to incorporate a new company to take over the two. That proposal has been changed in favor of a plan for the sale of a controlling interest. Officers of the Spring Company deny the reports.



Conveyor for Industrial Plants Mounted on Wheels to Give Portability and Having an Arrangement for Coupling the Sections Together

THE GOVERNMENT ARMOR PLANT

Navy Department to Investigate Sites and to Consider Offers of Existing Plants

WASHINGTON, D. C., Aug. 29, 1916.—Pursuant to the provision of the naval appropriation bill authorizing the construction or purchase by the Government of an armor-plate factory, the Secretary of the Navy has issued the following notice to all parties who have communicated with the department with reference to a site for the proposed plant:

The department will consider all proposed sites for the Government armor plant on Sept. 13 next. It would be glad, therefore, if you would submit a brief setting forth the claims for your proposed site in further detail should you care to do so.

If you desire to present any proposition in person, a hearing will be given on that date, but a written brief for the consideration of the general board, which must, under the law, approve the location, must be filed.

The provision authorizing a Government factory was originally introduced in the Senate in the form of a special bill by Senator Tillman of South Carolina, chairman of the Committee on Naval Affairs. After the passage of this measure by the Senate, it was adopted by the House Naval Committee as an original provision of the naval bill and was finally enacted with minor modifications in the following form:

The Secretary of the Navy is hereby authorized and directed to provide, either by the erection of a factory or by the purchase of a factory, or both, for the manufacture of armor for the vessels of the navy; said factory or factories to have an annual capacity of not less than 20,000 tons of armor; to be located at a place or places approved by the General Board of the Navy, with especial reference to considerations of safety in time of war; and the sum of $11,000,000 is hereby appropriated, out of any money in the Treasury not otherwise appropriated, to be immediately available, for the purposes of this paragraph. And if the United States owns no suitable site or sites, authority is hereby given to acquire by purchase, condemnation, or gift such site or sites as may be necessary. The expenditures for drafting, technical, expert, and clerical assistance necessary shall be paid from the appropriation herein made.

The Secretary of the Navy shall keep accurate and itemized account of the cost per ton of the product of such factory or factories and report the same to Congress in his annual report.

While the notice promulgated by the Secretary of the Navy contemplates the receipt on Sept. 13 of nothing but proposals relating to sites for the projected factory, it is understood that in the meantime the corporations owning private armor factories will be advised that the department is prepared to consider offers to sell them to the Government in accordance with the provisions of the naval act permitting the acquisition or construction of a plant. It is appreciated, of course, that this opens up a wide field for speculation as to the outcome and as to the ramifications of any propositions looking to the purchase of an existing factory. The so-called experts of the Government have undoubtedly given but little attention to the serious technical problems involved not only in the making of armor but in the production of the steel necessary therefor. A strong point was made by the armor manufacturers during the last hearings before the Senate Naval Committee that the superiority of the armor now being supplied to American warships is largely due to the research and experimental work done on a large scale in all the departments of a vast and comprehensive steel works. It is a serious question whether it would be practicable to segregate any of the existing armor factories from the steel-making plants of which they are integral parts, and none of the Government's experts appears to have any very definite ideas as to what it would be necessary for the Government to acquire in order to secure a well-balanced plant, or whether the private manufacturers could dispose of all the necessary adjuncts without crippling their general steel-making plants. Presumably, these details will be threshed out in any conference that may result should the private manufacturers manifest a disposition to dispose of their armor-making facilities.

Among those who have been invited to attend the hearing at the Navy Department on Sept. 13 to urge the merits of building-sites for the proposed factory are nearly a score of representatives in Congress who are authors of bills authorizing the location of the Government factory at various places in the Congressional districts which they represent. Following is a summary of these measures:

H. R. 144, Representative Dale, New York; at or near navy yard at Brooklyn.

H. R. 520, Representative Bruckner, New York; in the Borough of Bronx, New York.

H. R. 660, Representative Vare, Pennsylvania; at Philadelphia navy yard.

H. R. 761, Representative Carlin, Virginia; in the city of Alexandria, Va.

H. R. 3609, Representative Edwards, Georgia; at or near Savannah, Ga.

H. R. 6859, Representative Neely, West Virginia; in or near the city of Wheeling.

H. R. 6860, Representative Neely, West Virginia; near the city of Moundsville, W. Va.

H. R. 8472, Representative Konop, Wisconsin; at or near Green Bay, Wis.

H. R. 8675, Representative Lieb, Indiana; in the city of Evansville, Ind.

H. R. 9543, Representative Cary, Wisconsin; at Milwaukee.

H. R. 9709, Representative Barkley, Kentucky; at or near Paducah, Ky.

H. R. 10,495, Representative Hollingsworth, Ohio; near Steubenville, Ohio.

H. R. 10,481, Representative Slemp, Virginia; at or near Roanoke, Pulaski or Bristol, Va.

H. R. 12,033, Representative Flood, Virginia; at or near Glascow, Va.

It is understood that at the opening of the hearing on Sept. 13 a representative of the department will present briefly the considerations that will govern the selection of a site. In addition to the points that would appeal to private manufacturers with reference to convenient access to supplies of material, condition of local labor market, transportation facilities, etc., the Government will put special stress upon the practicability of protecting the proposed plant in time of war.

W. L. C.

Patterson Supply Company in New Quarters

The W. M. Patterson Supply Company, dealer in machinery and supplies, moved Aug. 28 into its new building on Rockwell Avenue, Cleveland, Ohio. The company now occupies a six-story and basement building, of reinforced concrete construction, which it erected specially to meet its requirements, and the new quarters are claimed to be among the best of the machinery display and storerooms to be found anywhere in the country. The floor space aggregates between 125,000 and 130,000 square feet and all modern facilities are provided for the display and handling of machinery and supplies. The first floor is taken up mostly with machinery and small tools. The entire second floor is used for office purposes, the basement for valves and fittings and the upper floors for the storage of machinery and supplies. The building is provided with a pneumatic system for the distribution of mail, an automatic telephone system and a pneumatic cleaning system. A blower system provides ventilation, washed air being circulated through the three lower floors and basement.

The St. Louis Chamber of Commerce, whose president is Clarence H. Howard of the Commonwealth Steel Company, has appropriated the necessary funds for a survey the purpose of which is to prepare data for a proposal to the War and Navy departments at Washington for the construction and equipment at St. Louis of a hydroelectric nitrate plant and an armor plate plant. The proposal involves the construction of a dam with accompanying locks for river traffic at a point just below St. Louis for the production of 400,000 hp. of electric current. The feasibility of such a plant has already been passed upon by engineers.

Lake Superior Corporation Earnings

The Lake Superior Corporation subsidiaries gave a very much better account of themselves during the year ended June 30, 1916, than in the previous 12 months. Their aggregate net earnings were $3,503,471, as compared with $1,366,210 in the previous fiscal year. The larger income, however, did not go to the parent company, but remains in the hands of subsidiaries in the form of enlarged reserves and balances. The parent corporation's income consisted of interest on bonds of subsidiaries amounting to $290,000 and other income of $45,795, making a total of $335,759, as against $369,032 in the previous year. The disbursements out of income were somewhat less, being $310,305, leaving a net of $25,454. This added to the balance from last year leaves a sum of $50,526, of which $40,000 was applied to reserve for depreciation of securities and the balance carried forward.

The disposition of the net earnings of all the subsidiaries, excluding the Algoma Central Railway, is as follows:

	1915	1916
Net earnings	$1,366,210	$3,503,471
Carried forward	61,930	*331,765
Deficit	331,765	.....
	$1,759,905	$3,171,706
Deductions:		
Interest, bond and other	$1,509,272	$1,513,539
Written off security expenses	62,000	206,680
Sinking fund	124,423	667,173
Reserves	54,209	425,595
Carried forward	.....	$358,718

*Deficit.

The Algoma Steel Corporation's production in each of the last three years, in gross tons, was as follows:

	1913–14	1914–15	1915–16
Pig iron	311,904	212,917	258,504
Steel rails	325,680	174,536	†215,416
Merchant steel	15,576	8,903	.....

†Includes rails, shell and merchant steel

The capacity of the Algoma plant has been brought up to 40,000 tons per month. Construction is under way on two additional 75-ton open-hearth furnaces. Further improvements which the directors have in mind and which foreshadow new capital expenditure are the installation of a large structural mill, a plate mill and certain changes in the existing merchant mills, all of which will permit of the company's turning out a wide range of material. The last named changes are part of a policy of preparation for after-war business.

The directors intimate that in October the interest payments on the bonds and notes will be resumed. Of the latter the amount outstanding is $2,432,500, and they are due in March, 1917.

The water power which the company owned has been disposed of for $1,000,000, which sum is held by trustees and is available for new construction.

The Algoma Central Railway Company's report is not ready, but the directors understand that its earnings, particularly from the steamship line, show a substantial increase. Details as to the operation of the Algoma Eastern line are not given, but, as in the case of the Central, the earnings show an increase. More rolling stock has been acquired, necessitated through prospective additional traffic. Patents have been acquired for 700,000 acres of land, much of which carries valuable pulpwood and is favorably situated for getting it out.

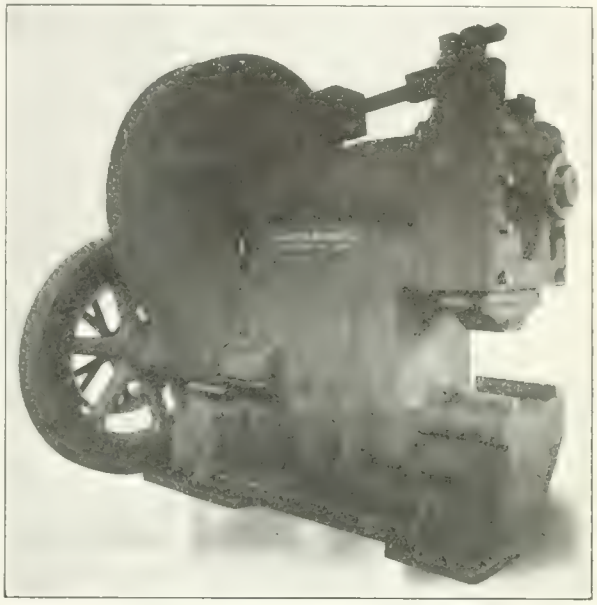
German Steel Output Still Increasing

The German steel production in May, according to the Association of Iron and Steel Producers, was 1,412,137 metric tons against 1,202,598 tons in April. The May output is the largest for the war, and the daily output of 52,301 tons also exceeds the previous record of 52,286 tons per day in April. The May output was made up of 701,099 tons of Bessemer steel; 591,072 tons of open-hearth steel; 96,628 tons of steel castings; 9356 tons of crucible steel and 14,082 tons of electric steel. The output of steel castings is unusually large, and the electric steel production equals the recent high average.

Open-Throat Machine for Breaking Rails

A rail breaking machine having an open throat and designed for handling rails not exceeding 100 lb. per yard in weight has been brought out by the Covington Machine Company, Covington, Va. It is designed as a substitute for a closed machine similar to a guillotine frame shearing machine. As the machine is designed to break the rail with a single stroke of the plunger, the shock is somewhat severe and special attention was paid to the size of the main bearings for the eccentric shaft on that account. A cast steel block is used to support the bearing parallels, which is relied upon to save the main frame from gradual deterioration.

A steel head is mounted on the plunger and on the lower portion of the jaw two renewable bearing parallels are mounted in a cast steel block pivoted to the lower face of the machine jaw. This arrangement, it is



Machine with Open Throat Developed for Breaking Rails Weighing as Much as 100 Lb. per Yard

pointed out, has been employed to reduce the wear on the main frame, it having been found that the bearing parallels wear out rapidly and when mounted directly on the jaw or main casting gradually break down the corners and the surface to which they are fastened. The rail is broken by laying it with the side of the bulb and thin edge of the flange on the parallels and a steel fuller block on the end of a metal handle is placed between the rail and the plunger head by the operator.

The machine is belt driven to prevent the plunger head jamming through carelessness to such an extent that the machine stops instantly and cannot make the remainder of the stroke without damaging some part. While electric motor drive with some type of friction mechanism can be employed, this arrangement is not recommended by the builder.

The main eccentric bearings have readily removable bushings and the eccentric shaft bearing in the cover has been made very large. Heavy lugs at the top of the frame are relied upon to keep this bearing in alignment. The bearings of the driving shaft are of the ordinary babbitt construction with caps and bolts.

The new blooming mill of the Worth Brothers Company, Coatesville, Pa., which has been in course of construction for several months, has been started and is now running double turn making blooms for the forging department. This department, however, cannot use the entire output of the mill, and after a stock of blooms has accumulated, the mill will be used to manufacture slabs for the plate mills.

The Chattanooga Iron Works and the Eureka Supply Company of Chattanooga, Tenn., have consolidated under the name of the Chattanooga Iron Works.

Provisions of a Record-Breaking Navy Bill

Much Early Work, Taking in Four Battleships, Four Cruisers and Twenty Destroyers, May Go to Private Yards

WASHINGTON, D. C., Aug. 29, 1916.—The House conferees on the record-breaking naval appropriation bill have unconditionally surrendered to the Senate. The measure, as just passed, carries the full program of the Administration, not only with respect to the number of vessels, the construction of which is to be begun in the current fiscal year, but also as to the comprehensive three-year program designed to put the United States in third, if not second, place among the maritime nations of the world before the end of 1920. The nation-wide demand for preparedness, naval as well as military, has aroused the Navy Department from its previous lethargy, and plans are now being rushed with all speed providing for the early letting of contracts for all the vessels to be begun prior to July 1 next.

THE PROGRAM OF THREE YEARS

The three-year program, together with the construction to be begun immediately, is set out in the bill, as finally passed, substantially as follows:

The President of the United States is authorized to undertake prior to July 1, 1919, the construction of the vessels enumerated below:

Ten first-class battleships, carrying as heavy armor and as powerful armament as any vessels of their class, four of which at a cost, exclusive of armor and armament, not to exceed $11,500,000 each, to be begun as soon as practicable.

Six battle cruisers, carrying suitable armor and as powerful armament as any vessels of their class, four of which costing, exclusive of armor and armament, not to exceed $16,500,000 each, to be begun as soon as practicable.

Ten scout cruisers, carrying suitable protection and armament and having the highest practicable speed and greatest desirable radius of action, of which four, costing exclusive of armor and armament, not to exceed $5,000,000 each, are to be begun as soon as practicable.

Fifty torpedo-boat destroyers of highest speed and greatest radius of action, of which 20, costing not to exceed $1,200,000 each, are to be begun as soon as practicable; provided that not less than four of these shall be built on the Pacific coast if the cost of construction thereon does not exceed the cost on the Atlantic coast plus transportation from coast to coast.

Nine fleet submarines.

Fifty-eight coast submarines, of which three are to have a surface displacement of about 800 tons each, to cost, exclusive of armor and armament, not to exceed $1,200,000 each, and 27, which shall be the best and most desirable and useful type of submarine which can be procured at a cost, exclusive of armor and armament, not to exceed $700,000 each, shall be begun as soon as practicable, the sum of $8,217,000 being appropriated for the construction of such submarines, to be available until expended. Not less than 12 of these submarines to be begun immediately shall be built on the Pacific coast, subject to the conditions applicable to the torpedo-boat destroyers above set forth.

One submarine, equipped with the Neff system of submarine propulsion, exclusive of armor and armament, $250,000: Provided, that the owners of the Neff system of submarine propulsion will construct, in accordance with drawings, plans and specifications provided by them, one coast-defense submarine of about 150 tons displacement when submerged, carrying armor and armament similar and equal to that of the "C" class of submarines, with fittings, equipment, machinery, devices, appliances, and appurtenances of every kind with latest improvements, complete in all respects, and suitable for naval purposes: Provided further, that the money appropriated for this purpose shall not be paid to the builders of said boat until the same has been completed, passed satisfactory service tests, and been accepted by the Secretary of the Navy; but upon such completion, tests, and acceptance by the Secretary of the Navy the sum appropriated shall be paid.

Three fuel ships, one at a cost not to exceed $1,500,000 to be begun as soon as practicable.

One repair ship.

One transport.

One hospital ship, at a cost not to exceed $2,350,000, to be begun as soon as practicable.

Two destroyer tenders.

One fleet submarine tender.

Two ammunition ships, one at a cost, exclusive of armor and armament, not to exceed $2,350,000, to be begun as soon as practicable.

Two gunboats, one at a cost, exclusive of armor and armament, not to exceed $860,000, to be begun as soon as practicable: Provided, that the 66 vessels directed herein to be begun as soon as practicable shall be contracted for or shall be begun in navy yards within six months from the date of the approval of this act.

YET GOVERNMENT NAVY YARDS ARE FULL

As a check upon the private shipyards of the country, the bill provides that the Secretary of the Navy "shall build any of the vessels herein authorized in such navy yards as he may designate, should it reasonably appear that the persons, firms, or corporations, or the agents thereof, bidding for the construction of any of said vessels have entered into any combination, agreement, or understanding, the effect, object, or purpose of which is to deprive the Government of fair, open, and unrestricted competition in letting contracts for the construction of any of said vessels: Provided, that the Secretary of the Navy is hereby authorized to build any of the vessels herein authorized in such navy yards as he may designate."

The total amount carried by the bill, as passed, for the increase of the navy, representing vessels heretofore authorized and those authorized to be begun as soon as practicable, is $139,345,287, of which the sum of $72,749,787 is to be expended for construction and machinery, $47,110,000 for armor and armament, and $19,485,500 for ammunition.

APPROPRIATIONS FOR INEFFICIENCY

The extraordinary conditions under which work in the Government navy yards must now be carried on, owing to the demands of labor successfully urged by influential members of both Senate and House, are clearly reflected in the following provision of the naval bill, the avowed purpose of which is to expedite construction:

To provide for the speedy construction of the vessels herein authorized and for the additional cost incident thereto, including the employment of more than one shift of labor per day, overtime work, and the speedy delivery of material, the Secretary of the Navy in his discretion is hereby authorized to increase the total cost of each of said vessels, including armament, not to exceed 20 per centum thereof if any of said vessels be constructed in Government navy yards; and if any of said vessels or the armor or armament for same be constructed by private contract, the Secretary of the Navy in his discretion is hereby authorized to prescribe in the contracts for same provisions for the payment of premiums over and above the contract price, not to exceed 20 per centum thereof, for the most expeditious delivery of same, and further provisions for penalties for delays and failure to complete within the contract time: Provided, that if, in the judgment of the Secretary of the Navy, the most rapid and economical construction of the battle cruisers authorized herein can be obtained thereby, he may contract for the construction of any or all of them upon the basis of actual cost, plus a reasonable profit to be determined by him. That each and every employee of the navy yards, gun factories, naval stations, and arsenals of the United States Government is hereby granted 30 days' leave of absence each year, without forfeiture of pay during such leave: Provided further, that it shall be lawful to allow pro rata leave only to those serving 12 consecutive months or more: And provided further, that in all cases the heads of divisions shall have discretion as to the time when the leave can best be allowed: And provided further, that not more than 30 days' leave with pay shall be allowed any such employee in one year: And provided further, that this provision shall not be construed to deprive employees of any sick leave or legal holidays to which they may now be entitled under existing law.

The House and Senate conferees reached a compromise on the provision appropriating money to improve and equip certain navy yards for the construction of warships. As the House passed the bill, the expenditure of this money was conditioned upon the inability of the Secretary of the Navy to secure bids from private shipbuilders at fair and reasonable prices. As adopted by the conferees, the whole matter is left to the discretion of the Secretary, except that he is directed to equip certain yards regardless of bids received from private contractors. The text of this interesting provision is as follows:

The Secretary of the Navy is authorized to improve and equip the navy yards at Puget Sound, Philadelphia, Norfolk, New York, Boston, Portsmouth, Charleston and New Orleans for the construction of such ships herein or as may be hereafter authorized as may be assigned to such yards for construction, and the sum of $6,000,000, or so much thereof as may be necessary, is hereby appropriated for this purpose: Provided, that the navy yards at Puget Sound, Philadelphia, Norfolk and Boston shall be equipped for the construction of capital ships forthwith.

A PACIFIST SECTION

The bill, as it becomes a law, contains a declaration intended as a sop to the pacifists, asserting it to be the "policy of the United States to adjust and settle its international disputes through mediation or arbitration, to the end that war may be honorably avoided, and it looks with apprehension and disfavor upon a general increase of armament throughout the world, but it realizes that no single nation can disarm, and that without a common agreement upon the subject every considerable power must maintain a relative standing in military strength." In view of the premises, the President is authorized to invite at an appropriate time, not later than the close of the European war, all the great governments of the world to send representatives to a conference "which shall be charged with the duty of formulating a plan for a court of arbitration, or other tribunal, to which disputed questions between nations shall be referred for adjudication and peaceful settlement, and to consider the question of disarmament, and submit their recommendation to their respective governments for approval." The President is authorized to appoint nine citizens, who, in his judgment shall be especially qualified for such duty, to be representatives of the United States in the proposed conference. If at any time before the construction authorized by this act shall have been contracted for there shall have been established, with the co-operation of the United States, an international tribunal competent to secure peaceful determinations of international disputes, "and which shall render unnecessary the maintenance of competitive armaments," then such naval expenditures as may be inconsistent with the engagements made in the establishment of such tribunal may be suspended, when so ordered by the President of the United States.

ANTI-TRUST AND ANTI-EFFICIENCY PROVISIONS

The policy of the Navy Department with respect to the manufacture of material in Government plants, or its purchase from private contractors, is outlined by the bill as follows:

Of each of the sums appropriated by this act, except such amounts as may be required to meet obligations authorized in previous acts and for which contracts have been made, no part shall be used to procure through purchase or contract any vessels, armament, articles or materials which the navy yards, gun factories or other industrial plants operated by the Navy Department are equipped to supply, unless such Government plants are operated approximately at their full capacity for not less than one regular shift each working day, except when contract costs are less than costs in said Government plants, and except when said Government plants are unable to complete the work within the time required, and except in cases of emergency.

That no part of any sum herein appropriated shall be expended for the purchase of structural steel, ship plates, armor, armament or machinery from any persons, firms or corporations who are parties to any existing combination or conspiracy to [illegible] the natural and foreign commerce or trade of the United States, or the commerce or trade between the States and any Territory or the District of Columbia, in any of the articles entering into the purchase of structural steel, ship plates or machinery, and no such articles shall be purchased at a price in excess of a reasonable profit above the actual cost of manufacture. But this limitation shall in no case apply to any existing contract.

The text of the provision prohibiting scientific management in Government institutions, as finally agreed to, is as follows:

Provided, that no part of the appropriations made in this act shall be available for the services of any officer, manager, superintendent, foreman or other person having charge of the work of any employee of the United States Government while making or causing to be made with a stop watch or other time-measuring device a time study of any job of any such employee between the starting and completion thereof, or of the movements of any such employee while engaged upon such work; nor shall any part of the appropriations made in this act be available to pay any premium or bonus or cash reward to any employee in addition to his regular wages, except for suggestions resulting in improvements or economy in the operation of any Government plant.

THE FUTURE SUPERDREADNAUGHT

That the United States may keep abreast of the nations of the world in the construction of superdreadnaughts, the bill contains a provision directing the Secretary of the Navy to "submit to the Congress during its next regular session a report on the largest battleship which can be undertaken in the United States in the present state of the shipbuilding and engineering sciences and arts, giving due consideration to the present and prospective depths and other limiting dimensions of the docks and harbors of the United States and its possessions, and of the locks of the Panama Canal; and he shall further report the principal characteristics of such a vessel, giving the displacement, cost, number and size of guns, thickness of armor, speed and cruising radius; and he shall further report on the desirability of building one or more such vessels."

It is semi-officially announced that the Navy Department will undertake to have the eight capital ships included in this year's program constructed in private yards, and, with that object in view, bids will be solicited at an early date upon plans which are now practically completed. As to whether the construction of any of these eight vessels will actually be undertaken in Government navy yards will depend upon the view of the Secretary of the Navy as to the reasonableness of the bids submitted for these ships. W. L. C.

British Exports and American Guarantees

The following from the London *Iron and Coal Trades Review* is of importance to American firms receiving certain classes of supplies from Great Britain:

"The attention of the Board of Trade has been called by the Foreign Office to cases which have occurred in which British firms have consigned to one of his majesty's consular offices in the United States, on account of certain United States approved importers, materials in connection with which the importers are required to sign (and in the case of any previous shipments received have signed) guarantees before a British consular officer to the effect that they will take certain precautions to prevent the materials from reaching the enemy. On arrival of the particular shipments, however, the importers have in certain cases refused to sign the requisite guarantees, and the British exporters have been compelled to store the goods, with little prospect of selling them to other importers prepared to sign the guarantees.

"The Board of Trade desires to suggest that, with a view to obviating such difficulties, exporters of such materials should include in their contracts with United States importers a condition that the necessary guarantees will not be withheld in the case of any of the goods covered by the contracts."

ESTABLISHED 1855

THE IRON AGE

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A Problem in Government

The country is now in a position to realize what our lawmakers have been doing in deferring so meekly to the wishes of the labor unions. The majesty of the people is offended in the condition presented in the railroad labor dispute. Here we have the spectacle of a comparatively limited number of men threatening to tie up practically the whole internal commerce of the United States to secure their selfish purposes. They demand greater compensation than they could earn in almost any other line of effort requiring the same or equal qualifications. Their demand is made on employers whose resources are limited by regulation and who are not free to transfer the burden of higher cost to the general public. The President realizes the gravity of the situation but uses the prestige of his high office in endeavoring to compel the railroads to yield to the men the most important part of their demand without arbitration. The country meanwhile is powerless to control the disturbers because of the following provision which was incorporated in the Clayton anti-trust act, adopted in October, 1914:

> Nothing contained in the anti-trust laws shall be construed to forbid the existence and operation of labor, agricultural or horticultural organizations, instituted for the purpose of mutual help, and not having capital stock or conducted for profit, or to forbid or restrain individual members of such organizations from lawfully carrying out the legitimate objects thereof; nor shall such organizations, or the members thereof, be held or construed to be illegal combinations or conspiracies in restraint of trade, under the anti-trust laws.

It is indeed galling to think that the people of this country have been placed by their chosen representatives in a position in which they are helpless and that they cannot legally attack the most gigantic conspiracy against their welfare that was ever hatched—and this, too, under the guise of improving the condition of the workingman. Our laws practically compel the prosecution of manufacturers, merchants or other business men who attempt to secure business benefits through combinations. They are obliged to avoid even the appearance of co-operation with one another. But labor organizations, on the contrary, which have in the case of the railroad unions grown so strong that they can control the trade of the entire country, are expressly exempt from the operations of the law.

The President has advised the railroad companies that unless the controversy can be adjusted he will resort to drastic measures. It would appear to be a most opportune time now for Congress itself to resort to drastic measures and take steps to destroy the power given to labor organizations by the passage of the Clayton anti-trust act. Its repeal would open the way for a case such as that now existing to be taken to the courts and summary punishment imposed upon those who would so seriously interfere with the business of the country.

Supply and Demand at Work

The materials committee of the National Implement and Vehicle Association, whose report on conditions in the steel-bar market and their effect on the implement trade was given in these columns last week, told the membership that the law of supply and demand was plainly operating in the steel market. There will be no dissent from that view; but the committee might have said also that the same law has determined the prices of steel products for a number of years, the chief difference in the present situation being that the price is high because demand is quite outstripping supply. The report referred to three interviews the committee had had with producers of steel, and of the failure of its efforts to get special concessions for the hundred or more manufacturers it represented. The arguments brought forward in these interviews are not detailed, but they have been made fairly familiar in the efforts that buyers of agricultural machinery and implements have put forth in the past three or four months to escape paying the more than 100 per cent advance in steel-bar prices over the basis of last year's contracts, or from 1.20c. to 2.50c.

Leaving out the history of the steel manufacturers' dealings with the implement trade, and the concessions of $2 a ton or more that have been enjoyed by the latter for years—saying nothing of the hard bargains driven at 85 and 90c. per 100 lb. for implement bars in periods of special distress in the steel industry—the argument in the recent campaign for a lower price turned on the certainty that farmers will get along with fewer new implements if the latter are advanced. Already some advances have been made, but on the higher bar prices that will apply on deliveries after Jan. 1

implements must go still higher. Total advances of 15 to 20 per cent, and in some cases more, are indicated, and the reduction in buying to be looked for is put at 25 per cent in some lines. There are implement manufacturers, it is to be said, who except to any such pessimistic view of their outlook, in spite of higher prices for materials and labor, though whether they count on some offsetting economies in manufacture or on an unprecedented willingness of the farmer to pay more for implements—as he ought, in view of his own war prosperity—does not appear. We have seen no reason to doubt that high-priced steel will cut down implement buying just as it has cut down railroad and structural buying. But in the one case, as in the others, it is as well to charge the damage, if that is what it is, to war prosperity and let it go at that.

Steel manufacturers may have argued rightly that there never was a good reason for the concessions to agricultural implement buyers, and that it is well that conditions have brought their elimination. Whatever may be said about the long cycle between the signing of bar contracts and the sale of the implement to the farmer, that is no better reason than the blast furnaceman could urge for a concession on his ore contract because it may be eighteen months before the last of the ore is charged into his furnace. The real reason why the concession has persisted is that the buyer of steel has had the whip hand most of the time—the same reason that has made contracts for finished steel the equivalent of buyers' options.

The implement makers' committee did not go into the legal phases of the issue, but it should be said that the question has been raised whether the steel manufacturers would not now lay themselves open to attention from the Federal Trade Commission if they formally agreed to give a preferential price to a certain class of buyers. Whatever the method by which implement bar buyers got the concessions heretofore—some more than others, because of large tonnages—in the present instance their effort has been co-operative. Whether there was any definite advice to implement association members from their officers or materials committee to refrain from buying bars until they were given a lower price does not appear. But it is pertinent to ask what view the Federal Trade Commission would take of an organized movement of consumers to affect a market price. That German buyers organized to break the price of American copper was urged by the Commission as one reason for allowing our manufacturers to combine in the handling of foreign markets. It would be interesting to have its suggestion as to the best method of dealing with a similar movement at home.

Immigrant Cripples

Congress has it on its mind to put the literacy test for immigrants before the President again, following the veto of January, 1915. There is no occasion at this time to discuss the merits and demerits of that proposition. Its veto met with quite general commendation outside the circles of organized labor.

The question of restriction of immigration involves a much more important matter. The European war has already made hundreds of thousands of cripples and will make many more. The problem as to the education of immigrants has not changed. The conditions are, and will be, substantially the same as they have been in the past. The conditions as to physical ability have been altogether altered. The proportion of cripples in the belligerent countries has been vastly multiplied. The rules that have been in force as to the admission of aliens not up to the highest physical standard, while perhaps adequate to conditions prevailing in the past, may easily be found to be altogether inadequate to cope with the new conditions.

The rule, as embodied in section 2 of the present immigration law, provides for the exclusion of "persons likely to become a public charge" and persons "who are found to be and are certified by the examining surgeon as being mentally or physically defective, such mental or physical defect being of a nature which may affect the ability of such alien to earn a living." The phrase "to earn a living" is subject to widely variant interpretations. In practice the uncertainties may have been slight in the past but for the future the case is entirely different. Congress fears a "flood of immigration" after the war; and accepting for argument that such a thing is a distinct possibility, it is obvious that the tendency to migrate to the United States may be much greater on the part of cripples than on the part of illiterates.

Ability to earn a living involves two factors—ability to render certain service and demand for the rendering of that service. Ability to play the violin, and to do nothing else, represents ability to earn a living only if there is demand for an additional violinist, when there remain some who wish to hear the violin played. There are some who do not. Maurice Maeterlink described music as "a particularly disagreeable form of noise."

A one-armed man can earn a fair living, usually, as a watchman, but if the supply of one-armed men is suddenly multiplied the supply of jobs will not hold out. The standards hitherto used in judging whether an immigrant alien has a physical defect which may affect his ability to earn a living would not be adequate to the condition of the number of one-armed men applying for admission being enormously increased. The immigration officials would be confronted by a new condition entirely, and the new problem of the partly unfit is a much more important one than the old and unchanged problem of literacy.

We de not consider at this time the question whether or not the tendency to immigrate to the United States will be greater or less, after the war, than it has been hitherto. What is obvious is that with so large a proportion of the male population in the belligerent countries physically defective there will be a vastly greater tendency to migrate to the United States on the part of those not physically perfect than on the part of those who remain physically perfect. One may go farther, indeed, and consider that the foreign governments, looking to their industrial welfare, may restrict emigration in order to conserve what may be left of their labor supply, and may easily hit upon the expedient of making it easier for the defectives to leave the country than the physically perfect. There are cases in which it is better to await the condition before

acting, to attempt to cross the stream only when the stream has been reached; but as diplomacy goes it would be much better for the United States to take its action first. A lesson should be taken from the actions of the entente allies, who have been making arrangements for commercial warfare after the bloodshed is over, partly, it is very reasonable to suppose, because the making of such arrangements afterward would be very awkward.

The United States has needed immigrants all these years to help in building its railroads, tilling its soil and making its coke and steel. For such work it could use only the strongest and most fit physically. Vastly less has it mattered whether or not these workmen could read. At no time has the United States needed cripples or those in the least defective physically. If such men should not be wanted abroad they would not be wanted here. Under existing law there is no protection but the provision that an alien is not to be admitted if he has been "assisted by others to come," or if his passage has been paid by "any corporation, association, society, municipality or foreign government, either directly or indirectly." It would perhaps be quite easy for foreign governments to escape the provisions as thus formulated and yet in substance exert upon the undesirables the most cogent influence to migrate to the United States.

To this great problem Congress had much better address itself than to the little question of the literacy test, which after all would mean little in actual practice, as to immigration, but perhaps a great deal by way of ammunition for the stump speaker.

Automobile Exports

While considerable attention has been directed to our exports of automobiles since the war started, these exports are really not large by comparison with the extremely rapid growth of the production. The number of commercial and passenger vehicles exported has been as follows, by fiscal years:

1911	11,803	1914	29,090
1912	21,757	1915	37,876
1913	25,286	1916	77,496

Production in the past twelvemonth, the automobile year, has been in the neighborhood of 1,400,000, according to some estimates; but taking only 1,200,000 as the production in the period concurrent with the production of those exported in the fiscal year, the proportion would be only between 6 and 7 per cent. The exports, in point of numbers, were more than two and a half times as great as in the year just preceding the war. The value of the business showed a somewhat greater increase, as the average value per car increased. The number of motor trucks increased sharply, as in the past fiscal year there was a fair proportion, whereas prior to the war our exports were almost exclusively of passenger cars.

Manganese Ore at Crystal Falls, Michigan

Private parties, drilling for iron ore in the Crystal Falls district of Michigan recently, struck 5 ft. of manganese ore running up to 35 per cent manganese. It is believed the deposit is small, but additional drilling is now being carried on. One hole was put down 100 ft. away without encountering manganese.

CORRESPONDENCE

Oxygen Gas for Removing Furnace Salamanders

To the Editor: In the issue of THE IRON AGE of August 24 appears an article by David F. Baker entitled "Oxygen Gas in Blast-Furnace Operations." This use of oxygen has been applied at the works of the Bethlehem Steel Company for about two years, not only at the blast furnaces but lately in the open-hearth departments. We believe we have discovered a hitherto unknown use for oxygen gas which will solve the mystery of the blast-furnace salamander. The hearth lining of our D furnace (recently blown out) was so badly worn away that we could not secure anything like a fair foundation for the lining. After a week of little progress made in drilling for the dynamite charges, a successful attempt was made to use oxygen gas as follows:

A ring of fire-clay was built about the point on the salamander where the hole was to be burned. Red hot coke was placed on the spot and oxygen was applied by the customary method of a long pipe attachment. As the hole became deeper, iron and slag filled the hole but were removed easily by inserting a pipe connected to the high pressure air line. It was while doing this we discovered that the free air, accompanied by the oxygen blast, positively accelerated the deepening of the hole as well as cleaning it out.

While we are more than pleased with the results obtained by this use of oxygen, with additional improvement contemplated in the use of explosives, we expect to remove the salamander for our next lining without the hand drill and accompanying hard labor of days or weeks. As progress along this line will be welcomed by all blast-furnace men, we will keep you informed as to developments in the future.

CHAS. L. T. EDWARDS,
Assistant Superintendent Blast-Furnace Department.
South Bethlehem, Pa., August 25, 1916.

Cutting Cast Iron When Red Hot with an Ordinary Saw

To the Editor: A very interesting article by Otto Vogel appears in *Stahl und Eisen.* It was called out by the statement of Dr. Petersen, one of the editors of that journal, that at a red heat cast iron could be easily cut with an ordinary carpenter's saw. This caused Mr. Vogel to look up the references to the subject, the oldest of which was in the *Annales de Chimie,* Paris, 1812, Vol. 82. This article was followed by discussions in German periodicals in 1813, 1824 and 1825. A brief synopsis of each of these is given.

The iron should be preferably at a uniform cherry red, when it can be cut readily. Attention is also drawn to the fact that Sven Rinman, the father of Swedish iron and steel metallurgy, points out that cast iron can be readily filed with an ordinary wood rasp if it is at a dull red heat. This is in his treatise on iron, which was translated into German in 1814. G. B. W.

Aeroplane Exports Five Millions

Aeroplane exports for the fiscal year ended June 30, 1916, were 269, against 152 to June 30, 1915, and only 34 to June 30, 1914. The valuation of the exports of aeroplane parts for the fiscal year ended June 30, this year, was $4,843,610, but only $583,427 and $37,225 for the fiscal years of 1915 and 1914.

The Chicago & Northwestern Railroad Company is stated to be contemplating the construction of a third ore dock at Ashland, Wis., at a cost of $1,500,000, to be ready at the opening of navigation in 1917. The present docks are of the old type of construction, but the proposed new structure will be of concrete and steel.

THE WEEK'S LABOR TROUBLES

Labor Difficulties in New England Continue to Crop Out

Little change has occurred during the week in strike conditions in Bridgeport and New Haven, Conn., and Westfield and Greenfield, Mass. Some of the strikers at the Westfield Mfg. Company, Westfield, are reported to be leaving town, having secured positions elsewhere, and the union organizers are continuing their efforts to hold the men in line. Two union leaders are also active in Greenfield, where the strike at the plant of the F. E. Wells & Son Company remains unsettled. About 200 laborers went on strike at the factory of the Randolph-Clowes Mfg. Company, Waterbury, Conn., Aug. 21. It is reported that they are demanding a raise of 25c. a day and five minutes to "wash up." Owing to the trouble with the laborers the factory was closed the following day.

Apparently trouble is brewing at the Pittsfield, Mass., branch of the General Electric Company. Many of the workmen of the plant belong to various craft unions and these organizations are united into a metal trades council with a local headquarters. A union committee reports that it has tried in vain to get a hearing with General Manager Cummings C. Chesney to place before him demands for recognition of an employees' committee, an increase of 10 per cent in both hourly and piece work wages and the reinstatement of employees who were discharged during the period of organization. On Aug. 26 the general manager issued a statement to the employees that he would receive at his office any individual employee or a committee of employees, who have grievances to present, or suggestions to make, but he would not officially receive a committee representing any of the so-called national or international labor unions. He also stated that on Oct. 1 a 5 per cent increase of hourly and piece rates will go into effect and that prior to Oct. 1 the employees by vote may determine whether the week's work is to consist of 50 hr. or 52 hr.

The Molders' Strike at Detroit

Trouble between members of the International Iron Molders' Union and their employers at Detroit has not been entirely settled, although telegraphic advices under date of Aug. 28 state that the men in all but two plants, which are under police guard, have returned to work after a satisfactory adjustment of their grievances. According to A. E. Terry, assistant secretary of the Union Conference Board of Detroit and vicinity, the dissatisfaction of the men in the foundries was typical of conditions in many local plants. A demand for a 9-hr. day and increased scales of pay were the apparent reasons for the strike, but the real cause, according to the employers, was their reservation of the right to maintain "open shop." On Saturday, Aug. 19, a compromise was effected, by which shorter hours and the restoration of the union men who had been dropped for serving on strike committees to their former positions were agreed upon. On the following Monday the men returned to work. There was no serious violence of any kind during the strike, and the police, having arrested a few men at intervals, quickly released them in each instance. In the two plants in which the molders still refuse to accept the offers made repeatedly by employers, labor officials assert that the companies have failed to keep faith with the men. The leaders of the latter, who number less than 100, say they will continue the strike indefinitely, although the workmen of one plant have not been at work for five weeks and of the other have been out since last November. The stove molders are all at work again, having been out only a week. They were instructed to return by their union officials. The weather was so hot that they probably felt like taking a vacation.

An Encouraging Milwaukee Statement

A statement showing that striking machinists in the Milwaukee district are rapidly returning to work and indicating that the organized demand for an 8-hr. day, which came to a head with the first walk-out on July 18, is not a success, was issued Aug. 26 by the Milwaukee Metal Trades and Founders' Association. It says: "At the beginning of the strike 22 per cent of the men in the departments where walkouts were ordered remained at work. On Aug. 26, 60 per cent of the men in these departments were working. The figures show that just previous to the calling of the strike 6578 men were employed in the departments later affected. At the beginning 4231 went out from 24 shops, leaving 2347 men at work in these departments. Now more than 3848 men are working in these departments, showing that more than 1500 have returned during the six weeks of the strike. The chart we have kept shows that the percentage of the men at work has been growing rapidly during the last few weeks."

A Nashville Employer Makes a Voluntary Advance

The Nashville Machine Company, Nashville, Tenn., announced Aug. 21 that it had voluntarily adopted the 8-hr. day as the basis for its operations thereafter. The change affects machinists, armature winders, pipe fitters and electric wire men. The pay of the men, based on a 9-hr. day, remains the same, amounting to an advance of 12½ per cent.

Strike in a Horseshoe Factory

Three hundred employees of the Bryden Horseshoe Company, Catasauqua, Pa., went on a strike Aug. 26, demanding payment of their wages twice a month, Saturday afternoons off, pilers of billets to be paid by the company instead of by the heaters and rollers and reinstatement of a discharged employee.

The Dayton Strike Not Yet Settled

A report under date of Aug. 29 indicates little change in the strike situation at Dayton, Ohio. A few more men have struck, but the manufacturers report more than double their number of old employees have returned. New men are being employed, and at present only one shop is suffering any inconvenience.

Molders' Strike at Cleveland

The molders at the No. 2 plant of the Taylor & Boggis Foundry Company, Cleveland, struck last week and the entire plant is shut down, about 125 men being out of work. The strike was not a result of any dissatisfaction in regard to wages, but because of efforts to unionize the foundry. The company's No. 1 plant is not affected.

First Launching at Chester's Shipyard

The launching of the first vessel from the ways of the Chester Shipbuilding Company, Ltd., Chester, Pa., the old Roach yard, took place Saturday morning, Aug. 26, when the Malmanger was successfully placed in the water. The new ship is all steel, 401 ft. long, 54 ft. broad and 32 ft. 9 in. in depth, with a draft of 26 ft. and a carrying capacity of 8800 tons. It is to be propelled by Westinghouse geared turbine engines, with three Scotch boilers, developing 3000 hp. and driving the ship at a speed in excess of 10½ knots per hour. The Malmanger is one of 10 ships to be built by the company for Norwegian interests of the same design of cylindrical oil tankers, besides four freighters for American firms. Its cost is to be about $1,000,000.

The last launching in Chester was at the same yard, then the Roach shipyard, and took place June 12, 1907, when the majestic City of Savannah glided into the Delaware River. It was the last of 10 ships built by John B. Roach for the Ocean Steamship Company.

The Pennsylvania Shipbuilding Company's yard at Gloucester, N. J., is rapidly nearing completion, and it is planned to lay the first keel Sept. 1. Two buildings have been practically completed, and the contract has been let for a third. The company has contracts for six 7000-ton tankers and two 12,500-ton freighters, all for Norwegian buyers. All of the ships will be launched sideways, an innovation on the Atlantic coast. They are to be equipped with Curtiss turbines made by the General Electric Company, Schenectady, N. Y.

Production of Spelter, First Half 1916

Figures compiled by C. E. Siebenthal of the United States Geological Survey from reports submitted by all zinc smelters operating during the first six months of 1916 show that the production of spelter from domestic ore in that period was 267,696 net tons and from foreign ore 48,756 tons, a total production of 316,452 tons, compared with 272,987 tons for the last half of 1915 and 216,532 tons for the first half. The following details are taken from his report:

The stocks of spelter held at smelters on June 30, 1916, amounted to 23,817 net tons, against 14,253 tons at the beginning of the year and 5884 tons at the middle of 1915. This shows a gain over stocks at the close of the year, part of which was doubtless due to the accumulation of working stocks at new smelters which started during the period.

From the foregoing figures and the records of exports and imports by the Bureau of Foreign and Domestic Commerce it is calculated that the apparent consumption for the period was 229,086 net tons, which compares favorably with 203,588 tons for the last half of 1915 and 160,906 tons for the first half. This consumption was not altogether domestic, however, for it must include the zinc content of the exports of brass and brass articles, which were largely increased during the first half of the present year.

In addition to that produced from ore, 15,800 net tons of spelter was distilled or recovered electrochemically from zinc ashes, skimmings and drosses. No statistics were obtained of the spelter produced by remelting skimmings, drosses, etc., but it was probably not less than 12,000 tons. The total output of spelter from both ore and skimmings was therefore about 344,000 net tons, or at the rate of 688,000 tons a year.

The number of retorts at zinc smelters June 30, 1916, was 196,640, and 24,812 additional retorts were building or planned, a total of 221,452. Some of the smelters listed earlier in the year as planned were abandoned, and a number of other plants not listed never got beyond the promotion stage. On the other hand, work was begun on two smelters not listed.

On the basis that 156,568 retorts were already in existence at the beginning of 1916, that the 49,612 additional retorts then planned, and electrolytic plants aggregating 60,000 tons annual capacity, also then planned, were completed and that the smelters of secondary spelter kept their usual capacity, the United States, it was estimated in the spelter statement of April 4, would have the capacity at the close of 1916 to produce spelter at the rate of over 900,000 tons a year.

It need have occasioned no surprise that the production during the first half of 1916 failed to equal half the capacity indicated for 1917. There are evident reasons, of course, why it could not. During the half-year 25 per cent of the retorts on which the estimate of capacity was based were only under construction or planned; in fact, one-sixth of the 25 per cent had not been completed at the close of the half year. These could not contribute to the output. Also a very considerable number of retorts was engaged in redistilling spelter of ordinary grade to make it of high grade. These retorts not only did not add to the output of spelter, but they diminished it, because there was a loss of 7 to 10 per cent of zinc in the redistillation.

The Chamber of Commerce of Allentown, Pa., has made arrangements for an extensive campaign to revive interest in the city. Efforts will be made to encourage new industries in all lines, especially the metal industries, and arrangements are being made to give financial assistance to deserving enterprises.

Tin exports from the Federated Malay States in July are returned as 3499 tons, against 3544 tons and 4582 tons for July in 1915 and 1914 respectively. The total to Aug. 1, 1916, is given as 25,224 tons, against 26,862 tons to Aug. 1, 1915, and 29,484 tons to Aug. 1, 1914.

Seattle Industrial Fair

The Manufacturers' & Merchants' Industrial Fair, held in Seattle the week of Aug. 14 to 19, is reported by our correspondent to have achieved the greatest success of any such event ever observed in the State of Washington. The exhibition enjoyed gratifying popularity and, aside from the Seattle business men and merchants, approximately 1000 merchants from all parts of the State were in attendance. The 200 exhibits, including among them the widest variety of State products ever brought together at one time, and their artistic arrangement, made the fair a memorable event. It was the fourth annual event of its kind to be held in Seattle, was constructed on permanent lines, and practically all of the booths will remain as the all-the-year-round exhibit of the Manufacturers' Association and Exchange.

The meeting of the Northwest Merchants' Convention, held in Seattle simultaneously with the holding of the fair, gave the movement for Washington-made goods and the industrial progress of the State a tremendous impetus. Attendants in charge of the various booths maintained by the State manufacturers report a surprisingly large number of inquiries for details and prices on goods manufactured, while scores of merchants placed large orders for manufactured articles previously purchased in other sections of the country.

In conjunction with the fair, the merchants of Seattle co-operated by making window displays of Washington-made goods in their stores, and even assisting to the extent of filling up window space unoccupied. A majority of the exhibitors expressed the opinion that the new industrial spirit for which manufacturers of Washington have been hoping has at last arrived, and that the factories of the State will receive the home recognition needed to put their business on a stable foundation.

At the convention the following topics were discussed: "Accounting, Credits and Collections," by E. C. McReavy, Big Lake, Wash.; "The Retail Salesman," Theodore H. Bowden, First National Bank, Everett; "Co-operation Between Banker and Merchant," C. A. Giblin, Seattle; "Advantages of Community Co-operation," W. H. Paulhamus, Sumner; "University of Washington," E. E. Dahm, University of Washington. Other speakers were Wiley Hemphill, Hemphill Brothers, Inc., on "Selling Merchants at Retail"; J. Fred Braid, advertising manager, Seattle *Daily Times*, "Advertising That Pays"; C. G. Morse, merchandise manager, Fraser-Patterson Company, "The Good Buyer."

Governor Ernest Lister made the welcoming address, and called on the visitors to become acquainted personally with the jobbers of Seattle as well as the manufacturers. R. R. Fox, Simonds Mfg. Company, Seattle, president of the Northwest Merchants' Association, said: "The great advantage in holding an affair of this nature is in acquainting the public with the articles that are manufactured and produced in the State. It would be my suggestion that these same exhibitors continue to advertise these Washington-made products, to be sure that everyone who visited the exhibits will not forget the things they saw at the fair."

Constant entertainment was provided for the visitors, including programs of music, vaudeville, automobiling, receptions and sight-seeing trips through Seattle's various manufacturing establishments.

The fair was held on the second floor of the Stuart-Henry-White Building, where the permanent exhibits of the Manufacturers' Association are maintained.

In giving an order for 63 motorcycles the War Department specified that they should be equipped with Corbin-Brown speedometers, which are made by the Corbin Screw Corporation, New Britain, Conn. Years ago the instrument was tested by experts in the Government laboratories at Washington and found to be accurate under all conditions. The excessive heat to which speedometers are subjected along the Mexican border necessitates the use of an instrument that is absolutely immune to the influences of heat and cold. It is doubtless with this requirement in mind that the War Department selected the Corbin-Brown.

UNIONS MAY BE SUED

Though Unincorporated, They Are Liable as Associations Under the Anti-Trust Act

An important decision bearing on the responsibility of labor unions in connection with their efforts to prevent the operation of plants where employees are on strike was given by the United States Circuit Court of Appeals recently at St. Paul, Minn. The United States District Court, in the case of the Bache-Denman Coal Companies of Arkansas against the United Mine Workers of America, dismissed the suit for triple damages, amounting to over $1,250,000, on the ground that the complaint did not set forth a cause of action under the Sherman anti-trust law. The complaint was directed against the attempts of the miners' union to prevent the operation of open-shop mines. There were mobs, riots, and the burning of railroad cars, lawlessness reigning until the arrival of Federal troops. Meanwhile, the mines were practically wiped out of existence and forced into the hands of a receiver. The Circuit Court of Appeals reversed the decision in the District Court. It held that a labor union, though unincorporated, may be sued in its own name under the anti-trust law, the statute specifically saying that the words "person or persons" includes corporations and associations. The Court of Appeals thus overruled the finding of the District Court to the effect that as the local unions had not been shown to be organized under any particular law they could not be held liable.

The next question was whether a case had been made out under the anti-trust law where the defendants had not, by boycott or otherwise, interfered with sales, though they had made attacks which cut off output. The higher court held that any attempt to restrain interstate trade by interference with the production of articles for interstate trade is a violation of the Federal anti-trust law. The case is now remanded to the District Court, where the defendants will be required to go to trial.

British Imports of Manganese Ore

British imports of manganese ore in July were 33,817 gross tons, against 50,826 tons in June. The total imports to Aug. 1 were 259,309 tons, against 154,158 tons to Aug. 1, 1915. The monthly import rate to Aug. 1, this year, has been 37,044 tons, against 22,022 tons per month in the same period in 1915. The 1913 and 1914 rates were 39,953 tons and 50,098 tons respectively per month.

The Crocker-Wheeler Company, Ampere, N. J., announces that its San Francisco district office, of which W. K. Brown is manager, has been removed from the Crossley Building, 619 Mission Street, to the ground floor of 87 New Montgomery Street. A large assortment of motors, generators and transformers will be carried in stock for the convenience of Pacific coast buyers of electrical equipment.

Charles M. Terry, Inc., Australian exporting commission merchant, 23-25 Beaver Street, New York, is conducting a business established by Charles M. Terry, who withdrew Jan. 1, 1916, from R. W. Cameron & Co., of which firm he was resident partner in Australia for many years. The new company's Australian offices are at 115 Pitt Street, Sydney.

Lime manufactured and sold in the United States in 1915 amounted to 3,589,699 net tons, valued at $14,336,756, according to G. F. Loughlin of the U. S. Geological Survey. This was an increase of 208,771 tons, or 6 per cent, over that of 1914 and nearly equaled the record output of 3,595,300 tons in 1913.

Deliveries of the Austrian Steel Trust for the first half of 1916 were 444,814 metric tons, against 295,364 tons to July 1, 1915. Of this year's total, 301,365 tons were bar iron and shapes.

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Old Machinery House Changes Its Name

The Prentiss Tool & Supply Company, 149 Broadway, New York, announces that on Sept. 1 its name will be changed by the formation of a new company, under the style of Henry Prentiss & Co., Inc. The new company will succeed to the business and properties of the one which has become so well known. Except for the change of name, the business will go on as heretofore, with the same officers, directors, stockholders, general organization and business policy. Henry Prentiss is president of the company and Marshall Prentiss is secretary and treasurer. It handles a line of metal-working machinery of high reputation, and has offices in Boston, Buffalo, Rochester, Scranton and Syracuse. Henry Prentiss was for some years vice-president of the National Supply & Machinery Dealers' Association, and in charge of the machine-tool interests of that body.

Iron and Steel Markets

GREAT PRESSURE ON MILLS

Large Orders, Foreign and Domestic

Rail Buying by France and England—Pig-Iron Market Broadening

The difficulties of the steel mills are again increasing, as the delivery of six months' output and more now narrows down for many of them to the four months that remain of 1916. Production in August was about equal to that of July, in spite of trying conditions, but new business was larger and the Steel Corporation expects to end the month with an increase in unfilled orders.

Domestic buying of finished steel for the first half of next year has not been conspicuous, though a good many implement makers have contracted for steel bars at 2.50c., the sales of the leading producer on this account being reported at 160,000 tons.

While mills are not disposed to put up prices on contract material, the market is stronger and premiums for early delivery are more in evidence, particularly on bars, plates and shapes. The Steel Corporation now quotes on forward delivery 2.60c., Pittsburgh, for bars, 2.70c. for shapes and 3c. for plates.

The 1916 naval program will make a far greater demand on steel works than had been calculated. It is now figured that hulls and armament 215,000 to 220,000 tons will be needed for the 4 battleships, 4 battleship cruisers, 4 scout cruisers, 20 destroyers, 20 submarines, 1 fuel ship, 1 ammunition ship and 1 hospital ship. In the case of two steel companies, at least, some of this Government work must be taken on to the exclusion of more remunerative foreign orders.

New vessel orders include three on the Pacific Coast, two at Philadelphia for American owners, and two at Baltimore for Norwegian interests. Steel placed for these is mainly for the third quarter of 1917. An Eastern yard has just placed 40,000 tons of shipbuilding steel, chiefly plates. Japan is still a buyer for its shipyards, and its wants make up the bulk of a 20,000-ton inquiry pending in the Chicago district.

Railroad wants have been more of a factor in the past week. The Southern Railway has ordered 20,000 tons of rails for next summer and 5000 tons has been bought for Cuba. The Canadian Northern is inquiring for 20,000 tons, of which it is likely only 10,000 tons can be supplied in this country. The Grand Trunk is in the market for 20,000 tons. In tie plates the Santa Fé order for nearly 10,000 tons is a feature.

France has just closed for 15,000 tons of rails, making its total orders in the past year about 100,000 tons. Great Britain, it now develops, has bought 56,000 tons of rails here, or much more than has been estimated. These export rail orders have given tonnage to Bessemer mills.

The placing of a large tonnage of 1½-in. and 2-in. Bessemer angles for France is attracting attention. Two steel companies have taken 18,000 tons, with 8,000 to 10,000 tons pending. Mills have asked 3.10 to 3.25c. on this material.

Foreign buyers for other than war needs are more active as signs point to the continuance of high prices instead of the reductions indicated two months ago. Wire products, structural shapes and plates are being extensively figured on. From Italy there is a 10,000-ton inquiry for sheet piling.

The scarcity of semi-finished steel is less acute in the Middle West, though one large steel company is still buying from others. On sheet bars it is indicated that one producer will ask $3 a ton more for fourth quarter than the basis of current deliveries.

The broadening of the pig-iron buying movement is evident, but there is considerable irregularity in prices. In view of the dip of the market in all districts in putting through the large transactions with which the August movement started, few sellers are now getting more than they were quoting through the lull. Close to $17.50 at Chicago district furnace was done on 2.25 silicon iron in the latest competition between Northern and Southern sellers.

Thus far, large buyers have taken the bulk of the iron sold for first half of next year. Buffalo reports sales of 100,000 tons of all grades in the week, most of it in good-sized lots. Some foundries will buy more iron for this year, but the large majority will carry over 1916 iron two or three months into 1917. Machine shop and foundry strikes have done much to keep pig iron from sharing in the advances in steel.

At Pittsburgh, the long predicted advance in basic pig iron is still delayed. A sale of 10,000 tons was made there, and inquiry covers 20,000 to 25,000 tons. An Indiana buyer has closed for 25,000 tons with Detroit furnaces. In eastern Pennsylvania, the basic market is higher; how much, will be shown by a new inquiry for 18,000 tons.

Pittsburgh

PITTSBURGH, PA., Aug. 29, 1916.

Prices of iron and steel products are fully as strong as at any time this year. They are much firmer than they were in June, when there was a decided lull and the market went off to some extent. The scarcity of Bessemer and open-hearth steel, which, however, promises to be corrected before long, is having the effect of holding prices on finished material very firm, the chances favoring further advances on some lines before long. The strength in prices on steel products was shown very clearly recently in the case of steel bars. Some implement makers that had the chance of covering their needs of steel bars for first half of 1917 at 2.35c., Pittsburgh, but refused to do so, claiming the price was too high, have since come in and bought at 2.50c. The market on Bessemer black sheets is stronger, due largely to the fact that sheet mills which buy their sheet bars will have to pay a higher price for fourth quarter bars than for third quarter. It is stated, but not confirmed, that sheet bars for fourth quarter from one large producer will be considerably above $40 at mill. It is claimed that it costs about $14 per ton or more to put bars into sheets, so that at 3c. at mill for No. 28 black sheets there would only be a fair profit.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

	Aug. 30, 1916	Aug. 23, 1916	July 26, 1916	Aug. 25, 1915
Pig Iron, Per Gross Ton.				
No. 2 X Philadelphia	$19.00	$19.00	$19.75	$14.00
No. 2, Valley furnace	18.00	18.00	18.25	13.50
No. 2 Southern, Cin'ti	**16.50**	16.50	16.00	13.00
No. 2, Birmingham, Ala.	**14.00**	14.00	14.00	11.00
No. 2, furnace, Chicago*	18.00	18.00	19.00	13.50
Basic, del'd eastern Pa.	**19.75**	19.00	19.00	14.50
Basic, Valley furnace	18.00	18.00	18.00	14.50
Bessemer, Pittsburgh	21.00	21.00	21.00	16.46
Malleable Bess., Chgo.*	19.00	19.00	19.00	13.50
Gray forge, Pittsburgh	18.50	18.50	18.50	13.46
L. S. charcoal, Chicago	19.75	19.75	19.75	16.25
Billets, etc., Per Gross Ton:				
Bess. billets, Pittsburgh	45.00	45.00	45.00	23.50
O.-h. billets, Pittsburgh	45.00	45.00	45.00	24.00
O.-h. sheet bars, P'gh	45.00	45.00	45.00	24.50
Forging billets base, P'gh	69.00	69.00	69.00	29.00
O.-h. billets, Phila.	**48.00**	46.00	45.00	32.00
Wire rods, Pittsburgh	55.00	55.00	55.00	28.00
Finished Iron and Steel,				
Per Lb. to Large Buyers	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.47½	1.47½	1.47½	1.25
O.-h. rails, heavy, at mill	1.56½	1.56½	1.56½	1.34
Iron bars, Philadelphia	2.659	2.659	2.659	1.459
Iron bars, Pittsburgh	2.60	2.60	2.60	1.30
Iron bars, Chicago	2.85	2.85	2.85	1.25
Steel bars, Pittsburgh	2.60	2.60	2.50	1.30
Steel bars, New York	2.769	2.769	2.669	1.519
Tank plates, Pittsburgh	4.00	4.00	3.50	1.30
Tank plates, New York	4.169	4.169	3.669	1.469
Beams, etc., Pittsburgh	**2.60**	2.50	2.50	1.30
Beams, etc., New York	**2.769**	2.669	2.669	1.519
Skelp, grooved steel, P'gh	2.35	2.35	2.35	1.30
Skelp, sheared steel, P'gh	2.45	2.45	2.45	1.35
Steel hoops, Pittsburgh	3.00	3.00	2.75	1.35

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

	Aug. 30, 1916.	Aug. 23, 1916.	July 26, 1916.	Aug. 25, 1915.
Sheets, Nails and Wire,				
Per 100 lb. to Large Buyers	Cents.	Cents.	Cents.	Cents.
Sheet iron, No. 27	3.60	3.60	2.90	1.90
Galv. sheet, No. 28	4.15	4.15	4.25	3.40
Wire nails, Pittsburgh	2.00	2.00	2.00	1.65
Cut nails, Pittsburgh	2.60	2.60	2.60	1.60
Fence wire, base, P'gh	2.50	2.50	2.45	1.50
Barb wire, galv., P'gh	3.45	3.45	3.35	2.40
Old Material, Per Gross Ton:				
Iron rails, Chicago	**18.75**	18.75	18.50	12.25
Iron rails, Philadelphia	20.00	20.00	20.00	17.00
Car wheels, Chicago	11.00	11.00	11.00	11.75
Carwheels, Philadelphia	15.50	15.50	15.50	13.50
Heavy steel scrap, Pittsburgh	16.00	16.00	16.25	14.00
Heavy steel scrap, Phila.	14.75	14.75	15.00	14.00
Heavy steel scrap, Ch'go.	15.25	15.25	15.25	11.75
No. 1 cast, Pittsburgh	14.50	14.50	15.00	13.00
No. 1 cast, Philadelphia	16.00	16.00	16.00	13.50
No. 1 cast, Chicago (net)	11.50	11.50	11.50	10.00
No. 1 RR. wrot, Phila.	20.00	20.00	19.50	15.50
No. 1 RR. wrot, Chicago (net ton)	**15.50**	15.25	15.25	11.00
Coke, Connellsville, Per Net Ton at Ovens:				
Furnace coke, prompt	**$2.90**	$2.85	$2.75	$1.50
Furnace coke, future	2.90	2.90	2.90	1.75
Foundry coke, prompt	**3.50**	3.50	3.25	2.00
Foundry coke, future	3.50	3.50	3.50	2.25
Metals,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	**27.50**	27.25	25.25	19.00
Electrolytic copper, N. Y.	**27.25**	26.87½	25.00	16.00
Spelter, St. Louis	8.25	8.00	10.25	12.25
Spelter, New York	8.60	8.35	10.50	12.50
Lead, St. Louis	6.50	6.50	6.00	4.35
Lead, New York	6.50	6.62½	6.50	4.50
Tin, New York	**39.25**	38.50	38.00	33.75
Antimony, Asiatic, N. Y.	13.50	13.50	13.50	28.50
Tin plate, 100-lb. box, P'gh	*$5.75*	$6.00	$6.00	$3.10

The pig-iron market is showing more strength, and an early advance in basic, and possibly on Bessemer, seems probable. On all lines of finished material, specifications are heavy, and there is a fair amount of new buying for first quarter and first half of 1917. Best grades of prompt furnace coke are scarce and prices are up. Scrap is quiet, prices on some grades being very weak.

Pig Iron.—The local market on both Bessemer and basic pig iron is stronger, but as yet prices have not advanced. A southern Ohio company, which bought a month ago a round tonnage of basic iron for its open-hearth steel works, has recently closed for 16,000 tons more, but none of this iron came from the valleys. The Carbon Steel Company of this city bought 10,000 tons of basic at about $18, Valley, the business being divided between a local furnace and an outside maker, which has a slightly lower rate to Pittsburgh than the Valley furnaces. A Youngstown interest is inquiring for 20,000 to 25,000 tons of basic, but has not yet closed. The supply of Bessemer and basic iron is limited, and with an active demand for the latter the price of $18 at furnace, which has ruled for several months, is likely to be higher in the near future. There is a fair inquiry for foundry iron for first quarter and first half of 1917, some furnaces asking as high as $19 for that delivery, but as yet this price has not been paid. We quote Bessemer iron at $21; basic, $18; gray forge, $17.75 to $18; malleable Bessemer, $18.50 to $19, and No. 2 foundry, $18.25 to $18.50, all at Valley furnace, the freight rate to the Pittsburgh and Cleveland districts being 95c. per gross ton.

Ferroalloys.—The local market on all kinds of ferroalloys is very dull and new inquiry is light. Domestic makers of ferromanganese are quoting lower prices, and for 80 per cent domestic, $165 or less would readily be done. It is not confirmed that the leading domestic producer of ferromanganese has been a seller in the open market. We quote 18 to 22 per cent spiegeleisen at $40 to $45, and 25 to 30 per cent, $55 to $65, at furnace. On 50 per cent ferrosilicon we quote $88 to $89 in lots up to 100 tons; over 100 tons, $87 to $88, and over 600 tons, $86 to $87, all per gross ton, f.o.b. Pittsburgh. We quote Bessemer ferrosilicon as follows: 9 per cent, $30; 10 per cent, $31; 11 per cent, $32; 12 per cent, $33; 13 per cent, $34.50; 14 per cent, $36.50; 15 per cent, $38.50, and 16 per cent, $41. Seven per cent silvery is $28.50; 8 per cent, $29; 9 per cent, $29.50; 10 per cent, $30; 11 per cent, $31, and 12 per cent, $32. These prices are f.o.b. furnace, Jackson or New Straitsville, Ohio, or Ashland, Ky., all having a freight rate of $2 per gross ton to Pittsburgh.

Billets and Sheet Bars.—There is still a scarcity in the supply of Bessemer and open-hearth steel, but the new demand is not so insistent, foreign inquiry having quieted down a good deal, and domestic consumers stating they are getting prompt deliveries from the mills. Prices vary considerably, depending on the kind of steel and how soon it is wanted. In a general way, soft Bessemer and open-hearth billets are quoted from $45 to $50 per ton, makers' mills, but it would be an extreme case that would cause the latter price to be paid. Several of the larger steel mills that are badly oversold are still buying in the open market. We quote soft Bessemer and open-hearth billets and sheet bars at $45, maker's mill, Pittsburgh or Youngstown. From dealers it might be possible to obtain steel at $1 to $2 per ton less for ordinary specifications and carbons. We quote forging billets at $69 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take $1 extra.

Structural Material.—The new inquiry is fair, but local fabricators are not bidding actively on large new work that is coming up, being sold up for four or five months. The American Bridge Company has taken about 250 tons of bridge work for the Baltimore & Ohio Railroad. We quote beams and channels up to 15-in. at 2.60c. at mill for such deliveries as the mill can make, while small lots from stock for prompt shipment bring 3c. to 3.25c., Pittsburgh.

Steel Rails.—Reports are that a very large export inquiry for 60-lb. rails, 100,000 tons or more, is in the market, but if this is true the inquiry has not yet come to the local mills. We note a sale of about 800 tons of 45-lb. rails at $37 at mill, equal to $38, Pittsburgh. The demand for light rails from the coal mining and lumber interests is active, but it is said competition from the rerolling rail mills is more severe than for a long time, and, as a result, they are getting most of such business that is being placed. We quote 25 to 45 lb. sections at $47; 16 and 20 lb., $48; 12 and 14 lb., $49; and 8 and 10 lb., $50, in carload lots, f.o.b. at mill, the usual extras being charged for less than carload lots. We quote standard section rails of Bessemer stock at 1.47½c., and of open hearth 1.56½c., Pittsburgh.

Plates.—One leading mill reports it can readily obtain 4.50c. for ¼ in. and heavier sheared plates, if it will guarantee delivery in 30 to 60 days. For shipment in two to four months, this same maker has sold quite heavily at 4c. at mill. Some inquiries for steel cars are coming out. The New York Central has placed 1000 steel underframe freight cars with the Standard Steel Car Company. The Kimberly-Clark Company, Neenah, Wis., is inquiring for 20 flat cars. The Pittsburgh & Lake Erie has ordered 10 locomotives from the American Locomotive Company. The minimum mill price on sheared plates is 3c. for delivery in first quarter and first half of 1917. We quote ¼ in. and heavier plates for shipment in two to four months, from 4c. to 4.50c., Pittsburgh.

Sheets.—It is said a leading steel interest has notified customers to whom it furnishes sheet bars that the price for fourth quarter delivery will be at least $3 per ton higher than for third quarter. Due to this fact, prices on Bessemer black sheets are firmer, two mills having recently advanced their minimum price to 3c. at mill. There is still some weakness in prices of galvanized sheets, because of the lower price of spelter. A sale is reported of 1000 tons of open-hearth blue annealed sheets for November and December delivery at 3.15c. at mill. The American Sheet & Tin Plate Company is operating this week to about 91 per cent of hot sheet mill capacity, but many of its mills are not operated more than four days a week. We quote No. 28 Bessemer and open-hearth black sheets at 2.90c. to 3c.; No. 28 galvanized, Bessemer, and open-hearth, 4.15c. to 4.25c.; Nos. 22 and 24 black plate, tin-mill sizes, H. R. & A., 2.90c.; Nos. 25, 26 and 27, 3c. to 3.10c.; No. 28, 3.10c. to 3.15c.; and No. 29, 3.20c. to 3.25c. These prices are for carloads and larger lots, f.o.b. mill, Pittsburgh.

Tin Plate.—The mills state that the pressure for deliveries from the canning interests is still very insistent and much beyond what they are able to supply. Some inquiry is in the market for the first half of 1917, but, beyond a few contracts taken for Pacific coast consumers, the mills are not likely to name a price for some time. The export inquiry is still quite heavy. To regular customers, mills are quoting tin plate from stock at $5.50, while production tin plate is quoted at $5.75 and up to $6 to the domestic trade. For export, $6 to $6.25 per base box is quoted. We quote 8-lb. coated ternes at $8.50 to $8.75 for 200 lb., and $8.75 to $9 for 214 lb., all f.o.b. Pittsburgh.

Cold-Rolled Strip Steel.—As yet none of the makers of cold-rolled strip steel has taken any contracts for delivery into 1917, but a meeting is to be held in this city Sept. 7, at which time it is possible makers may agree to open their books for such contracts. Nearly all large consumers are covered over the remainder of this year, and orders coming in now are from consumers who refused to contract ahead. We note one contract for 600 tons at $6, base, per 100 lb., another of 150 tons at $6.50 and one of 100 tons at $6.25, all f.o.b. at mill. Terms are 30 days net, less 2 per cent off for cash in 10 days, delivered in quantities of 300 lb. or more when specified for at one time.

Wire Rods.—Fairly large contracts have recently been closed with consumers for delivery through first quarter and, in a few cases, first half of 1917. Prices on these contracts depend largely on the class of products made by the buyers. Concerns making wire and wire nails could not pay above $50 for rods and market their products, while concerns making other products for which prices are high pay $55 and as high as $60. One contract for 500 tons of soft open-hearth rods, delivery over the next two or three months, was placed last week. We quote soft Bessemer, open-hearth and chain rods at $55 to $60 per ton, f.o.b. Pittsburgh, but to regular customers who buy in large quantities $50 per ton is being named.

Nuts and Bolts.—Makers state the recent advance of 5 per cent in nuts and bolts is holding firm. Most consumers are covered over the remainder of this year at lower prices and are specifying freely against contracts. Another advance in the price of steel bars is looked for soon, and if this is made the prices of nuts and bolts will likely advance again. Deliveries of steel bars to the mills are still very unsatisfactory, but it is believed will be better in September, as the hot weather will likely be over by that time. The export demand is fairly active. The discounts are as follows, delivered in lots of 300 lb. or more, where the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days:

Carriage bolts, small, rolled thread, 50 and 5 per cent; small, cut thread, 40, 10 and 5 per cent; large, 35 and 5 per cent.

Machine bolts, h. p. nuts, small, rolled thread, 50 and 10 per cent; small, cut thread, 40 per cent; large, 10 and 5 per cent.

Machine bolts, c. p. c. and t. nuts, small, 40 and 10 per cent; large, 35 per cent. Blank bolts, 40 and 5 per cent. Bolts, c. p. nuts, 40 and 5 per cent; with c. p. nuts, 35 per cent. Rough stud bolts, 15 per cent. Lag screws (cone or gimlet point), 50 and 5 per cent.

Forged set screws and tap bolts, 10 per cent. Cup and round point set screws, case hardened, 60 per cent. Square or hexagon head cap screws, 55 per cent. Flat, button, round or fillister head cap screws, 30 per cent.

Nuts, h. p. sq., tapped or blank, $2.70 off list; hex., $2.70 off. Nuts, c. p. c. and t. sq., tapped or blank, $2.40 off; hex., $2.80 off. Semi-finished hex. nuts, 60 and 5 per cent. Finished case-hardened nuts, 60 and 5 per cent.

Rivets, 7/8 in. and smaller, 60 and 10 per cent; 1 in. and larger, 10 and 5 per cent.

Rivets.—The new demand is not so active as it has been, but general conditions are good, makers being sold up for three or four months, while the output of rivets is held down by slow deliveries of steel bars from the mills. Foreign inquiry is heavy. One local maker is shipping two carloads of rivets to India. On current orders, makers are usually able to obtain full prices. Quotations, which are being shaded in some cases by jobbers, are as follows: Buttonhead structural rivets, ½ in. in diameter and larger, $4 per 100 lb., base, and conehead boiler rivets, same sizes, $4.10 per 100 lb., base, f.o.b. Pittsburgh. Terms are 30 days net, or one-half of 1 per cent for cash in 10 days.

Railroad Spikes.—The market is dull, no new inquiries being out, and specifications are quiet. None of the makers is running to more than about 50 per cent of capacity, if that much. Prices are not very firm and are as follows:

Standard railroad spikes, 4½ x 9/16 in. and larger, $2.65 to $2.75; railroad spikes, 4 and 5 inch, $2.75 base; railroad spikes, ⅜ in. and 5/16 in., $3.05 base; boat spikes, $2.80 base, all per 100 lb., f.o.b. Pittsburgh.

Wire Products. — Specifications are now being received by several mills in the Pittsburgh district for contracts for about 44,000 tons of barb wire for Russia, taken some time ago. There is still quite a heavy foreign inquiry for barb and fence wire, but local mills have so much business booked ahead they do not bid on much of this work. Specifications against contracts for wire and wire nails placed prior to the advance of Aug. 7 are coming in freely. It is said that about all the low priced contracts on nails and wire have been cleaned up, and prices on shipments now going out on wire nails range from $2.45 up to $2.50. On current orders, none of the mills is shading $2.60 on nails and $2.65 for bright basic wire. Prices to the large trade, effective from Aug. 7, are as follows: Wire nails, $2.60, base, per keg; galvanized, 1 in. and longer, including large head barbed roofing nails, taking an advance over this price of $2, and shorter than 1 in., $2.50. Bright basic wire is $2.65 per 100 lb.; annealed fence wire, 6 to 9, $2.55; galvanized wire, $3.25; galvanized barb wire and fence staples, $3.45; painted barb wire, $2.75; polished fence staples, $2.75; cement coated nails, $2.50, base, these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing remain at 61½ per cent off list for carload lots, 60½ per cent for 1000 rod lots and 59½ per cent for small lots, f.o.b. Pittsburgh.

Iron and Steel Bars.—The market on steel bars is very firm, none of the mills quoting less than 2.60c., and one mill that a month or more ago was actively seeking business for fairly prompt delivery is now quoting 2.75c. for shipment at its convenience. Large consumers of steel bars say that deliveries from the mills have been very bad for some time, this being due largely to the

hot weather and vacation period, but it is believed that early in September production will come up considerably. There are still large export inquiries for steel rounds coming to local mills, but not much of this business is being placed here. One leading mill has recently taken several large contracts for steel bars from implement makers at 2.50c. for delivery in first quarter and first half of 1917. The demand for iron bars is active and mills are sold up for several months. We quote merchant steel bars at 2.60c. at mill for delivery at convenience of the mill, which would be in last quarter of this year or first quarter of 1917, while for prompt shipment from warehouse 3c. to 3.10c. is quoted. We quote refined iron bars at 2.60c. to 2.70c., and railroad test bars, 2.70c. to 2.80c., f.o.b. Pittsburgh.

Shafting.—Nearly all consumers of shafting are covered over the remainder of this year, and in a few cases contracts are made running into the first half of 1917. One leading maker has not taken any contracts for delivery beyond this year, believing that prices for first half of 1917 may be higher than they are now. Specifications are coming in freely and small current orders for fairly prompt shipment are being placed at about 10 per cent, and in some cases 15 per cent off. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots for delivery in last quarter of this year and first quarter of 1917, and 10 per cent off in less than carload lots, f.o.b. Pittsburgh, freight added to point of delivery.

Merchant Steel.—Some consumers whose products are sold largely to the railroads are trying to cover for their supply of merchant steel through all of 1917. As yet mills are not inclined to quote so far ahead, but, if they do, claim they will ask at least $10 per ton over present prices. Current demand is active and for special grades of merchant steel premiums are readily paid. We quote: Iron finished tire, ½ x 1½ in. and larger, 2.60c., base; under ½ x 1½ in., 2.75c.; planished tire, 2.75c.; smooth channel tire, ¾ to ⅞ and 1 in., 2.85c. to 2.90c.; 1⅛ in. and larger, 3.10c.; toe calk, 3.10c. to 3.15c., base; flat sleigh shoe, 2.75c.; concave and convex, 2.85c.; cutter shoes tapered or bent, 3.25c. to 3.35c.; spring steel, 3.25c. to 3.50c.; machinery steel, smooth finished, 2.90c. to 3c., all f.o.b. at mill.

Hoops and Bands.—Most consumers are covered over the remainder of the year and specifications are active. For current orders for fairly prompt shipment, hoops are 3c. and steel bands 2.60c. at mill, with extras on the latter as per the steel bar card. For fairly prompt shipment steel bands are quoted at 2.75c. and higher.

Wrought Pipe.—Reports are that two fairly large gas lines in iron pipe have been placed with local mills. It is doubtful, however, whether any considerable orders of line pipe will be placed for delivery this year, as the mills are filled up so far ahead on lap-weld pipe they could not possibly make the deliveries. As stated before, mills are sold up five to six months ahead on lap-weld sizes but can ship out butt-weld sizes promptly. The new demand for oil country goods has fallen off, due to the decline in oil, and some contemplated drilling work has been stopped. Discounts on both iron and steel pipe, given on another page, are firmly held.

Boiler Tubes.—Most large consumers are covered ahead for this year, and some over the first half of 1917. Mills are sold up on locomotive and merchant tubes anywhere from six to 10 months, and on seamless tubes to July, 1917, or longer. Discounts on iron and steel tubes, as given on another page, are firm.

Coke.—There is still a scarcity of high grade furnace coke for prompt shipment, and this week it has sold at as high as $2.90 per net ton at oven. The Youngstown Sheet & Tube Company is now operating all of its 204 Koppers by-product ovens, and this releases a very large amount of beehive furnace coke to go elsewhere. We quote best grades of blast-furnace coke for prompt shipment at $2.90 to $3 per net ton at oven, and on contracts $2.50 to $2.60. There is no inquiry for contract furnace coke, as furnaces are covered. Prices on best grades of 72-hr. foundry coke are also higher, and we quote prompt at $3.25 to $3.50, and on contracts $3.50 to $3.75, per net ton at oven. The Connellsville *Courier* gives the output of coke in the upper and lower Connellsville regions for the week ended Aug. 19 as 408,060 net tons, an increase over the previous week of 4720 tons.

Old Material.—It is stated that the Carnegie Steel Company, which bought about 80,000 tons of heavy steel scrap in July, has piled practically all of this scrap that it has taken in and recently declared an embargo on further shipments, which is still on. The market on borings and turnings is very dull, prices on the latter being particularly weak. There is some movement in low phosphorus melting stock at $19.50 to $20, delivered. The American Steel Foundries is credited with having bought 8000 to 10 000 tons of selected heavy steel scrap for Sharon and Alliance at $16.25 per gross ton, delivered, or slightly higher. Prices now being quoted by dealers for delivery in Pittsburgh and points that take the same rates of freight, per gross ton, are as follows:

No. 1 railroad malleable stock	14.50 to 14.75
*Shipping point	

Chicago

CHICAGO, ILL., Aug. 29, 1916.

The buying of pig iron has become more widespread, although most of the quantities on which figures are being taken are 1000 tons or less. Activity has shifted from basic to foundry iron, with charcoal and malleable iron also in demand. Prices have strengthened both in the South and North, but competition is still holding down the quotations of local furnaces. The railroads are again showing an interest in supplies for next year. One sale of 20,000 tons of standard Bessemer rails is noted, as well as inquiry for an additional 20,000 tons. The Santa Fé has placed its order for tie-plates. In finished lines the only exception to the general condition of greatly protracted delivery is the renewal of premium quotations for prompt shipments of bars, shapes and plates. One mill is asking 2.75c. for high carbon open-hearth and Bessemer bars, 2.85c. for Bessemer shapes and is disposing of plates exceeding 90 in. in width at 4c., Pittsburgh. Negotiations for railroad equipment continue of importance, the principal new inquiry being that of the Western Pacific for 1250 cars. Export inquiry, mainly from Japan, for bars, shapes and plates, continues to run into large figures, one mill having at least 20,000 tons of such material under consideration. The market for sheets is somewhat stronger without appreciable change in prices. Some adjustments of store prices in conformity with recent advances in mill prices are being made. Makers of bolts and nuts have rounded up quite a large business following the announcement of new discounts. The scrap market is noticeably firmer because of the apparent shortage of old material, but lack of buying retards the upward movement of prices.

Pig Iron.—While the disposition of the recent business in basic iron reduces the volume under consideration, inquiry for foundry grades is becoming more general and the buying movement is gathering headway. For non-competitive iron the market is stronger, having been steadied by the advance in Southern prices. For high phosphorus Northern iron, however, quotations are still ragged and local interests are underbidding Southern quotations, a price for last and first quarter shipment of less than $18.50, delivered, on an 85c. freight rate, for iron 2.25 per cent and over in silicon.

is noted. For basic and malleable most of the local furnaces are again quoting $19, while for foundry iron of standard Northern analysis quotations range downward to $18.50. Inquiry includes a considerable number of lots of 1000 tons and less of both foundry and charcoal iron, with one lot of charcoal iron of 3000 tons. For Northern iron no premium is being asked for first quarter delivery, but Southern furnaces are quoting $14 for prompt shipment, $14.50 for last quarter and $15 for first quarter. The local situation is strengthened somewhat by the prospect of one of the South Chicago furnaces blowing out for relining in the near future. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of $1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5	$19.75
Lake Superior charcoal, No. 1	20.25
Lake Superior charcoal, No. 6 and Scotch	20.75
Northern coke foundry, No. 1	$18.50 to 19.00
Northern coke foundry, No. 2	18.00 to 18.50
Northern coke foundry, No. 3	17.50 to 18.00
Southern coke, No. 1 foundry and 1 soft	18.50 to 19.00
Southern coke, No. 2 foundry and 2 soft	18.00 to 18.50
Malleable Bessemer	19.00
Basic	18.00 to 18.50
Low phosphorus	34.00
Silvery, 8 per cent	26.50
Bessemer ferrosilicon, 10 per cent	32.50

Rails and Track Supplies.—The renewal of railroad inquiry for next year is unusual at this season. This inquiry covers a considerable quantity of track fastenings and 20,000 tons of rails for the Grand Trunk. The Southern Railway purchased 15,000 tons of Bessemer rails for delivery in the first half, subsequently increasing the order by 5000 tons. The Santa Fé reports having closed for its tie-plate requirements. Quotations are as follows: Standard railroad spikes, 2.75c., base; track bolts with square nuts, 3.25c. to 3.50c., base, all in carload lots, Chicago; tie-plates, $50, f.o.b. mill, net ton; standard section, Bessemer rails, Chicago, $33, base; open-hearth, $35; light rails, 25 to 45 lb., $40; 16 to 20 lb., $41; 12 lb., $42; 8 lb., $43; angle bars, 2c., Chicago.

Structural Material.—Steel fabricators report a more than comfortable supply of small jobs. New contracts in the past week include 120 tons for the General Electric Company's factory at Fort Wayne, 200 tons for a power station at Cincinnati, 320 tons for a mine shaft at Bessemer, Mich., and 500 tons for a bridge in Santa Barbara County, Cal. The Northwest Steel Company will fabricate 1600 tons for a post office at Portland, Ore., and the American Bridge Company, 1000 tons for additions to the Cook County Hospital, Chicago. Negotiations for the building of new cars and the repair of old ones embrace a number of lots of miscellaneous equipment and one lot of 1250 box cars for the Western Pacific. The New York Central has ordered 1000 cars from the Standard Steel Car Company. There is little local inquiry for plain material except in small lots for prompt shipment, much of which is being covered by offerings by Eastern mills of Bessemer shapes at advanced prices. One mill is quoting 2.85c., Pittsburgh. We quote for Chicago delivery of plain material from mill 2.789c.

We quote for Chicago delivery of structural steel from jobbers' stock 3.10c.

Plates.—Plate sales are of a miscellaneous character, the mills competing against the store price where prompt shipment is desired. Mill sales of narrow plates at prices ranging from 3.25c. to 3.50c. are noted, while for wide plates 4c. has been done in several instances. Inquiry for mixed lots of shapes and plates for shipbuilding purposes, largely for delivery to Japan, continues in large quantities, one such inquiry naming 20,000 tons. We quote for Chicago delivery of plates from mill at its convenience 3.189c. For prompt shipment we quote 3.439c. to 3.689c., in widths up to 72 in., and for wide plates 4.189c.

We quote for Chicago delivery of plates out of jobbers' stock 3.40c.

Sheets.—Makers of sheets have the support of a number of strengthening influences in the marketing of their product, particularly by reason of the very high prices being paid for sheet bars, but sheet prices, quoted to take the scattering business offered, show little improvement. Black sheets are still obtainable at prices as low as 2.85c., Pittsburgh, for No. 28, although 3c. is being quoted more frequently. Blue annealed sheets, particularly in the lighter gages, do not appear to be as firm as they were a number of weeks ago, but the market continues in the neighborhood of 3c. A number of sales of galvanized sheets are reported, but business is still obviously curtailed. We quote for Chicago delivery, blue annealed, No. 16 and heavier, 3.089c. to 3.339c.; box annealed, No. 17 and lighter, 2.939c. to 3.039c.; No. 28 galvanized, 4.289c. to 4.389c.

The price of black sheets out of stock has been advanced $3 per ton. We quote for Chicago delivery of sheets out of stock at minimum prices applying on bundles of 25 or more, as follows: No. 10 blue annealed, 3.40c.; No. 28 black, 4.25c.; No. 28 galvanized, 4.65c. to 4.75c.

Bars.—Some Bessemer bars are being offered for prompt shipment at 2.75c. There has also been some selling for future delivery, one mill taking about 5000 tons last week. A few contracts were placed for rail carbon bars by the implement interests, the price being 2.50c., Chicago. The bar-iron situation is unchanged, with new tonnage scattering and the price still 2.35c. at the mill. We quote mill shipment, Chicago, as follows: Bar iron, 2.35c.; soft steel bars, 2.789c.; hard steel bars, 2.50c.; shafting, in carloads, 20 per cent off; less than carloads, 15 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 3.10c.; bar iron, 3.10c.; reinforcing bars, 3.10c. base with 5c. extra for twisting in sizes 1 in. and over and usual card extras for smaller sizes, shafting 10 per cent off.

Rivets and Bolts.—The announcement of new discounts by the makers of bolts and nuts resulted generally in the closing up of outstanding quotations on the basis of lower prices, with a resultant booking of a fair aggregate of new business. We have revised our discounts according to the recent advance, and quote as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 50-5; cut thread, 40-10-2½; larger sizes, 35-2½; machine bolts up to ⅜ x 4 in., rolled thread, with hot pressed square nuts, 50-10; cut thread, 50; larger sizes, 40-5; gimlet-point coach screws, 50-5; hot pressed nuts, square, $2.70 off per 100 lb.; hexagon, $2.70 off. Structural rivets, ¾ to 1¼ in., 4c. to 4.15c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

We quote out of store: Structural rivets, 3.75c.; boiler rivets, 3.85c.; machine bolts up to ⅞ x 4 in., 60-10; larger sizes, 60-10; carriage bolts up to ⅞ x 6 in., 60-5; larger sizes, 50-10; hot pressed nuts, square, $4.25, and hexagon, $4.50 off per 100 lb.; lag screws 60-5.

Wire Products.—Demand for wire nails and barb wire is again assuming proportions considerably in excess of the ability of the mills to deliver, and the market stands exceedingly firm at the new level of prices. For fencing alone, the demand is noticeably light. We quote as follows per 100 lb.: Plain wire, Nos. 6 to 9, base, $2.839; wire nails, $2.789; painted barb wire, $2.939; galvanized barb wire, $3.639; polished staples, $2.939; galvanized staples, $3.639; all Chicago.

Cast-Iron Pipe.—Except for a contract for 300 tons of pipe for Fond du Lac, Wis., taken by the leading interest, new business of the past week was confined to orders of a routine character. We quote as follows, per net ton, Chicago: Water pipe, 4-in., $33.50 to $34; 6-in. and larger, $30.50 to $31, with $1 extra for class A water pipe and gas pipe.

Old Material.—The basis for judging the values of scrap in the present period of proscribed buying is largely confined to the prices being paid to fill short orders representing old sales. The apparent scarcity of scrap, particularly of the grades obtained from the railroads and those prepared by the yard dealers, is more noticeable and has resulted in a general hardening of the market, with some advances in price. The scarcity is commonly attributed to labor shortage. On the other hand, consumers are displaying very little interest in further purchases, the reduced operations of the rolling mills in the past two months cutting into

their stock much less rapidly than was expected. The situation, however, is recognized to have in it a potential strength that needs only a resumption of buying to make it manifest in the form of rapidly advancing prices. With the exception of 1000 tons of old material offered from the Belt Railway of Chicago, railroad scrap was again negligible. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Old iron rails	$18.25 to $19.00
Relaying rails	18.00 to 20.00
Old carwheels	11.50 to 12.00
Old steel rails, rerolling	16.00 to 16.50
Old steel rails, less than 3 ft.	14.25 to 14.75
Heavy melting steel scrap	15.25 to 15.75
Frogs, switches and guards, cut apart	14.25 to 14.75
Shoveling steel	14.50 to 15.00
Steel axle turnings	9.25 to 9.75

Per Net Ton	
Iron axles and pale bars	$18.50 to $19.00
Iron rail bars and bushelings	20.00 to 20.50
Steel angle bars	14.00 to 14.25
Iron car axles	26.00 to 26.50
Steel car axles	28.00 to 28.50
No. 1 railroad wrought	16.00 to 16.50
No. 2 railroad wrought	14.75 to 15.25
Cut forge	14.75 to 15.25
Pipes and flues	11.25 to 11.50
No. 1 busheling	13.00 to 13.50
No. 2 busheling	9.50 to 10.00
Steel knuckles and couplers	14.00 to 14.50
Steel springs	14.50 to 15.00
No. 1 locks, cut to sheets and rings	14.25 to 14.75
Boiler punchings	13.75 to 14.25
Locomotive tires, smooth	20.00 to 20.50
Machine shop turnings	6.00 to 6.50
Cast borings	6.25 to 6.75
No. 1 cast scrap	11.50 to 12.00
Stove plate and light cast scrap	9.25 to 9.75
Grate bars	10.00 to 10.25
Brake shoes	9.75 to 10.25
Railroad malleable	11.25 to 11.75
Agricultural malleable	10.75 to 11.25

Philadelphia

PHILADELPHIA, PA., Aug. 29, 1916.

The slight easing up which began about two months ago has entirely vanished, and the market is to-day strong in every direction. General business is good, and a greater scarcity of steel as well as of pig iron is widely predicted. New war orders and the export demand have absorbed raw and semi-finished steel to such an extent that offerings are no longer made. One must seek for steel and its products, and, if found, they are to be had only in limited quantities and at premium prices, if anything like prompt delivery is wanted. Makers of diversified products are receiving a vast amount of inquiry for lots ranging from 100 to 500 tons, mostly for delivery in the remainder of the year. Fear of a railroad strike is causing many consumers, including foundries, to request that immediate shipment be made to them. The demand comes from so many directions that it is difficult to be specific. The Southern Railway is inquiring for 5000 tons of track joints. Pig iron of all grades is livelier, good sales as well as inquiries being recorded. In plates, shapes and bars, a wide variance in price prevails. Plates and bars are more active than shapes. Coke is slow, and old material continues to drag, although the heavy export demand for steel axles is maintained.

Pig Iron.—The market is steadily gathering strength, with greater activity in both last-quarter and first-quarter deliveries, with the bulk of interest in deliveries over the remainder of the year. Not only is there an excellent volume of inquiry, but some important orders have been placed. The bulk of the tonnage contracted for consists of steel-making iron, but foundry grades are doing well, and would be more active were it not for the shortage of labor in foundries. A Chester pipe works is inquiring for 5000 tons of gray forge and No. 3, for delivery over the remainder of the year. Late last week 11,000 tons of eastern Pennsylvania basic was taken at $19.50 and $19.75, delivered in lots of 6000 and 5000 tons, the prices being 50c. and 75c. higher than that at which the last previous sale was made. Sellers are now asking $19.75 to $20, delivered. The movement of a few small lots brings the aggregate of basic sales in recent days close to 15,000 tons. More basic business is pending, one consumer in central Pennsylvania having made inquiry for 18,000 tons. An inquiry from outside of this territory calls for 12,000 tons. A shipbuilding company has closed for 500 tons of No. 3, delivery this year, and wants 1000 tons additional for the first quarter. Another consumer has taken 500 tons of No. 2 X, and another, who purchased 800 tons of malleable, is looking for 500 tons more. The minimum for malleable, delivered in this district, is about $20.58, but up to $22.44 has been paid for certain brands. Of an inquiry for 2000 tons malleable, 1700 tons has been placed. Another inquiry calls for 700 tons of No. 2 X and No. 2 plain. A Newport News interest is in the market. The Southern Railway is inquiring for a carload of special iron. A wide range in quotations continues to characterize Virginia iron, No. 2 X ranging from $20.25 to $21.25, delivered, and the sale is reported of 1500 tons of somewhat special Virginia iron at $19, furnace, but not for local delivery. A leading producer has made uniform his quotations for delivery this year and over the first six months of 1917, fixing the price for No. 2 X at $18.15, furnace, or $21.25, Philadelphia. Other makers ask $17.50, furnace, or $20.25, Philadelphia, for the approaching quarter. Standard low phosphorus is strong at $34 to $35, Philadelphia, and some lots of moderate size have been taken. Export inquiry for this and other grades continues active, a round lot having been taken by a Canadian interest. Italy and France want iron of various kinds, but especially Bessemer, one inquiry calling for 10,000 tons of the latter. Bessemer has been quoted for export at $22.69, $22.71 and $23, Philadelphia. A shipment of 4000 tons of Bessemer was made last week to the Italian Government, and a shipment to private consumers in Italy consisted of 1000 tons of low phosphorus. Quotations for standard brands, delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa., No. 2 X foundry	$19.50 to $20.00
Eastern Pa. No. 2 plain	19.25 to 19.75
Virginia No. 2 X foundry	20.25 to 21.25
Virginia No. 2 plain	20.00 to 20.75
Gray forge	18.50 to 19.00
Basic	19.75 to 20.00
Standard low phosphorus	34.00 to 35.00

Iron Ore—In the week ended Aug. 26 arrivals of foreign ore at this port consisted of 9868 tons from Sweden and 4200 tons from Chile.

Ferroalloys—The nominal price for 80 per cent ferromanganese, either domestic or foreign, is $175, seaboard, but it is known that this price is being shaded, and generally understood that $170 would be accepted. It is reported that 500 tons of domestic material, free of all restrictions, has been offered at the lower price. Spiegeleisen is unchanged at $50, furnace. Arrivals of English ferromanganese at this port last week totaled 399 tons. Fifty per cent ferrosilicon is unchanged at $86 to $88, Pittsburgh.

Plates.—The tightness of the market is illustrated by the action of a local mill in refusing to consider an export order for 6000 tons, prompt delivery, no matter what price figured. Large consumers in the Pittsburgh district have written and telephoned to local makers for plates, only to be refused. The order for Russian locomotives, which will require a goodly tonnage of plates, is still hanging fire. A large mill estimates that it has sufficient orders booked to run until next July. Prices show but little change, although in one or two cases small lots for prompt delivery have commanded very fancy premiums. Two makers quote 4.159c., Philadelphia, as their minimum, one of them feeling the shortage of open-hearth steel. Another mill quotes 3.159c. to 4.159c., Philadelphia, according to delivery, the nearest being eight to ten weeks.

Bars—A maker of Bessemer bars quotes a minimum of 2.759c., Philadelphia, to preferred customers, and up to 3.159c. for small lots. Open-hearth bars also are quoted at 2.759c., Philadelphia, minimum, but they are difficult to procure, some makers asking 3.659c., Philadelphia. Iron bars are unchanged at 2.50c., Pittsburgh, or 2.659c., Philadelphia. Sales have been made of bars rolled from old steel rails.

Structural Material—Quotations cover an unusual range. For a desirable order one mill will accept

2.759c., Philadelphia, but is asking up to 3.159c. for merchant lots. On the other hand, another mill has sold 2000 tons to a jobber at 2.909c., Philadelphia, and now quotes Bessemer shapes at 3.009c., Philadelphia. As for open-hearth shapes it is not inclined to let them go under 3.50c., Pittsburgh. The contract for 700 tons of steel required by the E. G. Budd Mfg. Company, Philadelphia, maker of automobile bodies, is soon to be let. Bids for the Southern Hotel, Baltimore, requiring 1000 to 1200 tons, will be taken Sept. 6. While the market is stronger and somewhat more active, the volume of sales is not nearly so great as it was two or three months ago.

Billets—A short time ago makers were occasionally offering billets here and there, but these lots have disappeared. Open-hearth rerolling billets are quoted at $48 and upward. Forging billets have sold up to $65, Eastern mill. For spring steel and other special steel $55 has been paid. Raw and semi-finished steel has been pretty well absorbed by the munitions makers and by the export demand. The export demand is strong, but much of this business is declined.

Sheets—The quotation is unchanged, with the demand slightly quieter at 3.159c. to 3.659c., Philadelphia, for No. 10 blue annealed.

Coke—Coke is moving slowly, although spot furnace is strong because of a shortage. Spot furnace is quoted at $2.75 to $2.85 and contract (nominal) at $2.50 per net ton at oven. Spot foundry, the production of which is restricted, is quoted at $3.25 to $3.50 per net ton at oven, and contract foundry at the same figures. Freight rates from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Old Material—Not much is doing, although there is some demand, at lower prices, for machine-shop turnings for blast-furnace consumption, and a limited demand for wrought pipe. Coatesville is still under embargo. Steel axles maintain their strength because of the heavy export demand. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania, and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$14 75 to $15 25
Old steel rails, rerolling	17 00 to 18 00
Low phos. heavy melting steel scrap	21 25 to 23 50
Old steel axles (nominal)	30 00 to 31 00
Old iron axles (nominal)	28 00 to 29 00
Old iron rails	20 00 to 20 50
Old carwheels	15 50 to 16 00
No. 1 railroad wrought	20 00 to 21 00
Wrought-iron pipe	13 00 to 13 50
No. 1 forge fire	12 50 to 13 00
Bundled sheets	13 50 to 13 00
No. 2 busheling	10 50 to 11 00
Machine-shop turnings	7 25 to 7 75
Cast borings	9 00 to 9 50
No. 1 cast	16 00 to 16 50
Grate bars	11 75 to 12 25
Stove plate	11 75 to 12 25
Railroad malleable	13 50 to 14 00

Cleveland

CLEVELAND, OHIO, Aug. 29, 1916.

Iron Ore.—Some additional chartering of vessels for September shipments at the going rate of $1 a ton, free, is reported and a contract for a small tonnage for September shipment is reported to have been closed at $1.25, free. Offers are understood to have been made at 75c. for ore for next season, but vessel men have declined to contract at that price. Shipments have been very heavy during the month, and the August movement is expected to be well over the 9,000,000-ton mark. The sale of a small tonnage of ore for this season's delivery is reported, but there are no new inquiries in the market, although there is some talk of a shortage before the opening of the next season of navigation. We quote ore prices as follows, delivered lower lake ports: Old range Bessemer, $4.45; Mesaba Bessemer, $4.20; old range non-Bessemer, $3.70; Mesaba non-Bessemer, $3.55.

Pig Iron.—Cleveland selling agencies report considerable inquiry from the East for basic, foundry and malleable iron for delivery during the first quarter and the first half of next year. However, in the northern Ohio territory, as well as in Michigan and Indiana, the market is quiet. Foundry iron prices have stiffened in Cleveland and in the Valley and $18 iron has disappeared. One interest which had been credited with being the lowest seller has advanced its price to $18.50 for No. 2 foundry, Cleveland and Valley furnace, and this is now the minimum price in this city either for local delivery or outside shipment. Owing to strikes and scarcity of labor, foundries in this territory will carry considerable iron over into next year. Many foundries will have enough iron left over to last for two or three months next year. The labor situation has caused considerable holding back of shipments and has a tendency to delay the buying movement for delivery after July 1. Southern iron is inactive, with the usual quotation of $14, Birmingham, for No. 2 for this year and $14.50 for the first half. We quote, delivered Cleveland, as follows:

Bessemer	$21.95
[illegible]	18.95
Lake Erie No. 2 foundry	18.80
Southern No. 2 foundry	$18.00 to 18.50
Gray forge	18.50
Jackson Co. silvery, 8 per cent silicon	28.62
Standard low phos., Valley furnace	32.00

Coke.—Owing to the shortage of labor in the Connellsville region producers are having trouble in keeping foundries supplied and find it necessary to ship some coke in open cars. As consumers are about all under contract, there is practically no demand. We quote standard Connellsville foundry coke at $3.25 to $3.50 per net ton at oven for prompt shipment and contract. Furnace coke for prompt shipment is held at $2.75 to $2.85.

Finished Iron and Steel.—There is a good demand for small lots of steel for prompt shipment, but not a great deal of inquiry for contracts. The pressure on the mills for deliveries is as great as ever. Jobbers are having trouble in getting shipments as promptly as desired on old contracts, and some are placing orders to replenish stocks with mills able to make early deliveries at 2.60c. for steel bars and 2.75c. for structural material. As warehouse prices are not changed, this means that jobbers' profits on these stocks will be considerably less than of late. New structural inquiry is light. The market is firm, and one mill has advanced its price on Bessemer shapes $2 a ton to 2.85c., Pittsburgh. The demand for plates continues heavy. Prices range from 3c. to 4c. Pittsburgh, the latter price being for light plates and in wide sizes, largely for the boiler trade. Some mills making hard-steel bars are eager for business, and are shading prices considerably. An inquiry for 1000 tons for a reinforced-concrete factory building for the B. F. Goodrich Company, Akron, Ohio, is understood to have brought out a price of about 2.30c., at mill, or $4 a ton below the general market price. Bar iron is quoted at 2.45c. to 2.50c., Cleveland. We note the sale of 300 tons of Bessemer billets at $45, Youngstown, for prompt shipment. Sheet prices are irregular. Some mills are asking higher prices, but others, apparently still having a supply of low-priced sheet bars, have not changed their quotations. One Youngstown mill has advanced its price to 3.30c. for black and blue annealed sheets and 4.50c. for galvanized. We quote black sheets at 2.90c. to 3c., Ohio mill, for No. 28; blue annealed at 3c. to 3.25c. for No. 10, and galvanized at 4.15c. to 4.40c. for No. 28. Warehouse prices are 3.25c. for steel bars and structural material; 3.65c. for plates, and 3.20c. for iron bars.

Bolts, Nuts and Rivets.—Bolt and nut specifications are fairly heavy, and some business is being taken at the new price, which is being well maintained. Rivet consumers are closing contracts for the fourth quarter at regular prices. We quote rivets at 4c., Pittsburgh, for structural, and 4.10c. for boiler rivets. Bolt and nut discounts are as follows:

[illegible]

Old Material.—The local scrap market is unusually dull, and not firm. Cleveland mills are practically out of the market, and about the only sales that are being made are for shipment to other points. Borings are slightly firmer owing to some activity in the Pittsburgh district. Prices are unchanged. We quote f.o.b. Cleveland as follows:

Per Gross Ton

Steel rails	$14 75 to $15 00
Iron rails	18 50 to 19 00
Steel car axles	32 00 to 33 00
Heavy melting steel	15 00 to 15 50
Carwheels	12 75 to 13 00
Relaying rails, 50 lb. and over	22.50
Agricultural malleable	12 50 to 12.75
Railroad malleable	14 00 to 14 25
Steel axle turnings	12 00 to 12.50
Light bundled sheet scrap	12.00 to 12.25

Per Net Ton

Iron car axles	$24.00 to $25.00
Cast borings	5.75 to 6.00
Iron and steel turnings and drillings	5.25 to 5.50
No. 1 busheling	11.00 to 11.25
No. 1 railroad wrought (nominal)	15 00 to 15.50
No. 1 cast	13 00 to 13 50
Railroad grate bars	10.00 to 10.50
Stove plate	10.00 to 10.25

Birmingham

BIRMINGHAM, ALA., Aug. 28, 1916.

Pig Iron—A change in the situation has occurred in the week, several fairly large sales of iron having been made. The buying movement that was expected in the first part of September has already developed. One concern sold about 12,000 tons, a second is known to have sold 10,000 tons and a third sold 8000 tons. Sales by others were also made. The third interest above referred to sold several thousand tons of special iron and has booked 4000 tons of export iron for September. Producers are unanimous in saying that the buying movement now begun is expected to be one of the largest and most satisfactory in a long time. Most notable is the general return of confidence. The sales made were on the basis of $14 to $15 for No. 2. Some of the iron was sold at $14.50 basis for spot while some went for $15, which is now being quoted for the first quarter of 1917, but with no sales yet reported. Big consuming interests were the largest purchasers. When smaller consumers discovered that others were buying quietly a scramble to get in on the movement was started. A discouraging phase of the situation is the car shortage, which is becoming worse every week, and with the movement of crops this fall the iron makers here are fearful that an unprecedented car shortage will result. About 35c. per ton, it is estimated, has been added to the cost of making pig iron here, through the operation of new rates on raw materials from mines to furnaces in this district. The new rates, which went into effect Aug. 15, were an increase from 12½c. per ton to 17½c. on coal, coke, ore and limestone. This nullifies the decrease of about 35c. in the rates on iron to Northern points gained some time ago by the pig-iron interests through a fight of two years before the Interstate Commerce Commission; in fact, it goes further, since the increased cost of production goes on all iron made here, whereas the decrease in Northern rates applies only to a part of the tonnage from the district. We quote, per gross ton, f. o. b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	$15.00 to $15.50
No. 2 foundry and soft	14 50 to 15.00
No. 3 foundry	14.00 to 14.50
No. 4 foundry	13 75 to 14 25
Gray forge	13.50 to 14.00
Basic	14.50 to 15.00
Charcoal	22.00 to 22.50

Cast-Iron Pipe—The tone of the market is steady, with a hopeful feeling for the future. Several small orders were received the past week. The pipe manufacturers are anxiously awaiting the decision of the Interstate Commerce Commission as to the plea for a suspension of the new transcontinental tariffs, scheduled to become effective Sept. 1. We quote, per net ton, f. o. b. pipe shop yards, as follows: 4-in., $28; 6-in. and upward, $25, with $1 added for gas pipe and 16-ft. lengths.

Coal and Coke—The greatest trouble with the coal situation here now is the car shortage, which is hampering the trade of a number of companies that for the first time in a year or so have secured orders in any quantity at all. The coke market is good, with standard beehive coke selling at $4.25 to $4.50 per net ton at oven and furnace coke $3.25 to $3.50.

Old Material—Several sales have been made, but at low prices, owing, in part, to the heavy productions of steel scrap at the mills manufacturing shrapnel shapes. We quote, per gross ton, f. o. b. dealers' yards, as follows:

Old steel axles	$24.00 to $30.00
Old steel rails	10.00 to 10.50
No. 1 steel scrap	9.25 to 9.75
No. 1 wrought scrap	12.50 to 13.00
No. 1 cast scrap	10.50 to 11.00
Extra heavy cast scrap	9.50 to 10.00
Stove plate and light	9.00 to 9.50
Old carwheels	9.50 to 10.00
Tram carwheels	9.50 to 10.00

Buffalo

BUFFALO, N. Y., Aug. 29, 1916.

Pig Iron.—The market is increasingly strong, with sales for the week aggregating fully 100,000 tons, perhaps more, and embracing all grades—foundry, malleable, basic and Bessemer. This makes a total of about 150,000 tons placed in the Buffalo district in the past two weeks. A large number of pig iron users have not yet come into the market for their requirements for the first half of next year, and producers anticipate a continuance of contracting in the next few weeks. Melters are busy to the limit of their ability to get out material, but owing to strikes, scarcity of labor and other drawbacks, it is estimated that the majority of foundries are operating at only about 65 per cent of capacity. The price range is now $18.50 to $20 at furnace for No. 2X, with one interest disposed to ask $19 as minimum. One of the three stacks of the Buffalo Union Furnace Company is now operating on basic iron. We quote as follows, f.o.b. Buffalo furnace, for last half and first half of next year:

No. 1 foundry	$19.00 to $20.00
No. 2 X foundry	18.50 to 19.50
No. 2 plain	18.50 to 18.75
No. 3 foundry	18.25 to 18.75
Gray forge	18.25 to 18.50
Malleable	18.50 to 19.00
Basic	19.00 to 19.50
Bessemer	21.00 to 21.50
Charcoal, regular brands and analysis	21.00 to 22.00

Finished Iron and Steel.—Inquiries received during the week by a number of agencies were in larger volume than for a number of months. Some of the mills report that they are forced to pro-rate tonnages, and it is known that a number of the larger users were unable to cover for all the steel they wanted because of the inability of mills to render service. It is predicted that larger tonnages will be carried into next year than mill managers anticipated; consequently they are showing greater reluctance to add to their present obligations, and even many preferred customers are finding it impossible to get material as required. This is especially true of bars, plates and structural shapes. The Lackawanna Steel Company will furnish the sheet steel piling for retaining walls for the new Bank of Buffalo Building, Buffalo, about 100 tons. The 1200 tons of structural steel for the new Central Elevator on Buffalo River was awarded to the Buffalo Structural Steel Company.

Old Material.—A strong buying movement has set in, with the demand for heavy melting steel and cast borings in the lead. Local consumers as well as users outside of the Buffalo territory are in the market. Dealers are watching the iron ore situation and the possible shortage owing to inability to secure boats to bring down the lakes the tonnage required; and are looking for a good demand for borings and turnings from blast furnaces. All dealers in this district consider that prices are due to advance. The ever present floating tonnages are, however, being moved at current market prices. As a matter of fact some l[illegible]ers are offering more to-day than mills are paying, largely due to the fact that the buying movement which

was predicted for September has developed with considerable force somewhat ahead of the expected time. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	$15.00 to $16.00
Low phosphorus steel	16.00 to 17.00
No. 1 railroad wrought scrap	16.50 to 17.75
No. 1 cupola cast, machinery cast scrap	16.00 to 17.00
Steel axles	26.00 to 27.00
Iron axles	24.00 to 25.00
Car wheels	15.00 to 16.00
Railroad malleable	14.00 to 15.00
Machine shop turnings	9.00 to 9.50
Heavy axle turnings	12.00
Clean cast borings	14.00 to 14.75
Iron rails	18.00 to 18.50
Locomotive grate bars	11.50 to 12.00
Stove plate (net ton)	11.00 to 11.50
Wrought pipe	13.00 to 13.50
Bundled sheet scrap	11.50 to 12.00
No. 1 busheling	12.00 to 12.50
No. 2 busheling	11.00 to 11.50
Bundled tin scrap	13.00 to 13.50

New York

NEW YORK, Aug. 30, 1916.

Pig Iron.—Foreign and domestic inquiries for pig iron, including 34,000 tons for a pump company and 30,000 tons, chiefly steel-making iron, for export, amount to 75,000 to 85,000 tons. Foundry iron sales in this immediate vicinity have not been heavy. In Connecticut 4000 tons of foundry iron was taken and some malleable business was done there. A 5000-ton lot of foundry iron inquired for by a northern New Jersey interest is still pending and the iron for 1917 delivery in the case of the pump company is to be taken up in the latter part of this week. The General Electric Company is expected to buy some Northern foundry iron, its recent purchases being chiefly of Southern. Figuring Alabama iron at $14.50 at furnace, which can be shaded, the price on Old Dominion docks in New York harbor would be $18.75, to which 50c. lighterage is to be added. Northern sellers are not meeting this price. Generally speaking, with two weeks of activity prices are firmer, but most of the iron put through thus far has been at the concessions with which a buying movement generally starts. No little irregularity has been seen in delivered prices in New York State, where there has been a good deal of activity, much of it in quiet transactions. Buffalo furnaces are not uniform in their rating of silicon values. A furnace outside of the Buffalo district has been making prices which would figure back quite a little under $18.50 Buffalo equivalent for No. 2 X. Virginia furnaces have been able for some time to take New England business, their delivered prices running from $20.25 to $20.50 for No. 2 X, but they are quoting on a higher basis now. More iron will be needed by some foundries for 1916, but the present buying is mostly concerned with the first half of next year. A large western New York steel foundry is in the market for 18,000 tons of iron, mostly basic, with some malleable. We quote at tidewater for early delivery: No. 1 foundry, $20 to $20.50; No. 2 X, $19.50 to $19.75; No. 2 plain, $19.25 to $19.50; Southern iron at tidewater, $19.25 to $19.75 for No. 1 and $18.75 to $19.25 for No. 2 foundry and No. 2 soft.

Structural Material.—No mill seems to be quoting below 2.60c., Pittsburgh, and though there are rumors that 2.50c. still obtains the indications are that in September 2.60c. will be the minimum. Much of the fabricated work which has been closed in the last week represents the results of announcements of early withdrawal of existing quotations for the plain material in these particular cases. The expected building movement to come in a few weeks has not yet become visible, and, of course, railroad buying in any department is held back owing to the threatened general railroad strike. Foreign offerings in structural material continue, but seem almost wholly for war purposes. Much of this is in bar mill sizes. A recent sale of 12,500 tons of 5-in. I-beams carries an option for 10,000 tons more. However, an inquiry for 10,000 tons of sheet piling for Italy is noted and a considerable amount of 1½ and 2-in. angles for France. Early expectations of wide inquiry from non-belligerent nations, though not actually wanted by the mills, are likely to receive a check through the indications of advances in ocean freight rates from the relatively low level to which they have dropped in the last month. The late awards for fabricated work include 900 tons for the Jattison Construction Company to the Harris, Silvers, Baker Company; 600 tons for the Mulliken and Moeller apartment, 302 West Eighty-sixth Street to the Hay Foundry & Iron Works; 600 tons for the Fischell loft, Fifth Avenue and Seventy-fourth Street, and 350 tons for a Levy apartment, both to the Passaic Structural Company, and 275 tons for an apartment house at 42 West Tenth Street to the Hinkle Iron Company. A number of other good size jobs are expected to close before the end of the week, and among new projects not hitherto mentioned may be numbered another Tishman apartment, Seventy-second Street and Lexington Aveue, 800 tons; the Campagna apartment, Ninety-fourth Street and West End Avenue, 500 tons; apartment for T. J. McLaughlin, 105th Street and Broadway, 650 tons; the Ditson Building, Boston, 700 tons; bridge work for the New York Central, 200 tons, and a coal stocking bridge for the same road at Syracuse, 200 tons; 500 tons for substructure work for a Paterno apartment over the Grand Central terminal area, and a church, rectory and school, Broadway and Seventieth Street, 450 tons. We quote mill shipments of plain structural shapes at 2.769c. to 3.019c., New York, for delivery in two or three months, and from warehouse 3.25c., New York.

Steel Plates.—The largest offering noted locally covers close to 7000 tons of plates for six ships for Japan. Some considerable differences in quotations are discovered. In one recent case of a few hundred tons for shipment in a few weeks, prices ranged from 3.15c. to 4c., Pittsburgh, and a late sale of a moderate tonnage for early shipment for tank plates up to about 5 ft. or so in width brought 3.25c., Pittsburgh. The mills making these prices, it is thought, have now been filled up to some extent, and quotations for tank plates below 4c. are difficult to secure. Even 3.75c., Pittsburgh, is the usual minimum for universal plates, which are not in good demand. We quote plates from warehouse at 4c., New York, and in view of the availability from this source, fabricators are not inclined to take on tonnage contracts for universal plates for the fourth quarter, particularly with no active building work yet discernible.

Steel and Iron Bars.—There are signs that consumers have now become concerned over their supplies for the last of this year and even for the first part of next, having apparently become satisfied concerning price stability. Tonnage business is coming out constantly from the buyers for the belligerents, and these carry good prices, besides being attractive from the standpoint of size. In addition to two lots of angles totaling about 6000 tons, some 8000 tons are now under consideration. Some of this business has been done at 3c., Pittsburgh, and a quotation of 3.10c., is regarded as likely. Not only has shell steel demand not been satisfied, but the effort now is to secure further orders for shell forgings on which deliveries will be taken to June 1, which is two months beyond the period for which the late forging contracts were closed. We quote mill shipments of steel bars at 2.769c., New York, for delivery at the convenience of the mills, and bar iron at 2.669c., New York, in say two months. Out of store iron and steel bars are sold at 3.25c.

Ferroalloys.—The situation as to future supplies of British ferromanganese is mixed. Some producers have not yet been granted any August licenses while others have had not trouble and report shipments thus far in August to have been satisfactory. It is evident that an important move is in contemplation. Reports received by sellers here indicate the blowing in of some ferromanganese furnaces on pig iron so as to increase the British pig-iron output, so great is the demand. The market as a whole is quiet, with inquiries and sales very few. Ferromanganese for any delivery is obtainable at $170 to $175, furnace, with the former quotation acceptable by some domestic producers. Spiegeleisen is quiet at $45 to $50, furnace, practically a nominal quotation. There is some foreign inquiry. Ferrosilicon,

50 per cent, is still in strong demand, and it is reported that a new producer in central New York is accepting orders.

Cast-Iron Pipe.—Current demand is quiet. Practically no public lettings are in sight, and private buying is consequently less active than it has been. Pipe manufacturers regard the lull as only temporary, being quite confident that, if the present buying movement in pig iron should advance the price of that commodity, consumers of pipe will come into the market for what they may need before the closing in of winter. Carload lots of 6-in., class B and heavier, are quoted at $30.50 per net ton, tidewater, class A and gas pipe taking an extra of $1 per ton.

Old Material.—The iron rolling mills of eastern Pennsylvania continue to be buyers of moderate lots of railroad wrought scrap and wrought pipe, prices of which have again slightly stiffened. Machine-shop turnings, which have long been completely neglected, are in renewed demand from blast furnaces, but prices show no disposition to advance. Steel scrap is extremely quiet, as embargoes in eastern Pennsylvania are continued and large consumers in western Pennsylvania are requesting shipments deferred. Brokers purchasing for the Pittsburgh market continue to quote $13 to $13.25, New York, for heavy melting steel scrap. They quote buying prices for the Eastern trade about as follows, to local dealers and producers, per gross ton, New York:

Heavy melting steel scrap (eastern Pennsylvania specifications)	$11.75 to $12.00
Old steel rails (short lengths) or equivalent	12.50 to 12.75
Relaying rails	27.00 to 28.00
Rerolling rails	16.75 to 17.00
Rerolling rails (for export)	19.00 to 20.00
Iron car axles	29.00 to 30.00
Steel car axles (for export)	34.00 to 36.00
No. 1 railroad wrought	18.00 to 18.75
Wrought iron track scrap	15.00 to 16.00
No. 1 wrought, long	13.00 to 14.00
No. 1 yard wrought, short	11.75 to 12.00
Light iron (nominal)	.50 to 1.00
Cast borings (clean)	6.75 to 7.00
Machine-shop turnings (nominal)	1.25 to 1.50
Mixed borings and turnings	1.25 to 1.50
Wrought pipe	11.25 to 11.75
Old carwheels (nominal)	15.00 to 15.50
Malleable cast (railroad)	12.00 to 12.50

Foundries are buying a little more freely, but quantities are small. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

No. 1 cast (machinery)	$16.00 to $16.50
No. 2 cast (heavy)	14.50 to 15.00
Stove plate	11.50 to 12.00
Locomotive grate bars	10.00 to 10.25

St. Louis

ST. LOUIS, MO., Aug. 28, 1916.

Pig Iron.—As a direct result of the heavy commitments of large local purchasers reported last week, the smaller concerns have begun to flood the market with inquiries. Some are specific and others tentative. Representatives are accordingly putting up numerous proposals to the furnaces and getting a liberal number of acceptances. Apparently the smaller foundries have reached the conclusion that first half deliveries have been endangered for them and they are rushing to cover. Sales reported for the past week include one of 1000 tons of Northern, three of 1000 tons each of Southern No. 2 and several lots of 700, 600 and 500 tons each of Northern and Southern iron.

Coke.—Transactions are altogether in small lots for immediate delivery or special requirements. By-product coke continues to be well held on a parity with Connellsville figures.

Finished Iron and Steel.—Business continues undiminished, but it is an aggregate of small lots. There is an increase of pressure for the delivery of material already under contract, and consumption is evidently increasing among fabricators. Movement out of warehouse remains good and the higher prices are being paid freely by consumers who cannot wait for deliveries on contracts. We quote for stock out of warehouse as follows: Soft steel bars, 3.15c.; iron bars, 3.10c.; structural material, 3.15c.; tank plates, 3.55c.; No. 10 blue annealed sheets, 3.45c.; No. 28 black sheets cold rolled, one pass, 3.45c.; No. 28 galvanized sheets, black sheet gage, 4.80c. to 5c.

Old Material.—Mills have not yet entered the market. Some high prices are being paid to cover short contracts and the market in consequence is particularly stiff on quotations, with relatively little material moving even among the dealers. A labor shortage in the scrap yards interferes with handling and preparing material for consumers. Relayers are very firm, especially in heavy sections, while light rails are active at good prices. The only list out during the week was one of 3000 tons from the Burlington. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Old iron rails	$15.50 to $16.00
Old steel rails	14.00 to 14.50
Old steel rails, rerolling	14.00 to 14.50
Relaying rails, standard section, subject to inspection	27.00 to 34.00
Old carwheels	11.00 to 12.00
No. 1 railroad heavy melting steel scrap	14.00 to 15.50
Heavy shoveling steel	14.00 to 14.00
Frogs, switches and guards cut apart	11.00 to 14.00
Railroad steel scrap	8.00 to 8.50

Per Net Ton

Iron axles	$16.00 to $16.50
Steel axles	13.00 to 14.00
Iron car axles	26.00 to 26.50
Steel car axles	27.00 to 28.00
Wrought iron bars and turnings	21.00 to 21.50
No. 1 railroad wrought	14.00 to 14.50
No. 2 railroad wrought	13.00 to 13.50
Railroad springs	14.00 to 14.50
Steel couplers and knuckles	14.00 to 14.50
Locomotive tires, 42 in. and over, smooth inside	20.50 to 21.00
No. 1 dealers' forge	10.25 to 10.75
Cast-iron borings	7.00 to 7.50
No. 1 busheling	13.00 to 14.00
No. 1 locks, cut to sheets and rings	9.50 to 10.00
No. 1 railroad cast scrap	11.00 to 11.50
Stove plate and light cast scrap	8.75 to 9.25
Railroad malleable	11.00 to 11.50
Agricultural malleable	10.00 to 10.50
Pipes and flues	11.00 to 11.50
Railroad sheet and tank scrap	9.75 to 10.25
Railroad grate bars	9.50 to 10.00
Machine-shop turnings	7.00 to 7.50

British Steel Market

High Prices for Bessemer Wire Rods and American Billets—Pig Iron Strong

LONDON, ENGLAND, Aug. 30, 1916.—(*By Cable.*)

The pig-iron market is strong, with the demand unrelaxed and the position of hematite iron still acute. The demand for tin plate is increasing, but business is difficult except against government orders, quotations being irregular at 33s. to 35s. Tin plates from stock command a premium. American billets are in demand, but the terms are discouraging to transactions, about £14 5s. being asked for September and October delivery. For Bessemer wire rods for late September delivery £19 is asked. Quotations are as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 33s. to 35s., against 32s. to 35s. a week ago.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £20 5s.

Steel ship plates, Scotch, delivered local yards, £13 17s. 6d.

Steel rails, export, f.o.b. works, £10 17s. 6d.

Heavy steel [illegible] Swansea Valley, £10 7s. 6d.

Steel bars, export, f.o.b. Clyde, £18

Ferromanganese (nominal),

Ferrosilicon, 50 per cent, c.i.f., £29.

(*By Mail*)

Pig Iron Tight and Steel Very Scarce—The Manganese Market

LONDON, England, Aug. 15, 1916.—The general situation is almost entirely under government control from raw to finished material, as emphasized by the recent extension of export prohibitions. With the more acute pressure of munition work and productive capacity already fully engaged over the rest of the year in most directions, the prosecution of new business has become a matter of increasing difficulty. There is no stock available at works, and but few odd lots can be spared here and there out of current output.

Pig iron is extremely tight, and, although domestic deliveries of Cleveland common foundry iron have proved more satisfactory, there is a necessity for an enlarged output, but many labor and raw material difficulties have yet to be overcome before the promised freer output, especially of hematite, can be realized. The forward demand continues unabated, and hematite makers are heavily booked ahead, while Cleveland producers are more reticent about extending their bookings into the fourth quarter.

The chief export feature has been the progress of the shipments to France, the total sent from United Kingdom ports last month having been 53,017 gross tons, making for the eight months an aggregate of 320,910 tons against only 36,506 tons in 1915. Export business otherwise is extremely reduced and difficult, for very few permits are obtainable. The reserve stocks of warrant iron have dwindled further to 20,000 tons as compared with about 150,000 tons at this time last year.

The scarcity of semi-finished steel is daily more acute, although the official price of Welsh bars is being retained at £10 7s 6d, at which figure only limited quantities are obtainable for sheets and tin plates. It is now understood that practically no steel will be allocated by the Ministry of Munitions except for government work. Therefore, more strenuous attempts are seemingly being made to procure American material which, however, is again much tighter, especially 2-in. to 3-in. billets and sheet bars, comparatively few offers being reported for shipment this quarter, with 2-in. billets quoted up to about £17. But 4-in. material for next quarter can be had near £15 c.i.f. Liverpool.

NEW RUSSIAN MANGANESE COMPANY

There has been practically no change in ferromanganese, and there is very little doing. The British combination is sold out for the remainder of this year, the small inquiries coming from the Continent being met by outside interests at about £35, basis f.o.b. for loose. Indian manganese ores ruled easier, more or less in sympathy with freight costs, with some business done recently at about 2s 2d per unit for near shipment to East Coast ports, a few small lots of low grade Welsh ore having also been sold at 1s 6d and upward per unit, the marketing of such material now being found fairly profitable owing to the high c.i.f. costs affecting imported ores.

It is reported that a new Russian manganese ore company was recently formed with a capital of 15 million roubles under the name of the South Russian Metallurgical Works, and it is understood that Vickers, Ltd., has secured an interest in the new company.

Exports of galvanized sheets have been practically at a standstill, while it is reported that attempts to secure permits since the prohibition of exports have proved so far abortive, due to the steel famine, which, in the case of tin plate, however, has led to a rapid recovery in prices of several shillings per box, since it is inferred that numerous mills will shortly be shut down on account of the great bulk of the steel output being required for munitions. The demand has certainly improved, while makers have entirely withdrawn, pending developments.

Cincinnati

CINCINNATI, OHIO, Aug. 30, 1916.—(*By Wire.*)

Pig Iron.—Following the lead of basic-iron purchasers, foundry and malleable consumers have been very active. In addition to sales made quietly, 1500 tons of Northern foundry iron was sold for first half shipment and the same quantity of Southern iron to a central Ohio melter and several lots of Southern foundry were sold in Indiana and Michigan, where the quantities ranged from 500 to 900 tons. Part of this latter business was taken at $13.50, Birmingham basis, but Southern producers have now withdrawn this quotation and $14 is minimum for strictly furnace iron. Some resale iron is still to be had at the lower figure, but the tonnage is limited and extra charges run the cost above the furnace price. The majority of Southern furnaces are asking $14.50 to $15 for the first half of next year. Northern foundry and malleable are still obtainable at $18, Ironton, and first half contracts have been made at this figure. The stiffening of Southern quotations has enabled Northern producers to reach farther out for business. The activity in malleable was unexpected. One manufacturer in this territory took 1500 to 2000 tons for first half movement, and other smaller sales were made. An Ohio firm is expected to close soon for 10,000 tons and an inquiry for 12,000 tons has been received from outside territory. Lake Superior charcoal iron has also afforded a surprise, recent sales including 2500 tons to a northern Ohio consumer and 500 tons to one in Indiana, with other business pending. In a number of cases the foundries have urged forward shipments of both coke and pig iron in order to forestall, as far as possible, any inconveniences should the threatened railroad strike occur. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	$17.40 to $18.40
Southern coke, No. 2 f'dry and 2 soft	16.90 to 17.90
Southern coke, No. 3 foundry	16.40 to 17.40
Southern coke, No. 4 foundry	15.90 to 16.90
Southern gray forge	15.40 to 16.40
Ohio silvery, 8 per cent silicon	28.26 to 28.76
Southern Ohio coke, No. 1	20.26 to 20.76
Southern Ohio coke, No. 2	19.26 to 19.76
Southern Ohio coke, No. 3	18.76 to 19.26
Southern Ohio malleable Bessemer	19.26 to 19.76
Basic, Northern	19.26 to 19.76
Lake Superior charcoal	21.20 to 22.20
Standard Southern carwheel	24.90 to 25.40

Iron and Industrial Stocks

NEW YORK, Aug. 30, 1916.

It would have been little short of marvelous if the stock market had shown no ill effect resulting from the constantly increasing danger of a strike of the railroad employees. Almost every security is now on a lower level than at the corresponding time last week. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week has been as follows:

Allis-Chal., com.	23 - 23¾	Ry. Stl. Spring, com.	45 - 50
Allis-Chal., pref.	78¼ - 79¾	Ry. Stl. Spring, pref.	100⅞
Am. Can, com.	58¼ - 62¾	Republic, com.	52 - 55⅛
Am. Can, pref.	111 - 112½	Republic, pref.	113¼ - 114
Am. Car & Fdy., com.	61 - 64½	Sloss, com.	47 - 50¼
Am. Car & Fdy., pref.	117 - 117⅞	Sloss, pref.	96
Am. Loco., com.	75 - 79½	Pipe, com.	19⅞ - 21½
Am. Loco., pref.	105 - 106	Pipe, pref.	53 - 53½
Am. Steel Foundries	53½ - 55	U. S. Steel, com.	95⅝ - 99⅝
Bald. Loco., com.	76⅝ - 82⅞	U. S. Steel, pref.	117⅝ - 118
Bald. Loco., pref.	104⅝ - 105	Va. I. C. & Coke.	45 - 46
Beth. Steel, com.	476 - 494	Westing. Elec.	58½ - 62
Beth. Steel, pref.	135 - 137	Am. Rad., com.	394 - 395
Cast. Cd. I. Co., pref.	85	Am. Rad., pref.	132
Colorado Fuel	47¼ - 51½	Am. Ship. com.	49 - 49½
Deere & Co., pref.	91	Chic. Pneu. Tool.	70 - 73
Gen. Electric	169⅞ - 173½	Cambria Steel	82
Gt. No. Ore Cert.	37¼ - 40¼	Lake Sup. Corp.	10¾ - 11¼
Int. Harv. of N. J., com.	114¾ - 115	Wat. Wks.	91 - 93¾
Int. Harv. Corp., com.	78 - 79	Cruc. Steel, com.	74⅞ - 79½
Int. Harv. Corp., pref.	104½ - 105¼	Cruc. Steel, pref.	117¾ - 118
Lacka. Steel	75½ - 79¼	Harb.-Walk. Refrac., com.	101½
Nat. En. & Stm., com.	23⅞ - 27⅝	La Belle Iron, com.	56½ - 59
N. Y. Air Brake	136½ - 139⅞	La Belle Iron, pref.	133 - 133½
Penn. Steel, pref.	93½ - 94	Pond Eng. Co.	70½ - 74½
Pressed Stl., com.	42 - 45	Int. Agr. Corp.	85 - 98
Pressed Stl., pref.	101	Midvale Steel.	62½ - 65

Dividends

The Pressed Steel Spring Co. declared its regular quarterly, 1¾ per cent. on the preferred stock, payable Sept. 1. No action was taken by the directors on common dividend.

The La Belle Iron Works, regular quarterly, 2 per cent, and extra of 2½ per cent on deferred dividends on the preferred stock, payable Sept. 1 to holders of record Aug. 15.

The Standard Screw Company has called for redemption on Oct. 1 next all its outstanding 5 per cent gold debenture bonds. There are $240,000 of these bonds yet outstanding, the rest of the original issue of $600,000 having been retired under provisions of the mortgage. The bonds are redeemable at par and interest. Interest will cease to accrue after Oct. 1.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, effective from April 10, 1916, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c.; Pacific coast (by rail only), 65c.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 2.60c. to 2.75c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs	.10
Angles, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Handrail tees	.15
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft	1.55

No charge for cutting to lengths 3 ft. and over.

Plates.—Tank plates, ¼ in. thick, 6 in. up to 100 in. wide, 3c. to 4c., base, net cash, 30 days, or ½ of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras

	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers)	.10
Boiler and flange steel plates	.15
"A. B. M. A." and ordinary firebox steel plates	.20
Still bottom steel	.30
Locomotive firebox steel	.50

Marine steel, special extras and prices on application.

Gage Extras

	Cents per lb.
Rectangular, ¼ in. thick, over 6 in. wide to 100 in. wide	Base
Lighter than ¼ in., to 3/16 in., up to 72 in. wide	.10
*Lighter than ¼ in., including 3/16 in., over 72 in. to 84	.20
*Lighter than ¼ in., including 3/16 in. over 84 in. to 96	.30
*Lighter than ¼ in., including 3/16 in., over 96 in. to 100	.40
*Lighter than ¼ in., including 3/16 in., over 100 in. to 102	.45
Lighter than 3/16 in., including No. 8, up to 72 in. wide	.15
*Lighter than 3/16 in., including No. 8, over 72 in. to 84	.25
*Lighter than 3/16 in., including No. 8, over 84 in. to 96	.35
Lighter than No. 8, including No. 10, up to 60 in. wide	.30
Lighter than No. 8, including No. 10, over 60 in. to 64	.35

Up to 72 in. not less than 10.2 lb. per sq. ft. will be considered ¼ in.
Over 72 in. must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.
Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.
Over 72 in., ordered weight 3/16 in., take No. 8 price.
Over 72 in., ordered weight No. 8, take No. 10 price.

Width Extras

Over 100 in. to 110 in. inclusive	.05
Over 110 in. to 115 in. inclusive	.10
Over 115 in. to 120 in. inclusive	.15
Over 120 in. to 125 in. inclusive	.25
Over 125 in. to 130 in. inclusive	.50
Over 130 in.	1.00

Length Extras

Universal plates 80 ft. long up to 90 ft. long	.05
Universal plates 90 ft. long up to 100 ft. long	.10
Universal plates 100 ft. long up to 110 ft. long	.20

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over

Lengths under 3 ft. to 2 ft. inclusive	.25
Lengths under 2 ft. to 1 ft. inclusive	.50
Lengths under 1 ft.	1.55
Circles 3 ft. in diameter to 100 in.	.30
Circles over 100 to 110 in. (width extra)	.35
Circles over 110 to 115 in. (width extra)	.40
Circles over 115 to 120 in. (width extra)	.45
Circles over 120 to 125 in. (width extra)	.55
Circles over 125 to 130 in. (width extra)	.80
Circles over 130 in. (width extra)	1.30
Circles under 3 ft. to 2 ft. inclusive	.55
Circles under 2 ft. to 1 ft. inclusive	.80
Circles under 1 ft.	1.85

Half circles take circle extras.
Sketches, not over four straight cuts, inc. straight taper .10
Sketches having more than four straight cuts .20
Plates sheared to a radius take complete circle extras.

*Including extra for width.

Wire Rods.—Including chain rods, $55 to $60.

Wire Products.—Prices to jobbers effective Aug. 5: Fence wire, Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, $2.55; galvanized, $3.25. Galvanized barb wire and staples, $3.45; painted, $2.75. Wire nails, $2.60. Galvanized nails, 1 in. and longer, $2 advance over base price; shorter than 1 in., $2.50 advance over base price. Cement-coated nails, $2.50. Woven wire fencing, 61½ per cent off list for carloads, 60½ off for 1000-rod lots, 59½ off for less than 1000-rod lots.

The following table gives the price per 100 lb. to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	6 to 9	10	11	12	13	14	15	16
Annealed	$3.60	$3.70	$3.80	$3.90	$4.00	$4.10	$4.20	$4.30
Galvanized	4.30	4.40	4.50	4.60	4.70	4.80	4.90	5.00

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect on black pipe from April 21, 1916, and on galvanized pipe from July 24, 1916, all full weight:

Butt Weld

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
⅛, ¼ and ⅜	63	37½	⅛, ¼ and ⅜	47	4
½	65	41½	½	51	21
¾ to 3	67	43½	¾ to 2	53	38
			2½ to 3	57	42
			¼ to 1½	60	43

Lap Weld

2	63	49½	1½	48	31
2½ to 6	65	51½	1¾	51	38
7 to 12	66	49½	2	53	39
13 and 14	63½		2½ to 3	57	42
15	61		3½ to 6	55	42
			7 to 12	56	41

Reamed and Drifted

1 to 3, butt	68	53½	¼ to 1½, butt	55	37
2, lap	63	48½	1¾, lap	43	25
2½ to 6, lap	66	51½	1½ lap	49	32
			2 lap	50	33
			2½ to 4, lap	52	36

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	59	40½	⅛, ¼ and ⅜	52	34
½	64	50½	½	57	43
¾ to 1½	68	54½	¾ to 1½	61	45
2 to 3	69	55½			

Lap Weld, extra strong, plain ends

2	63	49½	1¼	50	32
2½ to 4	66	52½	1½	55	39
4½ to 6	65	51½	2	57	42
7 to 8	61	47½	2½ to 4	59	45
9 to 12	56	40½	4½ to 6	53	44
			7 to 8	52	38
			9 to 12	47	33

Butt Weld, double extra strong, plain ends

½	55	43½	½	44	31
¾ to 1½	58	46½	¾ to 1½	47	34
2 to 2½	60	48½			

Lap Weld, double extra strong, plain ends

2	55	43½	1½	44	30
2½ to 4	57	45½	2	44	30
4½ to 6	56	44½	2½ to 4	46	35
7 to 8	51	39½	4½ to 6	45	34

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Sheets.—Makers' prices for mill shipments on sheets of U. S. standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Blue Annealed Sheets

	Cents per lb.
Nos. 3 to 8	2.95 to 3.20
Nos. 9 and 10	3.00 to 3.25
Nos. 11 and 12	3.05 to 3.30
Nos. 13 and 14	3.10 to 3.35
Nos. 15 and 16	3.20 to 3.45

Box Annealed Sheets, Cold Rolled

Nos. 17 to 21	2.70 to 2.85
Nos. 22 and 24	2.75 to 2.90
Nos. 25 and 26	2.80 to 2.95
No. 27	2.85 to 3.00
No. 28	2.90 to 3.05
No. 29	2.95 to 3.10
No. 30	3.15 to 3.30

Galvanized Sheets of Black Sheet Gage

Nos. 10 and 11	3.15 to 3.25
No. 12	3.25 to 3.35
Nos. 13 and 14	3.25 to 3.35
Nos. 15 and 16	3.35 to 3.45
Nos. 17 to 21	3.50 to 3.60
Nos. 22 and 24	3.60 to 3.70
Nos. 25 and 26	3.75 to 3.85
No. 27	4.00 to 4.10
No. 28	4.15 to 4.25
No. 29	4.30 to 4.40

Boiler Tubes.—Discounts on less than carloads, freight to destination added, effective from April 15, 1916, are as follows:

Lap Welded Steel

1½ in.	35	1¼ in.	27
1¾ and 2 in.	42	1½ and 1¾ in.	34
2¼ in.	44	2 in.	36
2½ and 2¾ in.	45	2¼ and 2½ in.	37
3 and 3½ in.	46	2¾ and 3 in.	38
3¾ and 4 in.	47	3½ and 4 in.	39
4½ and 5 in.	48	4½ and 5 in.	40
6 in.	49	6 in.	41
7 to 13 in.	50	7 to 13 in.	42

Less than carloads, freight to destination added, effective from April 15, 1916, are subject to higher prices.

1¾ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin,	Lead		Spelter	
Aug.	Lake	Electro-lytic	New York	New York	St. Louis	New York	St. Louis
25	27 00	27 00	38 87½	6 75	6 60	9 00	8 85
24	27 25	27 00	38 87½	6 75 to 6 80	6 60	9 00 to 9 12½	8 85
23	27 12½	27 00	38 62½	6 75	6 60	9 00	8 85
26	27 37½	27 12½		6 75		9 00	8 90
28	27 50	27 25	39 25	6 85	6 70	9 00	8 90
29	27 50	27 25	39 75	6 85	6 70	9 00	8 90

NEW YORK, Aug. 30, 1916.

The undertone of copper is strong and prices are higher, although buying is more moderate. Tin has advanced, despite no great activity. Lead is less active and lower. Spelter is dull and lower. Antimony is quiet again, but with the nominal quotation unchanged.

New York

Copper.—Prompt metal is scarce and is again classed as a specialty, with spot electrolytic commanding 28c. or over. October, November and December electrolytic can be had around 27.25c. and first quarter at about 26.50c. Lake, for last quarter delivery, is about 27.50c., cash, New York. First hands continue to report buying of forward positions, but the activity is becoming more moderate. The metal in every particular is in a strong position. The refineries are behind in deliveries because of the recent heat and mechanical troubles, and the development of any considerable demand at this time would send prices upward quickly. The London market is stronger at £129 for electrolytic, against £127 a week ago. The exports this month, including yesterday, total 27,635 tons.

Tin.—The week as a whole has been quiet, although on Aug. 24 and again on Aug. 28 there were fair sales. On the first date mentioned the market appeared inanimate on the surface, but very quietly there was some fair buying of Banca for spot delivery and Straits from the East. On Aug. 28 the buying was restricted to a few buyers, most of whom were apparently seeking metal wherewith to cover old contracts. Yesterday the market was quiet at 39.25c. for spot Straits, but consumers showed no interest. The arrivals up to yesterday total 3617 tons and there was afloat 3235 tons.

Lead.—This metal has become more settled and independents have lowered their quotation to the level of the leading interest, 6.50c., New York. At St. Louis, however, they are asking more than the principal producer, inasmuch as they quote 6.50c. there also, although the big seller asks but 6.42½c. For a time, when the independent quotations were as high as 6.75c. and a sale was made even at 6.80c., New York, the leading interest was not selling. Since then it has resumed, but it is understood that it will contract only with regular customers and for limited quantities. The exports continue light, those of the month, including yesterday, amounting to 797 tons.

Spelter.—The market has become quiet again, and with the falling off of interest on the part of buyers prices have declined steadily. The New York quotations for spot metal are now 9c. to 9.25c., and at St. Louis 8.75c. to 9c. Fourth quarter can be done at 8.50c. to 8.75c., St. Louis. The chief demand continues to come from abroad. Producers have a great deal of faith in the future. Some of the more important ones are well sold up to the end of the year, especially on prime Western. This month a large quantity of high-grade metal has been taken, both for export and by the brass mills. It is generally believed that the market would be much stronger were it not for the unsteadiness of some of the smaller producers, who soon become worried whenever buying subsides and seek to arouse action by offering concessions. Sheet brass continues difficult to get for delivery this year. The principal maker is understood to be selling at 37c. to 38c. to its regular customers, but outsiders have to pay 40c. Sheet zinc in carload lots is unchanged at 15c. per pound.

Antimony.—The heavy buying reported a week ago has entirely subsided and it is probable that the quotation usually made, 13.50c., could be shaded about ½c. per pound.

Aluminum.—Quotations are stronger at 59c. to 61c. for No. 1 virgin aluminum, 98 to 99 per cent pure, but the market is quiet.

Chicago

AUG. 28.—Activity among purchasers of copper continues and market quotations show a sustained firmness. Tin is in better demand, particularly for future delivery. Spelter quotations are again lower. Prices for scrap metals have advanced sharply. We quote: Casting copper, 26c.; Lake copper, 28c.; tin, carloads, 39.75c. to 40c., and small lots, 41c.; lead, 6.65c. to 6.75c.; spelter, 9c.; sheet zinc, 15c.; Cookson's antimony, 50c.; other grades, 14.50c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 19.50c.; copper bottoms, 17.75c.; copper clips, 18.50c.; red brass, 17c.; yellow brass, 13c.; lead pipe, 5.25c.; zinc, 6c.; pewter, No. 1, 28c.; tinfoil, 33c.; block tin pipe, 37c.

St. Louis

AUG. 28.—Metals have been quiet, closing to-day as follows: Lead firm, 6.65c. to 6.75c.; spelter, dull and weak, 9.25c. to 9.50c.; tin, 40c. to 41c.; Lake copper, 27.50c. to 28c.; electrolytic copper, 28c. to 28.50c.; antimony, 14c. to 15c. In the Joplin ore district zinc blende was held at a top price of $70 per ton, with the average for the week $61. The average for August has been $58.75 against $66.30 for July. Calamine ranged from $35 to $45, with the average for the week $41. Lead ore was firm at $65 for 80 per cent metal. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 8c.; heavy yellow brass, 11c.; heavy red brass and light copper, 15c.; heavy copper and copper wire, 17c.; lead, 5c.; zinc, 5c.; tea lead, 3.50c.; pewter, 25c.; tinfoil, 30c.

Orders for Locomotives

Orders for locomotives in recent weeks, mostly in August, have amounted to about 175. The American Locomotive Company will furnish 60 consolidated locomotives to the Italian State Railways, 15 locomotives to the Northern Railway of Spain, 9 mogul locomotives to the Russian Government, 10 locomotives to the Pittsburgh & Lake Erie, and 5 Pacifics to both the Michigan Central and the Cleveland, Cincinnati, Chicago & St. Louis. The British Government has placed an order for 45 narrow-gage locomotives with the Baldwin Locomotive Works and the New York Central has purchased 10 electric engines from the General Electric Company.

Large Sulphuric Acid Exports

Sulphuric acid exports in June were 9,421,735 lb., which is next to the largest month's total this year, the March exports having been 12,979,267 lb. This brings the total for the half year to 43,739,427 lb., or 7,289,903 lb. per month. For the fiscal year ended June 30, 1916, the total exports were 82,020,246 lb., against 46,771,510 lb. and 12,131,750 lb. for the fiscal years 1915 and 1914 respectively. The June exports were nearly equal to the total for 1913, of 9,689,005 lb., while the March exports were very little short of the 13,176,175 lb. exported in 1914.

The Brennan Engineering Company, Delaware Building, 36 West Randolph Street, Chicago, announces that on Aug. 1 the business was incorporated under the name of Brennan Wahl Company. It will conduct a business as consulting engineer—mechanical, structural and chemical—also as manufacturers' sales and purchasing agent for machinery and allied products. Daniel A. Brennan is president; Andrew G. Schneider, vice-president, and Henry R. Wahl, secretary-treasurer.

Customs Decisions

COPPER IN FLAKES, CALLED "SCHROT"

The general board has declined to take favorable action on a protest filed by George Benda, New York, relating to the classification under the tariff of so-called copper "schrot," consisting of copper in the form of small flakes produced by various manufacturing processes and intended to be converted into bronze powder. It appeared from the testimony that the flakes or clippings are cut from new copper. The collector took duty at 20 per cent as manufactures of metal not specially provided for, while the importer claimed free entry under that section of paragraph 461 reading "clippings from new copper." The board held that it was clearly the intent of Congress to admit free of duty copper which may virtually be said to be in the form of raw material, that is, copper which as imported shows that it still has to receive the first stages of manufacturing before it is even susceptible of being converted into manufactured articles. As against this intent, the board's decision said the customs tribunal was fully satisfied that the copper "schrot" was an article so far advanced in condition through manufacturing processes that all that remained to be done in order to convert it into its ultimate use as bronze powder was to further hammer or stamp it into a fine powder. The protest was accordingly overruled and the collector affirmed.

EMBROIDERY MACHINES DEFINED

According to a decision of the Board of United States General Appraisers, the provision in the present tariff law for "embroidery machines" cannot be stretched to include machines of other varieties even if the latter perform some of the functions of embroidery machines. The case enunciating this principle was that of the Robert Reiner Company, New York, the importations consisting of paper punching machines. The appraiser of the port made a report to the board in which he stated that the merchandise consisted of "13-needle embroidery machines, and card punching attachments for cutting out the designs of patterns." Duty was levied at the rate of 25 per cent under the provision in paragraph 165 of the act of 1913 for "embroidery machines." The importers asked a rate of 20 per cent under that section of paragraph 167 specifying "manufactures of metal not specially provided for."

The chief witness appearing at the trial was Robert Reiner, president of the importing company. His testimony showed that he had been for 18 years a dealer in embroidery machines; that his corporation at the present time is the largest dealer in that class of machines in the United States; that the machines under consideration are not embroidery machines but what are known as paper punching machines. The witness went on to testify that the sole purpose for which they were designed, and for which they are employed in the commerce of this country, is to punch holes, according to the pattern and design outlined in pencil or otherwise, in specially prepared paper rolls required for subsequent use in embroidery machines. Another point brought out was that, as a guide or check upon the accuracy of the work performed by the operator in punching the holes in conformity with the design or pattern desired, there is produced, simultaneously with the punching operation, a piece of embroidery measuring 13 in. in length showing the same pattern or design which has been punched through on the paper roll. It also appeared that the part of the machine which contains the mechanism for turning out this piece of embroidery comprises but one-tenth of the whole machine, whereas the part devoted to punching through the design upon the paper roll constitutes nine-tenths of the machine.

Counsel for the Government contended on the other hand "that the machines in question are embroidery machines, first, because they actually embroider pieces of cloth, and, second, because their other work, the punching of the paper roll, is a necessary preliminary process in the production of other pieces of embroidery in large commercial sizes on automatic embroidery machines."

Judge Fischer, in his decision approved by the other members of the board, commenting on the Government counsel's plea said in part:

"The record fully sustains the first contention, while the reasons advanced in support of the second would be as clearly unsound and unreasonable in practice as it is novel and extraordinary in theory. If a machine which is employed to make part of the product intended for use on an automatic embroidery machine itself becomes, by reason of the nature of its product, an embroidery machine and so classifiable for all purposes, then for the same reason and with the same sense of propriety should a machine which cuts the rolls used in actuating player pianos be itself treated as an automatic player piano, the machine which makes graphophone discs as a graphophone, a typesetting machine as a printing press, and a typewriting machine which cuts the stencils used in mimeograph work be considered a mimeograph itself. That the machine in question is clearly not an embroidery machine within the meaning of the law is conclusively proved of record. * * * The embroidery work it performs has no commercial value as such and is purely incidental and secondary to the card punching function of the machine. The protests are accordingly sustained and the decisions of the collector reversed."

Welding at the Electrical Exposition

Electric welding of iron and steel will be one of the feature exhibits of the New York Electrical Exposition, which will be held in Grand Central Palace, New York, Oct. 11 to 21. This exhibit is important from an educational standpoint, for the general public is surprisingly uninformed on this now highly developed process in the iron and steel industry.

The exhibit is being arranged by the Arc Welding Machine Company, 220 West Forty-second Street, New York, and O. A. Kenyon will be in charge. The public will have an opportunity of seeing all grades of welding accomplished in iron and steel, including structural pieces, plates and castings. Two arcs will be in operation equipped with automatic control so that the metal cannot burn by drawing too long an arc. The length of the arc is automatically controlled so that even the most unskilled worker cannot draw it beyond the point set. A special type of self-regulating generator, designed particularly for welding purposes, will be used. It consists of three units, one of which supplies the power, another regulates for constant current, and a third takes care of the adjustment. This generator is used exclusively by the Arc Welding Machine Company. The United States Government is co-operating in the exposition through the War, Navy and Commerce departments, all of which will have comprehensive exhibits.

Inland Steel Company Starts New Open-Hearth Furnaces

The Inland Steel Company on Friday, Aug. 25, placed in operation the first two of its new battery of eight 75-ton open-hearth furnaces at Indiana Harbor, Ind. The additional furnaces will be started next week. The company has been handicapped by a shortage of steel for its finishing capacity, but the output from these four furnaces will more than supply the deficiency and the company is understood to have made some sales of ingots. The completion of the remaining four furnaces will be timed to the progress in completing the new finishing mills which the company has under construction. The new open hearths in operation will absorb all of the hot metal production of the company's two blast furnaces and in addition some of the accumulation of iron that has been stored in anticipation. A third blast furnace is now under construction to provide for the open-hearth furnaces still to be finished.

The Michigan Bolt & Nut Works, Detroit, Mich., has a profit-sharing plan of the bonus type. The labor in the plant includes many foreigners. The company co-operates with the plan inaugurated by the Detroit Board of Commerce for the Americanization of such workmen. It encourages its men to attend night school, keeps check on their attendance and progress, and rewards proficiency in learning English and advancing in general education by promotion to better jobs.

PERSONAL

Henry R. Cobleigh, formerly mechanical editor of THE IRON AGE, and latterly managing editor of *Power*, has established himself in business as a partner in the Power Plant Management Company, National Bank of Commerce Building, New York. A specialty is made of effecting operating economies in power generation and distribution in existing industrial and other plants.

In addition to the appointments announced last week by the American Steel & Wire Company, the following have been made: C. R. Putnam, formerly superintendent of the Waukegan, Ill., wire works, has been appointed superintendent of the North Works, Worcester, Mass., succeeding G. W. Sells, who was made assistant manager of the Chicago District. W. E. Acomb, formerly superintendent of the Donora, Pa., wire works, has been appointed superintendent of the Waukegan wire works, succeeding Mr. Putnam. August Mann, formerly superintendent of the Farrell, Pa., works, has been appointed superintendent of the Donora wire works, succeeding Mr. Acomb. John Aurelius, formerly assistant superintendent of the Newburg, Ohio, wire works, has been appointed superintendent of the Farrell works, succeeding Mr. Mann. F. E. Gage, who was formerly assistant superintendent of the Rankin, Pa., works, has been appointed assistant superintendent of the Donora works, instead of superintendent as reported.

J. M. Brussell, who has been with the Ferro Machine & Foundry Company, Cleveland, as general superintendent for several years, has resigned to accept a similar position with the Delco Company, Dayton, Ohio.

William L. Diemer, Jr., has purchased the controlling interest in the National Wheel Company, Perrysburg, Ohio, maker of baby carriages and other vehicles for children, and has assumed the management of that company, having resigned as secretary of the Gendron Wheel Company, Toledo, with which he had been connected twenty-three years.

E. T. Foote, formerly of the New York office of the Cutler-Hammer Mfg. Company, and at one time in the engineering department at its Milwaukee factory, has recently been put in charge of the Boston office, located in the Columbian Life Building.

R. D. Chapman has been appointed general sales manager of the Taylor-Wharton Iron & Steel Company, High Bridge, N. J.; William Wharton, Jr., & Co., Inc., Easton, Pa., and the Tioga Steel & Iron Company, Philadelphia.

C. B. Andrews has been appointed sales manager of the Taylor-Wharton Iron & Steel Company, High Bridge, N. J.

Julean A. Arnold, American commercial attaché at Peking, China, has returned to the United States after a two years' stay in the Far East. He may be communicated with through the Department of Commerce.

W. S. Stothoff has been appointed general superintendent of Wm. Wharton, Jr., & Co., Inc., Easton, Pa., and the Tioga Steel & Iron Company, Philadelphia, Pa., in charge of plants and manufacturing. He was formerly in charge of sales of the Taylor-Wharton Iron & Steel Company, the parent company, at High Bridge, N. J.

Frank A. Moeschl, general manager of sales, Newport Rolling Mill Company, Newport, Ky., is spending his vacation on the Pacific coast.

A. N. Flora, general superintendent in charge of works operations of the Trumbull Steel Company, Warren, Ohio, for several years, has been made general manager of sales.

L. Meyrick, formerly of the Lavine Gear Company, Racine, Wis., has accepted the position of general superintendent of the Ferro Machine & Foundry Company, Cleveland.

Royal C. Wise, sales engineer, has removed his office from 9 South Clinton Street to 540 Monadnock Block, Chicago.

Arthur H. Halloran, vice-president and managing editor of the *Journal of Electricity, Power and Gas*, has been appointed Pacific coast representative of the Society for Electrical Development, with headquarters in the Crossley Building, San Francisco.

U. S. James of the Gisholt Machine Company sailed Aug. 26 on the Christianafjord for Christiana, Norway, to join C. H. Johnson, European representative of the company at Petrograd.

Iroquois Iron Company to Make Bessemer Steel

As already announced, the plans of the Mark Mfg. Company for its new Indiana Harbor, Ind., plant contemplated the installation of a Bessemer converter at once and in the future the erection of a blast furnace. It was expected that the metal for the converter would be furnished by the Iroquois Iron Company, whose interests are closely affiliated. The transfer of hot metal in the Chicago switching district has never been found feasible, and a revision of plans now provides for the erection of the converter by the Iroquois Iron Company on its own property and the delivery of ingots to the Mark Mfg. Company. The latter will delay building its own converter until such time as it builds blast furnace capacity. The Iroquois Iron Company, by rushing the completion of this 15-ton converter and a 1000-ton mixer, should be in position to take advantage of current demand for ingots in the period preceding the completion of the Mark finishing mills. Other improvements of the Iroquois Iron Company include a pig casting machine, to be erected at once, and an additional blast furnace and a by-product coke plant later.

Heroult Furnace Installations

The United States Steel Corporation has granted licenses for the installation of four more Heroult electric steel furnaces as follows:

The Warren Steel Casting Company, St. Louis, Mo., will erect a 3-ton furnace for making steel castings.

The Alabama Power Company, At Ensley, Ala., has purchased three more 6-ton furnaces for making munition and high grade steels. These are in addition to the two 3-ton furnaces already operating and the 6-ton now being built. The company will have six 6-ton furnaces when these new installations are completed.

These four furnaces bring the number of Heroult furnaces in operation or contracted for in the United States and Canada to 76. On Jan. 1, 1916, the number was 43, so that the rate of increase this year has been more rapid than ever before.

The Cutler-Hammer Mfg. Company, Milwaukee, is acquainting the people at large with the advantages of its C-H push socket by means of a nation-wide publicity campaign, designed to reach the millions who use lamp sockets in their residences, stores, offices and factories. This campaign, while planned some time ago, was held up until the accomplishment of a perfect trade distribution of the sockets in all parts of the country, so that the company as well as those handling or installing C-H sockets would receive the fullest benefit from the campaign from its very start. The capacity for turning them out has been doubled twice in the past two years.

It is estimated that 20 leading copper companies, operating in the United States, Canada and South America, produced approximately 895,000,000 lb. of copper in the first half of 1916. This is an increase of 299,000,000 lb., or 50 per cent, over the same period in 1915.

The Ellis-Smith Mfg. Company, Inc., will hereafter be the name of the Rub-On Mfg. Company, Inc., 87 Brayton Street, Buffalo, N. Y. The older name no longer describes the business, which covers the manufacture of automobile turn-table jacks, towing trucks and valve-reseating tools.

Britain's Great Increase in Munitions

Characterizing as an industrial miracle the work that had been done in Great Britain since the war began, in increasing the output of war munitions, F. Kellaway of the Ministry of Munitions in a recent speech said:

"Of the 4000 controlled firms now producing munitions 95 per cent had never produced a gun, shell or cartridge before the war. In 10 months they produced more shells than all the government arsenals and great armament shops existing at the outbreak of the war; and that was only a very small percentage of the total weekly production of shells in the country. Ninety arsenals had been built or adapted, and all except a very few were producing heavy guns, howitzers, big shells, or explosives, but we were not yet at the full flood of the output of guns and shell. There were 184,000 women engaged in war industries in 1914. To-day there are over 660,000. The total number of war workers in 1914 was 1,986,000; now it is 3,500,000. Women are engaged on 471 different munition processes, including 19 operations in connection with aeroplane production, the manufacture of howitzer bombs, the making of shrapnel bullets, filling bombs with smoke, explosives, gas, and other lethal contents; 31 processes on the production of machine tools; 6 processes in connection with marine mines; and 31 processes in shipbuilding. Two-thirds of these operations had never been done by a woman previous to 12 months ago. The Ministry of Munitions has built or is building housing accommodation for 60,000 workers, and canteens and mess rooms in munition works now give accommodation for meals for 500,000 workers a day."

American Porcelains

One field in which Germany has been pre-eminent is that of porcelain for chemical work. The Prussian product has heretofore never been equaled. Royal Berlin porcelain has been the standard of high quality. To make this, the Prussian manufacturer has had to import clays from different countries because of certain peculiar qualities necessary. When our supply of German porcelain was cut off with the outbreak of war in Europe, our chemical industries, and especially our chemical laboratories, were hard hit. To-day, however, American pottery manufacturers are producing in their own works, through their own skill and ingenuity, porcelains the equal of any produced in Germany. This is one of the achievements of American chemistry which will be demonstrated during Chemical Week at the Chemical Exposition in New York, Sept. 25 to 30.

Manganese Ore and Ferromanganese Imports

Manganese ore imports into the United States in June were 58,143 gross tons, against 74,875 tons in May. This brings the total for the half year to 232,926 tons, or 38,821 tons per month, which exceeds the monthly rate of 26,731 tons in 1915 and 28,757 tons in 1913, the record year. For the fiscal year ended June 30, 1916, the total imports have been 492,860 tons, against 206,859 tons and 288,706 tons for the same fiscal years of 1915 and 1914 respectively.

Ferromanganese imports for the first quarter of 1916, from Government data just published, were 19,752 gross tons, against 14,400 tons and 20,421 tons for the two preceding quarters.

The board of directors of the Mansfield Sheet & Tin Plate Company, Mansfield, Ohio, has decided to recommend an increase in the capital stock to $1,000,000 and to double the capacity of the plant. A special meeting of the stockholders will be held Sept. 3 to secure the formal ratification of the proposed extensions.

The Samuel Garber & Son Company has purchased the entire interests of Schulman & Garber, dealers in scrap iron, steel, metals, etc., Minneapolis, Minn. The yards and warehouses are on the Chicago, Milwaukee & St. Paul Railroad tracks and Tenth Avenue, South, and the office is at 1018 South Fourth Street.

OBITUARY

DANIEL MORRELL, the principal founder and former secretary of the Hartford Machine Screw Company, died in Hartford, Conn., Aug. 22, aged 80 years. He was born in Canajoharie, N. Y. In 1857 he entered the employ of David Groesbeck & Co., bankers and brokers, New York City, and rose to a partnership. In 1860 he was made a member of the New York Stock Exchange, retaining his seat for nearly 30 years. He became interested in the early automatic screw machine invented by Christopher M. Spencer of Hartford and by his liberal financial aid in the experimental stage made possible its later commercial success. He was also interested in the Johns-Pratt Company, Hartford, and several other industries. When the Hartford Machine Screw Company was sold to Western interests in 1907, Mr. Morrell retired from active participation in business.

JOHN NOEY, for 42 years superintendent of motive power and boilers at the Edgar Thomson works of the Carnegie Steel Company, died in Mercy Hospital, Pittsburgh, Aug. 23, aged 66 years. He was one of the oldest department superintendents at the Edgar Thomson Works, and in the old days was one of the "junior partners" of Andrew Carnegie. He was born in Johnstown, Pa., for some years was employed by the Cambria Steel Company, and in 1874 went with the late Capt. William R. Jones to help build the Edgar Thomson Works.

CHARLES L. THOMPSON, assistant to J. W. Deetrick, general superintendent of the Republic Iron & Steel Company, died suddenly at his home in Youngstown, Ohio, Aug. 27, aged 52 years. He was born in Aurora, Portage County, Ohio, and for many years was in the service of the Erie Railroad at Youngstown. Later he was with Cartright, McCurdy & Co., whose plant was taken over by the Carnegie Steel Company, and he then became identified with the Republic Company. He leaves his widow, a daughter and a son.

EMIL HERTER, chief mechanical engineer of the Edison Storage Battery Company, West Orange, N. J., died at the Orange Memorial Hospital, Aug. 26, aged 59 years. He was associated with Thomas A. Edison for some 30 years. He was a member of the American Society of Mechanical Engineers.

ROBERT MCCLEAN, member of the firm of A. McClean & Co., iron and metal dealers, Baltimore, Md., died Aug. 24 at a local hospital, aged 61 years. He was a native of Baltimore.

STANLEY O. AITKENS, assistant traffic manager for the American Steel & Wire Company, Worcester, Mass., died Aug. 16 from infantile paralysis, aged 22 years.

ERNST A. EVERSMAN, president Perfection Furnace Pipe Company, Toledo, Ohio, died Aug. 18.

Navy Department Adopts Geared Turbines for Destroyers

Geared turbine units are to replace the direct connected turbines of the destroyers Henley and Mayrant. Contracts for this work have been placed with the Westinghouse Machine Company, East Pittsburgh. The Navy Department has adopted geared turbines, it is understood, because they are lighter and take up less space than direct-connected units, are better mechanically because of their small size, and require less steam consumption at all speeds and especially at cruising speeds. This of course reduces the fuel consumption and increases the steaming radius, which is an important feature. The machinery to be supplied by the Westinghouse Machine Company, will consist of two complete-expansion geared-turbine units of the impulse-reaction type with Kingsbury thrust bearings, and two geared cruising units. It is to be installed in the same engine room space and to connect with the existing propeller shafting, and drive the propellers at the same speed as formerly.

Pittsburgh and Nearby Districts

Reports are that Eastern parties are trying to secure control of the plant of the LaBelle Iron Works, Steubenville, Ohio. The company has two blast furnaces, with a capacity of about 800 tons of iron per day; an open-hearth steel plant containing 11 furnaces, together with plate and sheet mills and a cut nail factory. The last named is located at Wheeling, W. Va. The LaBelle Iron Works also controls the Pitt Iron Mining Company, which operates the Miller and Wacootah mines in Minnesota; it owns the capital stock of the LaBelle Coke Company, which has 325 acres of coal lands and 200 beehive coke ovens in Fayette County, Pa.; it owns coal lands in Jefferson County, Ohio, and Brooke County, W. Va., and controls the LaBelle Steamship Company, having one Lake ore steamer with a carrying capacity of 10,000 tons.

The tar product of the new Koppers by-product coke plant of the Youngstown Sheet & Tube Company, all the 204 ovens of which are now in operation, will be sold direct to the Barrett Mfg. Company, which has erected a new plant at Youngstown, and it will also act as selling agent for the other by-products, such as benzol, toluol, phenol, etc. Gas from the by-product coke ovens is now being used in the 18-in. bar mill, replacing natural gas.

Salaried employees of the Youngstown Sheet & Tube Company will participate in a semi-annual bonus, to be paid Aug. 31, for the first six months of 1916. On Sept. 7 the mill employees will participate in a bonus for the first four months of this year, at a rate of 10 per cent. The bonus plan was dispensed with May 1 for the mill hands because of extra earnings received by reason of the prosperous trade conditions.

The Republic Iron & Steel Company, Youngstown, has put its new small tube mill in operation, making sizes from ¼ to 2½ in. It is expected to get the large mill on within the next four weeks, making from 8 to 16 in. The installation was made by the United Engineering & Foundry Company. With the two new mills in operation the capacity of the Republic tube plant will be increased 50 per cent.

The Sharpsville Boiler Works, Sharpsville, Pa., has been reorganized with a capital of $50,000 and will erect a new building, 120 x 170 ft., for heavy plate construction work. Officers have been elected as follows: Hugh Garvey, Sharon, president; Charles B. Fagan, Pittsburgh, secretary; Frank J. King, Sharpsville, treasurer; J. P. Keene, Pittsburgh, general manager; W. C. McGraffic, Pittsburgh, superintendent, and C. R. Vogel, also Pittsburgh, auditor. The company is said to have orders booked ahead for eight months.

The Fawcus Machine Company, Pittsburgh, maker of cut gears, has opened a downtown office in room 1905, First National Bank Building.

The Republic Iron & Steel Company has posted notices in its works announcing that it will pay monthly prizes to employees offering the best suggestions for improvements in plant operations. The prizes will be $25, $15, $10 and $5. A committee composed of heads of departments will judge as to the worth of suggestions submitted.

Stockholders of the Petroleum Iron Works Company and its two allied interests, the Pennsylvania Tank Car Company and the Pressed Steel Products Company, held annual meetings at Sharon, Pa., Aug. 24. Officers' reports submitted showed that all three are in prosperous condition, and have orders booked ahead for some months. Officers were elected as follows: Petroleum Iron Works Company—George P. Bard, president; John L. Considine, vice-president; A. S. Maitland, treasurer; H. C. Knowles, secretary and assistant treasurer. Pennsylvania Tank Car Company—L. S. Jordan, president; John L. Considine, vice-president; A. S. Maitland, treasurer; H. C. Knowles, secretary and assistant treasurer. Pressed Steel Products Company—John L. Considine, president; E. E. Mytinger, vice-president; A. S. Maitland, treasurer; H. C. Knowles, secretary and assistant treasurer.

The Roanoke Steel Company, Inc., which recently took over the plant of the Louks Iron & Steel Company at Roanoke, Va., has put it in operation, turning out about 50 tons of merchant iron bars per day. It is the intention to add to the equipment and increase the capacity to 100 tons per day of high grade iron bars and other products.

The Beaver Refrigerator Company, New Brighton, Pa., has let a contract for the erection of a new plant, 100 x 250 ft.

Robert W. Tener, for 21 years, and W. E. Troutman, for 12 years, with the United Engineering & Foundry Company, Pittsburgh, have purchased the plant of the Braddock Machine & Mfg. Company, Braddock, Pa., near Pittsburgh, and will make a specialty of producing acid open-hearth ingots, turning out about 1200 tons per month. The present machine-tool department of the plant will also be operated.

The plant of the Pittsburgh Sheet & Tin Plate Company at Marietta, Ohio, has been put in operation. Owners of the plant, formerly controlled by Eastern capitalists, plan to install six additional mills, which will give the company a total of 10 mills for rolling tin plate and tin-mill sizes of black sheets. Larkin C. Taylor, president Baird Machinery Company, Pittsburgh, is head of the Pittsburgh Sheet & Tin Plate Company; E. Cooper Shapley, Commonwealth Trust Company, is vice-president; M. J. Richards, formerly superintendent of the Standard Tin Plate Company, Canonsburg, Pa., is general manager. It is stated that about $500,000 will be spent for extensions and improvements.

The Westinghouse Electric & Mfg. Company, East Pittsburgh, has received an order from the Boston & Maine Railroad for two 130-ton Baldwin-Westinghouse electric locomotives, similar to those now in service. It has also recently sold to the Montana Power Company complete electrical equipment for the operation of a hydroelectric station on the Missouri River at Holten, Mont. The equipment includes four 12,000-kva. waterwheel generators, two 500-kw. waterwheel exciters, four 12,000-kva. transformers with a maximum continuous rating of 16,000 kva., switching equipment for the entire station, battery charging motor-generator sets, air compressors, testing set, oil filter, etc.

The Lovell Mfg. Company, Erie, Pa., is erecting a small addition to its plant. No additional machinery will be required.

The board of water commissioners of Erie, Pa., has awarded contract for a new 20,000,000-gal. turbine-driven pumping engine to the De Leval Pump Company, Trenton, N. J. Alliance, Ohio, has employed Chester & Fleming, hydraulic and sanitary engineers, Pittsburgh, to prepare detailed plans and specifications for additional pumping machinery, rebuilding pumping station and a new concrete-covered reservoir. A bond issue of $150,000 has been sold for these improvements, and the work will be advertised as soon as plans are finished.

The plant of the Best Foundry Company, New Kensington, Pa., was sold at sheriff's sale Aug. 25 to the American Manganese Mfg. Company, Philadelphia. The foundry is equipped with a 60-in. cupola and made gray-iron castings up to 10 tons in weight, with a capacity of about 20 tons per day. A machine shop is attached. It is not known whether the purchaser will operate the plant.

The Pullman Car Company, Chicago, denies the report that it will shortly begin the erection of a branch plant at Mingo Junction, Ohio, for the manufacture of steel cars. It is improving its plant at Pullman, Ill.

As part of the program of improvements at its Steelton, Pa., works, as recently announced, the Bethlehem Steel Company has let contracts for the erection of a 500-ton blast furnace to be known as A stack. The Raymond Concrete Pile Company, New York, will build the foundations and the structural steel and erection work will be done by the Bethlehem construction department.

Judicial Decisions

ABSTRACTED BY A. L. H. STREET

LEGAL PROTECTION AGAINST COPYING OF DEVICES.—A manufacturer, having achieved a valuable reputation as the producer of a certain unpatented device, is entitled to enjoin a competitor from copying the appearance of the article to the confusion of buyers. And when the public buys a part to replace one in a machine (in this case, spark plugs for automobiles) the fact that the imitating device is sold in a carton dissimilar from those used by the manufacturer of the original part will not avoid a finding of unfair competition, since a buyer of a machine originally equipped with the complaining manufacturer's part would not be familiar with that manufacturer's distinguishing carton. But when it appears that the questions involved in such a controversy arise out of honest trade differences, a decree in favor of the complaining manufacturer may be conditioned on his refraining from advertising the decree in such a manner as to interfere with defendant's future trade. (United States District Court, Southern District of New York, Champion Spark Plug Company vs. A. R. Mosler & Co., 233 Federal Reporter, 112.)

A SAFEGUARD AGAINST FREIGHT REBATES.—When a railroad company sues to recover freight charges on an interstate shipment, the defendant will not be permitted to file a counterclaim in the same suit for damages to the freight in transit, since, to permit a deduction from freight charges on such account would be to open the door to fraudulent rebates under the guise of freight loss claims. (United States District Court, Southern District of Iowa, Illinois Central Railroad Company vs. W. L. Hoopes & Sons, 233 Federal Reporter, 135.)

EMPLOYER'S LIABILITY FOR PHYSICIAN'S NEGLIGENCE.—An employer who, under agreement with his employees, makes deductions from their wages to defray the cost of employing a physician to attend them and their families in case of accident or illness, incurs no liability on account of negligence or unskillfulness of that physician, if the employer derives no profit from the arrangement and has used a reasonable degree of care to retain a suitable physician. (Mississippi Supreme Court, Eastman, Gardiner & Co. vs. Permenter, 72 Southern Reporter, 234.)

INJURY TO WORKMAN OUTSIDE SCOPE OF EMPLOYMENT.—If an employee, without authority from his employer, voluntarily steps beyond the scope of his employment to assist another employee and is injured while doing so, he cannot recover damages against his employer. (Alabama Supreme Court, Republic Iron & Steel Company vs. Howard, 72 Southern Reporter, 263.)

LIABILITY OF INITIAL CARRIERS.—A bill of lading covering a through shipment of freight from a point in the United States to a destination in a foreign country, to be carried over connecting lines, may validly limit the liability of each carrier to losses occurring on its lines; the clause of the Carmack amendment to the Interstate Commerce Act, declaring an initial carrier of a through shipment to be liable for losses occurring anywhere en route, being limited to shipments between interstate points. (South Carolina Supreme Court, Aldrich vs. Atlantic Coast Line Railroad Company, 89 Southeastern Reporter, 315.)

OBLIGATIONS OF CO-PARTNERS.—A partner is not liable to his associates for a loss resulting from an innocent mistake made in transacting firm business. So far as losses result from mere errors of judgment not amounting to bad faith, fraud or reckless disregard of his obligations, they must be borne by the firm. Nor does a partner impliedly make any representation as to his capacity to transact the partnership's affairs. (Massachusetts Supreme Judicial Court, Hurter vs. Larrabee, 112 Northeastern Reporter, 613.)

COMPUTING SALESMAN'S COMMISSION.—Since well-established trade customs are presumed to enter into contracts which do not contain express provisions to the contrary, in computing a salesman's commission on a basis of "net sales," the employer is entitled to deduct commissions paid jobbers, who guaranteed the accounts of retail dealers to whom the salesman made sales, and also entitled to deduct on account of "free goods" given as premiums and freight prepaid on shipments; those deductions being authorized by trade custom. (South Carolina Supreme Court, Friedheim vs. Walter H. Hildic Company, 89 Southeastern Reporter, 358.)

SHIPPER'S RIGHT TO RECLAIM GOODS NOT PAID FOR.—When it is agreed under a contract for sale of goods that title is not to pass until the buyer pays the price, payment being understood as to become due when loading is completed, and the purchaser fails to pay then, the seller is entitled to reclaim possession, and the railroad company's refusal to surrender possession renders it liable to the shipper for the value of the goods, although they were loaded on a car furnished by the contract purchaser. Nor is the railroad company entitled to require the shipper to give a bond to indemnify the company against liability to the buyer, as a condition to surrender of the goods, when the shipper is plainly entitled to possession. Refusal to deliver except upon such condition is the same in legal effect as an unqualified refusal to deliver. (Niagara County, N. Y., Court, Wilson vs. International Railway Company, 160 New York Supplement, 367.)

EFFECT OF CHECK OR DRAFT AS PAYMENT OF ACCOUNT.—In a suit against a buyer of a pump to make good a bank draft given in payment but not paid because of failure of the bank, it is held that a note, check or draft does not absolutely discharge the debt for which it is given, unless there is something to show that the creditor has accepted it on that condition. Ordinarily, acceptance of such paper is presumed to be only a conditional discharge of the debt, the condition being payment of the note, check or draft. (Colorado Supreme Court, Globe Express Company vs. Taylor, 158 Pacific Reporter, 717.)

CONDITION OF STEEL CASTINGS SOLD.—Under an agreement to sell castings of ductile steel metal, having a tensile strength of from 55,000 to 65,000 lb. to the square inch, and conforming to certain specifications, the seller, not knowing that the castings were intended to be used in making ammunition hoists for the Government, was not bound to furnish castings which would pass inspection under the buyer's contract with the Government. (New York Supreme Court, Appellate Division, Atlanta Machine Works vs. Felthousen, 160 New York Supplement, 29.)

RIGHTS OF NON-RESIDENT CORPORATIONS.—It was no defense to an action brought by a non-resident corporation to recover the price of a water wheel that the company had not complied with the laws of the State governing non-resident corporations engaged in doing business in the State, if the transaction was one in interstate commerce; such laws being restricted in their operations to purely intrastate dealings. (Alabama Supreme Court, Hurst vs. Fitz Water Wheel Company, 72 Southern Reporter, 314.)

VALIDITY OF CONVEYANCE AS AGAINST GRANTOR'S CREDITORS.—A brass works company bought real estate from a married woman to whom her husband had conveyed it. Held, that the company is entitled to hold the property as against the husband's creditors, although he may have intended to defraud them, if there was a substantial, although inadequate, consideration for the transfer to the wife, and if neither the wife nor the company participated in the fraudulent intent of the husband to hinder, delay or defraud his creditors. (Alabama Supreme Court, London vs. G. L. Anderson Brass Works, 72 Southern Reporter, 359.)

LIABILITY FOR CRANE ACCIDENT.—A steel and iron company may be held liable for fatal injury to the operator of a crane used in handling iron ore, due to collapse of bents of a trestle on which the crane was being operated, on it being found that the company was negligent in failing to have the bents properly braced, considering the weight of the crane. (Alabama Supreme Court, Sloss-Sheffield Steel & Iron Company vs. Scivally, 72 Southern Reporter, 349.)

Machinery Markets and News of the Works

NORMAL HEALTHY DEMAND

Scattered Orders Equalize Facilities

High Cost of Materials a Vexatious Question with Manufacturers—Economical Production Engaging More Attention

The demand for metal-working machinery is steady and widely diffused, and practically on a normal basis, in that there is no call for tools in lots of abnormal size. Machines are wanted principally to round out manufacturing facilities, and thus maintain maximum production. Deliveries are not much changed. Another indication of the approach of normal times is that manufacturers are giving more attention to improved shop methods involving costs.

Machine-tool builders, like other consumers of metal, find the high cost of materials, coupled with delayed deliveries, a vexatious question, especially those who have not sufficiently advanced prices to meet the situation.

Cleveland reports a good scattered demand for lathes, shipments of which are now considerably easier. In Milwaukee, the tool builders are less crowded than they have been heretofore, but new plants in that territory are taking a goodly amount of equipment.

Detroit factories are running full, likewise those at Niles, and extensions are going on steadily. Automobile makers are the most active purchasers in Cincinnati, where attention is drawn to the high cost of materials.

Shipbuilding continues very active in the Pacific Northwest, although other industries are no less busy. The car situation in Oregon has become exceedingly grave, as it promises to become in other sections of the country. Detroit manufacturers have held a meeting in conjunction with railroad heads. with a view of conserving the supply of freight cars.

Shell orders continue to be placed in Canada, where the officials are worried over the short supply of forgings suitable for large shells. Only four companies in Canada are engaged in making forgings for large shells.

New York

NEW YORK, Aug. 30, 1916.

The machine-tool business is strong and without the slightest trace of any weakness; but it is limited, especially with standard makes, by the ability to get equipment. Shops are now generally in the market for such tools as are needed to keep all departments up to the proper operating standard. This is the reason for the continued call for small lots and single tools which makes up the greater part of the trade to-day. Deliveries have shown no improvement worth mentioning; with some it is a bit better, with others not so good. Orders for radial drilling machines, for instance, are now being booked for delivery into next March.

Many machine shops that took on munition work for which their equipment was not originally installed and have not found it particularly remunerative, have recently taken advantage of renewed demand in their special lines to close out [illegible] business.

In spite of the good times manufacturers are enjoying, they are showing an increased interest in shop costs. Makers of time-keeping devices report a vastly improved demand for their equipment within the past year.

Recent buyers in this market include the McNab & Harlan Mfg. Company, Benjamin Eastman and the Watson-Stillman Company.

The Evans Addressing Machine Company, Inc., 257 Washington Street, Buffalo, N. Y., has increased its capital stock from $20,000 to $50,000 to provide for a contemplated extension of its business. Chauncey J. Hamlin is president and Geo. J. Evans, secretary and treasurer.

The National Bridge Works, Review Avenue, Long Island City, N. Y., recently increased its capital stock from $225,000 to $300,000 in order to provide funds for increasing the efficiency of its plant. Practically all the necessary equipment for this improvement has been provided. T. J. Foster is president.

The Clyde Motor Truck Company has purchased five acres at Farmingdale, Long Island, having 15,000 ft. frontage on the Long Island Railroad, with option on an adjoining 40 acres, and will construct a one-story factory of saw-tooth type, having about 12,000 sq. ft. of floor space for the manufacture of motor trucks. It is incorporated for $750,000. Mahlon C. Swartz is president; W. J. Melhiush, Jr., recently with the White Motor Company, is vice-president and general manager; P. R. MacLean, formerly American representative of Frazer & Best, Ltd., foreign motor vehicle exporters, is secretary and export manager. D. E. Vreeland, president of E. E. Vreeland, Inc. (advertising), is treasurer. P. J. Holdworth, formerly of the Chalmers Motor Car Company, is efficiency engineer and W. J. Kenlon, formerly with the Christie Front Drive Motor Company, is factory representative.

The [illegible] Mfg. Company, 32 Vanderbilt Avenue, New York City, owner of fire extinguishers, has recently increased its manufacturing capacity to produce a complete line of fire-protection apparatus, excepting only large vehicles and sprinkler systems.

The Hood Furnace & Supply Company, Corning, N. Y., is making additions and improvements to its manufacturing plant on East Third Street.

The Bayer Brothers Company, Rensselaer, N. Y., Dr. Emanuel Von Salis, manager, is taking bids for a factory building 60 x 150 ft., two stories, to be erected on Riverside Avenue, at a reported cost of $75,000.

The Up-to-Date Advertising Company, Canisteo, N. Y., H. W. Kellogg, president, is building an addition to its plant for the manufacture of signs.

The Carthage Sulphite Pulp & Paper Company, Carthage, N. Y., [illegible] A. Orenstein, manager, is building a machine shop addition, 60 x 60 ft., at its plant.

The Empire Mfg. Company, Franklinville, N. Y., George [illegible], president, is building a two-story addition, 37 x 155 ft., to its manufacturing plant.

The Hahn Paper Company, Watertown, N. Y., J. W. Hahn, president, has let contract for the erection of a machine shop, 70 x 90 ft., and a storehouse, 16 x 30 ft., one story, to be erected on Sewells Island at a cost of $15,000.

The Driver-Harris Wire Company, Harrison, N. J., has completed plans for an addition to its plant to cost approximately $10,000.

[illegible] Company, 42 Paine Street, Troy, N. Y., are taking bids for a two-story addition to their factory.

The North Buffalo Hardware Foundry Company, Buffalo, has taken out a building permit for an extension, 60 x 90 ft., to its foundry at Hertel Avenue and the Erie Railroad.

The C. Kurtzman Company, Buffalo, manufacturer of pianos, is building a brick addition to its factory at Seventh and Hudson streets.

The Schoellkopf Aniline & Chemical Works, Buffalo, has had plans for a two and three-story, steel and brick addition to its dye works at Abbott Road and the Buffalo Creek Terminal Railroad, to cost $145,000, and a five-story reinforced concrete and brick warehouse to cost $202,700.

The Rome Mfg. Company, Rome, N. Y., has let contract for the erection of an annealing building, 40 x 129 ft., one story, and a box factory, 40 x 156 ft., one story, at its plant on Railroad Street, to cost $30,000. E. L. Spriggs is superintendent.

The Lockport Glass Company, Lockport, N. Y., M. Woodard, manager, has let the general contract for the erection of a factory building, 60 x 400 ft., one and two stories, on Michigan Street, to cost $50,000.

Will & Baumer, Syracuse, N. Y., Anthony Will, president are taking bids on revised plans for three-story factory building, 70 x 178 ft., to be added to their plant at Greenport at an estimated cost with equipment of about $300,000.

The Transmission Ball Bearing Company, W. J. Murray, president, Toronto, Ont., is having plans prepared for a branch plant building which it contemplates erecting at Buffalo.

The Excelsior Steel Ball Company, Buffalo, E. A. Jones, manager, has let contract for the erection of a forging shop, 50 x 115 ft., one story, at its plant on Military Road and the New York Central Railroad, North Buffalo.

The American Brake Shoe & Foundry Company, Erie, Pa., has let contract to the Austin Company, 14,230 Euclid Avenue, Cleveland, Ohio, for the erection of a foundry building, 75 x 800 ft., one story, at Twelfth and Payne streets.

Philadelphia

PHILADELPHIA, PA., Aug. 28, 1916.

The Pennsylvania Gauge & Tool Company, Bellevue Court Building, Philadelphia, recently incorporated, has been absorbed by the Luster-Jordan Company, Franklin Avenue and Washington Street, Norristown, Pa., of which C. H. Stoer of Sherritt & Stoer, Finance Building, Philadelphia, is treasurer.

The John E. Sjostrom Company, 1719 North Tenth Street, Philadelphia, manufacturer of bank and office furniture, lost its plant by fire recently with an estimated damage of $150,000, including stock worth about $80,000 and machinery worth about $20,000.

The Pennsylvania Railroad Company has awarded contract to the Roydhouse-Arey Company, Philadelphia, for the erection of a one-story brick and reinforced concrete power house, to be erected at its Reed Street freight yard at an estimated cost of $22,000. It will be 30 x 86 ft.

Bradley & Co., Inc., of Philadelphia, has been organized with a capital stock of $50,000 by Arthur H. Gerhardt, 5625 Overbrook Avenue; Trenchard E. Newbold, 405 South Twenty-second Street, and Albert P. Gerhardt, 2307 North Fifty-eighth Street, to manufacture chains and accessories.

The Allen Chemical Company, Allentown, Pa., has been incorporated with a capital stock of $50,000 by Irwin Huebner, treasurer, and others, to manufacture chemicals.

The Home Service Garage, Philadelphia, has been incorporated with a capital stock of $10,000 by Joseph Henry, Jr., treasurer, 5232 North Broad Street, to operate a garage and repair shop.

The General Engineering Works, Inc., Philadelphia, has been incorporated with a capital stock of $100,000 by A. M. VanFosson, Norristown; M. T. Gemmell, 6048 Carpenter Street, and James Gemmell, Jr., 6048 Carpenter Street, Philadelphia, to manufacture boilers, engines, machinery and accessories.

The Steckel Rupp Company, Allentown, Pa., has been incorporated with a capital stock of $10,000 by V. H. Steckel, 12 North Seventh Street, Allentown; Charles H. Rupp, K. S. Steckel, Horace Wickersham and H. A. Schantz, all of Allentown, to manufacture motor-vehicle accessories.

The Mount Union & Huntingdon City Garage Company, Mount Union, Pa., has been incorporated with a capital stock of $50,000 by Ralph B. Cassady, Mount Union, Pa.; Harry W. Wagner and A. R. Petterson, Huntingdon, Pa., to operate a garage and repair shop.

The V. V. Fittings Company, Philadelphia, has been incorporated with a capital stock of $150,000 by John F. Burns, 1511 Allegheny Avenue; William T. Pringle, Wyncote, Pa.; William Gloeckner, Trenton, N. J., and Arthur E. Pringle, 545 Brinton Street, Philadelphia, to manufacture electrical and mechanical supplies.

The Doyle-DaCosta Mfg. Company, Easton, Pa., has been organized with a capital stock of $50,000 to manufacture insulated wire and electrical appliances. A building has been secured and about 60 men will be employed when operations begin. William A. Doyle and Robert C. DaCosta are the incorporators.

The National Alloy Company, Philadelphia, Pa., recently purchased from the Pennsylvania Railroad Company the property at the corner of Twenty-fifth and Dickinson streets. No changes are contemplated at present, but the company expects to take on some additional lines shortly.

Plans are in progress for a one-story top building, 80 x 100 ft., for the Autocar Company, Ardmore, Pa.

The Tinius Olsen Testing Machine Company, 500 North Twelfth Street, Philadelphia, will soon have the erection of a four-story addition, 50 x 60 ft., to be used for pattern storage. A large boiler extension will be made in the spring.

New England

BOSTON, MASS., Aug. 28, 1916.

The Coe Patent Pipe Arms Mfg. Company, Hartford, Conn., is to build a new plant, 60 x 200 ft., for [illegible]. The company now has contracts with nine foreign governments and expects to secure a large contract under the appropriations of the new army bill now before Congress. It now employs 2500 men and expects to expand to 3000. A contract for a new office building, 48 x 50 ft., has also been awarded.

It is currently reported that the Howe Scale Company, the largest industry in Rutland, Vt., is about to be acquired by new owners. This is part of a plan to merge the scale factories throughout the country. John A. Mega, who represents the controlling interest in the business, while not denying the transfer, states the business will remain in Rutland and that he will continue as its head. Extensive additions are in progress and it is expected the force of workmen will be considerably enlarged.

The Southington Hardware Company, Southington, Conn., has awarded a contract for the erection of two additions, 50 x 72 ft., one story, and 40 x 144 ft., two stories.

The Brass City Machinery & Tool Works Company, Waterbury, Conn., has been incorporated with a capital stock of $5,000 by George Fritz, Albert H. Mitchell, Emma S. Mitchell and Charles O. Nelson.

The B. & K. Company, formerly the Barnes & Kobert Company, Milldale, Conn., began work in its new factory on Ellis Street, New Britain, Conn., Aug. 28. The directors are contemplating the erection of a forge and galvanizing shop, 60 x 180 ft.

The Hinckley Mfg. Company, Turners Falls, Mass., cutlery specialties, has been incorporated with capital stock of $50,000 by Benjamin B. Hinckley, president; Walter H. Ray, treasurer, and F. W. Hance.

The Wire Novelty Company, Second Avenue, West Haven, Conn., has awarded a contract for an addition.

The Automatic Wood Heel Machinery Company, Lynn, Mass., has been incorporated with a capital stock of $25,000 by Joseph G. Redshaw, George O. Perkins, John G. Pool and Frank E. Longby.

Work has been started on an addition, 30 x 130 ft., one story, to the plant of the American Brass Company, Liberty Street, Ansonia, Conn.

The Motor Industry Appliance Company, Springfield, Mass., has been incorporated with a capital stock of $50,000 by Frank W. Arthur, Anton C. Schmelzer, Benjamin F. Arthur and Ralph S. Miles.

The Billings & Spencer Company, Hartford, Conn., has awarded a contract for the erection of an addition to its forge shop, 87 x 290 ft., one story, and an addition to its machine shop, 70 x 120 ft., two stories. A portion of the forge shop addition will be used to increase the heat treating facilities. The company has outgrown its new plant less than a year, but its greatly increased business makes it necessary to enlarge the forge shop nearly 50 per cent and its other departments to correspond.

The Naillick Motor Signal Company, Boston, Mass., has been incorporated with a capital stock of $500,000. The directors are Laurence J. Killian, 38 Clive Street, president and treasurer; William W. Killian and O. E. Perrigo.

The New England Bolt Company, Everett, Mass., has been incorporated with a capital stock of $20,000. The directors are William E. Clark, president; Kenneth T. Burr, Dorchester, treasurer, and E. W. Blodgett.

The casting shop of the Bristol Brass Company, Bristol, Conn., has been completed by the Austin Company and the same contractors are now beginning the erection of a foundry, 62 x 250 ft.

The Bullard Machine Tool Company, Bridgeport, Conn., has begun the erection of another unit, 44 x 142 ft., five stories, of its new plant. The old buildings are being replaced as fast as possible by new structures.

The Rumford Electric Alloys Company, Portland, Me., has been incorporated with a capital stock of $200,000. The officers are Charles M. Drummond, president; Wadleigh B. Drummond, treasurer; Joshua H. Drummond, clerk.

The American Brass Company, Waterbury, Conn., has awarded a contract for two additions at [illegible].

nue—a rolling mill, 80 x 240 ft., one story, and a furnace room, 60 x 160 ft.

The Universal Winding Company, Elmwood Avenue, Providence, R. I., is having plans drawn for a foundry building.

The Bosch Magneto Company, Springfield, Mass., has awarded a contract for a boiler house, 45 x 60 ft.

The Hemphill Mfg. Company, Central Falls, R. I., has awarded a contract for an addition.

The Taunton Rivet Works, Taunton, Mass., is to build an addition.

The American Voting Machine Company, Waltham, Mass., is to build an addition, 40 x 140 and 20 x 40 ft., one story, to its plant on South Street.

Murray & Sorenson, 352 Pearl Street, New York City, are having plans drawn for a factory at Roxbury, Conn., to replace one recently destroyed by fire.

Baltimore

BALTIMORE, MD., Aug. 28, 1916.

The Poole Engineering and Machine Company, Woodberry, Md., is understood to be planning the construction of a 20 x 60 ft. addition to its machine shop.

Extensive improvements have been started at the plant of the Pusey & Jones Company, Wilmington, Del.

Contract for an addition which will cost in the neighborhood of $25,000 has been awarded by the Baltimore Tube Company, Ostend and Wicomico streets, Baltimore.

The Coastwise Shipbuilding & Lighterage Company, 401 Keyser Building, Baltimore, has made application to use the property at the foot of Andre Street as a woodworking factory and to install 270 hp. in motors.

Heard & Cardwell, Danville, Va., are seeking prices on cold storage equipment and boilers.

The Titmus Optical & Instrument Company, Petersburg, Va., has been incorporated with $25,000 capital. J. A. Rucker is president.

Plans to greatly increase its output are being made by the Norfolk Mattress Company, Granby and Twenty-third streets, Norfolk, Va.

Extensive improvements, including a boiler house, engine room, etc., are planned by the Consumers' Ice & Coal Company, Front Street and Edgmont Avenue, Chester, Pa. The ice output will be greatly increased.

Chicago

CHICAGO, ILL., Aug. 28, 1916.

The machinery business in August has been marked by a decided revival, sales having increased to the regular domestic trade as well as in connection with new ammunition contracts. The demand for lathes, however, is still checked and the larger business has been felt more particularly by builders of milling machines, boring mills and grinders. Automobile manufacturers have recently been large purchasers. A few uncompleted railroad purchases still remain in the market but no new requirements have appeared.

The Kling Brothers Engineering Works, Chicago, builder of boiler shop and steel fabricating tools, has placed a contract for a new foundry.

The Pyle National Electric Headlight Company, 900 South Michigan Avenue, Chicago, will erect a plant to cost $250,000. It will include a machine shop, 132 x 280 ft., a pattern shop, foundry, 80 x 236 ft., forge shop, 48 x 94 ft., and power house.

The Variety Mfg. Company, 2942 Carroll Avenue, Chicago, is about to erect a three-story factory to cost $40,000. It is a fabricator of light steel work for buildings.

The former Whitcomb Agricultural Implement factory at Rochelle, Ill., has been acquired by the Thomas Engine Mfg. Company, Wichita, Kan., which will operate it for the manufacture of harvesting machinery. The Dugan Company expects to have its machinery installed and the plant in operation by Sept. 1.

The American Mfg. Company, Waterloo, Iowa, C. D. Pedersen, president, has been incorporated with a capital of $100,000 and is having plans prepared for a three-story manufacturing plant.

The Hart-Parr Company, Charles City, Iowa, is preparing to build an addition to its steel foundry to cost $100,000.

The Johnson Hay Stacker Company, Norfolk, Neb., has purchased additional property on which a machine shop, 75 x 150 ft., will be added to meet the need of increased factory capacity.

The American Dump Car Company, 1004 Pioneer Building, St. Paul, Minn., manufacturer of dump cars, frogs, switches and contractors' equipment, has under consideration the erection of a new plant in that city.

The Pilot Motor Car Company, Richmond, Ind., announces that within the next few months its plant will be enlarged to permit an increase of 50 per cent. George E. Seidel is president.

Detroit

DETROIT, MICH., Aug. 28, 1916.

Local factories are full of orders and their products are commanding high prices. The temporary summer lull has been passed satisfactorily. Those concerns which slow down annually for inventory, repairs, vacations, etc., are getting under headway, with every indication of plenty of business. Officials of Detroit's manufacturing institutions held a meeting with railroad men from all parts of the United States last week to discuss plans for the conservation of freight cars to prevent a possible shortage. The raising of the present high demurrage rates and the shortening of the free time limit for unloading were suggested by the latter as a remedy for the threatened interference with business.

The Consolidated Car Company, manufacturer of the Abbott-Detroit car, is to move to Cleveland in January. The company has purchased six acres of land in East Cleveland in the vicinity of the Chandler, Jordan and General Electric plant. At a recent meeting the stockholders of the company increased the capital stock from $500,000 to $1,250,000. The name of the company has also been changed from the Consolidated Car Company to the Abbott Corporation.

Plymouth, all of the manufacturing concerns in Niles, Mich., report great trade activity and are increasing their facilities. The National Standard Company, manufacturer of reinforcing fabric for automobile tires, automobile jacks, copper lighting cables, etc., has completed a big factory addition this year. The Acme Belting Company is also making rapid progress, having installed additional room which doubles its capacity.

The Schwarz Foundry Company, Detroit, has been incorporated, with a capitalization of $75,000, by Frank I., Frank L., Jr., and Elmer H. Schwarz.

The Star Auto Company, Holland, Mich., has been incorporated with a capitalization of $25,000.

The Chicago Stove & Range Company, now located at Fulton, Ill., has made a proposition to the Chamber of Commerce of Benton Harbor, Mich., to locate its plant in that city. The rail and water shipping facilities and the close proximity of the city to the great Chicago market are considered strong industrial inducements.

The Standard Malleable Iron Company, Muskegon Heights, Mich., has increased its capital from $100,000 to $500,000.

The Michigan Metal Supply Company, Detroit, has been incorporated with a capital stock of $5,000. The stockholders are David C. Creider, John E. Pankhurst and Ignace Capizzi.

The Chopa Piston Ring Company, Detroit, has incorporated with a capitalization of $10,000. The stockholders are John A. Chopieska, Anna R. White and George W. Angell.

The Graham-Bell Company, a corporation organized under the laws of South Dakota, and incorporated with a capital stock of $250,000 has leased the factory building at Lake Odessa, Mich., formerly occupied by the Brown-Hawkins Lumber Company, and will shortly commence putting in machinery to make valves of all descriptions.

Permits have been issued for three new automobile factory buildings for Dodge Brothers, Detroit, to cost $343,000.

The Bryant Paper Company, Kalamazoo, Mich., is contemplating the construction of an immense pulp mill in Canada involving the investment of approximately $1,500,000. The company has the distinction of being the largest book-paper maker in the world. It operates ten machines at this time and has prepared plans and specifications looking to the addition of two more machines, each 154 in. in width.

The Campbell Mfg. & Foundry Company, H. D. Campbell, president, has been organized to build a foundry at Muskegon, Mich. A site has been acquired and a building, 110 x 180 ft., will be erected. The company has a capitalization of $100,000.

The Michigan Bolt & Nut Works, Detroit, has started the construction of an additional two-story building, 80 x 120 ft., of steel and concrete, to be used for the stock, packing and shipping departments. This will release present quarters for additional manufacturing use and will add 25 per cent of floor space. The new building will be erected adjoining the present plant on river-front property acquired in 1905. In 1907 it fixed its capital stock of $300,000, where it now remains. Its activities include the manufacture of carriage and machine bolts, lag screws, hot-pressed nuts, forged turn-

buckles, drop forgings and special forgings. Its facilities for cold heading small-sized bolts have been increased recently. L. L. Barbour is president, F. S. Bigler is vice-president, treasurer and general manager, and R. H. Hill is secretary.

Milwaukee

MILWAUKEE, WIS., Aug. 28, 1916.

Numerous extensive plant additions and new construction in this district are noted by companies directly identified with the metal-working industry, which require large equipments of light and heavy machine tools and a varied lot of machinery. Machine-tool builders report their capacities well taken up with orders, but they are not so crowded as six months ago. In some instances bookings assure full operations for six to ten months ahead. Working forces are rapidly assuming normal proportions, the effect of the machinists' strike for an 8-hr. day having been minimized. The strike is generally regarded as being already a failure, although strike leaders are vigorous in denying the well-founded reports that the men are thoroughly disappointed and getting back to work with the least possible delay. Activity in all lines of industry is evident.

The Briggs & Stratton Company, 258-264 Milwaukee Street, Milwaukee, manufacturer of automobile and gas engine ignition specialties, switches, etc., announces that it will erect a five-story and basement factory, 60 x 220 ft., of reinforced concrete and steel, on Hopkins Road, near Center Street, at a cost of approximately $100,000. Herman J. Esser, architect, Camp Building, has completed plans and will close bids Sept. 1. The company will build its own power house and is in the market for boilers, engines, generators, etc., in addition to some machine tool and general shop equipment. Two electric freight elevators are specified. Stephen F. Briggs is general manager.

The Southern Wisconsin Electric Company, Lake Geneva, Wis., will issue $128,000 of bonds for improving and extending its plant.

The Munkwitz Realty Company, 431 Milwaukee Street, Milwaukee, has engaged Kirchhoff & Rose, architects, Majestic Building, to prepare plans for a garage and repair shop, 60 x 120 ft., three stories and basement, to be erected on Broadway.

Watertown, Wis., is asking bids until Sept. 18 for furnishing a combination hose and chemical motor car equipped with a 300-gal. pumping engine. Frank S. Weber is city clerk.

The International Dye Company, Milwaukee, has been incorporated with a capital stock of $30,000 to manufacture chemicals, dyestuffs, etc. The incorporators are William F., Rudolph A. and August Oesterreich.

The Ritter Automobile Company, Madison, Wis., will build a two-story addition to its garage and machine shop, making the enlarged structure 66 x 256 ft. Work will begin Sept. 1.

The Christensen Engineering Company, 847 Thirtieth Street, Milwaukee, manufacturer of engines, machinery and compressed air and pneumatic equipment, will increase its capital stock from $300,000 to $1,000,000. The new issue will be devoted to caring for the increasing business and no important extensions are planned at this time. Nels A. Christensen is president and general manager.

The Stewart-Warner Speedometer Company, 1828 Diversey Boulevard, Chicago, has awarded contracts for the extensive additions to the foundry of the Warner works, Beloit, Wis., to Jens Jensen, 1634 Mozart Street, Chicago. Specifications call for an iron foundry, 122 x 530 ft., a core building, 70 x 80 ft., and a brass foundry and storage building. The buildings will be of steel and brick, one story, with saw-tooth roofs. The Beloit works will be devoted to finishing raw materials for assembling and final operations at the Chicago works, which recently have been enlarged.

Fred Maettig, architect, 2906 North Avenue, Milwaukee, has been engaged to prepare plans and supervise the construction of a factory and power plant, the owner and location being withheld for the present. The building will be 40 x 76 ft., with an engine and boiler house, and will require power equipment, generators, belting, shafting, an ice machine and elevated tracks with carriers and hoisting device.

The Eau Claire Mfg. Company, Eau Claire, Wis., has purchased the entire business and works of the Bloomer Machine Works, Bloomer, Wis., manufacturer of gasoline engines and machinery. The machinery and equipment will be moved to Eau Claire at once and the real estate and buildings will be disposed of. The Bloomer Company was founded in 1896 by Charles Keller, who became manager of the Eau Claire Mfg. Company five years ago and now resumes control of his designs.

The Simms Foundry Company is the new style of the Racine Foundry Company, Racine, Wis., manufacturer of gray iron castings, and wood and metal patterns.

Bernard Larson, Rhinelander, Wis., has purchased the entire equipment of the machine shop of A. C. Velton and is installing it in his factory and shop. Mr. Larson will continue to make a feature of manufacturing shafting of his own design, and now is equipped to do custom machine work.

Contracts have been let for the addition to the plant of the Milwaukee Stamping Company, Sixty-fourth and Fullen Avenues, West Allis, Milwaukee, 72 x 122 ft., and to cost $17,000. Work is well under way.

The Superior Box Company, Harper Avenue and the Northern Pacific Railroad, Superior, Wis., has broken ground for a new bolt structure, 60 x 110 ft., to cost $15,000. A new boiler house, 18 x 18 ft., is being completed, and three new boilers and a 350-hp. steam unit are being installed. The old engine will be used to operate the new bolt mill.

The Kissel Motor Car Company, Hartford, Wis., is adding two more buildings to its plant. When these are finished more than 60,000 sq. ft. of floor space will have been completed during 1916. Further expansion plans are under way.

The R. L. Kenyon Company, Waukesha, Wis., manufacturer of camp furniture, etc., advises that it has not abandoned its plan for establishing a department for the manufacture of fiber-reed furniture, as previously stated. It is now filling an order for 50,000 cots for the United States Government and not 30,000.

Cleveland

CLEVELAND, OHIO, Aug. 28, 1916.

A good scattered demand exists for small lots of machinery, particularly for lathes. Shipments of standard lathes to dealers are now coming in quite satisfactorily, so that dealers are able to make fairly good deliveries. The miscellaneous demand for small lots of turret lathes is quite active. A Cleveland manufacturer reports the volume of business is fully equal to production so that no further gain is being made on deliveries. A local maker during the week took an order for 29 turret lathes for shipment to Russia, and an inquiry is pending for 50 turret lathes for use in making fuses. A good demand is noted for pneumatic tools for domestic use and for export. Considerable foreign business in this line is coming from Russia. The demand for cranes for shop purposes is holding up well. Among the orders just placed is one from the Firestone Tire & Rubber Company, Akron, Ohio, for a number of cranes.

The Acme Metal Stamping Company, Cleveland, recently incorporated, with a capital stock of $10,000, has established a temporary plant in the Perkins Power Block, Frankfort Avenue, where it is making dies and tools preparatory to establishing a plant to manufacture switch boxes and other light sheet metal stampings. The company is looking for a permanent site. It has all the press equipment needed for the present, but is in the market for a small surface grinder. The officers are R. A. Neff, president; F. A. Neff, vice-president; J. C. Bayliss, secretary and treasurer.

The C. M. Yoder Company, Cleveland, maker of sheet metal working machinery and cold rolled steel, will enlarge its plant at Walworth Avenue and West Fifty-fifth Street by the erection of a one-story addition, 108 x 156 ft., more than tripling its present capacity. It will require some additional machinery equipment, including lathes, drill presses, shapers and grinders.

The Ben-Hur Motor Company, Cleveland, has purchased a 10-acre site at Willoughby, Ohio, where it will erect a new automobile plant. It is stated the company plans to spend about $300,000 in the erection of a plant and that a contract for the first of three units has been placed. This building will be 150 x 400 ft., of steel and concrete.

The Dann Products Company, Cleveland, has acquired a site on East 152d Street on which it will erect a plant for the manufacture of automobile spring lubricating devices. Victor Sincere and others are interested.

M. S. Gartland, Marion, Ind., and J. J. Carroll, Cleveland, have signed a contract with the Federated Commercial Club, Sandusky, Ohio, to establish a foundry in that city. The plant, the erection of which will be started shortly, will be located on West Monroe Street, and will include a main foundry building, 84 x 300 ft., a finishing building, 100 x 100 ft., storage building and office.

The Woods Engineering Company, Alliance, Ohio, will double the capacity of its plant by the erection of a brick addition, 40 x 45 ft.

The Collier Motor Truck Company, Painsville, Ohio, recently organized, will establish a plant to manufacture light motor trucks in the building formerly occupied by the Vulcan

Company. M. E. Crow is president. W. A. Coffer and John Crean are also identified with the company.

The Westgate Tire & Rubber Company, Warren, Ohio, incorporated with a capital stock of $1,000,000, will build a plant for the manufacture of rubber tires. Plans have been completed and the erection of the plant will be started shortly.

The Carroll Foundry & Machine Company, Bucyrus, Ohio, will erect a new machine shop considerably larger than the old building, recently destroyed by fire, and its addition will build an erecting shop and blacksmith shop. Machinery and crane equipment will be required.

The Kelley Vault Mfg. Company, Bucyrus, Ohio, will enlarge its plant by the erection of a two-story brick and steel addition, 70 x 150 ft. It manufactures burial vaults, boilers, tanks, etc., and is reported to have been given a contract for building boilers and tanks for the Ohio Locomotive Crane Company.

The Power Mfg. Company has placed a contract for the erection of a plant in Marion, Ohio, to cost $70,000. It will be erected by the Bellefontaine Bridge & Iron Company.

The recently organized Napoleon Crown Fender Company, Napoleon, Ohio, will manufacture fenders and other stamped metal parts for automobiles, and has established a plant in a leased building along the Wabash track. The officers are Cyril Donnelly, president; L. W. Schultz, vice-president; Gerald Donnelly, secretary and treasurer, and W. A. Bockalman, general manager.

R. F. Marsh and Frank Lause, Delphos, Ohio, and John Grubb and R. W. Berry, Lima, Ohio, have acquired the interest of Joseph L. Fortener in the Delphos foundry and have organized a new company under the name of the Delphos Foundry Company. It is stated that the plant will be enlarged. The new officers are R. F. Marsh, president; R. W. Berry, vice-president; John Grubb, secretary and manager, and Frank Lause, treasurer.

The Wolverine Auto Company has established a plant at 2929 Dorr Street, Toledo, Ohio, for the manufacture of automobiles.

The Bock Bearing Company, Toledo, Ohio, has under construction a four-story addition, 60 x 270 ft., of steel and concrete construction. This will more than double the present capacity.

The National Forge & Tool Company, Erie, Pa., will move its Erie works to Irvine, Pa., where it has another plant in operation. The Irvine plant will be enlarged to accommodate the work now done in Erie.

Cincinnati

CINCINNATI, OHIO, Aug. 28, 1916.

The railroad labor dispute has not yet cut down domestic inquiries for machine tools to any appreciable extent, but there has been a slowing down in the aggregate of domestic orders placed. Automobile manufacturers continue the best customers; the railroads are practically buying nothing in the machinery line. The high cost of material is a more vexing question than heretofore with a number of manufacturers. Several machine makers have not been successful in advancing selling prices to offset enhanced manufacturing costs; notably among these are makers of small electrical machines of all kinds. Tanks and low pressure boilers are also still somewhat behind the procession.

The two manufacturers of lift-trucks in this territory are overrun with orders, most of which are coming from established factories and not from new plants. The foundries are busier, due to the break in the hot weather.

The Cincinnati Ball Crank Company, Oakley-Cincinnati, intends to increase its capital stock at an early date and will add additional machinery. No building additions are planned for the immediate future.

The Ward Equipment Company, Cincinnati, has been incorporated with $10,000 capital stock by R. E. Ward and others, to deal in power machinery. Details as to the company's plans and location are now lacking.

The city of Middletown, Ohio, has authorized the expenditure of $14,500 for an extension to its waterworks plant. Additional pumping machinery will be required.

It is rumored that the United States Tube & Machine Company, 2001 South Street, Cincinnati, contemplates adding equipment for increasing the output of its plant.

The Blackwood Steel Foundry Company, Springfield, Ohio, has commenced operating its large new plant but will add more equipment later.

The addition to the plant of the Miller Improved Gas Engine Company, Springfield, Ohio, is now under cover. No extra equipment will be required.

Definite confirmation has not yet been secured as to the plans of the Columbus Forge & Iron Company, Columbus, Ohio, as to the size of its new plant, but it is known that [illegible] will be made. The company recently secured an additional site on Third Street.

The C. A. S. Products Company, Columbus, Ohio, recently received a large contract for automobile gears, and is gradually adding to its equipment.

The Industrial Bureau of the Chamber of Commerce, Columbus, Ohio, announces that the Peck Hardware Mfg. Company, Berlin, Wis., will remove its plant to Columbus in the near future. It manufactures mail boxes and other metal specialties.

The Shields Pattern Works Company, Columbus, Ohio, has removed its plant to more commodious quarters at 79 East Chestnut Street.

The Pilot Motor Car Company, Richmond, Ind., is having plans prepared for doubling the capacity of its plant.

The Central South

LOUISVILLE, KY., Aug. 28, 1916.

The demand for power and special machinery is unusually good. The cotton crop is now being ginned, which is responsible for a steady call for supplies from the ginners. Wood-working plants, including sawmills and furniture factories, are all busier than they have been for several years. Oil operations in eastern Kentucky are reaching a point where some substantial refining plants are being planned. Machinery companies look for one of the best fall seasons in a number of years, especially those making power plant equipment.

James M. Wilson, chief engineer of the Louisville Water Company, is completing specifications for an addition to the pumping station to be erected at a cost of $300,000. Bids will be taken some time in September.

A roundhouse will be equipped in Jeffersonville, Ind., by the Pittsburgh, Cincinnati, Chicago & St. Louis Railway with general offices at Pittsburgh.

The Southern Builders' Company, Owensboro, Ky., maker of structural steel, has leased the building of the Lee Machine Company and will install additional equipment.

R. Burleigh & Son, Dawsonsprings, Ky., are planning the purchase of a boiler and engine to develop about 35-hp. They are also adding machinery for turning handles.

The Hull Tank & Pump Company, Owensboro, Ky., has announced plans for purchasing machinery which will double the capacity of its plant. N. D. Hull is general manager.

The Sullivan Construction Company, Lexington, Ky., has the contract for the construction and equipment of a sewage disposal plant at a cost of $207,184 and is in the market for the machinery. Address George B. Carey, secretary and treasurer.

C. Mehigan, Clarksville, Tenn., is erecting a new building which will be equipped for sheet metal work.

Ben L. and Fred Dulaney, Bristol, Tenn., have acquired water power rights on the Holston River and are planning the establishment of a hydroelectric plant at a cost of $75,000.

The Union Stockyards & Packing Company, Chattanooga, Tenn., has been organized with $150,000 capital stock and will establish a meat packing plant. Refrigerating equipment will be one of the principal items. The C. L. Brooks Engineering Company, Moultrie, Ga., is engineer in charge.

James C. Turpin, McMinnville, Tenn., has purchased the stone-cutting plant of J. T. Wilson & Co. and will install pneumatic cutting and polishing machinery.

The G. W. Simmons Company, 118 North Front Street, Memphis, Tenn., is in the market for a 25 to 30-kw. alternating-current generator, direct connected or belt connected to a engine.

The Anderson Tobacco Company, Gallatin, Tenn., is in the market for a 5-hp, three-phase, 220-volt motor, a nailing machine and a freight elevator. E. [illegible] Anderson, secretary.

The John C. Duncan Company, 208 West Jackson Avenue, Knoxville, Tenn., is in the market for a 20-hp., 220-volt motor, an 18-hp. motor and a 15-hp. motor. It will also buy a 2-wheel emery stand and a 16 to 20-hp., second-hand, double-cylinder double-drum hoisting engine, with or without boilers.

The McClary-Jemison Machinery Company, Birmingham, Ala., 2nd Avenue and 21st Street, is in the market for three 150-kw., 550-volt, direct-current engine-type generators, complete with necessary switchboard. The company will also consider second-hand turbine-driven outfits. James B. Lowe is vice-president.

St. Louis

St. Louis, Mo., Aug. 28, 1916.

Machine tool dealers report a good aggregate of business, but with no particular class of industries standing out more strongly than another in the demand. The easing up on deliveries enables new industries to make their purchases, which is of material benefit to the trade and also has led to an increase in investment in new operation. Second-hand equipment continues to be almost as desirable, as new tools and dealers' floors are well cleared.

The Federal Scale & Supply Company, St. Louis, Mo., has been incorporated with a capital stock of $12,000 by Anthony J. Laux, Gus C. Yoos and Charles H. Miller to manufacture scales and other mechanical appliances.

The Polar Wave Ice & Fuel Company, St. Louis, Mo., has purchased a site upon which it will erect and equip an ice-making branch, the machinery to cost about $15,000.

The Flatau Turbine Engine Company, St. Louis, Mo., has been incorporated with a capital stock of $100,000 by L. S. Flatau, T. G. Ratcliffe and E. D. Nims to manufacture steam turbine engines.

The LaBelle Funeral Car Company, St. Louis, Mo., has been incorporated with a capital stock of $35,000 by Barney L. Schwartz, William Gunther, Albert Blair and others to manufacture motor funeral cars.

The Vigar Motor Car Company, St. Louis, Mo., has been incorporated with a capital stock of $15,000 by George F. Vigar, Frank J. Riedling and others to equip a garage and machine shop.

The Warren Steel Castings Company, St. Louis, Mo., will build and equip additions to its plant. Electric equipment for operation will also be installed.

The planing mill of the Judson Roberts Lumber Company, Salem, Mo., has been destroyed by fire with a loss of about $25,000, largely on equipment, which will be replaced.

The Hathaway Motor Company, Kansas City, Mo., has been incorporated with a capital stock of $15,000 by C. N. and H. A. Hathaway and H. C. Page and will equip a repair and machine shop.

A roundhouse, turntable and repair shop will be equipped at Bird's Point, Mo., by the Iron Mountain Railroad, with the chief engineer at St. Louis headquarters in charge.

The National Mining Company, Joplin, Mo., has increased its capital stock from $32,000 to $64,000 to purchase additional equipment, including drilling machinery, etc.

The Valley Mfg. Company, Ironton, Mo., B. N. Brown, president and manager, is in the market for wood-working machinery.

The Wilson Stove Company will locate a plant at Metropolis, Ill., where the business men's organization gave $30,000 as a bonus, to employ 500 men.

The Citizens Gin Company, Texarkana, Ark., has been incorporated with a capital stock of $10,000 by A. M. McDaniel, H. Clark and F. E. Wilson and will equip a ginnery.

Jonesboro, Ark., will add one 150-hp. tubular boiler and a 100-hp. heater to its light and water plant.

The Hutson-Barker Auto Company, Newport, Ark., has been incorporated with a capital stock of $10,000 by Walker Ladd, E. A. Hirsch and Tom Barker and will equip a repair plant and machine shop.

An improvement district, No. 2, at Argenta, Ark., has been organized to acquire the Arkansas Water Company's plant at that point and to expend about $200,000 on additional equipment for the pumping station, etc.

The Arkansas Light & Power Company, Arkadelphia, Ark., will equip a power house and install electric motor driven pumps with a 24-hr. capacity of 600,000 gal. It will also equip a waterworks plant at Newport, Ark.

A waterworks plant to cost $85,000 will be erected and equipped at Stuttgart, Ark. Plans are being prepared by White, Humphreys & Tovey, Pine Bluff, Ark.

A new waterworks plant at Harrison, Ark., is to be equipped with a triplex power pump and other machinery to cost about $50,000. W. O. Galbreath, Harrison, is supervising engineer.

A plant to manufacture lawn furniture, swings, etc., is to be equipped at Glenwood, Ark., by capitalists represented by N. K. Nichols.

The Chickasha Electric Company, Chickasha, Okla., will expend about $10,000 in adding equipment to its generating plant.

Woodward, Okla., will expend about $12,500 in adding equipment to the municipal electric plant. The mayor should be addressed.

The McMahon Refining Company, J. D. McMahon, president, will equip a refinery at Jennings, [illegible] about $25,000 in machinery.

The Katy Refining Company, Yale, Okla., will [illegible] about $25,000 in oil refining equipment. [illegible] others are interested.

The Scraper Tar & Chip Sprinkling Company, [illegible], Okla., has been incorporated with [illegible] by W. S. Anderson, C. F. [illegible] Anderson and will equip a plant.

The Missouri Zinc Development Company, [illegible], Okla., has been incorporated with [illegible] by E. S. Newton, W. L. Alexander and C. W. [illegible] will purchase mining machinery, [illegible] power plant, hoisting equipment, etc.

Enid, Okla., will expend about $35,000 on waterworks improvement to increase the pumping capacity to 1,000,000 gal. per 24 hr. Cecil Harrison is engineer.

Wetumka, Okla., will expend about $4,000 on waterworks plant improvements. A. J. Cook is president of the commission in charge.

The Acme Milling Company's grain elevator at Oklahoma City, Okla., has been burned with a loss of $15,000 on machinery which will be replaced.

W. H. Fletcher, Tulsa, Okla., is reported in the market for wood-working machinery.

The Culpepper Motor Company, Meridian, Miss., has been incorporated with a capital stock of $17,500 by E. M. Culpepper and G. W. Shepherd and will equip a garage and machine shop.

The Great Southern Lumber Company, Bogalusa, La., it is reported, will build an additional mill to cost complete about $1,000,000.

The Cady Lumber Company, Lake Charles, La., will rebuild and re-equip its lumber plant recently burned with a loss of $300,000.

Lafayette, La., will expend about $18,000 for a new engine for the electric light plant and other equipment. Address the mayor.

The Iron Mountain Railway will equip a 15-stall roundhouse, machine and repair shops, mechanical coal chute, etc., at Monroe, La., to cost about $142,000. The chief engineer, St. Louis, Mo., can be addressed.

The St. Louis Felling Machine Company, manufacturer of sewing machines, St. Louis, Mo., has purchased one 2¼ x 11-in. and one 3¼ x 36-in. screw machine. It plans the manufacture of an automatic valve to control the filling of laundry tubs and it expects this will necessitate installing additional automatics, etc.

Texas

AUSTIN, TEX., Aug. 28, 1916

The machinery and tool trade continues satisfactory. The recent tropical hurricane that swept over the lower Gulf coast of Texas did great damage to many industrial plants.

The Petrolia Machine Shop Company, Burkburnett, will build repair shops at a cost of about $15,500. J. L. Staley is a stockholder.

The Fort Worth Elevator Company, Fort Worth, will build an additional grain storage elevator. Loading and unloading machinery will be installed.

J. A. Fletcher and Omar Fletcher will enlarge and install machinery in the cotton gin at Temple, which they recently purchased from E. B. Greenhouse.

The George West Water & Light Company, George West, will construct a waterworks and electric light plant at a cost of about $40,000. Charles Schreiner, Jr., San Antonio, is a stockholder.

J. H. Swope is organizing a local company to build a cotton mill at Houston to cost about $500,000.

Loraine, Tex., will issue $5,000 in bonds for constructing a waterworks system.

W. W. Chambers, Cameron, will build a garage and repair shop at a cost of about $10,000.

The El Paso Ice & Refrigerating Company will install new machinery in its plant at El Paso at a cost of $38,000 and will build a new cold storage plant.

Kingsville, Tex., will issue $100,000 in bonds for constructing a municipal waterworks.

It is announced that immediately following the return of the National Railways of Mexico to the owners by the de facto government of Mexico, scheduled to take place Sept. 1, large orders for materials for repairs and machinery for rehabilitating the shops at Aguas Calientes, Nuevo Lar

Piedras Negras and the city of Mexico will be placed. R. C. Burke, master mechanic, is now in Mexico investigating the condition of the property.

The Eagle Pass & Gulf Railroad Company will be incorporated to construct a railroad between Eagle Pass and Corpus Christi, a distance of about three hundred miles. Shops to cost about $100,000 will be built. Richard H. Phillips is chief engineer.

The Pacific Northwest

SEATTLE, WASH., Aug. 22, 1916.

The shipbuilding industry, for the past six months one of the most productive in the Pacific Northwest, seems to have only begun its phenomenal growth. Almost daily, new shipbuilding plants are rumored, and in Portland alone three plants are now under construction, which have orders booked ahead for months. Repair work has also been exceedingly heavy, and many allied industries, such as bolt and nut factories, have made their appearance, as a natural adjunct to the shipbuilding work under way. The need of ships and carriers of every kind continues very pressing, and this is particularly true in the lumber industry. Many of the larger plants are confining their work entirely to wooden vessels for the lumber trade. Threshing and harvesting in Oregon is now on in full swing, and a brisk demand exists for harvesting machinery of all kinds. Canners and packers throughout the Northwest and Alaska announce that their plants will probably be operated to practically their capacity. While extensive repair work and new construction have been done in this line, a number of the larger packers have withheld extension work until 1917, when the big year of the salmon four-year cycle is expected. The car-shortage situation in Oregon has become exceedingly grave, and the Public Service Commission has directed the railroad companies to take steps to remedy the trouble.

The Seattle Construction & Dry Dock Company, Seattle, according to statements of C. W. Wiley, vice-president and general manager, has recently closed a contract with Norwegian interests for three 7500-ton steel freight steamers at a total cost of $2,650,000. The order is the largest single contract for merchant craft ever awarded to a North Pacific shipbuilding firm.

The Washington Creosoting Company, Everett, Wash., recently organized, has purchased a site of 23 acres on the harbor front, on which a modern creosoting plant will be constructed. Geoffrey Winslow, Tacoma, is president.

John Martinolich, operating a shipbuilding plant in Tacoma, Wash., announces that he will move his business to Tacoma, where a large plant is to be constructed. Two lumber schooners are already under contract for building.

The Huffschmidt-Dugan Iron Works, Bend, Ore., whose plant was recently destroyed by fire, has started operation in a new building equipped with a number of improvements. A modern machine shop is to be added.

Construction work on the proposed milling plant to be built for the Cottonwood Milling Company, Cottonwood, Idaho, has started. The new plant will cost $25,000 and will have a capacity of 125 bbl. of flour daily and the grain elevator 50,000 bu.

The plant of the Smokeless & Sootless Coal Company, Washoe, Mont., was completely destroyed by fire recently, with a loss of $35,000. The power house and tipple were completely burned. Plans for rebuilding are now in preparation, according to J. F. Brophy, president.

The United Broom Company, Tacoma, has been capitalized for $50,000 by A. C. Mason and W. L. Hart. It is reported the company plans the construction of a manufacturing plant in Tacoma.

The Willamette Iron & Steel Works, Portland, is constructing an additional shop for building boilers, which will double the present capacity. The new plant with equipment, which includes a 20-ton traveling crane, 18-burner oil plate furnace, set of bending rolls and two high-power, high speed radial drills, will cost $100,000. It is expected to be in operation by Oct. 1. The company now has under construction at its shipbuilding plant, associated with the Northwest Steel Company, five Norwegian steamers.

The Pacific Bolt Company, Seattle, recently incorporated by John F. O'Brien and Albert J. O'Brien, has purchased a site of three acres on which a plant to manufacture bolts, spikes, nuts and rivets will be erected at a cost of $50,000. It is stated the plant will be in operation within three months and will be constructed to permit of further extensions.

J. F. Duthie & Co., Seattle, shipbuilders, have recently received a contract for three 8800-ton steel freighters to be constructed at a cost of $2,500,000. Contract was let by Hannevig & Johnson, New York, for Norwegian clients. The company's new plant will be rushed to completion.

Harry P. Edward, Tacoma, secretary of the Western Lumber & Millwork Company, with associates, has purchased the mills, yards and offices of the Keystone Lumber Company, Tacoma, which also operates a large sash and door factory. The new owners plan to make extensive improvements to its properties.

It is reported that the Northwest Steel Company and the Willamette Iron & Steel Works, Portland, Ore., have recently received contracts for the construction of three additional steel ocean going steamers representing a cost of $3,000,000. This makes a total of eight vessels contracted for, and insures operations on the present scale for at least [illegible].

The Crago Water Lifter Company, Sappington, Mont., has been incorporated for $250,000 by F. H. Crago and C. H. Sappington, and will erect a plant for the manufacture of the Cargo water lifter, and other devices.

George E. Hardy, Portland, Ore., is associated with a [illegible] to which plans the erection of a large shipbuilding plant at Portland. A number of vessels are already under contract for coast trade.

The McEachern-Standifer-Clarkson Ship Company, Astoria, Ore., has filed notice of dissolution, and articles of incorporation have been filed for the Standifer-Clarkson Company, with a capital of $160,000, by G. M. Standifer, Jesse Stearns and J. M. Robinson. It is now constructing a ship for the Libby, McNeil & Libby Company.

William Piggott, Seattle, will construct a bolt and nut plant at Seattle, at a cost of $5,000.

Canada

TORONTO, Aug. 28, 1916.

R. Neild, general manager of the Victoria Machinery Depot, Victoria, B. C., announces that his company has received another substantial order for shells. The contract calls for 20,000 high explosive shells of the 4.5-in. caliber. Work will proceed at once in changing over the plant in order to handle the larger shells so that there may be no delay when the billets arrive from the East for the new contract. It has been found, in most cases, that a delay of as much as four months has been occasioned in changing over the equipment before actual production could be undertaken. At the present time there are but four companies making forgings for the entire shell production of Canada. Their output falls far below the requirements of the factories making shells. The Imperial Munitions Board, realizing the seriousness of this drawback, has created a new office on the board, that of supervisor over the production of the forged billets from which shells are made. J. A. Kilpatrick, president and general manager of the Dominion Wheel & Foundry Company, Toronto, was appointed to the position and is formulating plans whereby new industries may be established in Canada.

E. S. Fraser, engineer, New Glasgow, N. S., is preparing plans for additions to be made to the waterworks plant and system to cost $100,000. J. Roy is clerk.

The Thomson Paper Mills, Newburg, Ont., has been purchased by Lewis F. F. Houpt of Buffalo, N. Y. Work of repairing the buildings has been commenced and the latest machinery will be installed. It will be known as the Houpt Paper Mills, Ltd., and will manufacture high grade bond paper. George B. Thomson will be resident manager, and it is understood that the plant will be ready for operation by Nov. 1. Mr. Houpt is president of the George Irish Paper Company of Buffalo, and the Monarch Paper Company of Toronto.

The Hanover Cement Company, Hanover, Ont., proposes to purchase additional machinery and equipment for its plant.

The Canadian Consolidated Rubber Company will build a large addition to its plant at St. Jerome, Que., and has awarded the contract to Gray & Dunn, Montreal.

The American Brakeshoe & Foundry Company of the United States proposes to establish a plant on Talbot Street, St. Thomas, Ont. The building will be 50 x 225 ft., one-story, and will be used for manufacturing all the company's Canadian orders, which have hitherto been manufactured in the United States. C. D. Pettit, New York, is president of the company.

Construction work will be started at once on the erection of a shipbuilding plant for Boyds, Ltd., of Port Moody, B. C., to include engineering and wood-working plants, foundry, etc.

Officials of the Canadian Car & Foundry Company, Montreal, are stated to have announced that they will have completed the original order from the Russian Government for $2,500,000 worth of shrapnel shells within three weeks.

The order for high explosive shells will be completed by the end of the year. New shell contracts have already been signed. The company's plant at Welland is booked up to the end of 1917.

Work has been commenced on the erection of shipyards on Poplar Island, in the Fraser River, by the Western Marine Railway Company of New Westminster, B. C. The plant will cost $70,000 and $15,000 worth of machinery will be installed.

With the completion of the Quebec Bridge early in September, it is understood that the St. Lawrence Bridge Company, a subsidiary of the Dominion Bridge Company of Montreal, will turn to the manufacture of 9.2-in. shells. The equipment of the plant is probably now under way.

The Canadian Chicago Bridge & Iron Company, Ltd., Bridgeburg, Ont., has been incorporated with a capital stock of $100,000 by George T. Horton, Robert H. Murray, Horace B. Horton, and others, of Chicago, Ill.; Christopher C. Gregory of Bridgeburg, Ont., and others, to manufacture tanks, iron, steel, etc.

The Boss Lock Nut Company of Canada, Ltd., Montreal, has been incorporated with a capital stock of $50,000 by Francis G. Bush, George R. Drennan, Herbert W. Jackson, and others, to manufacture nuts, bolts, fastening devices, iron, steel, etc.

The Ontario Steel Products, Ltd., is making extensive additions to its plants at Brockville, Ont., and Chatham, Ont. The company recently signed up contracts with three Canadian automobile companies which will cover production for nearly three years. In addition it has been active on war orders.

The Lincoln Electric Company of Canada, Ltd., Toronto, has been incorporated with a capital stock of $40,000 by Philip B. Wood, 332 Lippincott Street, Toronto; Clara Saccombe, George Hunt, and others, to manufacture motors, electrical appliances, machinery, etc.

The Leaside Munitions Company, with a capital stock of $250,000 has been granted a license to manufacture war munitions, shells, guns, etc., in Ontario. The company has appointed George C. Loveys, 801 Dominion Bank Building, Toronto, Ont., its attorney.

The City Council, Swift Current, Sask., will make extensive additions to its power plant. Either a gas plant to cost $100,000 or a steam plant to cost $34,000 will be constructed. J. W. Calder is engineer.

The London Rolling Mills Company, London, Ont., will build an addition to its plant and install new machinery at a cost of $50,000. Frank White is manager.

New Toronto, Ont., has granted a fixed assessment for a number of years on a factory which the Du Pont Fabrikoid Company, 864 Dufferin Street, Toronto, will erect there within a year at a cost of $150,000.

The Gray Dort Motor Company will build an addition to its plant at Chatham, Ont.

John T. Hepburn, Ltd., 18 Van Horne Street, Toronto, will build an addition to its machine shop at a cost of $3,000.

The Canadian Hanson & Van Winkle Company, 15 Morrow Avenue, Toronto, will build an addition to its foundry at a cost of $7,000.

The Canadian Bag Company, Montreal, will erect a factory on Paton Road, Toronto, to cost $40,000.

The Rawdon Machine Company, 163 Sterling Road, Toronto, will build an addition to its plant to cost $2,000.

Alfred A. Viau, St. Jerome, Que., has commenced the erection of a foundry.

The Acme Stamping & Tool Company, Ltd., Sydney Street, Hamilton, is having plans prepared for the erection of an addition to its plant.

The Dunlop Tire & Rubber Goods Company, 224 Booth Avenue, Toronto, proposes to erect a new factory building of brick and mill construction.

The Union Drawn Steel Company, Victoria Avenue South, Hamilton, will have an addition erected at its plant to cost $5,000.

The Thompson Norris Company, 355 Notre Dame Street East, Montreal, has let a contract for the construction of a reinforced concrete and brick paper factory and power house to cost $84,000. Lockwood & Greene, Boston, Mass., are the architects.

MacKinnon, Holmes & Co., Sherbrooke, Que., have let a contract for the extension of their forge shop at a cost of $5,000.

The Dominion Steel Products Company, Brantford, Ont., has commenced the erection of a plant for the manufacture of steel products. The building will be of steel and glass, 90 x 370 ft., and will cost $65,000. The contract for the construction of the plant has been let to the Austin Company, Cleveland, Ohio.

The Corrugated Paper Company, Ltd., 187 Geary Avenue, Toronto, Ont., has let a contract for the erection of a brick and steel addition to its plant to cost $12,000.

C. B. Dayfoot & Co., Georgetown, Ont., are in the market for a 20 to 35-hp. boiler to stand government inspection of 60 lb. pressure.

Plans have been completed by the Adams Harness Company, 204 King Street East, Toronto, for the erection of a reinforced concrete factory building to cost approximately $80,000.

Government Purchases

WASHINGTON, D. C., Aug. 28, 1916.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, schedule 43, for one heavy-duty engine lathe for Puget Sound; schedule 45, one 10-hp. induction motor; schedule 46, fifty ¼-hp. 120-volt, direct-current motors; schedule 49, one pressure blower with 12-in. outlet; schedule 54, thirty-five 4-in. and 6-in. handybilly pumps and schedule 68, five 120-volt, direct-current blowers, all for Brooklyn; schedule 70, for one 10-kw. electrolytic generator for Newport.

The commanding officer of the Frankford Arsenal, Philadelphia, will receive sealed proposals until 10 a. m., Sept. 5, under proposal 66, for furnishing one 500-ton hydraulic press for loading shell with high-explosive charges, together with appropriate pumps and accumulators.

The general purchasing officer of the Panama Canal will receive proposals under Panama circular 1075, class 28, until 10.30 a. m. Sept. 14, for three refrigerating machines.

The following bids were received by the chief of ordnance, Navy Department, Washington, Aug. 23, for furnishing projectiles:

9000 14-in. armor-piercing shell—Bid 5, for 3000 only, $524 each; 8, for 2000 only, $529.75 each; 9, for 3500 only, $492 each; 21, for 3000 only, $535 each.

2800 14-in. class B shell—Bid 5, for 500, $300 each; 8, for 500, $327.50 each; 9, for 1000 only, $320 each; 21, $302 each.

31,500 6-in. common—Bid 4, $27.50 each; 7, $31 each; 10, $24.50; 11, for 4000, $24.76 each; 15, $24 each; 18, 1500 at $17.75 each, 5000 at $19.75 each, 5000 at $21.75 each, 20,000 at $23 each; 20, 10,000 only, $32.75 each; 21, $33 each; 24, $18 each.

185,600 5-in. common—Bid 4, $11.70 each, $12.25 each for 150,000; 7, 100,000 only, $14.25 each; 10, $16 each; 19, $13.35 each, slings and plating omitted deduct 30 cents; 20, 100,000 only, $13.90 each; 21, $15 each; 24, $14 each.

139,529 4-in. common—Bid 1, $8 each; 4, $9.50 each, $10.50 each for 50,000 to 25,000; 6, $8.45 each; 7, $11.60 each; 10, $11.25 each; 12, $8 each; 14, own design, $7.25 each, government design, $7.50 each; 20, 40,000 only, $11.05 each; 21, $11.20 each; 24, $9.50 each.

300,000 3-in. common—Bid 1, $3.25 each; 2, $5.94 each and $4.86 each; 3, $3.75 each; 4, $3.75 each, $3.90 each for 200,000, and $4 each for 100,000; 7, $4.25 each; 10, $4.75 each; 12, $5.25 each; 13, $4.65 each; 14, own design, $4.625 each, government design, $4.75 each; 17, for 100,000 only, $4.90 each; 21, $3.95 each; 22, $3.15 each; 23, $3.53; 24, $6.50 each.

87,500 1-pounder anti-aircraft—Bid 10, $1.10 each; 21, 74 cents each.

187,500 1-pounder common—Bid 4, 90c. each; 10, 75c. each; 16, 79c. each; 21, $1.05 each.

The names of the bidders and the numbers under which they are designated in the above lists are as follows:

Bid 1, Acme-Harvester Company; 2, Industrial Works; 3, John Thompson Press Company; 4, Bridgeport Projectile Company; 5, Crucible Steel Company of America; 6, Harrisburg Pipe & Pipe Bending Company; 7, E. W. Bliss Company; 8, Midvale Steel Company; 9, Washington Steel & Ordnance Company; 10, Edwards Valve & Mfg. Company; 11, Huntington Alloy Company; 12, Worthington Pump & Machinery Corporation; 13, S. A. Woods Machine Company; 14, Automatic Transportation Company; 15, Minneapolis Steel & Machinery Company; 16, Poole Engineering & Machine Company; 17, General Ordnance Company; 18, Latrobe Tool Company; 19, Ingersoll-Rand Company; 20, Cram-Hoadley Company; 21, Bethlehem Steel Company; 22, American Car & Foundry Company; 23, Pressed Steel Car Company; 24, Cleveland Crane & Engineering ompany.

NEW TRADE PUBLICATIONS

Ball Bearings.—S. K. F. Ball Bearing Company, Hartford, Conn. Pamphlet No. 70, entitled, "Better Electric Motors." Covers the application of ball bearings to electrical machinery. In addition to describing a number of applications and illustrating them the features of reduced maintenance, durability, compactness and efficiency are touched upon. Instructions for mounting the bearings are also included.

Taps.—Greenfield Tap & Die Corporation, Greenfield, Mass. Bulletin. Concerned with a new form of tap in which the chips are forced out of the hole ahead of the tap instead of curling up in the flutes. A number of engravings showing the chips produced by the tap and some of the tests to which it has been subjected are presented, together with engravings of the tap itself. An illustrated description of the tap appeared in THE IRON AGE, Aug. 3, 1916.

Oxy-Acetylene Welding and Cutting.—Davis-Bournonville Company, Jersey City. Pamphlet. Gives in some detail the application of oxy-acetylene welding and cutting to gray iron and steel foundries and the sheet metal industry, as presented in a paper before the Detroit Foundrymen's Association. The methods of manufacturing the gases employed are touched upon, followed by a description of the welding and cutting torches employed. General information on such subjects as expansion and contraction, preheating, proper size of flame, the precautions to be used with iron and steel, etc., are included.

Foundry Equipment.—Illinois Mfg. & Supply Company, Quincy, Ill. Catalog No. 10. Relates to a line of foundry equipment, which includes exhaust tumbling mills, steel case dust arresters, water cinder mills, exhaust fans and sand mixing facing sand and reclaiming core sand. A brief descrip- presented, together with brief description of the essential features.

Power Presses and Blue Printing Machine.—Buckeye Engine Company, Salem, Ohio. Catalog and folder. The first deals with power presses, shearing machines, dies and other metal working machinery, a section of the catalog being devoted to each particular type of press or machine. Specification tables covering the various sizes of each that can be furnished are given, followed by illustrations and brief descriptions of the machines making up the line. A number of engravings of work that has been done with the company's presses and dies are included, as well as a number of tables of useful information. The folder treats of a vertical blueprint machine using an arc light, which is automatically cut out of the circuit when it reaches the bottom of the cylinder.

Sand Mixing Machinery.—National Engineering Company, Chicago. Pamphlet. Shows a machine adapted for mixing facing sand or reclaiming core sand. A brief description of the machine is presented, together with instructions for its use. The economies of using a mixing machine to combine old and new sand are briefly touched upon, and mention is made of a screen separator.

Electric Traveling Cranes.—Shepard Electric Crane & Hoist Company, Montour Falls, N. Y. Bulletin No. 1004. Contains several engravings of the cranes installed in the new laboratories of the Massachusetts Institute of Technology and two engravings of a typical hoisting unit and the standard bridge drive and truck construction. The special features of these cranes, such as automatic lubrication, permanent alignment, complete inclosure of moving parts and ready accessibility for inspection and repair, are touched upon.

Pipe Fittings and Valves.—Pittsburgh Valve & Fittings Company, Barberton, Ohio. Catalog D. Presents illustrations, dimension tables and price lists of an extensive line of iron pipe fittings, brass and iron valves, cocks, etc., for steam, gas, water and oil. There is practically no text in the catalog, reliance being placed upon the engravings to tell the story. A number of tables of useful information and alphabetical and numerical indices are included.

Oil Burners for Foundries.—Hauck Mfg. Company, 140 Livingston Street, Brooklyn, N. Y. Bulletin No. 69. Points out the advantages of using the company's foundry burners for lighting cupolas, heating ladles and skin drying molds. Views of the operations and also of the apparatus supplement the text description and tables of the various sizes that can be supplied are included.

Boiler Tube Cleaners.—Lagonda Mfg. Company, Springfield, Ohio. Catalog L-9. Size, 7¾ x 10¼ in ; pages, 36. Illustrates and describes various sizes of water, steam and air driven tube cleaners for water tube and return tubular boilers. The advantages of using tube cleaners for removing boiler scale are touched upon. The several cutter heads supplied are illustrated and briefly described, and this is followed by engravings and descriptions of the different cleaners. Mention is made of special cleaners and a line of boiler room specialties, all of which are illustrated and described. An illustrated list of repair parts for the various cleaners and cutter heads is included.

Galvanized Sheets.—American Sheet & Tin Plate Company, Pittsburgh. Booklet. Illustrations and descriptive matter explain the uses to which the company's plain galvanized and copper steel galvanized sheets may be put. The illustrations include culverts, fence posts, tanks, flumes, roofing, skylights and fences. Tables of weights of the flat sheets and formed products that can be furnished are included.

Steel Grit and Concrete Hardener.—Pittsburgh Crushed Steel Company, Pittsburgh. Two circulars. The first relates to Angular Grit for use as a substitute for sand in cleaning castings. Among the advantages claimed for it are freedom from pulverization and breaking down, rapidity of cleaning, smoothness of surface secured and the elimination of sand storage bins and dryers. The other folder describes Resisto concrete floor hardener and facing, which is designed to make concrete floors, dust, water and oil proof. The uses of this material, which is a metallic product specially manufactured and treated so that it mixes readily with cement and sand and can be used either when new floors are being laid or old ones repaired, are briefly described.

Steel Shelf Construction.—Wallace Supplies Mfg. Company, 412 Orleans Street, Chicago. Bulletin No. 11. Describes and illustrates a line of steel shelf construction consisting of iron pipe stanchions, angle iron brackets and flat steel strips for the shelving. Among the advantages claimed for this construction are interchangeability, adjustability and cleanliness. Engravings of the various types that can be supplied are presented with brief descriptions. Tables of the various sizes of brackets that can be furnished are also given.

Stencil Cutting Machine.—Ideal Stencil Machine Company, Belleville, Ill. Pamphlet entitled, "Safeguarding Your Shipments." Mentions the advantages to be derived from plain and legible marking of shipments and shows how the work can be done easily and cheaply by the use of machine-cut stencils. Brief descriptions of the machine and the way in which it operates are given, and a number of testimonial letters from users are included.

Centrifugal Pumps.—Pelton Water Wheel Company, Nineteenth and Harrison streets, San Francisco. Bulletin No. 9. Describes a centrifugal pump which is made in eleven sizes, ranging in capacity from 30 to 4500 gal. per minute. Among the features of the pump are the uni-diffusion system of the volute, an overhung pulley mounting and interchangeability between the belt-driven and direct-connected styles. Illustrations of the various pumps are included, together with condensed specification tables.

Vertical Gang Drilling Machine.—Silver Mfg. Company, Salem, Ohio. Circular F152. Presents illustrations of a 20-in. upright gang drilling machine that is made in a number of different table arrangements. The special features of the drill are a separate column and table for each of the two, three or four spindles and the use of a single-belt drive for the countershaft with individual drive for each drill. Condensed specification tables are included.

Water Purification Systems.—Wm. B. Scaife & Sons Company, 221 First Avenue, Pittsburgh. Catalog entitled, "Water Purification for All Purposes." Illustrates the various types of water softening and purifying apparatus made and the application of water purification to different industries. Analyses from various water supplies throughout the United States are included, together with miscellaneous data for calculating the water requirements for different purposes. In addition to illustrations of the apparatus, a number of views of illustrations are included.

Electric Light and Power Wiring.—L. K. Comstock & Co., 30 Church Street, New York City. Bulletin No. 1. Devoted to the part played by the electrical distribution system in a factory. The various features that are desirable in such a system, such as safety, reliability, flexibility, etc., are touched upon with particular reference to the facilities of this company along these lines. A number of views of installations and buildings that have been wired are included.

Employees of the Chesapeake Iron Works, Westport, Md., and their families, were given an all-day outing by the company on Aug. 26. Special cars carried them to a park on Middle River, where athletic events were held and refreshments served.

THE IRON AGE

New York, September 7, 1916

ESTABLISHED 1855 VOL. 98 : No. 10

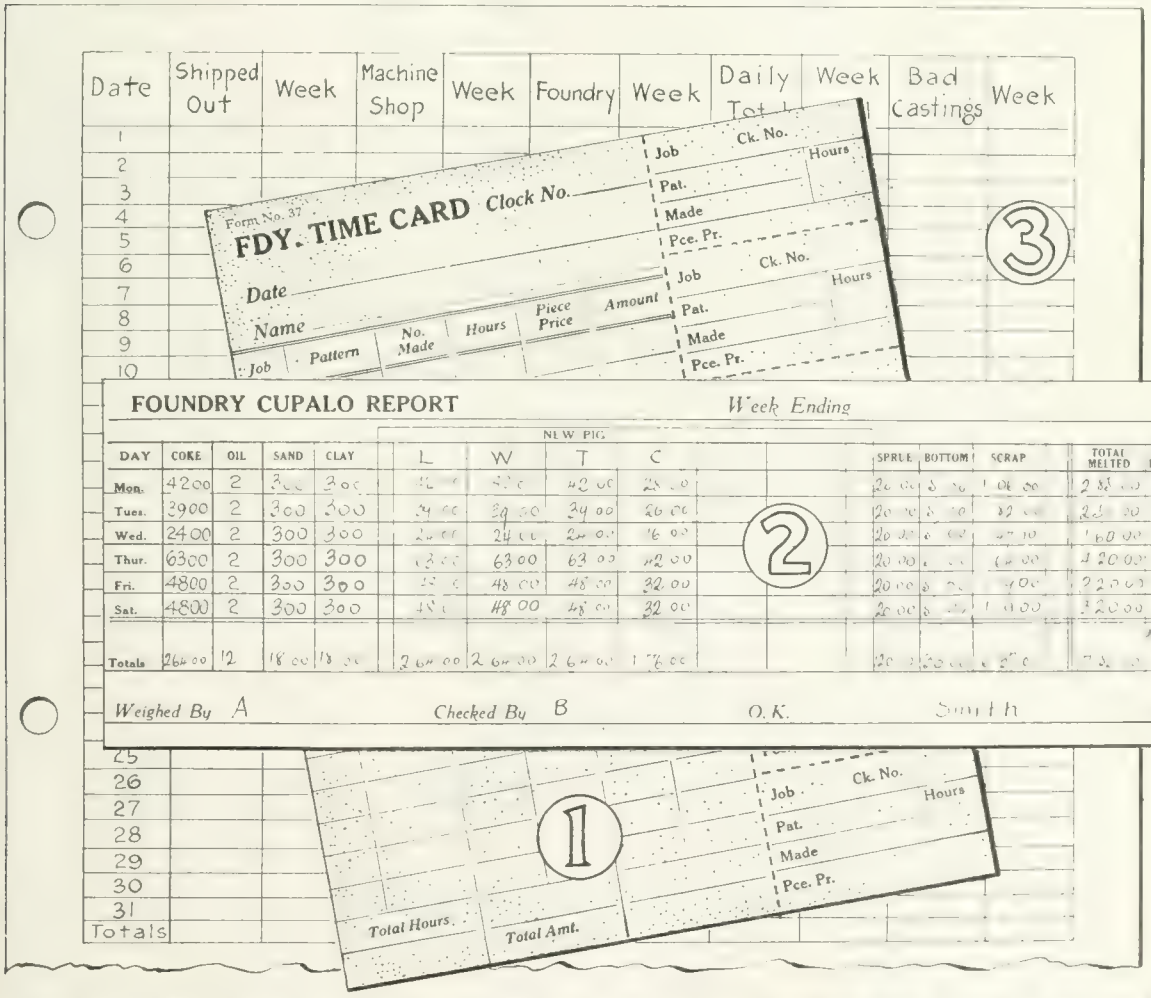
Two Examples of Foundry Cost Accounting

Methods Devised by New England Jobbing Foundries to Collect and Record Cost Data —Use of Constants or Factors in Estimating

BY W. E. FREELAND

THE subject of foundry costs is a perennial topic in foundry circles. There is no question that indefinite and incomplete knowledge of costs is at the root of many of the evils which have been long and widely accepted as a part of the foundry business; even truer is it that this lack of knowledge of costs is the underlying cause of the high mortality characteristic among jobbing foundries. It is productive of the guess-work estimate—that factor most obstructive to securing the manufacture of castings on the profitable basis, as has been well recognized in machinery work by the machine-tool builders to their advantage.

Some founders, though, have taken long strides



The foundry weight record, Fig. 3, is a simple form with self-explanatory headings under which are segregated all the items constituting the tonnage record for the month.

The foundry time card, Fig. 1, is made out daily by a foundry clerk. The quickly detachable job coupons aid in the compilation of payroll distribution. The perforations give six such coupons. They are sorted weekly and grouped as far as possible so that a single entry on the payroll distribution sheet frequently comprises several jobs on the same job number.

The foundry cupola report, Fig. 2, is notable for its conciseness and small size. Each variety of pig iron has a separate column. In actual practice these are of course designated by their trade names.

SOME OF THE FORMS USED IN THE TAYLOR & FENN PLANT

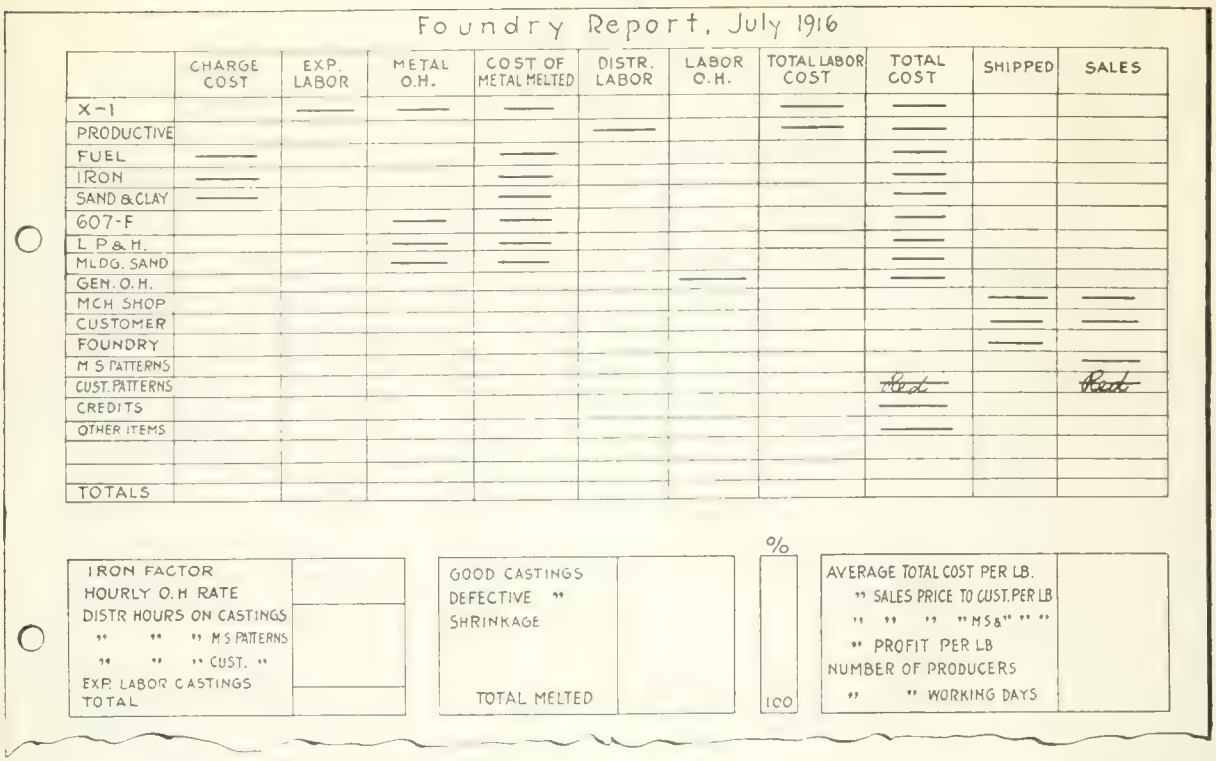
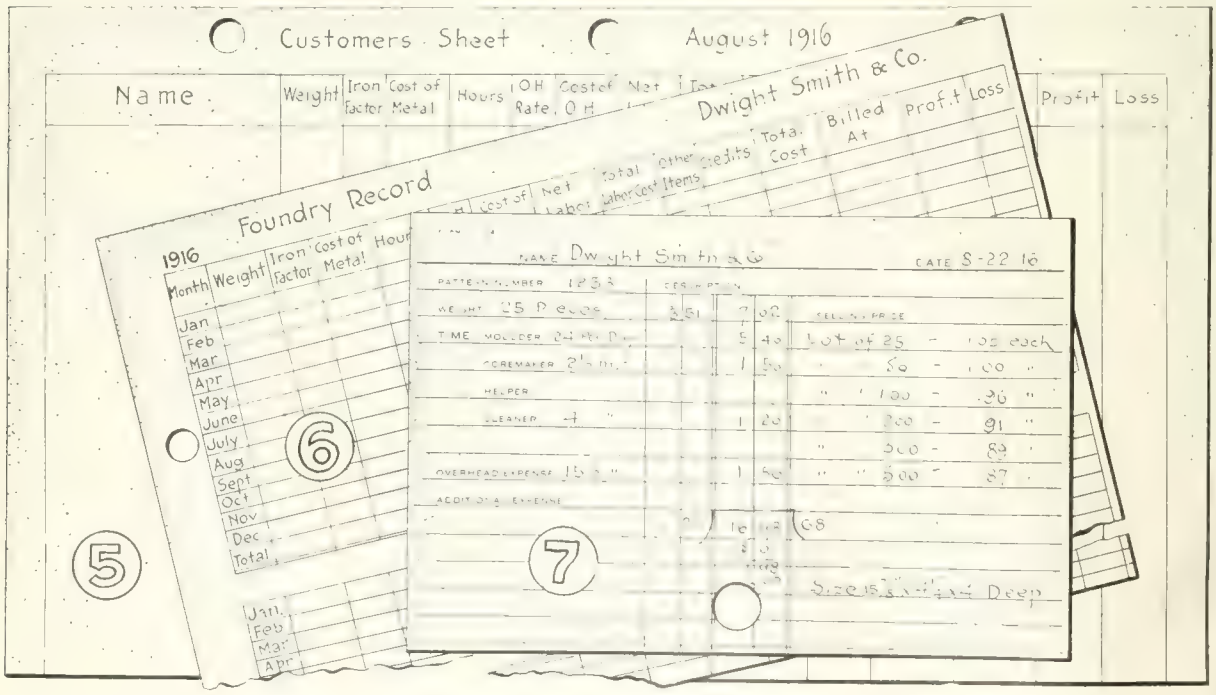


Fig. 4—The Taylor & Fenn system has a summary sheet upon which the items are gathered that make it possible to determine an iron factor, so-called, and an hourly overhead rate. The iron factor is obtained by dividing the cost of metal melted by the number of pounds of castings shipped; the hourly overhead rate by dividing the labor overhead by the total of distributive (direct labor) hours. The straight lines in the various columns indicate the positions of the entries on the original form. Customers' patterns have red ink entries and are not included in the totals as the labor has already appeared as part of the total cost of "productive" and the sales as a part of "customers' sales." The red ink entries are made only for the purpose of making monthly comparisons.

toward accurate knowledge of costs and the consequent elimination of unprofitable contracts. One such concern is the Taylor & Fenn Company, Hartford, Conn., whose foundry department is devoted largely to jobbing work. The cost system in this plant is the result of years of study and simplification. It has been in use long enough so that its comparative accuracy has been thoroughly demonstrated



The record of each job takes one horizontal line on the customers' record sheet, Fig. 5. The iron factor and hourly overhead rate employed to obtain the cost of metal and cost of hourly overhead are obtained from the foundry report, Fig. 4.

All the items of an individual customer appearing on the customers' record sheet, Fig. 5, are segregated and appear as a single monthly item in that customer's division of the foundry record, Fig. 6. The vertical columns on these sheets are identical. Each sheet of the foundry record is ruled to show a customer's profit and loss record for six successive years.

The same card, Fig. 7, is employed for both estimates and file cost record card in the Taylor & Fenn plant. The form shown is an estimate. The figures are necessarily fictitious. The actual weight of 25 pieces is multiplied by an iron factor of 2 cents to secure cost of metal melted. The total direct labor of 15½ hr. is multiplied by an hourly overhead rate of 12 cents to obtain the total labor burden cost.

through the general ledgers. In the following paragraphs an effort will be made to bring out the leading features of this system and some of the minor details.

The Taylor & Fenn System

A regular clock time card is employed to register the hours worked by each employee. A foundry time card is made out by a clerk in the foundry office. This card, Fig. 1, is perforated on one edge to form six small coupons, each coupon showing the job number, clock number, hours, pattern, pieces made and piece price. The body of the card bears the clock number, date and employee's name, and has vertical columns for the same information as furnished by the coupons with an additional column for the amount earned on each job. One of these cards is made out each day for each workman and they are checked against the clock time cards. The individual job coupons are sorted each week and entered on a sheet called "distribution of foundry payroll," groups of similar coupons being combined into a single entry. This distribution sheet has vertical columns bearing the headings: Date, charge to, clock number, time, rate, and amount. As all the accounts are known by number or symbol, these columns are narrow and it is possible to put two sets on each sheet. The total of hours on this sheet must agree with the total of the time clock cards, any variation of more than one-half hour being sought for until the cause for variation is found and corrected. The total of the amount columns on these sheets must agree with the total labor payroll.

A weekly "foundry cupola report," a copy of which is here reproduced as Fig. 2, is notable for its compactness. Each day, for example, requires but one horizontal line.

With all shipments of customers' castings one copy of a "memorandum of goods shipped" is sent, a duplicate sheet being sent at the same time to the office. This form has five vertical columns with these headings: order number, your order number, number of pieces, marks or pattern number, weight. With castings made for the company's own machine shop, a small slip is sent which is entitled "machine shop castings charge." This form has vertical columns with the headings "order number, pattern number, number of castings, and weight," also spaces showing department and individual to which delivery was made. A plain manila sheet serves as a manifold copy for the foundry office.

A monthly "foundry weight record," Fig. 3, compiled by days shows by days and by weekly totals the weight of castings sent to customers, to the machine shop, used directly in the foundry, and the daily and weekly totals of good castings and of bad castings.

The monthly "foundry report" is the form which summarizes the cost data. This is ruled up on a plain loose-leaf sheet and its form is made clear in the illustration, Fig. 4. On this form is brought together the information which makes it possible to obtain an iron factor and an hourly overhead rate both of which are so essential in making intelligent estimates and quotations.

IRON FOUNDRY COST SHEET

	Weight	Amount	Floor	Bench
Pig Iron				
Scrap Iron				
Steel				
Sprue				
Gross Melt				
Bad Castings made				
Natural Scrap Gates & Sprue				
Total Returns from Melt				
Net Melt				
Goods Castings produced for month				
" " " " period six months				
Average per Lb.				
Productive Molding Labor for month				
" " " " period six months				
" " Hours " month				
" " " " period six months				
Average per Hr.				
" Core Labor " month				
" " period six months				
" " Hours " month				
" " " " period six months				
Average per Hr.				
Total Hourly Burden " month				
" " " " six months				
Constant				
Total Tonnage Burden " month				
" " " " six months				
Constant				
Total Core Shop Expense " month				
" " " " " six months				
Constant				
TOTAL COST OF PRODUCT.				

Fig. 8—The constants for hourly burden, tonnage burden and core shop expense obtained on this foundry cost sheet of the Turner & Seymour plant are its most important features. The other averages obtained are useful guides to show the trend of direct labor costs and the value of good castings produced, especially in the form of graphic charts. For the use of the constants see the estimate card, Fig. 13. The constant used is an average of the constants for the preceding six months.

The item "x-1" is a symbol for all indivisible foundry labor; "607 - F" is a symbol for the various minor supply items charged to the foundry during the month; "L. P. & H." means "light, power and heat." The use of the other nine vertical columns is shown by the heads, the initials "O.H." meaning overhead. The items included in these overheads are described in the following paragraph.

The practice of dividing the burden into "metal overhead" and "labor overhead" is not common, but years of experience at this plant have proved its value. The metal overhead includes all the variable, and the labor overhead all the fixed burden charges. The metal overhead contains such items as general indivisible labor expense, molding sand, general supplies, light and power, etc.; that is, those expenses which will change with volume of business and number of working days. The labor overhead includes those items which seldom change, such as interest on investment, cost of supervision, taxes, insurance, etc. By this method the cost of metal melted contains those items of costs which may vary frequently with market and industrial conditions, and the total labor cost includes those items which change but seldom and then usually by relatively small amounts. Thus a fairly fixed factor in the business is not disturbed by including with it for estimating purposes other factors which are extremely variable. It has been demonstrated by records extending over several years that the iron factor and the hourly overhead rate thus obtained are extremely accurate, the proof being found in the close agreement of estimated and actual cost record

cards and in the profit (or loss) shown by the "customers' sheets" (to be described later in this article) and the profits as shown by the general ledgers.

The iron factor is found by dividing the total cost of iron melted by the tonnage shipped. The hourly overhead rate is determined by dividing the total labor overhead by the total number of direct or productive hours of labor on castings and patterns. The indirect labor is entered under the head of expense labor.

The "customers' sheet," Fig. 5, is made up monthly. On each horizontal line is the analysis of each job shipped. The form has fourteen vertical columns with these heads, as shown. The weight is obtained from the memoranda of goods shipped; the number of hours from the distribution of foundry payroll; the credits are usually for defective castings returned.

Another sheet called the "foundry record," Fig. 6, is much like the customers' sheet. It gives a yearly record of the monthly profit and loss for each customer and is so ruled that each sheet contains a record for six years. There is a horizontal line for each month of the year and a line for totals. An examination of the individual customers' records as found in this "foundry record" shows quickly which accounts are unprofitable and therefore undesirable at the existing quotations.

A single form of card, Fig. 7, is used for estimates and for file cost cards of completed work. It rarely happens that a blanket quotation on a group of patterns is given by this foundry; usually all quotations are made by unit pieces. By this method the quantity ordered determines the price, as quotations are varied according to the quantity ordered. This results in making many buyers order in sufficiently large quantities so that the production of castings becomes in the truest sense manufacturing rather than jobbing work.

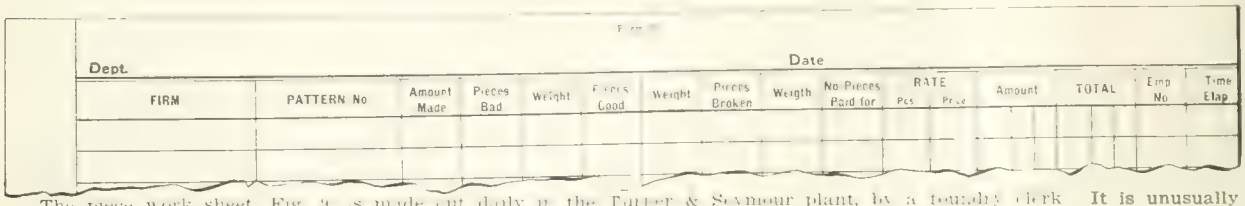
At the Turner & Seymour Mfg. Company, Torrington, Conn., the analysis of costs is carried a step further in that all costs, as far as possible, are allocated to the two grand divisions of floor and bench work. A brief description of the forms employed and the methods by which constants are established follows:

The Turner & Seymour System

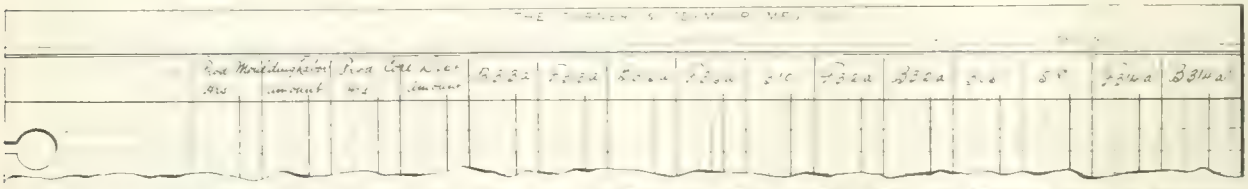
The body of the time clock card is of the regular form, but a section at the top (perforated) forms a pay check, which is signed by the employee and turned in as a receipt for payment of wages. The payroll sheet has a horizontal ruling for each employee and vertical columns for clock number, name, rate, six columns for hours worked each day, total hours, earnings, hours deducted, wages deducted, payment. A clerk in the foundry office also makes out a "piece work sheet," Fig. 9, for each day.

A sheet called "Foundry Piece Work Prices" is made up daily for each piece worker on molding or core making from which the payroll for men working by the piece is computed. This form has vertical columns with these heads: Pattern number, description, firm, pieces, molding rate, core rate per 100 pieces. A small card is kept in a permanent file which gives a brief description, the number and the molding rate of each pattern.

The payroll distribution of molding, core making



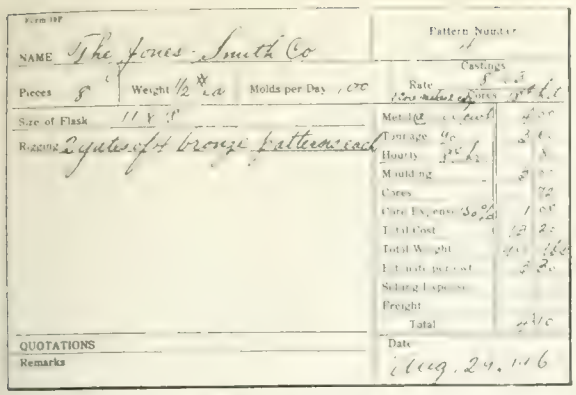
The piece work sheet, Fig. 9, is made out daily in the Turner & Seymour plant, by a foundry clerk. It is unusually specific in regard to the division of the work as regards quantity and quality.



The payroll distribution sheet, Fig. 10, shows the thoroughness with which direct and indirect labor is separated not only into various accounts but also into floor and bench accounts when division in that manner is possible.



The melt sheet of the Turner & Seymour foundry is distinctive in the separation of charging weights and gross melt into floor and bench iron. This division carried throughout the cost accounting helps to make estimates more accurate by its partial recognition of the difference in costs known to exist between work on light and work on heavy castings. Fig. 11 is the front and Fig. 12 the back of the melt sheet.


NAME The Jones Smith Co
Pattern Number
Castings
Pieces 8 Weight 1½ Lbs Molds per Day 100
Rate
Size of Flask 11 x 8
Rigging 2 gates of 4 bronze patterns each
Metal
Tonnage
Hourly
Moulding
Cores
Core Expense 50%
Total Cost
Total Weight
Selling Expense
Freight
Total
QUOTATIONS
Remarks
Date Aug. 24, 1916

This estimate card, Fig. 13, shows that the actual weight of metal, a tonnage burden constant of 90 cents per cwt., an hourly burden constant of 50 an hour and a core expense constant of 150 per cent, together with actual estimates of molding and core direct labor, are the items comprised in the net cost. The figures are fictitious.

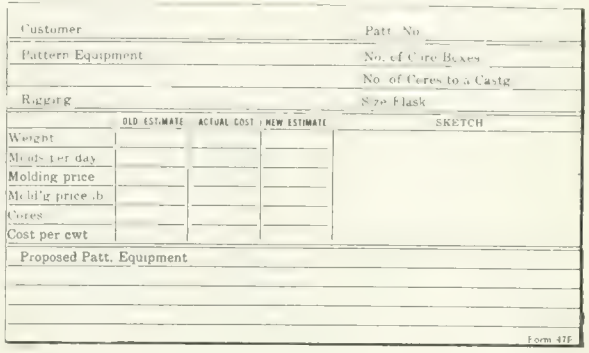
and pattern making is divided into the two general classes previously mentioned—floor and bench work—and subdivided as follows: Foundry department, indirect labor, under these heads; clerks, labor to repairs, night gang, yard gang, cupola, molding, core making, cleaning, shipping. The first four items are obviously not divisible into floor and bench work, but the remaining five items are so divided. The hours of direct labor in the foundry department are divided into bench and floor under the headings molding and core making. Wherever possible the work of the pattern shop is similarly divided into floor and bench classes under the headings: Experimental work on machine molding, repairs to patterns and machines, core boxes, flasks, pattern work for plant equipment, patterns for customers, work for other departments (charged at cost), core box repairs. The indirect hours in this department are indivisible and are comparatively small in number, including but little except sweeping. This item is handled in the same manner as the indirect labor in the foundry department.

The two sides of the melt sheet are shown in Figs. 11 and 12. The interesting feature of this sheet is the division of the melt into floor iron and bench iron. This division, while it does not make possible exact knowledge of melting costs of the remelt and oxidation losses on individual patterns, does recognize that these cost factors are frequently widely different on light or heavy castings and helps to make estimates on new work of either class more accurate. Where the patterns do not widely vary in character, it is highly probable that extreme subdivision of costs does not produce data sufficiently valuable to pay for the increased cost of gathering and segregating the information.

The experience of the Turner & Seymour Mfg. Company has proved that knowledge of the variations in cost between floor and bench work is worth while and that the clerical cost of this segregation into two classes instead of one is not excessive in view of the gain in accurate estimating. The melt sheet needs no detailed description, as the illustrations show the data considered and the summaries obtained. The planning department has a card for each car of iron and the melt sheet is sent to the planning office where the entries of iron and other materials consumed are made upon a perpetual inventory sheet. Physical inventory is made each three months as a check upon the perpetual inventory.

A "customer's record sheet" is kept on a file card whereon is shown the tonnage, the cost per hundred weight, the selling price per hundredweight, the total cost and the total selling price.

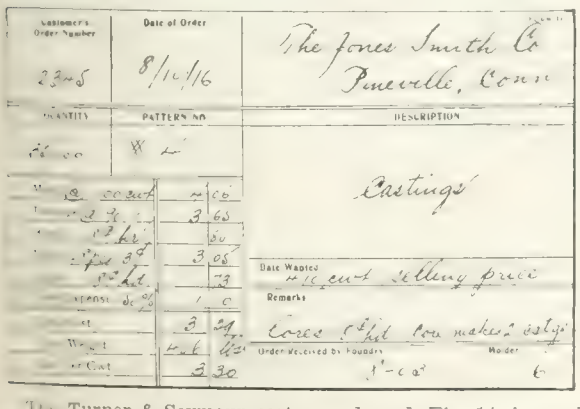
An "iron foundry report," divided into floor and bench work, is compiled monthly. The steel, pig iron, sprues, foreign and domestic scrap are added together to obtain the total melt. Deducting the weight of defective castings, pig bed, sprues, etc., gives the net melt; by deducting the tonnage of good castings from this result, the loss in melt is obtained. On this report also appear the amounts of molding


Customer
Patt. No.
Pattern Equipment
No. of Core Boxes
No. of Cores to a Castg.
Rigging
Size Flask
OLD ESTIMATE | ACTUAL COST | NEW ESTIMATE | SKETCH
Weight
Molds per day
Molding price
Mold'g price .b
Cores
Cost per cwt
Proposed Patt. Equipment
Form 47E

This card is used to compare actual costs against estimates and contains a space for a new estimate with other spaces for notes on equipment and proposed changes.

sand, fire sand, clay and brick used during the month.

A summary of foundry costs, Fig. 8, is made each month, from which is obtained six constants for use in estimating on new jobs, three for floor work and three for bench work. A constant for the hourly burden is obtained by dividing by the total productive (or direct-labor) hours an aggregate composed of such items as general foundry expense, a pro-rata share of general plant expense, heat, light and power, general repairs, supervision and clerical work, taxes, insurance and depreciation. A tonnage burden constant is obtained by dividing the total wages of the yard gang, the night gang and the indirect payroll of the cupola, molding and cleaning crews, together with expenses charged to these items, by the number of pounds of good castings. A constant for core expense is obtained by dividing the total core room expense by the total direct hours. An average of the cost per pound of good castings is obtained by dividing the net melt (in terms of dollars) by the number of pounds of good castings. Averages of the cost per hour of the direct labor of molding and core making are obtained by dividing the total direct wages of each by the corresponding number of direct hours.


Customer's Order Number 2345
Date of Order 8/10/16
The Jones Smith Co Pineville, Conn
QUANTITY PATTERN NO. DESCRIPTION
Castings
Date Wanted 4/10 cwt Selling price
Remarks
Cores 5 Pat. box makes 2 castgs
Under Received by Foundry Molder

The Turner & Seymour cost record card, Fig. 14, is much like the estimate card, Fig. 13, and the same constants are applied to determine burden costs. The figures on this form are, of course, fictitious.

Differences in the Estimating Methods

In the Taylor & Fenn system the iron factor and hourly overhead are based on the computations of the previous month; in the Turner & Seymour system the constants used in estimating are based upon

the average of the various constants for the previous six months.

In the Taylor & Fenn system a cost of metal at the spout is obtained which includes the cost of raw materials, molding sand, general labor, general supplies and all other variable overheads, this cost of metal melted divided by the weight of castings shipped giving the iron factor used in estimating. In the Turner & Seymour system the actual cost of metal is used plus a tonnage constant which includes the charges for supplies to, and the indirect labor of, the cupola, yard gang, night gang, molding and cleaning. Both systems use actual time estimates for molding and cores. The Taylor & Fenn system uses an actual time estimate for cleaning, which in the Turner & Seymour system is merged into the tonnage burden. By the Taylor & Fenn method the core expense appears in the iron factor; by the Turner & Seymour method the core expense is obtained by multiplying the core direct labor cost by a constant obtained in a manner previously described. Both use an hourly overhead constant or factor in which is incorporated the fixed overheads, the interpretation of fixed overheads differing slightly in the two systems.

The Turner & Seymour Mfg. Company is planning to make some improvements in their system of cost accounting in the next few months. A few of the changes now under consideration and virtually decided upon are these: To secure an actual cost of metal at the spout which will include cost of metal, coke, flux, cupola repairs, cupola and yard labor and similar items. Some of these now appear in the tonnage burden. Another change planned is to distribute certain fixed overhead items and probably supervision and administrative expenses on an area basis rather than the present method of hourly burden. A third proposed change is to compute the tonnage burden on the basis of the gross melt rather than the net melt, as the latter method gives inaccurate results, in that it does not take into account adequately the wide variation in the amount of metal melted for light and heavy castings due to the larger proportionate weight of sprues returned for remelt from the lighter castings. Because of this same variation in sprues and gates and to some extent on account of the complex shapes of some castings and the other factors affecting cleaning costs, special study is being made to find a more accurate method of determining and allocating spruing and cleaning costs.

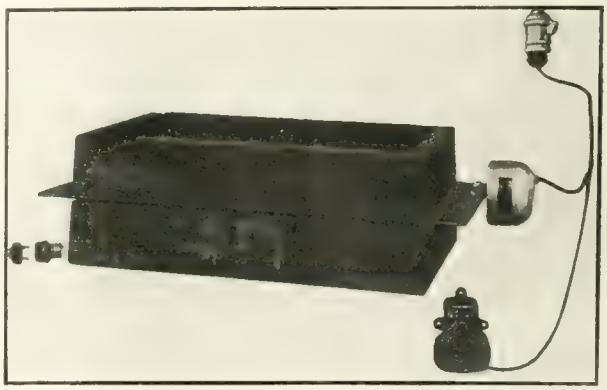
In setting forth these two cost systems, there is no intention of claiming that either is perfect. A large factor in their selection was the fact that they represented the present methods of two concerns which have had a long experience in the jobbing field and can claim to have given much thought to the creation of cost systems which would answer with reasonable accuracy the conditions peculiar to the business of a jobbing foundry. A foundry serving solely a machine building plant should be able to carry the refining of accuracy in cost accounting to much more exact conclusions because the factor of constant repetition of work on familiar patterns should make this easily possible—and profitable. In many cases it should be practicable to reach that desirable point of allocating overhead costs to individual patterns.

In a jobbing foundry, however, the constant introduction of new patterns and the short runs common to most patterns precludes any such refinement and a single overhead, or overheads based on broad subdivisions, are the most common forms in which burden costs are determined and constants or factors derived from these general groupings are usually employed in making estimates on new work. This matter of the extent to which the refinement of accuracy may be profitably carried is a subject which each foundry manager must consider in the light of his conditions and character of product.

An Electric Vibrator for Foundries

The E. J. Woodison Company, Detroit, Mich , has developed an electric vibrator for attachment to pattern plates or molders' tubs. It is intended as a substitute for hand or pneumatic rapping in a foundry. It is claimed that faster and truer lifts are secured by the use of this device, which in turn results in increased production.

The vibrator, which is designed for use on alternating-current circuits only, consists of a solenoid, the core of which produces the vibration as the current is cut



An Electric Vibrator Attached to a Pattern Plate to Take the Place of Hand Rapping, the Power Being Taken from the Nearest Lighting Socket and Controlled by a Knee Switch

off by the operation of the knee switch provided. The current for operating the vibrator is taken from a lighting socket or other convenient outlet, the work of installing it consisting merely of connecting the vibrator with the knee switch and also with the attachment plug that is screwed into the lamp socket.

Two styles of vibrator are made, one for plate work, which is the one illustrated, and another for attachment to tubs, benches or machines. Four sizes of vibrator are made. The two smallest are intended for plate work only, while the third is made for either plate or tub work and the largest one is made for tub work only. The current consumed, it is emphasized, is comparatively small so that it is possible, except in the case of two sizes, to place from 6 to 12 of the vibrators on the same circuit without exceeding the capacity allowed by the Board of Fire Underwriters, 660 watts. In the case of the two sizes that do not come in this group, it is possible to place three of one size and four of the other on the same circuit.

Oxygen for Opening Frozen Tap Holes

Opening frozen tap holes of blast or open-hearth furnaces by applying a heated iron bar to the hard or frozen metal in the hole and continuously feeding oxygen to the heated bar so as to maintain it in an incandescent state, and thus enable it to eat its way through, is the subject of a patent (U. S. 1,186,358—June 6, 1916) granted to Henry C. Witz, Johnstown, Pa.

The Upson Nut Company, Cleveland, Ohio, has called for redemption Oct. 1 the entire $1,200,000 issue of its preferred stock at 103. This company has already retired all of its $2,400,000 first mortgage 6 per cent bonds, which were also redeemable at 103. It is said that most of the preferred stock is held by the former owners of the Upson Company, who sold the Upson plant to the Bourne-Fuller interests several years ago for part cash and part Upson Company preferred stock.

Engineering Service Plus Machine Building

How the Gisholt Machine Company Has Added to Its Functions as Its Plant Has Added Size—Its Gray-Iron Foundry

BY O. J. ABELL

BUSINESSES expand under a wide variety of influences and in as many different ways. The spectacular growth is likely to be one, such as the automobile tire industry, where the manufacturer has but small part in the creation of demand yet can scarcely erect buildings rapidly enough to care for it. In direct contrast are other industries that build themselves from within by the accumulation of experience, by the development of a product for which demand is created on the basis of service, industries whose plant or equipment capacity is not infrequently made available in advance of sales, a guarantee that what is promised can be done. It is in fact by industry matured in this manner that standard and accepted practices are established. Among instances of individual organizations grown to the point of prominence in their particular lines, that of the Gisholt Machine Company is particularly interesting and suggestive. The Gisholt name is especially associated with turret lathes, but the fact that this type of machine tool puts upon its builders the necessity of a wider knowledge of tool building and metal working practice than would suffice for specialization in another direction is doubtless responsible for the general machine designing and building activity in which the organization is now also engaged.

The natural consequence of building up the broad experience corollary to the manufacture and marketing of turret lathes was the addition of other tools as standard products, and there have followed from time to time the Gisholt tool grinder, horizontal boring mill, vertical boring mill, the Gisholt automatic, and more recently a line of special lathes in 16 and 25 in. sizes. In addition, the development and production of the Periodograph recording instrument, described in THE IRON AGE, May 30, 1912, a mechanism requiring the machining methods of the jeweler shop, has been put upon a manufacturing basis.



Fig. 1—In front of the crane is a 250-ft. length of floor for the large work and the dry sand molding. At the right are the cupolas and dry sand ovens; at the left the machine molding floors. Beyond the crane is the cleaning room with a length of 125 ft.

Here is a formidable diversity of product. It calls first for adequate plant capacity. It calls for exceptional equipment for manufacturing in the form of tools, jigs and fixtures if each of the products is to compete in a specialized field. It demands a wide knowledge of how the work for which each

machine is sold can best be done and how the machine should be tooled to do it. It places especial emphasis upon service. In all of these directions the Gisholt Machine Company has been doing interesting things.

In THE IRON AGE of May 30, 1912, a description of the then recently completed main shop of the company was presented. Apparently adequate at that time for an indefinite future period, it has this year been reinforced by the outright purchase of the Northern works of the General Electric Company, a shop of similar type, close at hand and fully equipped for machine operations duplicating those of the main shop. Since the date mentioned the gray-iron foundry has been enlarged also and the range of work possible of being handled in it markedly increased, as will be later described in some detail. Another machine shop is operated at Warren, Pa. Thus plant capacity has grown with the product.

The problems of developing the proper methods and equipment to manufacture the company's own standard products in these shops, of designing and building the machines themselves, and finally of adapting the machines to the needs of the customers to whom they are sold, through correct tooling, are met by dividing the engineering forces of the organization into three divisions, one for each of these tasks. In the shop, corresponding departmental divisions are made. The result is a specialization in each of three directions, from which has been accomplished (1) the complete rigging of all machining operations in the Gisholt shops with jigs and fixtures where it is advantageous to do so and the establishing of an experience in fixture design of broadest limits; (2) the standardizing of machine operation, assembly and erection upon a shop unit basis such that individual character in a machine in process is reduced to a composite of unit operations; (3) an analysis of the functions of small tools which not only has added to the assurance of a creditable showing for the company's machines in service, but has made the company a manufacturer of small tools and tool holders for general use. And the significance of this logical and interesting expansion as a whole is that out of a specialized activity in the building of one type of machine tool has been created a general engineering practice in machine building. That the company has carefully fostered this development is indicated by the fact that the entire capacity of the recently acquired Northern works is to be devoted to the building of special machinery on contract or hourly rates.



Fig. 3—A part of the floor for dry sand molding. In the foreground is a row of turret molds and in the background a boring mill base



Fig. 2—An example of some of the lighter work put up on the main bay floor by hand. This is a tractor crank case, the mold being made by hand rather than on a machine because of the manner of placing cores

The improvement of service which the machine tool builder can render the user of machines has also been illustrated by this company. In its shops it conducts a class for the instruction of machine operators from which are recruited expert turret-lathe men for the employment in the shops of turret-lathe owners. These men are familiar with the construction of the turret lathe in every detail as well as of turret-lathe operation.

The company also makes a practice before selling a machine to have an exact understanding with the prospective customer regarding the nature of the work to be done and has a standard list of questions which are submitted for answers. When a production estimate is made, it is on the basis of the following statement:

We estimate that your work described below can be machined as indicated on a Gisholt ..... , provided that the machine is installed, tooled and operated as we direct.

Piece . . Matl . . Drg No .
Part No..... Floor to floor time....to.... minutes, each figured at a cutting speed of .....feet per minute, assuming parts are true to pattern and that the amount of stock to be removed from any surface does not exceed ..... of amount shown on sample submitted.

The sale of a machine upon this basis of understanding renders the tool buyer a distinct service and it safeguards the manufacturer from unjust complaint.

At the bottom of the broad plan of general engineering service the foundry is an essential element. The foundry presents a capacity and equipment for a wide range of work. As may be observed from the accompanying illustrations, work of varied character ranging from castings, weighing as much as 12,000 lb. down to the smallest snap flask jobs are simultaneously in progress. Structurally the foundry has not been expanded upon a prearranged



Fig. 5—A typical job on the squeezer machine floor in which a modern roll-over and squeeze machine in one operation makes both the cope and drag molds for two gear case covers

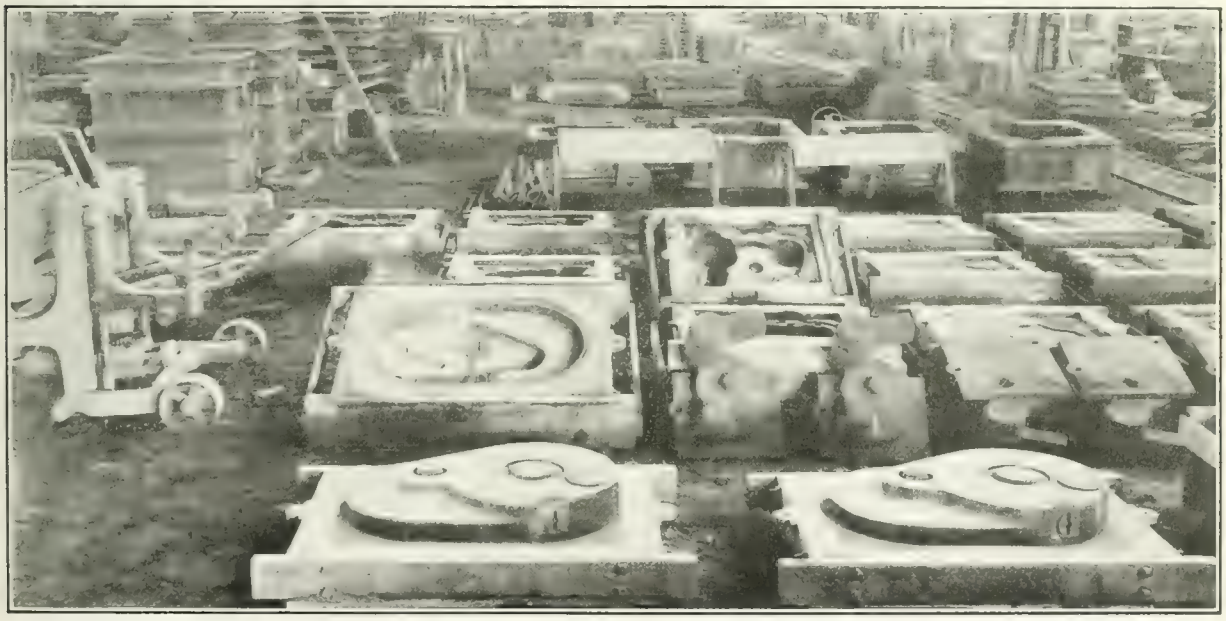


Fig. 4—Two interesting jobs made on Pridmore roll-over machines, both being tractor castings and representative of the jobbing work handled in this foundry

unit plan, but this does not prevent a satisfactory distribution of the different kinds of work on the floor and a direct progress of the work through the foundry.

The main bay is illustrated in Fig. 1. It has one runway carrying a 20-ton crane at a height sufficient to serve the charging floor of the cupola, and another lower runway carrying two 7½-ton cranes for the heavy work, dry sand molding and the cleaning department, the latter separated from the foundry floor by a partition wall. The bay has a total length of 375 ft., of which 250 ft. is foundry floor and 125 ft. the cleaning room, and it is 113 ft. wide. The lower crane runway is extended at the one end of the foundry for a length of 175 ft., serving a yard space used for the storage of the heavy iron flasks required for the larger work.

These flasks are arranged and kept in unusually orderly fashion so that they can be located promptly, their handling being rendered easy through the medium of the crane. On either side of the runway the lighter wooden flasks are stored. The entire yard is well lighted with tungsten incandescent lamps, so that the securing of flasks for the night operation of the foundry, or the returning of the flasks to the yard by the night gang, following the shaking out of the work of the preceding day, can be pursued without hindrance. The extension of the craneway at the opposite end of the building, beyond the cleaning room, serves as a temporary storage and loading yard for the finished castings. This yard has a stub spur of the track connecting the foundry with the machine shop and extends under the crane to facilitate the direct loading of castings. For the handling of the smaller castings a truck drawn by a Buda storage battery tractor truck is employed.

Centrally located at one side of the main bay

are the two cupolas, one lined to 60 in. diameter and the other to 48 in. and having aggregate capacity to supply as much as 140,000 lb. of metal per day. Opening off of the main bay on the side opposite the cupolas is the other principle section of the foundry, a building of saw-tooth roof construction, 60 x 280 ft., having two longitudinal bays. In the bay adjacent to the main foundry floor is put up the work suitable for making roll-over and jolt-ramming machines, and in the outside bay is the side-floor work at one end, the hand and power squeezer machine work and, at the opposite end, the core rooms and core ovens. The entire foundry floor area is thus divided into a section for the heaviest castings requiring hand work, a section for dry sand molding, adjacent to which are two large drying ovens of size sufficient to accommodate trucks 8 x 25 ft. and 7 x 25 ft. respectively, the heavier molding machine work, the light work for squeezer machines, the side-floor work, and along one wall of the main foundry bay a section for bench work.

Hot metal is distributed to these various floors in ladle trucks of 2000 lb. capacity on an industrial railway, the molders pouring off with ladles of 50 and 200 lb. capacity. The trackage is arranged to reach the various floors in a way to reduce the distance in which iron must be carried by hand to a minimum, inasmuch as it has been found that the molders put up an appreciably larger amount of work when the pouring off is rendered as easy as possible. For the same reason a point is made of furnishing the molders with ample help in the handling of the metal. For the larger work, which is all under the cranes, the iron is distributed directly in ladles from the cupola, the ladles having capacity of 2500, 3500 and 8000 lb. The larger of the two cupolas supplies the metal for the general work of the foundry and is the one to which the ladle track leads, the cupola metal being poured directly into the ladle cars, as indicated on Fig. 1. The smaller cupola melts the iron of special mixture of which the large machine beds, requiring a dense iron, are made, as well as the castings for which an especially smooth finish is desired. This iron is handled entirely with the large ladles and crane.

Some of the larger work, consisting of long lathe beds, cast both in pits and metal flasks, is shown in the foreground of Fig. 1. The molds for these beds, for boring mill bases, for the turrets, chucks, spindles and similar castings, are made up in dry sand molds. A view of a part of the work of this kind is shown in Fig. 3, with a row of turret molds in the foreground and in the background a mold for a large boring mill, the casting weighing 1700 lb. In addition to the castings for the company's own standard products, a large amount of outside work is done, including gas engine and tractor castings. In fact, the variety of work continuously handled is such as place wide limits on the range of the foundry, as fine molding as that required for the casting of air-cooled gas engine cylinders being included among the work produced.



Fig. 6—Above the ovens in the core department sand is distributed to bins as desired. The wall shelves in the ovens may also be seen

An example of the jobbing work done is illustrated in Fig. 2, this being a tractor crank case. The mold at the right is shown before the cores are set and that at the left with the cores in place. The pattern is shown between the two flasks. This mold has been made up as a two-part job rather than a three-part job by hanging several small cores in the lower part of the mold, though this method also necessitates the mold being put up by hand rather than on a jolt machine. Eleven cores in all are required. The mold is made up in a flask 24 x 36 in., with a 10-in. drag and a 6-in. cope. The castings weigh 105 lb. each, and one man makes up a minimum of seven per day.

A large variety of castings is poured in molds made up on jolt ramming and roll-over machines.



Fig. 7—The concrete pattern storage building has compartment walls, with fire doors and a sprinkling system

Two such jobs are illustrated in Fig. 4. In the foreground is a tractor casting having a metal section of about ¼ in. and weighing 52 lb. This mold is made in flasks 24 x 34 in., of 8-in. cope and 4-in. drag. The patterns as originally made provided for a large mushroom core hung in the drag. Instead of making this expensive core, the core print was stripped off of the pattern and the core box, fitted with a couple of pin plates, was used for the drag. The mold, in the simple form shown, was the result, all made in green sand. In the background of this view is shown the mold for a gas engine casting, also made on a Pridmore roll-over machine. This mold calls for four cores, the principal one of which is shown, top and bottom views, leaning against the flask. These cores are made as cover cores to permit the casting to be poured without a cope. The flask is 20 x 24 in. and the drag is 10 in. deep.

In the molding of small work, this foundry has developed practices which contribute to excellent production at small cost. Wherever possible the patterns are mounted on boards for machine molding, Mumford and Pridmore power squeezers being largely used with a few machines of other type, including a hand roll-over squeezer machine built by the Arcade Mfg. Company, illustrated in Fig. 5. Flask sizes have been standardized and brought down to three general sizes, 12 x 19 in., 14 x 14 in. and 16 x 16 in. Aluminum frames have been made for these machines to fit any board. The gating of the patterns for the squeezer work is also some-

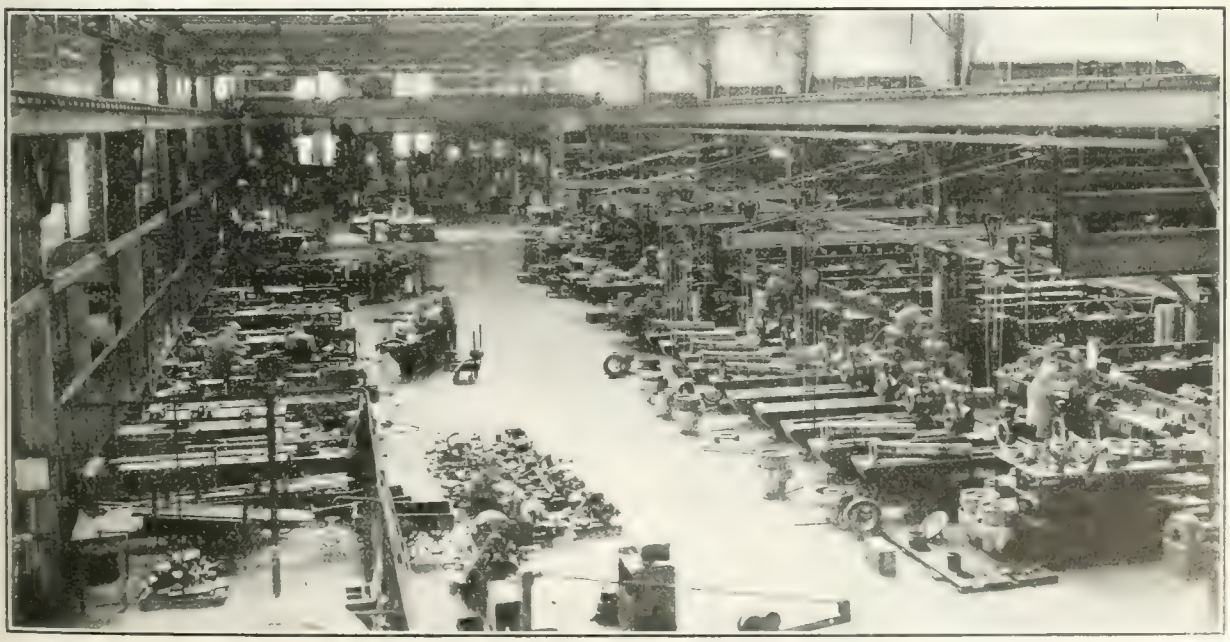


Fig. 8—One corner of the machine shop of the main works of the Gisholt Machine Company. At the right the aisle is a part of the department for manufacturing the company's standard machines; at the left a part of the department for building jigs and fixtures

what unusual. The gating is all kept in the cope with small, straight runners only in the drag, and then as high as possible. By cutting a sprue to the top of the mold of larger cross-section than the aggregate of the runners, the pouring gates are kept full of metal, and being entirely above the runners, a positive skimming action results. One of the typical squeezer jobs is illustrated in Fig. 5, the casting being a bearing plate and gear case cover for a gas engine and weighing 11 lb. The pattern is mounted to cast two pieces in a mold and both the drag and cope flask are made up simultaneously as shown on the machine. A production of 60 to 80 molds, or a minimum of 120 castings per day, is obtained, with unskilled labor trained only for this job.

The wide variety of castings made places heavy demands upon the core-making department. This is located, as previously indicated, in one corner of the foundry. A view of the large core ovens, which

affords the maximum of protection against fire loss. Connecting passages are protected by automatic fire doors and the building is equipped with a sprinkler system. Against the loss of patterns by misplacement equally adequate protection is had. Except in the case of those too large to handle in that manner, the patterns are stored on shelves, the shelf locations being systematically numbered. In each storage room is a card index. On these cards a record of the pattern number, its proper shelf location and its use is kept.

In connection with the card index, a scheme of color tabs is also used. A tab of one of these colors indicates that the pattern is on the shelf, another color indicates that it has been returned to the owner, another color that it is in the foundry, another color that it is in the shop being altered, etc. These tabs are small enough to be fastened on the top of the index card, and if the file is properly kept, constitute a complete guide to



Fig. 9—The large number and variety of jigs and fixtures in the fixture storage room, designed to make the building of the company's standard product a manufacturing operation.

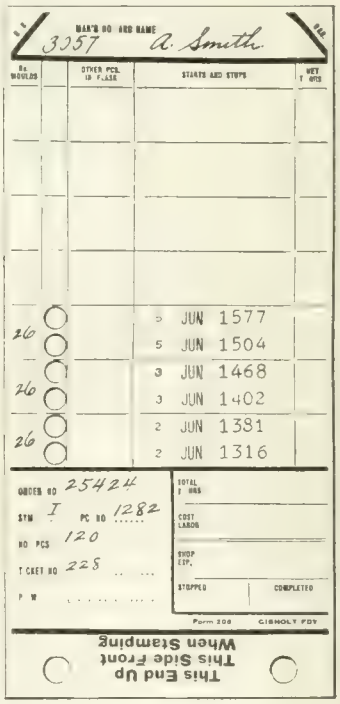


Fig. 10—Card used in connection with the periodograph

are 8 ft. wide and 12 ft. deep, with the core trucks, is shown in Fig. 6. For small cores, three drawer-type ovens also are installed. As may be noted from the illustration, the capacity of the car ovens has been increased above loading capacity of the oven floor and the drying cars by building shelves around the walls in what would otherwise be dead space. The core sand is mixed on a floor built immediately over the ovens. A bucket elevator brings the sand up from the storage bins into which the sand is unloaded from incoming cars and discharges upon a series of inclined belt conveyors. a week's supply of core sand is continuously at hand for mixing. When prepared the sand is lowered to the floor of the core room by means of the crane which spans the bay. The finished cores are placed on racks pending their being required in the foundry, at which time they are delivered to the molder. Standard cores $\frac{3}{8}$ in. in diameter and larger have established locations and the molders come and get them as required.

Exceptional facilities are provided for the storage of patterns. A three-story building of reinforced concrete construction, with each floor divided into small rooms separated by concrete walls, the present location of any pattern desired. In Fig. 7 a view in the pattern storage building is shown.

The handling of the patterns required on foundry orders is also interesting. Where castings are required, a blueprint list of the parts giving the quantity wanted is issued to the foundry. From this list, foundry orders or tags are made out for each piece, which are sent to the pattern clerk, who attaches the tags to the pattern. This tag gives all the necessary information to proceed. If the same pattern is to be used on more than one order number a separate tag is made out for each order number. The patterns are then sent down to a place of temporary storage adjoining the foundry, whence they are delivered to the molders doing the various classes of work as rapidly as they finish the preceding job.

The molder takes the tag from the pattern and immediately turns it in at the periodograph station, where a card is made on which is registered the period of starting the job. This periodograph card also shows the information transferred from the pattern tag and in addition the number of castings

(*Continued on page* 520)

Reclaiming Waste Molding Sand

Accumulation of waste molding sand proves a source of inconvenience to nearly all foundries, and where yard space is limited the removal of this waste entails a considerable expense. The reclamation of scrap iron in these refuse piles is not often attempted, as both the washing and sifting processes are too expensive and tedious. The Modern Foundry Company, Oakley, Cincinnati, recently found it necessary to remove a large accumulation of foundry sand, and the outfit described shows how this is being done at a low cost, and at the same time nearly all valuable scrap in the pile is saved.

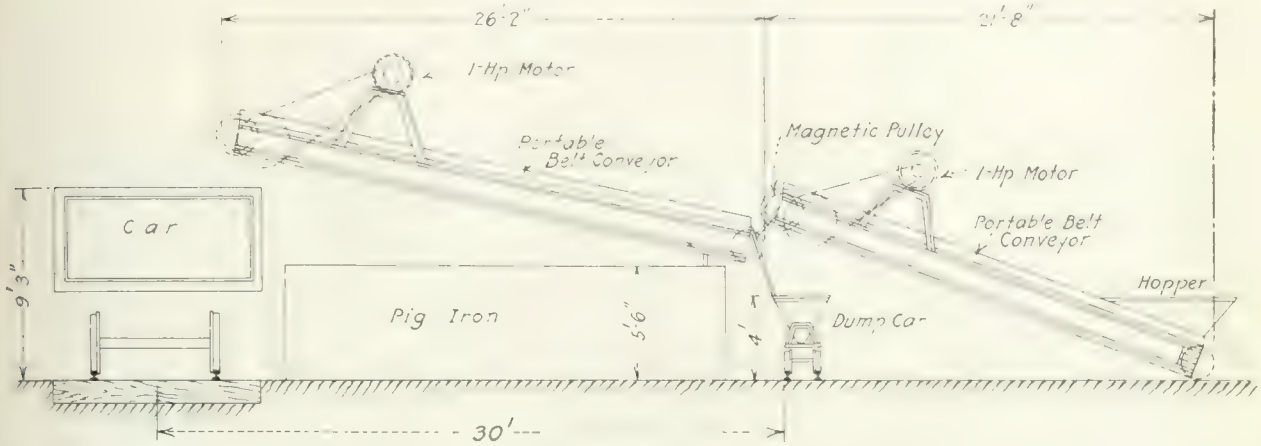
The outfit, which was designed and built by L. H. Sprague, manager engineering department, the Wirthlin-Mann Company, Cincinnati, consists simply of two belt conveyors, one with 23-ft. centers and the other with 26-ft. centers. Jeffrey 18-in. belts are used, the pulleys and motors being mounted on structural-steel frames. The conveyor frames are made of light channel iron, reinforced longitudinally with angle iron, and in spite of their light construction they are strong enough not to require any center supports.

The refuse is shoveled into the shorter conveyor, and passes over a Cutler-Hammer magnetic pulley having the magnetic coils on the inside of the pulley. The metal, as it passes over the pulley, adheres to the belt, while the sand is discharged upon the second conveyor, from which it is dumped into the car as shown. The metal is carried partly around the magnetic pulley and is dumped into a chute at the point where the belt leaves the pulley.

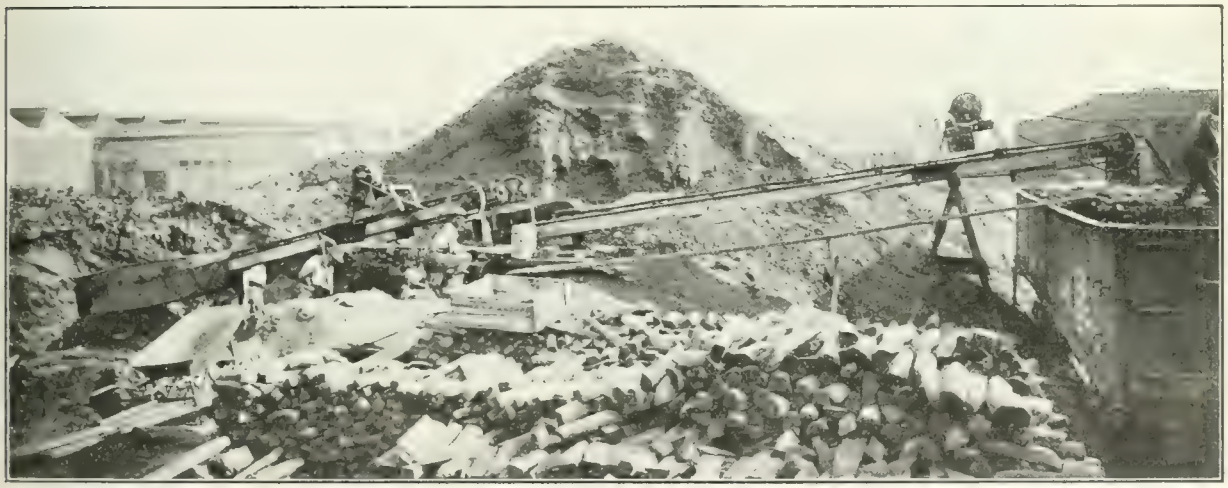
These conveyors are loaded by hand, and have a capacity of 1 ton a minute. They are electrically driven, a 1-hp. motor for each conveyor being sufficient.

One of the advantages of the system is that either conveyor can be used as a separate unit, and on account of their light construction they can be moved by traveling cranes very quickly from one part of the yard to another. Probably the largest amount of time required for this is in making the electrical connections, which is a matter of only a few minutes at the most.

The saving in loading this refuse over the hand method of handling it is self-evident, and the foundry company states that the amount of material reclaimed in six weeks has more than paid for the original cost of the outfit.



Elevation of a Plant for Reclaiming Waste Molding Sand

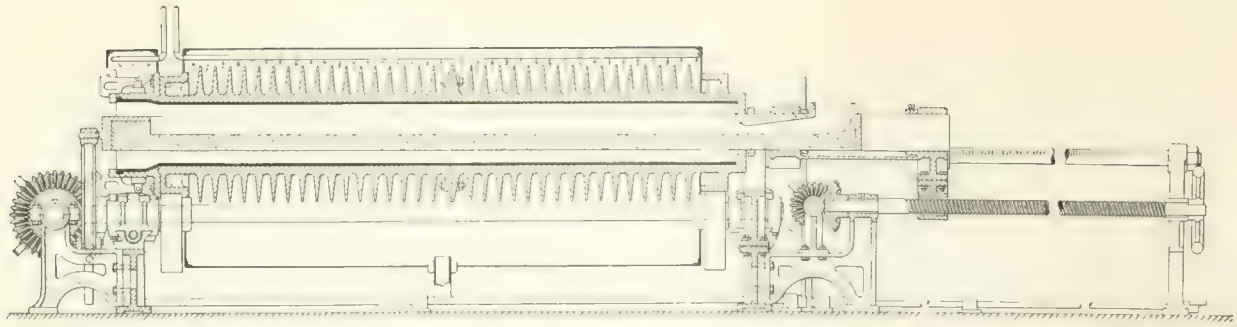


A Combination of Two Portable Belt Conveyors and a Magnetic Separator Is Employed to Remove the Ferrous Metal from Waste Molding Sand

New South Wales Steel and Iron Output

The pig-iron output of New South Wales for the first half of 1915 is recently published as 42,000 tons, with the steel ingot production at 38,000 tons, as compared with 75,150 tons and 24,420 tons respectively for all of 1914. The Iron and Steel and Allied Trades Federation estimates the total 1915 production to have been 120,000 tons of pig iron and 99,000 tons of steel.

The Sidney Tool Company, Sidney, Ohio, manufacturer of woodworking machinery, has placed on the market a 15-in. engine lathe of either the plain or quick-change type. It is driven by a four-step cone pulley and is equipped with double back gears. The swing is 17½ in. over the shears and beds ranging in length from 6 to 12 ft. are built.



A Centrifugal Machine for Casting Pipe

Results Obtained by a Brazilian Inventor Using a Rapidly Revolving Permanent Mold—Some of the Claims—Tests of the Iron Castings

A BRAZILIAN inventor, now in the United States, announces the successful commercial operation in Brazil of a revolutionary method of producing cast-iron pipe. It involves the application of the principle of centrifugal force to molten metal in a permanent mold. Briefly, regulated quantities of cast iron are introduced into a rapidly revolving water-cooled cylinder where, by the centrifugal force exerted, the metal is spread uniformly upon the surface of the mold and within a few seconds the pipe is withdrawn from the other end of the machine at a white heat; the pipe is not subjected to any further treatment except the tarring. Uniformity of section, speed in production, facility in handling and strength of the metal are among the claims made for the invention.

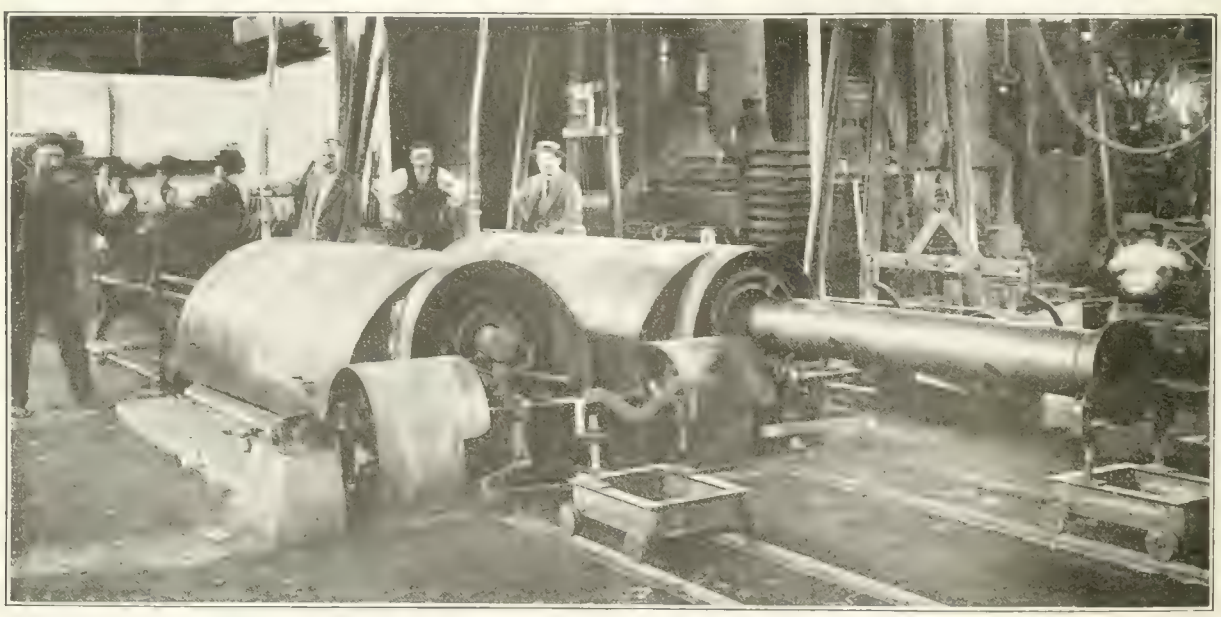
COMMERCIAL RESULTS IN BRAZIL

At present 13 of these new machines are operating commercially at two plants in Brazil, turning out various sizes of pipe from 4-in. to 15-in. in diameter and from 4 ft. to 14 ft. long. One set of the machines is producing pipe from blast-furnace metal at the blast-furnace plant owned by J. J. Queiroz at Esperanza in the State of Minas Geraes—the only blast furnace in Brazil. Its output is about 30 to 40 tons per day of charcoal iron, which has been contracted for by the Companhia Brasileira de Metallurgia for the production of pipe. The other plant employing the new process is at Sao Paulo, Brazil, where the main office of the above company is located. Here cupola metal is used, the mixture including pig iron from Esperanza, scrap iron and imported irons.

The inventor of the process is D. Sensaud de Lavaud of Sao Paulo, and he has as his collaborator, Fernando Arens, Jr. The system is known now as the Sensaud-Arens, it is patented in Brazil and other countries and letters patent have just been granted in this country.

With a view to introducing the process into the United States, Mr. Lavaud has had a machine built in the Buffalo district which has produced for exhibition and other purposes a quantity of 4-ft. 4-in. pipe. Arrangements are also being made to exhibit the process at the American Foundrymen's Convention in Cleveland, Sept. 11 to 16.

The application of centrifugal force to making cast-iron pipe dates back to 1857. None of the previous attempts were successful commercially, Mr. Lavaud says, although patents were secured in 1865, 1882, 1892, 1895, 1897, 1900, 1911, 1912 and 1913. The majority of the processes consisted in lining the molds with sand and there were serious mechanical complications in the use of a rotary mold. Attempts to form castings in permanent molds met with dis-



A 12-ft. 10-in. Pipe Coming from One of the Centrifugal Casting Machines at Sao Paulo, Brazil. Twelve of these pipes each hour are made from each of these two machines, constructed in pairs. Each pipe weighs 120 kg. (240 lb.) and is 0.24 in. thick. The inventor, D. S. Lavaud, is the figure at the extreme right of the group

appointment. The metal did not spread evenly in the mold, which consisted of a cope and a drag. Another difficulty was the extraction of the casting from the mold. It was necessary to stop the machine, remove bolts, etc., in order to get a casting out. The time required had a prejudicial influence on the quality of the iron.

THE INVENTORS' EARLY EXPERIMENTS

The steps leading up to the perfection of this interesting process were related by the inventor as follows:

It was in Santos, State of Sao Paulo, Brazil, in 1914 that I started my first experiments, with the assistance of Fernando Arens, to cast pipe in a permanent rotary mold. In the beginning our disappointments were as numerous as they were disheartening. A perfect pipe seemed impossible; the metal did not spread evenly over the surface of the mold; the pipe was brittle as glass and had many defects.

We then decided to use a trough for introducing the metal into the inside of the mold and the result was more satisfying. The first machine was constructed to produce 4-in. pipe about 3 ft. long, but realizing the difficulties in producing such small pipe, we built a machine to produce 6-in. pipe 7 ft. long.

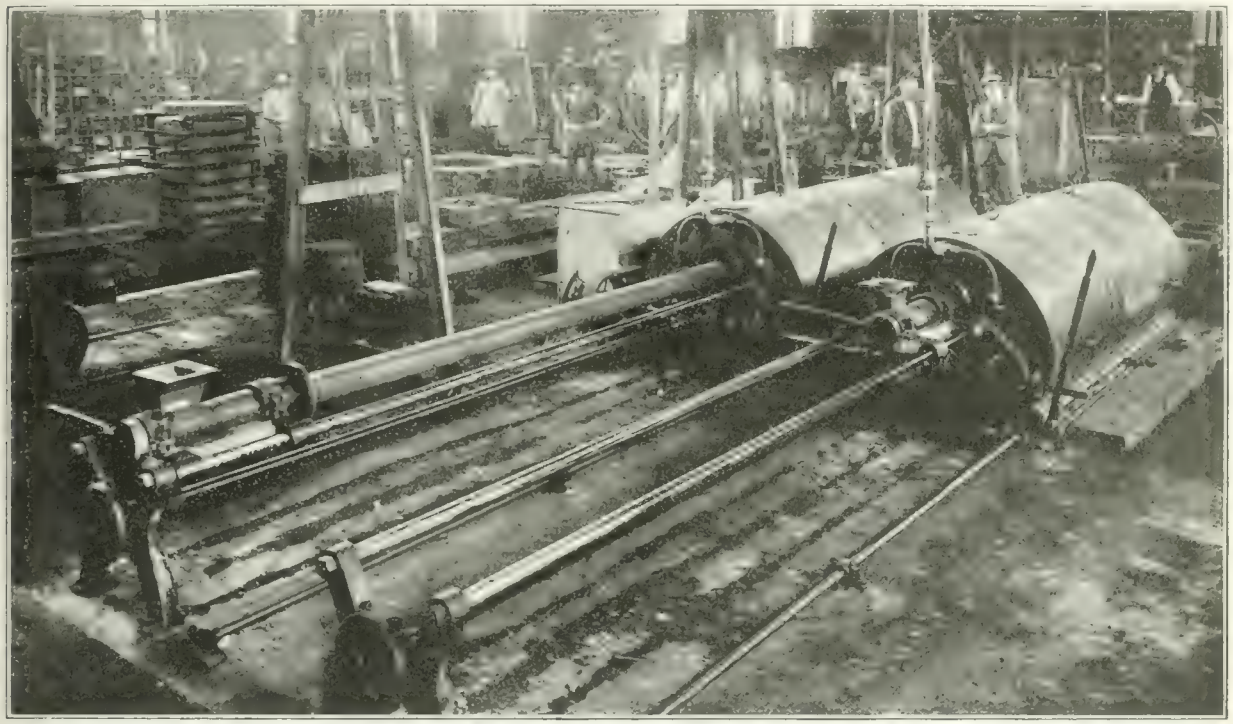
Because we did not know what would happen when casting 100 kg. (220 lb.) of metal under such conditions, we decided to heat the mold to about 600 deg. Fahr. It was impossible to extract the pipe from the mold, which was an iron bar with a 6-in. bore, because it required three minutes for the casting to decrease in diameter. It was then like glass, breaking easily under a hammer. The iron used was the ordinary metal used in foundry work. Three more attempts turned out likewise, with the extraction of the pipe more difficult each time until the fourth pipe could not be removed at all.

Though thoroughly discouraged, we later decided to make further trials and to use iron heated to a higher temperature and containing at least 2.50 per cent silicon. We did not heat the mold and Mr. Arens and myself had to pour the metal, as none of the foundrymen dared. Success attended this trial, for the pipe could be extracted almost immediately—5 to 10 seconds after. The pipe could not be broken with a light hammer, the metal was soft and could be easily machined. In casting the second pipe the mold had a temperature of 300 deg. Fahr. and the extraction of the pipe was now difficult and the metal harder. These conditions became aggravated until the fourth pipe was taken out only with the greatest difficulty and had the same defects observed when the early 4-in. pipe was made.

These attempts warranted the following conclusions as the basis of a successful operation of the process:

1. A permanent, rotary and cold mold.
2. Immediate extraction of the pipe after solidification.
3. The use of very hot iron.
4. A silicon content of 1.80 to 2.50 per cent.

The use of cold molds seems strange at first; but the metal is distributed in the interior of the mold over its entire length, just the same as water over a weir, and thus the cold permanent mold does not render impossible the even distribution of the metal.



Showing the Trough by Means of Which the Hot Iron is Introduced Into the Sensaud-Arens Centrifugal Casting Machines for Making 12-ft. 10-in. Pipe. It is another view of the 10-in. machine shown on the opposite page

THEORY OF THE PROCESS

According to Mr. Lavaud's theory, the metal falling in the cold mold will congeal at once, forming a solidified crust which creates a centripetal force; the pipe then detaches itself from the surface of the mold, and the space between the mold and the pipe becomes an insulating chamber, in which the air which is at a high temperature graduates the solidifying of the still molten mass and at the same time anneals the crust first formed. When the mold is at a temperature of 500 to 600 deg., the crust will not form and the whole mass of iron cools rapidly, with very slow contraction and consequent difficulty in removal.

The inventors found that the thickness of the walls of the mold could be greatly decreased. The great difference in the temperature of molds with thick walls subjects the metal in them to constant contraction and expansion, so that the internal surface splits increase with each casting made.

Any metal can be used in the construction of the mold. The final modification, as a result of extensive experiments, was the construction of a machine provided with a permanent rotary cold mold with ribs for cooling purposes, the cooling medium being an active water circulation. This is shown by the illustration at the head of this article indicating a

sectional plan of one of the early type of machines.

In the early stages of the development it is stated that only two casts per week for two hours at a time was the practice at the foundry, but from 18 to 22 6-in. pipes, averaging about 10 per hour, were made. This was continued for 5 months and the losses in that time, amounting to 15 to 20 pipe out of 800 cast, were caused by too cold a metal.

As a result of this experience the construction of seven machines was decided upon, two machines with interchangeable mold for pipes from 6 to 12-in. in diameter and 10 ft. long, and two machines with interchangeable molds for pipes 12-in. to 40-in. and 14-ft. long. The first machines were finished late in December, 1915, and the first pipes cast in January, 1916; all reported perfect and difficult to distinguish from steel pipe. Pipes with wall thickness of ⅛, ¼ and ⅜ in. were made with satisfactory results. The machines to make pipes up to 12-in. are used in connection with cupolas, while for the pipe over 12-in., metal direct from blast furnaces is employed in Brazil. One of the large machines was installed in February, 1916, and is successfully making 15-in. pipe 14 ft. long. It has been found that the larger the diameter of the pipe, the easier the process of manufacture.

The process of centrifugal casting is thus briefly described:

> The molten iron is brought to the machine and from graduated ladles is poured into the funnel at the end of the trough. The latter is then inserted in the revolving mold and turned 180 deg. when inside, so that the metal falls evenly on the whole length of the mold. The pipe leaves the machine a few seconds later, is placed on skids and rolled to the tar pit; it is then inspected as usual. No sand is used and cores and flasks are eliminated. The pipe walls, it is claimed, are of even thickness. The entire amount of metal entering the machine leaves it in the form of a pipe and there are no gates or excess to be removed.

The 4-in. machine at Buffalo is about 15 ft. long and 2½ ft. wide and located near a pit in which is a pump which furnishes water for the cooling as well as the propulsion of the mold itself. The capacity of this machine is 40 pipe per hour, 4 ft. long and 4 in. in diameter.

THE CHARACTER OF THE METAL

The question of the quality and structure of the iron from this process is important. Necessarily there is a decided contrast between the structure and condition of iron cast under such unusual conditions and that cast in sand molds where the cooling is much slower. The centrifugal action is also an important factor.

When casting by the new process in a rotary cold mold, the metal solidifies, say the inventors, probably in two to three seconds. This means that the segregation or separation of impurities is impossible, forming thus a completely homogeneous mass in which all the parts are equally distributed and the metal of a fine close grain. The pipe being removed immediately from the mold after solidification, the graphitic carbon does not change to combined carbon. That is, Mr. Lavaud holds that the quicker cooling prevents segregation and crystal growth and that the subsequent cooling after removal from the machine is of no influence in upsetting the favorable relations of the pipes' constituents, but at the same time insures a better metal.



Three Centrifugal Casting Machines Operating at Sao Paulo, Brazil, Each Machine Producing 20 Pipes per Hour, 5 ft. Long and 4 in. in Diameter. Each pipe weighs 20 kg. (44 lb.) with a wall thickness of 0.16 in.

To these claims for consideration should be added the effect of the action of the centrifugal force on the metal, which is asserted as compressing and expelling the air preventing gas holes and forming a more solid and denser metal. The strength of the metal in pipes from this process is reported as two to four times that of the same metal cast in sand molds and verified by official tests.

Metallographic examination of the metal in these new pipes has not yet been completed, but it doubtless will bring out soon interesting results and probably corroborate some or all of the claims made. It is expected that THE IRON AGE will be able to supply this later.

HYDRAULIC TESTS BY BRAZILIAN CITIES

Some interesting tests have been made on vari-



Position of Ladle When Pouring Blast-Furnace Metal at Esperanza, Brazil, Making 1? ft. 15-in. Pipe

ous sizes of this new pipe by the water works departments of two large cities in Brazil.

The Department of Water, Public Works of Rio de Janeiro, Brazil, under date of Oct. 23, 1915, certifies that three pipes, made by the Companhia Brasileira de Metallurgia and having bell and plain ends, weighing 66.6 kg. (146.5 lb.) each, with a diameter of 16 cm. (6.25 in.), a length of two meters (6.56 ft.) and a wall thickness of 16 mm. (0.24 in.) resisted an internal water pressure of 22 atmospheres (4851 lb. per sq. in.) without any signs of breaking open, being hammered with a hammer weighing 2 kg. (4.4 lb.) from one end to the other. No higher pressure could be applied because of the pump's capacity.

The Department of Water and Sewerage Works of Sao Paulo, Brazil, certifies to the following results of tests made on five pipes made by the Companhia Brasileira de Metallurgia, each two meters (6.56 ft.) long and 15 cm. (5.9 in.) in diameter:

One pipe having walls 7 mm. (0.28 in.) thick was tested at 40 atmospheres (5880 lb. per sq. in.).

One pipe having walls 6 mm. (0.24 in.) thick was tested at 50 atmospheres (7350 lb. per sq. in.)

One pipe having walls 6 mm. (0.24 in.) thick was tested at 45 atmospheres (6615 lb. per sq. in.).

One pipe having walls 5 mm. (0.20 in.) thick was tested at 50 atmospheres (7750 lb. per sq. in.).

One pipe having walls 7 mm. (0.28 in.) thick was tested at 50 atmospheres (7350 lb. per sq. in.)

In each case no signs of sweating or leakage were observed. Higher pressures were unobtainable because of the capacity of the pump.

Important claims as to the non-corrosive properties of pipe cast by the centrifugal process are made. The tests to which such pipe have been subjected are asserted to have demonstrated categorically that they are considerably less liable to rust than pipe cast in ordinary sand molds. No explanation is offered except that its compact consistency is believed to have some effect.

Corrosion tests on the centrifugal cast pipe were made last February by the chemical laboratory of the Department of Water and Sewerage Works of Sao Paulo, Brazil, and the following is taken from the official report of Feb. 26, 1916.

Three pipes were used, two of foreign make, 25 cm. (8.75 in.) in diameter and 10 cm. (3.9 in.) diameter respectively, the third being from the "Sensaud-Arens" process, 10 cm. (3.9 in.) in diameter. They were all submitted to the action of a diluted solution of chloride of sodium (Na Cl) containing 5 grams of nitrate of ammonia. In 30 hours the foreign made pipe was covered with a layer of rust while the centrifugal cast pipe after three days



Three Hours' Output of 8-ft. 6-in. Pipe from a Centrifugal Casting Machine in Brazil. Each pipe weighs 70 kg. (154 lb.) with a wall thickness of 0.24 in.

showed no signs of rust at all. They also resisted for another 48 hours the action of hydrochloric acid diluted one to three.

THE LIFE OF A MACHINE

As to the approximate life of one of these casting machines the inventors state that it is analogous to the life of a lathe and depends on the care with which it is handled. The only part subject to wear in the revolving cylinder or mold which will need replacing after 5000 to 10,000 pipes have been cast. The cost of this cylinder is regarded as insignificant, about $20 for one incorporated in a 5 ft. 4 in. machine.

The average yearly consumption of cast iron pipe in Brazil has been normally 150,000 to 200,000 tons. It was imported mainly from England. The new Sensaud-Arens centrifugal process is expected largely to supply this demand in the future.





Two Views of the Sensaud-Arens Centrifugal Casting Machine Recently Built at Buffalo, N. Y., for Casting 4-Ft. 4-In. Pipe for Exhibition in the United States

Jobbing Foundry Installs 2-Ton Furnace

Gas Traction Foundry Company, Minneapolis, Has Small Open-Hearth Furnace Besides Gray-Iron Foundry—Design and Performance

THE remarkable growth of the steel-casting industry scarcely needs further illustration to mark its impressiveness. In the districts of long established and diversified industrial activity, steel foundry operation, both as to the size of plant and the character of equipment, is thoroughly standardized; but in those fields where the iron and steel industry is still distinctly in a developing stage and installations have in them some elements of pioneering, new undertakings have a special interest.

Our middle northwestern states have been developed industriously through the exploitation of grain, lumber and mineral products. As a market for the manufacture of iron and steel products, this territory has only recently begun to grow. About six years ago the Gas Traction Foundry Company, Minneapolis, poured its first heat in a small gray-iron foundry. Its growth as a jobbing foundry has been accentuated by a specialization in tractor castings until the company now has a daily output of from 25 to 30 tons, almost entirely of this kind of work. But the expansion of the tractor industry has brought with it the substitution in numerous instances of steel castings for iron castings, in the construction of machines, and as a logical step the Gas Traction Foundry Company has just completed a steel foundry, housed in a new building 60 x 100 ft., adjoining its iron shop. This new foundry is interesting as being the only one in a wide territory using an open-hearth furnace as a steel-making unit, and is especially noteworthy in that its furnace is the second successfully operating 2-ton McLain-Carter type of small open-hearth.

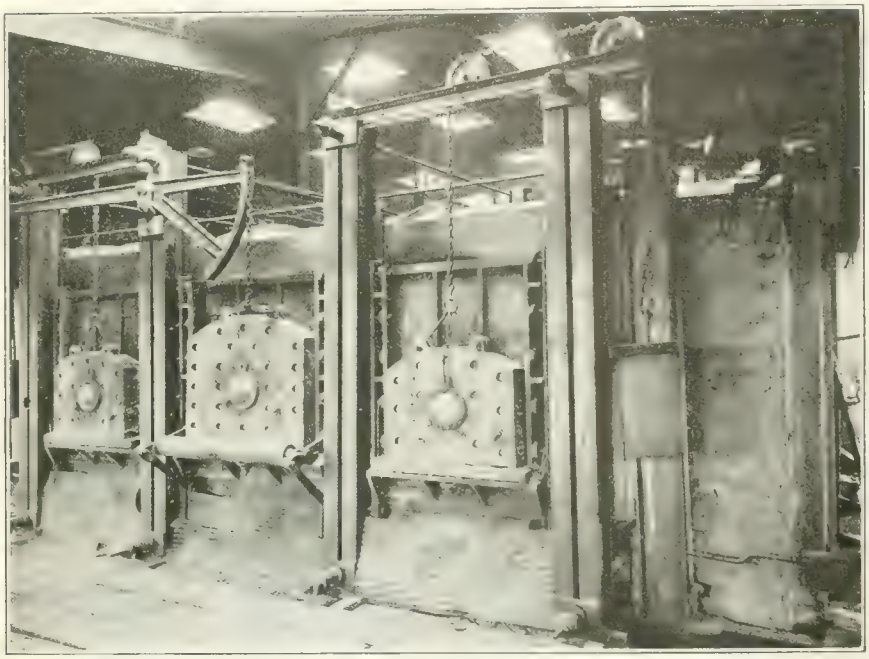


Fig. 1—Charging Side of the 2-Ton Open-Hearth Furnace Installed in the Gas Traction Foundry

This furnace is a duplicate of the first one installed in the plant of the Standard Crucible Steel Castings Company at Milwaukee. That one, since its first heat early in March of this year, has melted nearly 600 heats of metal at a rate averaging four to five daily. The Minneapolis furnace has not yet been called upon for a tonnage output requiring continuous operation,

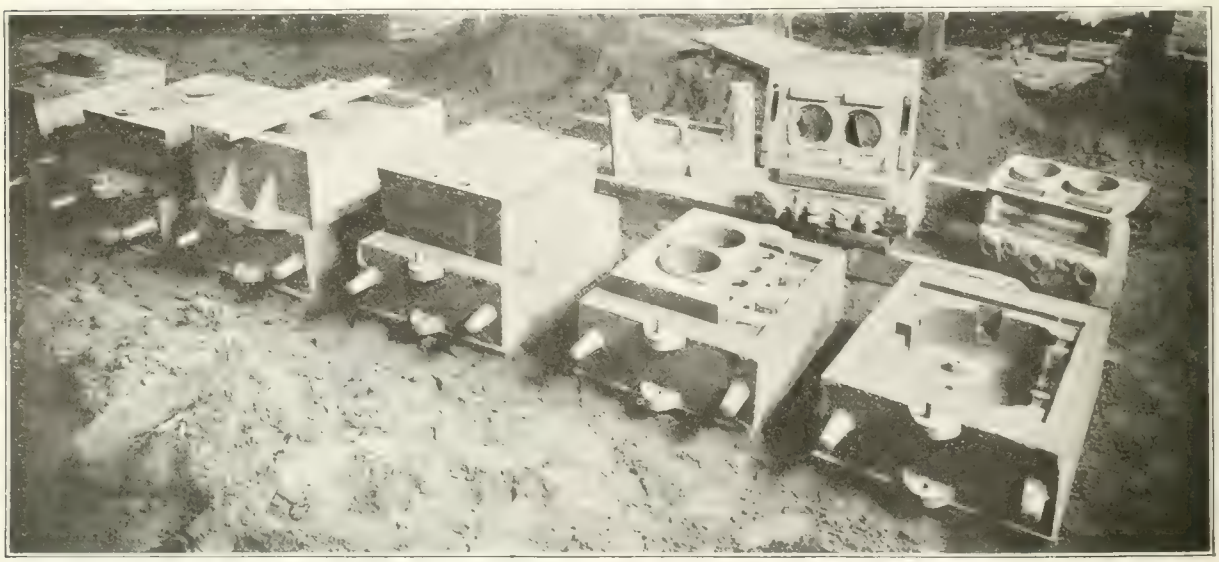


Fig. 2—Difficult Core Work in a Machine Molded Gas-Engine Cylinder Job

but since Aug. 1, when it was placed in service, two to three heats have been taken off daily.

Attempts to build open-hearth furnaces of small capacity have had but little success heretofore from the standpoint of economical production of steel. The experience in this direction is pretty well known, and the general cause of failure has arisen from the fact that the reduced areas within the smaller furnaces have subjected the lining and roof to direct flame and radiated heat action such as to break down the brick work very rapidly. The cost of relining and patching, and the interruption of operations as a result, have been the common reasons for failure. But the obvious desirability of a small melting unit in the steel foundry as attested by the wide use of the converter and the remarkable increase in the number of electric furnace installations, remained as an incentive to the design of a small open-hearth furnace, especially in view of the advantages of that type of furnace for steelmaking.

The essential consideration determining the design of the McLain-Carter type of furnace is the retention of furnace dimensions markedly in excess of the sizes as they would be, if reduced from the lines of a standard size furnace, in like proportion to the reduction in rated output. In consequence, this small furnace, rated to yield from 2 to 3 tons per heat, except for having a very shallow bath, has dimensions proportionate to a capacity at least double that at which the furnace is rated. Views of the charging and pouring sides of the Gas Traction Foundry Company's furnace are shown in the accompanying illustrations. It is a stationary type unit, the brick work being carried on I-beam girders resting on concrete piers and tied in with structural shapes in the manner indicated. It is oil-burning and the port construction is simple with easy access for cleaning. The furnace has an acid lining, which in the case of the installation at Milwaukee has served thus far for more than 580 heats without necessity of relining or unusual repairs in consequence of any internal action in the furnace.

Cross-sectional views of this small open hearth, in plan and elevation, are also here reproduced. The furnace is 35 ft. 4 in. long and 12 ft. wide. The furnace is an unusually rapid melter, the bath being obviously very shallow in view of the large ratio between the area of the furnace bed and the output, that relation being approximately 17 sq. ft. per ton of capacity, or about twice the ratio common to furnaces of larger size. The depth of the bath is 7 in., and the height to the roof arch 5 ft. The melting period from the time of charging cold scrap until the furnace is tapped is frequently as low as 1 hr. 40 min. and seldom exceeds 2 hr. A consumption of 50 gal. of oil per ton of steel melted is normal for regular operation of the furnace, and the furnace can be kept hot when not melting with an oil consumption 60 per cent less. On the basis of present prices of raw materials, these small fur-

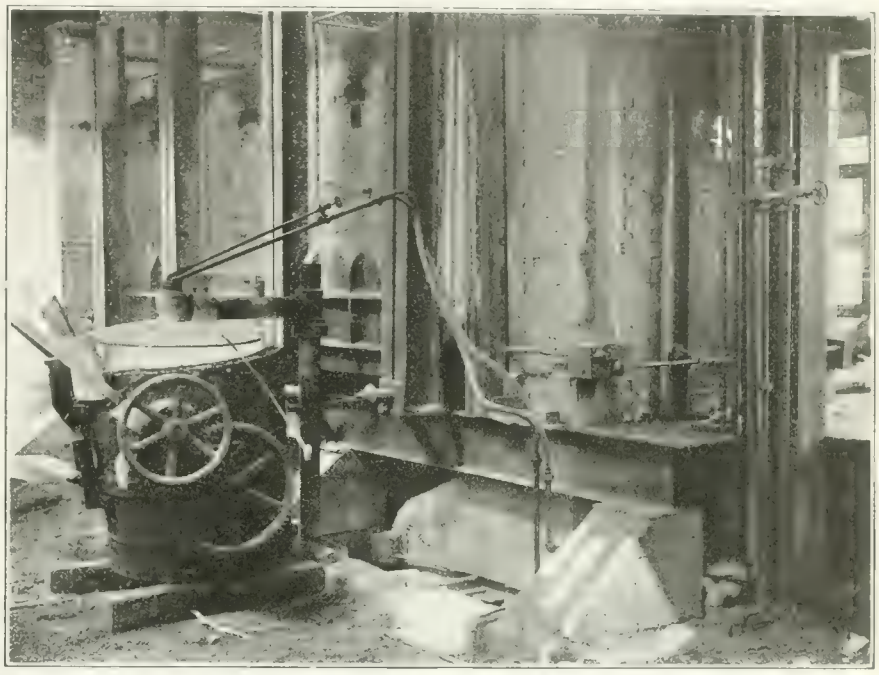


Fig. 3—Pouring Side of the Furnace, Showing Port at One End, Ladle and Oil-Burner Drying Arrangement

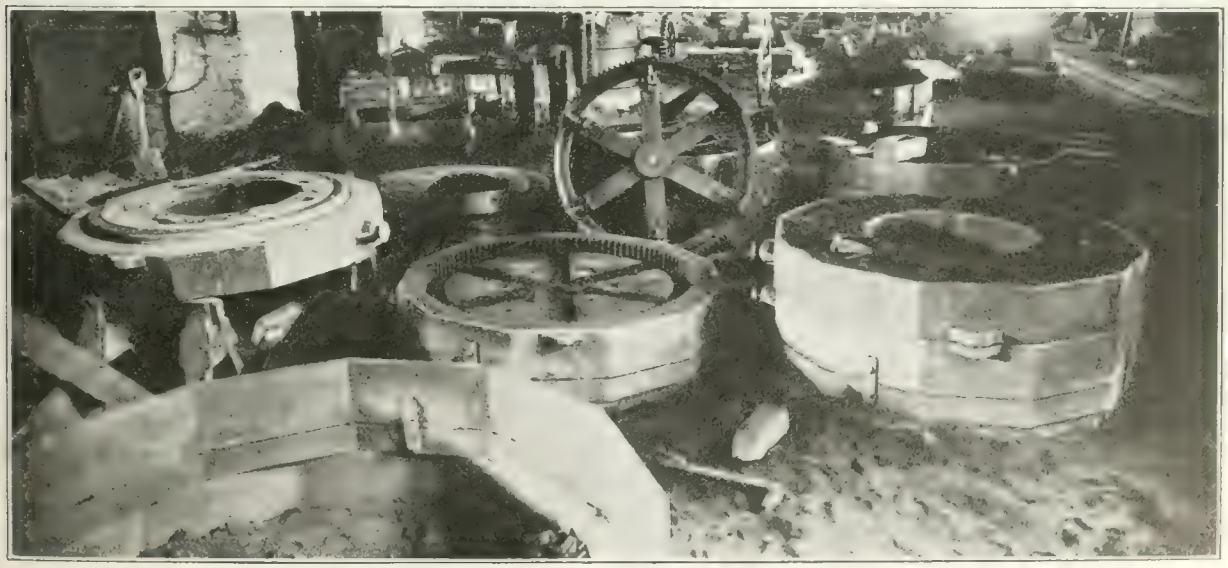


Fig. 4—Accurate Gear Molding in the Heavy Work Bay in the Foundry Foreground



Fig. 5—Typical Castings Poured from Steel Made in the 2-Ton Furnace

are almost entirely added in the furnace. When melting the ordinary charge of pig iron and scrap, a melting time of 45 min. ordinarily suffices, and so rapidly can the charge be poured that the addition of the ferroalloys can be made in the bath immediately preceding the pouring. In the case of titanium treatment, however, the ferrotitanium is added as the metal is poured into the ladle. A typical charge for the ordinary work, such as this foundry is making, consists of the following materials:

	Heat No. 1	Heat No. 2	Heat No. 3	Heat No. 4
Low phosphorus pig iron, lb.	630	680	600	650
Open-hearth scrap, lb.	1550	1700	1600	1550
Ferromanganese, lb.	15	15	15	15
Plate scrap, lb.	820	750	840	900
Ferrosilicon, lb.	20	20	20	20
Total, lb.	3035	3165	3075	3135

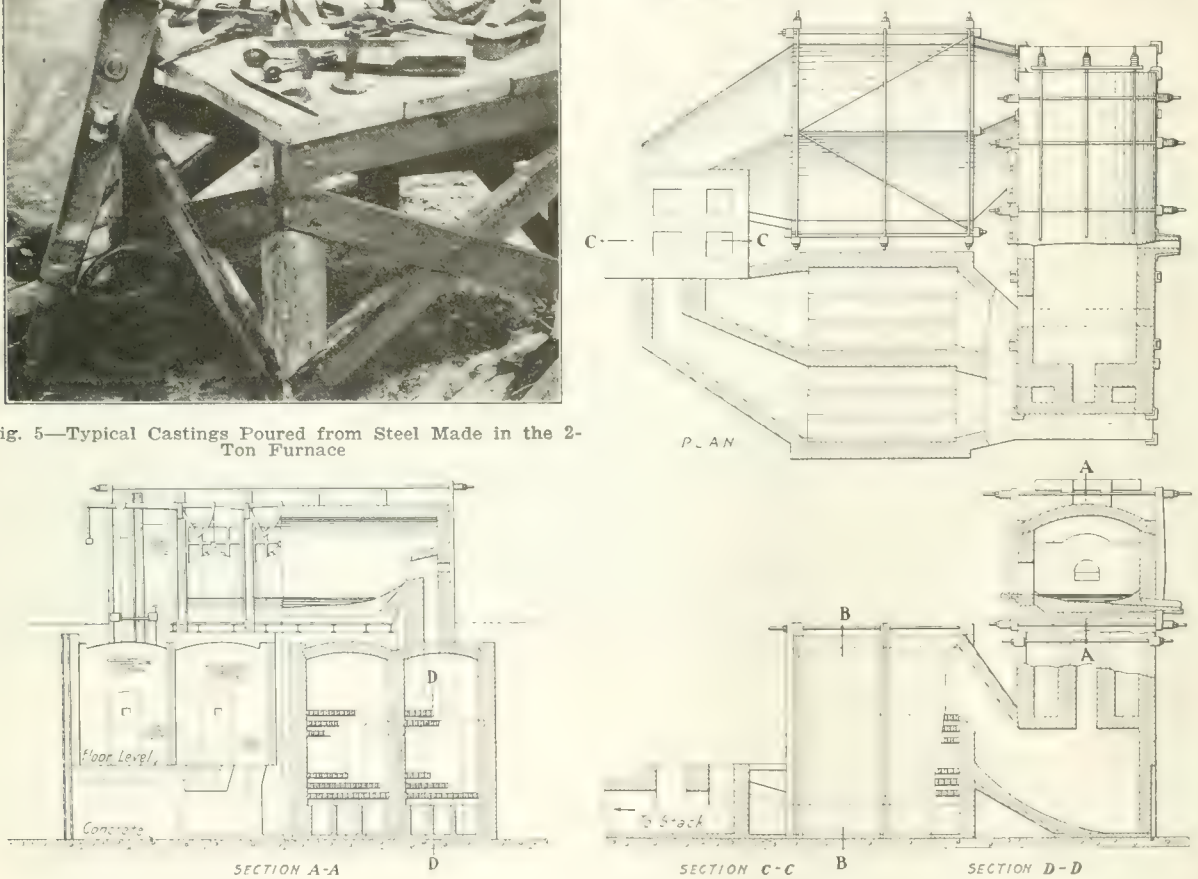


Fig. 6—Cross-Sectional Plan and Elevation of McLain-Carter Open-Hearth Furnace

naces are producing steel at a cost of less than $30 per ton.

The oil burners, which are of simple construction, to permit ready replacement if burned off, consist chiefly of a wrought steel pipe flattened at the tip. They are inserted at the ends of the furnace in the ordinary manner, burning at either end in alternation with the reversing periods of 15 to 20 min. In the design of the regenerative chambers and checker work, the same principle of liberal sizes is applied, these chambers having capacity ample for a much larger unit. An idea of their overall size may be gained from the fact that the concrete pit in which they are built has dimensions 25 ft. x 39 ft. 8 in. The gas value is of the ordinary water-sealed butterfly type with a special precaution against freezing of the water line secured by circulating the water through a coil in the jacket of the furnace stack. The stack has an inside diameter of 42 in. and is 85 ft. high.

The melting practice in this small furnace differs from that of larger units chiefly in the rapidity with which the stock is melted down, the shortening of the period of refining and the fact that ferroalloys

From charges of the above character heats of the following analyses have been regularly obtained:

	Per cent	Per cent
Carbon	0.18	0.235
Silicon	0.26	0.32
Sulphur	0.05	0.053
Phosphorus	0.035	0.035
Manganese	0.34	0.63

That the metal produced is of a satisfactory character for a wide range of castings is indicated from the illustration shown in Fig. 5, all of the pieces shown having been cast from the first several heats taken from the furnace. A very hot metal can be had when desired for thin sections and the furnace characteristics lend themselves to an easy control of the metal to supply all ordinary requirements of a varied class of castings. The hot metal from this furnace is handled as indicated in the view of the pouring side of the furnace in a bottom-pour ladle of approximately 6000 lb. capacity.

In the gray iron foundry the work ranges from small snap-flask jobs to castings weighing several hundred pounds. Typical of the work that this company is doing on squeezer molding machines is the cylinder job shown in Fig. 2. Specifications for this

cylinder require exact clearances, and the setting of the cores in the mold, of which there are 29, calls for exceptional accuracy. In the illustration there is shown, on the fourth mold at the right, a wood templet cheek which is located on the drag flash by means of the pins and from which the principal cores are centered. The mold is poured without a flask for the cope, the upper section of the mold being entirely in cores. Skim gates of the kind shown in illustration are used, the metal being trapped in the flat covers shown in place on one of the molds. A molder and helper put up 30 of these molds per day. The finished steel casting weighs 112 lb.

Some of the larger work cast is illustrated in Fig. 4, the piece being a gear for a tractor, the gear having a diameter of 4 ft. 6 in. and weighing 283 lb. It is required to be cast true within 3/32 in., the teeth of the gear to be clean and accurate so that no subsequent machining is necessary.

The designers of the 2-ton furnace are David McLain, Goldsmith Building, Milwaukee, and Frank Carter, now associated with the Gas Traction Foundry Company, Minneapolis.

Plant for Making Electric Vacuum Cleaners

Shop of Frantz Premier Company, Cleveland — Interesting Equipment Details — Foundry Methods for Making Difficult Aluminum Castings

ONE of the manufacturing industries that have developed rapidly during the past few years is the making of portable electric vacuum cleaners. One of the largest companies in this field is the Frantz Premier Company, Cleveland, which recently moved into a new four-story plant, 320 ft. long and 60 ft. wide, all of which is devoted to the manufacture of the cleaners. All of the metal parts, including the small motors that drive the suction fans, are made in this plant. A narrow wing extends from one side of the building, near the front, this to be a connection section when growth warrants the erection of another unit a duplicate in size of the present one. The toilet rooms are located at one side of this wing, and a wide aisle will provide for trucking between the floors of the adjoining buildings when the second unit is built.

Virtually as a part of this plant, but occupying an adjoining building, and operated by a different but allied company, the Premier Aluminum Foundry Company, is an aluminum and brass foundry. This makes the aluminum castings for the cleaner, which are the principal product of the foundry.

The manufacturing plant represents the modern type of factory construction. The building is of brick, steel, and reinforced-concrete fireproof con-

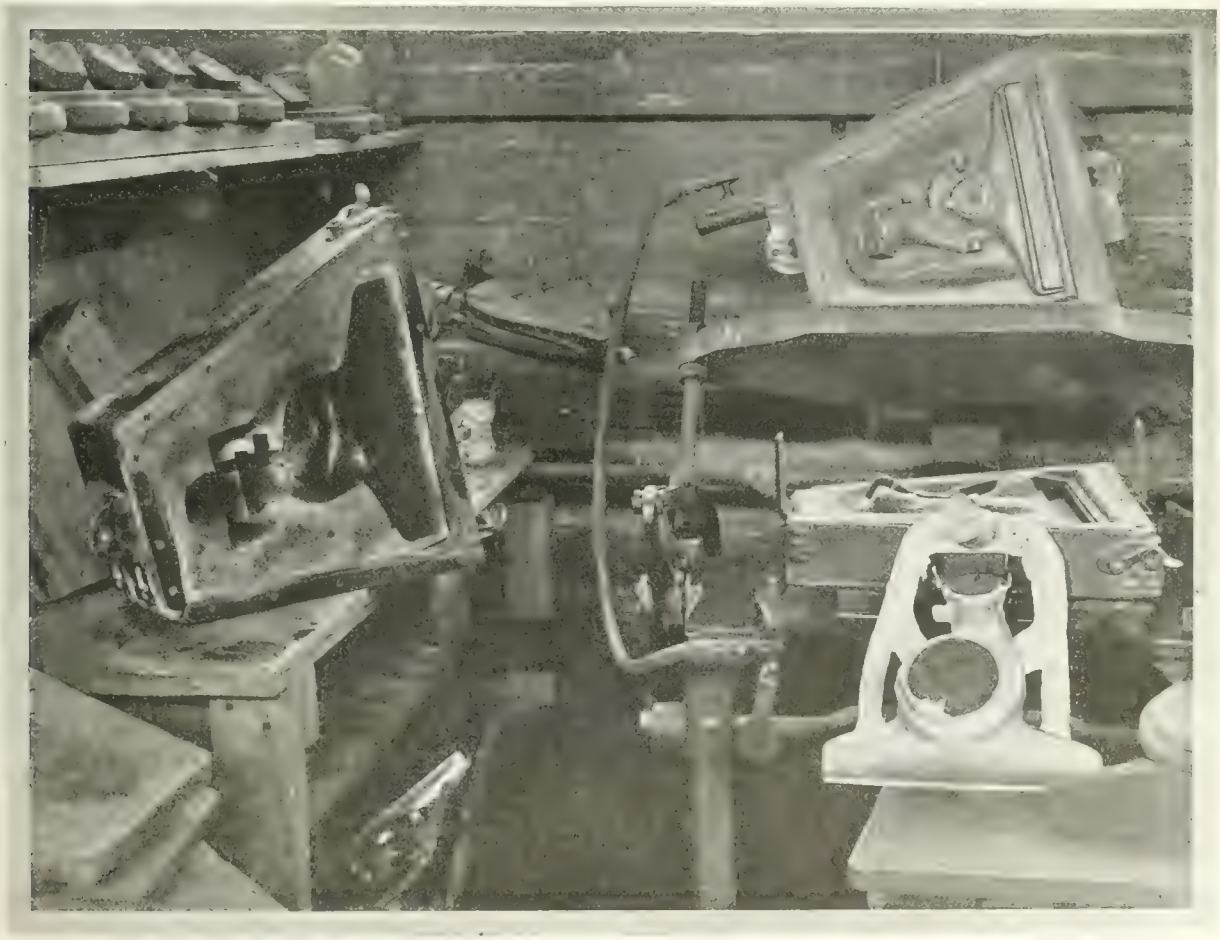


Fig. 1—The Bottom or Main Body Casting As It Comes from the Mold and Cope and Drag and Matched Plate Pattern. At the extreme lower right hand corner half of two large cores for this mold are shown

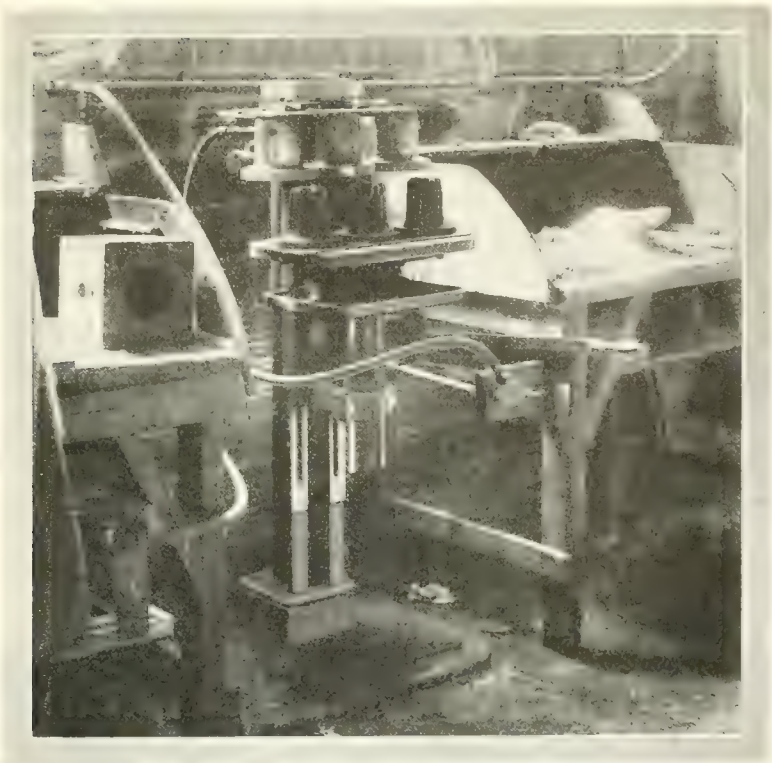


Fig. 2—Unique Core Drawing Machine Found Particularly Efficient in Drawing Long Cores. Mounted on the machine are three core boxes and motor cap cores requiring a 5-in. draw

struction, with an abundance of window surface on all sides, the window glass being fitted into steel sash. The plant is arranged to meet the special requirements of the industry and for the economical manufacture of the product; the various departments are laid out for the convenient routing of material in process of manufacture and assembling.

The various manufacturing processes require the use of considerable machinery and other equipment of varied character, including automatic machines, screw machines, punch presses, polishing and buffing machinery, electric welders, and baking ovens. Various improvements have recently been developed in some of the manufacturing processes to improve the product and cut down the cost of production. The Taylor system of management is being carried out in the plant, and operations are directed from the planning department on the second floor, adjoining the general offices.

Interesting methods are employed in the foundry making some of the aluminum castings. The three principal castings used in the cleaner comprise the bottom or main body part, which contains a nozzle that passes over the surface that is to be cleaned; the motor base, and the motor cap or case, the last a cylinder about 5 in. in diameter, rounded over at the enclosed end. There are several smaller castings used as parts of attachments. All molds are made with green sand and all cores with dry sand. The bottom casting is the most difficult to make, owing to its peculiar shape and thin section, being only 3/32 in. in thickness, and to the large cores required.

The mold for the bottom casting is made on Farwell 32-in. hand squeezers, in wooden snap flasks tapered from end to end to conform to the general outline of the mold, and thus to reduce the quantity



Fig. 3—Automatic and Screw Machine Department, Showing the Shafting and Counter-Shafting Placed Parallel to the Machines or at an Angle with the Building

of sand required. The flask is 16 in. long on two sides, 16½ in. on the third, and 8 in. on the side or end opposite the third. The cope is 5 in. in depth and the drag is 3½ in. deep. The pattern is a double match plate made of aluminum. After the mold is removed from the flask a tapered wooden jacket is placed around it. Formerly, much difficulty was experienced in producing these castings free from pin holes. This has been avoided by providing a more equal distribution of metal by having four gates instead of one, these gates being connected to one sprue hole and reaching the mold at the parting line, as shown in view of the method of molding.

Two large cores are required in making the bottom—a nozzle core and a fan core. The nozzle core is set in the mold, and the fan core rests on the nozzle core, on a 1½-in. print in the center and on the mold on one side. These cores are made by hand in bronze core boxes. Owing to the extreme thinness of the casting, much care is required to secure the proper shrinkage allowance for the core boxes. This shrinkage is insufficient in iron core boxes. For that reason bronze core boxes are used, the composition being 85 per cent copper and 15 per cent tin. The lasting qualities of these core boxes are indicated by the statement that one bronze core box can be used for making 40,000 cores.

The cores are drawn on a core-drawing machine that has been fitted up from an old drilling machine from which the head has been removed. A jaw is provided for holding the core box while the core is being drawn. The core-drawing device is said to have proved particularly efficient in drawing cores for the motor caps requiring a 5-in. straight draw, in which there are four small ribs. By mechanically drawing the core, no patching is required on the cores after drawing, and by eliminating patch-



Fig. 4—The Polishing and Buffing Department Has Such an Effective Exhaust System so That it is Not Necessary to Partition This Department from the Other Manufacturing Departments on the First Floor. One of the exhaust fans is shown suspended from the ceiling in the background

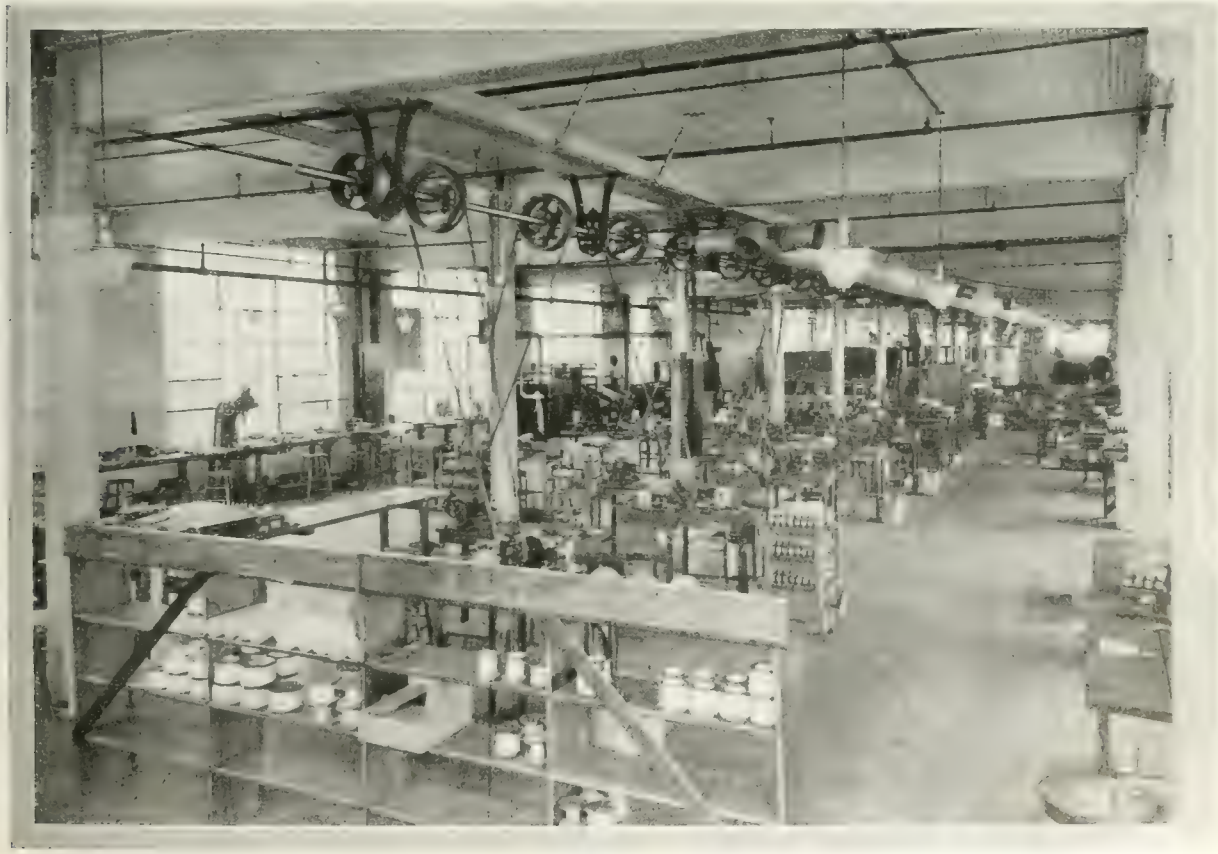


Fig. 5—Armature and Field Winding Department with Semi-Indirect Lighting. Location of open window sections for ventilation is shown and the electric baking oven appears along the wall at the left

ing the machine is said to save fully 50 per cent in the time of drawing cores.

Cast-iron driers are used for the bottom cores, and the other cores have a shape that requires the use of drier boxes. The cores are baked from 45 to 60 minutes.

The motor base and cap molds and smaller parts are made on an Arcade Modern roll-over pattern drawing and Osborn direct-draw roll-over jolt molding machines with brass patterns mounted on iron plates. Six motor caps are poured from one gate, one chill, to prevent cracking, being set at the top of the cap mold forming the hub where the metal is thicker. Miscellaneous small cores are made on a Hewlett-Demmler core machine, and this machine will be used shortly for making the larger cores for the bottom casting. The small core boxes are cast iron. The core sand is mixed by means of a Blystone core sand mixer.

The melting equipment includes seven gas-burning Buckeye pot furnaces with a capacity of 60, 80, 100 and 125 lb. per heat, the largest pots being used for aluminum and the smaller for brass.

The finished castings, after being cleaned, chipped and inspected at the foundry, are sent to the Cleaner Company's factory, where, after various machine operations, they are polished and buffed and are ready for assembling. The machining of the inside of the motor case is the most interesting machine work on the casing. In one setting the case is faced and four ribs on the inside of the case are drilled, the hole is drilled and reamed in the hub for the bronze bushing, and the bushing is pressed in with a turret tool and bored and reamed. These operations are performed on a Warner & Swasey turret lathe, at the rate of 40 an hour, the work being held during the various operations in a special automatic chuck.

The polishing and buffing department is so arranged that the work passes from one machine to another in regular order of operations, first to the rough polishing machines, then to the finished polishing machines, and finally to the buffing machines. Webster & Perks double-headed polishing machines are used. An interesting feature of the polishing department is that the exhaust system is so effective that it is not found necessary to partition this room off from the other departments, this occupying a section of the first floor near the machine shop. Two exhaust fans suspended from the ceiling on brackets are provided, one for the ten double end-polishing machine and the other for the buffing machine, each driven by a 20-hp. motor. The exhaust from each unit is carried out through the side wall and above the roof. The exhaust system is furnished by the Ohio Blower Company.

The fan of the vacuum cleaner, which was formerly a casting, is now made of steel stampings. It consists of a circular disk $4\frac{1}{2}$ in. in diameter, with a flange, and on the opposite side of this disk are attached seven $\frac{5}{8}$-in. blades, each of the blades being spot-welded to the body. Three weldings are used for each blade and seven weldings for the small reinforcing blade that is attached to the hub. The welding is done with a Toledo spot welder, and one operator can weld 500 fans in a day.

The handle arm or fork consists of two steel stampings spot-welded together, and the handle ferrule is spot-welded to the fork. The fans are spray painted by means of the Aeron System, equipment for which was furnished by the DeVilbiss Mfg. Company, Toledo, Ohio. After painting, the fans are baked in an electric oven.

An electrically heated oven has taken the place of the former steam-heated oven for baking varnish on armatures and for baking enameled and painted parts. These parts are baked for 11 hr. at a temperature of 185 deg. Fahr. In order to keep the air in the oven in circulation, thus providing an even temperature, a small fan is located at the side of the oven. This oven was furnished by the Young Brothers Company, Detroit.

An interesting feature of the automatic and screw-machine department is that the line and countershafting, instead of being parallel to the axis of the building, are placed parallel to the machines, or at an angle of 15 deg., thus eliminating twisted belts and belt troubles. Wagner B. W-type motors, located overhead, are used throughout the plant, and the machinery is driven in groups by 20, 10 and 5-hp. motors. The motors are equipped with the Sundh electric switch type of magnetic control, and the control of all the motors is from the switchboard in the planning department, which is the heart of the shop; and the motors are started and stopped by this department. If the motor is shut down through the day on account of a break it cannot be started except by the planning department, so this department cannot escape notification when something is wrong. A 20-hp. motor, with pulleys, is kept in reserve, to be placed in any desired location on the floor for use should any motor give out. It is stated that this motor can be located and put into operation within 15 min. and give the same pulley speed as the disabled motor did, so that men doing piecework will suffer no serious inconvenience.

The lighting of the plant represents up-to-date practice. All lighting is overhead, general lighting with lamps, mostly of 100-watts capacity, equipped with standard reflectors, so that no local lighting with drop cords to machines need be required. An unusual application is found in the semi-indirect lighting, which is seldom adopted for factory purposes because this lighting, to be satisfactory, requires white ceilings. The semi-indirect lighting is used in the armature-winding department, where the work calls for a uniform distribution of light and elimination of shadows, and it is found to be very satisfactory. Because of the nature of the work in this department, and the location of the plant at the outskirts of the city away from the large manufacturing center, the ceiling in this department can be kept white without frequent repainting.

A departure from the usual arrangement of open window sections is found in this plant. There are three continuous window sections between the curtain walls. The lower windows of the two outer sections and the upper windows of the center section are hinged, providing openings for ventilation both near the floor and close to the ceiling, and permitting a very free circulation of air during the warm weather when the windows are all open.

Youngstown Iron & Steel Company's Additions

The Youngstown Iron & Steel Company, Youngstown, Ohio, which but recently completed its steel plant containing three 75-ton open-hearth furnaces, illustrated in THE IRON AGE of Feb. 24, has decided to add at once another furnace of the same size, also one 4-hole soaking pit, a gas-producer plant, and a crane runway 80 x 400 ft. It will then have a monthly capacity of close to 20,000 tons of ingots. These will be rolled into sheet bars, to be used in the company's sheet and other finishing mills. These extensions will cost close to $500,000. When the gas-producer plant is finished the company will dispense with the use of natural gas. The Fort Pitt Bridge Works, Pittsburgh, has the contract for the structural steel, and the Culbertson Construction Company will do the excavating.

The Grönwall-Dixon Electric Furnace

Results in a Year's Operations in the Production of Special Alloy and Carbon Steel Billets—Cost and Electrical Data



THERE has been in successful operation in Detroit for over a year an electric steel furnace with which the electric steel industry of the United State as a whole is but little acquainted. It is now known as the Grönwall-Dixon electric melting and refining furnace, and is operated by the John A. Crowley Company of New York and Detroit.

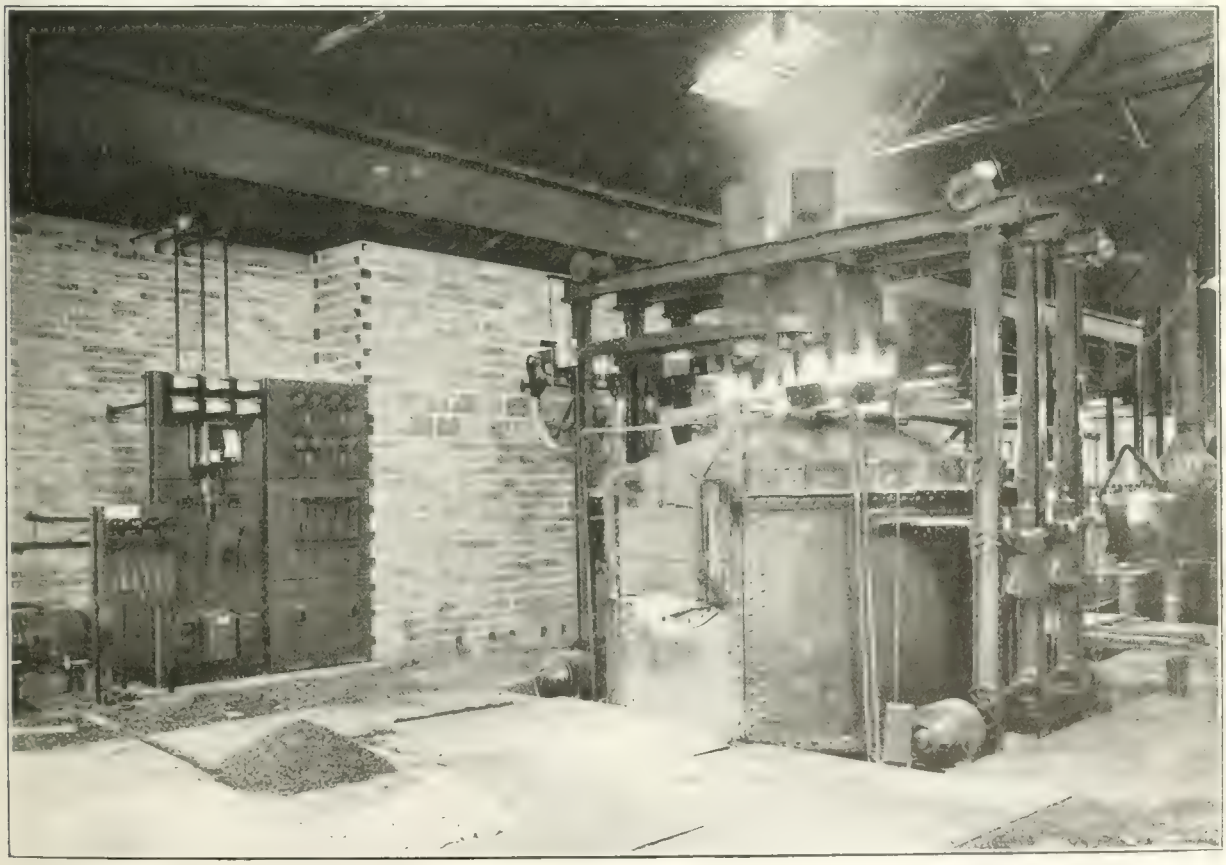
ORIGIN OF THE FURNACE.

When first introduced in this country, it was called the Grönwall furnace, but because of certain American patents secured by Joseph L. Dixon of the John A. Crowley Company the name was recently changed. While the Detroit installation is the only one commercially operating at present in this country, sales of several others have been arranged, and there were twelve in England and two in other countries operating or contracted for on Jan. 1, 1916, according to the review of the electrical steel industry published in THE IRON AGE of Jan. 6, 1916. But in Europe the furnace has been more familiarly known as the Electro-Metals furnace, as put out by the Electro-Metals Company, Ltd., of London, with which Mr. Dixon, a metallurgist and electrical engineer, was once associated. Essentially, however, the furnace is of Swedish invention.

Early in 1915 John A. Crowley, president of the company, returned from England after having concluded negotiations for the representation of the furnace in the United States and Canada. At that time it was better known here in connection with the ore smelting furnace of the same name used in smelting Swedish ores in Sweden. After careful investigation of a location arising from a decision to operate the furnace commercially in this country producing high-grade alloy and carbon steels, Detroit was selected. That city was regarded as offering the double advantage of a good market for the product of the furnace and a source of desirable and varied scrap.

Arrangements were concluded with the Railway Steel Spring Company, whereby at one end of its plant a 5-ton furnace was installed, with a provision that the billets of various steels be rolled into finished shapes by the same company. The first heat was taken out July 25, 1915, since which time there has been almost uninterrupted successful operation. On Aug. 18, 842 heats had been poured and incorporated into various sizes of billets.

The furnace at Detroit is cylindrical in shape. It is tilted by the usual worm-driven connecting rods operated by a motor drive through a reversing controller. The silica brick roof is constructed in a supporting steel ring made in halves, and is



The Grönwall-Dixon Electric Melting and Refining Furnace at Detroit as It Appears When Operating. Its Capacity Is 5 Tons



Pouring a 5-Ton Heat Into Bottom-Poured Ingots from the Grönwall-Dixon Installation at Detroit, Mich.

removable and replaceable by a spare one. Such a roof, it is stated, is capable of lasting 75 or more heats, but is usually replaced every two weeks. The assertion that a roof so constructed is weakened by the four holes for the electrodes is not borne out by experience, as after more than 50 heats it easily withstood the weight of two or three men.

THE ELECTRICAL ARRANGEMENTS

The furnace has two doors, front and back, the front being a combination pouring and charging door by using a removable spout. The use of two doors instead of three is considered an advantage. The electrodes are carried by an overhead support of beams, their weight being counterbalanced with a mechanical gearing for the control attached. An individual motor for each electrode operates this control, and they are energized through a system of contractors, located on the switchboard. The amount of current to be passed through each electrode can be set at a number of different steps by the operator, the current being so maintained by an automatic control. Indicating instruments for current and voltage in each electrode are also under the immediate observation of the operator. The operation of one to four furnaces can be readily watched by one melter and his assistant by locating all the levers for operating the switches on one panel.

This furnace differs from most of those operating at present in the United States, in that it uses two-phase current and four electrodes through the roof with a neutral one in the hearth. Though operating on a two-phase system, a three-phase supply is taken through two banks of transformers and changed to two-phase by a modified Scott three-phase to two-phase connection. Four vertical electrodes pass through the roof in furnaces of five or more tons capacity. In smaller ones, two such electrodes are recommended. The bottom electrode, which is of carbon and not of metal nor water-cooled, is protected from the molten metal by being imbedded under the hearth's lining.

The transformers are arranged so as to deliver a current of variable voltage. Each phase of the two-phase current is carried to a pair of the vertical electrodes, the bottom one being joined to the neutral point of the transformers, and hence called the neutral electrode. The two-phase current takes a perfectly balanced load from the three-phase supply mains.

The principal advantages claimed for the Grönwall-Dixon furnace are:

Ease with which a large power input can be used in melting down cold charges.

The facility with which the melted metal can be agitated when refining by the influence of the neutral electrode in creating a magnetic movement of the bath, insuring more complete mixing.

The arcs can be thrown in series by means of a special arrangement of switches, in which case the bottom electrode carries the unbalanced load; or when thrown in parallel the bottom electrode serves as a common return. Operation can also be conducted in several intermediate positions between series and parallel. For this arrangement it is urged that when melting on a cold charge or bottom when the resistance is high, rapidity of operation can be secured with the added economical advantage that large power input through a long arc of high voltage can be used without a waste of energy by passing large currents through the bottom.

Later this voltage can be reduced when refining, recarburizing, etc., by shortening the arc and thus decreasing decidedly the reflected heat on the walls and roof, which, of course, lowers the cost per ton of metal. Either the parallel or one of the modified connections is used with the short arc, the current passing through the bath to the bottom electrode; thus the proportion used is capable

of being varied to almost any extent. This electrical system affords power companies a desirable load, effecting a transformer efficiency of over 98 per cent, with the service mains and power station undisturbed by any serious surges, the minor ones that take place during melting being absorbed by the interlocking of the phases by the transformers. The power factor is reported as 90 to 95 per cent.

THE GRADES OF STEEL MADE.

All grades of scrap are used—from high sulphur and phosphorus bolts, nuts and plate to nickel and alloy steel turnings. The furnace operates basic and is continuous. The more than 900 heats already made have included high and low carbon nickel steels, chrome-nickel steels, chrome-vanadium steels and high silicon and high manganese steels as well as any grade of plain carbon steel.

The high and low carbon nickel steels average 3 to 3.50 per cent in nickel. The high and low carbon nickel-chrome steels have contained 0.25 to 0.35 per cent carbon for the low and 0.50 to 0.60 per cent carbon for the high, with the nickel about 1.50 per cent and the chromium about 0.75 to 1 per cent. The low carbon steels have been especially employed for case-hardening. The chrome-vanadium steels have been made to contain on the average about 1 per cent chromium and 0.18 per cent vanadium. Special variations from these have been supplied. Most of these steels are being consumed by automobile and aeroplane builders.

Each heat is reported to average from 4 to 5 hr., with an energy consumption of 550 to 600 kw. hr. per ton. Three hours is reported as the minimum under favorable conditions for some heats, averaging under 0.02 per cent sulphur and phosphorus with a consumption of only 460 kw.-hr. per ton.

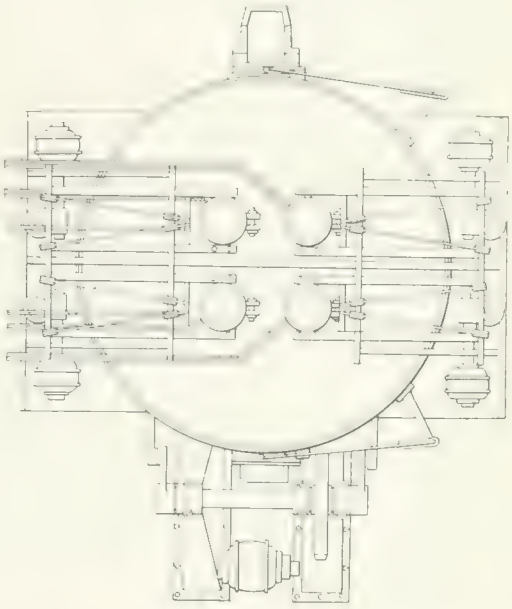
Most of the heats made have been to a carbon specification of 0.35 to 0.65 per cent carbon. This necessitates recarburizing, as well as the addition when required of the ferroalloys. The company has its own chemical laboratory, and it is the regular practice to hold special alloy heats until a satisfactory indication of the composition is obtained from the chemists so as to meet the exacting specifications.

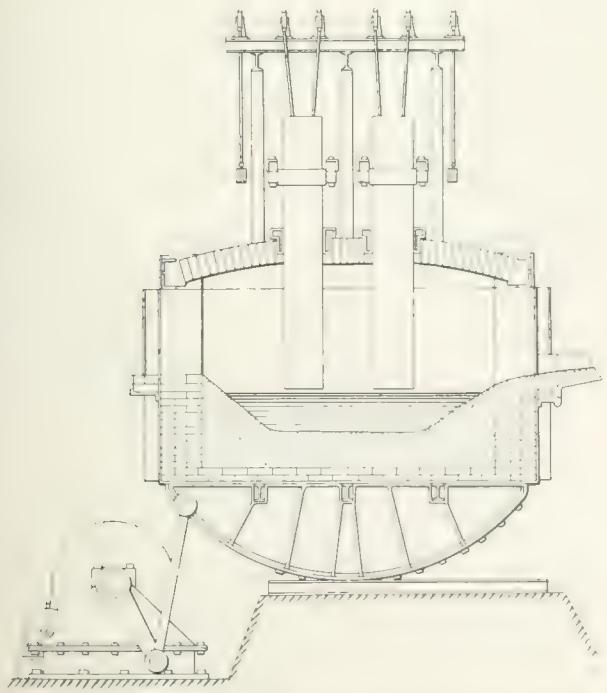
TREATING MANGANESE SCRAP AND CUPOLA METAL.

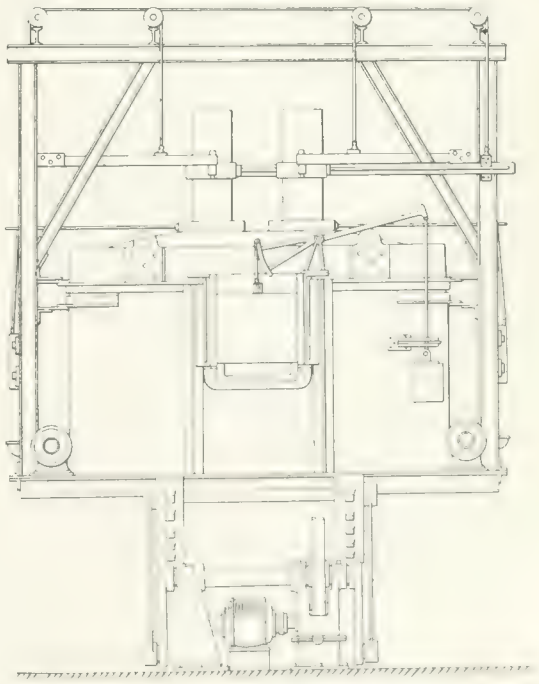
The advantage of the electric furnace in general and this one in particular was recently demonstrated by several very interesting experimental heats made for a company interested in reclaiming its high manganese steel scrap. The scrap, which showed a manganese content of 12 to 13 per cent, was charged alone into the furnace. After complete melting, samples revealed the fact that the average manganese loss was slightly less than 0.75 per cent, which is decidedly less than the company had ever been able to secure by any other furnace or process.

Still another interesting experiment carried out at Detroit, and which is regarded as suggesting a field for such a furnace, is the electric refining of cupola metal. Encouraging results were achieved somewhat as follows:

Fluid cupola metal of the following analysis was charged into the Grönwall-Dixon furnace:







Sections and Plan of a 10-Ton Gronwall-Dixon Electric Furnace, Showing Construction and Electrical Connections

	Per Cent		Per Cent
Carbon, combined	0.63	Manganese	0.73
Carbon, graphitic	2.65	Phosphorus	0.313
Silicon	1.980	Sulphur	0.044

The metal was refined in the usual way and from it a 1-in. square test bar was cast. Physical tests of this bar were as follows:

Supported on knife edges 12-in. apart, it sustained a load, applied in the middle, of 3050 lb. before breaking, the deflection being 0.215 in. The tensile strength was 27,570 lb. per sq. in. and the Brinell hardness 202.

This experiment is reported as a sample of many excellent ones. While thus far it has been only experimental, it is believed by the company that the commercial field is wide.

COST OF THE STEEL.

The cost of producing a ton of liquid alloy steel or steel castings, refined to 0.025 per cent or under of phosphorus and sulphur, based on a year's operation of this 5-ton furnace, is given as follows:

	Liquid Alloy Steel	Steel Castings
Electric energy, 550 kw.-hr. at 8c.	$4.40 (500 kw.-hr.)	$4.00
Electrodes, 20 lb., at 5½c. per lb.	1.10	1.10
Refractories	0.40	0.40
Alloys	0.61	0.61
Slag mixture:		
60 lb. lime per ton of steel		
6 lb. fluor spar per ton of steel	0.25	0.35
10 lb. of coal per ton of steel		
Scrap and iron	14.00	12.00
Skilled labor	0.70	0.60
Unskilled labor	0.30	0.12
Total	$21.76	$19.18

About 5 lb. of standard ferromanganese per ton of steel are found to be necessary to raise the steel from a minimum of 0.30 to 0.40 per cent manganese to the desired content. About 6 lb. of 50 per cent ferrosilicon per ton of steel are added to bring the steel to 0.15 per cent silicon. The estimated cost is 43c. for the manganese and 18c. for the silicon. Special alloys for special steel are extra.

The cost figures are based on the making of high-grade alloy steels to meet severe specifications, and it is emphasized that in producing steel castings these costs can be decidedly reduced because of no necessity to analyze the metal before tapping.

The experience of the operations thus far has demonstrated that it is unnecessary to use any deoxidizing agents, such as ferromanganese or ferrosilicon, except such as needed to meet specifications. It has been possible to add most of the desired alloys as scrap, or as soon as the charge was melted, and in some cases no manganese or silicon was at all necessary, demonstrating the non-oxidizing nature of the furnace operations. Absolute uniformity is reported as characterizing all steels made.

THE LIFE OF THE BOTTOM.

The duration of the original basic bottom is pointed to as noteworthy. It is still intact and in good condition after nearly thirteen months of constant use. This is attributed to the influence of the passage of the current through the hearth.

All ingots are bottom poured and weigh about 400 lbs. each. There has been very little evidence of segregation even in piped ingots, and there has been no difficulty in refining down to 0.01 per cent sulphur from a initial content of 0.10 per cent. These results are ascribed in part to the effect of the bottom electrode, which causes the current to pass through the metal, overcoming a tendency of the arcs to skim over the surface and causing an unusually high temperature. The same influence is claimed to have been responsible for the fact that there have thus far been no cold rings nor chilled bottoms in the furnace.

An interesting set of investigations is being conducted at present by the Detroit Edison Company of Detroit on certain electrical phenomena and other conditions arising from the application of electric current to such operations. In addition some special heats are being made of ferro-carbon-titanium-treated steel for incorporation in boiler tubes for use by the same company. The metallurgical phase of this is being investigated by the metallurgical department of the University of Michigan under Professor White.

The John A. Crowley Company has already completed plans for building a new plant of its own, situated in the western section of Detroit. It will have a 10-ton Grönwall-Dixon furnace, now under consideration, and all facilities for rolling its billets into desired shapes. Later the present 5-ton furnace will be removed to the new plant. A complete modern plant, capable of expansion, will be the result. It is the belief of the promoters of this furnace that the large electric furnace unit as a successful competitor with the open-hearth is a development to be confidently expected.

Engineering Service Plus Machine Building

(*Continued from page* 504)

to be made, some molds containing more than one. From these cards, on which the molder's finishing time is later recorded, the first information is then obtained for making up the daily heat report sheet. The remaining data are obtained when the castings have gone through the cleaning room, passed inspection and are ready for delivery. Here the weights and number of good castings are recorded. A copy of this heat report then goes to the foundry clerk.

The patterns when they are returned by the molder at the completion of the job are loaded on a large multiple shelf truck for return to the storage rooms. Before taking them back the pattern keeper checks each pattern against the heat report for shortages as the result of defective castings or miscount. Where a shortage in the number of castings is found a green tag is attached to the pattern and it is returned to the temporary storage shelves, where the foreman distributing the work can promptly send it out to the foundry, thus preventing an accumulation of shortages and a resultant delay in filling orders for the lack of a few pieces. In the case of both the white and the green pattern tags, a detachable coupon provides for the making of the necessary cores. From the heat sheets a further card index record, filed according to order numbers, is kept, each card showing a continuous record of the number of castings made each day against an order with the remainder still to come.

Powdered Coal Under Steam Boilers at Parsons, Kansas

What is believed to be the first large installation of pulverized-coal burning under a complete battery of stationary steam boilers has been in operation since Aug. 1 at the shops of the Missouri, Kansas & Texas Railroad, at Parsons, Kan. There are eight 250-hp. O'Brien water-tube boilers, and an evaporation of 10.7 lb. of water from and at 212 deg. Fahr. per pound of combustible was obtained, with 16 per cent carbon dioxide in the stacks. The plant was designed and installed by the Fuller Engineering Company, Allentown, Pa.

Foundrymen's Conventions at Cleveland

Iron, Steel and Non-Ferrous Foundry Meetings and Foundry and Machinery Exhibition Next Week



R. A. Bull, President, A. F. A.

FOUNDRY week this year will be held in Cleveland. It will begin Monday, Sept. 11, and close on Saturday, Sept. 16. As usual, the American Foundrymen's Association, devoted to iron and steel subjects, will hold joint sessions and also independent simultaneous sessions with the American Institute of Metals, the organization concerning itself with non-ferrous problems. This year, however, will mark for the first time the joint management by the two associations of the exhibition of foundry equipment and supplies and of machinery and accessories formerly conducted by an independent corporation. Another departure is noted in that the programs provide for one meeting per day, thus allowing better arrangements than formerly for the inspection of the exhibits and for the participation in plant visitations and entertainment features.

The technical program of the American Foundrymen's Association is announced as the most elaborate and complete in the history of that organization. It contains 40 papers and addresses and 11 committee reports. The completeness of the program of the American Institute of Metals is also noteworthy, containing 21 papers on brass foundry and rolling mill work. The number of contributions on iron and steel requires simultaneous sessions; on Thursday, on steel and malleable casting work, and on Friday, on gray iron and steel castings, and the program includes three symposiums, by four authors each, on the gating of castings, on the relation of the engineer to the foundry and on the manufacture of electric steel castings, respectively. Special emphasis is also placed on a new safety code for iron, steel and brass foundries to be presented. Special attention is also called to a report to come from the committee on foundry scrap, this aiming to put quotations on a uniform net ton basis in every important scrap center. The reclamation of waste foundry sand is to considered by several authors. Brass foundry practice will be discussed Wednesday morning; heat treatment, corrosion, etc., Thursday, and papers on physical tests, metallography, etc., are announced for Friday morning.



A. O. Backert, Secretary, A. F. A.



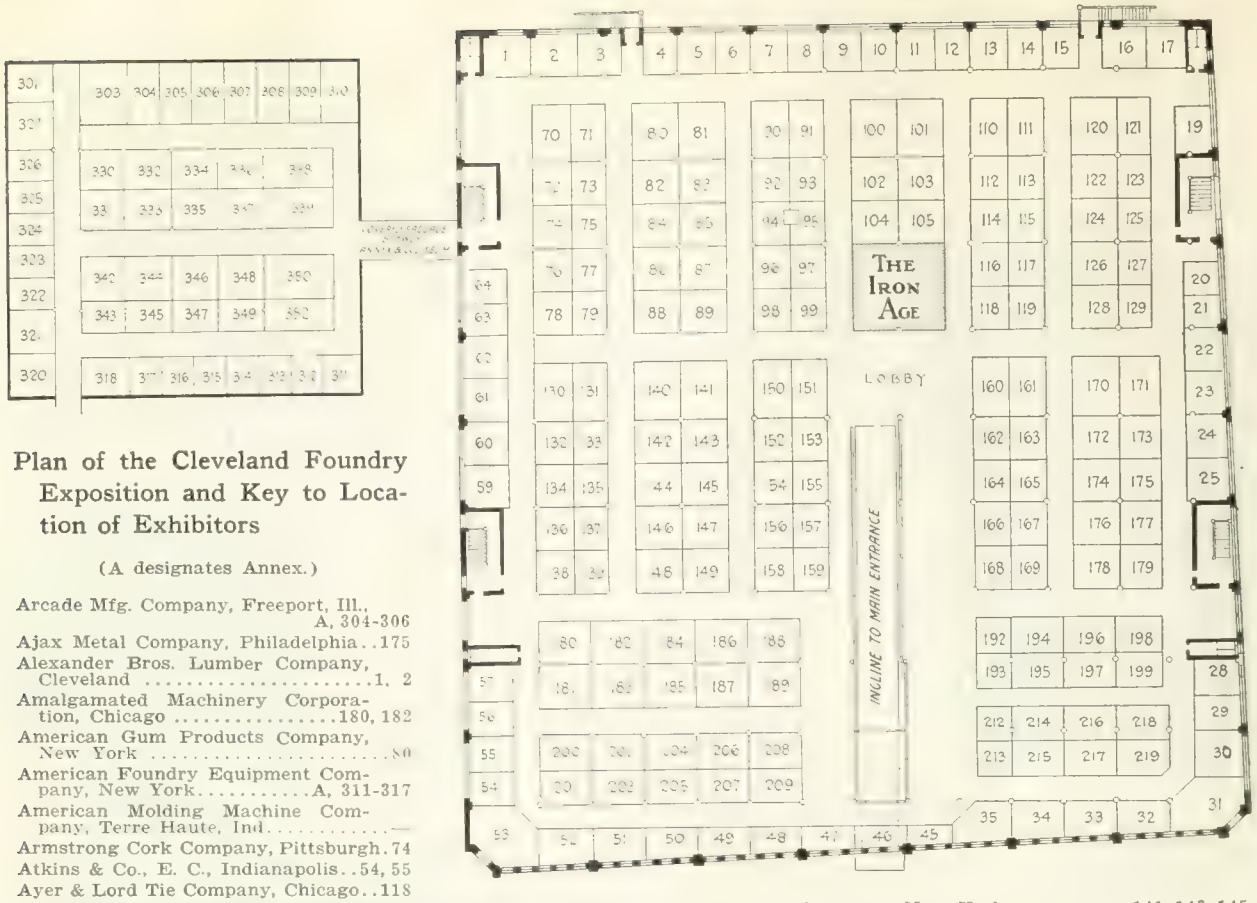
J. L. Jones, President, A. I. M.

Two buildings were required to provide space for the exhibitors. It was first intended to house the exhibition in the Coliseum on East Thirteenth Street near Euclid Avenue, but the 60,000 sq. ft. proved insufficient, and a temporary annex, affording 10,000 sq. ft. additional exhibition area, was built alongside the Coliseum, as indicated in the plan on the following page. There will be over 30 per cent more exhibitors than participated in the exhibition last year at Atlantic City, and there will be numerous operating exhibits.

Prior to 1906 individual manufacturers of foundry devices displayed their products in hotel rooms, but in that year a half dozen manufacturers in Cleveland and vicinity formed an organization for the conduct of an exhibition. Thus ten years later in the same city the organized method of showing the latest advances in the art is taken over by the associations on whose account it was instituted. In 1906, 42 companies made displays, though there were not that many booths; while this year there are upward of 130 exhibitors to whom space has been allotted. Meanwhile the associations themselves have gained in membership in the interval from some 300, this including the brass operators, to nearly 1000 to-day in the American Foundrymen's Association and close to 400 in the American Institute of Metals. The entertainment features are noted in the accompanying condensed program of foundry week. At the banquet, Thursday evening, Secretary of War Newton D. Baker and Irving Bacheller, the author, will be the speakers. Henry A. Carpenter, vice-president of the American Foundrymen's Association, will be toastmaster. Plant visitations will be limited to two days.



W. M. Corse, Secretary, A. I. M.



Plan of the Cleveland Foundry Exposition and Key to Location of Exhibitors

(A designates Annex.)

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Woodison Company, E. J., Detroit....100

Exhibitors and the Products Displayed

Alexander Bros. Lumber Company, pattern and flask lumber specialists, Cleveland, Ohio.—Represented by H. L. Spitler and M. F. Fitzgerald.

Ajax Metal Company, Philadelphia, Pa.—Ajax process ingot and babbitt metals. Represented by G. H. Clamer, C. F. Hopkins, F. M. Willeson, C. F. McRae and L. E. Purnell.

Amalgamated Machinery Corporation, Chicago, Ill.—Majolt, combination jolt squeezer, plain jolter, machine for making piston castings and a core jolter. Represented by E. H. Morgan, Charles Morgan, L. L. Munn, Henry Tscherning, R. E. Turnbull, August Christen and G. D. Wolfley.

Armstrong Cork Company, Pittsburgh, Pa.—Brick for insulation of furnaces and kindred high-temperature equipment, high-pressure covering for steam lines, boiler, and cork covering for service lines and building equipment. An electric furnace will be in operation to illustrate its insulating brick. Represented by E. C. Lloyd and P. W. Lamson.

E. C. Atkins & Company, Inc., Indianapolis, Ind.—Line of saws, including circular metal-cutting, metal-cutting band, hacksaw blades and frames, saw-fitting tools and friction disks. Demonstration of power hacksaw machine and hacksaw blades. Represented by Thomas H. Endicott, T. A. Carroll and A. Mertz.

Ayer & Lord Tie Company, Chicago, Ill.—Section of 3-in. interior creosoted wood block floor. Represented by A. H. Noyes, W. H. Blythe, F. W. Maechler, B. S. McConnell, S. C. Conway and R. C. Inslee

B. & B. Mfg. Company, Indianapolis, Ind.—Stationery chine for boring and finishing large high-explosive shells. Represented by N. A. Mears.

American Foundry Equipment Company and Sand Mixing Machine Company, Combined, New York.—New design self-propelled automatic sand cutter for cutting and tempering sand for floor molders where required; automatic sand blast tumbling barrels and rotary table sand blast room. Represented by H. L. Wadsworth, Hutton H. Haley, John B. Alexander, John Bradley, V. E. Minich and others.

American Gum Products Company, New York.—Samples of core binder and cores. Represented by G. I. Lindsay, W. E. Baird, J. F. Gaffney and R. H. Mills.

American Molding Machine Company, Terre Haute, Ind.

Arcade Mfg. Company, Freeport, Ill.—Power roll-over

Condensed Program of Foundry Week

Monday, Sept. 11

9:00 a. m.—Registration, mezzanine floor, Hotel Statler.

2:00 p. m.—Opening of the exhibition in the Coliseum and the Annex.

2:30 p. m.—JOINT OPENING SESSION, American Foundrymen's Association and American Institute of Metals, Hotel Statler.

Tuesday, Sept. 12

10:00 a. m.—JOINT SESSION, American Foundrymen's Association and American Institute of Metals.

3:00 p. m.—Ball game, Cleveland vs. Detroit, American League Park.

8:15 p. m.—Theater party.

Wednesday, Sept. 13

10:00 a. m.—PROFESSIONAL SESSION of the American Foundrymen's Association at the Hotel Statler, for the discussion of general topics.

10:00 a. m.—PROFESSIONAL SESSION, American Institute of Metals, Hotel Statler, for the discussion of foundry practice.

12:00 m.—Ladies' luncheon at the Hotel Statler.

1:00 p. m.—Inspection of the Cleveland Furnace Company's plant. Sight-seeing automobiles will make trips at 30-min. intervals from the Hotel Statler to the blast furnace plant.

2:00 p. m.—Ladies' sight-seeing automobile trip.

7:30 p. m.—Trip to Euclid Beach Park in special cars.

Thursday, Sept. 14

10:00 a. m.—STEEL SESSION, American Foundrymen's Association, Hotel Statler.

10:00 a. m.—MALLEABLE SESSION, American Foundrymen's Association, Hotel Statler.

10:00 a. m.—PROFESSIONAL SESSION of the American Institute of Metals, at the Hotel Statler, for the discussion of heat-treatment, corrosion, etc.

7:00 p. m.—Annual banquet, Hotel Statler.

Friday, Sept. 15

10:00 a. m.—GRAY-IRON SESSION, American Foundrymen's Association, Hotel Statler.

10:00 a. m.—STEEL SESSION, American Foundrymen's Association, Hotel Statler.

10:00 a. m.—PROFESSIONAL SESSION of the American Institute of Metals, at the Hotel Statler, for the discussion of physical tests, metallography, etc.

12:00 m.—FINAL BUSINESS SESSION, American Foundrymen's Association, Hotel Statler.

Saturday, Sept. 16

5:00 p. m.—Exhibition closes.

Plant visitation is limited to Thursday and Friday, Sept. 14 and 15

power squeezer with power unit; portable power squeezer with power unit and stationary hand power and squeezer machine of new design. Represented by the Cleveland Power Transmission Company.

Beighlee Electric Company, Inc., Cleveland, Ohio.—Indicating and recording pyrometer equipment of the compensating cold-junction type.

Berkshire Mfg. Company, Cleveland, Ohio.—Automatic molding machine, hand and air squeezer machines, jolt squeezer machines, vibrators, etc. Represented by W. A. Price, C. L. V. Evans, W. D. Fraser, F. Hulec and G. L. Cantell.

Charles H. Besly & Company, Chicago, Ill.—Pattern makers' disk grinding machine and disk grinding machine, both motor-driven; wide-face ring wheel grinding machine and vertical spindle disk grinding machine, both belt-driven. Also abrasive disks and various accessories for its equipment. Represented by Edward P. Welles, Charles A. Knill, Ralph W. Young, Leo E. Jacobs and George Klemp.

S. Birkenstein & Sons, Chicago, Ill.—Special metal products for brass and aluminum foundries and castings from them. Represented by Harry Birkenstein, Lee Kahn, M. Schero, H. Goldstein and Charles Raphael.

Blystone Mfg. Company, Cambridge Springs, Pa.—Low standard motor-driven ore sand mixers with screen attached and equipped with power dump. Represented by W. J. Pees and Luther G. Conroe.

Brown Hoisting Machinery Company, Cleveland, Ohio.—Tramrail equipment with switch, turntable, I-beam trolley and hoists; also overhead hand traveling crane with trolley and hoist. Represented by A. R. Leeds and F. D. Johnson.

Brown Specialty Machinery Company, Chicago, Ill.—Three styles of hammer core machines, electric duplex shaker, pneumatic duplex shaker, revolving barrel sand blast machine and three sizes of rotary table machines. Represented by John Laycock, J. E. Sweet and Elmer A. Rich, Jr.

Buckeye Products Company, Cincinnati, Ohio.

Carborundum Company, Niagara Falls, N. Y.—Carborundum and Aloxite wheels for foundry use, Carborundum fire sand and silicon metal. Represented by George R. Rayner, G. T. Eastabrook, W. U. Parrott, C. W. Bardon, W. Walters, C. D. Sargent, O. C. Dobson, J. P. McCann, T. B. Woodrow and C. E. Hawke.

Cataract Refining & Mfg. Company, Buffalo, N. Y.—Core oils and compounds, partings, cutting lubricants, compounds and oils, with samples of cores, castings, made with Cataract material, etc. Bolt machine will be operated using company's cutting lubricants. Represented by J. Purvis, Jr., J. E. Chism, E. P. Hughes, D. L. Baldsin, A. A. Schaefer, A. C. Breese, R. M. Hitch, W. E. Williams, F. N. Tweedy, E. H. Coburn, B. Deacon, C. W. Seibold, H. C. Newton, T. E. Kenefick and H. C. Hutchins.

Champion Foundry Machinery Company, Chicago, Ill.—Electric sand riddles in operation. Represented by H. O. Magnuson, William Magnuson and A. Magnuson.

Chicago Eye Shield Company, Chicago, Ill.—Safety goggles and lenses for eliminating violet rays. Represented by Robert Malcom aand Dr. Brennecke.

Chicago Pneumatic Tool Company, Chicago, Ill.—Pneumatic chipping hammers, rammers, hoists, compressors, drills, casting cleaners, electric drills and grinders. Represented by A. C. Andresen, T. D. Slingman, T. G. Smallwood, J. G. Osgood and others.

Cincinnati Pulley Machinery Company, Cincinnati, Ohio.—Three motor-driven machines in operation, two single-spindle and one two-spindle with pump and lubricant connection, three machines not in operation, two single-spindle and one single-spindle with power feed and round column. Represented by L. B. Patterson, J. G. Hoy, J. F. Murrelles and C. K. Cairns.

Charles J. Clark, Chicago, Ill.—Operating exhibit, showing use of Blast meter and line of instruments for measuring volume and pressure of blast to cupolas malleable and other industrial furnaces. Represented by Charles J. Clark.

Cleveland Blow Pipe & Mfg. Company, Cleveland, Ohio.—Dust collecting system for emery and grinding wheels, consisting of motor-driven exhaust fans, dust trap and piping; also sheet-metal shower bath installation. Edward Coney will represent the company.

Cleveland Pneumatic Tool Company, Cleveland, Ohio.—Air tools, including riveting and chipping hammers, drills, sand rammers, core breakers, valve grinders, air hose couplings, etc. A riveting hammer will be shown which embraces features not heretofore used in such hammers.

Cleveland Wire Spring Company, Cleveland, Ohio.—Steel barrels, boxes and waste cans. Represented by J. W. Campbell, C. H. Erickson, J. Marshall and C. C. Klingman.

Thomas E. Coale Lumber Company, Philadelphia, Pa.—Michigan soft cork white pine and display of California sugar pine pattern lumber. Represented by Thomas E. Coale, E. C. Anderson and A. Warren Anderson.

Curtis Pneumatic Machinery Company, New York.—Controlled splash oiling system air compressor with adjustable sight-feed cylinder lubricating feature, new type reciprocating vertical air hoist for washing and pickling operations, single I-beam crane for foundry and machine shop, closed hoppers sand blast, small compressors, single I-beam trolley and illustrations of representative installations and of devices not exhibited. Represented by L. C. Blake and the staff of the Charles E. Stamp Company.

Dalton Adding Machine Company, Cincinnati, Ohio.—Adding, listing and calculating machines, both hand and motor-driven. Represented by R. Lancaster Smith.

Davenport Machine & Foundry Company, foundry molding machines, Davenport, Iowa.—Represented by John T. Anderson and Carl Falk.

Davis-Bournonville Company, Jersey City, N. J.—Oxy-acetylene and oxy-hydrogen welding and cutting apparatus, with working exhibit, showing application in foundry work, general repairs and manufacturing. Represented by Hugh H. Dyar, William H. Joyce, Alex Blazer and Messrs. Lindholm and Gill.

William Demmler Bros., Kewanee, Ill.

Joseph Dixon Crucible Company, Jersey City, N. J.—Graphite products including crucibles, stoppers, nozzles, sleeves, phosphorizers, stirrers, foundry facings, etc. Represented by Dudley A. Johnson, H. C. Sorenson, F. R. Brandon and J. A. Biel.

Electric Controller & Mfg. Company, Cleveland, Ohio. Lantern slides of its products. Represented by F. R. Fishback and M. Converse.

Excelsior Tool & Machine Company, East St. Louis, Ill.—Polishing machines, one in operation on stove top, the other in operation polishing pipe; also polishing and buffing lathe in operation. Represented by T. F. Philippi and assistant.

Federal Foundry Supply Company, Cleveland, Ohio.—Jolt and squeeze machines, plain squeezers and line of jolt machines and foundry supplies. Represented by W. J. Adams, R. Ditty, E. Kaye, I. D. Adams, C. Collins, John Bayer and L. H. Heyl.

Felt & Tarrant Mfg. Company, Chicago, Ill.—Demonstration of controlled-key duplex comptometer adding and calculating machine as applied to book work, billing, estimating, pro-rating, cost calculations, etc. Represented by J. C. Nevins, W. F. Sims, J. G. Luniak, W. G. Resch and Miss Irma Urban.

Foundry Equipment Company, Cleveland, Ohio.—Stationary core ovens of roller drawer type, brass and aluminum furnaces, sprue cutters, squeezers, crucible lever lifters, core makers' benches and oil burners. Represented by Julius Tuteur, F. A. Coleman and C. A. Barnett.

Gardner Machine Company, Beloit, Wis.—Grinders in sizes ranging from 12-in. to 53-in., both belt and motor-driven; pattern-makers' disk grinders and ball bearing polishing lathes, several of which will be in operation; accessories and parts. Represented by L. W. Thompson, F. E. Gardner, W. B. Leishman, J. M. Gardner, E. L. Beisel, V. E. Breyley, W. L. Townsend and D. C. Graves.

General Electric Company, Schenectady, N. Y.—Line of control devices, switchboards, panels, motor and a 300-ampere portable arc-welding outfit. Represented by J. W. Ham, J. A. Seede, J. Eaton, R. E. Wooley, O. W. Buddington, L. W. Shugg, W. J. Hanley, G. E. Guy and J. A. Boers.

Gibb Instrument Company, Pittsburg, Pa.—I-Rite pyrometer. Represented by W. H. Gibb and J. R. Brueckner.

Gisholt Machine Company, Madison, Wis.—Display of the periodograph for obtaining time records in operation. Represented by Ellis F. Muther, W. J. Hannum, R. M. Carter, Howard E. Preston and Charles B. Carr.

Goldschmidt-Thermit Company, New York.—Line of carbon-free metals; 50 per cent ferrosilicon; samples of Thermit welds on heavy sections of wrought iron and steel, with illustrations covering the process adapted to repairs on steel mill equipment, and a line of Thermit and Titanium Thermit cans for use in foundry ladles. Demonstrations of pipe welding. Represented by D. B. Browne, H. G. Spilsbury, J. G. McCarty, H. D. Kelley and E. B. Bloom.

Gordon Sand Company, Conneaut, Ohio.—Reception booth. Represented by F. E. Gordon, H. E. Kanavel, W. R. Thompson and H. A. Keener.



WALTER WOOD
Vice-Pres. Am. Foundrymen's Asso.



H. E. FIELD
Vice-Pres. Am. Foundrymen's Asso.



H. A. CARPENTER
Vice-Pres. Am. Foundrymen's Asso.



H. B. SWAN
Vice-Pres. Am. Foundrymen's Asso



A. T. DRYSDALE
Vice-Pres. Am. Foundrymen's Asso.



S. B. CHADSEY
Vice-Pres. Am. Foundrymen's Asso.



W. A. JANSSEN
Vice-Pres. Am. Foundrymen's Asso

Members
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Association



Graceton Coke Company, Graceton, Pa.—Specimens of foundry coke.

Great Western Mfg. Company, Leavenworth, Kan.—Gyratory foundry riddle, gyratory foundry riddle with no-dump sieve for continuous riddling, and similar riddle with large sieve for contractors' use. Represented by F. A. Pickett and George W. Combs.

F. A. Hardy & Company, Chicago, Ill.—Safety devices, including eyeglasses, goggles, respirators and helmets. Represented by C. S. Wells and W. B. Gosman.

Benjamin Harris & Company, Chicago, Ill.—Various grades of ingot brass and castings made therefrom. Represented by L. Goldman, N. Harris and O. Harris.

Hauck Mfg. Company, Brooklyn, N. Y.—Compressed air and hand pump cupola lighters, skindrying outfits, kerosene torches, core oven burners, ladle heaters, rivet forges, blacksmith and brazing forge and aluminum melting furnaces. Represented by A. Busch Hauck and A. P. Link.

Hayward Company, New York.—An operating exhibit will be made of electric motor clam shell buckets. There will also be shown clam shell buckets of other types, orange peel buckets and drag scraper buckets. Representatives: H. S. Atkinson, production engineer; C. F. Hutchings and H. M. Davison, sales engineers.

Herman Pneumatic Machine Company, Zelienople, Pa.—Small type jarring machine. Represented by A. M. Frauenheim, H. T. Frauenheim, Alfred Herman, Robert Ringle, Andrew Rodgers, R. P. Morgan, Robert Walker and Thomas Kaveny.

Herold Bros. Company, Cleveland, Ohio.

Hill-Brunner Foundry Supply Company, Cincinnati, Ohio.—Reception booth. Represented by John Hill, Bruce Hill Fred J. Brunner.

Hill & Griffiths Company, Cincinnati, Ohio.

Hoevel Mfg. Corporation, New York.—Catalogs. Represented by H. F. Hoevel, F. W. Weiss and L. B. Passmore.

Holland Core Oil Company, Chicago, Ill.

Herman A. Holz, New York.—Portable apparatus for the determination of the Brinell hardness of metals and metal products, independent of their dimensions, shape, etc. Represented by William O. Little.

Imperial Brass Mfg. Company, Chicago, Ill.—Oxy-acetylene and oxy-hydrogen welding, cutting and decarbonizing equipment. Represented by F. McNellis, Charles E. Young, J. Meskan and J. F. Schroeter.

Ingersoll-Rand Company, New York.—Bench and floor types of pneumatic sand rammers, ½ to 5-ton air motor hoists, complete line of chipping, calking and scaling hammers, core breaker, pneumatic grinder, reversible and non-reversible drills, close-quarter drills, riveting hammers with and without safety retainer, jam-riveters, holder-ons for backing up rivets, chipping hammers, pneumatic core-breaking hammer, and 12 and 7½ x 12 duplex air compressor, short belt and motor-driven, in operation running exhibits of pneumatic machinery. Represented by W. A. Armstrong, George A. Gallinger, Walter A. Johnson, J. E. Kemmerling and George C. Williams.

International Molding Machine, Chicago, Ill.—Represented by Edward A. Pridmore, W. W. Miller, J. W. Dopp and F. W. Hamel.

Interstate Sand Company, Zanesville, Ohio.

Jamison Coal & Coke Company, Pittsburgh, Pa.

Jennison-Wright Company, Toledo, Ohio.—Samples of Kreolite wood blocks and structural timbers, showing types of floor blocks designed for machine shops, foundries, pickling rooms, annealing rooms, forge shops, driveways, loading platforms, etc. Represented by A. W. Cobley, H. G. Jennison, W. E. Wright, F. W. Cherrington, E. M. Humphrey and H. P. Consaul.

Charles C. Kawin, Chicago, Ill.—Represented by Charles C. Kawin, John J. Nellis, J. H. Hopp and R. J. Courtney.

Julius King Optical Company, Chicago, Ill.—Line of safety eye protectors, welding helmets and sand blast helmets. Represented by W. G. King, J. J. Duffy, A. G. Larson and Edmond Harold.

Lake Erie Smelting & Refining Company, Cleveland, Ohio.

Lakewood Engineering Company, Cleveland, Ohio.

H. M. Lane Company, Detroit, Michigan.—Represented by H. M. Lane and two others of the company.

Lehigh Coke Company, South Bethlehem, Pa.—Samples of foundry cokes and by-products and photographs of the company's plant. Represented by D. A. Barkley and Robert McDonald.

Lees Bradner Company, Cleveland, Ohio.

Life Saving Devices Company, Chicago, Ill.

Lincoln-Electric Company, Cleveland, Ohio.—A 300-amp. arc welder. Represented by Robert E. Kinkead.

Lucas Machine Tool Company, Cleveland, Ohio.—Special 50-ton power forcing press, adapted for straightening heavy malleable-iron castings. Represented by J. A. Leighton, Jr., and F. P. Sprague.

David Lupton's Sons Company, Philadelphia, Pa.—Steel sash of counter-balanced type and continuous sash with operating device; also photographs and drawings of applications to foundry lighting and ventilation with photographs of installations. Represented by Clarke P. Pond, C. F. P. Buckwalter and William Pfielder.

J. S. McCormick Company, Pittsburgh, Pa.—Pan grinder and mixer, gyratory motor-driven riddle, core oven plates and foundry supplies and facings. Represented by J. S. McCormick, T. E. Malone, S. R. Costley and A. T. Richardson.

MacLeod Company, Cincinnati, Ohio.—Sand blast barrels, sand blast machine, dust arrester, portable oil burners and oxy-acetylene welding and cutting apparatus. Represented by Walter MacLeod, O. P. Gwinner and Gus Schmidt.

Mahr Mfg. Company, Minneapolis, Minn.—Portable foundry torches and portable oil-burning rivet forge. Represented by J. A. Mahr, F. N. Brooker and F. A. Davis.

Malleable Iron Fittings Company, Branford, Conn.—Line of vibrators from ⅜ in. to 2 in., new line of valves, fittings and clamps for attaching vibrators to molding machines. Represented by G. B. Pickop and J. C. Page.

Manitowoc Electric Implement Company, Manitowoc, Wis.—Electric vibrators for alternating current and direct current. Represented by Frank Brixius and Rude Stockinger.

Michigan Smelting & Refining Company, Detroit, Mich.—Specimens of ingot brass and finished brass products, non-ferrous ingot metals and samples of lead pipe, solders, babbitt metals, etc. Represented by Joseph Sillman, C. O. Patch, Henry Levitt, A. J. Hall, W. J. Schweitzer, A. J. Oates, H. D. LeBel, J. D. LeBel, H. E. Berliner, R. H. Evans and G. W. Larissy.

Midland Machine Company, Detroit, Mich.—Jolt roll-over pattern drawing machine with special car for taking molds out on floor, and hand roll-over machine. Represented by G. L. Grimes, E. L. Grimes, L. V. Grimes and C. J. Skeffington.

Moldar Company, Maspeth, N. Y.—Roller-ramming and molding machines and sand-handling appliance. Represented by George M. Etzel.

Moltrup Steel Products Company, Beaver Falls, Pa.—Line of steel pattern plates, including plates with pattern mounted, finished machine keys, cold-drawn steel bars and finished machine racks. Represented by F. H. Guppy and N. S. Leyda.

Monarch Engineering & Mfg. Company, Baltimore, Md.—Battery of core ovens of various types with oil, gas, coal or coke as fuel; stationary oil furnace, tilting oil furnace, tilting coke furnace; also single and double chamber furnaces for use without crucibles. Represented by H. D. Harvey, James J. Allen, W. Raber and F. Maujean.

Mott Sand Blast Mfg. Company, New York—New type round table machine using direct pressure in blasting operation and arranged with vibrating separator for recovering abrasive material; direct-pressure sand blast barrels equipped with same recovery apparatus; cabinet for cleaning small tools; exhausters; dust collectors; standard direct-pressure hose machines and full line of accessories. Represented by E. J. Rosenthal, David Mayer, Foster J. Hull, Charles T. Bird, E. C. Gilmour, George D. Flether and Louis Schroeder.

Multi-Metal Separating Screen Company, New York—Respirators, sand blast helmets, dust hoods, babbitting masks and acid masks. Represented by Frederick Stern.

E. H. Mumford Company, Elizabeth, N. J.—Combination jolt and squeeze ramming split-pattern machines, low and high trunnion jolt squeezers, plain squeezers, plain split-pattern machines and jolt rammers. Represented by T. J. Mumford and H. W. Sinclair.

Mumford Molding Machine Company, Chicago, Ill.—High trunnion squeezer (10-in.). Represented by James T. Lee, Donald Alexander, Otto F. Weiss, D. M. Whyte, L. R. Palmer and Arthur F. Jensen.

National Engineering Company, Chicago, Ill.—Intensive pan mill 6-ft. diameter foundry mixer in operation. Represented by P. L. Simpson.

New Haven Sand-Blast Company, New Haven, Conn.—Sand blast rolling barrel, several hose type machines and other accessories. Represented by C. E. Billings, C. S. Johnson and Charles A. Dreisbach.

Norma Company of America, New York—Line of precision ball, roller, thrust and combination bearings, arranged to illustrate the mounting of bearings and assembly of parts. Represented by E. A. Perkins and O. P. Wilson.

Norton Company, Worcester, Mass.—Grinding wheels for foundries of bench and floor types, showing new style protection and dust hoods; one machine in operation.

A. F. A. Committee on Exhibits



MAJ. JOS. T. SPEER



ALFRED E. HOWELL



C. E. HOYT



J. P. PERO



H. S. COVEY



S. T. JOHNSTON



V. E. MINICH

Mr. Hoyt, Lewis Institute, Chicago, is exhibition manager of the American Foundrymen's Association, in charge of the Cleveland exposition.

Maj. Speer, Pittsburgh Valve Foundry & Construction Company, Pittsburgh, and former president of the American Foundrymen's Association.

Mr. Howell, Phillips & Buttorff Mfg. Company, Nashville, Tenn., and former president of the American Foundrymen's Association.

Mr. Pero, Missouri Malleable Iron Company, East St. Louis, Ill., and senior vice-president of the American Foundrymen's Association.

Mr. Covey, Cleveland Pneumatic Tool Company, Cleveland.

Mr. Johnston, S. Obermayer Company, Chicago.

Mr. Minich, Sand Mixing Machine Company, New York.

Represented by Carl F Dietz, A R Sandine and R O Anderson.

S. Obermayer Company, Chicago, Ill.—New type molding machine. Represented by S. T. Johnston, E. D. Fronman, J. E. Evans, O. C. Olson, F. H. Dodge, William Fenton, O. J. Peterson, C. M. Barker and William Fitzpatrick.

Oliver Machinery Company, Grand Rapids, Mich.—Universal wood milling machine, new ball-bearing jointer with safety features; universal saw bench with guards; vertical spindle and disk sander with ball bearings and single-pulley motor drive; 16-in. motor-driven heavy-duty engine lathe; 14-in. heavy-duty turret lathe and 1½-in screw machine. Represented by A S Kalagian, R. F. Baldwin, M. D. Baldwin, Arthur Blake, J. R. Duthie, T J Piers and Herbert Walsh

Osborn Mfg. Company, Cleveland, Ohio—Roll-over jolts, stripping-plate jolts, split-pattern machines, air squeezers, stripping-plate machines, plain jolts and standard type molding machines. Represented by H. R. Atwater, E. T. Doddridge, M. W. Zeman, J. C. Alberts, E. W. Jacobi, A J. Goss and others

Oxweld Acetylene Company, Chicago, Ill.—Demonstration of oxy-acetylene welding and cutting equipment. Represented by E. E. Radcliffe

Pangborn Corporation, Hagerstown, Md.

J. W. Paxon Company, Philadelphia, Pa.—Paxon-Colliau cupola showing the Zippler tuyereage system, also samples of molding and core sands. Represented by H M Boughel, F J Zippler and I F Kremer

Phoenix Mfg. Company, Eau Claire, Wis.

Philadelphia Bourse, Philadelphia, Pa.—Represented by L. R. Duffield, who will be prepared to give information concerning the machinery exhibition and salesroom of the Philadelphia Bourse.

Pickands, Brown & Co., Chicago, Ill.—Solvay coke in foundry and crushed sizes. Bow and forward portions of Commodore Perry's flagship Lawrence, built almost entirely of coke. Represented by George A. T. Long, B. T. Bacon, E A Bateman, A B Hawes J A Gallagan T. W. Glasscot and F. T. Lowering.

Pittsburgh Crushed Steel Company, Pittsburgh, Pa.—Samples of angular grit for sand blast machines and of concrete hardener and facing. Represented by G. H. Kain.

Portage Silica Company, Youngstown, Ohio—Photographs of the company's plant and quarry, specimens of natural rock, samples of steel molding and core sands and sand blast sands. Represented by E. E. Klooz, C. M. Bixler and L. R. Farrell.

Prest-O-Lite Company, Indianapolis, Ind.—Demonstration of uses of oxy-acetylene welding and cutting apparatus in foundry work. Specimens of risers cut from steel castings. S. M. Paxton, Cleveland branch manager, in charge. H. E. Komitc, director of sales, and H. S. Smith, engineer, in attendance.

Henry E. Pridmore, Inc., Chicago, Ill.—Line of molding machines, power squeezers, power rock-over drop and combination jarring machines with new features. Represented by Mrs. Henry E. Pridmore, Harry A. Pridmore, Charles H. Ellis, D. F. Eagan and A. V. Magnuson.

Pyrotectite Company, Chicago, Ill.

Robeson Process Company, New York—Specimens of cores, photographs and samples of glutrin. Represented by George N. Moore, T. J. Ryan and R. S. Hughes.

Rogers, Brown & Company, Cincinnati, Ohio—Complete exhibit of pig-iron samples, showing influence of various chemical elements in pig iron; also collection of unusual castings. Represented by Standish Meacham, L. C. Calkins, F. J. Waldo, A. F. Stengel, W. T. Shepard, J C. Mears, J. R. Morehead, T. A. Wilson, S. W. Hubbard, Harwood Wilson, A. J. Wentworth, W. H. Knight, F W. Miller, F. W. Bauer, R. W. Clark, Cecil E. Bertie and H. W. Fernald.

Searchlight Company, Chicago, Ill.—Demonstrations of oxy-acetylene welding and cutting equipment, and compressed acetylene gas. Represented by R. A. Sossong, H. L. Jillson and P. A. North.

Sipp Machine Company, Paterson, N. J.—Motor-driven single-spindle sensitive drill press; one four-spindle drill press, and universal table drilling machine. Represented by C A. Widmer.

W. W. Sly Mfg. Company, Cleveland, Ohio—Cleaning mill, resin mill, sand blast mills with dust arrester, core oven, rotary table and photographs. Represented by W. C. Sly, George J. Fanner, R. J. Emerich and P. W Graue.

Smith Facing & Supply Company, Cleveland, Ohio—Display of the company's products. Represented by J. S. Smith, George W Fleig and Ray Fleig.

Werner G. Smith Company, Cleveland, Ohio—Core oils, cores and castings. Represented by John C. DeVenne, Milton S. Finley, Louis F. Ferster and Werner G. Smith.

R. F. Smith & Sons Company, Chicago, Ill.—Safety congress shoes for molders and foundrymen. Represented by B. B. Smith, Jr.

Standard Sand & Machine Company, Cleveland, Ohio.

Sterling Wheelbarrow Company, West Allis, Wis.—Rolled steel flasks and wheelbarrows showing new features. Represented by I. R. Smith, H. H. Baker, J. J. Coyne, G. H. Lambkin, E. W. Dowd, C. L. Kirk, J. W. Dopp and J M Dickson

Frederic B. Stevens, Detroit, Mich.—Foundry facings, core compounds, buffing compositions and new stamped steel ladle bowls. Represented by Frederic B. Stevens, W. J. Cluff, J. M. Mayers, Henry Krigner, James F. Hughes, J. M. Johnston, D. D. Baxter and Thomas E. La Mondy.

W. F. Stodder, Syracuse, N. Y.—Suction sand blast nozzle. Represented by W. F. Stodder.

Strong-Kennard & Nutt Company, Cleveland, Ohio—Demonstration for showing strength of goggle lenses and method of determining color values in welding lenses. Protection goggles for grinding, chipping, polishing, welding; also respirators and masks for electric welding. Represented by Buell W. Nutt and Richard Cook.

Sullivan Machinery Company, Chicago, Ill.—Belt-driven angle compound compressor which will supply air to various pneumatic tools shown by exhibitors. Represented by W R Jarvis and M S Sloman

Superior Sand Company, Cleveland, Ohio—Samples of molding sand. Represented by W. H. Smith, H. C. Koontz and W. J. Sallee.

Thomas Elevator Company, Chicago, Ill.—Several styles and sizes of wrenchless chucks in operation. Represented by D. T. Siegel and John L. Parkes.

Titanium Alloy Mfg. Company, Niagara Falls, N. Y.—Line of bronze and brass castings, titanium aluminum bronze castings, die castings and samples of ferro-carbon-titanium. Represented by H. H. Cook, A. C. Hawley, W. J. Evans, W. M. Corse, H. R. Corse and Charles Vickers

Union Steam Pump Company, Battle Creek, Mich.—Inclosed steam-driven high-speed splash-lubricated air compressor, short belt-driven air compressor, vertical duplex short belt-driven and other air compressors.

United States Graphite Company, Saginaw, Mich.—Reception booth. Represented by H. F. Gump, F. B. Godard, W W Lampkin, R A Corrigan and F J Hanson

United States Molding Machine Company, Cleveland, Ohio—Plain jolt machines, plain air squeezers, combination jolt and squeeze, combination jolt squeeze pattern-draw, combination jolt pattern-draw, combination jolt roll-over pattern-draw, combination squeeze roll-over pattern-draw. Represented by J. N. Battenfeld, C. F. Battenfeld and Joseph Jirka.

United States Silica Company, Chicago, Ill.—Flint shot sand blast sand samples. Represented by A. Volney Foster and Harry S. Goebig.

Wadsworth Core Machine & Equipment Company, Akron, Ohio—Stock core-making machines, sand mixing and compounding mill motor-driven; all-steel reinforced core trays, snap flask bottom boards and a working demonstration of jar ram box-lifting roll-over core-making machine. Represented by George H. Wadsworth, M. C. Sammons and Even George.

J. A. Wallace, Chicago, Ill.—Bench planer with flap and shutter safety guard, motor-driven. Represented by J. D. Wallace.

Warner & Swasey Company, Cleveland, Ohio—Universal hollow hexagon turret lathe, motor-driven, operating on bar work, and universal turret screw machines, motor-driven, operating on chucking work. Represented by A. C. Cook, Ralph Glaser and W. E. Marshall.

West Haven Mfg. Company, New Haven, Conn.—High-speed power hack saw machine, hack saw blades and frames. Represented by A. A. Twichell and W. A. Gilbert.

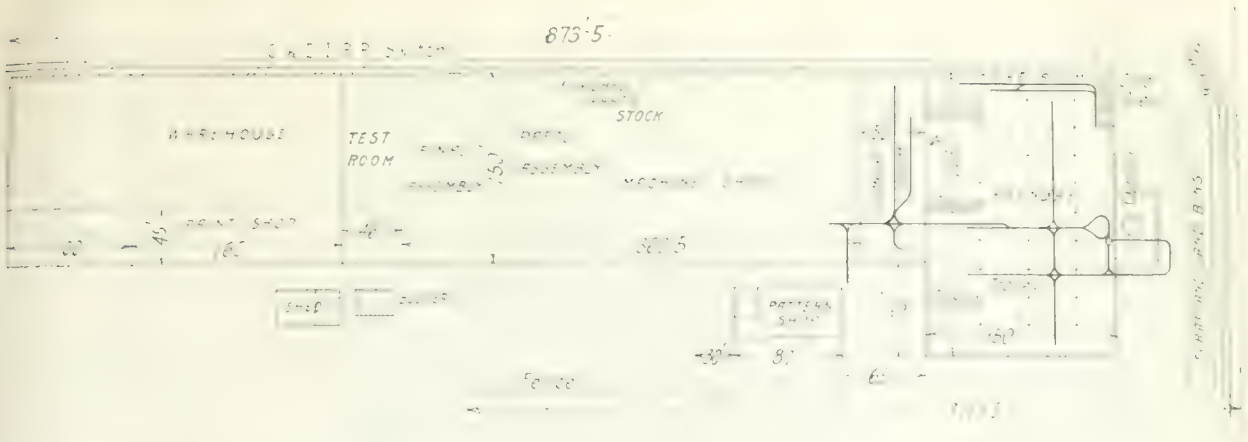
Wheeler & Holcomb, Chicago, Ill.—Fireproof gloves, mittens, leggins, aprons, pants and coats of asbestos cloth, fireproofed duck and leather.

White & Bro., Inc., Philadelphia, Pa.—Casting copper ingots, composition brass ingots and other castings from its ingots. Represented by Raymond Hunter, George C. Procter, Harold C. Reinhardt and Frank Krug.

Whiting Foundry Equipment Company, Harvey, Ill.—Photographs covering its entire line, such as latest type foundry cranes. Represented by C. A. Hardy, R. H. Bourne and G E Jones

T. B. Wood's Sons Company, Chambersburg, Pa.—Taper snap molding equipment, including tapered snap flasks and automatic adjustable snap jackets; and also specimens of castings. Represented by Charles O. Wood, George M. Naylor and Victor Lesher.

T. J. Woodison Company, Detroit, Mich.—Electric vibrator of new design.



Production Methods in Gas Engine Plant

Hercules Gas Engine Company Accelerates Operations with Machine Molding, High Metal Cutting Rate and Piece Work

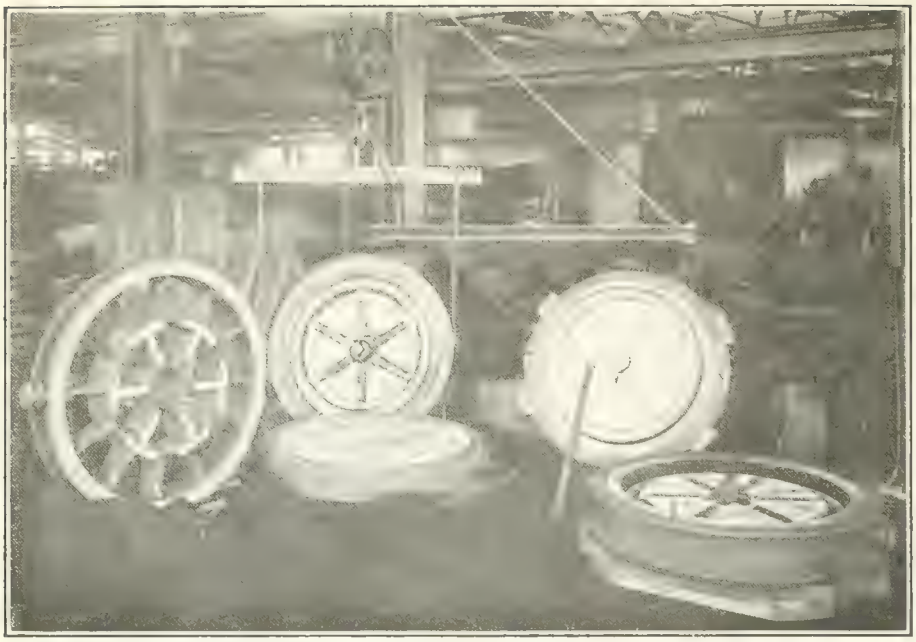
BY O. J. ABELL

IT is a human quality entering into works organization which is the determining element in making the operation of one plant entirely different from that of another, particularly as between competitors manufacturing the same product. This difference, in its essentials, is not a distinction that has to do with resources, equipment or location, though all of these are factors, but it is that which accounts for successful and profitable business in one instance as against failure in another, particularly in the production of staple materials selling at a small profit margin. There can be observed a contrast in manufacturing methods, apart from questions of good or bad workmanship; a distinction between ability to produce one piece and ability to produce that one piece in quantity at low cost continuously. It is a matter of getting production out of men and machines, and examples of manufacturing operations where "the production sense" is in evidence are still sufficiently limited to make each one an interesting study.

The manufacture of buggies, for example, in the recent years of the ascendency of the power vehicle, has conspicuously made for a survival of the fittest in that industry. The business of the Hercules Buggy Company, Evansville, Ind., is one of the manifestations of that process, and very clearly its fitness to survive has come from an accommodation of its production methods to the changing conditions of its market, without deterioration of product. The wheel shop of this company is an amazing example of consecutive machine operations associated in a sequence that converts raw materials into finished product at maximum speed and minimum cost. In a small shop, perhaps 75 x 150 ft., there are built from the rough lumber



A Floor of Cylinder Head and Cylinder Molds Showing the Manner of Pouring with Core Made To Fit Over the Cope and the Machine Mounting for the Cylinder Head in the Background



The Mold for Casting the Large Flywheels and the Special Arbor for the Cope, Also the Patterns and the Molds with One of the Former on the Jolt Ramming Machine Employed

1600 wheels per day. Entrance by this company into the manufacture of gas engines, which was undertaken about three years ago, might therefore be expected to introduce similar principles of operation into that activity.

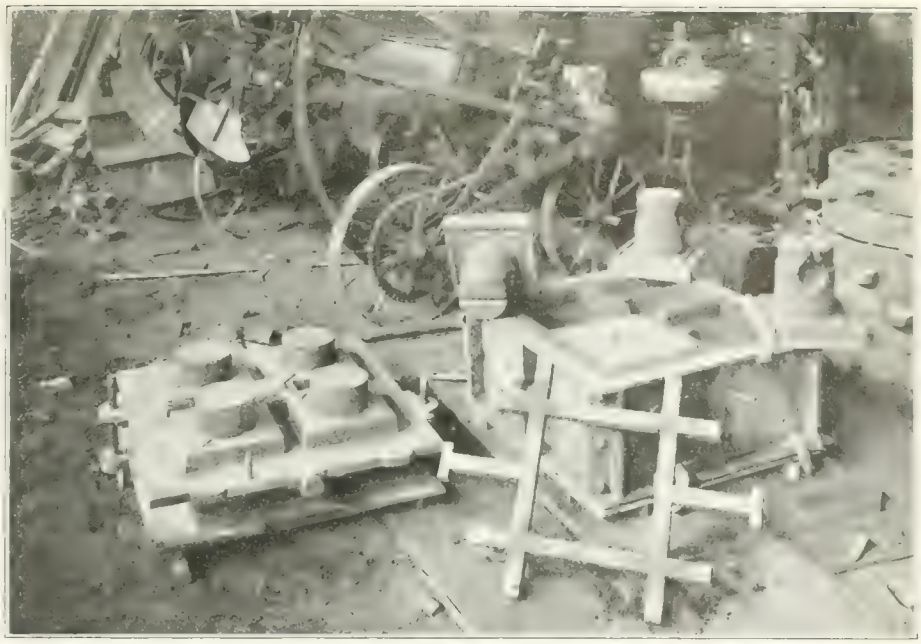
When the business of a small manufacturer of gas engines for farm use was acquired, the Hercules Gas Engine Company was formed to take it over and a foundry and machine shop were erected adjoining the buggy works. It is with the operations of this foundry and machine shop that this article is particularly concerned. The work in the foundry was inaugurated with all of the trials and inefficiency normal to a strange business. In the first year, with a floor area of 150 x 225 ft., and a 90-in. cupola, an average of only 18 tons of castings per day was produced. Now, with approximately the same payroll, but on a piece-rate basis, and with the installation of overhead cranes and trolleys and with machine equipment for the molding of every job of more than 25 pieces, production has been increased to a daily average of 65 tons and a maximum of 75 tons, with total losses not exceeding 3 per cent. The machine shop, in turn, with jigs and fixtures for every possible job, and high speed cutting tools, can finish in a day and night shift 160 gas engines of sizes ranging from 1½ to 12 hp.

The castings production effected in the foundry, a tonnage above the average for non-continuous operation, is obtained despite the building arrangement rather than because of it. To say that delivery of hot metal to the pouring floors is not as easy at it might be because of the restrictions occasioned by building columns, or that the low roof construction is unfavorable to the best light and ventilation, or that the restricted yard space and facilities for charging the cupola interfere with an efficient handling of raw materials, is not a criticism, but rather an emphasizing of the good showing the foundry makes. In the line drawing



The Machines and the Molds for the 1-Hp. Engine Cylinder and Frame with a Floor of These Molds in the Background

the layout of the foundry, cleaning room, machine shop and other departments of the works is shown. The three 5-ton Whiting and Pawling & Harnischfeger electric overhead traveling cranes that serve the bay in which the heavy molds are put up and the overhead trolley system that serves the foundry generally are indicated. In the central bays, 1-ton underslung hand-operated Curtis cranes, with pneumatic hoists, span the full width of the pouring floors. In this connection it is especially interesting to note that the production of certain of the molds which are handled from the machine to the floor for pouring by these Curtis cranes, were remarkably increased by lowering the crane bridges from their position above the runway, as installed, to the underslung position, the cranes responding in their travel along the runway much more readily.



The Molds for the Cylinders for the Larger Engines Are Made in Groups of Four and the Castings Are Poured Without a Cope, a Stripping Plate Being Used

The pronounced increase in production which has been brought about in this foundry has been due to the effective application of molding machines and the piece-rate wage plan. At the time of the installation of mechanical molding equipment, a new force of men was also started, men almost entirely of the inexperienced common labor class, who were gradually trained for their jobs. The molding machine equipment, with the exception of a group of Adams and Arcade squeezer machines, consists of various types built by Henry E. Pridmore, Chicago, including plain electric jolt, electric jolt with pneumatic rock-over or roll-over and plain stripping plate machines.

In the case of the larger engine flywheels, when the job was changed from hand molding to ramming on the jolt machine, two men were able to put up in a day as much as seven men previously had been able to do. These wheels have a diameter of 44 in. and the casting weighs 550 lb. It is made in cope and drag on a 12-in. electric jolt ramming machine. Both the molds and patterns are illustrated. Special attention is called to the large



The Coremaking Section of the Foundry and the Carrier Trays on Which the Green Cores Are Delivered to the Ovens



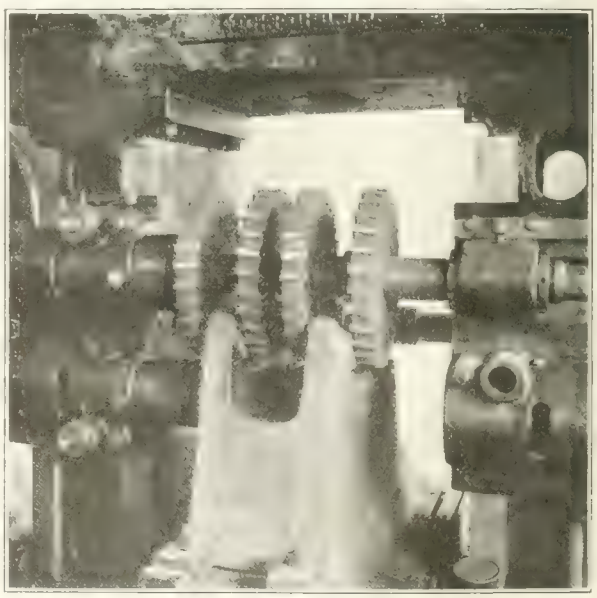
Using a Long-Lipped Ladle To Pour the Large Flywheels at the Center Without a Long Runner

arbor shown at the left, the use of which in ramming the cope mold has obviated the use of gaggers in the cope. To cut down the loss of metal resulting from long runners in pouring these castings, ladles were built with extra long lips, so that these wheels are now poured with the runner box directly over the wheel center. With the use of the arbor mentioned above, the rate at which the jolting machine can produce is more nearly approached, and the molder and helper put up 50 molds a day.

These large flywheels are cast in the bay spanned by the 5-ton cranes, where the other heavier castings are also made. The bases for the larger engines, the six sizes of which range from ½ to 12 hp., are likewise rammed on jolt machines, molds as deep as 36 in. being successfully made on them. The large cylinders are molded in this bay also, the practice on this job being one of the specially interesting operations. Four cylinders are cast in one bolted iron flask. A stripping plate is used in conjunction with the portable plate on which the patterns are mounted, as indicated in the photograph. The patterns for the cylinder bore are mounted on the top plate and thus drawn up through the stripping plate which carries the core prints. When the patterns have been sufficiently withdrawn, the stripping plate is caught by pins on the guides, which align it with the pattern plate at each side, and is lifted out with the pattern plate. The illustration shows the mold, turned over after ramming, with patterns withdrawn and one core set in to indicate the shape in which the core is made to eliminate the use of a cope mold. The cores are held down when the mold is poured by the arbor shown in the foreground. Skim gates are used in pouring all the cylinders, piston and cylinder-head molds, and in the case of the cylinder molds two skim gates are used.

The molds for the smaller cylinders are made on a combination electric jolt and pneumatic roll-over machine, which is mounted on wheels and is operated along a track that parallels the pouring floor, the machine being moved along as the sand is worked up. The mold is made up in a manner similar to the larger one just described. The cylinder-head molds are made on the same machine, which is illustrated together with a view of a floor of cylinder-head and cylinder molds. As may be seen, the cylinder heads are also poured without copes. The trucks on which the molding machine is mounted are provided with a hinge arrangement that permits the machine to be dropped down solidly on the rails during the jolting operation, eliminating the vibration which might ensue were the weight carried on the trucks. With this equipment, a molder and helper are putting up 200 cylinder heads per day.

Another job typical of the practice in this foundry is the cylinder and base for the 1-hp. engine. On two Pridmore drop plate stripping machines, one for the cope and the other for the drag half of the mold, two men at each machine turn out 75 complete molds per day, including the setting of seven cores. The casting which comprises the water reservoir, cylinder and base, all in one piece, for the 1-hp. engine, one half of the mold, the principal cores and the pouring floor are shown in the illustration. The molds are set over onto the floor from the machines with the Curtis travelers, one of which is shown in the background. The under-slinging of this crane on the runway increased the production of these molds by 20 per cent. In the case of the water reservoirs for the 3-hp. engine, the molds for which are made on the adjoining floor on an electric jolt and rock-over machine, the same expedient effected a like increase. Of these latter molds three men put up 130 per day. Molds for various small parts, including cams, bearing caps, etc., are made with match-plate patterns on Adams squeezer machines. Gears and mufflers are molded on Arcade machines, the work being put up in snap flasks. Where tap holes are required in a casting for set screws or cap bolts, as in the case of pulleys and mufflers, nuts of the diameter and thread required are set in the mold with a core to hold them in place, and cast into the piece, saving the otherwise necessary drilling and tapping operation in the machine shop. For the molding of the small pulleys, where the diameter is very small with relation to the hub and the face pretty wide, making it difficult to hold the cores in an ordinary mold, a permanent sectional steel mold has been developed in which six pulleys are cast at a time. This mold consists of six split steel blocks mounted rigidly in a single row on a frame, with a lever and hinge device by which the split blocks may be swung open simultaneously along the central longitudinal axis, and in turn closed and automatically locked. The blocks have plain cylindrical vertical holes through the center, of a diameter corresponding to that of the pulley.



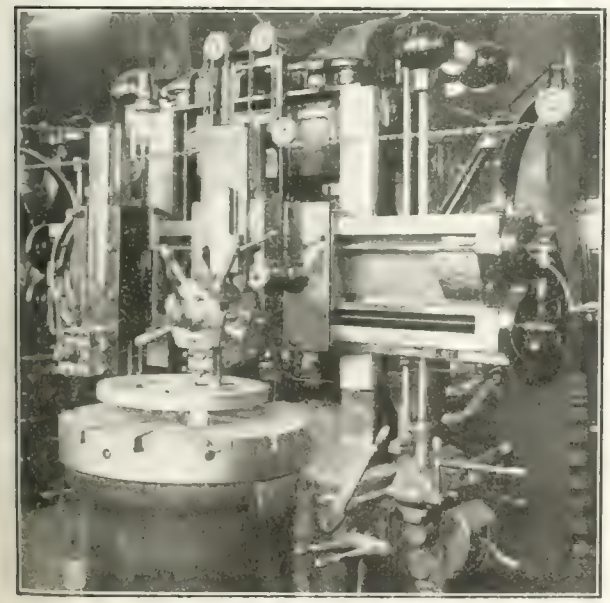
The First Machine Shop Operation on the Larger Engine Beds in Which Nine Cuts Are Taken by a Milling Machine with the Same Setting

Two smaller cores, reversed at top and bottom, with a small set-screw hole core, set in these blocks, complete the mold, which is then poured through the center of the core. The job is taken care of by one of the foundry laborers as an extra task, and at a cost of a fraction of a cent apiece the desired production of these pulleys is obtained in a very short period.

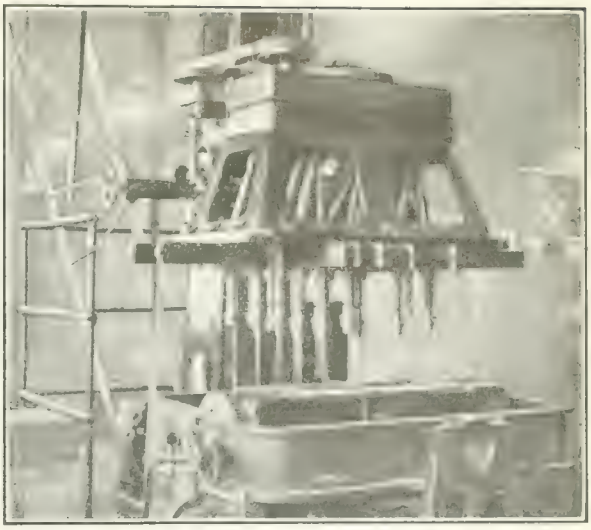
Two iron mixtures are used, the iron for the cylinder castings being made from a charge of high silicon, high manganese pig with some charcoal iron and 20 per cent of steel scrap, the regular mixture running lower in silicon and containing from 10 to 12 per cent scrap. The high cutting speeds of the machine shop also have a bearing on the iron mixture used. The cupola, lined down to 62 in. from a 90-in. shell, has a continuous tuyere and melts at the rate of 20 tons per hour. The pouring of the cylinder iron is begun about 14 charges back and is again followed by the regular mixture to finish the heat. To facilitate the removal of the cupola drop following a heat, a heavy cast-iron fan-shaped rake is laid on the floor under the cupola. The bottom is dropped on this and hauled out after cooling.

The coremaking department is installed along a portion of one side of the foundry building. The coremakers' benches are placed along the wall under the windows, but the core ovens are of necessity at the extreme end of the coremaking section. To reduce the time loss in transferring the cores from the benches to the ovens, the several carrier trays were installed for operation along the overhead trolley, as shown in the illustration. The green cores, when made, are placed directly on one of these trays, which can be spotted within reach of any of the benches, and when the carrier is full transferred by a helper to the ovens. The ovens are the drawer type, built by the Central Iron Works, and are coke fired from the rear, outside of the building.

Both in the foundry and machine shop the piece-rate method of wage payment, with but one or two exceptions, prevails for all work. The night gang which shakes out the molds from the day, cleans up the floor and cuts over the sand for the next day with a power sand-cutting machine, is paid by the hour. But such work as the lining of the ladles, patching of the cupola and charging of the cupola,



The Tooling on a King Vertical Turret Lathe for the Complete Machining of Flywheels Which Enables Metal To Be Removed Rapidly

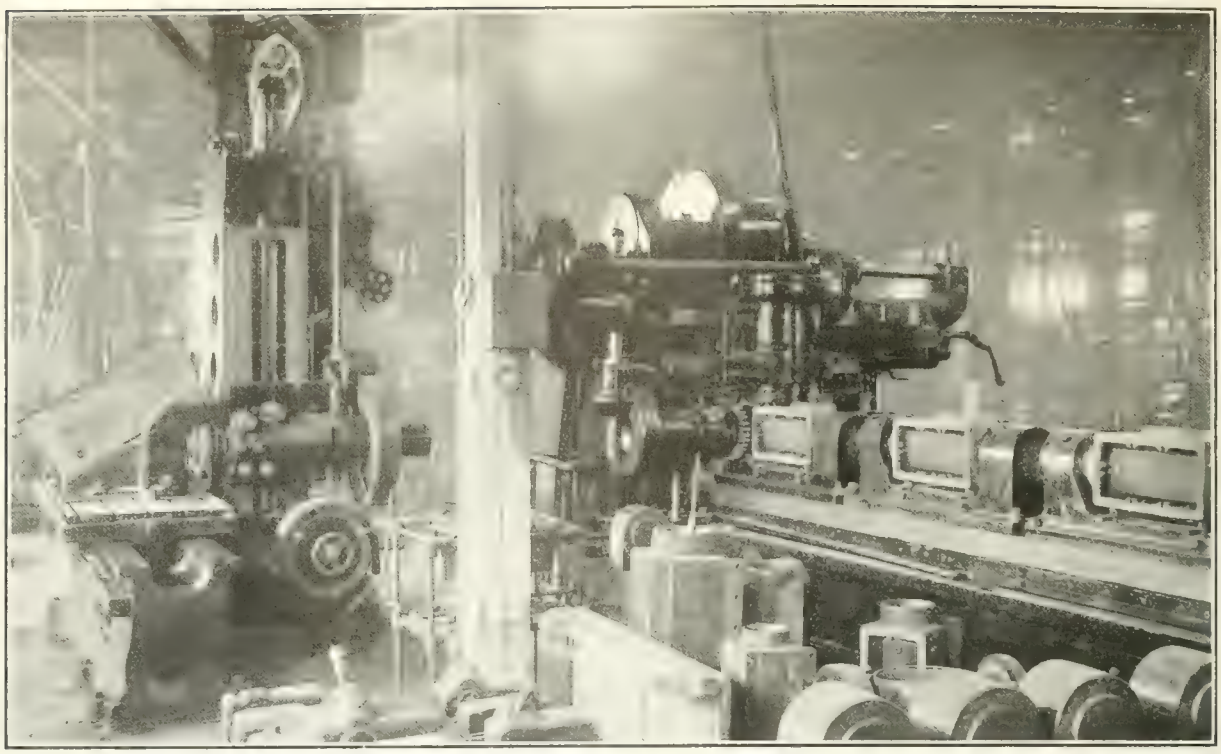


A Flexible Fixture Used To Enable All the Holes in the Large Engine Bases To Be Drilled

are all on a piece-rate basis at so much per ton melted, as for example, the two men lining ladles receive 5c. each per ton of iron poured. In the machine shop all of the jobs have been timed and rigged up for piece-rate schedule, though the speeds and feeds approximated as correct for the job are not rigidly fixed and are subject to the judgment of the operator in crowding or easing up on the rate of cutting, as the particular casting may suggest. The operators are paid only for good work, where defects are chargeable to them, and the payroll is made up not from the count of the pieces at the machine as they are molded or machined, but as the work passes the inspection department, each operation involved in the complete job being there credited to the man regularly performing it.

The arrangement of the several departments of this shop, as indicated in the floor plan, provides for a straight-line layout. From the foundry the castings go directly to the cleaning room, thence through the machine shop to the finished parts stock, to the parts assembly, final assembly, testing room, paint shop and warehouse. In the machine shop the principal machining jobs have their several operations flow in the same directional sequence in parallel lanes from the cleaning room end. Some of this work may be briefly followed as typical examples. In the first operation on the bases of the 5-hp. engine the beds are set up singly on an Ingersoll planer-type milling machine, and at that setting the ends of the main bearings, the bosses on which the cylinder rests, the top and inside of base, in all nine different surfaces, are faced off with a production of about 60 a day. The casting is then moved forward to another Ingersoll milling machine, where, mounted on an angle fixture which offsets the angle of the main bearings, these bearings are milled out. The nature of the operation is clearly shown in the illustration.

In the background of this engraving the multiple-spindle drilling machine can be seen, on which the following operation is performed. This is shown in detail, a job that is interesting largely because of the fixture which makes it possible to drill the 20 variously located holes in the base with one handling of the casting. The casting is hung in the fixture frame so that it can be rotated in a horizontal axis by the hand crank and gear, while the frame itself rotates on the central trunnions in a manner to tilt the casting up at any desired angle. The fixture in addition is mounted on a short track which permits it to be pulled out from



The Second Operation on the Bed, That of Milling Out the Bearings, Is Shown at the Left, While the Multiple Mounting of Cylinders on a Planer Type Milling Machine for Facing All External Bosses and Flanges Is Illustrated at the Right

under the drills. In this latter position the casting is put in place, the fixture tilted and pushed in toward the machine far enough to drill the holes in the bearings. A pneumatic hoist is available for tilting the fixture, which is then pushed all the way in and eight holes in the top side drilled, after which the base is rolled over on either side for the drilling of the remaining holes. The drill spindles are fitted with quick-change chucks and a helper is changing the drills while the machine operator adjusts the fixture. After the drilling, the base is put on an adjoining Bickford radial drilling machine for tapping the necessary holes, an inclined stand being used for tapping the holes for the bearing-cap cap screws.

In finishing the cylinders the first operation is that of boring. The 9 and 12 hp. sizes are put on horizontal boring mills, one of the type built by the Binsse Machine Tool Company, Newark, N. J., and the other by the Barrett Machine Company, Meadville, Pa. One operator attends both machines and the cylinder is rough and finish bored, then reamed and the end faced off. The smaller 5 and 7 hp. cylinders are finished in three successive operations on the three spindles of a Foote-Burt gang drilling machine, a similarly rigged Baker high-speed gang drilling machine finishing the 2-hp. cylinders. The machining of the external surfaces of the cylinder casting, including the pedestal, side bosses and water reservoir flange, is also illustrated. At the right of this view is shown an Ingersoll milling machine with a long bed and table. The larger cylinders are mounted five at a time in the special fixtures, as shown on the machine and in the foreground. This machine is fitted with two vertical spindles and two horizontal opposed spindles. About 45 min. is required for the complete set-up, the machine operator having a helper to handle jigs and castings. A pneumatic hoist is conveniently at hand. The water reservoir flange that rests on the cylinder is ground on a Safety Emery Wheel Company grinder.

The head end of the cylinder is faced off on an Ingersoll vertical milling machine, while all of the drilling of holes in the cyinder casting is accomplished with the mounting of the casting in a fixture consisting essentially of a hinged plate to which the casting is fastened. In this way the casting is held rigidly to be drilled either for a vertical or horizontal hole, the hinged plate swinging through a 90-deg. angle in a vertical plane.

In the case of the smaller engines, as the 1½-hp. size, the cylinder and base are one casting. The cylinder is bored and the end faced in a turret lathe, the casting being locked in a suitable jig, the several operations including rough boring, finishing and reaming, a roughing and finishing cut over the end face and the champfering of the open end. In addition to running the turret lathe, finishing about 50 castings daily, the operator helps the horizontal boring mill man opposite him in the handling of the heavier cylinder castings. The bearings are then babbitted, the side bosses milled, the base drilled on a multiple-spindle drilling machine, the holes in the side drilled on a Cincinnati upright drilling machine and tapped on an American radial, leaving only the name plate holes to be pushed through with a sensitive drilling machine.

All of the above work progresses along either side of the main aisle of the shop, where the work can be easily handled to and from the machines. The transfer of work from machine to machine is not separated into a distinct function. Generally speaking, one machine is close enough to the other on which the next operation is performed so that the second operator can conveniently pick up where the first laid down, enough space being reserved for a working supply of stock. In the operations of finishing the cylinder-heads this method is particularly distinct. The facing of the heads is done on a Le Blond heavy-duty lathe with a turret tool post, and in the case of the smaller heads, on a Gisholt turret lathe. They are then drilled on Fox multiple-spindle and Rockford Drilling Machine Company two-spindle drilling machines and tapped on a Baker heavy-duty drilling machine, all of the operations being at high speeds. These several machines are in a row along an aisle and between

each is a platform, elevated perhaps 10 in. from the floor and within easy reach of either machine, on which the work in process is piled, each operator being thus enabled to handle the stock without loss of time.

The policy of this shop in the matter of keeping up the production rate is to depend not so much upon a highly organized division of tasks as upon rigid tools that will stand high cutting speeds and heavy feeds, upon the pressure of the work as it flows through the shop and the incentive of wages proportionate to the amount of good work turned out. An interesting example of tooling and a high rate of metal cutting is illustrated. The flywheels are finished almost completely in one setting on King Machine & Tool Company vertical turret lathes, using a feed of ⅜ in. and a speed of 40 ft. per minute. The tooling for this job is apparent from the illustration. The two tools in the turret head face off the end of the hub and the boss shown on the left of the wheel, while the two roughing tools in the side head finish the top and bottom faces of the rim. While the rough and finish boring tools and the reamer in the turret head are then finishing the hub of the wheel, the side head is moving in and the center tool scrapes the face of the pulley. This job represents an excellent test of the stiffness of the machine used.

While automatic machines and Potter & Johnson lathes are used on small pieces, including gear blanks and small pulleys, and Jones & Lamson flat turret lathes for bar work, one operator running as many as four machines, the pistons are turned up on a standard lathe, the set-up time for this job on an automatic machine having been found disproportionate to the actual machining time, as the work can be done on a lathe. A roughing cut is taken over the piston with ⅛-in. feed, followed by a second cut with ¼-in. feed. The surface is then worked over with a scraping tool and the ring seats roughed out. The ring seats are finished with a roughing and finishing cut, one cut being taken down the side of the seat on all except the top seat, which is given an additional surfacing.

In the control of the above detailed operations and the various others which make up the whole work of the shop, the management has apparently sought to avoid an excess of system. The direct method of accomplishing results and performing functions is encouraged. The absence of restrictive routine in the shop system is illustrated in the finished-parts stockroom. The finished parts from the machine shop, after being checked through the inspection into stock, are brought together in partial assemblies. The assemblers are not required to requisition the necessary materials from stock, but take what they need, the stock being readily accessible to them. With the other checks upon materials, and the incentive which the assembler has to keep his production up, no trouble has been experienced in loss of materials, and as no attempt is made to keep detailed costs at each step in the manufacturing operation, there has appeared little occasion for taking out the stock on an O. K'd charge ticket system. And in this general attitude much of the effectiveness of the shop organization is believed to lie.

The Danville Structural Tubing Company, Danville, Pa., is stated by a local paper to have been sold to C. S. Wagner and S. C. Rebman, who intend to make the plant much larger. Mr. Wagner is a nephew of Charles M. Schwab and is a graduate of Lehigh University, class of 1915. He will be president and general manager of the company and Mr. Rebman will be vice-president and treasurer.

BRITISH STEEL EXPORTS

July Shipments Large Despite Restrictions—Total Now Less than American

Exports of iron and steel from Great Britain in July, made up mostly of supplies sent to the Allies, were 298,929 gross tons, excluding iron ore and including scrap. This total ranks third for 1916, that of May having been 395,750 tons, with the average for the first six months 313,864 tons. The 1915 average was 270,858 tons.

July pig-iron exports were 62,914 tons (53,017 tons going to France), against 66,150 tons in June and 61,805 tons in July, 1915. To Aug. 1, 1916, the total pig-iron exports were 503,617 tons, as compared with 188,327 tons to Aug. 1, 1915. Of the former total, France took 320,910 tons and Italy 87,330 tons, with 21,075 tons credited to Japan.

Ferromanganese exports in July were only about 7000 tons, against 16,000 tons in July, 1915. To Aug. 1, 1916, they were 74,000 tons, against 57,000 tons to Aug. 1, 1915.

Steel-bar exports in July were 45,584 tons (36,783 tons going to France), against 39,574 tons in July, 1915. The total to Aug. 1, 1916, was 406,950 tons, as compared with 268,126 tons to Aug. 1, 1915. France has taken 345,538 tons of the former total.

Rail exports to Aug. 1, 1916, were 31,763 tons, compared with 157,190 tons to Aug. 1, 1915. Galvanized sheet shipments continue about one-half of last year's. In July they were 10,382 tons, against 10,861 tons in June. To Aug. 1, this year, they were 95,216 tons, against 198,549 tons in the same period in 1915. Exports of tin plates continue practically unchanged at 38,174 tons in July, against 30,351 tons in June and 39,528 tons in July, 1915, with the total to Aug. 1, 1916, at 226,772 tons, against 237,863 tons to Aug. 1, 1915.

July imports of iron and steel, excluding iron ore and including scrap, were 83,186 tons, which compares with 86,303 tons in May, the record for 1916, but still considerably below the 1915 average of 107,944 tons per month.

Imports of blooms, billets and slabs in July were only 10,898 tons, comparing with 11,223 tons in June and 62,568 tons in July, 1915. To Aug. 1, 1916, they were only 86,894 tons, against 269,857 tons to Aug. 1, 1915. The United States supplied 67,188 tons of this year's total, against 208,271 tons last year.

Iron-ore imports were large in July, 748,029 tons, making the total to Aug. 1 this year 4,137,609 tons, compared with 3,666,789 tons to Aug. 1, 1915.

The valuation of the exports for the first eight months of the year is given as £34,788,653, against £22,127,916 for those to Aug. 1, 1915.

It is interesting to note that while for many years British iron and steel exports were much larger than those of the United States, the average for this country to July 1, this year, was 436,000 tons per month, against an average for the seven months to Aug. 1 of 312,000 tons per month for the British exports.

Exports of Grecian Magnesite

Magnesite shipments from Greece in 1915 are given by U. S. Consul General A. W. Waddell of Athens as follows, in metric tons:

To	Raw	Calcined
England	48,745	7,987
United States	33,641	6,218
France	15,375	4,331
Netherlands	1,750	350
Greece	3,150	1,000
Total	92,661	18,726

All Grecian magnesite mines are located in the Athens district, most of them being on the island of Euboea. In 1914 the mines produced 117,430 metric tons of raw magnesite. The total 1915 output is placed at 133,858 tons. The United States bought more heavily in 1915 than formerly.

Building the New Navy a Serious Problem

Government and Private Yards Are Already Overrun with Work and Labor Is Scarce —Farcical Labors of the Shipping Board

WASHINGTON, D. C., Sept. 5, 1916.—The Government of the United States is now facing one of the greatest industrial problems it has ever been called upon to solve. A way must be found to secure the speedy construction of 63 warships, the immediate building of which is authorized by the naval appropriation act just signed by the President, and at the same time the newly-created Shipping Board must go into the market to buy or build $50,000,000 worth of merchant vessels. Instead of being able to pick and choose between a score or more of private shipyards eagerly competing for desirable work, the Government now finds itself obliged to appeal to the patriotism of the managers of a few yards, all of which are crowded with work that will keep them busy for 18 months. Owing to the short-sighted economy of the Secretary of the Navy in rejecting bids for vessels heretofore authorized, on the ground that they were exorbitant, although it is now freely conceded, in the light of recent market tendencies, that the competitors barely protected themselves in their proposals, the navy yards of the country are unable to come to the rescue, and Government officials must rely, in meeting a grave emergency, upon the public spirit of the men they have so freely abused.

The Navy Department has issued an advertisement calling for proposals for the construction by contract of 57 of the 63 vessels included in the first installment of the three-year naval program just authorized by Congress, the bids to be received until 12 o'clock noon of Wednesday, Oct. 25. These include 4 so-called dreadnaughts (battleships Nos. 45-48), 4 scout cruisers (Nos. 4-7), 20 torpedo boat destroyers (Nos. 75-94), and 29 submarines (Nos. 78-106). Confidential circulars for the information of bidders, and plans and specifications relating to the vessels, are ready for distribution, but, following the usual policy of the department, will not be made public.

A BLUNDERING NAVAL POLICY

In planning the expansion of the navy on the basis of the new appropriation act, the construction bureaus estimate that all of the ships authorized to be started this year should be completed by 1919. Inasmuch as the designs of nearly all the vessels have been fully worked out by the naval architects, and the plans and specifications are ready for the builders, the question of chief concern now is as to the private shipbuilding facilities which will be placed at the service of the Government at this time. It is, of course, assumed that eventually the Government's naval expansion program will induce existing private yards to expand, and possibly will tempt private capitalists to establish additional plants, but officials of the Navy Department are frank enough to state that thus far there has not been the slightest intimation from any responsible quarter that any such development may be counted upon. On the other hand, the practical men of the department now realize keenly that the policy of Secretary Daniels in not only rejecting bids of private shipyards which it is now admitted were reasonable, but also publicly censuring them for "seeking to compel the Government to pay extortionate prices for much-needed warships," has cooled the ardor of more than one prospective bidder and caused private shipbuilders generally to think twice before investing money in additional facilities available chiefly for naval work.

The blundering policy of the Secretary of the Navy with respect to his treatment of the big shipyards in the matter of the construction of the dreadnaughts authorized a year ago is now clearly disclosed, especially in its bearing upon the ability of the navy yards to help out on the new construction program. When, after rejecting bids of private shipyards, the dreadnaughts California and Tennessee were allotted for construction to the Government yards, the California to Mare Island and the Tennessee to the New York navy yard, the Navy Department overloaded both those establishments for many months to come. Although the plans of the Tennessee were completed a year ago, her keel has not yet been laid at New York because of the delay in completing the New Mexico. As the Mare Island yard lacked a slip adequate to take the California, it was found necessary to construct one specially for the purpose; hence, preparations for the building of both of these dreadnaughts are now taxing the facilities of the two yards. Secretary Daniels is said to have been exceedingly anxious that two of the new dreadnaughts authorized by the 1917 naval appropriation act should be built in the Eastern navy yards, but has reluctantly abandoned this project, as the only two yards capable of doing the work will be fully occupied for more than a year.

LARGEST AND FASTEST CRUISERS

According to a memorandum issued by the Navy Department, the four new dreadnaughts about to be contracted for will have the following chief characteristics: Displacement, 32,600 tons; speed, 21 knots; main battery, eight 16-in. guns; secondary battery, 18 5-in. guns, four 3-in. anti-aircraft guns; complement officers and men, 1022.

The scout cruisers are designed to be the largest and fastest vessels of this class ever laid down for any navy. Their characteristics will be: Displacement, 7100 tons; speed, 35 knots; length, 550 ft.; beam, 55 ft.; armament, eight 6-in. guns, four torpedo tubes and two 3-in. anti-aircraft guns; complement, 330. A distinct departure for vessels of such powerful type will be their complete equipment for carrying, launching and operating the largest-sized hydro-aeroplanes.

The hospital ship will be the first vessel ever built specially for this purpose for the United States Navy, those now in use being converted merchant ships. Every feature of an up-to-date and complete hospital will be embodied in the ship, which will have accommodations for 500 patients. Its displacement will be 9800 tons, length 460 ft., beam 60 ft. 10⅛ in., draft 19 ft. 6 in., and speed 16 knots. Under the terms of the Geneva convention, which makes hospital ships immune from capture or attack, the vessel will carry no armament, either for offense or defense.

The gunboat will be of a type specially designed for service in tropical waters, and of light draft for use in shallow rivers. Its characteristics will be: Displacement, 1575 tons; length, 241 ft. 2 in.; beam, 41 ft. 2½ in.; draft, 11 ft. 4 in.; armament, three 4-in. guns, two 1-pounder guns, four 30-caliber machine guns, two 3-in. field guns, two 3-pounder guns; speed, 12 knots; complement, 149.

LABOR SCARCITY A PROBLEM

Another feature of the present industrial situation is causing the officials of the Navy Department no little anxiety, namely, the scarcity of skilled labor. The high wages and exceptional opportunities for the promotion of especially skilled men offered by the munition makers of the country have made heavy drafts upon all the manufacturing establishments of the Government, especially upon the arsenals and navy yards. The private shipyards have also suffered to some extent, but the greater flexibility of their employment systems as compared with the hard and fast rules of the Government yards has enabled them to keep their best men and

to develop inexperienced employees for special purposes with great rapidity. The preparations for the construction of the dreadnaughts California and Tennessee at Mare Island and New York respectively have been greatly delayed by the lack of skilled labor, and it will be a month or more before either of these vessels is laid down. Several months ago the department undertook to hasten the work on the New Mexico so as to clear the ways for the Tennessee, by putting on double shifts, but this project had to be abandoned, and it has taxed the employment bureau of the yard to keep a single shift going.

Present conditions in the American shipbuilding industry, taken by and large, reduce the immediate program of the Shipping Board created by the enactment of the Alexander bill to a mere academic problem. Under normal conditions, $50,000,000 would purchase so small a tonnage of efficient merchant vessels as to produce little or no effect upon the commerce of the country. At the present time, when the average seaworthy vessel is able to earn her entire cost in a single voyage, it is obvious that the Shipping Board, if it is to buy ready-built vessels, must pay prices representing an almost criminal waste of the people's money. On the other hand, with shipyard prices at top-notch figures, any construction program must be almost equally extravagant, and cannot be carried through on a basis of deliveries that will tend in any degree to relieve the situation that will prevail until the end of the European war. It is a curious anomaly that no matter what policy the Shipping Board may pursue, it can be of little or no assistance to the commerce of the country until after the crisis is past, and then only at a cost that will appear little short of mountainous in view of the conditions that will prevail almost immediately after the cessation of hostilities in the great European conflict. W. L. C.

Pollak Steel Company Adds South Chicago Plant

The Pollak Steel Company, which has operated an axle and forging plant at Cincinnati for a number of years, has purchased the plant of the Willard Sons & Bell Company, South Chicago, Ill., and will manufacture axles and forgings there also, the plant being started up on Aug. 28. Within the past year the plant at Cincinnati has doubled its capacity by the addition of buildings and machinery. At present 1500 men are employed at Cincinnati, and the company will shortly employ about 500 at South Chicago, making a total of 2000. The combined forging and axle output at the two plants is estimated at 30,000 tons per month, and both are booked for several months.

Rodney D. Day, formerly general manager of sales of the William Tod Company, Youngstown, has been appointed assistant to the vice-president, with headquarters at Cincinnati. He will be in charge of all operations at the plants at Cincinnati and Chicago. Frank Dunbar, formerly Western sales manager for Brown & Co., Pittsburgh, formerly connected with the mechanical department of the Missouri Pacific Railroad and with the Scullin-Gallagher Company, has been appointed district manager of the plant at South Chicago, with headquarters there. Sales in the Chicago district will be under the jurisdiction of Frank W. Graves, Railway Exchange Building, Chicago, who has been Western sales manager of the company for a number of years.

The Noble Electric Steel Company's plant at Heroult, Cal., has been in steady operation since April 15, most of the time on ferromanganese, with occasional runs on ferrochrome and pig iron. Manganese ore has been coming in slowly, but is now in better supply, being received from several sources.

The Sugarman Iron & Metal Company, old metals, has taken a five-year lease on a lot on Brannan Street, near Fifth, San Francisco, Cal.

Willamette Works Adding Large Boiler Shop

Construction of another boiler shop is under way at the plant of the Willamette Iron & Steel Works, Portland, Ore., which will increase its facilities for building boilers 100 per cent. The new shop is 50 x 500 ft., and it adjoins the main shop in which boiler work has been carried on previously. When the new building has been finished and put in shape for service the plant will have, it is claimed, the largest strictly boiler shop on the Pacific coast. The new building and alterations will represent an outlay of $30,000. The equipment, which will cost $75,000, will consist of a 20-ton traveling crane, an 18-burner oil plate furnace, a set of bending rolls, and two high-powered, high-speed radial drills. The rolls will be capable of bending a plate 1⅝ in. thick. The plant is expected to be in operation by Oct. 1. It will be possible to work on nine new boilers at a time.

Each of the five Norwegian steamers under contract at the Northwest Steel Company's yards in South Portland will be fitted with three boilers, making a total of 15 for the fleet. In addition to these, the Willamette Iron & Steel Works has a contract for the construction of six boilers of exactly the same size and type for two large offshore steamers being built by Eddy & Skinner, Seattle. These vessels, it is understood, will fly the Danish flag. The Willamette Works is also building eight digestors for various pulp and paper mills of the Pacific Northwest. Each is to be 16 ft. in diameter and 50 ft. high, and will carry a pressure of 250 lb. They will be made of steel plate 1¼ in. thick, each weighing 50 tons. This is wholly new work being done at Portland. Formerly all such contracts were awarded to Eastern firms.

Additions to Australia's New Steel Plant

In a recent report to the Australian Minister of Defense, G. D. Delprat, general manager of the Broken Hill Proprietary, Ltd., Australia's new steel plant at Newcastle, made the following statement outlining the position of the company as to its ability to supply iron and steel:

We are at present under obligation to supply 4000 tons of rails to the Commonwealth Government, and 3000 tons of rails to the New South Wales Government per month. The total production of steel at present is 6600 tons per month. We are adding 4 open hearth furnaces, making a total of 7. At the end of this year our production of steel ought to be 11,800 tons per month. Our present rolling mill is only designed for rolling rails above 60 lb. and heavy structural steel. We hope to complete by the end of July or August a mill, to roll lighter sections of rail and structural steel. By the end of the year we ought to be in a position to supply a very large proportion of the steel required in Australia. We have in hand between 30,000 and 40,000 tons of pig iron. We are not exporting any material, but are keeping all our products for Australia. The difficulty in getting machinery from America makes progress slower than it otherwise would have been. We have been supplying rolling mills in Melbourne with billets and blooms so as to keep them going. I note the suggestion that the government should assist us in increasing the works. I hope this may not be necessary, but if at any time the want of capital should interfere with the necessary extension of the works to keep Australia supplied, we will take the opportunity of discussing the whole position.

National-Acme Company to Build New Plant

The National-Acme Mfg. Company, Cleveland, Ohio, has acquired 14 acres at Eddy and Coit roads, on the Belt Line Railroad, and will shortly begin the erection of new factory buildings on this location. The company's present plant is inadequate to accommodate its growing business, and is hemmed in on all sides by other factories. It is the intention to continue to use the present buildings entirely for the machinery department and to remove the screw-machine products department to the new location. The company plans to erect as soon as possible one-story brick and steel buildings on the new site, covering about two acres of floor space.

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Triumphant Unionism

In a document addressed to his followers, made public on Saturday, Sept. 2, Samuel Gompers, president of the American Federation of Labor, called 1916 the best year of the trade-union movement. At the time his address was prepared the eight-hour railroad legislation was progressing toward enactment into law, and the belief that it would meet no serious impediment doubtless imparted much of the spirit of exultation to his utterances. He was thoroughly justified in making the claim he did for the pre-eminence of 1916 in trade-union achievements, but if his address had been delayed only a few hours he would have been able to indulge in still more triumphant language. He could then have claimed complete trade-union control over the greatest law-making body on earth—the Congress of the United States. Months before that, his cause had gained the favor of the President, who had shown a most willing disposition to assist any movement giving organized labor special privileges or immunities. The President's crowning opportunity to make his exact position known came when he appeared before the joint session of the two Houses of Congress last week in a plea for legislation to avert the threatened railroad strike and made himself virtually an attorney for the unions. The President, however, is but an individual. His submission to the union yoke was by no means so great a triumph for the cause as the abject surrender by the Senators and Representatives of the free commonwealths composing the august Government of the United States to the demands imposed by a combination of railroad workmen. Seldom has greater haste been shown in the enactment of important legislation. The union leaders cracked the whip and our rulers strained their muscles to pull the load through in the time set by the stop watch. Unionism is at last triumphant and the country must reap whatever consequences our new masters see fit to impose.

Unit vs. Blanket Bids on Castings

The first and most impressive disclosure made plain by the early summary sheets of a newly introduced foundry cost system is the number of factors previously unknown or obscured which are vital to the success of the business. A direct result of this discovery is usually a realization that the practice of making blanket quotations in the form of a pound rate upon a group of patterns is ordinarily unfair to both the foundry and the customer. Not only does it disregard fundamental factors affecting costs, but it is an incentive to one or both parties to lower their moral and business standards and employ questionable methods to prevent showing a loss.

Accurate cost records show the folly of the guesswork estimate which is well nigh inseparable from the blanket quotation. Almost without exception a good cost system shows that the profits anticipated by the foundryman from the heavier patterns of the group do not offset the losses from the lighter patterns. Furthermore, in many cases he discovers that the proportion of light castings on re-orders is growing steadily larger, owing to the increasing demand for repair parts on the machine which the customer has sold. Usually, too, the foundryman finds that he has deluded himself with the belief that a large volume of orders from a single account necessarily makes that customer's business profitable. The revelations of the cost system cause logical thinking and logical thinking underlies any advance in practice.

The activities of some foundry managers in correcting abuses revealed by cost records have been the topic of many profitable discussions at foundrymen's meetings in the past few months. In these discussions the subject of unit piece quotations has frequently produced the most heat, if not the most light, on this vexed topic. The impartial observer notes that the more a foundry owner has developed his cost system, the more sturdily does he insist that the unit quotation will remedy many of the existing evils.

In his argument he generally brings out these points: That the number of pieces in an order has a definite bearing on the cost per piece and consequently the quotation should include a range of selling prices based upon the number of pieces ordered. That many buyers by shrewdly (?) pitting one foundry against another in blanket bids cause frequent shifting of contracts from foundry to foundry, finally coming back to the first foundry and thereby completing a cycle in which everyone

concerned has lost money, including the buyer. That each successive foundryman, finding the contract unprofitable, has ultimately sidetracked this customer's work when more profitable work came in, thereby creating delays and other troubles which have often more than offset the cent or more per pound which the customer expected to save when accepting this foundryman's quotation. These are specimen arguments for quotations by the piece; the list could be extended.

When it comes about that all buyers realize that in purchasing castings they are not buying raw stock like bar steel but are really entering into a partnership with another manufacturer in the production of formed parts for their own products, then the foundry cost system will come into its own as a vital factor in reducing costs of all products in which castings are incorporated. Then selling prices of castings will be fixed upon a basis equitable to both seller and buyer; contracts will become more stable, and the foundryman will be encouraged to study the methods he employs to the end that he may retain his established trade by sharing with his customers the gains made by better foundry practices. To-day many a buyer is paying the prices necessary to make 10 castings a day by hand molding when, with a better understanding, more mutual confidence and more actual co-operation between them, the foundryman could so change his rigging and pattern equipment that 75 castings a day could easily be produced by machine molding.

Accurate cost accounting will light the way to the profitable manufacture of castings; and most buyers have learned that it is not good business to be a party to a contract that is not profitable to the seller.

The Puddler's Earnings

Under the present abnormal conditions, labor of all kinds in the steel trade is receiving the highest wage ever known. In sheet and tin-plate mills, the men have been making as much money in four days as they formerly made in six. In many cases they will work but four or five days a week, being fully satisfied with the earnings of the shorter week and having one or two days of idleness. The high wages ruling have led to some exaggerated statements, usually confined to the daily press, but the one quoted below is from a journal devoted to the metal trades:

> As an illustration of the position of operation in the mills, it may be noted that iron puddlers to-day are receiving $8.80 per ton, which is the highest rate in the history of the industry. Two and one-half tons is considered an average day's turn, so that a puddler is making at the rate of $22 per day. Because of the excessive hot weather, however, few of the puddlers have been able to work recently more than four days a week.

In the first place, under the scale of the Amalgamated Association, the men charge in a single puddling furnace about 550 lb. per heat and work five heats in a turn. If the puddler gets out his full allotment of puddled iron, it would mean 2750 lb. Under the present rate of $8.80 per ton of 2240 lb., the earnings for a turn would be not over $12. However, this does not all go to the puddler, as in the hot weather he has two helpers; but under existing rulings of the Amalgamated Association the term "helpers" has been allowed to disappear and the men are put on an equal basis as regards their earning power, the total money earned in a turn by a single puddling furnace being divided between three men, each receiving about $4 per turn when maximum output is secured. On a double puddling furnace, four men work in the winter and six men in the summer. The output of a double puddling furnace is about twice that of a single furnace, so that in the winter four men divide not over $24 per day and in the summer six men divide the same amount. If the output of a double puddling furnace in the summer and winter pays $24 per ton, each man would receive in the summer not over $4 and it rarely reaches that amount, while in the winter his earnings would be very little more than $6 per turn.

It has been said frequently that the puddler is probably the poorest paid wage-earner in the iron trade, considering his skill and his exertions. His work is hard, in the summer it is very hot and exhausting, and yet he does not make at the outside over $5 or $6 per day, and his average earnings would not be over $4 to $4.50 per day. On the other hand, sheet and tin mill hands whose work is much more comfortable on account of the modern facilities installed in many of the mills—notably plates on which the workmen stand and which are cooled by water, also the introduction of pipes through which cooled air is blown—are earning in many mills as high as $12 per day, and in some cases more. While the work of a sheet and tin mill roller or heater requires more skill than that of a puddler, yet the discrepancy in pay seems out of proportion. It is also said, and is no doubt true, that the hard work of puddling wears the worker down faster than sheet or tin mill rolling. To-day many men are working in bar-iron rolling mills as laborers who were formerly puddlers but are no longer able to do that work.

The Trade Commission No Issue

One might reasonably have supposed two years ago, when the Federal Trade Commission and other "trust" measures were being passed by Congress, that the trust subject would be a live one at the next quadrennial election. Such is very distinctively not the case. There are various issues, some clear cut and some quite otherwise, but one does not observe much excitement over the question whether the Federal Trade Commission should be abolished or should have its powers increased.

There is room for discussion, however. It is about two years since the law establishing the commission was enacted, and about a year and a half since the commission formally organized. The experiment has now been conducted for a sufficient length of time to permit of some opinion being formed. Thus far the commission has performed chiefly the function of a lecture bureau, and that work it has done well. Perhaps it has done all that it could do under the law. Business men have consulted their lawyers and have been given the unvarying opinion that the commission is without

legal power. The commission is evidently of the same opinion.

If the commission has in itself no legal power it should at least have influence with the law-making body which created it. The slowness of Congress to act upon its recommendation that the way should be cleared for business men to combine to extend foreign trade is no more creditable to Congress than most of its acts of omission or commission.

One may reasonably ask "What is the use?" If what has occurred or has not occurred in the past year and a half of the commission's existence is the measure or gage of what is to be expected from it, there is question whether it is worth while, although the lecture and other educational features are not without their merits. The Department of Agriculture, the Geological Survey and other branches of the Government all do useful educational work, and the Federal Trade Commission may be doing all that should be expected and no more, but it is rather remarkable that the question constitutes no issue at this time.

Nearly 20 years ago the Interstate Commerce Commission was established, also with powers limited, but not so limited as those of the trade commission. In its first year and a half it accomplished something, and the conduct of the railroads continued to be a live issue, whereby from time to time the commerce act was amended. It may be a trifle early to judge, but it does seem that the quieting down of the trust talk is an indication that the question was not such a great one after all, as two administrations would have the country believe.

There is one unfortunate suggestion, however, in the lack of results, Congressional and otherwise, in connection with the Federal Trade Commission, and that is that the establishment by Congress of a tariff commission might not bring about all that some of its advocates have hoped. To have that commission barren of results would be distinctly disappointing to business interests, when with respect to the Trade Commission business has offered no complaints. Results would not automatically follow the establishment of a tariff commission. Desirable as such a commission is admitted to be, it must not be taken for granted that it will remove the tariff question from politics. Those who have been so eager for that consummation should reflect on the evidence that working results of commission government bear a close relation to the powers conferred.

Iron a Barometer

There is such a disposition in some quarters to regard the activity of the iron and steel industry as being based chiefly upon the war demand for steel that it might be inferred that iron is not at this time the barometer of general trade; but the proposition can be defended that iron and steel activity is at this juncture as close a reflection of general trade activity as has been the case at various times in the past. The production of steel ingots is at a rate considerably more than 40,000,000 tons a year, against only 30,000,000 tons in 1912 and 1913, hitherto the best years, and the war demand for steel does not account for all of the excess tonnage.

Another and very important factor must be considered. There have been times when such general business activity as existed ran largely to new construction work, a line in which steel is particularly prominent. At such times the steel industry was more active than were many others, and if taken as a barometer it rather exaggerated the degree of general prosperity. At the present time the divergence is in the other direction. The employment of steel for strictly new construction is relatively small, and the consumption of steel for various miscellaneous uses, more directly and closely associated with the activities of the people, is relatively large.

The function of the barometer, however, is not to tell of an existing condition, but to furnish means for a forecast, and it may be inquired what light the state of affairs in the steel market throws upon the question how long the war is to last and how long business activity is to last. If one is to judge by the attitude of buyers of steel he may be confused, for some buyers are taking a decidedly conservative if not pessimistic view of the future of their particular lines if high prices for steel are to continue indefinitely. Others are buying with confidence. If we are to judge by the attitude of steel producers there is no occasion to be confused. The steel producers are engaged in new construction work on a large scale and prosecuting it when construction costs are extremely high. Some of the new capacity will be in service within a few months, but much of it not until the lapse of more than a year.

CORRESPONDENCE

Cost Method for Small Shops

To the Editor: Dr. William Kent, at the end of his interesting article on a "New Method of Determining Factory Costs," invites comment.

He seems to have demonstrated, with most direct reasoning, the fallacy of the direct labor burden. The system presented in the article is hardly applicable, however, to the small shop. When the capacity of a plant is not over 200 men, the duties of the so-called non-producers are multifarious. The cost clerk may also have charge of the patterns, the timekeeper may check invoices, and so on. It would seem wise, therefore, to eliminate the job cost by considering it a part of the man-hour cost. The material cost, if necessary, could be limited to storekeepers, transportation, elevator men and the interest items. It would seem advisable to reduce the variations in the machine-hour cost. Bench vises, foot presses, shears, etc., need not carry any power burden, this item being apportioned to all other machines. Thus you would have only two machine-hour rates.

As stated above, these modifications of Dr. Kent's proposed method are for the small shop only, the writer not feeling qualified to approach the subject from the viewpoint of a large plant. However, there are some general questions which suggest themselves. For instance, why is not the purchasing agent charged to materials. Should not a part of the watchman's wages be charged against machine cost? Of course, in many plants certain general expenses are kept as distinct from manufacturing costs as are selling expenses, and

Dr. Kent may have this in mind; but such an arrangement is only feasible when the size of the business warrants the carrying of costs to the utmost detail.

H. D. MURPHY.

The Percentage of Open-Hearth Steel

To the Editor: In the last issue of THE IRON AGE an article appeared under my name dealing with the history of the open-hearth furnace. The very last sentence contained an error. In the original manuscript I made the following statement: "Taking the records for 1913, which was the last normal year, we find that 60 per cent of all the steel came from open-hearth furnaces." This seems to be plain, but perhaps it would have been better if the following words had been added: "The remaining 40 per cent being made in Bessemer converters, including both acid and basic."

Some one in your office altered the wording so as to make the figures show the relative output of steel from acid and basic furnaces. No accurate information can be given on this point, for France, Belgium, Russia and other countries do not classify their open-hearth steel; but it will not be far wrong to say that 14 per cent of all the open-hearth steel produced in the world is made in acid furnaces, while 86 per cent comes from basic hearths.

H. H. CAMPBELL.

Wayne, Pa., Sept. 2, 1916.

Central Western Iron-Ore Rates Readjusted

Advance of 12 Cents to Monessen—With Deliveries at Gates of Yards, Mahoning Valley Furnaces Will Pay More than Before

WASHINGTON, D. C., Sept. 5, 1916.—The Interstate Commerce Commission to-day announced a revision of rates on iron ore from Lake ports to furnaces in Pennsylvania, Ohio and West Virginia, and of practices relating thereto, effective April 1, 1917. The net result, it is believed, will be the imposition of a greater burden on the industry than it now bears, notwithstanding the fact that the change is to be made in supposed response to complaints by the Youngstown Sheet & Tube, Wheeling Steel & Iron and Pittsburgh Steel companies, alleging present rates to be unreasonable and unjustly discriminatory.

If the commission follows up its report on these complaints with the necessary order, a complete change will be made in the method of stating rates on ore. Sharp advances on "dock" or "indirect" ore will result. Attempts will be made, it is known, to prevent disruption of the present rate structure by means of injunctions, but the outcome of these proceedings is uncertain.

As the matter stands, the Pittsburgh Steel Company, the chief complainant, instead of obtaining relief, will be compelled to pay 12c. more per ton for direct and 16c. or 18c. more for dock ore. That advance will follow the transfer of Monessen, where its plant is located, from the Pittsburgh rate group to the Johnstown group.

Nominally Youngstown retains its present rate on direct ore, namely, 56c., Pittsburgh receives a reduction from 88c. to 82c., and Josephine is advanced from 93c. to 94c. As a matter of fact, it is doubtful, in view of another change ordered by the commission—namely, that deliveries shall be made at gates of furnace inclosures instead of on trestles—whether Pittsburgh will have any reduction in charges at all. Youngstown, it is certain, will have its cost of getting ore to the furnace trestles advanced.

UNLOADING SERVICE SEPARATED

The report was written by Commissioner Harlan. That declaration is sufficient to indicate to those who are familiar with Interstate Commerce Commission matters that something unusual has been proposed. The commission's new project is that every ore rate shall be divided into three parts, each part representing a detail of the service. At present rates are stated so as to include the whole service of taking the ore from the "rail of the vessel" to the trestle of the furnace company. Commissioner Harlan's proposal, approved by the commission, is that the unified service shall be treated as three distinct operations, for each of which a charge is to be made. The first is to be a flat rate of 6c. per gross ton for unloading from ship to car. The second is for the rail haul from the dock to the furnace plant inclosure and the third is to cover the placing of the car on the unloading trestle. Stated in accordance with the new method, the rate from Youngstown, now 56c., including the whole service of taking the ore from the hold of the ship and placing it on the trestle ready for dumping, will be 6c. for unloading, 50c. for carrying from dock to furnace inclosure and a charge on an engine-hour basis for hauling the cars up the trestle. Inasmuch as the present whole-service rate to Youngstown is exactly equal to the sum of the proposed rates for unloading and hauling, it is obvious that the whole charge, after April 1, will be greater by the cost of placing the ore on the trestles.

In pursuit of the ideal, Commissioner Harlan thinks the practice of a railroad in "spotting" the cars on the trestle is vicious, because all railroads do not do it for their customers. Therefore, he holds, no road should be permitted to perform this service. When this regulation goes into force, switching for furnaces will not be in accordance with the rule approved by the U. S. Supreme Court in the Los Angeles switching cases, which was that the rate shall include the ordinary service of setting a car on a private or company track, convenient for loading, hauling it to the destination community and there placing it upon a company or private track "convenient for unloading."

The groupings of Lake ports as points of origin and of furnace towns as groups of destination are also to be changed. None, however, results in such penalties as that which Monessen must suffer. The destination groups and distances are to be as follows: Youngstown to include furnace points from 50 to 74 miles from the lake; Leetonia, 75 to 99 miles; Midland, 100 to 124 miles; Pittsburgh-Wheeling, 125 to 159 miles, and Monessen-Johnstown, 160 to 199 miles. Monessen is 162.5 miles from the lake. That slight excess of distance will cost the Pittsburgh Steel Company 12c. a ton on its ore.

DIRECT AND DOCK ORE

Dock ore at present bears a rate of from 8c. to 10c. greater than direct ore. The rate on dock ore is also to be stated so as to show its components. The railroads which own the unloading devices are to charge 16c. for taking the ore out of the ship and depositing it in a stock pile and 10c. for taking it from the stock pile to the car. That means a net increase of 16c. in dock ore that now pays 10c. more than direct ore and of 18c. in the case of ore that costs 8c. more than direct ore.

A positive order respecting these changes is to be issued in time to enable the carriers to make them by April 1, or a month before the lake navigation season opens. No order will be made respecting deliveries beyond the gates of the furnace enclosures. The testimony showed, Commissioner Harlan thinks, that it would not be just to arrange that compensation on the per-ton basis. He points out that the expense to the

carrier for making deliveries "at convenient points for unloading" consists of assigning engines and crews to place a draft or drafts of cars on the trestles and that each engine can haul more cars than it is usually called upon to push up the incline. Therefore, the suggestion is that the charge be on the engine-hour basis; that is, the furnace is to pay according to the number of hours it uses an engine and crew, regardless of the number of tons of ore handled. This innovation, in the eyes of those familiar with the commission's rulings, is in conflict with its consistent pronouncements that the carload is the proper unit for measuring rates and not the trainload, as large shippers have proposed and as various railroads have approved.

RAILROAD EQUALIZATION CALLED VICIOUS

According to the report, the effort heretofore made by the railroads to equalize the cost of assembling the raw materials used in making pig iron is vicious and has utterly failed, hence the commission's determination to try something else. How the new system of rate making will work out remains to be seen.

Dissenting from the findings of the majority, Commissioner McChord asserts there is nothing in the record justifying the advance in rates for the Monessen furnaces. He also points out that the average loaded car-mile revenue to the Pittsburgh-Wheeling district under present rates is 27c.; to Pittsburgh proper, 32.9c.; to Monessen, 25.7c., and to Johnstown, 21.2c., while to DuBois-Punxsutawney it is 16.3c.; to Hamilton-Wellston (Ohio), 11.3c., and to Ashland-Ironton (Ohio and Kentucky), 13.2c. He figures that on the basis of the average tonnage hauled during the period 1909-1914, the revenue of the carriers, under the rates to be made effective in April, will be $50,000 greater annually than at present, even without considering the revenue that will result from the extra charge for trestle delivery. Nearly 25,000,000 tons is involved. Fifteen cents per loaded car-mile is deemed a remunerative rate. Commissioner McChord also criticises his colleagues for keeping up rates to the central district (southwestern Pennsylvania, southeastern Ohio and northern West Virginia), while leaving rates to the western (southwestern Ohio) and the eastern (Punxsutawney and DuBois) at their present levels, which are low in comparison with Pittsburgh-Wheeling. W. L. C.

Hearing on Iron and Steel Export Rates

A number of iron and steel manufacturers will appear before the Board of Suspension of the Interstate Commerce Commission on Monday, Sept. 18, in reference to the proposed withdrawal of export freight rates on iron and steel articles effective Oct. 1, 1916. The Pollak Steel Company, Bernard E. Pollak, treasurer and general manager, has submitted a statement to the Interstate Commerce Commission in opposition to the change, contending that the domestic freight rate to the seaboard is too high and that in case the export rate is withdrawn the domestic rate should be lowered. Copies of this brief will be furnished other shippers desiring them.

The steel trade in California is taking a keen interest in electric furnaces, and several new installations will give an opportunity for a close comparison of performances. Since the installation of a Heroult furnace by the Monarch Iron Works at Stockton, Cal., the Samson Sieve-Grip Tractor Company of that place has ordered a Rennerfelt furnace of ¾ ton capacity, which will start up in October. The Enterprise Foundry, San Francisco, is building an electric furnace of its own design, the work being under the supervision of its electrical engineer and the superintendent of the steel-furnace department. The transformer installation for this plant has been ordered from the Allis-Chalmers Company.

The Chicago Bridge & Iron Works, Chicago, Ill., has opened an office in the Florida Life Building, Jacksonville, Fla. Sales in the states of Georgia, Florida and Alabama will be handled from this office, which will be in charge of Elwood G. Ladd.

Papers to Be Read at Foundry Meetings

The papers to be read at the technical sessions at 10 o'clock on Tuesday, Wednesday, Thursday and Friday mornings,, next week, at the foundry convention in Cleveland, particularized by groups and as regards special features, elsewhere in this issue, are as follows:

Tuesday, Sept. 12.

Symposium on "The Results of Closer Co-Operation Between the Engineer and the Foundry," as relating to:

"Gray Iron," by D. W. Sowers, Sowers Mfg. Company, Buffalo.

"Steel," by John Howe Hall, Taylor-Wharton Iron & Steel Company, High Bridge, N. J.

"Malleable Iron," by G. F. Meehan, Ross-Meehan Foundries, Chattanooga, Tenn.

"Non-Ferrous Metals," by C. E. Chase, Modjeski & Angier, Chicago.

Symposium on "The Influence of Gating on Castings," covering

"Gray Iron," by B. D. Fuller, Westinghouse Electric & Mfg. Company, Cleveland.

"Steel," by William Gilmore, Hubbard Steel Foundry Company, East Chicago, Ind.

"Malleable Iron," by A. M. Fulton, Fort Pitt Malleable Iron Company, Pittsburgh.

"Non-Ferrous Metals," by R. R. Clarke, Pennsylvania Lines West, North Side, Pittsburgh.

"Waste Foundry Sand," by H. B. Swan, Cadillac Motor Car Company, Detroit, and H. M. Lane, consulting engineer, Detroit.

"The Significance of the Fire Waste," by Franklin H. Wentworth, secretary, National Fire Protection Association, Boston.

"What the Pratt Institute Has Done, Is Doing and Hopes to Do, in the Training of Men for the Foundry Industry," by Samuel S. Edmunds, Pratt Institute, Brooklyn.

"Analyzing Foundry Operations as a Basis for Improvement in Shop Conditions," by R. E. Kennedy, University of Illinois, Urbana, Ill.

"Foundry Work at the University of Nebraska," by John Grennan, University of Nebraska, Lincoln, Neb.

Wednesday, Sept. 13

Report of A. F. A. Committee on Foundry Costs, by B. D. Fuller, chairman.

"Foundry Costs," by Clinton H. Scovell, Clinton H. Scovell & Company, Boston.

"Profit Sharing as a Factor in Preparedness," by C. E. Knoeppel, C. E. Knoeppel Company, New York.

Report of A. F. A. Committee on Foundry Scrap, by G. E. Jones, chairman, Whiting Foundry Equipment Company, Harvey, Ill.

Report of A. F. A. Representatives on the Conference Board on Training Apprentices, by B. D. Fuller.

Report of A. F. A. Advisory Committee to the United States Bureau of Standards, by Richard Moldenke, chairman, Watchung, N. J.

"How Some Cleaning Room Problems Have Been Solved," by H. Cole Estep, *The Foundry*, Cleveland.

"The Introduction of the Molding Machine in Foundries," by A. O. Backert, Penton Publishing Company, Cleveland.

Brass Foundry Session:

"Twenty-five Years' Experience in the Brass Foundry," by E. A. Barnes, Fort Wayne Electric Company, Fort Wayne, Ind.

"Evolution of the Die Casting Process," by Charles Pack, Doehler Die Casting Company, Rochester, N. Y.

"How a Large Manufacturing Concern Disposes of Its Old Metal," by J. M. Bateman, Western Electric Company, Cleveland.

"The Reclamation of Brass Ashes," by Arthur F. Taggart, Hammond Laboratory, Yale University, New Haven, Conn.

"The Small Leaks of a Brass Foundry," by Charles T. Bragg, Ohio Brass Company, Mansfield, Ohio.

"The Application of the Oxy-Acetylene Welding Process in the Repair of Defective Non-Ferrous Castings," by S. W. Miller, Rochester Welding Company, Rochester, N. Y.

"Allows to Withstand Internal Air Pressure," by S. D. Sleeth, Westinghouse Air Brake Company, Wilmerding, Pa.

"Making Thin-Walled Castings," by R. S. B. Wallace, National Cash Register Company, Dayton, Ohio.

Thursday, Sept. 14

Steel Session:

Symposium on "Electric Furnace Practice."

"The Ideal Electric Furnace for the Steel Foundry" by F. J. Ryan, E. B. McKee and W. D. Walker, Snyder Electric Furnace Company, Chicago.

"The Electric Furnace in the Foundry," by E. B. Clarke, Buchanan Electric Steel Company, Buchanan, Mich.

"Gronwall-Dixon Electric Melting and Refining Furnace," by John A. Crowley, John A. Crowley Company, New York.

"Electric Furnace Practice in the Manufacture of Steel Castings," by T. S. Quinn, Lebanon Steel Foundry, Lebanon, Pa.

"Electric and Converter Steel Compared," by Peter Blackwood, Blackwood Steel Foundry Company, Springfield, Ohio.

"The Manufacture of Manganese Steel Castings," by W. S. McKee, American Manganese Steel Company, Chicago.

"The Presence of Alumina in Steel," by G. F. Comstock, Titanium Alloy Mfg. Company, Niagara Falls, N. Y.

Malleable Session:

"The 25-Ton Air Furnace," by F. C. Rutz, Rockford Malleable Iron Works, Rockford, Ill.

"What Is the Normal Fracture of Good Malleable Iron?" by Enrique Touceda, Albany, N. Y.

"The Commercial Side of the Malleable Iron Industry," by W. G. Kranz, National Malleable Casting Company, Cleveland.

"The Application of Malleable Iron Castings in Car Construction," by Frank J. Lanahan, Port Pitt Malleable Iron Company, Pittsburgh.

Report of A. F. A. Committee on Standard Specifications for Malleable Iron Castings, by Enrique Touceda, chairman.

"Suggested Standards for Pattern Parts," by W. W. Carlson, Kansas State Agricultural College, Manhattan, Kan.

Heat-Treatment, Corrosion, etc., Non-Ferrous Metals:

"Deterioration of Muntz Metal," by H. S. Rawdon, United States Bureau of Standards, Washington, D. C.

"The Initial Stress Produced by the Burning-In of Manganese Bronze," by Paul D. Merica and C. P. Karr, United States Bureau of Standards.

"A Curious Case of Corrosion of Tinned Sheet Copper," by Paul D. Merica.

"Notes on the Occurrence and Significance of Twinned Crystals in Electrolytic Copper," by H. S. Rawdon.

"The Annealing Properties of Copper," by G. V. Caesar and G. C. Gerner, Hammond Laboratory, Yale University, New Haven, Conn.

"Some Uses and Properties of German Silver as Applied to the Optical Trade," by G. C. Holder, American Optical Company, Southbridge, Mass.

Gray Iron Session: *Friday, Sept.* 15.

"The Effects of Different Mixtures on the Strength of Chilled Car Wheels," by G. S. Evans, Lenoir Car Works, Lenoir City, Tenn.

"Semi-Steel Classified," by David McLain, McLain's System, Milwaukee.

Report of A. F. A. Committee on Standard Methods for Analyzing Coke, by H. E. Diller, chairman, General Electric Company, Erie, Pa.

"Use of By-product Coke in Foundries," by George A. T. Long, Pickands, Brown & Co., Chicago.

"The Use of Borings in Cupola Operations," by James A. Murphy, Hooven, Owens & Rentschler Company, Hamilton, Ohio.

"The Use of Cheaper Materials," by C. C. Kawin, Charles C. Kawin Company, Chicago.

"One-third of a Century in a Gray Iron Foundry," by Alfred E. Howell, Phillips & Buttorff Mfg. Company, Nashville, Tenn.

"Thermal Reactions in Gray Iron," by Thomas Turner, The University, Birmingham, England.

Report of A. F. A. Committee on General Specifications for Gray Iron Castings, by W. P. Putnam, chairman, Detroit Testing Laboratory, Detroit:

Steel Session:

"The Use of Titanium in the Manufacture of Steel Castings," by W. A. Janssen, Bettendorf Company, Davenport, Iowa.

"Acid Versus Basic Steel for Making Castings," by E. F. Cone, THE IRON AGE, New York.

"Alloy Steel Castings," by David Evans, Chicago Steel Foundry Company, Chicago.

"Theory and Practice in Gating and Heading Steel Castings," by Ralph D. West, West Steel Casting Company, Cleveland.

"The Small Open-Hearth as a Flexible Unit for Either Large Steel Foundries or General Jobbing Shops," by Frank Carter, Milwaukee, Wis.

Report of A. F. A. Committee on Specifications for Steel Castings, by John Howe Hall, chairman.

Physical Tests, Metallography, etc., Non-Ferrous Metals:

"Aluminum Castings and Forgings," by P. E. McKinney, United States Navy Yard, Washington, D. C.

"Copper-Aluminum-Iron Alloys," by W. M. Corse, Titanium Alloy Mfg. Company, Niagara Falls, N. Y.

"Physical Tests on Common High Brass Taken Parallel and at Right Angles to the Direction of Rolling," by William B. Price and Philip Davidson, Scovil Mfg. Company, Waterbury, Conn.

"Seasoning Cracks and the Self-Annealing of Brass," by W. Arthur, Frankford Arsenal, Frankford, Philadelphia.

"Co-operation with the Metal Industries in Metallographic Work," by C. H. Mathewson, director, Hammond Laboratory, Yale University, New Haven, Conn.

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Japan's Boom in Metals

The boom in Japan's metal industry in 1915 appears from the statement of the director of the Mining Bureau of the Department of Agriculture and Commerce that the total value of the mineral output in 1915 was $87,711,075, exclusive of the production of the Government iron works. This was a gain of $10,428,620 over 1914. The total value of metals produced amounted to $17,811,405, or 57 per cent above the previous year's figures. The increase in copper output was 7 per cent, and in value more than 37 per cent over 1914. Antimony output increased 200 per cent, while the gain in value was 8750 per cent. Zinc showed an advance of 206 per cent in output and 804 per cent in value.

LITTLE CHANGE IN PIG IRON

August Falls Below July in Output

A Gain of Four Furnaces, However, and September Rate Is Higher

Due to hot and humid weather, August pig-iron production fell slightly below that of July. The total as reported to THE IRON AGE was 3,203,713 tons, or 103,346 tons a day, against 3,224,513 tons in July, or 104,017 tons a day. There was a net gain of four active furnaces in the changes caused by the blowing in and blowing out of furnaces in August. The number on the active list Sept. 1 was 320, with a daily capacity of 104,502 tons, against 316 active furnaces on Aug. 1, with a daily capacity of 103,624 tons.

DAILY RATE OF PRODUCTION

The daily rate of production of coke and anthracite pig iron by months, from August, 1915, is as follows:

Daily Rate of Pig-Iron Production by Months—Gross Tons

	Steel Works	Merchant	Total
August, 1915	67,801	21,865	89,666
September	70,977	24,108	95,085
October	78,595	22,227	100,822
November	78,289	27,962	101,244
December	73,647	29,686	103,333
January, 1916	72,614	30,132	102,746
February	75,305	31,151	106,456
March	76,274	31,393	107,667
April	77,226	30,366	107,592
May	77,706	30,716	108,422
June	76,526	30,527	107,053
July	[illegible]	[illegible]	[illegible]
August	74,617	28,729	103,346

CAPACITY IN BLAST SEPTEMBER 1 AND AUGUST 1

The following table shows the daily capacity in gross tons of furnaces in blast September 1 and August 1 by districts:

Coke and Anthracite Furnaces in Blast

Location of furnaces	Total number of stacks	Sept. 1 Number in blast	Sept. 1 Capacity per day	Aug. 1 Number in blast	Aug. 1 Capacity per day
New York:					
Buffalo	12	10	[illegible]	10	[illegible]
Other New York	5	3	[illegible]	3	[illegible]
New Jersey	6	1	[illegible]	1	214
Pennsylvania:					
Lehigh Valley	10	1	[illegible]	1	[illegible]
Spiegel	2	[illegible]	[illegible]	2	[illegible]
Schuylkill Val.	12	11	[illegible]	10	2,897
Lower Susquehanna	6	[illegible]	[illegible]	[illegible]	[illegible]
Lebanon Valley	8	[illegible]	[illegible]	[illegible]	[illegible]
Ferro and Spiegel	1	1	[illegible]	[illegible]	[illegible]
Pittsburgh Dist.	73	49	[illegible]	[illegible]	[illegible]
Ferro	3	[illegible]	[illegible]	[illegible]	[illegible]
Shenango Val.	19	19	[illegible]	18	[illegible]
Western Pa.	24	20	[illegible]	18	[illegible]
Ferro and Spiegel	2	1	[illegible]	1	[illegible]
Maryland	3	3	[illegible]	3	[illegible]
Ferro	1	1	[illegible]	1	[illegible]
Wheeling Dist.	14	13	[illegible]	13	[illegible]
Ohio:					
Mahoning Val.	25	24	10,445	25	10,613
Central and Northern	24	[illegible]	[illegible]	21	[illegible]
Hock. Val., and Hanging Rock	15	11	[illegible]	11	[illegible]
Ill. and Ind.	35	31	[illegible]	[illegible]	14,000
Ferro	2	1	[illegible]	1	[illegible]
Michigan, Wis. & Minn.	12	[illegible]	[illegible]	[illegible]	[illegible]
Col. and Mo.	6	[illegible]	[illegible]	[illegible]	[illegible]
Ferro	1	1	[illegible]	1	[illegible]
The South:					
Va.	18	[illegible]	[illegible]	[illegible]	[illegible]
Ky.	7	[illegible]	[illegible]	[illegible]	[illegible]
Ala.	28	24	[illegible]	23	[illegible]
Tenn.	1	[illegible]	[illegible]	[illegible]	[illegible]
Total	364	320	[illegible]	316	104,624

Among furnaces blown in between Aug. 1 and Sept. 1 was one Bethlehem in the Lehigh Valley, Meily in the Lebanon Valley, Ella in the Shenango Valley, one Cambria at Johnstown and one Saxton in western Pennsylvania, Oriskany in Virginia, one Central at Cleveland, one Wellston in the Hanging Rock district, Mississippi Valley in Missouri and one Gadsden and Woodstock in Alabama.

Among furnaces blown out last month were one Isabella in the Pittsburgh district, Marshall in western Pennsylvania, Covington in Virginia, one Ashland in Kentucky, Cherry Valley in Mahoning Valley, Hamilton in Hanging Rock district, one Clifton in Alabama and Standard in Tennessee.

OUTPUT BY DISTRICTS

The accompanying table gives the production of all coke and anthracite furnaces in August and the three months preceding:

Monthly Pig-Iron Production—Gross Tons

	May (31 days)	June (30 days)	July (31 days)	Aug. (31 days)
New York	210,464	190,140	190,319	182,812
New Jersey	6,856	6,379	6,621	7,020
Lehigh Valley	117,870	111,689	104,834	99,650
Schuylkill Valley	94,254	93,112	89,811	88,373
Lower Susquehanna and Lebanon Valley	81,288	75,092	73,440	69,358
Pittsburgh district	730,[illegible]	728,071	726,477	721,917
Shenango Valley	181,[illegible]	175,[illegible]	178,208	179,970
Western Pennsylvania	167,014	171,[illegible]	169,979	172,970
Maryland, Virginia and [illegible]	94,[illegible]	85,687	87,294	92,540
W. [illegible]	141,[illegible]	125,[illegible]	128,[illegible]	123,426
[illegible]	344,[illegible]	315,[illegible]	314,461	326,413
Central and Northern [illegible]	274,695	274,[illegible]	261,162	263,587
Hocking Valley and [illegible]	46,[illegible]	48,640	48,624	50,168
[illegible]	481,[illegible]	462,394	446,[illegible]	460,836
Mich., Minn., Mo., Wis.	125,[illegible]	123,116	121,285	115,341
Ala. [illegible]	228,[illegible]	204,[illegible]	213,973	219,076
[illegible]	32,81[illegible]	[illegible],[illegible]	33,299	30,056
Total	3,361,[illegible]	3,211,[illegible]	3,224,513	3,203,713

PRODUCTION OF STEEL COMPANIES

Returns from all furnaces of the United States Steel Corporation and the various independent steel companies show the following totals of steel-making iron month by month, together with ferromanganese and spiegeleisen. These last, while stated separately, are also included in the columns of "total production."

Production of Steel Companies—Gross Tons

	Pig, total production 1914	1915	1916	Spiegeleisen and ferromanganese 1914	1915	1916
Jan.	1,261,430	1,115,944	2,251,035	17,325	18,041	24,866
Feb.	1,329,414	1,237,380	2,183,845	10,524	13,319	23,877
Mar.	1,704,688	1,551,082	2,365,116	20,133	12,274	29,388
Apr.	1,635,226	1,584,111	2,316,768	18,676	12,337	31,862
May	1,457,847	1,694,290	2,408,890	21,504	13,440	35,844
June	1,329,623	1,770,657	2,295,784	16,254	19,200	38,597
July	1,[illegible]	1,[illegible]	2,[illegible]	16,524	17,854	31,353
Aug.	1,455,054	2,101,818	2,[illegible]	[illegible]	[illegible]	[illegible]
Sept.	1,390,322	2,129,322	.....	13,786	23,159	.....
Oct.	1,271,820	2,281,456	.....	17,435	23,992	.....
Nov.	1,059,159	2,198,459	.....	21,977	28,741	.....
Dec.	1,034,802	2,283,047	.....	20,733	25,004	.....

THE RECORD OF PRODUCTION

[illegible] Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1912—Gross Tons

	1912	1913	1914	1915	1916
Jan.	2,057,911	2,795,331	1,885,054	1,601,421	3,185,121
Feb.	2,100,815	2,586,337	1,888,670	1,674,771	3,087,212
Mar.	2,405,318	2,763,563	2,347,867	2,063,834	3,337,691
Apr.	2,375,436	2,752,761	2,269,655	2,116,494	3,227,768
May	2,512,582	2,822,217	2,092,686	2,263,470	3,361,073
June	2,440,745	2,628,565	1,917,783	2,380,827	3,211,588
July	2,[illegible]	2,560,646	1,957,645	2,563,420	3,224,513
Aug.	2,[illegible]	2,545,763	1,[illegible]	2,779,647	3,203,713
[illegible]	18,[illegible]	21,455,183	16,354,621	17,443,884	25,838,679
Sept.	2,463,839	2,505,927	1,[illegible]	2,852,561	.....
Oct.	2,[illegible]	2,546,261	1,778,186	3,125,491	.....
Nov.	2,630,854	2,233,123	1,518,316	3,037,308	.....
Dec.	2,[illegible]	1,983,507	1,515,752	3,203,322	.....
Total, [illegible]	28,[illegible]	30,724,101	23,049,752	29,662,566	.....

DIAGRAM OF PIG-IRON PRODUCTION AND PRICES

The figures for daily average production, beginning January, 1909, are as follows:

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1909—Gross Tons

	1909	1910	1911	1912	1913	1914	1915	1916
Jan.	57,975	84,148	56,752	66,384	90,172	60,808	51,659	102,746
Feb.	60,976	85,616	64,090	72,442	92,369	67,453	59,813	106,456
Mar.	59,232	84,459	70,036	77,591	89,147	75,738	66,575	107,667
Apr.	57,962	82,792	68,836	79,181	91,759	75,665	70,550	107,592
May	60,753	77,102	61,079	81,051	91,039	67,506	73,015	108,422
June	64,656	75,516	59,585	81,358	87,619	63,916	79,361	107,053
July	67,793	69,305	57,841	77,738	82,601	63,150	82,691	103,624
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Sept.	79,507	68,476	65,903	82,128	83,531	62,753	95,085	.....
Oct.	83,856	67,520	67,811	86,722	82,133	57,361	100,822	.....
Nov.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.....
Dec.	85,022	57,349	65,912	89,766	63,987	48,896	103,333	.....

The fluctuations in pig-iron production from January, 1908, to the present time are shown in the accompanying chart. The figures represented by the heavy lines are those of daily average production, by months, of coke and anthracite iron. The two other curves on the chart represent monthly average prices of Southern No. 2 foundry pig iron at Cincinnati and of local No. 2 foundry iron at furnace at Chicago. They are based on the weekly market quotations of THE IRON AGE.

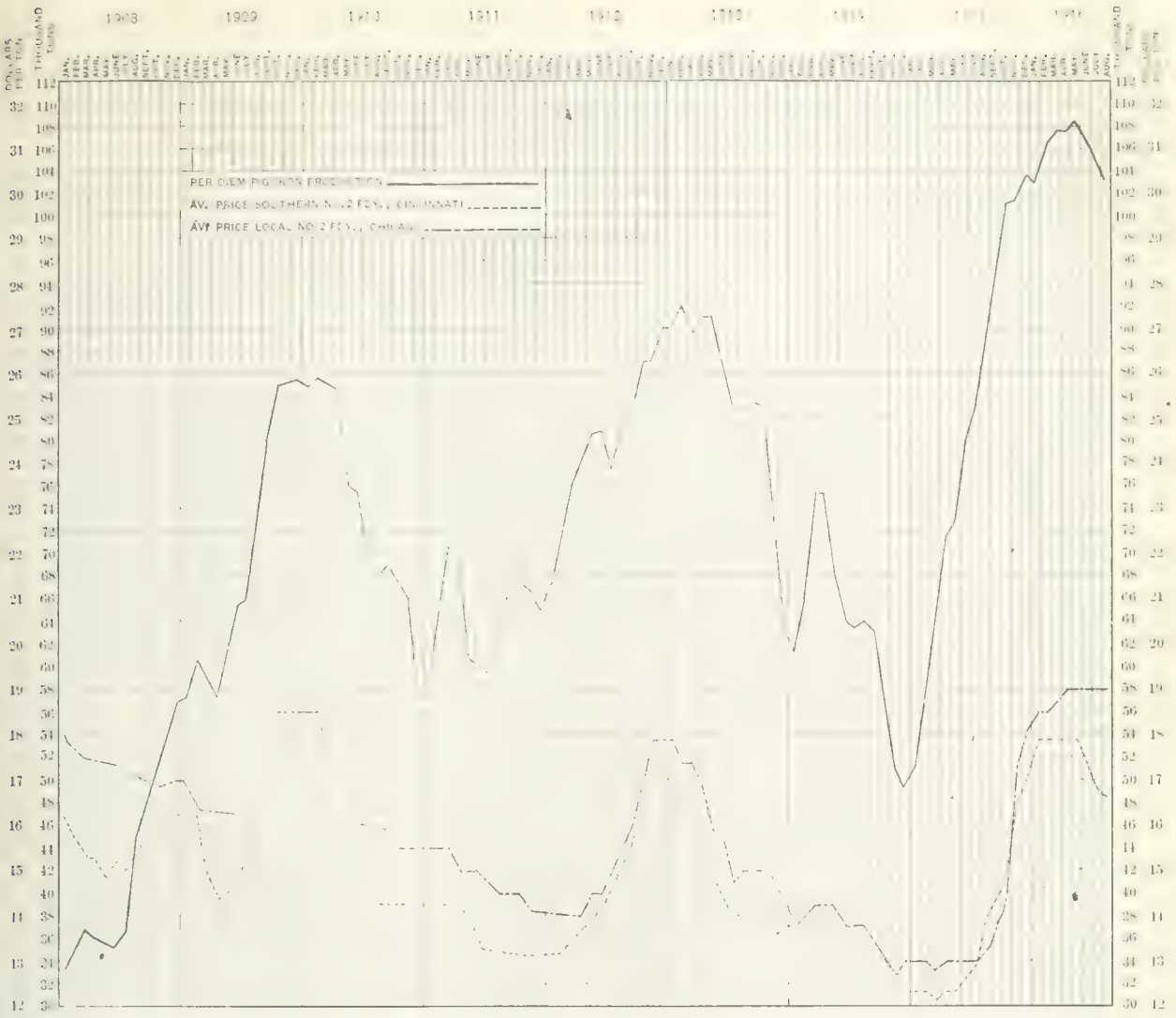


Diagram of Daily Average Production by Months of Coke and Anthracite Pig Iron in the United States from Jan. 1, 1908, to Sept. 1, 1916, Also of Monthly Average Prices of Southern No. 2 Foundry Iron at Cincinnati and Local No. 2 Foundry Iron at Chicago District Furnace

Blast Furnace Notes

The Alabama Company blew in its No. 1 furnace at Gadsden, Ala., Aug. 31, for the production of Etowah pig iron. Only one of the company's furnaces at Ironaton is now in operation, the No. 2 furnace there having been blown out.

B furnace of the Detroit Iron & Steel Company at Zug Island, Detroit, is now ready to go in blast.

It is expected that the blast furnace at Big Stone Gap, Va., will be blown in at the beginning of the new year.

D furnace of the Bethlehem Steel Company's Lehigh plant, South Bethlehem, Pa., was blown in Aug. 31, having been out since July 29 for relining.

No. 7 Franklin blast furnace of the Cambria Steel Company, Johnstown, Pa., has been started up after being relined. In addition the shell was remodeled.

The No. 1 Bird Coleman furnace of the Lackawanna Iron & Steel Company at Cornwall, Pa., is being relined.

Merchant Mill Record at Bethlehem

The 22-in. mill of the new merchant mill layout of the Bethlehem Steel Company, South Bethlehem, Pa., broke its record with an output of 9189 tons in August, as compared with 8168 tons, the previous high figure, reached in May of this year.

The Iron Products Company, Philadelphia, has taken over the Slatington Rolling Mill at Slatington, Pa., and proposes to put it in operation at once in the manufacture of merchant bar iron. A dispatch from Allentown states that the capacity of the plant will be doubled.

Germany's Steel Output for June

Germany's steel output for June is reported as 1,319,762 metric tons, against 1,412,137 tons in May, the record war month. Counting 24 German working days in June, the daily output was 54,990 tons, the largest since the war started, the previous record having been 52,301 tons per day in May. The June total was made up of 659,347 tons of Bessemer steel, 539,647 tons of open-hearth steel, 96,784 tons of steel castings, 8947 tons of crucible steel, and 15,037 tons of electric steel. The steel-casting and electric steel output are unusually large.

To July 1, 1916, the steel output was 7,746,000 tons, against 6,187,000 tons to July 1, 1915, or an increase of about 25 per cent. In the same period this year the pig-iron output was 6,497,000 tons, so that steel production now exceeds that of pig iron.

Transcontinental Freight Advances Postponed

The Interstate Commerce Commission has suspended from Sept. 1 until Dec. 30, 1916, the operation of certain tariffs which contain proposed increased transcontinental commodity rates to and from Pacific coast points. These schedules were the subject of an informal hearing before the Board of Suspension at Washington, Aug. 14 to 19 inclusive, on application by shippers from various parts of the country for suspension thereof. The advanced rates would have borne especially heavy on shipments of pig iron, cast-iron pipe and coke from Alabama.

The Greenfield Tap & Die Corporation, Greenfield, Mass., has discontinued its store in Detroit.

Iron and Steel Markets

STEEL EXPORTS FALL OFF

July Below May and June Records

Allies Buying Shell Steel Discards—Iron-Ore Movement at High Point

That pig-iron output in August fell below that of July indicates the handicaps under which the industry is trying to meet the present unparalleled demands upon it. Last month's total was 3,203,713 tons, or 103,346 tons a day, against 3,224,513 tons in July, or 104,017 tons a day. Heat and humidity counteracted the effect of a slight increase in active furnaces. September should show some gain, as 320 furnaces were in blast at the opening of the month, with a daily capacity of 104,502 tons, as against 316 furnaces on Aug. 1, representing a capacity of 103,624 tons a day.

The height of the buying movement in pig iron so far as concerns the Central West seems to have been passed last week. Following the marked activity in basic iron, foundries came into the market and a good many 3000 to 6000-ton sales were made. Perhaps 50,000 tons was taken up by such buyers. At Chicago the buying of foundry iron for the first half has been relatively less than in other districts.

Southern iron, which has long been weaker than Northern grades, is at last putting on a better front. While $14 for No. 2 is still possible on two or three brands, $14.50, Birmingham, is more commonly the price for this year's delivery, while for next year $14.50 to $15 has been the range of recent contracts.

On both export and domestic account buying of steel keeps up on a scale showing that hopes of lower prices have been put aside indefinitely. For the Allies the taking up of large lots of shell steel discards further accents the scarcity of the forms of steel for which they have been scouring the market lately. Two Central Western steel companies have disposed of about 100,000 tons of such material and the supply is now about cleaned up.

The July exports of iron and steel reported in tons were 496,000 tons, against 527,000 tons in June and 540,000 tons at the highest rate, which was in May. It is not to be concluded from these figures that the high point has been reached in the war boom, but the export movement will be closely watched for signs of the turn. Steel works order books do not show it.

The placing with a Western maker of 4000 small gondola-type cars is the only tangible outcome thus far of the long negotiations for rolling stock for Russia. Many more cars are needed, but the deal has taken a devious road.

Further sales of ship steel have been made to Japan, including 10,000 tons of plates. Canada is buying steadily in this market, the week's orders including 7000 tons of structural steel placed at Chicago.

The railroads find a surprisingly small amount of steel in some of their lines available for the first half of next year. Belated inquiries have come out in Chicago, showing that spikes, bolts and angle bars from usual sources will not be available before the last quarter of 1917 and that tie plates are sold up to the second quarter of next year.

Bar contracts for the first half of next year are rapidly taking up the remaining capacity and users of high carbon bars have been actively covering their needs.

Another record in iron-ore shipments from Lake Superior was made in August at 9,850,000 tons. The total to Sept. 1 was 39,215,000 tons. Allowing that the grain movement will reduce ore shipments in September and October below the season's average thus far, and reckoning only 5,000,000 tons for November, there is still a prospect that the total will exceed 62,000,000 tons.

The Interstate Commerce Commission's decision on iron-ore rates from Lake Erie ports to furnaces in the Central West wipes out the long-standing equalizing scheme of the railroads in a way little expected by the complaining furnace companies. The net result is no reduction for most of them and for many an actual increase. Such a wrenching of the competitive line-up will not be serious while the boom lasts, but since it will bring on the overhauling of iron and steel freight rates in all districts its ultimate possibilities are highly disturbing.

Pittsburgh

PITTSBURGH, PA., Sept. 5, 1916.

Reports are that the Allies have been heavy buyers of shell steel discards recently, and that the local supply has been pretty well cleaned up. One Youngstown interest is said to have sold 50,000 to 60,000 tons of discards for export, and another interest nearly as large an amount. This will emphasize the shortage in supply of soft Bessemer and open-hearth steel, as a good many users that were buying shell steel discards will now have to buy regular soft Bessemer and open-hearth steel. As an offset to this, many of the steel casting makers are now casting ingots and selling them to the steel plants, the amount of such steel available being very considerable. The general market is without particular change, sellers stating there is no trouble in selling anything at good prices if they can make the deliveries. The market on Bessemer and basic pig iron is strong, some sellers absolutely refusing to shade $18.50, Valley furnace, on basic iron. There is a good deal of inquiry for foundry iron for first half of next year. Steel billets and sheet bars are still scarce, bring-

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

Pig Iron, Per Gross Ton.	Sept. 6, 1916.	Aug. 30, 1916.	Aug. 9, 1916.	Sept. 8, 1915.
No. 2 X, Philadelphia...	$19.50	$19.50	$19.50	$16.00
No. 2, Valley furnace....	18.25	18.25	18.25	14.50
No. 2 Southern, Cin'ti...	16.90	16.90	16.90	13.90
No. 2, Birmingham, Ala..	14.00	14.00	14.00	11.00
No. 2, furnace, Chicago*	**18.50**	18.00	18.50	13.50
Basic, del'd, eastern Pa..	19.75	19.75	19.00	17.00
Basic, Valley furnace....	18.00	18.00	18.00	14.50
Bessemer, Pittsburgh	21.95	21.95	21.95	16.95
Malleable Bess., Ch'go..*	19.00	19.00	19.00	13.50
Gray forge, Pittsburgh..	18.70	18.70	18.70	14.70
L. S. charcoal, Chicago..	19.75	19.75	19.75	15.75
Billets, etc., Per Gross Ton				
Bess. billets, Pittsburgh..	45.00	45.00	43.00	24.00
O.-h. billets, Pittsburgh..	45.00	45.00	45.00	24.50
O.-h. sheet bars, P'gh....	45.00	45.00	45.00	25.00
Forging billets, base, P'gh	69.00	69.00	69.00	32.00
O.-h. billets, Phila.....	48.00	48.00	45.00	32.00
Wire rods, Pittsburgh....	55.00	55.00	55.00	29.00
Finished Iron and Steel,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.47½	1.47½	1.47½	1.25
O.-h. rails, heavy, at mill	1.56½	1.56½	1.56½	1.34
Iron bars, Philadelphia..	2.659	2.659	2.659	1.459
Iron bars, Pittsburgh....	2.60	2.60	2.60	1.35
Iron bars, Chicago.....	2.35	2.35	2.35	1.25
Steel bars, Pittsburgh....	2.60	2.60	2.50	1.35
Steel bars, New York....	2.769	2.769	2.669	1.519
Tank plates, Pittsburgh..	4.00	4.00	3.50	1.35
Tank plates, New York..	4.169	4.169	3.669	1.519
Beams, etc., Pittsburgh..	2.60	2.60	2.50	1.35
Beams, etc., New York..	2.769	2.769	2.669	1.519
Skelp, grooved steel, P'gh	2.35	2.35	2.35	1.30
Skelp, sheared steel, P'gh	2.45	2.45	2.45	1.35
Steel hoops, Pittsburgh..	3.00	3.00	2.75	1.35

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire, Per Lb. to Large Buyers:	Sept. 6, 1916. Cents.	Aug. 30, 1916. Cents.	Aug. 9, 1916. Cents.	Sept. 8, 1915. Cents.
Sheets, black, No. 28, P'gh	2.90	2.90	2.90	1.90
Galv. sheets, No. 28, P'gh	4.15	4.15	4.25	3.60
Wire nails, Pittsburgh....	2.60	2.60	2.60	1.65
Cut nails, Pittsburgh....	2.60	2.60	2.60	1.60
Fence wire, base, P'gh..	2.55	2.55	2.75	1.50
Barb wire, galv., P'gh...	3.45	3.45	3.4	2.50
Old Material, Per Gross Ton				
Iron rails, Chicago.....	18.75	18.75	18.50	13.50
Iron rails, Philadelphia..	20.00	20.00	20.00	13.50
Carwheels, Chicago.....	11.50	11.50	11.50	11.75
Carwheels, Philadelphia..	15.50	15.50	15.50	14.00
Heavy steel scrap, P'gh..	16.00	16.00	16.00	11.00
Heavy steel scrap, Phila..	14.75	14.75	14.75	13.00
Heavy steel scrap, Ch'go	**15.75**	15.25	15.25	11.75
No. 1 cast, Pittsburgh...	14.50	14.50	15.00	13.00
No. 1 cast, Philadelphia..	16.00	16.00	16.00	14.00
No. 1 cast, Ch'go (net ton)	**12.00**	11.50	11.50	10.00
No. 1 RR. wrot, Phila	20.00	20.00	19.50	16.50
No. 1 RR. wrot, Ch'go (net ton)	**16.00**	15.50	15.25	11.00
Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt...	**$3.00**	$2.90	$2.75	$1.50
Furnace coke, future....	2.50	2.50	2.50	1.75
Foundry coke, prompt...	3.50	3.50	3.25	2.00
Foundry coke, future....	3.50	3.50	3.50	2.25
Metals,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York..	**28.00**	27.50	26.75	18.00
Electrolytic copper, N. Y.	**28.00**	27.25	26.50	17.50
Spelter, St. Louis.....	*8.50*	8.75	8.12½	14.25
Spelter, New York.....	*8.75*	9.00	8.37½	14.50
Lead, St. Louis.....	**6.60**	6.50	5.75	4.75
Lead, New York.....	**6.75**	6.50	5.95	4.90
Tin, New York.....	38.87½	39.25	37.67½	33.25
Antimony, Asiatic, N. Y..	*12.00*	13.50	11.00	28.00
Tin plate, 100-lb. box, P'gh	$5.75	$5.75	$6.00	$3.15

ing up to $45 and higher in some cases. Specifications against contracts for all kinds of finished material are active, with steel mills and smaller manufacturing plants well sold up for the remainder of the year. Wire products are in sharp demand, with a decided scarcity in barb wire. Furnace coke is not plentiful and has sold for spot shipment at $3 and probably higher for best grades. Scrap is dull and neglected.

Pig Iron.—W. P. Snyder & Co. report the average price on Bessemer iron for August to have been $21 and on basic $18, both at Valley furnace, being the same averages as for July. There is some export inquiry for Bessemer iron, one calling for 4000 tons for last three months of this year and another of 10,000 tons for Italy for delivery over four or five months. The latter inquiry is likely to result in a sale, as the New York party that makes the inquiry claims to have a boat ready for 2000 to 3000 tons if shipment can be made within a week. The Harrisburg Pipe & Pipe Bending Company, Harrisburg, Pa., is in the market for 18,000 tons of basic iron, 3000 tons a month over first six months of 1917, and the Kennedy-Stroh Corporation for 2500 tons for this year. The Westinghouse Electric & Mfg. Company is inquiring for 15,000 to 20,000 tons or more of foundry iron for its Cleveland plant for delivery in first and second quarters of 1917. Bessemer iron is not so strong, one or two small sales being reported at slightly under $21; but basic is firm at $18, with the supply limited. Some sellers of basic refuse to consider less than $18.50, and believe the market will be $19 or higher before the end of this year. About a month ago a leading interest bought around 25,000 tons of basic for delivery in first half of 1917 at less than $18 at Valley furnace, and this unsettled the market to some extent. Foundry iron is firm at $18.25 to $18.50 at Valley furnace. We note two sales of 500 tons each of malleable Bessemer iron at $18.50, one sale of 1500 tons of standard Bessemer iron at $21, 500 tons of basic at $18, 200 tons of No. 2 foundry at $18.25, and other sales of foundry aggregating 1200 to 1500 tons, part of it into next year, at $18.50, all at Valley furnace. We quote Bessemer iron at $21; basic, $18 to $18.50; gray forge, $17.75 to $18; malleable Bessemer, $18.50, and No. 2 foundry, $18.25 to $18.50, all at Valley furnace, the freight to the Pittsburgh and Cleveland districts being 95c. per ton.

Ferroalloys.—Inquiry for ferromanganese for early delivery is better, two concerns asking for 700 to 800 tons, and prices are firmer. The market on English 80 per cent ferromanganese is $175, seaboard, but for some time domestic makers have been shading this price $5 to $10 per ton or more and taking all the business. Domestic 80 per cent ferromanganese is held today about $170, seaboard, freight added to destination. We quote 18 to 22 per cent spiegeleisen at $40 to $45, and 25 to 30 per cent, $55 to $65, at furnace. On 50 per cent ferrosilicon we quote $88 to $89 in lots up to 100 tons; over 100 tons, $87 to $88, and over 600 tons, $86 to $87, all per gross ton, f.o.b. Pittsburgh. We quote Bessemer ferrosilicon as follows: 9 per cent, $30; 10 per cent, $31; 11 per cent, $32; 12 per cent, $33; 13 per cent, $34.50; 14 per cent, $36.50; 15 per cent, $38.50, and 16 per cent, $41. Seven per cent silvery is $28.50; 8 per cent, $29; 9 per cent, $29.50; 10 per cent, $30; 11 per cent, $31, and 12 per cent, $32. These prices are f.o.b. furnace, Jackson or New Straitsville, Ohio, or Ashland, Ky., all having a freight rate of $2 per gross ton to Pittsburgh.

Billets and Sheet Bars.—The fact that large quantities of shell steel discards have lately been sold for export is expected to emphasize the shortage in supply of soft Bessemer and open-hearth steel. However, the opinion still prevails that before long the shortage will have been corrected to some extent, owing to the large amount of new capacity in open-hearth steel that will be active. It is almost impossible to quote accurately the ruling prices on soft Bessemer and open-hearth steel, as they vary a great deal, depending on the needs of the buyer and the quantity and kinds of steel he wants. Dealers are picking up a good deal of open-hearth steel from steel-casting plants, and are offering it in the form of small ingots at $43 to $45. When a mill quotes on an inquiry for billets or sheet bars the price is usually $45 or higher. We note a sale of 200 tons of forging billets for November and December delivery at a price slightly better than $70, delivered Pittsburgh. This order was put up to practically every maker of forging billets, and the fact that the buyer

paid this high price indicates clearly the strength of the market on forging billets. We quote soft Bessemer and open-hearth billets and sheet bars at $45, maker's mill, Pittsburgh or Youngstown. From dealers it might be possible to obtain steel at $1 to $2 per ton less for ordinary specifications and carbons. We quote forging billets at $69 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take $1 extra.

Structural Material.—The new inquiry has been more active and some good jobs have been placed. The McClintic-Marshall Company has taken 1700 tons for an East River tunnel, New York, and 500 tons for additions to the plant of the Donner Steel Company. The Fort Pitt Bridge Works has secured about 2000 tons for extensions to open-hearth buildings and a crane runway for the Youngstown Iron & Steel Company. Bids have gone in on 6000 tons or more for the new shops of the Westinghouse Machine Company at Essington, near Philadelphia, also on the Southern Hotel at Baltimore, about 1000 tons, and for the new Arlington Hotel in Washington, D. C., about 5000 tons. Bids closed Sept. 2 on about 6000 tons for new structural shops for the Norfolk Navy Yard. A local mill is reported to have taken 10,000 tons of plain material for export shipment in the first four months of 1917. We quote beams and channels up to 15 in. at 2.60c. at mill for such deliveries as the mill can make, while small lots from stock for prompt shipment bring 3c. to 3.25c., Pittsburgh.

Steel Rails.—Export inquiry for standard sections is reported heavy, but domestic roads are placing few new orders. The Carnegie Steel Company could not take on any more work in standard sections for delivery prior to July of next year. The new demand for light rails is active, but much of the business is going to the rerolling rail mills. We quote 25 to 45 lb. sections at $47; 16 and 20 lb., $48; 12 and 14 lb., $49; and 8 and 10 lb., $50, in carload lots, f.o.b. at mill, the usual extras being charged for less than carload lots. We quote standard section rails of Bessemer stock at 1.47½c., and of open hearth 1.56½c., Pittsburgh.

Plates.—As indicating the strength in prices on plates, it is said a large consumer recently offered to contract for 5000 tons per month over the first six months of 1917 at about 4c. per pound if he were guaranteed deliveries, but the offer was refused by two mills. Plates, ¼ in. and heavier, for shipment in 30 to 60 days, readily bring 4c. to 4.25c. at mill. The two leading local mills are still quoting 3c., but for very extended delivery, probably in second quarter of next year. Car orders are scarce and no large inquiries are out. The minimum mill price on sheared plates is 3c. for delivery in first quarter and first half of 1917. We quote ¼-in. and heavier plates for shipment in two to four months, from 4c. to 4.50c., Pittsburgh.

Sheets.—A feature of the market is the heavy export demand, particularly for galvanized sheets. One interest has booked lately good orders of Bessemer black and galvanized for shipment to England, Russia and France, for which it obtained higher than ruling domestic prices on galvanized. A Cleveland interest has recently taken 10,000 tons of light plates and blue annealed sheets for delivery over the remainder of the year. On an inquiry recently for a round lot of sheets for roofing purposes, the prices quoted were from 2.90c. up to 3.15c. Prices on Bessemer black sheets are stronger than for some time. Specifications are heavy. The American Sheet & Tin Plate Company is operating this week to 94 per cent of hot sheet mill capacity. The cooler weather of the last two weeks has increased the output of sheets to some extent. We quote Nos. 9 and 10 blue annealed sheets at 2.90c. to 3.15c., for delivery at convenience of the mill. No. 28 Bessemer and open-hearth black sheets, 2.90c. to 3c.; No. 28 galvanized, Bessemer, and open-hearth, 4.15c. to 4.25c.; Nos. 22 and 24 black plate, tin-mill sizes, H. R. & A., 2.90c.; Nos. 25, 26 and 27, 3c. to 3.10c.; No. 28, 3.10c. to 3.15c., and No. 29, 3.20c. to 3.25c. These prices are for carloads and larger lots, f.o.b. mill, Pittsburgh.

Tin Plate.—Some consumers are importuning the mills to take their orders for delivery next year, the price to be fixed later, but only in a few cases has this been done. One mill has taken an order for 80,000 boxes for Pacific coast delivery in first quarter of 1917 at whatever price may be fixed for first half. The opinion is that tin plate for first half of 1917 will be about $5.50 per base box, but nothing definite has been done. Export inquiry is heavy, one calling for 70,000 boxes and another for 25,000 boxes. Current demand for this year is fair, mills stating they are getting $5.50 to $5.75 for plate from stock. The American Sheet & Tin Plate Company operated last week to about 97 per cent of hot tin mill capacity. To regular customers mills are quoting tin plate from stock at $5.50, while production tin plate is quoted at $5.75 and up to $6 to the domestic trade. For export, $6 to $6.25 per base box is quoted. We quote 8-lb. coated ternes at $8.50 to $8.75 for 200 lb., and $8.75 to $9 for 214 lb., all f.o.b. Pittsburgh.

Cold-Rolled Strip Steel.—It is likely that within a short time several makers will open their books on contracts for delivery in first half of 1917. Most consumers are covered for the remainder of this year, but one contract was placed last week for 300 tons at $6, base, per 100 lb. We quote cold-rolled strip steel at $6 base on contracts for delivery over the remainder of the year, and $6.50 to $6.75 in small lots for fairly prompt shipment. Terms are 30 days net, less 2 per cent off for cash in 10 days, delivered in quantities of 300 lb. or more when specified for at one time.

Wire Rods.—The demand is active and the supply very limited. As recently stated, prices being charged for rods depend largely on the kind of products they are going into. Some large consumers have covered for rods for some time ahead at $50, these rods going into wire and wire nails, while on other products, such as wire rope and high-grade wires, $55 and $60 have been paid. We note a sale of a fairly large lot of open-hearth rods for delivery over the last quarter at $55, maker's mill. We quote soft Bessemer, open-hearth and chain rods at $55 to $60 per ton, f.o.b. Pittsburgh, but to regular customers who buy in large quantities $50 per ton is being named.

Nuts and Bolts.—The new demand is fairly urgent, but most consumers are covered over the remainder of the year. Export inquiry is fairly active. Specifications are heavy. Deliveries of steel by the mills are still unsatisfactory, interfering materially with output. Most makers of nuts and bolts are sold up for three or four months. The discounts are as follows, delivered in lots of 300 lb. or more, where the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days:

Carriage bolts, small, rolled thread, 50 and 5 per cent; small, cut thread, 40, 10 and 5 per cent; large, 35 and 5 per cent.

Machine bolts, h. p. nuts, small, rolled thread, 50 and 10 per cent; small, cut thread, 50 per cent; large, 40 and 5 per cent.

Machine bolts, c. p. c. and t. nuts, small, 40 and 10 per cent; large, 35 per cent. Blank bolts, 40 and 5 per cent. Bolt ends, h. p. nuts, 40 and 5 per cent; with c. p. nuts, 35 per cent. Rough stud bolts, 15 per cent. Lag screws (cone or gimlet point), 50 and 5 per cent.

Forged set screws and tap bolts, 10 per cent. Cup and [illegible] set screws, case hardened, 60 per cent. Square or [illegible] head cap screws, 50 per cent. Flat, button, round [illegible] head cap screws, 30 per cent.

Nuts, h. p. sq., tapped or blank, $2.70 off list; hex., $2.70 off. Nuts, c. p. c. and t. sq., tapped or blank, $2.40 off; hex., $2.80 off. Semi-finished hex. nuts, 60 and 5 per cent. Finished and case-hardened nuts, 60 and 5 per cent.

Rivets, 7/16 in. in diameter and smaller, 45, 10 and 5 per cent.

Rivets.—Makers report the new demand not so active as some time ago, but this is largely because consumers are covered over the remainder of the year. Export demand is heavy, coming from India, Russia and South America. Prices, which are being shaded to some extent by jobbers, are as follows: Buttonhead structural rivets, ½ in. in diameter and larger, $4 per 100 lb., base, and conehead boiler rivets, same sizes, $4.10 per 100 lb., base, f.o.b. Pittsburgh. Terms are

30 days net, or one-half of 1 per cent for cash in 10 days.

Railroad Spikes.—One local maker received specifications last week for upward of 20,000 kegs, the heaviest in any week for some months. New demand is dull. Not enough new business has been placed in spikes for some months to test prices, which are nominally as follows:

Standard railroad spikes, ½ x ⅜ 16 in. and larger, $2.65 to $2.75; railroad spikes, ½ and 7/16 in., $2.75 base; railroad spikes, ⅜ in. and 5/16 in., $3.05 base; bolt spikes, $2.80 base, all per 100 lb., f.o.b. Pittsburgh.

Wire Products.—It is estimated that the consumption of fence wire in the United States runs about 450,000 tons per year, but this year the demand will be for less than half that amount. However, makers of fence wire are not urgently seeking orders, one large interest having some time ago withdrawn its salesmen, as it is pushing other products. The export demand for wire and wire nails is heavy, one inquiry coming in last week from South America for 2500 kegs of wire nails, half to be round and half to be square nails. Mills report that low-priced contracts are pretty well cleaned up and that shipments going out now on wire nails are largely on the $2.50 basis. On current orders $2.60 is being firmly held. Prices to the large trade, effective from Aug. 7, are as follows: Wire nails, $2.60, base, per keg; galvanized, 1 in. and longer, including large head barbed roofing nails, taking an advance over this price of $2, and shorter than 1 in., $2.50. Bright basic wire is $2.65 per 100 lb.; annealed fence wire, 6 to 9, $2.55; galvanized wire, $3.25; galvanized barb wire and fence staples, $3.45; painted barb wire, $2.75; polished fence staples, $2.75; cement-coated nails, $2.50, base, these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing remain at 61½ per cent off list for carload lots, 60½ per cent for 1000-rod lots and 59½ per cent for small lots, f.o.b. Pittsburgh.

Iron and Steel Bars.—Most consumers are covered over the remainder of this year at lower prices than are ruling now, and in many cases deliveries on these contracts will run into the first quarter of 1917. Inquiries for steel rounds for shrapnel are heavy, but not much of this kind of business is being taken by local mills. The two leading steel-bar makers are sold up for the remainder of this year and probably 75 per cent of their output for the first half of 1917. Some remarkable records for output have recently been made in the Duquesne steel-bar mills of the Carnegie Steel Company. The new demand for iron bars is fairly active, local mills stating they are sold up for three to four months or longer. We quote merchant steel bars at 2.60c. at mill for delivery at convenience of the mill, which would be in last quarter of this year or first quarter of 1917, while for prompt shipment from warehouse 3c. to 3.10c. is quoted. We quote refined iron bars at 2.60c. to 2.70c., and railroad test bars, 2.70c. to 2.80c., f.o.b. Pittsburgh.

Shafting.—Some of the larger consumers have covered their shafting needs over the first half of 1917 at 20 per cent off list. Makers report specifications coming in freely. Prices are firm. On small current orders 15 per cent to 10 per cent off is being quoted for the remainder of this year delivery. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots for delivery in last quarter of this year and first quarter of 1917, and 10 per cent off in less than carload lots, f.o.b. Pittsburgh, freight added to point of delivery.

Merchant Steel.—Inquiry is heavy from large consumers for delivery over the first half of next year, and some business has been closed at prices reported considerably higher than are ruling now. The new demand is heavy and specifications are coming in freely. August shipments of a leading maker showed an increase of nearly 25 per cent over July. We quote: Iron finished tire, ½ x 1½ in. and larger, 2.60c., base; under ½ x 1½ in., 2.75c.; planished tire, 2.75c.; smooth channel tire, ¾ to ⅞ and 1 in., 2.85c. to 2.90c.; 1⅛ in. and larger, 3.10c.; toe calk, 3.10c. to 3.15c., base; flat sleigh shoe, 2.75c.; concave and convex, 2.85c.; cutter shoes tapered or bent, 3.25c. to 3.35c.; spring steel, 3.25c. to 3.50c.; machinery steel, smooth finished, 2.90c. to 3c., all f.o.b. at mill.

Hoops and Bands.—There is not much new buying of either hoops or bands, as consumers are covered over the remainder of the year, and in some cases through the first quarter of 1917. Specifications are active. Both hoops and bands for prompt shipment bring premiums. For current orders hoops are 3c. and steel bands 2.60c. at mill, with extras on the latter as per the steel bar card. For fairly prompt shipment steel bands are quoted at 2.75c. and higher.

Wrought Pipe.—It is understood that the recent inquiry of the Sinclair Oil & Refining Company for about 800 miles of 10 to 12 in. pipe has been withdrawn, as none of the mills cared to bid on it. Actual orders entered for butt and lap weld pipe in August are reported to have been heavier than in July. The leading producer is said to be sold up for four or five months on lap-weld pipe, but on butt-weld sizes, up to 3 in., can make fairly prompt deliveries. The new demand for oil country goods is quiet, but it is said there have been no important cancellations of contracts, deliveries on these having been deferred until conditions in the oil trade improve. Discounts on both iron and steel pipe, printed on another page, are firmly held.

Boiler Tubes.—Consumers are covered and mills are sold up for four or five months on locomotive and merchant tubes and on seamless tubing for 12 to 15 months. Discounts on iron and steel tubes, given on another page, are strongly maintained.

Coke.—The supply of high-grade blast-furnace coke for prompt shipment is limited and prices are firm and higher. It is said that coke has sold at $3 per ton for September delivery for best grades. There is no inquiry for contract coke, as consumers are covered. We now quote best grades of blast-furnace coke for prompt shipment at $2.90 to $3, and on contracts, $2.50 to $2.60 per net ton at oven. We quote best grades of 72-hr. foundry for spot shipment at $3.25 to $3.50, and on contracts, $3.50 to $3.75 per net ton at oven. The Connellsville *Courier* gives the output of coke in the upper and lower Connellsville regions for the week ended Aug. 26 as 397,495 net tons, a decrease over the previous week of 10,565 tons.

Old Material.—The local market continues neglected. None of the large consumers is buying, but the embargo on scrap routed to the Homestead works of the Carnegie Steel Company at Munhall, Pa., was removed Sept. 1, and this is expected to benefit the market. The fact, too, that large quantities of shell steel discards have been taken out of the market by foreign buyers is expected to help heavy steel scrap. Only small sales of heavy steel scrap are being made, ranging from carloads to 200 and 300 tons, and this is bringing $16 to $16.25, delivered. However, if a large consumer wanted to pick up 15,000 to 20,000 tons of selected heavy steel scrap, it is doubtful whether he could get it under $17, and he might have to pay more. We note a sale of 300 tons of low phosphorus melting scrap at $19.50, and 500 tons at $20, delivered. Prices quoted by dealers for delivery in Pittsburgh and points that take the same rates of freight, per gross ton, are as follows:

Heavy steel melting scrap Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	$15.00 to $16.25
No. 1 heavy melting steel	14.50 to 14.75
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	16.50 to 17.00
Hydraulic compressed sheet scrap	13.50 to 14.00
Bundled sheet scrap, sides and ends f.o.b. consumers' mills, Pittsburgh district	11.25 to 11.50
Bundled sheet stamping scrap	10.25 to 10.50
No. 1 railroad malleable stock	14.50 to 14.75
Railroad grate bars	10.25 to 10.50
Low phosphorus melting stock	19.75 to 20.00
Iron car axles	28.00 to 28.50
Steel car axles	28.00 to 28.50
Locomotive axles, steel	30.00 to 30.50
No. 1 busheling scrap	11.00 to 11.50
Machine-shop turnings	7.00 to 7.50
Old carwheels	17.25 to 17.50
Cast-iron borings	8.00 to 8.50
*Sheet bar crop ends	17.00 to 17.50
No. 1 railroad wrought scrap	18.00 to 18.50
Heavy steel axle turnings	10.50 to 10.75
Heavy breakable cast scrap	12.25 to 12.50

*Shipping point.

Chicago

CHICAGO, ILL., Sept. 6, 1916.—(*By Wire.*)

It is the common report of steel producers that buyers have never been more free in contracting for forward delivery. The size of purchases is being held in check in a number of instances by the irrevocable nature of the sale, but, despite the limitations of capacity under which contracts are being taken by many of the mills, bookings are reported in several instances in excess of shipments. In this activity the steel-using trade is participating quite generally. There is also a continuance of export business both as to inquiry and orders, inquiry coming from India, Japan and Australia, as well as the European countries. In addition to further sales of shipbuilding material for Japan in amounts ranging from 2000 to 10,000 tons, an order for 7000 tons of structural shapes for Canada is reported. Among domestic orders several lots of car steel, one of 10,000 tons for a Western carbuilder, are prominent. New orders for cars include 4000 placed by Russia with the Bettendorf Company and 1000 bought by the Western Pacific. Miscellaneous buying is significant in the revival of a number of postponed undertakings, the opinion apparently prevailing that current high prices will outstay the hope of more favoring conditions. While premium prices are now the exception, despite the inability of a number of mills to ship promptly, the market is unquestionably firmer at the generally prevailing level of prices. The buying movement in pig iron is now in full swing, with many of the larger buyers negotiating for last quarter and first half iron. Minimum prices in the South are higher and quotations from Northern furnaces are following that lead.

Pig Iron.—The aggregate of pig-iron inquiry under consideration is steadily increasing. Negotiations are largely for foundry iron and have to do with the wants of many of the larger buyers, including the principal implement interests. Prices are being quoted on one lot of 2500 tons, another of 4000 tons and various others of sizes ranging within these limits. A fair proportion of sales is being consummated, but the closing of the principal tonnage is still to come. The effect on prices has been most marked in the South, where the minimum furnace quotations for any delivery in the last half now appears to be $14.50 for No. 2, with as high as $15.25 asked for first half 1917 delivery. Furnace reports also show a decided shrinkage in the amount of iron available for sale in the remainder of the year. For Northern foundry iron of competitive grades prices are being determined in accordance with the competition, but for iron of standard Northern analysis, including malleable and basic, $19 is being asked. Quotations as low as $13.75 at Birmingham indicate that some resale iron is still available. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of $1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 7	$19.75
Lake Superior charcoal, No. 1	20.75
Lake Superior charcoal, No. 6 and Scotch	20.75
Northern coke foundry, No. 1	$19.00 to 19.50
Northern coke foundry, No. 2	18.50 to 19.00
Northern coke foundry, No. 3	18.00 to 18.50
Southern coke, No. 1 f'dry and 1 soft	19.00 to 19.50
Southern coke, No. 2 f'dry and 2 soft	18.50 to 19.00
Malleable Bessemer	19.00
Basic	19.00
Low phosphorus	34.00
Silvery, 8 per cent	29.50
Bessemer ferrosilicon, 10 per cent	32.50

Rails and Track Supplies.—Indications that the leading producer has little or no available capacity for the manufacture of spikes, bolts and angle bars prior to the last quarter of 1917 and of tie-plates before the second quarter have brought out considerable inquiry from the railroads. In respect of rails, there is no current business of importance. Quotations are as follows: Standard railroad spikes, 2.75c., base; track bolts with square nuts, 3.25c. to 3.50c., base, all in carload lots, Chicago; tie-plates, $50, f.o.b. mill, net ton; standard section, Bessemer rails, Chicago, $33, base; open-hearth, $35; light rails, 25 to 45 lb., $40; 16 to 20 lb., $41; 12 lb., $42; 8 lb., $43; angle bars, 2c., Chicago.

Structural Material.—The purchase of 4000 cars for Russia from the Bettendorf Company disposes of the long drawn out negotiations in that connection. The Western Pacific has bought 1000 cars in addition to its inquiry for 1500. The Chicago & Alton has placed 300 cars, and from 300 to 400 have been taken by local meat packing interests. Various other lots of cars of less quantity are reported placed. Carbuilders have been buying steel, one lot of 10,000 tons for the Western Steel Car & Foundry Company and another of 5000 tons for the Pullman Company being noted. Contracts for building projects were few last week, one order for 325 tons going to the Minneapolis Steel & Machinery Company, another for 225 tons to the Wisconsin Bridge & Iron Company and one for 450 tons to the American Bridge Company. Bridge shops very generally are contracting for their first half requirements. We quote for Chicago delivery of plain material from mill 2.889c.

We quote for Chicago delivery of structural steel from jobbers' stock 3.10c.

Plates.—Plates in narrow widths are available for prompt shipment, in some instances as early as one week from several mills, and at prices which represent only nominal premiums. Various orders taken last week were placed at prices ranging from 3.25c. to 3.50c. Wide plates are much more difficult to secure, even some of the jobbers paying 4c. for plates that are resold at the regular price out of store. We quote for Chicago delivery of plates from mill at its convenience 3.189c. For prompt shipment we quote 3.439c. to 3.689c., in widths up to 72 in., and for wide plates 4.189c.

We quote for Chicago delivery of plates out of jobbers' stock 3.50c.

Sheets.—The latest quotations for black sheets indicate a firming up of the market to the extent of about $1 per ton, but prices for galvanized show a disposition to softness, notwithstanding the relatively high spelter cost. For those gages which are midway between the blue annealed and one-pass bases, quotations as low as 4.15c., Pittsburgh, are reported. For both the lighter and heavier gages higher prices rule. One-pass black sheets can be readily had for prompt delivery, as can galvanized as well, from the few mills marketing it, but automobile body sheets and other sheets of special finish continue scarce. We quote for Chicago delivery, blue annealed, No. 16 and heavier, 3.139c. to 3.339c.; box annealed, No. 17 and lighter, 2.989c. to 3.039c.; No. 28 galvanized, 4.289c. to 4.389c.

The price of black sheets out of store has been advanced $3 per ton. We quote for Chicago delivery of sheets out of stock, minimum prices applying on bundles of 25 or more, as follows: No. 10 blue annealed, 3.40c.; No. 28 black, 4.50c.; No. 28 galvanized, 4.65c. to 4.75c.

Bars.—First half contracting for steel bars by the manufacturing trade is rapidly absorbing the capacity reserved by the mills for that purpose. A covering of needs for high carbon bars is also in progress. The bar-iron market continues firm, with some increase in the quantity being booked by the mills. We quote mill shipment, Chicago, as follows: Bar iron, 2.35c.; soft steel bars, 2.789c.; hard steel bars, 2.50c.; shafting, in carloads, 20 per cent off; less than carloads, 15 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 3.10c.; bar iron, 3.10c.; reinforcing bars, 3.10c. base with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting 10 per cent off.

Rivets and Bolts.—The stability of the market with respect to prices of steel bars and wire rods is making easier the maintenance of bolt and nut prices at present levels than when prices were lower. We quote as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 50-5; cut thread, 40-10-2½; larger sizes, 35-2½; machine bolts up to ⅜ x 4 in., rolled thread, with hot pressed square nuts, 50-10; cut thread, 50; larger sizes, 40-5; gimlet-point coach screws, 50-5; hot pressed nuts, square, $2.70 off per 100 lb.; hexagon, $2.70 off. Struc-

tural rivets, ¾ to 1¼ in., 4c. to 4.15c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

We quote out of store: Structural rivets, 4c.; boiler rivets, 4.10c.; machine bolts up to ⅞ x 4 in., 50-10; larger sizes, 10-10; carriage bolts up to ⅞ x 6 in., 50-5; larger sizes, 40-5; hot pressed nuts, square, $3.25, and hexagon, $3.25 off per 100 lb.; lag screws, 55.

Wire Products.—The fall demand for wire nails and barb wire is in full swing and specifications are coming in more rapidly by a considerable margin than the movement of materials to the jobbing and retail trade. The dullness in fence buying continues. We quote as follows per 100 lb.: Plain wire, Nos. 6 to 9, base, $2.839; wire nails, $2.789; painted barb wire, $2.939; galvanized barb wire, $3.639; polished staples, $2.939; galvanized staples, $3.639; all Chicago.

Cast-Iron Pipe.—The leading maker of pipe is the low bidder for the contracts for 750 tons of high-pressure and special pipe at Cincinnati, 1800 tons at St. Louis and 300 tons at Hammond, Ind. At Lima, Ohio, the award of 625 tons was to have been made Aug. 31, but no announcement has as yet been made. We quote as follows, per net ton, Chicago: Water pipe, 4-in., $33.50 to $34; 6-in. and larger, $30.50 to $31, with $1 extra for class A water pipe and gas pipe.

Old Material.—Prices of scrap in this market made a rapid advance last week and without much increase in actual buying. Additional interest is being displayed by melters and some buying in small lots has been done, but the advance is still largely one in asking prices by those who hold the scrap. There has been more concern shown by those who have short orders to cover, and the activity in that direction was responsible for most of the transactions. There appears to be more scrap available than has been offered for several weeks, though strictly yard grades are still scarce. Dealers, however, are holding firmly for the higher prices, which in some instances represent advances of $1 per ton. For heavy melting steel $16.50 is commonly asked and there are few offerings of wrought scrap at less than $16.50 per net ton. The Chicago & Northwestern sold about 4000 tons of old material at the end of the week and the Pennsylvania Lines West has a large list. The Chicago, Milwaukee & St. Paul is offering 2500 tons and the Wabash a smaller list. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	$18.75 to $19.25
Relaying rails	19.50 to 20.50
Old carwheels	11.50 to 12.00
Old steel rails, rerolling	16.50 to 16.75
Old steel rails, less than 3 ft.	16.50 to 17.00
Heavy melting steel scrap	15.75 to 16.25
Frogs, switching and guards, cut apart	15.75 to 16.25
Shoveling steel	15.25 to 15.75
Steel axle turnings	8.75 to 9.25

Per Net Ton

Iron angles and splice bars	$18.75 to $19.00
Iron arch bars and transoms	20.00 to 20.50
Steel angle bars	14.75 to 15.00
Iron car axles	25.50 to 26.00
Steel car axles	28.00 to 28.50
No. 1 railroad wrought	16.00 to 16.50
No. 2 railroad wrought	15.00 to 15.50
Cut forge	15.00 to 15.50
Pipes and flues	11.75 to 12.25
No. 1 busheling	13.75 to 14.25
No. 2 busheling	9.50 to 10.00
Steel knuckles and couplers	14.75 to 15.00
Steel springs	15.25 to 15.50
No. 1 boilers, cut to sheets and rings	10.25 to 10.75
Boiler punchings	14.00 to 14.50
Locomotive tires, smooth	21.00 to 21.50
Machine-shop turnings	5.50 to 6.00
Cast-borings	6.50 to 7.00
No. 1 cast scrap	12.00 to 12.50
Stove plate and light cast scrap	9.75 to 10.25
Grate bars	10.00 to 10.25
Brake shoes	9.75 to 10.25
Railroad malleable	11.50 to 12.00
Agricultural malleable	11.00 to 11.50

Construction work on the plant of the Chattanooga Steel Company, Chattanooga, Tenn., is being pushed on the return of C. E. James from New York, where he went on matters relating to the financing of the venture. A. B. Stitzer, New York, and E. Payson Cook, Paterson, N. J., are stated to be interested in the company, which has booked orders for a large tonnage of rounds for delivery this winter.

Philadelphia

PHILADELPHIA, PA., Sept. 5, 1916.

The threatened railroad strike had a quieting influence on the market, except where unprofitable activity was caused by requests that shipments be hurried or postponed. The Labor Day holiday also cut down the volume of business. Otherwise the week brought but little change, either in demand or prices. Shipyards which contemplate naval contracts are putting out feelers for prices on plates and shapes they may need, but reports as to the total quantity to be required are contradictory. The great demand for plates, from at home and abroad, continues, but structural shapes drag. Bars are more active and stronger. The price of open-hearth rerolling billets is well established at $48, Eastern mill. Sheets incline toward quiet. In most steel products the range of prices continues notable, much depending on the supply of open-hearth steel which the mills have available and the number of uses they have for it. Pig iron continues active, with steel-making iron especially strong. In foundry iron there are some soft spots. Ferromanganese is easy in the absence of contracting. Spot coke, both furnace and foundry, is scarce. Old material shows no improvement.

Pig Iron.—A goodly tonnage has been taken, mostly in small or moderate-sized lots for delivery in the last or first quarters. While the fear of a railroad strike existed sellers were deluged with requests for immediate shipments. The situation in foundry iron is somewhat contradictory for the reason that, while the majority of producers and their agents assert that the market is steady, with promise of higher prices, others complain of quotations below the minimum acceptable to them, and say that the low sellers have taken business from them. Eastern Pennsylvania No. 2 X is available in some directions at $19.50, delivered, although certain makers insist that their minimum is upward of $20, delivered. In one case 400 tons was negotiated, at a few cents over $20, delivery to be in the last and first quarters. Stove manufacturers have taken around 6000 tons of No. 2 X and No. 2 plain. A Chester pipe works which inquired for 5000 tons of No. 3 and gray forge for delivery this year has not placed its order. The Norfolk & Western Railway has issued an inquiry for 7000 to 8000 tons of miscellaneous grades for the first half of next year, which probably will be divided among Virginia furnaces. A Virginia company which has been building a new furnace that will be blown in some time in November, and has been selling but little from stock for several months, has entered the market again with a view of accumulating orders to fill when operations are resumed. For deliveries to be distributed in even monthly quantities over the last and first quarters it quotes $17.50, furnace, or $20.25, Philadelphia, for No. 2 X. It has sold about 6000 tons in the last 10 days. Another producer, which has large tonnages booked, is asking $1 more. Many large consumers of Virginia and other irons are well bought ahead, and some have not consumed as much as they thought they would. Buffalo producers are reported to be sold for some months ahead. Basic is strong at $19.75 to $20, delivered; the largest inquiry calling for 18,000 tons for delivery at Harrisburg. Standard low phosphorus at $34 to $35, delivered, is stronger than any other grade, and the makers regret that they cannot increase their output. Domestic and foreign consumers, including some in Canada, want low phosphorus. Export inquiries continue to come for various grades, especially Bessemer, a recent one specifying 4000 tons of high silicon Bessemer. Quotations for standard brands, delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa. No. 2 X foundry	$19.50 to $20.00
Eastern Pa. No. 2 plain	19.25 to 19.75
Virginia No. 2 X foundry	20.25 to 21.25
Virginia No. 2 plain	20.00 to 20.75
Gray forge	18.50 to 19.00
Basic	19.75 to 20.00
Standard low phosphorus	34.00 to 35.00

Iron Ore.—In the week ended Sept. 2 the only arrival reported consisted of 5760 tons from Chile.

Ferroalloys.—Domestic 80 per cent ferromanganese, made in the electric furnace on the Pacific coast, has

been offered at $168, delivered, while blast-furnace material made in the East is offered at $170. A few carloads of imported ferromanganese have been taken at $175, seaboard. There is no large inquiry and no contracting. Spiegeleisen is quoted at $50, furnace, with the probability that concessions might be obtained. Fifty per cent ferrosilicon is unchanged at $86 to $88, Pittsburgh, and 11 per cent at $34.44, delivered.

Plates.—The larger makers quote 4c., Pittsburgh, or 4.159c., Philadelphia, deliveries at the convenience of the mills. One maker has refused to consider several large inquiries for export, one calling for 10,000 tons of ship plates, one for 6000 tons for shipment to Japan, and another for 5000 to 6000 tons for Italy. Western consumers continue to appeal for plates, but with little or no results. The mill in question asserts that it is sold out to the third quarter of next year on sheared plates, although it can make deliveries in from 6 to 8 weeks on universals. Some consumers are revising their specifications in order to use the latter. Another mill also quotes 4.159c. as its minimum, but a third asks 3.909c., Philadelphia, for nearby deliveries, and 3.659c. for future shipments. The scarcity of open-hearth steel and the variety of uses which various mills have for it govern the situation. Shipyards which build for the Government are requesting plate builders to supply quotations, but the plate makers are awaiting the receipt of new navy specifications. Reports vary as to the quantities which will be required, but it is estimated that the initial part of the naval program will take 150,000 to 200,000 tons of plates and shapes, this in 1917. The entire governmental requirement will be at least 300,000 tons, and possibly 500,000 tons. The Coastwise Shipbuilding Company, Locust Point, Baltimore, Md., is reported to have received an order for five barges for the Philadelphia & Reading Railroad, each 207 ft. long, at a total cost of $400,000.

Bars.—The minimum quotation for open-hearth steel bars is 2.759c., Philadelphia, with some makers asking 2.909c. to 3.159c., Philadelphia, for Bessemer bars. Inquiry is strong from all directions, and many bars rolled from discarded shell steel are being taken. Iron bars are active, but with the price unchanged—2.659c., Philadelphia.

Structural Material.—Shapes continue to lag behind other steel products, both as to price and activity, yet the minimum of 2.759c., Philadelphia, is difficult to obtain by a buyer. A large producer asks 3.009c., Philadelphia, for Bessemer shapes, and up to 3.659c. for open-hearth steel. The contract for a building requiring 700 tons of material to be erected for the E. G. Budd Mfg. Company, Philadelphia, went to the Eastern Bridge & Structural Company, Worcester, Mass. Time dominated the proposition, it being understood that the building is to be completed in 2½ months.

Old Material.—The threatened railroad strike greatly disturbed the market, some consumers wanting shipments made at once, others asking that they be deferred. But little new business was done. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania, and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$14.75 to $15.25
Old steel rails, rerolling	17.00 to 17.50
Low phos. heavy melting steel scrap	21.25 to [illegible]
Old steel axles (for export)	21.00 to [illegible]
Old iron axles (for export)	31.00 to 31.50
Old iron rails	20.00 to [illegible]
Old carwheels	17.50 to 18.00
No. 1 railroad wrought	20.00 to 21.00
Wrought iron pipe	12.50 to 14.00
No. 1 forge fire	13.00 to 13.50
Bundled sheets	13.00 to 13.50
No. 2 busheling	10.00 to 11.00
Machine shop turnings	7.25 to 7.75
Cast borings	9.00 to 9.50
No. 1 cast	16.00 to 16.50
Grate bars, railroad	11.75 to 12.25
Stove plate	11.75 to 12.25
Railroad malleable	13.50 to 14.00

Billets.—Purchases of some good-sized tonnages have established the market at $48, minimum, Eastern mill, for open-hearth rerolling billets. Forging billets are quoted at $65 f.o.b., Eastern mill.

Sheets.—Except for a few large inquiries, the market is rather quiet. Quotations range from 3.159c. to 3.659c., for No. 10 blue annealed.

Coke.—Foundry coke is difficult to get because of the shortage of labor and cars. Spot furnace coke is not over-plentiful also. For spot furnace the quotation is $2.75 to $2.85 per net ton at oven, and for contract, nominally $2.50. Spot and contract foundry is quoted at $3.25 to $3.50 per net ton at oven. Freight rates from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Cleveland

CLEVELAND, OHIO, Sept. 5, 1916.

Iron Ore.—Another new record in iron-ore shipments from the Lake Superior district was made in August, the lake movement during the month amounting to 9,850,140 gross tons, a gain of 100,000 tons over July. Beginning with May, each of the past four months has broken all previous records for ore shipments, and the shipments during June and July, as well as August, exceed 9,500,000 tons. Duluth made a remarkable showing last month, shipping 3,380,066 tons, a gain of 368,000 tons over July. Some of the other ports show a falling off. Shipments up to Sept. 1 were 39,215,864 tons, or over 7,000,000 tons in excess of those in the corresponding period of the record-breaking season of 1913. Shippers now estimate that the lake movement for the season will be between 61,000,000 and 63,000,000 tons. Some let-up is expected from now on, but it is apparent that unless something develops to interrupt traffic the lake fleet can easily bring the total up to 61,000,000 tons or more. Some additional chartering is being done at $1 free from the head of Lake Superior, and at 90c. from Marquette. We quote iron-ore prices as follows for delivery at lower lake ports: Old-range Bessemer, $4.45; Mesaba Bessemer, $4.20; old-range non-Bessemer, $3.70; Mesaba non-Bessemer, $3.55.

Pig Iron.—A fairly active buying movement in foundry and malleable iron for the first half of 1917 is under way. Buying appears to be quite general in Ohio and surrounding territory with the exception of Michigan, where the market is still rather quiet. A number of large consumers either have covered or are in the market, although in northern Ohio most of the inquiries are coming from the small foundries. The Westinghouse Electric & Mfg. Company has placed orders with Cleveland furnaces for a portion of the first half requirements for its Cleveland plant, which usually amounts to 6000 tons. Another Ohio inquiry for 6000 tons is pending. The market is firm on all grades. Foundry iron is quoted at $18.50, Cleveland and Valley furnace, for first half, and one or two interests are understood to be holding for $19. Southern iron is firmer, and $14.50, Birmingham, is claimed to be the minimum quotation for No. 2 for first half, with some producers asking $15. We quote, delivered Cleveland, as follows:

Bessemer	$21.95
[illegible]	18.95
Northern No. 2 foundry	18.50
Southern No. 2 foundry	$18.00 to 18.50
[illegible]	18.50
Jackson Co. silvery, 8 per cent silicon	28.62
Standard low phos. Valley furnace	32.00

Coke.—While dull, the market is firm. Foundry coke is held at $3.25 to $3.50 per net ton at oven, the latter being the general quotation for standard makes. Some producers are entirely sold up and out of the market.

Finished Iron and Steel.—The demand for steel for early shipment continues active but deliveries from the mills that have been able to make reasonably prompt shipment are getting further behind, Bessemer bars not being available within four to six weeks and Bessemer shapes not until November. The demand on warehouses continues very heavy, and jobbers report that in most lines August business exceeded that of July. Steel bars are quoted at 2.60c. to 2.75c., Pittsburgh, and structural material 2.70c. to 2.85c. The demand for plates is active and a Cleveland mill is making sales at 4.25c.

to 4.50c., Pittsburgh, for delivery in about two months. For future delivery at the convenience of the mills plates are quoted at 3c. to 3.50c. Not much building work requiring a round tonnage of steel is coming out. Bar iron in unchanged at 2.40c. to 2.50c., Cleveland. Sheets continue in fair demand with prices firm but unchanged. We quote sheets at 2.90c. to 3c., Ohio mill, for No. 28 black; 3c. to 3.25c. for No. 10 blue annealed and 4.15c. to 4.30c. for No. 28 galvanized. Warehouse prices are 3.25c. for structural material; 3.65c. for plates and 3.25c. for iron bars.

Bolts, Nuts and Rivets.—Some large inquiries are pending for bolt and nut requirements for the remainder of the year from the railroads and other consumers. There is little demand from jobbers, who are mostly under contract. Specifications continue heavy. The new demand for rivets is light and specifications are coming out in a large volume. We quote rivets at 4c., Pittsburgh, for structural and 4.10c. for boiler. Bolt and nut discounts are as follows:

Coach or carriage bolts, ⅜ x 6 in. and smaller or shorter, rolled thread, cut thread, 40 to 5 per cent. off; larger or longer, 5 and 5 per cent. off. Machine bolts, ⅜ x 4 in. and smaller, rolled thread, 40 and 10 per cent. off; cut thread, 40 and 5 per cent. off. Lag bolts, 40 and 10 per cent. off. Planer head, set screw, 40 and 10 per cent. off. Upset hexagon head set screws, blank or tapped, 40 and 10 per cent. off. Upset square head set screws, blank or tapped, 40 and 5 per cent. off. Hexagon nuts, all sizes, 5 per cent. off. Cold pressed semi-finished hexagon nuts, all sizes, 60 and 5.

Old Material.—The unsettled condition due to the threatened railroad strike had its effect on the scrap market for several days, and as yet there has been no recovery from the dullness and weakness. However, with the strike menace removed there is an improved feeling in the trade and more activity is looked for this week. Cleveland mills are out of the market, so that local dealers are depending almost entirely on outside consumers for orders. Canton has made additional purchases of heavy melting steel and is credited with buying about 8000 tons in all for September, October and November delivery, paying as high as $17 for some. Local sales of heavy melting steel are reported to dealers covering on contracts at $15.75, which is a higher price than the mills are willing to pay. Quotations are unchanged. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton

Steel rails	$14.75 to $15.00
Iron rails	18.50 to 19.00
Steel car axles	32.00 to 33.00
Heavy melting steel	15.00 to 15.50
Car wheels	12.75 to 13.00
Relaying rails, 50 lb. and over	22.50
Agricultural malleable	12.50 to 12.75
Railroad malleable	14.00 to 14.25
Steel axle turnings	12.00 to 12.50
Light bundled sheet scrap	12.00 to 12.25

Per Net Ton

Iron car axles	$24.00 to $25.00
Cast borings	5.75 to 6.00
Iron and steel turnings and drillings	5.25 to 5.50
No. 1 busheling	11.00 to 11.25
No. 1 railroad wrought (nominal)	13.00 to 13.50
No. 1 cast	13.00 to 13.50
Railroad grate bars	10.00 to 10.50
Stove plate	10.00 to 10.25

Cincinnati

CINCINNATI, OHIO, Sept. 6, 1916.—(*By Wire.*)

Pig Iron.—Southern prices continue to gain strength and the majority of furnaces are now quoting and selling iron at $14.50, Birmingham basis, for this year's shipment and from $14.50 to $15 for delivery in the first half of next year. However, there is still some No. 2 foundry obtainable at $14 for prompt shipment. Resale iron in the South is getting scarcer and is now not much of a factor in the regulation of prices. The heavy buying of foundry iron has put the Southern producers in a more independent position, and it is stated that $14 iron either from furnaces or speculators will shortly be unobtainable. The general inquiry is good and it is not now necessary for salesmen to rake over their territories for business as was the case less than two months ago. The Standard Sanitary Mfg. Company has put out an inquiry for approximately 8000 tons of foundry iron, part of which will be shipped this year, and from Indiana there are three inquiries for quantities ranging all the way from 500 to 1000 tons. In central Ohio other foundry melters are getting interested. Recent sales include 3000 tons of Southern foundry iron to a northern Ohio melter, 1000 tons to a central Ohio consumer and 600 tons to a local foundry. Approximately 2000 tons of Southern iron was contracted for by an Indiana manufacturer. A few small sales of Lake Superior charcoal have been made recently and there is more business pending. Malleable is still active, but with the exception of one sale of a fair-sized tonnage no transactions of note have been made here lately. Northern No. 2 foundry is still being sold at $18, Ironton, with shipments extended into the first half of next year. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1	$[illegible] to $[illegible]
Southern coke, No. 1 foundry	[illegible] to [illegible]
Southern coke, No. 3 foundry	16.40 to 17.40
Southern coke, No. 4 foundry	[illegible] to [illegible]
Southern gray forge	[illegible] to [illegible]
Ohio silvery, [illegible] per cent.	[illegible] to [illegible]
Southern Ohio coke, No. 1	20.26 to 20.76
Southern Ohio coke, No. 2	19.26 to 19.76
Southern Ohio coke, No. 3	[illegible] to [illegible]
Southern Ohio malleable Bessemer	19.26 to 19.76
Basic, Northern	19.26 to 19.76
Lake Superior charcoal	[illegible] to [illegible]
Standard Southern carwheel	24.90 to 25.40

(By Mail)

Coke.—The threatened railroad strike caused a number of foundries to urge shipments of coke so that yard stocks are probably heavier than for some time. However, this movement had no appreciable effect on prompt shipment prices, which are now the same as contract figures. Connellsville operators are holding 72-hr. coke around $3.25 to $3.50 per net ton at oven, and Pocahontas and Wise County brands are firmer at $3.50 to $3.65. New River foundry coke is still quoted around $4 at oven. No furnace coke business has lately been transacted in this immediate territory and Connellsville grades are quoted at $2.50 to $2.75 at oven.

Finished Material.—Both black and galvanized sheets are firmer. Nearby mills are quoting from 4.40c. to 4.50c., Cincinnati or Newport, Ky., on No. 28 galvanized, and only very acceptable orders would be booked at the inside figure. Black sheets are around 3c. for No. 28. Business is said to be good, but the mills are not encouraging customers to order very far ahead, and are confining their efforts to take care of old customers who are specifying heavily on contracts. The jobbers are complaining that it is almost impossible to get prompt shipments from the mills on some kinds of rivets as well as bolts and nuts. As a consequence quotations on different articles are somewhat erratic and depend principally on the ability of the seller to obtain the goods. Jobbers' quotations are as follows: Steel bars and small structural shapes, 3.20c.; twisted steel bars, 3.35c.; wire nails, $2.85 per keg base; barb wire, $3.70 per 100 lb., and No. 10 blue annealed sheets, 3.50c.

Old Material.—Iron axles and locomotive tires are about the only two grades of scrap that are stronger, but no change has been made in previous quotations. Steel turnings may be said to be a trifle firmer. There is no appreciable increase in the demand from any particular source. Yard stocks are heavy and are increasing at a slow rate. The following are dealers' prices f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton

Bundled sheet scrap	$10.25 to $10.75
Old iron rails	15.50 to 16.00
Relaying rails, 50 lb. and up	21.00 to 21.50
Rerolling steel rails	14.50 to 15.00
Heavy melting steel scrap	14.00 to 14.50
Steel rails for melting	13.00 to 13.50

Per Net Ton

No. 1 railroad wrought	$13.00 to $13.50
Cast borings	4.50 to 5.00
Steel turnings	4.75 to 5.00
Railroad cast scrap	11.00 to 11.50
No. 1 machinery cast scrap	12.75 to 13.25
Burnt scrap	9.50 to 10.00
Iron axles	24.00 to 25.00
Locomotive tires (smooth inside)	20.75 to 21.25
Pipes and flues	9.00 to 9.50
Malleable and steel scrap	10.75 to 11.25
Railroad tank and sheet scrap	8.25 to 8.75

Birmingham

BIRMINGHAM, ALA., Sept. 4, 1916.

Pig Iron.—The second week of the new buying movement closed with sales of about 100,000 tons of Southern pig iron. Fully 60,000 tons was booked in the Birmingham district the past week, with the Sloss-Sheffield Steel & Iron Company, the Alabama Company and the Woodward Iron Company the chief sellers. One company sold 6000 tons of special iron. The Tennessee Coal, Iron & Railroad Company is accepting but few orders. Sales are being made at $14.50 to $15 for No. 2 foundry, and sellers are finding it easier to get $15. Some of the iron just sold is for 1917 first quarter delivery. While some hope is expressed that $15.50 might be obtained for 1917 delivery, the general feeling is that iron will be firm at $15, with some sales made at $14.50. Practically all producers, with the exception of the Tennessee Company, are getting some business from Holland, Norway, Sweden, France and Italy. Inquiries are numerous. The car shortage continues serious. Etowah furnace No. 2 of the Alabama Company, Gadsden, was blown in this week. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	$15.00 to $15.50
No. 2 foundry and soft	14.50 to 15.00
No. 3 foundry	14.00 to 14.50
No. 4 foundry	13.75 to 14.25
Gray forge	13.50 to 14.00
Basic	14.50 to 15.00
Charcoal	22.00 to 22.50

Cast-Iron Pipe.—A more hopeful feeling has been engendered by the decision of the Interstate Commerce Commission suspending the new transcontinental tariffs from Sept. 1 until Dec. 30. The rate to Pacific coast terminals would have been increased from $11 to $17.60 a ton, and would have been a severe blow to the market. The demand continues steady, with no striking features. Several carloads of pipe were shipped the past week to the Pacific coast. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., $28; 6-in., and upward, $25, with $1 added for gas pipe and 16-ft. lengths.

Coal and Coke.—Several coal mines were forced to close down last week on account of the car shortage, which is severely crippling business. The coke market is in excellent shape, with the demand taking everything offered. Business with Mexico, discontinued some time ago when trouble between that country and the United States seemed imminent, has been resumed in part. Standard beehive coke is selling at $4.25 to $4.50 per net ton at oven and furnace coke at $3.25 to $3.50, with much of it being taken at $3.50.

Old Material.—Sales have been heavier, but with no change in prices. The tendency is toward a stronger demand. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old steel axles	$24.00 to $30.00
Old steel rails	10.00 to 10.50
No. 1 steel scrap	9.25 to 9.75
No. 1 wrought scrap	12.50 to 13.00
No. 1 cast scrap	10.50 to 11.00
Extra heavy cast scrap	9.50 to 10.00
Stove plate and light	9.00 to 9.50
Old carwheels	9.50 to 10.00
Tram carwheels	9.50 to 10.00

St. Louis

ST. LOUIS, MO., Sept. 4, 1916.

Pig Iron.—The demand for iron for the remainder of this year, and especially for the first half of next year, has spread to foundrymen of all classes. The market has been filled with small inquiries on which numerous sales have been made, while still others are pending. At the same time some of the larger inquiries which were pending at the beginning of the week and on which quotations have been made have been held over until the purchasers feel absolutely certain that a railroad strike is not to confront them, with its attendant effect upon their own trade as well as the delivery of their purchases. Among the inquiries were one for 1000 tons of charcoal iron and two for an aggregate of about 6000 tons of malleable.

Coke.—Transactions have been few and for small lots. By-product coke is in control of the local situation, to a large extent, but prices are held on a parallel with Connellsville and Virginia quotations.

Finished Iron and Steel.—The market has shown no receding tendencies in either the pressure for the delivery of material already specified or the demand for future deliveries, but the situation of the mills as to the latter is continuing to drive purchasers to the warehouses, where the higher price is freely paid for immediate delivery. Light rails are in active request, particularly from coal companies, while lumbermen are showing a little more interest in the market. For stock out of warehouse we quote as follows, the figures being very firmly held: Soft steel bars, 3.15c.; iron bars, 3.05 to 3.10c.; structural material, 3.15c.; tank plates, 3.55c.; No. 10 blue annealed sheets, 3.45c.; No. 28 black sheets, one pass, cold rolled, 3.45c.; No. 28 galvanized sheets, black sheet gage, 4.80 to 5c., this latter being largely under the influence of the spelter market.

Old Material.—Dealers have had an off week, so far as real business is concerned, none of their customers being inclined to buy, while the railroads have withheld their lists temporarily in order not to offer any occasion for additional complications in the movement of freight during the strike threat's pendency. Dealers, however, are holding their prices firmly, with an expectation of advances with the lifting of railroad embargoes and the further clarifying of the railroad situation. Relaying rails, standard section, are in very sharp demand, with the supply practically nil. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton

Old iron rails	$16.25 to $16.75
Old steel rails, rerolling	15.00 to 15.50
Old steel rails, less than 3 ft.	15.00 to 15.50
Relaying rails, standard section, subject to inspection	23.00 to 24.00
Old carwheels	11.50 to 12.00
No. 1 railroad heavy melting steel scrap	15.00 to 15.50
Heavy shoveling steel	13.50 to 14.00
Frogs, switches and guards cut apart	14.50 to 15.00
Bundled sheet scrap	8.00 to 8.50

Per Net Ton

Iron angle bars	$16.00 to $16.50
Steel angle bars	13.50 to 14.00
Iron car axles	26.00 to 26.50
Steel car axles	27.00 to 27.50
Wrought arch bars and transoms	21.00 to 21.50
No. 1 railroad wrought	15.50 to 16.00
No. 2 railroad wrought	15.00 to 15.50
Railroad springs	15.00 to 15.50
Steel couplers and knuckles	14.00 to 14.50
Locomotive tires, 42 in. and over, smooth inside	20.50 to 21.00
No. 1 dealers' forge	10.25 to 10.75
Cast-iron borings	7.00 to 7.50
No. 1 busheling	13.50 to 14.00
No. 1 boilers, cut to sheets and rings	9.50 to 10.00
No. 1 railroad cast scrap	11.00 to 11.50
Stove plate and light cast scrap	8.75 to 9.25
Railroad malleable	11.00 to 11.50
Agricultural malleable	10.00 to 10.50
Pipes and flues	11.00 to 11.50
Railroad sheet and tank scrap	9.75 to 10.25
Railroad grate bars	9.50 to 10.00
Machine shop turnings	7.00 to 7.50

Buffalo

BUFFALO, N. Y., Sept. 6, 1916.—(*By Wire.*)

Pig Iron.—The week shows a lull in buying compared with past three weeks. Still there has been a total of 25,000 to 30,000 tons placed in the Buffalo district in the past week, of foundry grades and basic and Bessemer. One selling interest has disposed of considerable quantities of special irons. Of the 15,000 tons of foundry iron placed by the Worthington Pump & Machinery Company last week, a portion was taken by Buffalo furnaces. Most producers of the district are now very stiff in their prices, one interest being entirely sold up and out of the market. The price range, however, continues about the same as last week. We quote as follows, f.o.b. Buffalo furnace, for last half and first half of next year:

No. 1 foundry	$19.00 to $20.00
No. 2 X foundry	18.50 to 19.50
No. 2 plain	18.50 to 18.75
No. 3 foundry	18.25 to 18.75
Gray forge	18.25 to 18.50
Malleable	18.50 to 19.00
Basic	19.00 to 19.50
Bessemer	21.00 to 21.50
Charcoal, regular brands and analysis	21.00 to 22.00

Finished Material.—No cancellations are reported of August quotas, but specifications are being made for full amounts. Buyers are convinced there will be no weakness for some time to come. Quiet inquiries are being made regarding requirements extending into next year, particularly for first quarter. Mills are unable to book additional tonnage for this year, and in practically all instances new business is accepted for shipment at mills' convenience only, which on most products represents eight to ten months. The John W. Cowper Company, Buffalo, is placing 200 tons reinforcing bars for the Buffalo General Hospital. Bids are being taken for 100 tons of shapes for the Gerhardt-Lang brewery, Buffalo; 120 tons for cattle sheds at the Erie County farm; 1200 tons for a bascule bridge at Abbott Road over the Buffalo River, and for 300 tons for a lift bridge at Minetto, N. Y., over the Erie Canal. The Progressive Structural Steel Company, Buffalo, has taken 200 tons for store and loft building for J. A. Cramer, Buffalo.

Old Material.—No change in prices is noted. The market is still holding strong, though there was a temporary lull in inquiry and sales for several days pending the outcome of the threatened railroad strike. Business has rapidly resumed normal proportions. The principal demand is for heavy melting steel. A shortage is anticipated and prices are expected to advance within a brief period. There is still a pronounced demand for old steel axles for export, and $30 per ton could be secured if any were available. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	$15.50 to $16.00
Low phosphorus steel	20.00 to 20.50
No. 1 railroad wrought scrap	17.25 to 17.75
No. 1 railroad and machinery cast scrap	15.50 to 16.00
Steel axles	26.00 to 26.50
Iron axles	24.00 to 24.50
Carwheels	13.00 to 13.50
Railroad malleable	15.00 to 16.00
Machine shop turnings	6.00 to 6.50
Heavy axle turnings	12.00
Clean cast borings	7.50 to 7.75
Iron rails	18.00 to 18.50
Locomotive grate bars	11.50 to 12.00
Stove plate (net ton)	11.00 to 11.50
Wrought pipe	12.00 to 12.50
Bundled sheet scrap	11.50 to 12.00
No. 1 busheling	13.00 to 13.50
No. 2 busheling	11.00 to 11.50
Bundled tin scrap	15.00 to 15.50

New York

NEW YORK, Sept. 6, 1916.

Pig Iron.—Quite a little of the business that has been before the market for the last two or three weeks was closed up just before Sept. 1. The pump company that some time ago took bids on 15,000 to 16,000 tons for the first half of 1917, and as much more for the second half, is understood to have bought, but only up to the middle of the year. Quite a good deal of this business went to western Pennsylvania and a relatively small amount to Buffalo. A New Jersey foundry that has been asking for 5000 tons for first half took all of this and perhaps more, some of the iron going at $20, delivered. In Brooklyn several hundred tons of western Pennsylvania iron was bought at slightly over $20, delivered, figuring back to a little over $18 at furnace for No. 2. The American Locomotive Company is in the market for about 5000 tons for Schenectady and Dunkirk. New inquiry from nearby New Jersey points includes 1500 tons for the manufacture of heating castings, 1000 tons from another foundry and 500 tons from each of two others. Pennsylvania and northern New York furnaces have taken quite a little of the recent New Jersey business. In New England a jobbing foundry has bought several thousand tons for first quarter delivery. Alabama furnaces have done some business in New England around $20 for No. 2 for 1917 delivery. In Virginia some sales of furnace iron have been made at $17.75 at furnace for No. 2 X, though resale Virginia iron has been sold at considerably less, as low as $16.75 in one case. In western New York some basic iron has been taken by a coupler company, Buffalo and Valley furnaces being sellers. The market is still irregular, some evidence appearing of a firmer attitude by furnaces, while in other cases concessions are made. On the whole there is a slight gain in strength. We quote at tidewater for early delivery: No. 1 foundry, $20 to $20.50; No. 2 X, $19.50 to $19.75; No. 2 plain, $19.25 to $19.50; Southern iron at tidewater, $19.25 to $19.75 for No. 1 and $18.75 to $19.25 for No. 2 foundry and No. 2 soft.

Ferroalloys.—The ferromanganese market is lifeless, with very few inquiries and fewer sales, only a few carload lots being sold at about $175, seaboard. Little more is heard of possible restrictions of British shipments. Receipts are reported as very good, with specifications on contracts insistent. Some dealers, however, are behind in their deliveries. Little is heard of domestic offerings or sales, though it is understood some domestic product is obtainable at $175 or less, delivered. Fifty per cent ferrosilicon is active, with users urging forward metal under contract.

Finished Iron and Steel.—The withdrawal of quotations on plain material mentioned last week resulted in a number of additional awards for fabricated building work, and it is understood that plain material must now be figured at 2.60c., Pittsburgh, as a minimum. New work continues to appear, indicating urgent construction and also an acceptance of present price levels. Conspicuous are the following: A Paterno apartment to occupy part of the Grand Central Terminal area and involving 9000 to 10,000 tons; 4700 tons for the Norfolk Navy Yard; 700 tons for the Chespeake & Ohio; 500 tons for a warehouse for the Seaboard at Savannah, and 400 tons for a boiler house at Baltimore for the Consolidated Gas, Light & Power Company. For the present the substructure for the Paterno apartment is alone under consideration, taking 3500 tons, largely plate girder work. On Sept. 13, bids will be taken on 2340 tons for the Eastern Parkway subway in Brooklyn. Meanwhile it is believed that the hotel in Washington will not be put through on account of cost and the Baltimore hotel project has not yet been financed. The New York Central is in the market for about 300 tons of bridge work and the New York & Harlem is expected in the course of several weeks to take figures on upward of 4500 tons for an office building on the Grand Central Terminal area. A building for the White Motor Sales Corporation, Fifty-seventh Street, taking 300 tons, is mentioned as an early likelihood. Among awards are the following: Hedden Iron Construction Company, 400 tons for the General Electric at Lynn, Mass.; 250 tons for a powerhouse for the Queensboro Company at Far Rockaway and about 100 tons for the Continental Paper Company at Bogota, N. J.; American Bridge Company, 200 tons for the Bosch Magneto Company at Springfield, Mass., and 1000 tons for the Philadelphia Electric office building; A. E. Norton, Inc., 700 tons for Borchardt apartment, Seventy-fifth Street and Park Avenue, and 600 tons for a Bing & Bing building on West Seventy-first Street, leaving open still another Bing & Bing job, of 600 tons, on West Sixtieth Street; Passaic Structural Steel Company, 650 tons for the T. J. McLaughlin building at 105th Street and Broadway; New England Structural Company, 700 tons for the Ditson building, Boston; Phoenix Bridge Company, 400 tons for the Congoleum Company, Marcus Hook, and 100 tons for the Reading; and Pennsylvania Steel Company, 1100 tons for Snare & Triest for the Blackwell's Island storehouse. Another buyer of shipbuilding material for merchant vessels has established himself in New York in the person of James Donald, general manager of the States Marine & Commercial Company, Inc., 17 Battery Place, New York. In export buying at this writing it may be stated that many more cars are yet to be bought by Russia, more rails for the same country are under consideration, but a plan involving 10,000 tons of barb wire and 30,000 tons of ¾-in. rounds for Italy has been abandoned. We quote mill shipments of plain structural material at 2.769c. to 3.019c. New York for delivery in two to three months; steel bars at 2.769c. for delivery at convenience of the mill and as high as 3.169c. for say three months and limited largely to Bessemer steel; bar iron, 2.669c., and steel plates at

3.169c. to 4.169c., the wider the plates and the earlier the delivery, the higher the price. Out of store we quote iron and steel bars and shapes at 3.25c., New York, and plates 4c.

Cast-Iron Pipe.—The most interesting feature of the market is the increase in inquiries for export. The Southern pipe foundries have heretofore been most favored with orders for foreign shipment, but indications are favoring the diversion of some of this trade to Northern foundries. No large municipal lettings have come out and private buying is of but moderate volume. Prices are well held. Carload lots of 6-in., class B and heavier, are quoted at $30.50 per net ton, tidewater, class A and gas pipe taking an extra of $1 per ton.

Old Material.—About the only change for the better is in such materials as are wanted for export. Relaying rails, rerolling rails and car axles are in especially good demand for shipment to foreign buyers. In the domestic trade the iron rolling mills in eastern Pennsylvania are the only consumers taking much interest in the market and the demand from them is more for specialties than for staple commodities. Western Pennsylvania consumers are taking practically nothing from this market and brokers state that $12.60, New York, is about the best that could be paid at present for heavy melting steel scrap to be shipped to the Pittsburgh district. They quote buying prices for the Eastern trade about as follows to local dealers and producers, per gross ton, New York:

Heavy melting steel scrap (eastern Pennsylvania specifications)	$11.75 to $12.00
Old steel rails (short lengths) or equivalent	12.50 to 12.75
Relaying rails	27.50 to 28.00
Relaying rails (for export)	30.00 to 32.00
Rerolling rails	16.75 to 17.00
Rerolling rails (for export)	19.00
Iron car axles (for export)	35.00
Steel car axles (for export)	37.00
No. 1 railroad wrought	18.50 to 18.75
Wrought-iron track scrap	15.50 to 16.00
No. 1 yard wrought, long	13.50 to 14.00
No. 1 yard wrought, short	11.75 to 12.00
Light iron (nominal)	3.50 to 4.00
Cast borings (clean)	6.75 to 7.00
Machine shop turnings (nominal)	4.25 to 4.50
Mixed borings and turnings	4.25 to 4.50
Wrought pipe	11.25 to 11.50
Old carwheels (nominal)	15.00 to 15.50
Malleable cast (railroad)	12.00 to 12.50

Foundries are purchasing only moderate quantities. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

No. 1 cast (machinery)	$15.75 to $16.00
No. 2 cast (heavy)	14.00 to 14.50
Stove plate	11.50 to 12.00
Locomotive grate bars	10.00 to 10.25

British Steel Market

Billets Much Higher—Italian Pig-Iron Orders Diverted to America

LONDON, ENGLAND, Sept. 6, 1916.—(*By Cable.*)

The pig-iron market is strong, with forward sales restricted. Large sales of Cleveland iron have been made to France, but new Italian business has been diverted to the United States. American billets are dearer, with independent producers practically sold out for this year. Four-in. billets for December delivery have sold at $65, c. i. f. Liverpool, but now $68 is quoted for January-March delivery. France has bought for prompt delivery 1¾-in. billets at £16, c. i. f. net. Tin plates are irregular, with government orders at 30s. and upwards, and stock plates at 37s. Benzol, 90 per cent, at 1s. 1½d., and toluol at 2s. 3d., are unchanged, and solvent naphtha is nominal at 1s. 10d. to 2s. Ammonium sulphate is quoted at £16 15c. We quote as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 33s. to 37s.
Steel black sheets, No. 28, export, f.o.b. Liverpool, £20 5s.
Steel ship plates, Scotch, delivered local yards, £13 17s. 6d.
Steel rails, export, f.o.b. works, £10 17s. 6d.
Hematite pig iron, f.o.b. Tees, about 140s.
Sheet bars (Welsh) delivered at works in Swansea Valley, £10 7s. 6d.
Steel bars, export, f.o.b. Clyde, £18.
Ferromanganese (nominal), £35.
Ferrosilicon, 50 per cent, c.i.f., £29.

Iron and Industrial Stocks

NEW YORK, Sept. 6, 1916.

The stock market of the past week fluctuated considerably. The threatened railroad strike presented new conditions from day to day, which alternately caused weakness and strength in industrial stocks. On Thursday United States Steel common attained 99⅜, but it dropped on the following days, rising on Tuesday of this week to 99. Other industrial stocks were also quite strong. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com.	22 - 24½	N. Y. Air Brake	134 - 136½
Allis-Chal., pref.	78 - 79	Pitts. Steel, pref	98 - 98¾
Am. Can, com.	58½ - 62¼	Pressed Stl., com.	51½ - 54
Am. Can, pref.	112 - 115	Pressed Stl., pref.	101 - 101¾
Am. Car & Fdy., com.	60½ - 63	Ry. Steel Spring, com.	44¼ - 46½
Am. Car & Fdy., pref.	117 - 118½	Republic, com.	51 - 54½
Am. Loco., com.	74½ - 77¼	Republic, pref.	113½ - 114
Am. Loco. pref.	104 - 105⅞	Pipe, com.	19¼ - 20
Am. Steel Fdries.	53¼ - 53¾	Pipe, pref.	52⅝
Bald. Loco., com.	76 - 80⅞	U. S. Steel, com.	95 - 99⅜
Bald. Loco., pref.	104 - 104½	U. S. Steel, pref.	117⅝ - 118½
Beth. Steel, com.	480 - 487	Westing. Elec.	57¾ - 60
Colo. Fuel	45⅞ - 46¼	Am. Rad., com.	396 - 397
Deere & Co., pref	90	Am. Ship, com.	47 - 49
Gen. Electric	167 - 170¼	Chic. Pneu. Tool	70 - 71¾
Gt. No. Ore Cert.	36⅛ - 38¾	Lake Sup. Corp.	10½ - 10⅞
Int. Harv. of N. J., com.	114 - 116¼	Cruc. Steel, com.	73 - 78½
Int. Harv. of N. J., pref.	118 - 118¼	Cruc. Steel, pref.	116⅛ - 118
Int. Harv. Corp., pref.	108	Hub Walk Reface, pref.	102 - 104
Lackaw. Steel	75 - 78½	La Belle Iron, com.	55⅜ - 56½
Nat. Ed. & Stm., com.	23½ - 25	La Belle Iron, pref.	133⅛ - 133½
		Driggs-Seabury	65 - 80
		Midvale Steel	61⅛ - 62¾

Dividends

The American Car & Foundry Company, regular quarterly, ½ of 1 per cent. on the common and 1¾ per cent on the preferred stock, payable Oct. 2.

The American Can Company, regular quarterly, 1¾ per cent on the preferred stock, payable Oct. 1.

The Driggs-Seabury Ordnance Company, regular quarterly, 1¾ per cent on the first preferred stock and 1½ per cent on the second, payable Sept. 15. The dividend on the common stock was passed, although earnings were more than sufficient to pay it.

The Wheeling Steel & Iron Company, regular quarterly, 2 per cent and an extra of 1 per cent on the preferred stock.

The American Locomotive Company, quarterly, 1¼ per cent on the common stock, payable Sept. 28, being the first dividend declared on the common stock since 1908, and regular quarterly, 1¾ per cent on the preferred stock, payable Oct. 21.

The Dominion Iron & Steel Company, Ltd., 3½ per cent on the preferred stock for the half year ended April 1, 1916, and 3½ per cent additional for the half year to end, or Oct. 1, 1916. This action clears the slate of arrears on the preferred.

The American Iron & Steel Mfg. Company, regular quarterly, 1¼ per cent on the common and preferred stocks, payable Oct. 2.

The Bethlehem Steel Company, regular quarterly, 7½ per cent on the common stock and 1¾ per cent on the preferred stock, payable Oct. 2.

The Cambria Iron Company, 2 per cent, payable Oct. 2.

The Hendee Mfg. Company, regular quarterly, 1¾ per cent on the preferred stock, payable Oct. 2.

Pettibone, Milliken & Co., Inc., regular quarterly, 1¾ per cent on the first and second preferred stocks, payable Oct. 1.

The Scovill Mfg. Company, extra 1½ per cent, payable Sept. 1.

The Worthington Pump & Machinery Corporation, 1¾ per cent on the preferred A stock, payable Oct. 2.

The Chandler Motor Company, regular quarterly, 2 per cent and extra 1 per cent, payable Oct. 2.

The Continental Can Company, regular quarterly, 1¼ per cent on the common and 1¾ per cent on the preferred stock.

Japan as a Source of Tungsten

Exports of tungsten ore from Japan in 1915 were 85 tons to the United States, 214 tons to France, and 110 tons to the United Kingdom, or 409 tons in all. Estimated shipments to July 20, 1916, are placed at 480 tons, most of it going to the United States. The tungsten output of Japan is reported as 25 to 40 tons of ore per month from the Kiwada mine, 10 to 11 tons per month from the Takitori mine, and 75 tons per month from several small mines. Those in Corea produce between 50 and 60 tons per month. Attempts were made to obtain tungsten from Siam, but the ore contained large percentages of tin, greatly reducing the value.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, effective from April 10, 1916, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c.; Pacific coast (by rail only), 65c.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zèes 3 in. and over, 2.60c. to 2.75c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs	.10
Angles 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and connecting rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	20 to .80
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55
No charge for cutting to lengths 3 ft. and over	

Plates.—Tank plates, ¼ in. thick, 6 in. up to 100 in. wide, 3c. to 4c., base, net cash, 30 days, or ½ of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras

	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers)	.10
Boiler and flange steel plates	.15
"A B M A" and ordinary firebox steel plates	.20
Still bottom steel	.30
Locomotive firebox steel	.50

Marine steel, special extras and prices on application.

Gage Extras

	Cents per lb.
Rectangular, 1¼ in. thick, over 6 in. wide to 100 in. wide.	Base
Lighter than ¼ in., to 3/16 in., up to 72 in wide	.10
*Lighter than ¼ in., including 3/16 in., over 72 in. to 84	.20
*Lighter than ¼ in., including 3/16 in., over 84 in. to 96	.30
*Lighter than ¼ in., including 3/16 in., over 96 in. to 100	.40
*Lighter than ¼ in., including 3/16 in., over 100 in. to 102	.45
Lighter than 3/16 in., including No. 8, up to 72 in. wide	.15
*Lighter than 3/16 in., including No. 8, over 72 in. to 84	.25
*Lighter than 3/16 in., including No. 8, over 84 in. to 96	.35
Lighter than No. 8, including No. 10, up to 60 in. wide	.30
Lighter than No. 8, including No. 10, over 60 in. to 64	.35

Up to 72 in. not less than 10.2 lb. per sq. ft. will be considered ¼ in.
Over 72 in. must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.
Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.
Over 72 in., ordered weight 3/16 in., take No. 8 price.
Over 72 in., ordered weight No. 8, take No. 10 price.

Width Extras

Over 100 in. to 110 in., inclusive	.05
Over 110 in. to 115 in. inclusive	.10
Over 115 in. to 120 in. inclusive	.15
Over 120 in. to 125 in. inclusive	.25
Over 125 in. to 130 in. inclusive	.50
Over 130 in.	1.00

Length Extras

Universal plates 80 ft. long up to 90 ft. long	.05
Universal plates 90 ft. long up to 100 ft. long	.10
Universal plates 100 ft. long up to 110 ft. long	.20

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over

Lengths under 3 ft. to 2 ft. inclusive	.25
Lengths under 2 ft. to 1 ft. inclusive	.50
Lengths under 1 ft.	1.55
Circles 3 ft. in diameter to 100 in.	.30
Circles over 100 to 110 in. (width extra)	.35
Circles over 110 to 115 in. (width extra)	.40
Circles over 115 to 120 in. (width extra)	.45
Circles over 120 to 125 in. (width extra)	.55
Circles over 125 to 130 in. (width extra)	.80
Circles over 130 in. (width extra)	1.30
Circles under 3 ft. to 2 ft. inclusive	.55
Circles under 2 ft. to 1 ft. inclusive	.80
Circles under 1 ft.	1.85

Half circles take circle extras.

Sketches, not over four straight cuts, inc. straight taper	.10
Sketches having more than four straight cuts	.20

Plates sheared to a radius take complete circle extras.

*Including extra for width.

Wire Rods.—Including chain rods, $55 to $60.

Wire Products.—Prices to jobbers effective Aug. 5: Fence wire, Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, $2.55; galvanized, $3.25. Galvanized barb wire and staples, $3.45; painted, $2.75. Wire nails, $2.60. Galvanized nails, 1 in. and longer, $2 advance over base price; shorter than 1 in., $2.50 advance over base price. Cement-coated nails, $2.50. Woven wire fencing, 61½ per cent off list for carloads, 60½ off for 1000-rod lots, 59½ off for less than 1000-rod lots.

The following table gives the price per 100 lb. to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

No.	9	10	11	12½	13	14	15	16
Annealed	$2.60	$2.65	$2.70	$2.75	$2.85	$2.95	$3.05	$3.15
Galvanized	3.25	3.30	3.35	3.45	3.55	3.65	3.75	3.85

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect on black pipe from April 21, 1916, and on galvanized pipe from July 24, 1916, all full weight:

Butt Weld

Steel: Inches	Steel: Black	Steel: Galv.	Iron: Inches	Iron: Black	Iron: Galv.
⅛, ¼ and ⅜	63	47½	⅛, ¼ and ⅜	5	24
½	67	51½	½	9	25
¾ to 3	68	52½	¾ to 3	11	38
			3½ and 4	16	42

Lap Weld

2	64	48½	2	18	31
2¼ to 6	68	52½	2½ and 3	24	38
7 to 12	67	51½	3½ and 4	27	39
13 and 14	62½		4½ to 6	37	42
15	51		7 to 12	56	41

Reamed and Drifted

1 to 3, butt	68	52½	¾ to 1½, butt	35	37
2, lap	62	48½	1½, lap	43	35
2½ to 6, lap	66	51½	1¾ lap	49	32
			2, lap	46	33
			2½ to 4, lap	52	36

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	59	40½	⅛, ¼ and ⅜	32	34
½	64	44½	½	37	43
¾ to 1½	68	47½	¾ to 1½	41	45
2 to 3	69	48½			

Lap Weld, extra strong, plain ends

2	63	49½	1½	50	33
2½ to 4	66	52½	1¾	52	39
4½ to 6	65	51½	2	54	42
7 to 8	61	45½	2½ to 4	59	45
9 to 12	56	40½	4½ to 6	58	44
			7 to 8	52	38
			9 to 12	47	33

Butt Weld, double extra strong, plain ends

½	55	43½	½	44	31
¾ to 1½	58	46½	¾ to 1½	47	34
2 to 2½	60	48½			

Lap Weld, double extra strong, plain ends

2	55	43½	1½	44	30
2½ to 4	57	45½	2	44	30
4½ to 6	56	44½	2½ to 4	46	35
7 to 8	51	35½	4½ to 6	45	34

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Sheets.—Makers' prices for mill shipments on sheets of U. S. standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Blue Annealed Sheets

	Cents per lb.
Nos. 3 to 8	2.95 to 3.20
Nos. 9 and 10	3.00 to 3.25
Nos. 11 and 12	3.05 to 3.30
Nos. 13 and 14	3.10 to 3.35
Nos. 15 and 16	3.20 to 3.45

Box Annealed Sheets, Cold Rolled

Nos. 17 to 21	2.70 to 2.85
Nos. 22 and 24	2.75 to 2.90
Nos. 25 and 26	2.80 to 2.95
No. 27	2.85 to 3.00
No. 28	2.90 to 3.05
No. 29	2.95 to 3.10
No. 30	3.15 to 3.30

Galvanized Sheets of Black Sheet Gage

Nos. 10 and 11	3.15 to 3.25
No. 12	3.25 to 3.35
Nos. 13 and 14	3.25 to 3.35
Nos. 15 and 16	3.35 to 3.45
Nos. 17 to 21	3.50 to 3.60
Nos. 22 and 24	3.60 to 3.70
Nos. 25 and 26	3.75 to 3.85
No. 27	4.00 to 4.10
No. 28	4.15 to 4.25
No. 29	4.30 to 4.40

Boiler Tubes.—Discounts on less than carloads, freight to destination added, effective from April 15, 1916, are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1¼ in.	35	1¼ in.	27
1¾ and 2 in.	47	1¾ and 2 in.	29
2¼ in.	44	2¼ in.	26
2½ and 2¾ in.	50	2½ and 2¾ in.	41
3 and 3½ in.	55	3 and 3½ in.	47
3½ to 4½ in.	56	3½ to 4½ in.	48
5 and 6 in.	49	5 and 6 in.	41
7 to 13 in.	46	7 to 13 in.	38

Locomotive and steamship special charcoal grades bring higher prices.

1¾ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin,	Lead		Spelter	
Aug.	Lake	Electro-lytic	New York	New York	St. Louis	New York	St. Louis
30	27.50	27.50	38.87½	6.50	6.50	9.00	8.50
31	27.50	27.50	38.75	6.50	6.50	8.87½	8.62½
Sept.							
1	27.75	27.75	38.75	6.50	6.50	8.75	8.50
2	28.00	28.00	....	6.50	6.50	8.75	8.50
4	....	....	....	....	....	....	....
5	28.00	28.00	38.87½	6.75	6.60	8.75	8.50

NEW YORK, Sept. 6, 1916.

Copper is stronger, with nearby metal scarce. Consumers of tin show but little interest and prices are lower. Lead has stiffened after buying by consumers short of stock supplies. Spelter is dull and lower. Antimony has declined in a quiet market.

New York

Copper.—Prior to the scare over the possibility of a railroad strike there was a good volume of buying. While this has temporarily subsided, the market is unquestionably strong. September electrolytic is quoted at 28c.; October, 27.75c.; November and December, 27.50c., and first quarter, 26.50c. Lake copper is nominally the same as electrolytic. The quotation for nearby metal is that of outside interests, the producers being sold up for the time. September copper is scarce, and an effort to obtain 300 tons of spot yesterday was unsuccessful. Foreign governments are expected to come in the market for huge quantities for 1917 delivery, but producers are not willing to book the business at the heavy concessions desired. It is said that England has offered 25c. to 25.50c., which was declined. The August exports total 32,160 tons. The London market yesterday for electrolytic was £130, against £129 a week previous.

Copper Averages.—The average price of Lake copper for the month of August, based on daily quotations in THE IRON AGE, was 26.95c., and for electrolytic, 26.72c.

Tin.—The only noteworthy activity has been in futures. Late on Aug. 31 about 250 tons was dealt in for future delivery, and on the following day 150 tons. Spot and nearby have been neglected and this despite offers of fairly low prices. The large consumers, and especially those in the interior, apparently see no reason for buying freely, the explanation of which is that they are now taking deliveries of tin bought at high prices and their frame of mind is not optimistic. Business has been hampered also by the railroad disturbance. The deliveries into consumption in August were smaller than was expected, but this did not depress the market in the slightest degree. They amounted to 4335 tons, which ordinarily would be considered good. The total of deliveries in eight months, 40,388 tons, is 8130 tons in excess of the same period last year. In stock and landing Aug. 31 was 4756 tons. Banca tin continues a factor, selling from 1c. to 1½c. per lb. under Straits. There is now afloat 3840 tons en route to this country. The quotation for spot Straits yesterday was 38.87½c.

Lead.—The market in this metal has been a shifting one. Last week there was but little change in the situation. When the leading interest sold at the price it has steadfastly quoted—6.50c., New York—it was in limited quantities and to regular customers only. Independent producers are well sold ahead for the most part and the situation enables some outsiders to get premiums. There are indications that some consumers stayed out of the market too long, with the result that they are now short of metal and are looking for prompt deliveries. There was inquiry of this sort yesterday and sales were made up to 6.75c., New York, and 6.65c., Chicago. More could have been sold if it had been available. Shipments three to four weeks away were $1 to $2 per ton cheaper. The St. Louis independent quotation yesterday was on a par with that of New York. The leading producer quotes 6.42½c., St. Louis. The August exports were light, amounting to only 830 tons.

Spelter.—Prompt can be had easily at 8.75c., New York, and 8.50c., St. Louis, and it is probable that these figures might be shaded. Some interest was shown by domestic consumers yesterday, but on the whole the market is quiet. Second hands are held responsible for a good bit of speculation in spelter. September delivery is held at 8.50c.; October, 8.25c.; November, 8.12½c., and December, 8c., all St. Louis. On Aug. 31 the New York Metal Exchange, following the recommendation of the spelter committee, adopted a new ruling as to what constitutes a good delivery on contracts for prime Western spelter. It reads that prime Western shall be virgin spelter resulting from the distillation of zinciferous material and shall not contain on the average in excess of 2 per cent lead and 0.08 per cent iron. The August exports were large, amounting to 11,352 tons.

Antimony.—In a dull market quotations have declined, and spot metal can be had at 12c. to 12.50c., duty paid, although some of the importers are holding their quotations considerably above these figures.

Aluminum.—The market is strong but without features of special interest, at 60c. to 62c. for No. 1 virgin aluminum, 98 to 99 per cent pure.

Old Metals.—Values are rising, with an active demand. All metals are higher. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible	24.50 to 25.50
Copper, heavy and wire	23.25 to 24.00
Copper, light and bottoms	20.50 to 21.50
Brass, heavy	14.00 to 15.00
Brass, light	11.50 to 12.00
Heavy machine composition	19.00 to 19.50
No. 1 yellow rod brass turnings	14.25 to 15.00
No. 1 red brass or composition turnings	15.50 to 16.50
Lead, heavy	6.00
Lead, tea	5.50
Zinc	7.00 to 7.50

Chicago

SEPT. 2.—Prices of non-ferrous metals, while slightly easier, still reflect a firm producer situation. We quote: Casting copper, 26c.; Lake copper, 27.75c.; tin, carloads, 39.50c., and small lots, 41c.; lead, 6.65c. to 6.75c.; spelter, 8.50c.; sheet zinc, 15c.; Cookson's antimony, 50c.; other grades, 14.50c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 19.50c.; copper bottoms, 17.75c.; copper clips, 18.50c.; red brass, 17c.; yellow brass, 13c.; lead pipe, 5.25c.; zinc, 6c.; pewter, No. 1, 28c.; tinfoil, 33c.; block tin pipe, 37c.

St. Louis

SEPT. 4.—Non-ferrous metals have been firm the past week, with these prices quoted at the close: Lead, 6.65c. to 6.75c.; spelter, 8.75c.; tin, 39.50c. to 40c.; Lake copper, 28c. to 28.50c.; electrolytic copper, 27.50c. to 28c.; antimony, 15c. for Asiatic metal. In the Joplin ore district there was a further curtailment of production, with zinc blende quoted at $50 to $70, premium settlements of choice ores running as high as $73, and the average for the week $61.50 per ton. Calamine ranged from $35 to $45, with the average for the week $42. Lead ore was firm at $65 for 80 per cent, and the average for the week $64. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 8c.; heavy yellow brass, 11c.; heavy red brass and light copper, 15c.; heavy copper and copper wire, 17c.; pewter, 25c.; tinfoil, 30c.; zinc, 5c.; lead, 5c.; tea lead, 3.50c.

German Pig Iron and the Manganese Supply

Complaints of the present quality of German pig iron are found in a Dutch periodical, which states that it is daily proving worse, and the opinion is advanced that this deterioration is due to a shortage of skilled workmen and an insufficient quantity of manganese. The substitute for manganese, reported in German papers, does not seem to have come up to expectations, continues the report, and the iron is hard and brittle.

Pittsburgh and Nearby Districts

The Pennsylvania Lines West, through its purchasing agent at Pittsburgh, has sent out inquiries for about 50 machine tools, including two 100-in. boring mills, two 6-ft. radial drill presses, one 600-ton 90-in. driving wheel press, one 60-ton vertical driving box and rod press, about 15 16 to 60-in. lathes, two forging machines, three high-power turret lathes, one cold saw, one guide-bar grinding machine, three planers, several heavy-duty drill presses, four or five small boring mills, two rod-boring machines, one traverse head shaper, one 24-in. horizontal boring and drilling machine, and a number of pneumatic tools.

The H. Koppers Company, Pittsburgh, is inquiring for 12 machine tools for shop equipment, to be used at the by-product coke plant of the Seaboard By-Product Coke Company, now being erected near Jersey City, N. J.

The Pittsburgh Steel Company reports sales for the twelve months ended June 30, 1916, as $21,848,035.67, compared with $11,649,863.97 for the year ended June 30, 1915. Net profits were $4,564,067.18, compared with $858,160.02 for the previous year. There was set aside out of the earnings for the year ended June 30, 1916, the sum of $500,000 as a reserve for depreciation. The company has issued a call for payment on Oct. 1 of $1,000,000 of its 6 per cent coupon gold notes, series C, due Jan. 1, 1920. These are the last of that series of notes, and the last of the entire issue of $5,000,000 of notes dated Jan. 1, 1915, and which were to mature as follows: $1,500,000, Jan. 1, 1918; $1,500,000, Jan. 1, 1919; $2,000,000, Jan. 1, 1920.

The Standard Stamping Company, Marysville, Ohio, maker of hardware specialties and stamped-metal goods, has increased its capital from $70,000 to $120,000. The company states that the increase was made on account of its rapidly growing business, and that it is probable some new building operations will be necessary later on.

The Standard Seamless Tube Company, Pittsburgh, has started up its open-hearth steel plant at Economy, Pa., which contains two 30-ton open-hearth furnaces. At present the company is turning out ingots which are being sold in the open market, but about October, when the company expects to finish and put in operation its new seamless-tube mills, it will use its entire output of steel.

The Sharpsville Boiler Works Company, recently organized at Sharpsville, Pa., with a capital of $50,000, has elected officers as follows: Hugh J. Garvey, president; Charles D. Fagan, secretary; F. W. King, treasurer; James P. Keene, general manager; and W. C. McGaffic, superintendent. The company states that it has orders on its books to keep it busy for the next eight months. It is about to erect an additional building, 70 x 120 ft., of steel construction.

The Baldwin Tool Works Company, Parkersburg, W. Va., has completed an addition to its plant that will be occupied at an early date.

The city of Upper Sandusky, Ohio, has awarded a contract for a new filter control apparatus with the Pittsburgh Filter Mfg. Company, Pittsburgh.

The Johnson Bronze Company, New Castle, Pa., has placed a contract with the Anderson Construction Company for the erection of a new foundry to cost about $85,000. It will be of steel and brick construction, and will be equipped with the most modern appliances.

The Brier Hill Steel Company, Youngstown, Ohio, which is building two 100-ton open-hearth furnaces, expects to have one finished about Dec. 1 and the other about Jan. 1. The company now has 10 open-hearth furnaces of this capacity, making about 15,000 tons of steel per month.

The creditors' committee appointed some time ago to handle the financial affairs of J. V. Thompson, coal and coke operator, Uniontown, Pa., announces a program which it is submitting for the creditors' approval. This gives the committee a period of three years from Sept. 1, in which to adjust the Thompson finances. The committee states that it represents and is acting for over 98 per cent of the unsecured creditors under terms of a deposit agreement. James A. Campbell, president Youngstown Sheet & Tube Company, and Julian Kennedy, Pittsburgh, are members of the committee.

The Blairsville Machine Company, Blairsville, Pa., with a capital stock of $5,000, has been incorporated by J. R. Robinson, Mount Lebanon, Pa.; L. H. Seidner, 49 Bryant Avenue, Bellevue, Pa., and M. R. and P. W. Robinson, Blairsville, to manufacture fans, ice machines, etc.

The Wilson & Daum Company, Pittsburgh, with a capital stock of $50,000, has been incorporated by Rowland S. Wilson, 341 South Rebecca Street, Pittsburgh; John A. Daum and Rowland S. Wilson, Jr., to manufacture lighting fixtures, etc.

It is practically confirmed that the Westinghouse Machine Company, East Pittsburgh, will build a large plant at Essington, near Philadelphia, on ground acquired some months ago. It will make the same products as are at present made at East Pittsburgh, but probably some time will elapse before definite plans have been worked out. The company is inquiring for 6000 tons of structural material for steel buildings for the new plant.

Stockholders of the recently organized Edgewater Steel Company, which will take over the plant and assets of the Kennedy-Stroh Corporation, Oakmont, Pa., near Pittsburgh, held a meeting in the latter city on Wednesday, Sept. 6, to elect officers and also to take steps to dissolve formally the Kennedy-Stroh Corporation. The Edgewater Steel Company, it is understood, will manufacture steel tires and forged steel carwheels. Some open-hearth furnaces and other equipment will be added to the plant at Oakmont. Some time ago the corporation sold its entire pipe-fitting department to the Pittsburgh Valve, Foundry & Construction Company.

Changes at American & British Mfg. Company

Control of the American & British Mfg. Company, Bridgeport, Conn., has changed hands. This has caused the retirement of Joseph H. Hoadley, president; A. H. Hoadley, general manager; William E. White, treasurer, and William M. Strawn, superintendent. John C. Stanley, who has been made president, retains his connection as purchasing agent of the Remington Arms-Union Metallic Company ammunition plant. Suit has been brought against Joseph H. Hoadley and the Cramp-Hoadley Company, which in the complaint is termed the "alter ego" of Mr. Hoadley, to restrain them from disposing of five notes of the American & British Mfg. Company amounting to about $200,000 and of other securities of the company. The suit is brought against Joseph H. Hoadley, the Cramp-Hoadley Company, Alfred H. Hoadley, George E. Bouchie and William E. White, directors of the Hoadley Company, to recover assets which it is alleged have been diverted. The election of Mr. Stanley to the presidency is taken to mean that the Remington interests are now in control of the American & British Company, which is a large producer of heavy guns and munitions.

Increasing Its Tungsten and Alloy Plant

The Hudson Reduction Company, 314 Empire Building, Pittsburgh, with works at Latrobe, Pa., has greatly increased its capacity, and is operating 33 electric smelting furnaces in the manufacture of ferrotungsten and tungsten metal. Additions are under way to produce ferrosilicon and ferrovanadium. Branch offices are located at 50 Church Street, New York, and Commercial Trust Building, Philadelphia.

The Cleveland Crane & Engineering Company, Wickliffe, Ohio, which is engaged in the manufacture of shell forgings in addition to its regular line, has taken an additional contract for forging 100,000 4½-in. shells for England. The machine work on these shells will be done in Canada.

PERSONAL

B. R. Shover, former general superintendent of the Tata Iron & Steel Company, Ltd., Sakchi, India, who resigned recently, returned to his home in Youngstown, Ohio, last week. He states that 9 cents a day in our money is paid for common labor in the Tata works, but about six men are required to do the work that one does in this country. The company is now employing close to 9000 men, of whom about 160 are white men. It is now turning out about 10,000 tons of steel per month, of which about 20 per cent is munition steel and the remainder merchant steel bars, plates and shapes.

Walter F. Schleiter of Dilworth, Porter & Co., Inc., Pittsburgh, maker of spikes and tie-plates, has been elected a director of H. P. Taylor & Co., dealers in stocks and bonds in that city.

William J. S. Ritscher, formerly assistant to L. F. Hamilton, manager of the publication department of the National Tube Company, Pittsburgh, has resigned to become advertising manager of the Petroleum Iron Works Company, Sharon, Pa.

Arthur L. Lewis, formerly with L. F. Fales, Walpole, Mass., has been appointed superintendent of Sleeper & Hartley, Inc., Worcester, Mass.

P. J. Freeman has resigned from the professorship of applied mechanics in Kansas State College to become engineer of tests for the Pittsburgh Testing Laboratory.

Ferdinand Jehle has resigned as laboratory engineer with the Automobile Club of America to become service engineer with the Aluminum Castings Company, Cleveland.

W. H. Kavanaugh, for 15 years a member of the faculty of the College of Engineering at the University of Minnesota, has accepted the professorship of experimental engineering in the Towne Scientific School of the University of Pennsylvania.

R. D. Day, formerly with the William Tod Company, Youngstown, Ohio, has been appointed assistant to Vice-President Maurice Pollak of the Pollak Steel Company, Cincinnati, Ohio.

A. W. Foote, president Foote-Burt Company, Cleveland, builder of drilling machinery, has been elected president of the H. A. Lozier Company, automobile manufacturer, Cleveland, succeeding H. A. Lozier, who continues as director.

S. R. Willock, who has been assistant sales manager, has been appointed general manager of sales of the William Tod Company, Youngstown, Ohio. He succeeds R. D. Day, who has resigned to become connected with the Pollak Steel Company, Cincinnati.

Frank L. Herzog, chief engineer for the Philadelphia Roll & Machine Company, Philadelphia, has resigned to take a position with Mackintosh, Hemphill & Co., Pittsburgh. Leonard F. Uthe is leaving the Garrett-Cromwell Engineering Company, Cleveland, to take the position vacated by Mr. Herzog.

The Universal Portland Cement Company, Chicago, announces the following appointments: Adolph G. Carlson, mechanical engineer since 1907 and formerly assistant superintendent of the Syracuse, Ind., plant of the Sandusky Portland Cement Company, is appointed chief engineer. He has had to do with the designing of Nos. 3, 4 and 6 mills of the Universal Portland Cement Company at Buffington, Ind., and No. 5 mill at Pittsburgh and No. 7 mill at Duluth. M. S. Humphryes, formerly superintendent of No. 6 mill, Buffington, Ind., is appointed assistant mechanical engineer at the general offices in Chicago. Nels Nelson, formerly superintendent of No. 2 mill, South Chicago, which plant has been dismantled, is appointed superintendent of No. 6 mill, Buffington, Ind. J. H. Lendi is appointed electrical engineer at the general offices in Chicago. He has been connected with the company for several years in the engineering department. A. C. Wilby is appointed assistant to the president, having been assigned to these duties in April, 1915, after seven years' connection with the sales department of the company, first as salesman and then as division sales manager.

Bertholf M. Pettit, for three years advertising manager of the J. I. Case Threshing Machine Company, Racine, Wis., has resigned to accept a position with the Curtis Publishing Company, Philadelphia.

Arthur J. Sweet of Vaughn, Meyer & Sweet, Majestic Building, Milwaukee, consulting engineers and electrical experts, has withdrawn from the partnership and established an office in the Palace Theater Building, Milwaukee, for the general practice of electrical and consulting engineering.

B. L. Worden, Buffalo, N. Y., president Worden-Allen Company, structural fabricator and erector, Milwaukee, Chicago and Buffalo, together with the managers of the branch and home offices, spent last week in a tour of the Michigan copper country to inspect the large number of mining structures the company has erected in that section.

Charles Schuering, for many years in charge of the Lyons Boiler Works, De Pere, Wis., has accepted the position of superintendent of the Weil Boiler Company, Indianapolis, Ind., and assumed his new duties Sept. 1.

Albert H. Noyes, who has been assistant secretary and treasurer of the Ayer & Lord Tie Company, Chicago, has been appointed secretary and treasurer.

James Donald, of Leopold Walford, Ltd., London, England, and some years ago identified with the New York Shipbuilding Company, has established an American branch of the Walford institution at 17 Battery Place, New York, known as the States Marine & Commercial Company, Inc., to conduct an exporting business in coal and steel products, as well as in general steamship freight contracting. He is general manager of the company, which will also have connections with other branches of the Walford house, such as the Compagnie Française de Marine et de Commerce, Paris, and the Kenitra Commercial Company, Ltd., Kenitra, Morocco.

George S. Thompson, formerly with Gaston, Williams & Wigmore, Inc., is now in charge of an office at 8 Rue Edouard VII, which the American Steel Export Company, Woolworth Building, New York, has established at Paris, France.

New Method of Producing Copper Coated Steel

A process for uniting bodies of dissimilar metals is covered by a patent (U. S. No. 1,193,667) issued to Fred B. Corey, Barberton, Ohio. The union between the metals is effected by welding and is relied upon to resist the action of mechanical stresses produced in working the metal, as well as changes in temperature. In producing bimetallic shapes one of the metals has its surface thoroughly cleaned. A thin layer of a metal having a low melting point is then welded to the cleaned surface and any excess metal is removed. The surface of the other metal, which has been thoroughly cleaned, is then brought into intimate contact with this coating and the whole heated to a temperature at which an alloy is formed between the metal having a low melting point and the one which it is desired to unite to it. The temperature at which this alloying action takes place, of course, is below the melting point of either of the two metals that it is desired to join. The object of this method is to produce a union that will avoid absorption of one of the metals by the other and also give a metallic structure that may be rolled, drawn, hammered, bent, twisted, punched or machined without destroying the union between the two metals.

The selection of Cleveland as a site for new automobile industries is noteworthy. The movement began with the Chandler Motor Car Company. It was followed by the H. A. Lozier Company, the Jordan Motor Car Company, and the Grant Motor Car Corporation, and more recently the Consolidated Car Company.

STRIKES AND SETTLEMENTS

More New England Labor Troubles

As predicted last week, a strike involving a large number of workmen took place Saturday, Sept. 2, at the Pittsfield, Mass., shops of the General Electric Company.. The company has issued a statement in which it says that, of the 6300 workmen, but 1869 walked out, many of the union members refusing to leave the plant. The labor leaders claim that over 4000 are out, including many unorganized workmen, who struck in sympathy. The main issues are an advance of 10 per cent in pay, reinstatement of men discharged (presumably for organization activities), discrimination against men seeking work who acknowledge that they are union members and recognition of shop committees. It is claimed that the strikers do not seek direct recognition of the unions at this time. The plant was to be reopened Tuesday morning.

Following the strike over a week ago in the A. H. Wells & Son division of the Greenfield Tap & Die Corporation, Greenfield, Mass., 175 men out of 376 at the Wiley & Russell division walked out last Wednesday. It is expected that trouble will occur in another division within a day or two. The shops are now running 54 hr. a week and the demands are, as usual, for an 8-hr. day and time and one-half for over hours, with double time for Sundays and holidays. F. H. Payne, secretary of the corporation, states that the trouble in the A. H. Wells & Son plant is practically over and that the company has no intention of granting any of the demands, as the movement is really an effort to unionize the plants, the men being already among the highest paid in Massachusetts factories, having had several raises of pay in the past year.

The labor troubles in New Haven are practically over, as the Winchester Repeating Arms, Geometric Tool, Peck Bros. Company and Eastern Machine Screw plants are fast resuming normal conditions. The manufacturers are steadfast in their refusal to accede to any of the demands made upon them.

While conditions are not greatly changed in the molders' strike in Bridgeport, Conn., three or four of the foundries are resuming operations with workmen secured mostly from outside of the city and the prospect of the strikers winning is growing faint. The entire membership, including the founders, of the Bridgeport Manufacturers' Association is a unit in its determination to keep Bridgeport an open shop city.

The Dayton Strike

Reports date Sept. 1 from Dayton, Ohio, show that a total of 973 machinists have struck and that 282 of them have returned to work, leaving only 691 men that are still out. It is stated that most of these are men recently employed and many of them are not finished mechanics. The plant that was most affected has succeeded in getting a sufficient number of men to operate on full time.

Nashville Machinists May Strike

Sixty members of the local machinists' union at Nashville, Tenn., at a meeting Aug. 28, pledged the organization to the policy of an 8-hr. day in the machine shops of Nashville and set about fuller organization of the trade in the city. Various representatives of the international organization were present and urged the men to demand the shorter working day with the present wage scale. A strike may result.

Two Blast Furnaces for Ford Tractor Company

The Ford Motor Company, Detroit, through its identified interest, the Ford Tractor Company, has about completed plans for the building of two blast furnaces in the Detroit district to make foundry iron. The plans of the Ford Tractor Company, as heretofore noted, contemplate a large plant for the building of tractors, but these have not been completed. The two blast furnaces will have a combined daily capacity of about 800 tons. Julian Kennedy, Pittsburgh, is consulting engineer for this new project.

OBITUARY

HENRY B. DENKER, one of the principal founders of the St. Charles Car Company, now a part of the American Car & Foundry Company, died at St. Charles, Mo., Aug. 30, aged 77 years. He was a native of Germany, whence he came when but 19 years of age, settling in St. Charles. He served in the Union army as captain during the Civil War, and then assisted in establishing the car plant which afterward was merged with the larger concern. After the merger he was made district manager. He served as mayor of his city for several terms. He leaves three daughters and two sons.

ALBERT BOEBINGER, president Boebinger Hardware Company, Cincinnati, Ohio, a hardware and mill supply house, was killed by an automobile when crossing the street, Sept. 1. He was a prominent member of the Ohio Hardware Association, having been chairman of its exhibit committee for eight years, and was vice-president of both the Cincinnati Hardware Guild and of the Hardware Club of Cincinnati. He was 52 years old and leaves his widow and a daughter.

S. S. LEONARD, vice-president and manager Western Automatic Machine Screw Company, Elyria, Ohio, died Sept. 3 from hardening of the arteries, aged 62 years. He went to Elyria in 1906 from Cleveland, where he had been engaged for many years in manufacturing lines. He was vice-president of the Elyria Young Men's Christian Association and ex-president of the Elyria Chamber of Commerce..

WILLIAM FERGUSON, president Ferguson & Lange Foundry Company, Chicago, died suddenly in the night of Aug. 29 from an apoplectic stroke, aged 63 years. He had been active at the foundry that day and had attended the theater in the evening. He had been associated with H. O. Lange for the past 17 years. He leaves his widow and five children.

JAMES M. DENNISTON, for many years general traveling salesman of the American Steel & Wire Company, died at his residence in the Chicago Athletic Association, Aug. 29. He was born in Pittsburgh in 1866. Mr. Denniston was well known in wire circles in Pittsburgh and the West.

DAVID C. FARRAR, of the Farrar Advertising Company, Empire Building, Pittsburgh, died at his home in that city Aug. 31. The company handles the advertising accounts of a number of the leading manufacturing concerns in the Pittsburgh district.

ALBERT F. ROBER, president Rober Machinery Company, Portland, Ore., died Aug. 22, aged 53 years.

WILLIAM BUNTING, president Bunting Brass & Bronze Company, Toledo, Ohio, died Aug. 26.

Foundry Exhibition Opens Sept. 12

C. E. Hoyt, manager of the department of exhibits, American Foundrymen's Association, announces that the opening of the exhibition at Cleveland in connection with the foundrymen's convention has been postponed from 2 p. m., Monday, Sept. 11, to 9 a. m., Tuesday, Sept. 12. Some exhibitors, because of the embargoes announced by the railroads in anticipation of a possible strike, were unable to make shipment until Sept. 5. That all exhibits arriving at Cleveland on Monday, Sept. 11, may be installed before the opening, the postponement has been ordered.

A recent statement from China is that less than a year ago the Shanghai-Hangchow-Ningpo Railway placed an order with the United States Steel Products Company for four bridges to be fabricated at Ambridge, Pa. The completion of these bridges on schedule time, notwithstanding difficulties brought about by the war, has been gratifying, for they were shipped to China and erected within eleven months after the order was cabled to the United States. The accuracy with which all the parts fitted when assembled is a matter of comment.

Machinery Markets and News of the Works

LARGE RAILROAD LIST OUT

Inquiry from Pennsylvania Lines West

August Business, Helped by War Demand for Large Lathes, Above Normal—Threatened Strike Did but Little Harm

The Pennsylvania Lines West is in the market for about 50 machine tools, and from other directions come indications of interest on the part of railroads, although in the East they are slow in closing.

August business was above normal, and the tool builders almost without exception have orders enough to keep their capacity engaged for some time. Here and there a maker is pretty well caught up. Large lathes are difficult to obtain for prompt shipment, but the new demand for them has passed. The buying of such machines early in August considerably swelled the month's business. Altogether, however, all types of machines shared the demand. The month brought an excellent volume of orders from the manufacturing trades.

In Cleveland the general demand was good, although some hesitancy in closing was noted. In Cincinnati there is a dearth of large engine lathes. August activity in Milwaukee was satisfactory. In that city, new construction showed a falling off when compared with August a year ago, but the year is ahead of the same period in 1915 by 35 per cent.

In the Pacific Northwest machine-tool dealers are interested in contemplated improvements at the Puget Sound Navy Yard, Port Townsend, Wash. The demand from the Orient for machinery is excellent.

The French Commission continues to place orders in New York, but the Russians are less active, partly because the port of Archangel will be closed before steamers from New York can arrive there.

The threatened railroad strike exercised a short-lived influence on the trade. In some cases shipments were deferred for two or three days because the railroads refused to assume any risks.

New York

NEW YORK, September 6, 1916.

The aggregate of business in August was above normal in volume, although the pressure was less than in previous months. All types of tools shared the demand. In the latter part of the month no large lists were issued, but scattered, miscellaneous sales were excellent. Business was greatly augmented early in the month by the companies who had booked orders for 6 to 12-in. shells. The feeling of the trade is that the passing of Labor Day will bring more activity.

The threatened railroad strike made itself felt to a limited extent by the action of the railroads in refusing to accept shipments except at the shippers' risk, causing some of the latter to defer shipments pending developments. In most cases only two or three days' delay resulted.

Prices continue strong, with some of the builders reserving the right to advance prices at the time of delivery should conditions warrant, but most of the makers name a flat price in their contracts to which they will adhere. Deliveries are growing better, even those of good standard tools.

A few of the railroads have inquiries out for tools, but they are slow in closing. The General Electric Company continues to buy for delivery to Schenectady, N. Y. and Fort Wayne, Ind.

The Tide Water Oil Company, 11 Broadway, is inquiring for the following tools, new or second hand:

One 20-in. x 6-ft. lathe, one 20-in. Gisholt turret lathe, one 60-in. boring mill, one 40-in. drill press, and one 2¼-in. Acme screw machine.

The French Commission continues to place orders, having taken some boring mills, among other machines. The Russians are not buying as actively as they were a few weeks ago, when shipments could be made by way of Archangel, but they are in the market occasionally for tools to be forwarded via Vladivostock. The carefulness and good judgment shown by most of the foreign buyers is a subject of remark.

The American Car & Foundry Company has been in the market, it is reported, for equipment to fill a contract for 300,000 shells for the United States Government.

The Pennsylvania Lines West, through its purchasing agent at Pittsburgh, has sent out inquiries for about 50 machine tools, including two 100-in. boring mills, two 6-ft. radial drill presses, one 600 ton, 90-in. driving wheel press, one 60-ton vertical driving box and rod press, about 15 16 to 60-in. lathes, two forging, three highpower turret lathes, one cold saw, one guide bar grinding machine, three planers, several heavy duty drill presses, four or five small boring mills, two rod-boring machines, one traverse head shaper, one 24-in. horizontal boring and drilling machine and a number of pneumatic tools.

Scott & Williams Laconia, N. Y., manufacturers of knitting machines, are adding three stories to their present plant.

The Lewiston & Lake Ontario Shore Power Company, Ransomville, N. Y., has been granted a franchise for the construction and operation of an electric lighting system, and will erect a power plant.

The Union Springs Light & Power Company, Union Springs, N. Y., has completed plans for extensions and improvements to be made at its power plant.

The Lehigh Valley Railroad Company has completed plans and will soon let contracts for the erection of shop buildings at Manchester N. Y.

The Sherman Carbureter Company, Inc., Buffalo, has been organized to manufacture carbureters and automobile and motor cycle supplies. W. H. Grever, 146 Hughes Avenue, R. C. Harrison and J. F. Sherman, Buffalo, are the incorporators.

The Automatic Transportation Company, Buffalo, is building a two-story concrete addition to its plant at Main Street and the Erie Railroad. Other extensions and additions to be made at a later date are in contemplation.

The Higrade Motors Company, Buffalo, N. Y., has been incorporated with a capital stock of $250,000 and will manufacture a medium size motor truck, weighing about 2200 lb. The incorporators are J. Elmer Pratt, 67 Beard Avenue, Buffalo, formerly sales manager of the Pierce-Arrow Motor Car Company; L. W. Coppock, Grand Rapids, Mich., and Willam J. Loomis, Ionia, Mich. Arrangements are being completed for the establishment and equipment of a plant at Grand Rapids, Mich.

The MacLaren Knitting Company, West Sand Lake, N. Y., is in the market for a second-hand 750-gal. underwriters' steam fire pump.

The United Wax Paper Mfg. Company, Buffalo, has been incorporated with a capital stock of $25,000 by John E. Willis, 216 Pearl Street; Henry J. Walz and Roswell S. Price. A factory will be located at Buffalo, or Orchard Park.

The H. D. Pancoast Company, Philadelphia, is taking revised bids on a machine shop, office building and storage shed to cost $20,000.

P. J. Collins, 1301 North Second Street, Philadelphia, will erect a one-story machine shop 108 ft. long. The architect is now taking bids.

The Yost Brothers Company, Creighton, Pa., contemplates the erection of a one-story machine shop and foundry addition, 50 x 100 ft., to cost $20,000. W. F. Yost is president.

The Light Railway Equipment Company, Chester, Pa., will build a one-story addition, 60 x 75 ft.

New England

BOSTON, MASS., Sept. 4, 1916.

The Heald Machine Company, Worcester, Mass., has awarded a contract for an addition, 120 x 190 ft., one story, to its recently completed machine shop. The new section will not require the immediate purchase of machinery, as it will be devoted to expansion of the present machine tool layout and to storage.

The Frank Mossberg Company, Attleboro, Mass., is to build two additions, 150 x 200 ft., and 80 x 120 ft., one story.

Napoleon R. Thibert, 3 Heard Street, Worcester, Mass., is equipping a shop to manufacture munitions which will employ about 22 men. It is reported that he has secured a munitions contract totaling $165,000 from the General Electric Company.

The main building of the Wollaston Foundry Company, Quincy, Mass., has been destroyed by fire.

The Clark Brothers Bolt Company, Southington, Conn., has increased its capital stock from $250,000 to $400,000.

The Electric Systems Corporation, Providence, R. I., has been incorporated with a capital stock of $100,000, to manufacture and deal in electric appliances. The incorporators are Harry W. Mays, Arthur C. Stone, George Briggs, Jr., and Alton E. Stevens, all of Providence.

A. O. Norton, Boston, Mass., manufacturer of lifting jacks, has bought land on Brookline Avenue on which he contemplates erecting a factory.

The Derby Mfg. Company, Derby, Conn., has been incorporated with a capital stock of $300,000, by Joseph Willman, Frank M. Clark and Charles N. Downes, to manufacture steel and iron goods.

The Bosch Magneto Company, Springfield, Mass., has awarded a contract for a factory addition to cost $200,000.

George A. Leighton, president Leighton Machine Company, Manchester, N. H., is to build an iron foundry on Silver and Maple streets which, it is reported, is to be leased to a Maine company.

The Hunt-Spiller Corporation, Boston, Mass., has awarded a contract for an addition, 50 x 70 ft., one and two stories, to its foundry at 383 Dorchester Avenue.

The Feeney Tool Company, Bridgeport, Conn., has been incorporated with a capital stock of $40,000. The directors are John M. Feeney, president and treasurer; John McD. Cronin, secretary; John D. Lockhart and D. J. Slavin.

The United Wire & Supply Company, Auburn, R. I., is to concentrate the business of the company, now carried on in plants in Pawtucket and Auburn, in a new factory, 200 x 340 ft. with two wings, now being erected on a six-acre plot in Auburn.

The Texas Steamship Company, Bath, Me., has $3,500,000 worth of work now under way in its recently acquired shipyard, including four large steamers with a total tonnage of more than 25,000, two harbor steamers and a tug.

The Fox Auto Searchlight Company, Providence, R. I., has been incorporated with a capital stock of $100,000, by Joseph P. Fox, Walter H. Barney and Philip V. Marcus.

H. C. Dodge, Inc., Boston, Mass., manufacturer of machinery, machine tools, etc., is a new corporation with a capital stock of $50,000. The directors are Harry C. Dodge, president; Herbert A. Horgan, 79 Shirley Avenue, Revere, treasurer, and A. W. Blakemore.

The Scovill Mfg. Company, Waterbury, Conn., which is now building about 100 houses for employees, has bought about 45 acres of land off Hamilton Avenue, which it is expected to develop in the same manner.

The National Scale Company was erroneously stated in THE IRON AGE of August 25 to be located in Holyoke, Mass. The company is in Chicopee Falls, Mass., where it manufactures counting and weighing machines, elevating trucks, steel shelving and metal stampings.

Baltimore

BALTIMORE, MD., Sept. 4, 1916.

The Spanish-American Cork & Specialty Company, 2211 Pennsylvania Avenue, Baltimore, has acquired three lots at Westport, Md. Jose Aquilera is secretary-treasurer.

The Sapero Box Company, 220 Grindall Street, Baltimore, will install 100 hp. in motors for the manufacture of boxes.

The Harvey Company, 113 South Street, Baltimore, is seeking prices on steam shovels.

Plans are being made by the York Mfg. Company, West Point, Va., manufacturer of panels, to increase its output.

The Federal Extract Company has been formed at Bristol, Va., and plans are being made for the construction of a plant for the manufacture of wood extracts.

The mill of the Stuarts Draft Milling Company, Stuarts Draft, Va., was recently destroyed by fire, but will be rebuilt.

The name of the Rittenhouse Machine Company, Inc., 414 Key Highway, Baltimore, engineer and machinist, has been changed to the Key Machine Company.

The Duryea Motors Company, Inc., Philadelphia, is seeking a site for a plant in or near Baltimore. A letter has been received from Charles E. Johnson, treasurer, by Mayor James H. Preston asking the latter to hold a conference with Charles E. Duryea.

A garage containing a machine shop will be built at Brinckle and Pennsylvania avenues, Wilmington, Del., for Pierre S. DuPont.

Indianapolis

INDIANAPOLIS, IND., Sept. 4, 1916.

The Hoosier Wheel Company, Indianapolis, has been organized to manufacture farm machinery. The directors are Frank White, W. E. Osborn and W. Bert Denison.

The Wriley Mfg. & Distributing Company, Indianapolis, has been incorporated, with $10,000 capital stock, to manufacture toilet articles. The directors are J. R. Grotendick, J. H. Kehl and T. W. Smith.

The Wing Motor Car Company, Gary, Ind., has been incorporated, with $10,000 capital stock, to manufacture automobiles. The directors are Joseph Fluxman, A. A. Feder and William Feder.

The Kent Light & Power Company, Hanover, Ind., has been incorporated to operate an electric light plant. The directors are James C. Reed, P. Sample and I. A. Reed.

The Imperial Electrical Company, Union City, Ind., has increased its capital stock from $1,000 to $25,000.

The A. C. Mannweiler Company, Fort Wayne, Ind., has been incorporated, with $25,000 capital stock, to manufacture electrical supplies. The directors are A. C. Mannweiler, P. W. Mannweiler and Ellsworth Hartmann.

The Foster Machine Company, Elkhart, Ind., has increased its capital stock from $150,000 to $500,000.

The Logansport Machine Company, Logansport, Ind., has increased its capital stock from $6,000 to $25,000.

The plant of the Central Foundry Company, Fort Wayne, Ind., was damaged by fire. The estimated loss is about $1,500.

The Lexington-Howard Motor Company, Connersville, Ind., will build a one-story addition to its plant, 125 x 200 ft.

Robert H. Hassler, manufacturer of shock absorbers, Indianapolis, Ind., will erect a factory, 100 x 300 ft., to cost $45,000.

Scottsburg, Ind., is planning the establishment of a municipal water system at a cost of $21,000.

Chicago

CHICAGO, ILL., Sept. 4, 1916.

The period of buying heavy tools which attended the recent placing of contracts for shells of large size appears to have passed though an occasional inquiry is reported. The month of August, however, brought out a bigger volume of orders from the regular manufacturing trade than local dealers have received in any other month for a long time. Business has also been enhanced by railroad purchases of a miscellaneous sort, which, despite the absence of any formal lists of size, has aggregated a profitable and satisfactory total. The Pennsylvania lines have been buying a number of tools. Automobile manufacturers have been consistent buyers both of standard and special tools, one company offering to contract for the entire capacity of a Western tool builder for the manufacture of special tools.

Foreign sales of machinery for uses other than the manufacture of munitions are surprisingly heavy and in many instances of interesting origin. Builders of mining machinery are sending abroad almost record-breaking shipments as a result of the efforts of Great Britain and Russia to increase their gold supply by the forced operation of gold mines. Shipyards of Europe are also large buyers from Western builders and dealers.

The Wheeling Corrugating Company, Chicago, will build a garage at an estimated cost of $50,000, which is to be fully equipped for the maintenance of large trucks.

Oscar Baun, Thirty-first Street and Kedzie Avenue, Chicago, will build a one-story foundry, 60 x 200 ft., at an estimated cost of $10,000, exclusive of equipment.

The Centaur Motor Company, 2246 South Michigan Avenue, Chicago, will build a garage, 50 x 150 ft., to cost $50,000.

The Chicago, West Pullman & Southern Railroad, 606 South Michigan Avenue, Chicago, is about to build a one-story roundhouse and shops at a cost of about $20,000. W. D. Price is engineer.

The Albaugh-Dover Company, Chicago, has completed plans for a plant at Norfolk, Neb., for the manufacture of tractor engines.

The Allen Portable Hoister Company, Madill, Okla., has been organized with a capital of $5,000 by R. M. Harris, W. P. Allen and C. H. Brown.

The Sanitary Spray Company, St. Peter, Minn., has plans for the construction of a factory, 60 x 150 ft., to cost approximately $15,000.

Milwaukee

MILWAUKEE, WIS., Sept. 4, 1916.

The August machine-tool business in this district, while somewhat less in volume than that of the same month last year, is considered eminently satisfactory and figures considerably above the normal. The capacity of every tool builder is well taken up for a long time ahead, and the steady stream of orders during the last 60 to 90 days is encouraging. The labor situation is still a perplexing problem, although the effects of the machinists' strike have been greatly minimized. New construction during August shows a falling off, compared with a year ago, but the total for the year to this date is still 35 per cent larger than for the corresponding period of 1915. Much activity in public utility lines is noted, requiring a variety of equipment. The automobile, motor truck and gas engine industries are experiencing their most prosperous period. Gasoline engine builders, especially those catering to the automobile truck and tractor trade, are far behind on orders. The fall and winter are expected to be unusually heavy for the farm implement industry generally.

The American Show Print Company, 382-388 Sixth Street, Milwaukee, which sustained heavy damage by fire several weeks ago, will rebuild at once and add an additional story, 50 x 150 ft. Much new printing and electric motor equipment will be installed. Herman Pfeil is manager.

The Allis-Chalmers Mfg. Company, Milwaukee, has tentative plans by Klug & Smith, consulting engineers, for an addition to the boiler shop and boiler material warehouse, 50 x 350 ft. No decision has been made as to when the work will be started.

The Falls Machinery Company, Sheboygan, Wis., will erect two factory buildings, 120 x 120 and 52 x 52 ft., to cost approximately $60,000. Alfred C. Clas, Colby Abbott Building, Milwaukee, is the architect.

The Briggs & Stratton Company, Milwaukee, Wis., manufacturer of automobile specialties, will build a factory 60 x 200 ft., to cost $100,000.

R. R. Kastner, Mauston, Wis., will erect a two-story concrete building, 50 x 200 ft., to contain a machine shop, blacksmithy, salesroom, farm implement warehouse and service station. The contract is in charge of Pratt Brothers.

The Waukesha Motor Company, Waukesha, Wis., is preparing to build a new brick and concrete administration building, 36 x 132 ft., two-stories and basement. The architect is H. C. Hengels, 1225 First National Bank Building, Milwaukee.

The Best Register Company, Fifteenth and Cleveland avenues, Milwaukee, manufacturer of ventilators and registers for hot air heating systems, has changed its name to Metal Stamping & Mfg. Company. The plant has been enlarged by the erection of an addition, 50 x 200 ft.

M. J. Tappins, secretary Wisconsin State Board of Control, Madison, Wis., will receive bids Sept. 26 at 9:30 a.m. for engines, generators, exciters, etc., on the first unit of the Southern Wisconsin Home for Feeble-Minded, Union Grove, to cost $1,000,000. The architects are Robert A. Messmer & Brother, 1001 Majestic Building, Milwaukee.

The Damrow Brothers Company, Fond du Lac, Wis., manufacturer of sheet metal specialties, will build a new plant, 100 x 100 ft., two stories and basement, at Western Avenue and Brooke Street. The present factory at 35-41 Third Street is being operated on a 24-hr. schedule to fill orders.

The New England Supply Company, Providence, R. I., has definitely decided to establish a plant at Green Bay, Wis., and accepted the proposition of the Green Bay Stockyards & Packing Company to erect buildings. It is planned to build and equip a by-products plant costing from $200,000 to $250,000.

The Curtis Form-A-Tractor Company, Chicago, Ill., is negotiating with the business men's associations at Green Bay, Fond du Lac and Madison, Wis., for a location of its proposed plant and headquarters.

The Stewart-Warner Speedometer Corporation, Chicago, has practically completed the transfer of the machinery and equipment of the Warner works in South Beloit, Wis., to the recently enlarged factories in Chicago and ground was broken Sept. 1 for the new group of foundry buildings.

Pending the completion of a new assembling shop and a new motor repair shop by the Falls Motors Corporation, Sheboygan Falls, Wis., a large part of the final processes of the manufacture of gasoline motors for automobile purposes is being carried on under canvas. A huge tent has been erected on vacant property adjoining the plant so that assembling work may go on without interference of delivery schedules. The company has been able to procure 35 to 40 skilled machinists from other metal-working centers, but is in need of a great many more men.

The S. & S. Motor Car Company, 130 South Washington Street, Green Bay, Wis., has leased the ground and basement floors of the Rahr Building, and will convert it into a garage, machine shop and service station.

The Milwaukee Electric Railway & Light Company, Milwaukee, awarded the general contract for the construction of its new car repair shop, 80 x 300 ft., two stories and basement, on Cold nd Avenue, near North Avenue, to the Arthur W. Riesen Company, 20 University Building. R. H. Pinkley is supervising engineer.

The South Milwaukee Garage, 1016 Madison Avenue, South Milwaukee, Wis., has sold its building and equipment to the Wright Auto Sales Company, which will purchase a small list of additional machinery during the next 30 days.

The Four Wheel Drive Tractor Company, Clintonville, Wis., is considering offers from business men's associations at Oshkosh, Shawano and other Wisconsin cities for a location for its works and headquarters. Dr. Charles Topp is president.

The Kaukauna Box Company, Milwaukee, maker of [illegible] packages, has purchased the plant and entire interest of the Kaukauna Fiber Company, Kaukauna, Wis., from the receiver at $16,000. The Kaukauna plant will be operated independently of the Milwaukee factories. Some improvements will be made during the fall and winter.

The Sanitary Refrigerator Company, Fond du Lac, Wis., has awarded contract to the Immel Construction Company for its new plant, 96 x 106 ft., four stories and basement, to be completed about Oct. 15 or Nov. 1. The company recently was incorporated for $200,000 by the same interest which operates the Fond du Lac Church Furniture Company.

It is reported that the Railway Materials Company, Stevens Point, Wis., is increasing its facilities to provide for a large production of fuel oil furnaces for temperng automobile and vehicle springs and steel forgings.

The Park Lumber Company, Eldo, Wis., is planning to build a new sawmill of the single band type, with a daily capacity of 50,000 ft. on double shifts.

Detroit

DETROIT, MICH., Sept. 4, 1916.

The Triangle Machine Company, Detroit, has been incorporated with a capitalization of $3,000 by Harry E. Kline, Albert G. Ferney and Rose Klagge Olde. It will manufacture machine and auto parts.

The Saxon Motor Car Corporation, Detroit, has purchased a factory site one block north of Michigan Avenue just outside the city limits. Plans for the new building will be announced later, according to Harry W. Ford president.

The Detroit Steam Appliance Company, Detroit, has been incorporated with a capitalization of $25,000 to manufacture steam fitting machinery and appliances. The stockholders are Charles B. Burger, Sam D. Grossman and Lawrence E. Runnels.

The directors of the Continental Motors Company have approved a plan to build a one-story, saw-tooth roof, automatic screw machine plant at Muskegon, Mich.

The Alter Motor Car Company, Plymouth, Mich., has plans for a factory building, 60 x 100 ft., to be erected at Grand Haven.

The Michigan Lumber Company, Manistee, Mich., has started work on the erection of a sawmill.

The Jackson-Church-Wilcox Company, Saginaw, Mich.,

will build an addition to its plant to practically double the capacity. The company makes the Lucox steering gear.

The Flint Springs Ice Company, Flint, Mich., will install an ammonia ice plant with a capacity of approximately 100 tons per day. It will be electrically operated.

The Calumet & Hecla Company, Calumet, Mich., has had plans prepared for a 100-ft. addition to its foundry.

Bids will shortly be asked on two electrically operated water plants of 1,000,000-gal. capacity for the city of Mc[illegible], Mich.

The Cadillac Auto Truck Company, Cadillac, Mich., has increased its capital stock from $1,000 to $100,000 and will erect a new building, 60 x 200 ft. W. A. Keen is president.

Cleveland

CLEVELAND, OHIO, Sept. 4, 1916.

Machinery houses report a good volume of business in small lots and considerable new inquiry is coming out. The Pennsylvania Railroad is in the market for lathes, planers and other shop equipment for its Southwest lines. The Cooper Furnace Company, Canton, has purchased several machine tools for its machine shop equipment. Prospector, has caught up to the demand on hand screw machines of which the output has increased materially the past year, and it is claimed that some of the makers that are now on the 9-11 are quoting low prices to get the business away from their old-established competitors. The demand for automatic screw machinery continues heavy and makers report very little improvement in deliveries. There is still considerable export trade. Russia for these machines. The demand for punching and shearing machinery is very heavy, particularly from shipyards. Cranes, hoists and trolleys continue in active demand.

The Timken Axle Company, Cleveland, has been incorporated with a capital stock of $1,750,000 to succeed the Timken Gear & Axle Company. It is now erecting a plant on East 152nd Street, Cleveland, for the manufacture of internal gear drive axles.

The Big Four Tire & Rubber Company, Cleveland, is reported to have purchased the plant of the Ohio Rubber Company, Barberton, Ohio, which it will equip to manufacture automobile tires. C. H. Ritchie, Akron, Ohio, is president.

The White Company, Cleveland, automobile builder will enlarge its plant by the erection of a one-story steel and concrete machine shop, 231 x 264 ft.

The McLaren Iron Works Company, Cleveland, will erect a new plant at Urbana Avenue and the Nickel Plate Railroad.

The Canton Steel Foundry Company, Canton, Ohio, will enlarge its plant by the erection of an addition, 100 x 240 ft., about doubling its present capacity. The contract for the building has been placed with the Samuel Austin Company, Cleveland.

The Toledo Alloy Steels Company, Toledo, Ohio, has been incorporated with a capital stock of $[illegible],000 by E. R. Heer and others and plans to manufacture alloy steel. For the present the company's product will be produced by the Boerder Process Steel Company.

The Toledo Incinerator Company, Toledo, Ohio, has been incorporated with a capital stock of $10,000 by John J. Hubbell, Harry E. Hubbell and Carl S. Siegrist to manufacture garbage incinerators and hot water heating systems.

The Western Clay Machinery Company, Bucyrus, Ohio, has purchased from the New York Blower Company the old Sharp foundry buildings and, it is stated, will enlarge them and erect some new buildings and install electric cranes to make it a modern foundry plant.

The foundry of William Cureton & Son, Lexington, Ohio, comprising a building 60 x 100 ft., was destroyed by fire a few days ago. It will be rebuilt at once.

The Alliance Rubber Company, Alliance, Ohio, has decided to incorporate under the name of the Alliance Tire & Rubber Company and to enlarge its plant by the erection of a three-story building.

Cincinnati

CINCINNATI, OHIO, Sept. 4, 1916.

From a manufacturing standpoint Cincinnati was probably less concerned over the threatened railroad strike than any other center in the country. Ohio River transportation insured a supply of coal for the larger plants and a large number of the smaller ones are operated by internal combustion engines, using natural gas. While orders for machine tools were not cut off to any appreciable extent, the mill and factory supply business was considerably reduced.

[illegible] prompt shipment, and [illegible] lathes that were wanted for immediate delivery. Inquiries are now coming in for shaping machines, mostly from domestic sources.

The E. [illegible] Company, Cincinnati, will let contract in a few days for the proposed addition to its sheet metal plant at West Dayton, Ohio.

The Star Motor Car Company, Cincinnati, will soon be incorporated for the purpose of erecting a plant to assemble automobiles. Louis Tyroler, Commercial Tribune Building, is one of the incorporators.

The Herrold Varnish & Equipment Company, Cincinnati, has been incorporation with $10,000 capital stock by Joseph H. Herrold and others. It is closely identified with the Ohio Foundry Supply Company and will manufacture foundry equipment. No exact machinery will be required.

The Boye & Emmes Machine Tool Company, Cincinnati, has bought an additional site adjoining its plant, but has no intention of increasing its capacity at the present time.

The Cincinnati Laundry Company, Cincinnati, will erect a large plant on Eighth Street.

The Diamond Laundry Company, Columbus, Ohio, is increasing the capacity of its plant on South Fifth Street. Nothing is known as to equipment required.

The Standard Chain Company, St. Mary's, Ohio, is reported to be contemplating increasing the capacity of its plant.

The Central South

LOUISVILLE, KY., Sept. 4, 1916.

Inquiries in all lines continue numerous. Competition is erratic in power equipment—a manufacturer citing a job on which bids varied from $6,500 to $9,000.

J. M. Holstner, Louisville, Ky., has taken over the plant and business of the Holstner & Sons Company, dissolved. J. M. Holstner will continue the sheet metal business and is installing new metal-working equipment.

The Leyman Motor Company, Louisville, Ky., operating a garage and doing a general automobile business, has incorporated with $10,000 capital. Harry L. Leyman, Cincinnati, Ohio, and Harry D. Compton and Clarence Longacre, Louisville, are the incorporators.

William Meed, Ashland, Ky., is asking for data and prices on a contractor's saw with gas engine.

The Glasgow Oil Burner Company, Glasgow, Ky., has been incorporated with $1,000 capital by H. S. Warder and L. A. Depp.

The Motor Bath Company, Glasgow, Ky., authorized to manufacture a lubricating oil has been incorporated with $20,000 capital by Otto Summers, Cary G. Jewell and E. F. Jewell.

The Green River Chair Company, Livermore, Ky., will increase the capacity of its factory to give it 15,000 sq. ft. of floor space. C. W. Kimberlin, Owensboro, Ky., is the architect.

The Kentucky Light & Power Company, Hickman and Fulton, Ky., has purchased the plant and business of the Princeton Electric Light & Power Company, Princeton, Ky., retaining W. J. Holman as manager.

George C. Hinton, New York and Vancouver, B. C., has purchased the water franchise at Irvine, Ky., and will establish a waterworks system to serve Irvine and Ravenna, Ky.

Roach Quarles, La Center, Ky., has sold his interest in the Seaton Auto Company and with his brother will erect a garage at Heath, Ky.

N. Jensen, of the Zickgraf-Jensen Lumber Company, Jellico, Tenn., states that the company will add a hardwood furniture manufacturing factory to its band-saw and planing mills at Jellico.

The Harlan-Morris Mfg. Company, Jackson, Tenn., announces plans to rebuild the plant destroyed with a loss of $15,000. New equipment to include two 100-hp. high pressure boilers and a 125-hp. engine will be installed.

The Melick Refining Company, Lexington, Ky., has been organized with $100,000 capital stock by David L. Melick, Columbus, Ohio, and others to establish an oil refinery with a capacity of 110,000 bbl. It is stated the plant will involve an expenditure of $1,000,000.

John Lanyer and Clem Finch will be in the market for some small machine tools for an automobile repair shop at Maysville, Ky.

St. Louis

ST. LOUIS, MO., Sept. 4, 1916.

While machine-tool dealers have reported some hesitancy in closing transactions under way, no other appreciable interference with demand for equipment has been noted the past week. The general inquiry continues good for equipment, for extensions as well as for new enterprises and replacements. General business conditions are reported especially good.

The Falico Chemical Company, St. Louis, Mo., has been incorporated with a capital stock of $25,000 by Guy N. Hitchcock, William Stephenson and Spencer C. Graves to manufacture coatings for metals, wood, etc.

The St. Louis Bank Equipment & Fixture Company, St. Louis, Mo., has increased its capital from $25,000 to $37,500 and will add wood-working equipment to its plant.

The Fore Electrical Mfg. Company, St. Louis, Mo., has been incorporated with a capital stock of $10,000 by Albert Wehmeier, J. H. McEwen and L. R. Brown to manufacture electrical measuring equipment and mechanical devices.

The Superior Tire & Supply Company, St. Louis, Mo., has been incorporated with a capital stock of $12,000 by Victor H. Hanschug, Theo. C. Detzer and Earl Hanschug to equip a machine shop and auto repair plant.

The Hill-Behan Lumber Company, St. Louis, Mo., has purchased a site for a new plant on which a planing mill and other manufacturing equipment will be installed to cost about $100,000.

Edward Sterns, president Efficiency Oil Corporation, St. Louis, Mo., has organized a company which will erect and equip a plant at a cost of about $250,000 for the manufacture of automobile tires and inner tubes. A daily output of 1600 casings and 3200 inner tubes will be the capacity of the first unit.

The Zink Mfg. Company, Kansas City, Mo., has been incorporated with a capital stock of $50,000 by Clarence S. and Cecil J. Zink and J. F. Cleaveland to manufacture electrical current indicators, etc.

The Bapst Motor Company, Kansas City, Mo., has been incorporated with a capital stock of $15,000 by R. E. Watson, M. S. Neal and G. M. Bapst and will equip a repair and machine shop and garage.

The Dixon Light & Power Company, Dixon, Mo., has been incorporated with a capital stock of $10,000 by George E., James B. and Anna Abernathy and will equip an electric light and power plant.

The Marion-Handley Motors Company, Kansas City, Mo., has been incorporated with a capital stock of $20,000 by L. C. Gadenhead, F. A. Britton and Glen L. Brunner and will equip a machine shop, garage and repair plant.

The Grant Motor Car Company, St. Joseph, Mo., has been incorporated with a capital stock of $15,000 by L. R. Grant, John W. Broaddus and A. L. Guitar to equip a machine shop and garage.

The Metzner Stove Repair Company, Kansas City, Mo., has been incorporated with a capital stock of $50,000 and will equip a plant to cost about $40,000 for the manufacture of stove repairs, including foundry equipment, etc.

The Economy Petroleum Company, Kansas City, Mo., C. A. Brailey in charge, will build a refinery with a daily capacity of 5000 bbl. of oil, and a pumping plant.

Jere Tyree, Kansas City, Mo., will equip a garage and repair shop requiring about $3.500 of machinery.

Hamilton, Mo., will equip a sewer system and install a disposal plant. E. T. Archer, New England Building, Kansas City, Mo., is supervising engineer. About $30,000 will be expended.

Trenton, Mo., will equip a water filtration plant at a cost of about $50,000. E. E. Harper, Trenton, is the engineer in charge.

The Searcy Oil & Ice Company, Searcy, Ark., has been incorporated with a capital stock of $50,000 by Harry Neely, Otho Kine and J. M. Shoffner and will equip a cotton oil compressing plant and an ice making plant.

The Waldron Power & Ice Company, Waldron, Ark., has been incorporated with a capital stock of $10,000 by J. S. Hill, W. S. Mitchell, W. P. Harris and J. L. Center and will equip an electric plant and an ice making plant.

The National Refining Company, Cleveland, Ohio., L. R. Bailey, Liittle Rock, Ark., manager, will equip a filling and pumping station at Little Rock, the machinery to cost about $10,000.

A contract to remove 10,000,000 yd. of earth from a coal deposit in Tulsa County, Okla., has been awarded to the Fargo Construction Company, St. James Building, Jacksonville, Fla., which is reported in the market for equipment therefor.

The Oklahoma Power & Light Company, Shawnee, Okla., has been incorporated with a capital stock of $25,000 by Edward Howell, Shawnee; J. A. Hamilton, Marissa, Ill., and Sinclair Mainland, Oshkosh, Wis., and will install equipment.

The Osage Foundry & Machine Shop Company, Bartlesville, Okla., will rebuild and re-equip its foundry recently burned. About $10,000 of machinery will be required.

The Mount-Cooper Boiler & Iron Company, Tulsa, Okla., has been incorporated with a capital stock of $50,000 by William Mount, C. A. Cooper and J. E. Waller to equip and operate a boiler plant.

The Noble County Auto Company Perry, Okla., has been incorporated with a capital stock of $12,000 by John Knox, J. C. Fleming and Lee Schurkens and will equip a machine shop and garage.

McLeod, Okla., will expend about $15,000 on waterworks plant equipment. The Benham Engineering Company, Oklahoma City, Okla., is supervising the work.

The State Capitol Commission, A. N. Leecraft, secretary, Oklahoma City, Okla., is in the market for five 250-hp. boilers for heating and power plant for the State capitol. Layton & Smith, Majestic Building, have the specifications.

The Foster Creek Lumber & Mfg. Company, Madison, Wis., will equip an electrically operated sawmill at Stephenson, Miss. A power plant with eight 18 x 84 in. high pressure boilers, two 600 kw. and one 300 kw. condensing turbines, one kw. exciter, one 25 kw. exciter motor driven water pump and about 50 motors of varied sizes will be installed.

The C. P. Foret Motor Car & Supply Company, Thibodaux, La., is in the market for one 2 hp. a.c. motor, 110 volts; also air station pump of 15 cars' capacity; drill press, lathe, battery charging outfit and other equipment.

W. T. Hopkins, Lexington Miss., is reported in the market for water turbine equipment.

William J. Lee will equip a plant at Mountain View, Ark., for the manufacture of hubs and is in the market for woodworking equipment.

Texas

AUSTIN, TEX., Sept. 2, 1916.

Irrigation projects are receiving a large amount of attention in this section, and the demand for engines and pumping equipment is unusually good. It is estimated that the Texas cotton crop will bring in a revenue of more than four hundred million dollars to the farmers.

The Gulf, Colorado & Santa Fe Railway Company, with general offices at Galveston, will construct two large water storage reservoirs and pumping plants. One will be located near Brownwood and will have a capacity of 300,000,000 gal. and the other near Sweetwater with a capacity of 290,450,000 gal.

The Willard Storage Battery Company, Dallas, has been incorporated with a capital stock of $20,000. L. Barrett is a stockholder.

A. B. Mull, Eagle, will install an irrigation pumping plant on Double Bayou.

R. Kennedy, Fort Stockton, will build a dam to impound the water of Caynosa Creek and will install an irrigation pumping plant.

W. R. Newton, Miles, plans to install an irrigation pumping plant on the Concho River, near that place.

Fritz Graef, Hovey, will install an irrigation pumping plant on Caynosa Creek.

E. W. Grimes, Bouse, Ariz., and associates, plan to install hydraulic machinery for operating the La Paz placer field. A pumping plant to cost about $125,000 will be installed and the water pumped from the Colorado River, a distance of about six miles.

The Alamo Dressed Beef Company, San Antonio, will build an addition to its packing plant to cost $34,000.

The Mogollon Power & Lumber Company, Mogollon, N. M., has awarded the contract for installing its new hydraulic plant on Mineral Creek to the Pelton Water Wheel Company.

The New State mine, near Prescott, Ariz., is to be equipped with a large air compressor and power drills. W. S. Wilhelm is manager.

John Brockman of Los Angeles, Cal., and associates will build a mill at Fierro, N. M., for the treatment of the copper-iron ores, with a daily capacity of 400 tons.

Clark W. Rider and associates, Dallas, plan to build a factory for the manufacture of express and parcel post boxes.

A new 25-hp. internal combustion engine, one double suction centrifugal pump with a capacity of 150 gal. per minute and a 7½-kw. dynamo will be installed at the mu-

nicipal waterworks and the electric light plant, Vernon, Tex.

The Para Vulcanizing Company of Wichita Falls plans to establish a branch at Vernon.

The Kirby Lumber Company, Houston, has a contract with the New York Central Railroad to furnish its lines with crossties for a period of years. In order to handle the business the company will open branch offices in New Orleans, Mobile and Hattiesburg, Miss.

T. D. Brooks, Beaumont, Tex., has organized a supply company in that city, handling new and second-hand pipe, oil well machinery, drilling rigs, etc. The main wareroom is 40 x 200 ft. and will contain a machine shop.

The Pacific Northwest

PORTLAND, ORE., Aug. 29, 1916.

Machine-tool merchants are taking considerable interest in the plans for large improvements to the Puget Sound Navy Yard, Port Townsend, Wash. Current business is sufficiently active to prevent much accumulation of stock and orders are booked for future delivery. Second-hand tools are in especially strong demand. Pumps, flour mill and agricultural equipment are active. Orders for mine and smelter equipment are still coming out, and a number of plans for new industrial plants in various lines are developing. Woodworking machinery is quiet, the demand being mostly for spare parts and replacements. A strong demand for all kinds of American machinery is coming from the Orient and a much larger business would be done if cargo space were available.

The railroads are buying in fair volume. Industrial companies are expected to be in the market for more than a normal amount of lumber, but the shortage in export demand is severely felt. Unfavorable crop reports in certain districts are reflected in the lumber market. Mill operations in the West coast district continue approximately 10 per cent below normal. The car shortage in Oregon, Washington and Idaho continues to be a serious question. General business conditions are steadily improving.

The American Can Company, Seattle, has awarded a contract for the erection of the five-story reinforced concrete factory to be completed by January, 1917. The plant, including equipment and site, will represent an expenditure of more than $1,000,000.

The Acorn Lumber & Shingle Company, New Westminster, B. C., is constructing a new shingle mill at a cost of $10,000 with a capacity of 100,000 shingles daily. M. D. Irvine is president.

The Duluth Sawmill Company's plant in Harrison, Idaho, was recently destroyed by fire with a loss of $45,000. It is reported the plant will be rebuilt.

Kruse & Banks, shipbuilders, Marshfield, Ore., have the contract for the construction of a wooden vessel, 260 ft. long, 50-ft. beam, with lumber-carrying capacity of 1,250,000 ft. It will be an oil-burner, equipped with turbine engines, and will cost about $200,000.

H. D. Stewart, American Bank Building, Seattle, has received a contract from the Northern Board & Paper Company, Sumner, Wash., for the construction of an addition to cost $40,000.

The Yellowstone Packing Company, Billings, Mont., has awarded contracts for improvements and extensions to its plant to cost about $70,000.

Plans have been completed by J. F. Duthie & Co., Seattle, for their proposed shipyards, which provide for an investment of about $400,000. The plant will include a machine shop, plate shop and mold loft and will be constructed for the building of three steel freight steamers for Norwegian interests. It is announced that a contract for three more large ships has recently been received.

The Standard Tire & Rubber Mfg. Company, Kirkland, Wash., recently incorporated for $500,000, will begin work immediately on the construction of a concrete plant 60 x 120 ft. for the manufacture of rubber tires, inner tubes, etc. Max Freed is president.

The Ballard Marine Railroad Company, Seattle, shipbuilder, is reconstructing its plant at a cost of more than $150,000. It will be operated by electric power and compressed air, and will be reopened within thirty days. A new floating drydock to cost $100,000 is also to be built.

The first marine engines of the semi-Diesel type to be constructed on the Pacific coast will be built by the Puget Sound Iron & Steel Works, Tacoma, Wash., for the H. W. Sumner Company, Seattle. The contract calls for two engines, to be installed in two lumber schooners now under construction, and will cost about $40,000.

The Independent Sheet Metal Works, Seattle, has recently constructed an additional unit to its plant which will double its capacity.

S. M. and A. M. Meyer are starting a plant for the construction of wooden ships adjoining the Columbia Engineering Works, Linnton, Ore.

The Pacific Coast Boat Company, Seattle, recently organized by J. F. and A. J. O'Brien, has purchased a three-acre site and will start work at once on a factory to manufacture bolts, spikes and rivets.

The Buehner Lumber Company, North Bend, Ore., is building a new machine shop.

Sherrard & Lowelen have opened a small machine shop at Bandon, Ore.

William Leppert is putting in a steel machine shop at Junction City, Ore.

Work has been started on the Low Parker Hill & Sullivan smelter, Kellogg, Idaho, to cost about $1,000,000.

Canada

TORONTO, ONT., Sept. 4, 1916.

John R. Duncan, Vulcan Iron Works, New Westminster, B. C., is trying to lease from the city a site at the foot of Tenth Street on which to establish a boiler shop and foundry and later a steel shipbuilding plant. The plan calls for an immediate investment of $150,000 and of about $200,000 more when the drydock is built. The Vulcan Iron Works has now a well-equipped plant on the water front, near the Fraser River bridge. Owing to the rapid growth of business, the company finds its present quarters cramped. The equipment planned for the new site includes plate rolls capable of handling steel plates 1 in. thick, 18 ft. wide and of any length.

H. Johnson, Port Sydney, Ont., is in the market for a 5-hp. Buffalo marine engine.

The City Council, Stratford, Ont., has unanimously agreed to accept the offer of $17,500 by the Kindel Bed Company, Toronto, for the Kemp factory at Stratford. The Kindel Bed Company will remove its machinery from the Toronto plant and install it in the old Kemp factory. P. E. Kroehler is president and general manager.

The Hanna Brothers Planing Mills, Ltd., Fort Erie, Ont., has been incorporated with a capital stock of $75,000 by Asa J. Hanna, Bridgeburg, Ont.; Fred. Hanna, Alonzo R. Ellis and others of Fort Erie, to manufacture sashes, blinds, doors, etc.

The contract for the new Dominion Arsenal at Lindsay, Ont., has been awarded to Westinghouse, Church, Kerr & Co., Inc., New York, which has a large Canadian branch at Montreal. The contract will involve probably between $2,000,000 and $3,000,000, including machinery and buildings. Colonel Weatherbee, Halifax, N. S., will supervise the carrying out the contract. It is hoped to complete the work within a few months, and to have the new arsenal turning out rifles and ammunition by spring.

It is announced that the St. Lawrence Bridge Company has commenced the installation of about $500,000 worth of machinery for the production of large caliber shells, a preliminary order for $2,000,000 having been received from the Imperial Munitions Board. Its plant is at Rockfield, Lachine, Que., and for the past few years has been concentrated upon construction work of the Quebec Bridge. The St. Lawrence Bridge Company is controlled by the Canadian Bridge Company, Walkerville, Ont., and the Dominion Bridge Company, Montreal, each company owning 50 per cent of the capital stock.

The sawmill at Chicoutimi, Que., owned by A. Gagnon, was destroyed by fire with a loss of $40,000. The plant will be rebuilt as soon as possible.

The Iron & Metal Supply Company, 400 Power Building, Montreal, will build a factory at Sherbrooke, Que., at a cost of $15,000.

The Canadian Clock Company, Orangeville, Ont., proposes to build a factory at a cost of $30,000. It is asking the town for a loan of $15,000 and a by-law will be submitted to the ratepayers.

The Dominion Hardwoods, Ltd., Deseronton, Ont., will build a concrete and steel factory at a cost of $150,000 to replace its plant recently destroyed by fire.

The Manufacturers' Corundum Company, Jewelville, Ont., has commenced the erection of a plant. H. E. T. Haultain, 63 Heath Street West, Toronto, is the engineer in charge.

The Marsh Hutton Powers Company, Western Trust Block, New Westminster, B. C., has leased a site on Lulu Island and will build a shingle mill to cost $30,000. Construction work will be commenced in the near future.

The National Mfg. Company, Ottawa, manufacturer of steel ranges, scales, etc., will build an addition to its factory to cost $16,000

The George White & Sons Company, Ltd., Cabell Avenue, London, Ont., manufacturer of threshing engines, boilers, machinery, etc., is having plans prepared for a factory addition on Adelaide Street to cost $15,000.

Frank A. Robinson's flour mill at Grenville, Ont., was damaged by fire with a loss of $6,000. It will be reconstructed and new machinery installed

The Experimental Farm, Fredericton, N. B., will have a new pumping plant erected to cost $3,000. Judson Barker will be foreman of construction.

Ottawa will receive tenders until Sept. 8 for one portable gasoline-driven air compressor, 100-cu. ft. capacity; four pneumatic calking hammers, and two 5-ton chain blocks. Specifications may be obtained from A. F. Macallum commissioner of works.

H. M. Rathbun, Deseronto, Ont., is in the market for an set to 100 hp. locomotive type, 100 lb. pressure

The Canadian Steel Foundries, Ltd., Welland, Ont., has purchased [illegible] adjoining its plant to be used for future additions.

Henry Spencer Schaake Machine Works, New Westminster, B. C., will establish a machine shop and foundry on the water front. A ship repair plant is also contemplated.

The Saskatchewan Steel & Bridge Company, with plants at Moose Jaw, Sask., and Medicine Hat, Alberta, is planning to establish a plant at New Westminster, B. C.

The Cushman Motor Works of Canada, Ltd., Winnipeg, has been incorporated with a capital stock of $100,000 by Albert E. Donovan, Frank K. Hamilton, Harvey E. Kennedy and others to manufacture farm implements, motors, machinery, engines, tools, etc.

The Manitoba Steel Foundries, Ltd., Montreal, has been incorporated with a capital stock of $500,000 by Peter J. Smith, Arthur M. Tirbutt, Horace Ormond and others, all of Winnipeg, to manufacture tools, machinery, etc.

The Mitchell Rail Anchor & Specialty Company, Ltd., Montreal, has been incorporated with a capital stock of $50,000 by Louis A. Davis, Joseph S. Lamarre, Sigfrid H. R. Bush and others to manufacture railroad track, material cars, tools, implements, machinery, boilers, etc.

The National Bronze Iron & Engineering Works, Ltd., Montreal, has been incorporated with a capital stock of $[illegible] by Louis A. Duval, Benjamin Robinson, Joseph S. Lamarre and others to manufacture machinery, machine tools, implements, etc.

The Lakeport Elevator Company, Ltd., Fort William, Ont., has been incorporated with a capital stock of $[illegible] by Frederick A. Guy, Daniel R. Byers, Leslie J. Greaves and others to build, equip and operate elevators, warehouses, etc.

The Canadian Export Paper Company, Ltd., Montreal, has been incorporated with a capital stock of $500,000 by Walter R. L. Shanks, Francis G. Bush, George R. Drennan and others to manufacture paper, etc.

The Montreal Machinery & Supplies, Ltd., Montreal, has been incorporated with a capital stock of $50,000 by Francis G. Bush, Walter R. L. Shanks, Michael J. O'Brien and others to manufacture machinery, supplies, tools, etc.

W. E. Clark, Ltd., Toronto, has been incorporated with a capital stock of $40,000 by Wilbert E. Clark, 28 Adelaide Street West; James F. Coughlin, 8 Beatrice Street, Francis P. O'Hearn and others to manufacture brass, steel, iron and metal products, etc.

Two contracts for equipment for handling shell forgings, totaling over 4½ miles of roller conveyors and carriers, have been placed with the Mathews Gravity Carrier Company, Ellwood City, Pa. One order is for 9000 ft. of 8-in. roller carrier for the E. W. Bliss Company, Brooklyn, N. Y., while the other is for 15,000 ft., which will be installed at the Richmond, Va., plant of the American Locomotive Company to handle the forgings from the time they are received in cars until they are shipped. Several automatic inclined elevators are included in the latter order.

The Farnsworth Mfg. Company, 65 Beverly Street, Boston, Mass., manufacturer of steam utilities (tilting traps and duplex boiler feeders), has opened a Chicago office at 20 East Jackson Boulevard. Charles O. Lindahl has been engaged as managing district engineer. The Farnsworth line is comparatively new, but strong claims are made as to coal economy by handling condensation through its system.

Book Reviews

Homans's Automobile Handbook. By J. E. Homans. Pages, 248, 5 x 7½ in.; illustration, 77. Published by Scully & Kleinteich, 373 Fourth Avenue, New York City. Price, $1.

The book summarizes in a volume of moderate size the principles of construction and operation of a gasoline motor car and engine. A full description of the essential parts and auxiliaries is given with directions for the management, operation and care of the car, the explanations being notably lucid. The transmission apparatus is discussed at some length with reference to the various types, such as chain, bevel and worm gear, friction disk and magnetic transmissions, and the various types of speed changers in use. The engine, of the several forms used, is gone into at length, and the subjects of fuel, ignition and lubrication all receive attention.

For the motor-car owner who would like to have ready means for keeping a record of the automobile expenses and at the same time secure some bits of advice relating to motor-car operation, the Norman W. Henley Publishing Company, 132 Nassau Street, New York, has brought out what it calls the "Automobilists' Pocket Companion and Expense Record." Its author is Victor W. Pagé, who has written several other books on the automobile, and its price is $1. Most of its 169 pages, which are bound in flexible covers, are blank forms for all imaginable collations of expense and tour figures. Lest he forget, the motorist is told what to do every day the car is in use in the matter of lubrication for example, and he is told how to care for the storage battery and the tires. There are several pages of symptoms of road troubles and to what they point. How to keep the hands soft is listed first under "Useful Information," which tells however also how to care for the tops and the upholstery. A few tables of interest are appended.

The American-Russian Chamber of Commerce, 60 Broadway, New York, has issued a bulletin, "The Russian Market, Its Possibilities and Problems." The point is emphasized that "to secure a permanent foothold in the Russian market it is essential that many American firms should create companies in Russia for the purpose of developing Russian business enterprise, and a knowledge of Russian incorporation law is necessary." Special attention is devoted in this booklet, therefore, to the methods of establishing incorporations in Russia, and it is shown that there has been a remarkable development in the joint stock companies operating in Russian business. The Russian Minister of Commerce recently said publicly: "We will, as far as possible, welcome foreign capital necessary for our development."

A 56-page pamphlet illustrating and describing the various pieces of apparatus employed for welding and cutting by the oxy-acetylene and oxy-hydrogen processes, has been issued by the Imperial Brass Mfg. Company, 1210 West Harrison Street, Chicago. The pamphlet, which is intended for use as a handbook, is free from technicalities, although the fundamental principles are not slighted. Suggestions for beginners are given, together with instructions on the care and use of the apparatus. Numerous engravings of the apparatus, and the way in which the various operations should be performed, are presented in the pamphlet, which is of the 6 x 9-in. size. The price is $1.

The water powers of Canada have been made the subject of a publication obtainable from the Department of the Interior, Ottawa, Canada. The book has some 360 pages, profusely illustrated. It is a reprint in combined form of five monographs by several Canadian water-power engineers, prepared originally in connection with the International Engineering Congress at San Francisco last September.

In the review of "Poor's Manual of Public Utilities" in THE IRON AGE of July 27 it was stated that the price is $7.50. It should have been given as $10.

TRACTORS HANDLE PIG IRON

Electrically Propelled Truck Used in Ferro Machine & Foundry Plant

BY F. L. PRENTISS

The problem of providing a satisfactory and economical method of handling material in the process of manufacture has been solved by the use of electric tractors and trucks in many plants, but the Ferro Machine & Foundry Company, Cleveland, is said to be the first to use an electric tractor for handling pig iron and other material used in its cupolas, flasks and castings. In addition it is used for taking scrap from the foundry floor and cleaning room, for conveying steel stock from the storage yard to machine shop, and, in fact, does practically all the handling work required around the foundry and adjoining yard with the exception of conveying the hot metal from the cupolas to the foundry floor.



An Electric Tractor and Three of the Specially Designed Trailer Trucks Employed by the Ferro Machine & Foundry Company to Handle Pig Iron. A Boardwalk Has Been Laid in the Storage Yard to Serve as a Track for the Tractor

The Ferro Company has used an electric tractor in its foundry for several months, and it is stated that its use has been found to have resulted in a great saving in labor. The adoption of the tractor conveying method was suggested by the large amount of labor required in conveying castings from the foundry floor to the cleaning department. Before the tractor was provided it often required a dozen men to push a truck heavily loaded with castings from the foundry to the cleaning room, the unevenness of the brick foundry floor and the sand that necessarily accumulates on the floor making the propulsion of the loaded truck by hand power extremely difficult. The results at this plant are stated to have proved that an electric tractor can be very successfully operated when plant conditions make it necessary to run it over a rough track caused by a badly worn and uneven floor.

The volume of work done by the tractor is indicated by the fact that it hauls from the material storage yard all the pig iron, scrap and coke used in the cupolas that melt 110 tons of metal a day, conveys the castings weighing approximately the same amount from the foundry floor to the cleaning room and the metal flasks between the foundry and outside storage yard, in addition to various other conveying services. The tractor is kept in operation almost continually, or about 20 hr. per day. The distance of the hauls ranges from 200 to 400 ft.

The company has just placed in use 25 trucks or trailers of a special type to increase the value of its tractor conveyor system. These are scattered around the foundry and yard as needed and when loaded are hauled to their destination. The tractor has a capacity of hauling three or four trailers, but in operation usually draws but one or two trucks. About 3 tons of pig iron is placed on each truck for a load.

To provide a good track for the tractor and trucks outside of the plant board walks were laid throughout the storage yard, these walks crossing the railroad siding in the yard, in which pig iron and other material is stored. A locomotive crane and magnet is used for unloading the pig metal from the cars. There is about 400 ft. of board walk, 8 ft. in width and constructed to withstand the heavy loads of the tractor. The walk is built of 6 x 6-in. pine laid on 2-ft. centers covered with 2 x 10-in. pine plank, and on the latter 3 x 10-in. oak plank is laid at an angle of 45 deg. A new 6-ton Otis electric elevator with a cage 7 ft. 6 in. x 8 ft. 2 in. has just been installed for conveying pig iron to the cupola platform. The tractor goes up to the elevator with its load, which it hauls out on the platform.

The tractor is of a standard type built by the Elwell-Parker Electric Company, Cleveland. It is mounted on four 15-in. wheels, being steered by all four wheels and driven by the two rear ones. The drive is from the motor mounted under the dash through worm gearing to the rear axle. It has three speeds in either direction and its pulling capacity is 400 lb. The maximum speed is 6½ miles per hour. Two Edison 21-cell batteries furnish the electric power for the tractor. The batteries are given four boosting charges for ½ to 1 hr. per day at double the normal charging rate or 90 amp., which is equivalent to a normal charge of 7 hr. On Sundays a normal charge of 45 amp. is given for 7 hr. Extra sets of batteries are provided for use should it be necessary for any reason to remove the regular batteries. Because of the additional work for the tractor, a duplicate of the one now in use has been ordered. Both tractors will be equipped with a new type of Elwell-Parker automatic coupler.

The company places the cost of operating the tractor at $1.15 per hour, but states that this estimate is rather high. This cost includes the pay for the operator and helper, charging the batteries, 50c. a day charged for repairs and 25 per cent. per annum for depreciation.

The trailers or trucks are of very heavy and strong construction, being designed for heavy foundry service. They are 6 ft. long and 36 in. wide. They have 5-in. channel frames and cross supports

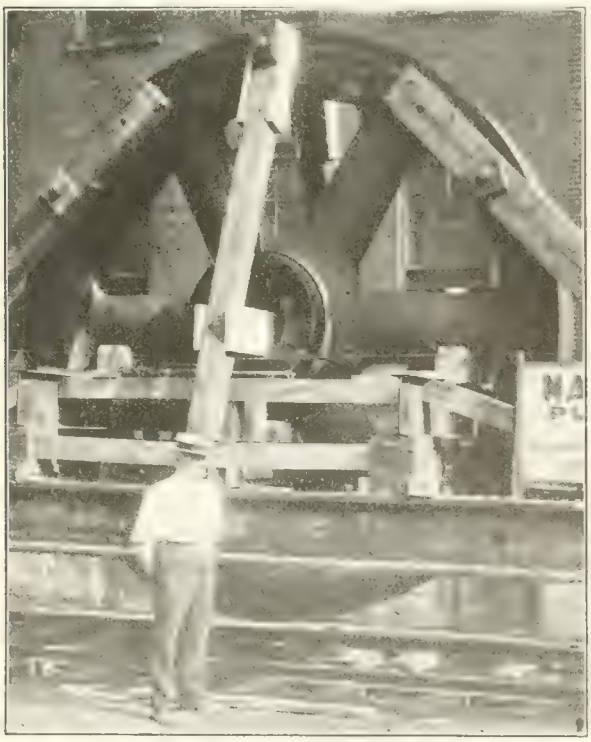
and 3/16-in. plate platforms. Near the edge of the platform on both ends and sides are holes for 1-in. pipe for stakes. These stakes are supported underneath by pressed steel stockets riveted to the frame and located underneath each hole. The trucks run on two center wheels 18 in. in diameter located underneath the frame, so that the body of the truck is entirely clear at the sides, eliminating the danger of the wheels striking obstacles. At each end are two caster wheels 10 in. in diameter. This construction permits the trucks to run on the two center wheels and to teeter on the caster wheels. Both the center and the caster wheels are unusually wide, having a 4-in. face. The trucks were designed with large wide wheels and caster wheels at each end with a view of making them well adapted for running on uneven ground and over sand on the foundry floor. The wheels have cage roller bearings. The trucks were built by the Lakewood Engineering Company, Cleveland.

The company will shortly begin hauling foundry refuse with a tractor and trucks. This refuse is now removed with a locomotive crane at a daily cost of $40, and it is estimated that with the tractor the daily cost will be reduced to $12. It amounts to about 3500 cu. ft. per day and has to be hauled to the dump, a distance of from 700 to 1000 ft.

The Ferro Company has adopted a standard wood floor for its manufacturing departments, including the foundry. The use of a wood floor in a foundry is an innovation, as the general objection might be made to it that the surface would be burned by hot metal spilled upon it, and consequently it would not be lasting. However, it is the intention to replace the present brick foundry floors with wood. The standard creosoted wood block floor adopted is made of 3 x 6-in. pine blocks 3 in. thick, saturated with 20 lb. of oil per cubic foot.

Shipping a 75-Ton Flywheel

The National Transit Pump & Machine Company, Oil City, Pa., recently shipped a very large casting—a 14-ft. flywheel forming part of the drive for a 300-ton billet mill being installed by the Crucible Steel Company of America in its plant at Midland, Pa.



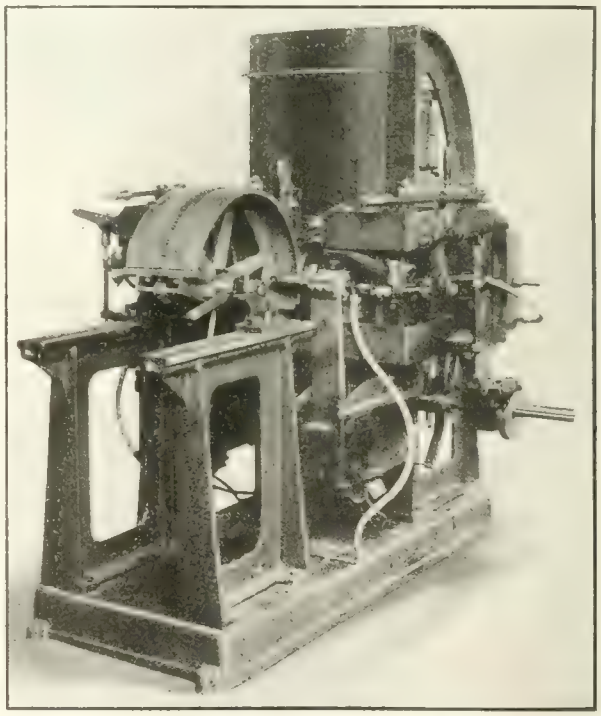
The Center of a 14-Ft. Flywheel Forming Part of the Drive for 300-Ton Billet Mill Ready for Shipment

The shipment was loaded on three special steel cars of the well type that has been developed by the Pennsylvania Railroad for transporting pieces of machinery that are too high for the ordinary type of flat car. One car was used for the center of the flywheel, which was supported by steel beams and heavy timbers, as shown. The two rings, which are to be bolted on either side of the rim of the center section, were placed in another car and supported in practically the same manner. The clearance between the under side of the flywheel and the rails was 8 in., and the top escaped the tunnel roofs and bridges along the line by 4 in. The shaft and the bearings which weighed approximately 30 tons were contained in the third car. The two end rings of the flywheel also weighed 30 tons and the weight of the completed wheel was approximately 75 tons.

The casting was made by the loam mold method with green sand. Approximately 200 tons of sand was required to make the mold.

Electric Welding of Pulleys

Another special machine has been developed by the National Electric Welder Company, Warren, Ohio. It is designed for welding pulley fillers to rims ranging from 12 to 60 in. in diameter. Apart from the great range of automatic operation, the machine is characterized by a small number of moving parts, simplicity of operation and the provision of complete and separate welding equipment on each side of the pulley center.



An Automatic Machine for Welding Pulley Spokes to Rims by Electricity

Water cooling is provided for the welding points, which can be withdrawn to give a clearance of 12 in. between them. If desired they can be arranged to operate within a radius of 2½ in. from the center of the arbor. The feeding and the stopping of the work are automatic, the feed device being adjustable from ½ to 3 in. between welds as desired. The stops operate automatically to trip the machine. The desired distances between centers and the face of the work are secured by an adjustable mandrel.

Motor drive and an automatic switch are provided for each of the welding equipments which have a capacity of 60 welds per minute each. The floor space occupied by the machine measures 50 x 66 in. and the weight of the machine is approximately 3500 lb.

THE IRON AGE

New York, September 14, 1916

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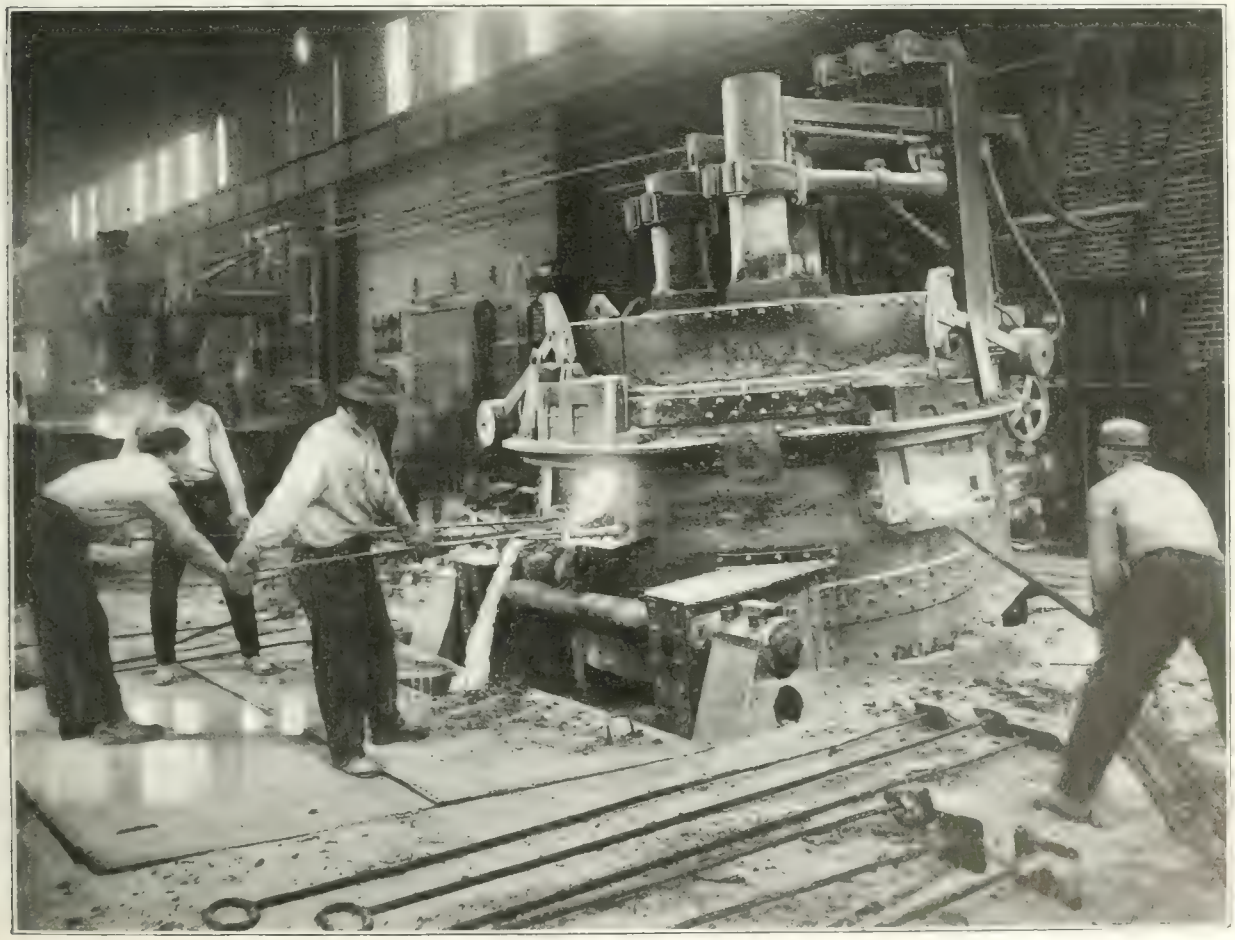
Electric Alloy Steels Made on Tonnage Basis

Steel Plant and Rolling Mill of the Latrobe Electric Steel Company, Producing Ball-Bearing, Die, Magnet and High-Speed Steels

LARGE scale production of alloy steels by means of the electric furnace—a notable development in the steel industry—was undertaken some months ago by the Latrobe Electric Steel Company. In fact the company was formed for the purpose. It was held by those who promoted the enterprise that the electric furnace of generous proportions had found itself and that general conditions of price and demand warranted a venture of the kind and relative magnitude. As a result, its works, at Latrobe, Pa., not far from Pittsburgh, has been engaged all this year in quantity manufacture, not only of alloy steels, such as go into ball-bearing parts and into automobile construction, but of high-speed metal-cutting and special alloy steels for various purposes.

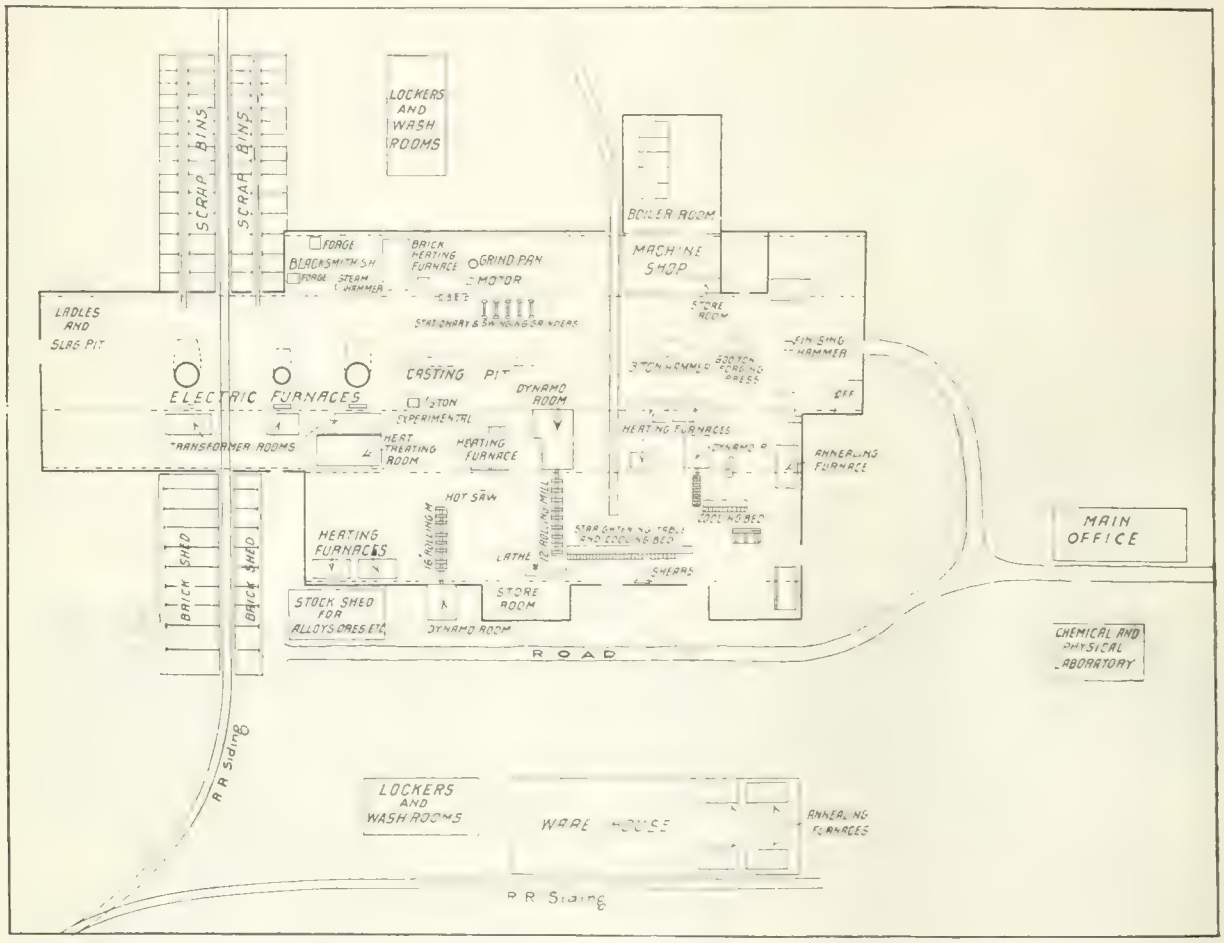
As a nucleus for the present works possession was secured of a foundry plant in outlying Latrobe, on a branch of the Ligonier Valley Railroad. This had a 6-ton electric furnace, for making electric steel castings, but the accompanying plan of the works shows how the plant has been converted into a conveniently arranged steel-making plant and rolling mill. The accompanying reproductions of photographs will convey an impression of the scale of operations. The capacity of the plant may be put at 65 tons per day, or 20,000 tons per year.

The plant has now two 6-ton Heroult electric



Removing First Refining Slag from 3-Ton Furnace

furnaces and one of 3-tons capacity, as well as a 1-ton experimental electric furnace. The major part of the output goes into chrome, chrome-nickel and chrome-vanadium steels, but high-speed steel is a conspicuous article of manufacture marketed under the name of Electrite, as for example Electrite No. 1, Electrite No. 2 and Electrite-Uranium A,—but the company has developed a number of special brands, including a non-shrinking die steel, known as Mangano; Renow steel, suitable for wire drawing dies; steels for hot punching work, such as Electrite No. 4, which is a medium high chrome-tungsten steel, and Select, a high-chrome steel, and a tungsten permanent magnet steel. A 12-in. and a 16-in. rolling mill constitutes the finishing end of



General Plan of Works of Latrobe Electric Steel Company

the plant, which can produce rounds from 3/16 to 5 in. in diameter; squares from ¼ to 4¾ in. on the side, and flats from 9/32 x ¼ in. to 1 x 8 in.

The electric furnaces lie along the center line of the main or original foundry building, which is 60-ft. wide and of lofty proportions, and they are located toward one end, as indicated in the accompanying plan, with the scrap-bins nearby. A railroad siding brings the scrap cars alongside the bins and narrow-gage tracking provides for carrying to the funaces the charges made up from the material in the different bins. The bins are covered for protection from the elements, and a similar group of bins, reached also by the railroad siding, provide for the storage of bricks and other materials for the furnaces. This main part of the works has lean-tos, 30-ft. wide, on each side, but longitudinal as well as lateral extensions were made, and an extention to the main bay gives space for building up spare tops of the furnaces and for storing and lining ladles and accommodating the slag. Beyond the lean-to containing the transformers for the furnaces and the different heating furnaces is the rolling mill proper, all departments in direct communication and bringing the main manufacturing departments virtually all under one roof.

At the time of the visit to the Latrobe plant sufficient figures were not available to give a comprehensive idea of the performance of the steel-making plant. An idea of the materials used, selected at random from furnace charging sheets show that for making a steel running about 0.98 per cent carbon, 0.3 per cent manganese and 0.35 per cent chromium, the charge would be made up about as follows: Pig iron, 1300 lb.; punchings, 2800 lb.; tool scrap, 2200 lb.; drop forging trimmings, 7000 lb. Similarly, the composition of the charge for steel made in one of the larger furnaces, to run, say, 1.06 per cent carbon, 0.32 per cent manganese and 1.38 per cent chromium would be about as follows: Pig iron, 2150 lb.; chromium scrap, 2500 lb.; carbon scrap, 1000 lb.; drop forging trimmings, 1000 lb.; punchings, 6350 lb.; chromium trimmings, 1000 lb.; limestone, 600 lb. and burnt lime, 200 lb.

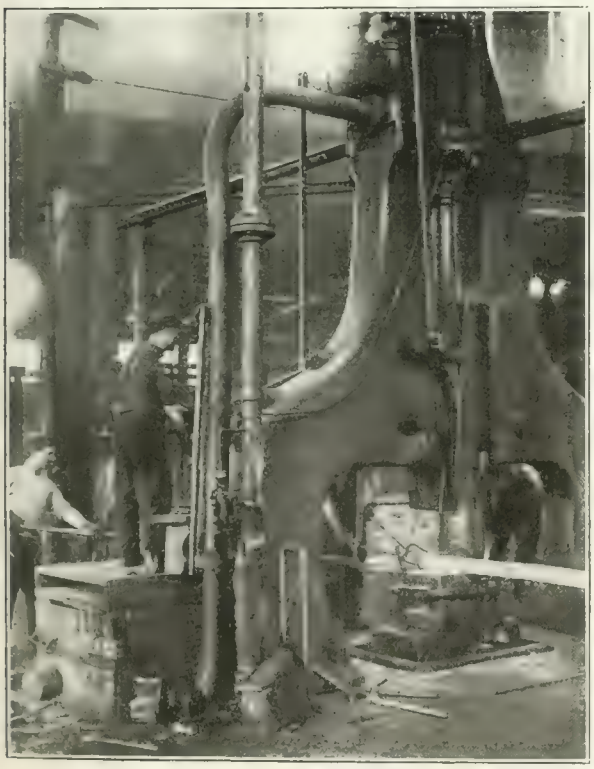
The steel is cast in split molds, 4 to 14-in. in diameter, and hot refractory tops are used. For breaking down the ingots a 3-ton steam hammer, a 600-ton Mesta high speed steam forging press are provided, and a 2500-lb. and an 800-lb. Chambersburg finishing hammer are also included in the equipment. The stripped ingots are heated in coal-burning furnaces near the hammer and the press as indicated. Each of these furnaces is of three-door size and is equipped with steam-jet burners. For handling the ingots in and out of the furnace a swiveling post crane is employed. As ordinarily



Pouring Electric Furnace Steel from 10-Ton Ladle

operated the forged ingot is cut in the middle into two billets. Before passing into the heating furnaces of the rolling mills, the billets are, of course, ground on the surface wherever folds, slivers or other blemishes are discernible, and for the etching processes there is a group of stationary and swinging grinders of a type, individually motor-driven, seen in foundry cleaning rooms. The steel-making department is commanded by two electric traveling cranes, one of 10-tons capacity and the other a 15-ton Niles crane.

The arrangement of the rolling mills shows the five stands of the three-high 12-in. mills with the heating furnaces nearby and the 16-in. three-high mill, which is of three stands. Both mills are electrically driven. The 12-in. mill is driven by two



Three-ton Forging Hammer



Working on 600-Ton Forging Press



Rolling Round Bars on 12-In. Mill

direct-current motors coupled together with their common shaft in a continuation of the shaft of the mill. They are operated from a 300-kw. rotary converter and the speed control allows for variations of 70 to 200 r.p.m. It is probable that the two motors together develop 400 hp. The 16-in. mill is driven by a link-belt chain from a 450-hp. Allis-Chalmers motor with a flywheel 24-ft. 4-in. in diameter. The speed reduction through the link belt is from 440 to 70 r.p.m. and the chain drive, which is 30 in. wide, was used to allow for a short distance between the motor and mill shaft centers.

Overhead light trolleys provide for bringing the billets from the billet-heating furnaces to the mills, but the rolling mill is also served by a 3-ton Euclid Crane & Hoist Company's traveling bridge controlled from the floor. The 12-in. mill delivers a product from the smaller sizes up to 3¾ in. diameter in the case of rounds and to 5 x ½-in. in the case of the flat bars. In octagonal and hexagonal shapes the top size is equivalent to about 1½-in. hexagons. The 16-in. mill produces from 2-in. rounds upward to the maximum sizes already mentioned.

A railroad track entering the rolling mill toward the finishing end provides for the ready delivery of products by direct railroad shipment, and a wagon road gives facilities for automobile truck transportation. A warehouse is, however, in course of construction for storing stocks of the various standard products of the company and a railroad siding will here accommodate shipment. In this building is to be a heat-treating department, with gas furnaces and oil, brine and fresh water for quenching. A completely equipped laboratory for scientific investigation and research work forms an important part of the plant. It is equipped with testing machines for the examination of physical characteristics and a special heat-treating plant is included.

The finishing equipment in the rolling mill includes an annealing furnace, and special tube containers allow for packing the bars to be annealed against exposure to atmospheric influences within the furnace. Besides two Garrison hot saws for the 16-in. mill, and two Abramsen straighteners and a polisher and a straightener for flat bars are provided.

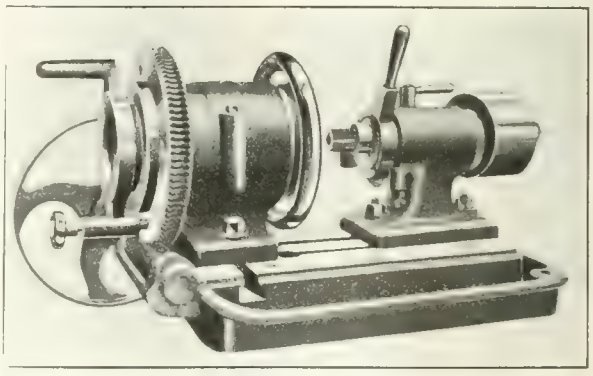
Electric current for the furnaces, mill motors and for lighting is purchased, but for steam for the hammers a battery of Erie City Iron Works boilers was installed. A machine shop with the usual machine tools, motor-driven, and including an Ingersoll-Rand compressor for air blowing of scale at the forging hammers as well as for general use around the plant, was a part of the original equipment. The grinding pan of the former foundry is utilized for mixing materials, as for making the hot tops, which are molded on a jarring machine.

The leading figure of the company is E. T. Edwards, formerly of the Firth-Sterling Steel Company and latterly president of the Vanadium Alloys Mfg. Company at Latrobe. He is vice-president and manager of the Latrobe Electric Steel Company. M. W. Saxman, a coal operator and banker of Latrobe, is president and Ira B. Schallenberger, banker, of Latrobe, is secretary and treasurer. Frank Garrett, formerly with the Firth-Sterling Steel Company, is metallurgist. Charles W. Guttzeit is sales manager of the New York office at 165 Broadway.

Screw Thread Milling Machine

A machine specially designed for cutting the threads in shrapnel shells, and one which it is said has been extensively used in France and has lately been introduced into Italy for a similar purpose, is shown in the accompanying illustration. The thread cutter is fixed to the shaft of the holder by means of a cross pin and the holder itself is held over its whole length inside the tail stock, to minimize vibration and consequently secure accurate working. The cutter revolves at a speed of 150 r.p.m. and is driven the exact depth to be threaded.

The threads are cut once and for one revolution of the shell. While the shell completes this revolution, the chuck which holds it advances inside the head stock against the cutter by the action of a lead screw. The shell is held fast in the chuck by means of a hand wheel which acts upon a vice. No spanner or other special tool is required, and no loss of time results on this account. One man attends two machines and the threading of one shell takes about three minutes. The



Screw Thread Milling Machine of a Design Extensively Used Abroad

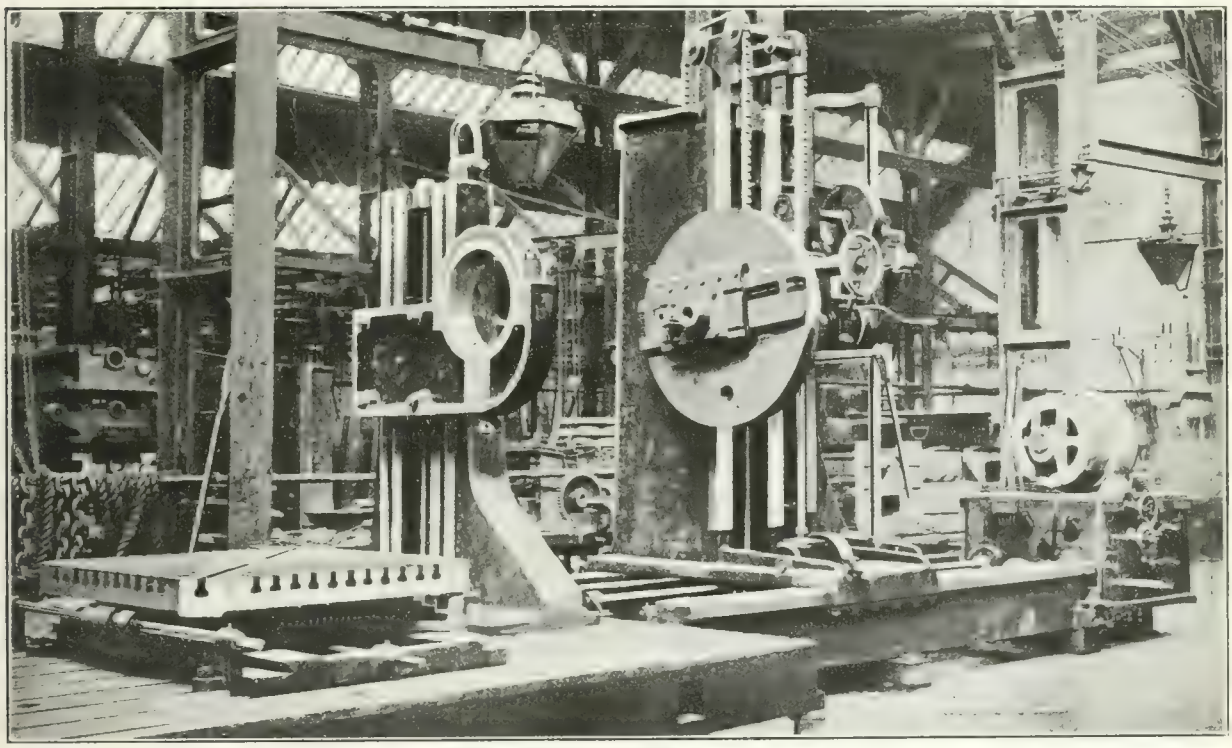
machine may, of course, be placed upon a pedestal base. It is built in Switzerland but London *Engineering*, which has illustrated it, secured particulars from the Imperial Motor Industry, Ltd., 11 Denmark Street, Charing Cross Road, London, W. C.

Industrial accidents in Pennsylvania in August killed 246 workers and injured 23,817, according to figures just announced by John Price Jackson, Commissioner of Labor and Industry. This is the greatest number of accidents in any month this year.

A Large Horizontal Boring Machine

A horizontal boring machine of large proportions designed for general work has been built by G. & A. Harvey, Ltd., Albion Works, Glasgow, Scotland. From a brief description in *Engineering*, of London, the following particulars are obtainable and one of the photographic illustrations, showing the machine ready for operation, is here reproduced.

The machine proper with the spindle driving mechanism or standard has a bed 14½ ft. long and 6 ft. 10½ in. wide, and to one end of this is bolted the table for the work, the table measuring 13 ft. 9 in. by 34 ft. The standard on the main bed is provided with self-acting feed and in addition power traverse and hand adjustment in either direction, and it can be locked in any position. The length of traverse is 7 ft. 6 in. The saddle carried by the standard is balanced for vertical movement, and it has a vertical travel of 5 ft. 6 in., the center of the spindle in the lowest position being 2 ft. 4 in. and the highest 7 ft. 10 in. above the top of the table.



Large Horizontal Boring Machine Built by G. & A. Harvey, Ltd., Glasgow, Scotland

The spindle is of cast iron revolving in gun-metal bearings. The front journal is 10 in. and the back journal 5¼ in. in diameter. The spindle is driven from a 40-hp. motor on a cast-iron box fixed to the end of the main bed. The drive is altogether by gears to the shaft in the bed and thence by bevel gears and vertical shaft to a horizontal shaft in the saddle. The saddle is fitted with speed gears, giving twelve changes in all for the spindle. Its maximum speed is 23 r.p.m. and the minimum speed 0.3 r.p.m.

The spindle drive is fitted with reversing gear on the saddle, so that the chuck may be revolved in either direction. The chuck is 53 in. in diameter and carries a tool slide on one side. The facing slide is placed on the front of the chuck in adjustable vees and has a sub-acting feed or hand travel of 33 in. The facing tool will operate on any part of a surface from the center of the spindle to 66 in. diameter.

The work-plate is provided with a table 7 ft. square and is capable of being revolved by hand through worm and worm-wheel, and locked in four right-angle positions. The table is carried in a cross-slide which is bolted securely to the work-plate in any position longitudinally. The cross adjustment of the table is over 3 ft.

Casting High-Explosive Shells

The method of casting and forging 8-in. high-explosive shells is described in *Canadian Machinery*, July 27, 1916. The plant uses a 20-ton charge made up as follows: Pig iron, 7000 to 7500 lb.; shell head scrap, 13,000 lb.; plate scrap, 7600 lb.; crop ends of ingots, 11,000 lb.; iron ore, silicon and manganese to bring the charge to 38,000 to 42,000 lb. About 75 per cent of the pig-iron charge is first placed in the furnace, and when this begins to settle the shell and plate scrap and the crop ends are added. The remainder of the pig iron is added after these have become partly melted. From 4½ to 5 hr. is required to melt the charge, and another hour elapses before it is ready to tap. The tapping condition of the charge is determined by the fracture of a test bar. No chemical analysis is made until after the metal has been poured into molds.

The metal is tapped into a 20-ton ladle, which will fill about 120 8-in. molds or 360 4.5-in. molds. The metal is poured very hot for the 4.5-in. molds to avoid any possibility of its freezing. The top surface of each ingot is covered with floor sand as it is poured in order to retain the heat and to aid in the feeding of the metal as the billet solidifies.

After cropping, the billets are placed 15 at a time in an oil-burning furnace and heated to 2100 deg. Fahr., requiring 1¾ to 2 hr. This time may be lengthened somewhat if the analysis shows the billets to be high in carbon. The billets are forged in a 350-ton Wood forging press the capacity of which is approximately 450 shells per day of 24 hr. To maintain this production 15 shell-heating furnaces are necessary. To insure satisfactory operation of the forging process, scale is removed from the billet by scrapers, which is necessary not only for the preservation of the dies but also for the uniform drawing of the shell. Were this not done, the adherence of the scale would have a tendency to produce a shell with eccentric walls.

The W. H. Mullins Company, Salem, Ohio, has completed a large three-story factory building as an addition to its plant. The building was formally opened Aug. 26 by a reception and entertainment, which was attended by over 4000 guests.

Normal Fracture of Good Malleable Iron*

The Effect of Haphazard Fractures and the Burning Out of Surface Carbon—An Erroneous Theory Regarding the Strength

BY ENRIQUE TOUCEDA

I HAVE seen very few photographs of fractures of malleable iron that have been made with the object of obtaining one of good iron, and all that I have seen have either shown the fracture of a test lug that had been hammered off a casting, the fracture of a test piece, or of a casting that had been broken transversely. Such fractures are made complex because failure takes place due to the influence of both tension and compression stresses, these being of varying intensity depending upon their distance from the neutral axis. While it is a fact that failures in castings of any kind, in the majority of cases, are due to loads that produce bending, torsion or both, still I believe this subject can be more accurately approached by a study of fractures that have been produced through the sole action of a direct pull, as in making tension tests.

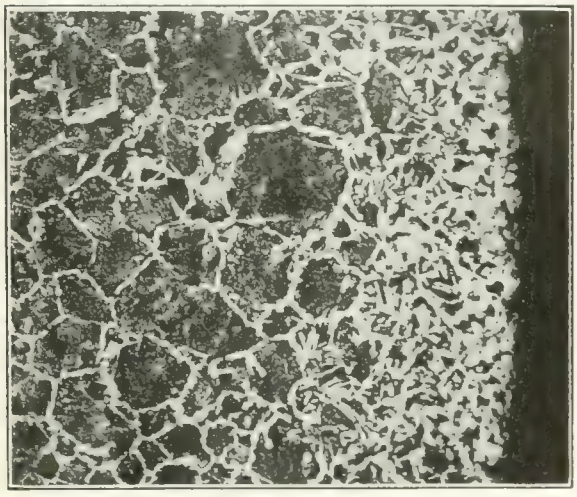


Fig. 1—Photomicrograph of a Piece of Steel Showing the Difference Between Skin and Core

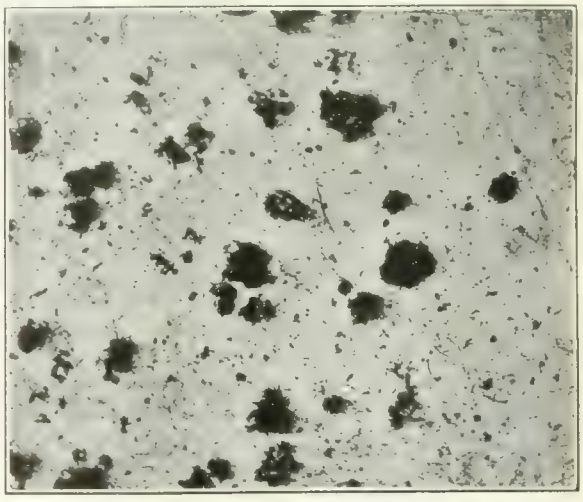


Fig. 2—Photomicrograph of the Structure of Decarbonized Border and Core of a Tensile Test Bar of Malleable Iron

EFFECT OF HAPHAZARD FRACTURES

It is evident that if a crystal of pure iron is compressed and flattened out, its subsequent ability to elongate when pulled is greatly reduced. Consequently, when the lug is struck side blows in order to knock it off the casting, numerous shiny particles on the tension side of the fracture will be seen, because the ductility of the crystals has been greatly lessened by the compression which they previously sustained and they will, when subjected to a pull, part through the slip bands instead of stretching. This leaves facets that will sparkle, so that the tension side of the fracture will have an abnormal appearance, be the material good, bad or indifferent, as compared with what the fracture of these respective grades would show if subjected to transverse or tensile stress only.

When malleable iron is broken transversely, the metal on one side of the neutral axis is of course in compression, and in any quality of malleable it will always appear silvery white at the extreme edge of the compression side, the whiteness being less in evidence as the neutral axis is approached, because, as stated, the compression stresses are of varying intensity, and the crystals furthest from the neutral axis are flattened much more than those nearer to it. Fractures that have been produced by transverse stress will always show a silvery white area on the compression side, starting faintly to one side of the neutral axis and growing deeper as the edge is approached.

It is clear, therefore, that if we want to ascertain the appearance of the fracture of malleable iron it is desirable to see what its fracture looks like when the metal in the entire section has been subjected to the same treatment as would be the case in a tension test. The structural composition of malleable iron consists simply of two constituents, including about 98 per cent, by weight, of ductile iron practically free from carbon, and about 2 per cent of small rounded particles of graphitic carbon uniformly distributed throughout this mass of iron, except within the decarbonized border.

SURFACE CARBON BURNED OUT

It is well known that it is not possible to heat a steel casting, a steel billet, or a malleable iron casting in the oxidizing gases of a furnace without removing a great deal, if not all, of the carbon from the metal for a certain depth under its surface. In commercial practice this depth will vary anywhere from a 1/32-in. to a 1/16-in. As steel contains no graphitic carbon the fracture of a broken piece will be uniform in appearance throughout, and the characteristics of the fracture can best be described by the accepted term "steely." The microscope, however, will disclose the fact that there is very much less carbon in the nearly decarbonized ring of metal referred to, than in the core which it encircles.

The reason, that when the fracture is examined by the eye, the border is similar in appearance to the core in the case of steel is due solely to the

*From a paper presented Sept. 14, 1916, at the American Foundrymen's Convention in Cleveland, Ohio.

fact that the appearance of the steel fracture does not depend upon carbon percentage, unless the amount of carbon between the steels that are being compared varies greatly. For instance, the fracture of a 0.10 per cent carbon steel would look about the same as one that contained 0.40 per cent carbon. A polished and etched section, however, when viewed under the microscope shows that a great difference exists between the two, which can be plainly seen by reference to Fig. 1, enlarged 60 diameters. This shows the difference in structural composition between the skin and core of a piece of steel that was ⅛ in. thick.

Even in the case of the very best malleable iron the eye easily distinguishes the difference in appearance between the decarbonized border and the metal it surrounds, because the former is practically carbonless and looks steely, while the latter is dotted with numerous particles of graphitic carbon causing the metal to look dark. Consequently, due to contrast, the border is plainly visible.

In Fig. 2, which is enlarged 60 diameters, can be seen both the structure of the decarbonized border and the core, as it is misleadingly called, of a section taken from a tensile test bar. The skin is practically free from carbon, while the little particles of graphitic carbon can plainly be seen distributed with great uniformity throughout the iron of the core. You are aware that any commercial iron product containing but little combined carbon must of necessity be ductile, and as good malleable iron contains but little, if any, it must be ductile material.

AN ERRONEOUS OPINION

I have dwelt upon this matter because there appears to be an erroneous opinion, first, in connection with the characteristics of the border or skin of malleable iron; second, because of the common belief that a decarbonized border or skin is unique in malleable iron and not present in steel, owing to its invisibility in the fracture; third, because the skin must be taken into account in considering the fracture of malleable iron, and fourth, because this so-called skin can in the case of inferior malleable iron be of itself an explanation of its inferiority.

In the fracture of good malleable iron when broken by direct tension, or when it fails due to a steady, direct pull, the crystalline grains of iron, when the elastic limit has been reached, start to elongate permanently. As the test proceeds, they stretch further and become thinner, and just prior to fracture they become tapered down to a point.

The fracture then has what is known as a "tooth," because its surface is made up of an innumerable number of spines that have resulted from the elongation of the numerous grains in the metal. That part of the fracture encircled by the decarbonized ring appears to be of a dark gray color. This is due in part to the presence of small particles of graphitic carbon and in part to the shadows that are cast by the spines of the elongated grains. The skin, or border, looks white, due in part to the fact that no graphitic carbon is present and in part to light reflection. When the bar fails, the metal in the border being slightly more ductile, breaks last and at an angle, and consequently, when the light shines directly on the fracture of the core, it shines obliquely on the surface of the border. If, however, the bar is held obliquely to the direction of the light, a very fine silky sheen will be seen that varies in shade from a silvery gray to darker shades of the same color, as the obliquity of the fracture to the light is decreased. Such will always be the appearance of the fracture of a tensile test bar of good malleable iron when the fracture is held in the various positions described.

If a bar is broken transversely, then the part that failed in tension should show, in a large measure, the characteristics covered by the foregoing description, while the part that was in compression would have the whitish looking area already referred to, and the more ductile the metal the greater will be the depth of this area.

STRENGTH NOT DUE TO THE SKIN

Only a few years ago such fractures as are shown in Fig. 3 were considered typical of what

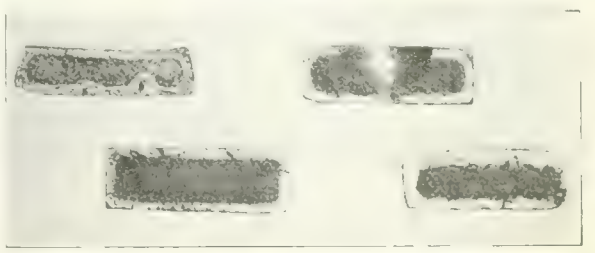


Fig. 3. Appearance of the Fracture of Black Heart Malleable Iron

the fracture of good malleable iron should be, and it is actually due to such fractures that malleable iron made in this country received the name "black heart." Such iron as this is defective, as the border instead of being decarbonized, contains considerable carbon in the combined form. As a matter of fact it is a steel, and consequently is more brittle than the core. When good malleable breaks in tension the core parts first, as must be the case if its ductility is slightly less than the metal in the skin. This fact alone is sufficient to prove that those who have claimed that the strength of malleable iron lies mostly in the skin are misled. In the case of material whose fracture is similar to that shown in Fig. 3, the skin breaks first, as it is more brittle than the core.

Direct Production of Iron-Nickel Alloys

To avoid the separate extraction of iron and nickel, or iron and any other metal, such as manganese, from an ore when it is possible to obtain a desirable alloy by direct reduction, Frederick A. Eustis of Milton, Mass., and Charles P. Perin of New York have taken out a patent (U. S. 1,185,187—May 30, 1916) for the direct production of such alloys. Taking Cuban ore as an example, containing about 1 per cent nickel, a parcel of ore is divided into two parts, one of which is to be treated for the extraction of a predetermined amount of its nickel, which is subsequently added to the second part, thereby enriching the mixture in nickel, whereupon the mixture is smelted to produce an iron-nickel alloy. The treatment of the first part of the ore for extraction of nickel may be accomplished by roasting with sulphur-bearing material, yielding a sulphated product from which nickel sulphate can be leached. The nickel solution thus obtained may be precipitated, and the precipitate added to the second part of the ore prior to smelting. Various modifications of the method are given.

The Efficiency Society will hold a fall convention in New York City on Nov. 16, 17 and 18. It plans to discuss the question, "After the War, What?" To prevent the meetings having a political aspect, the dates mentioned were selected. It is proposed to invite wage-earners as well as representatives of the industries of the country.

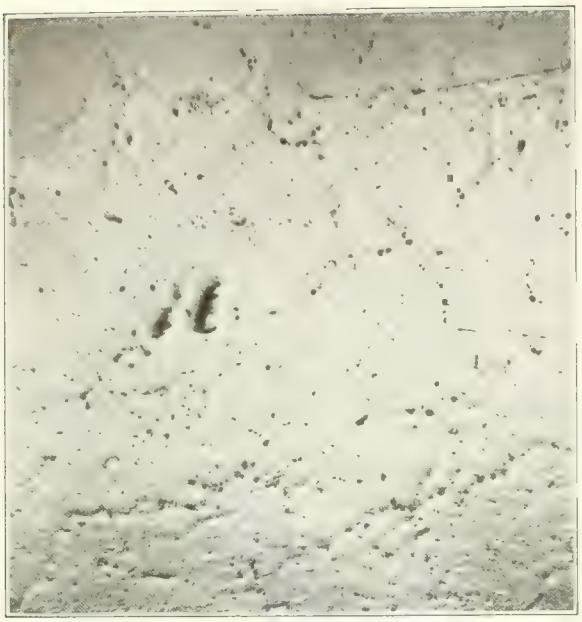


Fig. 1—Photomicrograph of a Sample from Ingot No. 1, Unetched and Magnified 50 Diameters

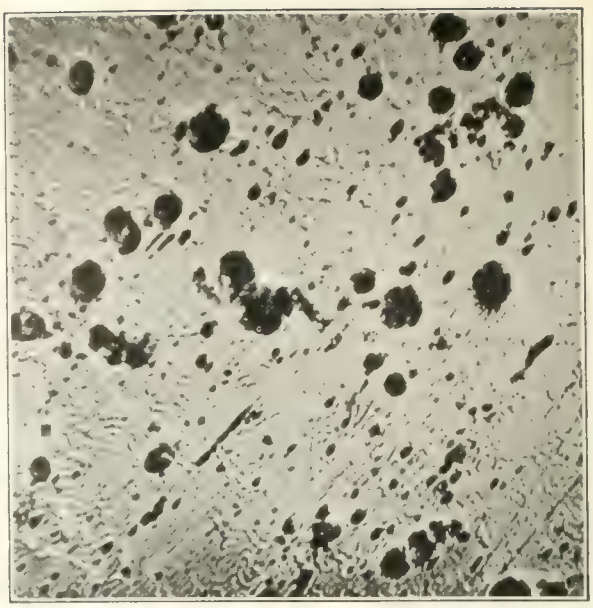


Fig. 2—Photomicrograph of the Same Steel as Fig. 1, Unetched and Magnified 180 Diameters

Converter Steel Castings Low in Manganese

Unusual Effect of Attempts at Economy by Reducing the Ferroalloy Additions—A Peculiar Slag Contamination

BY EDWIN F. CONE

WHEN the scarcity and high price of ferromanganese some months ago threatened serious inconvenience to steelmakers, attempts were made to find substitutes or at least to cut down the amount consumed. In some cases success attended these efforts, especially in open-hearth practice where high-grade ferrosilicon or spiegeleisen was an effective agent in partly deoxidizing the steel and furnishing some of the manganese. In converter practice and in converter foundry practice in particular, these efforts were not so successful. One instance of this was brought to the writer's attention and the circumstances attending it are unusual and interesting.

It had been the custom of a prominent Eastern side-blow converter steel foundry to obtain its desired manganese content by adding ferromanganese. When the scarcity was acute it was decided to lower, by 50 per cent or more, the amount that had been added. Supplies were low, the prospects of obtaining more poor and the prices $400 to $450 per ton. It was not long before serious difficulties



Fig. 3—Photomicrograph of a Sample from Ingot No. 2, Unetched and Magnified 50 Diameters. The poor quality of the metal in this and Fig. 1 is evident



Fig. 4—Photomicrograph of the Same Steel as Fig. 3, Etched with Picric Acid and Magnified 500 Diameters, Blow Holes (the Large Black Spot) and Manganese Sulphide Are Visible

were encountered where formerly excellent results had been the rule.

The most serious and striking result of the reduced manganese charge was the periodical appearance in the metal, as it flowed from the ladle, of a slag-like agglomeration all through it, sometimes in sufficient mass to completely stop up the ladle's nozzle and hang like an icicle therefrom. It did not float to the top of the metal like a normal slag. The castings from many heats, especially when this phenomenon occurred, were not only more than usually blowy, but were permeated with slag-like inclusions, sufficient to cause their rejection at once on machining. A chemical examination of the slag-like agglomeration gave the following results:

	Per Cent		Per Cent
Silica	67.76	Magnesia	None
Oxide of iron	22.86	Titanium	None
Aluminum	5.06		
Manganese oxide	2.15	Combined carbon	0.14
Shot or steel	2.00	Manganese	1.36
Lime	None		

Specific gravity, 3.10.

This compound seemed to collect in the steel cumulatively, similar to undigested food in the human system. Its content of entrapped steel is surprising. It needed to be physicked away, but the removal of part of the manganese was believed to have prevented this.

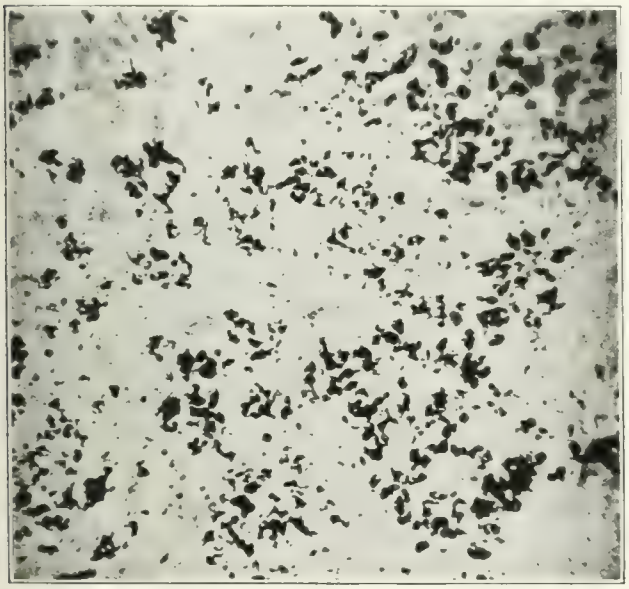


Fig. 5—Photomicrograph of a Sample from a Tooth of the Gear Etched with Picric Acid and Magnified 50 Diameters

Working on this theory, it was found that in the weeks during which this trouble had appeared the average manganese content of the steel made had been only 0.46 per cent with many heats below 0.30 per cent manganese, and even as low as 0.14 per cent manganese. Previous to this and when using normal quantities of ferromanganese the average content had been from 0.70 to 0.80 per cent manganese.

To make the investigation more thorough I selected two castings made in heats where the unusual phenomena had occurred. In addition a small test ingot was poured from two heats, exhibiting the same phenomenon. These were analyzed and then submitted to microscopic examination. The analysis of the castings and ingots were as follows:

	Ingot No. 1, Per Cent	Ingot No. 2, Per Cent	Toothed Gears, Per Cent	Small Casting, Per Cent
Manganese	0.38	0.44	0.37	0.50
Silicon	0.32	0.35	0.28	0.34
Sulphur	0.046	0.037	0.062	...
Carbon	0.15	0.17	...	0.17
Aluminum	0.01	0.01	...	0.02
Titanium	None	None	...	None

The composition of these is normal except the manganese content.

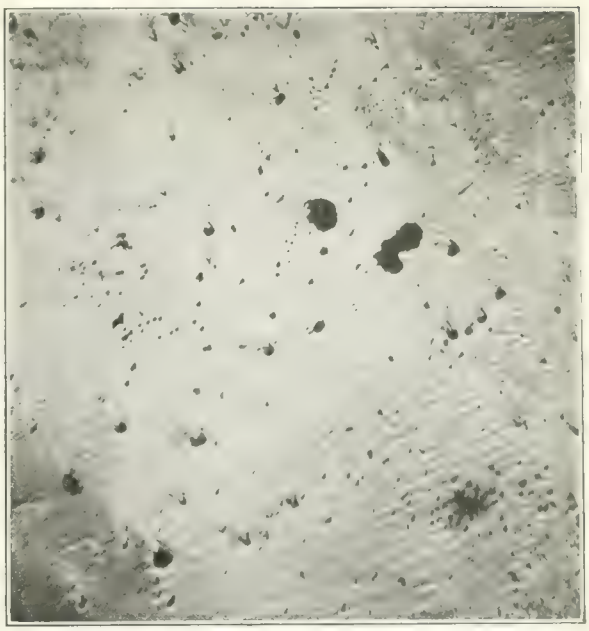


Fig. 6—Photomicrograph of the Same Steel as Fig. 5, the Gear Wheel Unetched and Magnified 180 Diameters

Samples from each of the above were submitted to microscopic examination and the results, as shown by the photomicrographs here reproduced, substantiated the theory advanced. Each one was found to be full of blowholes and oxide as revealed by the black spots appearing in the unetched specimens. The photomicrograph from the first ingot, with a manganese content of 0.38 per cent, shows the worst condition. The small casting, the one highest in manganese, was the best but it was abnormal. The gear casting revealed also an abnormal amount of manganese sulphide.

Without doubt the contributing cause of this unsound metal and of the periodical appearance of the unusual slag was the use of too little ferromanganese. The conditions governing the manufacture of steel by the side-blow converter process are of a highly oxidizing nature, and every precaution should be taken to overcome and neutralize this condition. A radical elimination of manganese, one of the strongest deoxidizing agents in use, is not a commendable procedure.

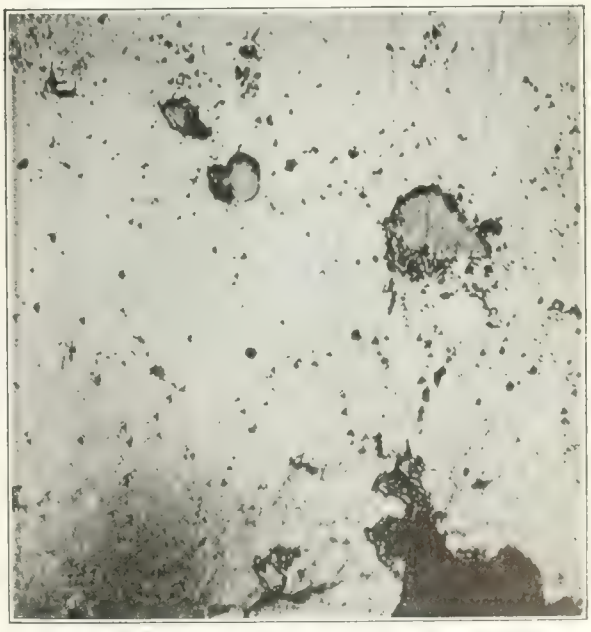


Fig. 7—Photomicrograph of the Same Steel as Figs. 6 and 7, Etched with Picric Acid and Magnified 500 Diameters, Showing Manganese Sulphides. The Black Is Pearlite

Another factor having a potent influence was that the pig iron used in the cupola had practically no manganese in it. Also it was likely that at that time this pig iron was being made under conditions which involved or favored the production of a more highly oxidized iron. If this were so, such portions of the iron might appear in the melted iron from the cupola, not necessarily continuously but intermittently.

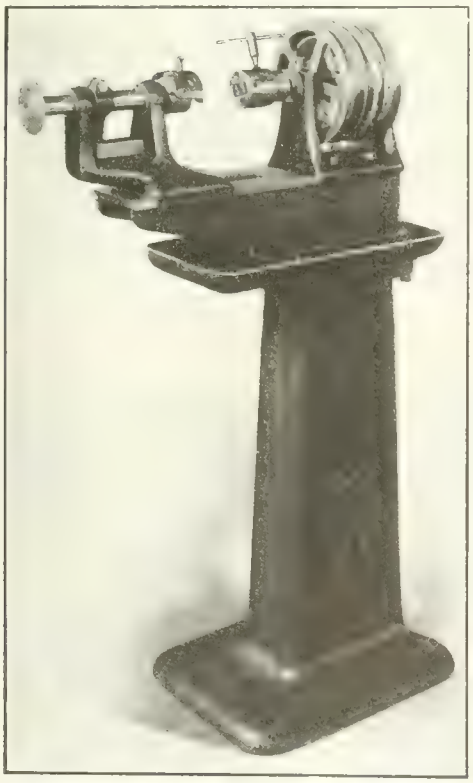
When such iron is blown in the converter the condition of oxidation is aggravated. A considerable manganese content in the pig iron originally would have helped to neutralize this tendency, a fair initial percentage of manganese in pig iron being recognized as beneficial to steel made by any process.

It is of interest to state that as soon as the normal amount of ferromanganese was restored, all trouble was eliminated and the metal and castings were as excellent as formerly.

Horizontal Precision Tapping Machine

The H. E. Harris Engineering Company, Bridgeport, Conn., has placed on the market a precision tapping machine of the horizontal type in which a friction cone is employed for driving and reversing the tap. As is the custom in machines of this type, the reversal is accomplished at a relatively high rate of speed. The machine can also be used for work where more than one hole of the same size is to be tapped and for tapping holes in the periphery of the piece along radial lines.

The friction employed for the drive is applied on the cone principle and consists of leather and cast-iron surfaces in contact. It is of the dry type and under normal conditions it is pointed out that no oil can work its way to the leather face and thus impair the efficiency of the drive. The leather face is cushioned and is relied upon to give an easy, sensitive and powerful grip by a slight application of longitudinal pressure. The use of the friction driving and reversing arrangement, it is emphasized, does away with the necessity of safety chucks to guard against breakage of the tap. The forward friction is thrown into action by a slight pressure on the end of the tap, which is secured by pushing the tap into the hole drilled in the work. When the hole has been tapped to the desired depth, the work spindle in the tailstock bears against a stop, and the cone friction, it is explained, is automatically released by the action of the tap drawing into the work.



A Horizontal Precision Tapping Machine in Which the Driving and Reversing of the Tap Are Accomplished by a Cone Friction

The tap is then reversed and backed out by a slight pressure of the operator's hand in a direction to pull the work from the tap. The reversal is accomplished at a speed at from 50 to 100 per cent greater than the normal operating speed, this increase being secured by a countershaft having driving pulleys of two diameters and a tight and loose pulley. The spindle, which is of small diameter, is of tool steel and the cone spider on it is made of aluminum. In this way, it is emphasized, the flywheel effect is kept down and the spindle comes to a stop when the friction is released, this arrangement being relied upon to insure tapping to a fixed distance or the bottom of a hole.

Work holding fixtures fitted to a taper shank are inserted in the tailstock spindle, an arrangement which is designed to insure the tapping of holes in alignment and the proper location, the taper shank being attached so as to be in line with the hole that is to be tapped. Where more than one hole is to be tapped in the work with the same size of tap, the fixture used has a circular or traverse movement or a combination of both. In this way, it is explained, by using stops all the holes can be tapped at the same setting whether they are in the same line or at the same angle. Where the holes are tapped along radial lines in the periphery of a piece, a special slide stock is substituted for the regular one and a rotating indexing mechanism is employed. When it is desired to change from one fixture to another, all that is necessary is to knock the taper shank out from the tailstock spindle, a hole that extends through the spindle being provided for the purpose, and inserting another fixture, after which the tailstock is set and the stop adjusted for the proper depth of hole.

The machine illustrated is designed to handle taps ranging from ¼ to ½ in. in diameter and the tailstock has a range of adjustment to take care of thin work with a very short tap or larger work with a standard length ½-in. tap, which will tap holes about 2 in. deep. A smaller size machine of the same design is built for handling taps up to a maximum of ¼ in. This machine is of the bench type and is driven by a motor mounted underneath the bench.

Cast-Steel Shells from German Converters

The inclusion of numerous small Bessemer plants among the producers of cast-steel shells was referred to at the annual meeting of the German Foundrymen's Association at Düsseldorf, Germany, Aug. 5, by Dr. Werner as part of the association's work. He also mentioned an investigation of the position of aluminum in the steel industry which had been undertaken in conjunction with the Association of Iron and Steel Producers. The extent of female labor in foundries was discussed. Other topics were the progress made in the investigation of cast-iron substitutes for copper and other scarce metals, the strength of cast-iron columns and the future policy of the foundries.

The plant of the Lorain County Electric Company, Lorain, Ohio, will be greatly enlarged, and a 6250-kw. turbine driven generator will be installed. A 200-ft. stack will be erected and the boiler plant will be equipped with modern stokers.

THE 25-TON AIR FURNACE*

Advantages Over Smaller Ones in Malleable Practice—Cost Data

BY F. C. RUTZ

The malleable furnace has perhaps escaped being written about as much as any one subject pertaining to the malleable industry, and yet it is one of the most important. Improperly constructed or improperly handled furnaces are apt to wreck the best chemically calculated heat. Simple measurements of the openings between the top of either front or back bridge and the bottom of the bungs over them are apt to make either for melting with just the proper oxidizing flame, or slow melting. The latter gives the flame too much play on a slow trickling of metal causing the familiar "high heat," or too low a silicon content.

METAL SHOULD BE SNAPPY AND FLUID

A properly handled furnace will cause the metal to collapse quickly into a molten state, giving the desirable snappy life and fluidity, with a consequent decrease in defective castings.

In my opinion, after having had experience with various sizes of furnaces, the 25-ton furnace has a sufficient number of points in its favor to warrant its adoption. These points include decreased operating expense, flexibility, and space economy.

From cost figures available, the larger furnace can be operated at a total cost of $3.25 per ton, including firemen, coal, ash, slag and repair labor, all materials, tools and equipment. This figure is an average cost for the past four years, based on average heats of slightly over 18 tons. The charges are proportioned as follows:

	Per Ton
Firemen, labor	$0.25
All other labor	.40
Coal	2.00
Brick	.38
Fire sand and clay	.07
Tools and equipment	.16
Motor and fan repairs	.01
Total	$3.25

From figures available, obtained from a number of sources, covering costs on 12 to 15 ton furnaces, the cost of melting per ton averages approximately $3.85. Owing, however, to different methods of distributing costs, a satisfactory comparison cannot be arrived at, itemized as above. The final result, however, seems to be greatly in favor of the larger furnace.

THE MELTING RATIO

The melting ratio from a fair average covering a year's tonnage, actually poured, would be 2.75 to 1, after allowing approximately 13 per cent for shrinkage on the total amount charged, owing to oxidation, slag, etc.

As to flexibility, the advantage also appears to be greatly in favor of the larger furnace, owing to its adaptability for either large or small loads, depending upon the grade of work that one desires to make. Small heats of 12 to 15 tons can be handled as successfully as 20 to 25 tons, merely by keeping the bath of the metal at the proper depth. Another valuable feature of the larger furnace is the great space economy that can be effected, owing to its ability to do practically double the work of the 12 to 15-ton furnaces. The saving of floor space may be turned into productive channels.

DIMENSIONS OF THE FURNACE

Regarding the detailed dimension figures of a successful 25-ton furnace, the grate surface is 5 x 8 ft. The grate bars are 6 in. wide with ⅝-in. openings. The opening from the top of the front bridge to the bottom of the center of bung is 27 in. The back bridge opening is 12½ to 13 in. The lower blast pipe is 17 in. in diameter, and the top blast 6 in. in diameter. From it 8 pipes having 2⅛-in. openings, pitched so as to strike at the base of the front bridge wall, extend through the wind bung. The height of the front bridge from the top of the grates is 40 to 42 in. The blast pressure is 5 ounces. The above dimensions have proved the most successful among a number of experiments made to get the most economical results.

*From a paper presented Sept. 14, 1916, at the American Foundrymen's Convention in Cleveland, Ohio. The author is connected with the Rockford Malleable Iron Works, Rockford, Ill.

Power and Coke-Oven Gas

Results obtained from the operation of gas engines working on coke-oven gas are described by G. Dearle in a paper published in the June issue of the *Journal* of the Institution of Electrical Engineers, Great Britain. The engines are of from 300 to 500 b.hp., direct connected to three-phase alternators, and operating at a speed of 300 r.p.m.

Several unusual features are incorporated in the design, to facilitate the operation and also to eliminate certain common causes of breakdown. The engines are of the vertical single-acting 4-stroke-cycle tandem type, with the cylinders so arranged that the explosion stroke of one cylinder on a given piston rod is the suction stroke of the other. Each crank, therefore, receives a power impulse each revolution and the inertia of the moving parts on the upward stroke is absorbed by the compression of the charge in one or the other of the cylinders. The connecting rod is thus always in compression and little or no strain is thrown on the connecting rod bolts, which are said to be the causes of more engine failures than any other part. Each engine has eight cylinders, the upper four being 16.5 in. in diameter and the lower four 1 in. less, to facilitate the withdrawal of the pistons and rods for cleaning purposes.

Gas is supplied to the engines from a battery of 60 waste-heat and 50 regenerative Otto ovens, 15 per cent of the total gas being available from the former and 40 per cent from the latter. The average gas pressure is about 10 in. The gas leaving the benzole scrubbers contains about 900 grains of H_2S per 100 cu. ft. which would combine with the condensed moisture in the gases to form sulphuric acid. This would attack the valves and cylinders and also increase the danger of preignition. The gas is therefore purified by oxide of iron in four purifiers of the Wilbourne type, each 20 ft. square and 5 ft. deep, and holding 30 tons of oxide in two tiers of ordinary grids. From 2½ to 3 per cent of air is drawn in at the exhauster, which air has an important effect in revivifying the iron oxide. The oxide is renewed every four months, while prior to the introduction of the air it was necessary to renew it every four weeks. The purifiers reduce the H_2S to less than 50 grains per cu. ft., and also remove the last traces of tar from the gas.

The usual method of mixing gas and air by diluting the mixture with a certain percentage of exhaust gas was considered inefficient and an auxiliary air supply was introduced in the mixing chamber of the engine instead. This supply is controlled by a diaphragm governor, and dilutes the gas in the mixing chamber by a certain percentage of air. A further supply of air, controlled by hand from the driving platform of the engine, is admitted to the chamber of the governor valve where the diluted gas and air meet. After passing through the chamber of the governor valve the mixture is passed through a set of vanes to give it a rotatory motion, and also through a set of perforated plates. The mixture was thus made most thorough, and overheating and preignition of the gas was eliminated. The engines were enabled to run up to and beyond their rated capacity without trouble.

By means of regular analyses of the exhaust gases and instructions to the engine drivers to drive by the pressure gage, the gas consumption was reduced from 15 million cu. ft. in March, 1914, to 12½ million cu. ft. in May of that year, the load remaining practically constant, and still further reduced somewhat later. The gas consumption is approximately 39 cu. ft. per kw. hr.

The Presence of Alumina in Steel*

Its Recognition and Identification — A Comparison with Other Inclusions—Failures in Service Due to Aluminum Oxide

BY GEORGE F. COMSTOCK

NON-METALLIC inclusions in steel have attracted remarkably little attention among students of metallography considering the vast amount of work that has been done in recent years in the investigation of metallic structures with the microscope. Indeed, the tendency is still far too common among metallographists to give the general name slag to all substances seen in polished steel surfaces that are not metal. This is especially unfortunate in regard to sulphides, which obviously are not slag, and it should be equally desirable to distinguish between other typical inclusions, such as silicates of iron or manganese, iron oxide or scale, alumina, and titanium nitride. The objects of this paper are to call attention to the fact that alumina can be distinguished from other non-metallic inclusions in steel, to indicate how it can be recognized, and to show a few examples of the harm arising from it when locally abundant.



Fig. 1 is a Photomicrograph of Steel Showing Characteristic Alumina Inclusions; Fig. 2, of a Typical Silicate Inclusion in a Rolled Steel Bar; Fig. 3, of Complex Slag Inclusions in Steel

EXISTENCE OF ALUMINA RECOGNIZED

Various early writers on alumina in steel recognize its existence as a frequent non-metallic impurity in steel. They are aware of the potential harmfulness of this impurity, but they do not give any idea as to how it may be recognized and identified in metallographic work. To supply this deficiency was the object of the author's article on "Alumina in Steel," published in *Metallurgical and Chemical Engineering*, Dec. 1, 1915, and also printed in the Titanium Alloy Mfg. Company's booklet entitled "Ferro Carbon-Titanium in Steel Making." This article described the experiments made to ascertain the characteristic appearance of alumina in steel, and showed numerous photomicrographs to illustrate it. In the first bar of steel that came to the author's attention, in which alumina was known to be present, it was found in the form of small rounded spots, arranged close together in one elongated streak. They were of a very dark bluish-gray color, when examined with the white light of an electric arc, appearing black unless highly magnified, and it was almost impossible to polish them without forming little pits around each inclusion. If the polishing is done very carefully, these pits may be kept very small; but with certain methods of polishing the pits are made so large that the original inclusions cannot be seen at all. If the specimen is not rotated continuously during the final polishing, the pits will take the form of short scratches, and each inclusion will have a little tail like a comet.

Fig. 1 shows a bar of steel in which the occurrence of alumina was assured. Although this shows a longitudinal section of a forged bar, the individual inclusions have not been elongated by the forging, but merely the groups of particles have been drawn out into streaks. Compare this with Fig. 2, showing silicates in rolled bars, and a great difference is evident at once, for the individual silicate particles are very much elongated in the direction of rolling. It should perhaps be noted here that there is no difference between rolling and forging in their effects on either alumina or silicates.

DIFFERENCES BETWEEN ALUMINA AND OTHER INCLUSIONS

The differences between inclusions of alumina and ordinary slag or silicates in steel are summarized as follows:

Silicate inclusions will generally take a fairly smooth polish in a section prepared for microscopic examination, while alumina is very hard to polish without pitting.

Silicate inclusions are always elongated in the direction of rolling or forging, while alumina particles are not. The groups of particles are of course elongated, but not the particles themselves.

Silicate inclusions are often found of quite large size, as well as very small, while particles of alumina are always small, and do not seem to coalesce into large bodies even when closely grouped together.

These characteristics of alumina inclusions agree with what is known of the properties of alumina. Its great hardness and brittleness would account for the pitting effect; its infusibility would account for the small size of the particles and the tendency not

*From a paper presented, Sept. 14, 1916, at the American Foundrymen's Convention in Cleveland. The author is metallurgist for the Titanium Alloy Mfg. Company, Niagara Falls, N. Y.

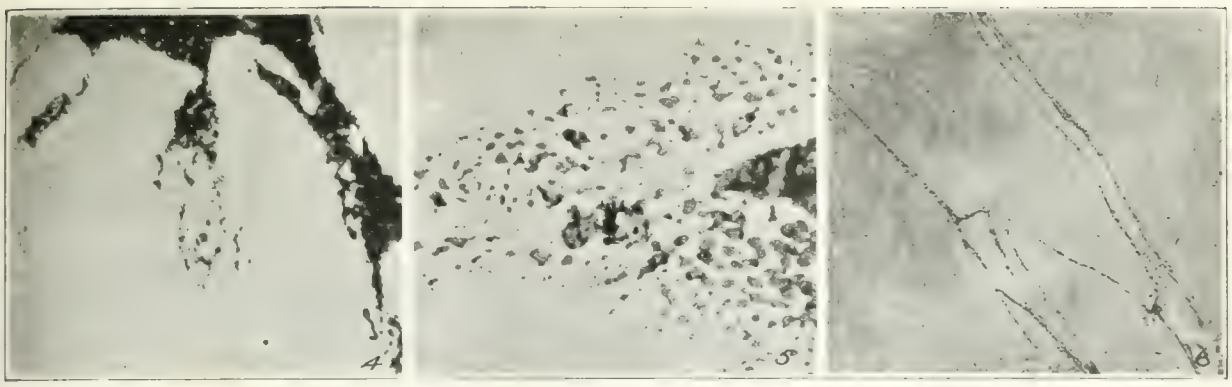


Fig. 4 is a Photomicrograph of Chromium Oxide Embedded in Steel; Fig. 5, of Inclusions in Steel Treated with Nickel Oxide; Fig. 6, of Alumina Particles in the Same Sample as Fig. 1, but Magnified Less

to coalesce; and both of these properties together would account for the particles not being elongated by forging or rolling of the steel in which they are embedded.

It was brought out in my former article that no other substance was known to me that had exactly the same appearance as alumina in a polished steel section, and this statement still holds true. Fig. 3 shows some complex slag inclusions, probably containing titanium, since the steel was treated with oxide of titanium before casting. Evidently it cannot be said that this oxide looks like alumina. Fig. 4 shows oxide of chromium embedded in steel. These resemble alumina slightly in a photograph, but when seen directly through the microscope they may be distinguished by their smooth polish and purplish color. Fig. 5 shows the inclusions in steel treated with nickel oxide. These are probably oxide of iron, and could not be mistaken for alumina. Titanium nitride crystals are easily identified by their angular form and pink or orange color, which is shared by no other substance in steel. The differences between silicates and alumina have been pointed out and sulphides are of course known to nearly all metallographists by their smooth dove-gray appearance. Thus the appearance of alumina is believed to be distinct, and warrants the identification of this substance in steel by metallographic examination.

The author's work in establishing this identification has been based largely on checking the microscopic evidence by chemical analysis. It was stated in the previous article that all samples in which more than the merest trace of alumina was found by analysis were seen to contain the typical inclusions as described above, and those in which alumina was not found by analysis, did not contain these inclusions. Furthermore, those in which more alumina was found by analysis contained more of these inclusions than those in which only a very little was found. These analyses were not made under the author's direction, but in a different laboratory, and neither the chemist nor the metallographist knew each other's results until the work of both on any given sample was completed.

INVESTIGATION BY PROF. SAUVEUR

The well known metallographist, Prof. Albert Sauveur, of Harvard University, has recently completed an independent investigation dealing with the occurrence of alumina inclusions in steel, in the course of which he examined some of the author's specimens as well as some that he himself prepared. His report of this work was published in THE IRON AGE, July 27, 1916. Fig. 6 is a photomicrograph taken by Professor Sauveur of the same sample shown in Fig. 1, but magnified only about 36 diameters. It illustrates well the "filmy" arrangement sometimes assumed by alumina particles, as mentioned by Martens and Heyn, early investigators. The conclusion reached by Professor Sauveur was that "alumina inclusions may be distinguished under the microscope from the other inclusions generally occurring in steel, being characterized by their small size, their dark coloration, and more especially by a complete absence of elongation in the direction of the rolling or forging."

IDENTIFYING ALUMINA IN CAST STEEL

To a foundryman it may appear that the characteristic appearance of alumina inclusions, as compared with slag or silicates, is only exhibited in worked steel, but this is not the case. The identification of alumina in cast steel calls for more care and experience than in worked steel, for small silicates here exist as globules instead of fibers, and might perhaps be mistaken for alumina if carelessly polished and examined. But the very dark color of alumina, its rough appearance and the pitting effect, and the invariably small size of the



Fig. 7 is a Photomicrograph of Alumina Inclusions in Soft Steel Castings; Fig. 8, of a Large Typical Slag Inclusion in Steel Castings; Fig. 9, of a Section Near the Top of an Ingot Where the Alumina Content Was Unusually High



Fig. 10 is a Photomicrograph of Alumina Particles Near the Fracture in a Locomotive Tire; Fig. 11, of Alumina and Sulphide Particles in a Failed Rail; Fig. 12, of a Section of a Blistered Thin Steel Plate

individual particles are sufficiently distinctive characteristics to enable it to be recognized in castings as well as forgings, especially if the observer is careful and already familiar with its appearance. Fig. 7 shows these inclusions in a casting of soft steel, where the presence of free alumina was established by chemical analysis of the insoluble residue from a large sample. Fig. 8 shows a fairly typical though large slag inclusion in another casting, and the sharp outlines of the slag, as compared with the rough appearance of the alumina, are clearly brought out. This slag, moreover, as is often the case, is evidently not homogeneous, but of duplex composition. Fig. 9 shows a section near the extreme top of an ingot, where the alumina content was excessively high. This foamy appearance is rare, but to a certain extent it resembles descriptions by Martens and Heyn. The usual aspect of alumina in cast steel is the same as in forged or rolled steel, with the single exception that when the particles are grouped closely together in certain spots, these groups are of irregular or rounded shape in castings, instead of being elongated into streaks as in a rolled bar.

A similar difficulty to that experienced in castings may be encountered in cold-worked steel, such as wires, tensile test bars after pulling, etc. Here the slag or silicate fibers are usually broken up into fragments and drawn out into streaks, but if carefully polished the fragments of silicates can be recognized by their definite and angular outlines and their smooth surface, while alumina particles will be rougher, probably more or less pitted, and less distinctly outlined.

It is not desired to give the impression that alumina always exists in steel in the form of such large groups of particles as shown in the photomicrographs. Its most usual mode of occurrence is probably in isolated particles, thinly scattered through the metal, and in this form it is practically harmless. The danger in its use as a deoxidizer lies in the fact that with our present knowledge, or under present mill conditions, we can never be sure that the alumina particles will not segregate or gather together in certain parts of the casting or ingot. When this happens the results are dangerously weak streaks. They may not be common, but they nevertheless do occur when aluminum is used, and may cause great harm.

SERVICE FAILURES DUE TO ALUMINA

Fig. 10 shows a group of alumina particles near the starting point of the fracture of a large driving tire on a railroad locomotive. No other defect could be found to explain the failure, except the presence of too much alumina, segregated in spots through the metal. Fig. 11 shows part of a streak of alumina and sulphide particles that caused the top of the head of a rail to break and shell off in the track. The contrast in appearance between alumina and sulphides is well brought out in this photomicrograph. Fig. 12 shows a section of a thin steel plate, on which blisters appeared after hot-rolling. A large streak of alumina was found near the surface of the plate, and part of this streak is shown in the photomicrograph. The black strip along one edge is space beyond the edge of the section, or beyond the surface of the plate, and the other long black spots are sections of blisters, the bright areas being, as in all the other photomicrographs, the polished surface of the steel. The metal evidently tore through the alumina streak, as the blisters are seen to lie in it, and the contraction of the hot interior of the plate after rolling caused the cooler outside layer to bulge outward, forming blisters where the separation or tearing in the alumina had taken place.

All the photomicrographs here reproduced except Fig. 6, taken by Professor Sauveur, were made at a magnification of 200 diameters, and no etching reagent was used.

A New Virginia Manganese-Ore Company

The Consolidated Manganese Corporation, recently organized, has taken over a Virginia manganese-ore property, and is mining and shipping high grade ore. The mine has been known as the Piedmont or Meyers mine, located about 6 miles east of Lynchburg, Va. When formerly operated it had yielded 5052 tons from one shaft, with a total output of about 30,000 tons of washed ore. The new company has already shipped 750 to 1000 tons of ore averaging from 45 to 55 per cent manganese, 3 per cent iron, 7 to 8 per cent silica and 0.16 per cent phosphorus, which compares very favorably with the product of Brazilian or Indian mines. It is planned to increase the output to 1000 to 1500 tons per month. New York parties are back of the enterprise. Van Ness Heermance is president and H. T. Helver, general manager. Offices will soon be established in New York. C. M. Weld, 60 Broadway, New York, formerly associated with the Tata Iron & Steel Company, Sakchi, India, as a mining engineer, is consulting engineer in charge of the mines for the new company. The Matthew Addy Company is sales agent.

The Bridgeport Housing Company, Bridgeport, Conn., which has been incorporated with a capital stock of $1,000,000, has a list of officers and a board of directors composed of some of the largest industrial and financial leaders in the city. The company purposes building at least 1000 houses now badly needed. Frederick C. Blanchard, for the past 10 years manager of the Ashcroft Mfg. Company, and previously production manager of the Fort Wayne works of the General Electric Company, has been selected as manager of the new enterprise.

NOVEL SHOP RESTAURANT

Hundreds Are Served in a Short Time by a Mechanical Device Which Dispenses with Waiters

The problem of rapidly serving several hundred employees with good meals in a company restaurant without the assistance of waiters appears to have been solved by a system recently installed by Endicott, Johnson & Co. at one of their large factories at Johnson City, N. Y., a suburb of Binghamton. In this restaurant a hot lunch—it may well be called a dinner—is sold for 15 cents. The excellence of the food might be dwelt on, but it is the equipment of the place and the mechanical arrangements for facilitating service to which particular interest attaches.

To the restaurant and its appurtenances a three-story building, 75 x 100 ft., is given up exclusively. The first floor is devoted to the storerooms, refrigerating plant, cold storage, bakery and kitchens, all supplied with modern machinery. On the second floor is the dining room with seating capacity for 600 persons at one time. The employees enter this room by passing over a bridge from the factory; then turning to the right walk in a single line between the wall and a railing constructed of pipe. At the end of the passageway, which serves to keep them in line, they purchase a ticket from a cashier who operates a ticket machine. From this point there stretches across the room for a distance of 45 ft. a cotton belt conveyor electrically driven, carried on wooden rollers spaced 12 in. apart. As each employee approaches the moving belt he picks up an aluminum tray, 12 x 19 in., on which an attendant places bread or biscuits. The employee then deposits in a box the ticket he purchased and places his tray on the belt. From that moment he must keep moving at the same rate as the tray. Parallel with the conveyor and immediately adjoining it, opposite the line of workers, as shown, is a long table on which attendants place dishes of food as fast as others are removed. For the hot dishes there are steam tables.

As the employee walks along, he first picks up a plate containing meat and potatoes and places it on his tray, then a vegetable, then a knife, fork and spoon, pie and ice cream, mug of coffee, bottle of milk, or both, glass of water—he is not stinted in anything.

Once out of the railing inclosed gangway, the employee is free to go to whatever table he chooses where there is room, though he is requested to go to the rear of the room if possible. When a person is through eating he leaves his tray and makes his way to the exit. Boys gather up the trays with their burden of dishes and place them on wheeled trucks; these in turn are taken by elevator to the floor below for washing, which is done by machine.

Before the belt conveyor was installed trouble and delay resulted from the habit of some of the men and women in hovering over the dishes to pick out what to them looked best or largest. One or two fastidious persons would delay scores of others waiting to get their food. Again, trays were carried unevenly, inasmuch as only one hand was available for the purpose a large part of the time, and the falling of dishes and their contents was almost unavoidable. All of these troubles disappeared with the use of the belt and the consequent livelier movement of the line. The record achieved by the system is the serving of 840 employees in 45 minutes, although in the course of a day many more are fed. The company operates two restaurants and at Endicott a third is building. The two restaurants in operation prepare food for five of the six factories



One end of company restaurant of Endicott, Johnson & Co., Johnson City, N. Y., showing belt conveyor on which employees place aluminum trays, then passing in line before the long serving table, picking up their portions and placing them on the trays as they pass. When a tray is filled the employee goes to one of the tables in the same room, of which there are sufficient to seat 600 persons at a time. Several hundred are served in 45 minutes

of the company. Of the 12,000 employees, 4000 are cared for at breakfast, dinner and supper, for the restaurant which has been described is open from 6.15 a. m. to 5.30 p. m. In its kitchens are prepared daily 2000 sandwiches which are sold to piece-workers by boys who go through the various shops. Officers and department heads share the same food and the same tables in the restaurant. On the third floor of the building is a lunch counter, soon to be extended around three sides of the room, for those who prefer that mode of service.

It is admitted by the management that the meals are sold at less than cost, but it is sufficiently satisfied with the results to go ahead with extensions of the idea. George F. Johnson and other members of the company assert their belief that their people are entitled to good hot meals, and to one who has surveyed the situation there can be no question that the net result is more contented and more efficient workers. Only praise for the company and its welfare methods is heard.

Electric fans are numerous throughout the shops, and a remark concerning them by a member of the company illustrates its attitude. He said: "They have fans in saloons, where men don't work; why should they not be in places where men do work?" Over the fans are signs saying that they are to be touched only by the electrician or foremen.

The company maintains large and excellently equipped playgrounds for the youngsters of the neighborhood, a dozen or more tennis courts and a huge swimming pool, all of which are illuminated at night; also a public park and ball park, all carefully policed. A fire department with motor-driven apparatus is a feature. Bicycles and many other articles are sold to the employees at cost and on easy payments. Band concerts are given at three places several times a week.

The shops are non-union. George F. Johnson is known as a man of few words. It is related that a short time ago a committee of employees, inspired by outside agitators, went to Mr. Johnson and said they wanted to organize a union. He replied he had all the money he needed, and that when they organized for protection they did not need he would shut down the factory. The matter went no further.

July Iron and Steel Exports and Imports

Some Falling Off in Exports as Compared with Previous Months of Heavy Trade —Ferromanganese Imports Now Shown

WASHINGTON, D. C., Sept. 11, 1916.—The official statistics of the exports of iron and steel from the United States in July, 1916, will suggest to many minds that the high-water mark of the big war boom has been reached and the downward movement begun. Moderate declines are noted in both values and quantities of the principal classes of products as compared with May and June. In view of the fact, however, that the month consisted of but 25 official working days, and that transportation, especially of export goods, was more or less interrupted by embargoes, formal and informal, the decreases noted are far from conclusive evidence that the export movement is on the down grade.

The total shipments of iron and steel products in July, on a basis of values, rose 100 per cent as compared with the same month of 1915, but declined 7.7 per cent as compared with the banner record of June. Tonnage commodities gained 35 per cent over July, 1915, but decreased 8 per cent as compared with May of this year. Shipments of machinery rose 68 per cent over July, 1915, but lost 4½ per cent as compared with May, 1916. Exports of machine tools gained 100 per cent over July, 1915, but lost 21 per cent as compared with the phenomenal total of May, 1916, when all records were shattered.

Figures for the seven months of 1916, as compared with the corresponding period of 1915, are especially significant, as the depressed period immediately following the outbreak of the war is eliminated from the comparison. The total shipments of iron and steel for the seven months of 1916 gained 153 per cent over 1915 and 145 per cent over the record total for the same period of 1913. Tonnage commodities gained 84 per cent over the corresponding months of 1915, which, in turn, represented a large increase over any previous comparable period. Exports of machinery recorded an 81 per cent rise over the seven months of 1915 and a gain of 60 per cent over the high record of 1913. Machine tools scored a rise of 100 per cent over the seven months of 1915, which constituted the record for this period.

The value of all shipments of iron and steel products in July, 1916, was $70,345,162, as compared with $35,891,575 for the same month of 1915, and $16,737,552 for July, 1914. The high record for exports of iron and steel was made in June of this year, when the total was $76,257,884. For the seven months of 1916 the total was $442,240,120, as compared with $174,970,645 for the same period of 1915, and $179,703,554, the record for seven months, which was made in 1913.

EXPORTS OF TONNAGE IRON AND STEEL

The exports of iron and steel for which quantities are given aggregated 496,624 gross tons in July, 1916, as compared with 368,893 tons in July, 1915. The record for these exports was made in May of this year, when the total was 540,591 gross tons. The total for the seven months of 1916 was 3,116,234 gross tons, as compared with 1,676,485 tons in 1915.

The following table shows the exports of tonnage iron and steel for July and for the seven months ended July, 1916, as compared with 1915:

Exports of Iron and Steel

	Gross Tons			
	July		Seven Months	
	1915	1916	1915	1916
Pig iron	21,589	28,718	109,040	178,118
Scrap	728	4,788	21,375	103,684
Bar iron	6,712	6,934	16,038	47,038
Wire rods	16,008	14,598	91,072	96,133
Steel bars	49,524	78,947	219,371	445,256
Billets, ingots and blooms, n.e.s.	67,121	129,278	263,985	727,644
Bolts and nuts	3,010	2,286	10,120	16,704
Hoops and bands	2,142	3,953	12,213	25,941
Horseshoes	2,462	841	10,193	5,834
Cut nails	568	630	2,265	2,517
Railroad spikes	1,090	1,495	3,642	17,195
Wire nails	10,514	12,328	45,604	84,532
All other nails including tacks	777	869	4,442	4,918
Cast-iron pipes and fittings	3,872	6,466	27,844	36,025
Wrought pipes and fittings	11,484	14,420	72,463	71,060
Radiators and cast-iron boilers	252	193	1,186	1,198
Steel rails	31,802	21,822	126,394	262,953
Galvanized iron sheets and plates	12,373	7,138	48,533	46,596
All other iron sheets and plates	3,094	2,941	9,594	26,527
Steel plates	31,871	21,778	108,300	145,812
Steel sheets	9,074	7,323	57,366	59,574
Structural iron and steel	26,151	26,583	116,348	154,569
Tin and terne plates	13,845	18,742	60,855	141,599
Barb wire	29,986	47,474	119,551	252,672
All other wire	22,574	36,079	121,791	162,135
Total	368,893	496,624	1,676,485	3,116,234

EXPORTS OF MACHINERY

Exports of machinery in July, 1916, were valued at $18,971,052, as compared with $11,412,623 for the same month of 1915, and $8,060,614 in July, 1914. Shipments of metal-working machinery aggregated $7,814,691 in July, as compared with $3,872,358 for the same month a year ago, and $9,935,806, the high record of May of the present year. Exports of machinery of all kinds for the seven months ended July, 1916, were valued at $123,406,983, as compared with $67,959,822 in 1915, and $76,830,444, the record total of 1913.

Details of the exports of machinery for July, 1915 and 1916, and for the two seven-months' periods, are given in an accompanying table.

IMPORTS OF IRON AND STEEL

Imports of tonnage iron and steel in July amounted to 14,773 gross tons, as compared with 20,857 tons in 1915. Imports for the seven months of 1916 were 145,309 gross tons, as compared with 124,636 tons for the same period of 1915. The following table shows the imports of tonnage commodities for July, 1916, and for the seven months ended July, as compared with 1915:

Imports of Iron and Steel

	Gross Tons			
	July		Seven Months	
	1915	1916	1915	1916
Ferromanganese	———	5,341	———	40,162
Ferrosilicon	234	487	3,546	4,042
All other pig iron	11,943	606	41,025	22,975
Scrap	3,250	4,615	16,894	34,289
Bar iron	1,136	987	5,222	4,289
Structural iron and steel	108	7	1,027	1,012
Steel billets without alloys	62	145	1,035	8,031
All other steel billets	753	1,202	6,512	9,007
Steel rails	3,017	546	43,572	16,520
Sheets and plates	79	192	692	1,094
Tin and terne plates	70	150	2,139	671
Wire rods	205	495	2,972	2,666
Total	20,857	14,773	124,636	145,309

The correspondent of THE IRON AGE recently requested the Bureau of Foreign and Domestic Commerce to cause instructions to be sent to the various ports to segregate imports of ferromanganese in the customs returns. Beginning with the new fiscal year, this is being done, the imports for July appearing for the first time in the above table. W. L. C.

Export licenses for the shipment to the United States of solvent naphtha containing less than 5 per cent toluol are announced as subject to consideration by the British War Trade Department, according to a cablegram in *Commerce Reports*.

Exports of Railroad Material

Exports of railroad material in the fiscal year ended June 30, 1916, as compared with those for the fiscal year 1914, are given by the *Railway Age Gazette* as follows:

	Fiscal Year	
	1916	1914
Railroad cars	$26,660,000	$11,178,000
Rails for railroads	17,687,000	10,259,000
Locomotives, steam	12,666,000	3,692,000
Locomotives, electric	4[illegible],000	437,000
Engine parts (all kinds)	7,274,000	3,257,000
Switches and other track materials	5,262,000	2,534,000
Ties	2,435,000	2,065,000
Railroad spikes	1,399,000	746,000
Carwheels	742,000	414,000
Telegraph instruments	149,000	137,000
Total	$74,729,000	$34,919,000

Until very recently the foremost foreign markets for our freight cars have been Canada and Cuba; for locomotives, Cuba, Canada and Brazil, and for steel rails, Canada, Australia, Japan, Brazil, Argentina and Cuba. At present we are sending large quantities of freight cars and other material to Russia and important supplies to France and Spain as well as to the former customers. In June alone exports of freight cars were valued at $1,613,000, of which $1,086,000 worth went to Russia. Steel rails valued at $1,730,000 went abroad in June, those to France alone amounting to $1,188,000. Of the $721,000 worth of locomotives exported, $272,000 worth went to Spain.

Exports of Machinery

	July		Seven Months	
	1915	1916	1915	1916
Adding machines	$68,705	$108,662	$268,730	$827,802
Air-compressing machinery	23,987	87,489	247,600	381,865
Brewers' machinery	10,464	791	52,656	11,282
Cash registers	156,254	74,559	783,396	871,821
Parts of	14,627	22,600	62,987	87,534
Cotton gins	5,592	4,606	29,490	39,344
Cream separators	31,200	26,375	156,870	320,863
Elevators and elevator machinery	90,608	155,527	468,132	948,364
Electric locomotives	———	13,176	134,238	373,479
Gas engines, stationary	30,395	30,690	316,761	211,946
Gasoline engines	321,755	981,345	3,081,395	9,224,071
Steam engines	372,966	1,126,375	1,933,113	5,697,812
All other engines	57,330	197,511	557,791	3,109,225
Parts of	644,606	875,130	2,363,865	5,075,839
Laundry machinery, power	31,143	18,714	192,233	170,908
All other	23,433	16,591	136,486	119,651
Lawn mowers	18,180	15,705	230,699	147,307
Metal-working machinery (including metal-working tools)	3,872,358	7,814,691	23,962,815	47,182,401
Meters, gas and water	22,135	26,166	157,079	204,992
Milling machinery (flour and grist)	295,451	152,040	1,323,034	1,514,683
Mining machinery, oil well	126,567	355,190	781,849	1,122,709
All other	569,467	651,537	2,924,528	3,519,661
Paper-mill machinery	128,455	76,007	520,632	417,471
Printing presses	163,781	114,042	889,446	1,052,668
Pumps and pumping machinery	277,986	437,277	1,581,692	2,995,688
Refrigerating and ice-making machinery	74,795	111,445	498,736	419,762
Sewing machines	572,925	398,068	3,683,751	3,222,701
Shoe machinery	177,287	72,680	873,774	583,926
Sugar-mill machinery	245,886	448,428	1,127,006	1,954,068
Textile machinery	180,999	333,511	1,019,724	1,995,143
Typesetting machines	34,119	130,363	236,202	737,902
Typewriting machines	672,730	742,879	3,979,272	5,899,249
Windmills	129,640	78,605	490,945	678,752
Wood-working machinery, saw mill	20,239	30,938	212,053	244,027
All other	65,630	52,002	446,393	483,164
All other machinery, and parts of	1,880,928	3,189,337	12,234,649	21,558,897
Total	$11,412,623	$18,971,052	$67,959,822	$123,406,983

Iron-Ore Imports and Exports

Iron-ore imports to the United States in June were 134,154 gross tons, bringing the total for the fiscal year ended June 30 to 1,425,717 tons. To June 30, 1915, they were 1,196,077 tons, and to June 30, 1914, they were 2,167,662 tons. The imports for the first half of this year have been at the rate of 104,334 tons per month, against 111,773 tons per month for all of 1915. The receipts of 1,425,717 tons for the last fiscal year came as follows: 94,366 tons from Spain, 223,559 tons from Sweden, 142,570 tons from Canada, 808,859 tons from Cuba, and 156,363 tons from other countries.

Exports of iron ore in June were 203,558 tons, with the total for the fiscal year ended June 30, 1916, at 924,020 tons. In 1915 the total iron-ore exports were 708,641 tons, with 551,618 tons in 1914, and 1,042,151 tons in 1913, showing the present rate to be large.

Russia's total copper output in 1915, according to the Central War Industrial Committee, was 1,587,155 poods (1 pood = 36 lb.) against 1,949,721 poods in 1914 and 2,095,289 poods in 1913. The Ural works produced 1,043,892 poods of the 1915 output.

New Developments in Foundry Equipment

Larger Use of Completely Power-Operated Molding Machines—Other Features of the Exhibition at the Cleveland Convention

The annual exhibit of foundry equipment being held in connection with the foundrymen's conventions at Cleveland this week, the first of these exhibitions to be conducted under the auspices of the American Foundrymen's Association and Institute of Metals, is the largest and in many respects the best ever held. It occupies more floor space in the Cleveland Coliseum and the temporary annex than has been taken up by any of its predecessors. All the operating exhibits of molding machines are housed in the annex. However, two or three companies decided not to have a working exhibit, in view of the fact that they could show their machines in operation in various Cleveland foundries, and these have space in the main exhibition hall. There were a good many delays in shipments, due to the congestion following the lifting of the railroad strike embargo, and great difficulty was experienced in getting the exhibits in shape for the opening on Tuesday. Many shipments were sent by express.

While some individual exhibits of molding machines and foundry supplies are not as large as usual, there are more molding-machine exhibitors than ever, and more molding machines are shown than on any like occasion heretofore. Builders of molding machines have followed the policy of limiting somewhat their individual exhibits and showing only their very best equipment.

TENDENCY AWAY FROM HAND SQUEEZERS

The molding-machine exhibit is particularly interesting because of the number of new machines and of old machines with improved features that are shown. None of the new machines shows any radical change in construction. The exhibit as a whole indicates a tendency to use power, jolt and roll-over machines in preference to hand squeezers. In these times of high wages and scarcity of labor, together with the objection of molders to doing a great deal of hand work, both the molding-machine makers and foundrymen are turning their attention to complete power-operated machines. Improvements in old machines also include leveling and locking devices and various refinements, all in the line of increasing the efficiency and rapidity of the machine and improving the quality of the work.

The machine-tool display is larger than at Atlantic City last year, but the conditions of a year ago, when machine-tool manufacturers were so crowded with work that they had no machines that could be spared for exhibition purposes, have not changed materially, and the representation in this department was, therefore, smaller than it would otherwise have been.

The showing of sand-blast equipment is highly creditable and interesting, and would have been larger had not some of the manufacturers been so crowded with work.

An important feature is the display of oxy-acetylene welding and cutting equipment. There were five of these exhibits, as compared with two at previous foundry shows.

Had the management known in advance that there would be so many exhibitors of safety devices, a separate section would have been set aside for them. For the first time there was a display by the Committee of Safety of the American Foundrymen's Association, mainly of charts loaned by the National Safety Council.

FEATURES OF NEW MACHINES

A new jolt stripping plate and squeezing machine is presented by the Osborn Mfg. Company, Cleveland. A feature is that its head runs on a sliding track, on ball-bearing wheels, permitting it to be pulled up to a squeezing position and then pushed back out of the way so that the mold can be removed, and thus save hand work. This is designed for small work, particularly for flywheels, gear cases, and other automobile castings. Because of the tendency to use small jolt machines instead of hand types of squeezers for small work, this company has brought out a new roll-over jolt machine, which is shown among many others. This has previously been built in larger sizes. It rolls over, jolts and draws by power, and is designed for small, deep work such as pistons, crank cases and gear cases. The two new machines displayed are of the portable type, but they are also built stationary.

The E. H. Mumford Company, Elizabeth, N. J., has a group of molding machines, including a new jolt, roll over, draw machine, designed for a large range of work, with 16-in. draw, taking 37 x 48-in. flasks, ranging in depth from 8 to 26 in., and having a capacity for castings up to 3000 lb. The table is 30 x 36 in., being large for the size of the machine to insure an unusually good support for the pattern board. The machine is equipped with a Mumford standard jolt rammer, and has a number of new features, including a locking device for securing the pattern board to the roll-over arms and a new automatic air-operated leveling device. All operations are controlled from one point, making it unnecessary for the operator to move from his position. When the flask is level it is locked into position by air. This machine also has air adjustments for different centers of gravity for flasks of different weight. The company has added a jolt attachment to its 10-in. Mumford high-tension squeezer, which is shown for the first time.

A new jolt stripping machine is shown by the Arcade Mfg. Company, Freeport, Ill. The plate is stripped away from the pattern in the usual way, and there is an automatic stripping of the plate from the flask back to its former position. This company shows its line of air squeezers and power, roll-over jolt machines with new features. The air squeezers have an improvement in their valve system and in their attachments, making them easier to operate. The power roll-over jolt machine has been provided with a self-adjusting leveling device on the drawing cylinder, and this is held firmly in place by the mold when the latter rests upon it. The Arcade Company is also showing its Modern molding machine with an improved table that swings the mold around to the side of the machine instead of coming out in front; thus another mold can be made on the machine while cores are being set in the completed mold.

Henry E. Pridmore, Chicago, is showing a 30-in. power roll-over machine in which oil, contained in a reservoir surrounding the cylinder, is used as a cushion to secure a more even draw than would be possible with air alone. The speed is controlled by a ¼-in. valve oil outlet from the cylinder on the drawing device. All of the Pridmore power roll-over machines are now being so equipped. Another new feature is that the working parts of the electric jarring equipment run in an oil bath. In this exhibit is also shown a 24-in. power roll-over machine equipped with a new air-locking device for locking the pattern plates.

The Midland Machine Company, Detroit, is showing its 6-in. jolt-ramming, roll-over, pattern-drawing molding machine in a remodeled form, having the working parts housed and with various refinements of construction. With this machine is shown a newly designed special car for lifting out the molds and drawing them to the foundry floor.

A new combination jar ram, roll-over, pattern-drawing machine is shown by the U. S. Molding Machine Company, Cleveland. It draws the pattern direct from the sand with a counterbalanced air cylinder instead

of lowering the mold, making, it is claimed, a cleaner draw. The same principle is adopted in another new machine, a jar squeezing, roll-over, pattern-drawing machine exhibited by this company, being practically the same as the one first referred to, except that it has the squeezer attachment.

The Obermayer Company, Chicago, is showing a hand-power portable stripping plate machine of simple design, the important feature of which is that the table, when at its full height, cannot be pushed down by its load, being held firmly in its position until lowered with a lever.

CLEANING AND GRINDING EQUIPMENT

The exhibit of the Sly Mfg. Company, Cleveland, is very complete. In addition to its cleaning and sand-blast mills, the company is showing a new core oven with improved features. It has drawers that run on roller bearings, with the rollers running on T irons instead of angle irons, and the trolleys also run on roller bearings. The wide drawers are arranged so that L-iron partitions can be placed in them, making double drawers for use when baking small cores. Each drawer is provided with a clock dial.

The Macleod Company, Cincinnati, shows a new sand-blast tumbling barrel with a tapered barrel designed to provide a double tumble to the castings, which are thrown backward and forward, in addition to the regular tumbling motion produced in an ordinary type of machine.

In the disk-grinding display of the Gardner Machine Company, Beloit, Wis., several machines are shown with modifications in design. The most interesting new feature is a horizontal disk grinder equipped with a quarter-ton overhanging hoist. Another feature is the dust hood which covers the entire wheel except a small space where the work is located, so that the machine can be operated with practically no dust escaping into the room. A pattern-making machine now equipped with a gear instead of a friction drive is also shown. In order to insure the arrival of its exhibits on time, the Gardner Company shipped its entire display, weighing 23,760 lb., from the factory by express.

The first exhibit of their wide-face, ring-wheel, disk-grinding machine is made by Charles H. Besly & Co., Chicago. This machine has a wide-faced ring wheel at one end of the spindle and a helmet spiral steel disk at the other end, the latter for finishing work. It is designed particularly for flat surfacing work of a heavy nature.

In the machine-tool exhibit, the Cincinnati Pulley Machine Company, Cincinnati, Ohio, is showing a line of high-speed ball-bearing drill presses, one of which is a new sensitive drilling machine of large capacity. It has a capacity for drilling holes up to 1⅛ in. in diameter. It is equipped with a round swinging table and flat working base, and is built with power or plain feed.

The present high cost of crucibles has caused an added interest in non-crucible melting furnaces for brass and non-ferrous metal alloys. Two furnaces of this type, one a simplex and the other a double-chamber furnace, are shown by the Monarch Engineering & Mfg. Company, Baltimore, in addition to its regular exhibit of melting furnaces and core ovens.

Two exhibits in addition to those listed in THE IRON AGE of Sept. 7 should be mentioned. The Phoenix Mfg. Company of Eau Claire, Wis., is represented by W. L. Harrison with an exhibit of turret lathe heads and other machine-tool equipments. William Demmler & Bros., Kewanee, Ill., are exhibiting a Hewlett-Demmler core machine at booth 349 in the Annex, with H. L. Demmler in charge. The machine is adapted to the making of irregular-shaped cores.

The name of the Sand Mixing Machine Company, 52 Vanderbilt Avenue, New York, which was listed in connection with the American Foundry Equipment Company, should have appeared separately in THE IRON AGE'S enumeration of Sept. 7 of firms exhibiting at the convention. The Sand Mixing Machine Company has been an exhibitor at eight consecutive conventions.

The Wm. H. Nicholls Company, Brooklyn, N. Y., is showing a new combination jolt and power molding machine with automatic stripping plate and split pattern plate device. This machine was designed for molding copper bands and is also used for molding malleable and gray iron fittings and can be used for making other molds in quantities.

Another Quebec Bridge Disaster

On Monday, Sept. 11, in the presence of more than 50,000 persons, massed along both banks of the St. Lawrence River, the last span of the new Quebec Bridge, weighing more than 5000 tons, while being hoisted from pontoons to its abutments, was raised too fast by the jack at one corner, buckled in the middle, collapsed, and sank 200 ft. to the river's bottom. A multitude of small craft that held crowds of sightseers started the work of rescuing as many as possible of the 90 workmen who had been dashed into the river when the collapse came. Of these, 11 are known to be dead, either from drowning or injury, and the bodies of more, it is feared, may be found later. A score of injured survivors are in hospitals.

The scene of the disaster is the same spot where, on Aug. 29, 1907, a bridge structure, different in form but designed to be of nearly the same magnitude, collapsed with the loss of 70 lives. The new bridge was being built by the St. Lawrence Bridge Company. The loss in material is estimated at $600,000. The bridge was to connect Quebec with the opposite bank of the St. Lawrence River, and to carry the traffic of eight railroads, cutting off 200 miles of the rail distance from Halifax to western Canada.

The span which fell was 640 ft. long, and was to be the keystone of the whole work, which, when completed, was to have been 3239 ft. from shore to shore. It was built on pontoons, was floated to its place, and specially built 8000-ton hydraulic jacks were designed to raise the completed span to its height.

Slight Increase in Steel Corporation's Orders

The United States Steel Corporation's statement for August showed an increase of 66,765 tons in unfilled orders on its books. The total at the close of business Aug. 31 was 9,660,357 tons. This is next to the largest ever reported, the unfilled orders as of May 31, 1916, having been 9,937,798 tons. The showing a year ago, or on Aug. 31, 1915, was only 4,908,445 tons. The following table shows the unfilled tonnage for each month from January, 1913:

	1916	1915	1914	1913
January	7,952,767	4,248,571	4,613,680	7,827,568
February	8,568,966	4,345,371	5,026,440	7,656,714
March	9,331,001	4,255,749	4,653,825	7,468,956
April	9,829,641	4,162,244	4,277,068	6,978,782
May	9,937,798	4,264,598	3,998,160	6,324,322
June	9,640,458	4,678,196	4,032,857	5,807,317
July	9,593,592	4,928,540	4,158,589	5,390,356
August	9,660,357	4,908,445	4,215,331	5,223,168
September	.....	5,317,618	2,787,667	5,003,785
October	.....	6,165,452	3,461,097	4,513,767
November	.....	7,189,489	3,324,592	4,396,347
December	.....	7,806,220	3,836,643	4,282,108

Iron and Steel Institute Fall Meeting

The annual fall meeting of the Iron and Steel Institute will be held in London, England, Sept. 21 and 22, 1916. The following papers will be presented:

"Some Properties of Ingots," by H. Brearley.

"Influence of Heat-Treatment on the Thermo-Electric Properties and Specific Resistance of Carbon Steels," by Prof. E. D. Campbell.

"Heat Treatment of Eutectoid Carbon Steels," by Dr. H. M. Howe and A. G. Levy.

"Steel Ingot Defects," by J. N. Kilby.

"Manganese Ores of the Bukowina, Austria," by Herbert K. Scott.

"Influence of Elements on the Properties of Steel," by Dr. J. E. Stead, F.R.S.

"Notes on (*a*) Nickel Steel Scale. (*b*) On the Reduction of Solid Nickel and Copper Oxides by Solid Iron. (*c*) On Effect of Blast Furnace Gases on Wrought Iron," by Dr. J. E. Stead, F.R.S.

"Use of Meteoric Iron by Primitive Man," by G. F. Zimmer.

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Steel Delivery Problems

Three months ago there was some disposition to question whether the year ahead would show the same strain upon the steel mills of the United States as marked the first six months of 1916. In the efforts then made to read the signs of the next 12 months, here and there evidence appeared that some buyers of steel had provided liberally against future wants. Such buyers were not receiving the maximum amounts on their 1916 contracts and at the same time they were holding off from contracting for the first half of 1917. The situation in some of its aspects was puzzling, various distributers and other buyers being keenly interested in knowing what would be done with certain contracts on which mill deliveries were far in arrears.

Reviews of the steel market have pointed out in the past six weeks that the whole attitude of consumers toward the market has changed. The continuance of heavy purchases from abroad, with deliveries running six months and nine months ahead, and the appearance of large export inquiry for steel for other than war purposes seems to have removed all question as to the full operation of the steel capacity of the country for many months to come, and has centered attention on the buying of steel at present contract prices for delivery running well into 1917.

Nothing has so impressed students of the present remarkable situation in the steel trade with the strength of the producers' position as the measures the mills have adopted to secure a proper distribution of their output. In previous booms buyers ordered heavily ahead and then reckoned that at some time, though it might be distant, the mills would reach these orders and from then on the buyers' course would be smooth. The difference now is striking. The avalanche of orders is so great that some mills long ago gave up trying to bring up arrears. It has not availed a buyer greatly to point to an order with a June or July date, 1915. Age seems to be no longer the basis of shipments.

Two reasons are given for this new policy of some of the leading mills. One is that if they attempted to follow the old order and take care of buyers in rotation they would never catch up. The other is that a good many jobbers as well as large consumers placed at the lower prices of last year heavy orders that were in a measure speculative and looked to large profits from the advances that seemed certain to come. There was an effort at censorship by sellers. Orders coming in were checked up carefully with the amounts placed in previous years, due allowance being made for plant extensions which called for more steel. Where the tonnage offered seemed excessive, the producers took on what they considered would meet the real wants of their consumers in the period for which contracts were sought. It is now argued by those who exercised this rigid censorship of orders last year that if some particularly pushing distributers and manufacturing consumers had been given all they wanted, much of the supply to-day would be in the hands of a comparatively small number of buyers while many who had been less forward in pressing their claims would have no steel at all.

There have been recent evidences that the policy of important steel interests is to give their customers what they actually need to have. Apparently they have succeeded in this aim; at least it is many months since there have been reports of manufacturing users of steel having to close down for lack of material. Previous records of dealings between consumer and mill have determined the treatment various users have received. Those who have been opportunists and somewhat inconstant in the placing of their orders are probably having the most difficulty. To-day the argument that his plant actually needs the steel to keep going is generally more effective in the case of a regular consumer than the offer of a premium by one not so regular.

The present regime is trying to buyers who relied on the former vogue and after placing large orders with the steel mills made engagements with their own customers which curtailed deliveries of steel have seriously upset. Some of their experiences have quite effectually disposed of the belief at one time well grounded that all orders on mill books would eventually be reached and full deliveries be made in sequence. The work of order departments is not ordinarily the best appreciated service of the mills, but there are many evidences that in these trying times some of them have contributed most creditably to the solution of unprecedented problems of delivery.

New Steel Capacity

At the beginning of 1916 comment was directed in the steel trade to the large amount of open-hearth steel capacity then under construction, and its effect upon the market in the year just ahead was a subject of discussion. This rather turned on the small amount of blast-furnace capacity under construction, in comparison with steel-making capacity, and out of this came an argument for a stronger pig-iron market than had been seen in many months. That expectation was realized, though not to the extent looked for by the prophets of $25 pig iron in 1916.

As the year advanced various portions of the open-hearth additions were started up. From time to time attention was called to the possible effect of these new operations in relieving the tensity in steel and in bringing the supply into closer relation with the demand. There has been every incentive to producers to hurry the new furnaces into commission. Prices have been highly profitable and old and new capacity has been crowded to the utmost. But the outstanding fact in nearly nine months of increase in producing capacity is that steel prices are now higher than at the beginning of the year—an unmistakable indication of the expanding demand for American steel.

It will be of interest to summarize the new open-hearth steel plant that has been actually started up since Jan. 1, with an estimate of the addition thus made to the annual capacity in terms of ingots. In the list below the principal new plants and extensions are given, no effort being made to present the facts as to new steel castings capacity.

Pittsburgh Steel Company, Monessen, Pa.—Two 60-ton furnaces, started in August, representing 80,000 tons a year. Two others now being finished, to start in October.

Carnegie Steel Company—Three 60-ton open-hearth furnaces at Ohio works, Youngstown, Ohio. Increase, 135,000 tons a year. Two 60-ton furnaces at Clairton, Pa., already started which with 1200-ton mixer completed this month, give 150,000 tons a year additional.

American Steel & Wire Company—Two new 25-ton converters just completed at Donora, Pa., to be operated in duplexing, adding 300,000 tons a year to open-hearth output.

Cambria Steel Company, Johnstown, Pa.—Two 75-ton open-hearth furnaces, ready this month. Increase, 110,000 tons a year.

Brier Hill Steel Company, Youngstown, Ohio.—Two 100-ton open-hearth furnaces. Increase, 110,000 tons a year.

Youngstown Sheet & Tube Company, Youngstown, Ohio.—Three 100-ton open-hearth furnaces. Increase, 210,000 tons a year.

Jones & Laughlin Steel Company, Pittsburgh.—At South Side works, one 30-ton open-hearth furnace. Increase, 20,000 tons a year.

Pittsburgh Seamless Tube Company, West Economy, Pa.—Two 30-ton open-hearth furnaces. Increase, 40,000 tons a year.

United Steel Company, Canton, Ohio.—Four 75-ton fixed open-hearth furnaces and one 20-ton tilting furnace. Increase, 180,000 tons a year.

Central Steel Company, Massillon, Ohio.—Four 50-ton open-hearth furnaces. Increase, 140,000 tons a year.

Corrigan, McKinney & Co., Cleveland.—New plant of eight 75-ton open-hearth furnaces. Capacity, 325,000 tons a year.

Inland Steel Company, Indiana Harbor, Ind.—Four 75-ton open-hearth furnaces. Increase, 160,000 tons a year.

Bethlehem Steel Company, South Bethlehem, Pa.—Four 75-ton open-hearth furnaces at Lehigh plant. Increase, 160,000 tons a year.

Midvale Steel & Ordnance Company, Worth Brothers plant at Coatesville, Pa.—Six 60-ton open-hearth furnaces. Increase, 210,000 tons a year.

Lackawanna Steel Company, Buffalo, N. Y.—Nos. 21 and 22 open-hearth furnaces. Increase, 90,000 tons a year.

Donner Steel Company, Buffalo, N. Y.—Plant long idle, started since Jan. 1. Capacity, 150,000 tons a year.

Wilmington Steel Company, Wilmington, Del.—Plant long idle, started since Jan. 1. Five open-hearth furnaces, capacity, 100,000 tons a year.

The total is 2,700,000 tons a year of ingots to be rolled into various forms of finished steel. Other open-hearth furnaces capable of producing about 500,000 tons of ingots a year are expected to be ready for operation before the end of the year, which would bring the additions of 1916 up to 3,200,000 tons.

Still greater is the amount of new construction under way that will not be completed until 1917 and in some cases later. A number of the companies named above are building other open-hearth furnaces. The steady procession of announcements of new plans has been astonishing. The great Steel Corporation additions of Bessemer and open-hearth plant in the Chicago district, the new Bessemer and open-hearth construction by independents in the same district, the Bethlehem Steel Company's enormous additions at three plants, the new work at Buffalo, Johnstown, Youngstown, Lorain and in the Pittsburgh district, together give a total of fully 4,000,000 tons that will follow the 3,200,000 tons of 1916, and two-thirds to three-fourths of the 4,000,000 tons is quite certain to come into operation next year. It would not be out of the way to put the additions to the country's active capacity in open-hearth steel between Jan. 1, 1916, and July 1, 1917—eighteen months—at 5,000,000 tons, or a 12½ per cent increase on the 40,000,000-ton rate of production at the beginning of this year. What is most significant is the way these additions are being absorbed without affecting prices or changing a preponderance of demand into a preponderance of supply.

British Steel Companies Prospering

The steel trade of the United States is not alone in its enjoyment of greater profits as a result of the war. Reports of British companies now coming out show that large profits are being realized on that side of the Atlantic. Guest, Keen & Nettlefolds, Ltd., and the Workington Iron & Steel Company, prominent among British manufacturers, have just issued their financial statements for the year ended June 30. The profits of both companies had declined sharply in the two previous years, but the past year wrought a remarkable recovery. The report of the first named company shows profits of £424,480, which is £40,000, or nearly $200,000, higher than the previous year, enabling its reserve fund to be strengthened by $500,000, while a dividend of 15 per cent is paid to the holders of the common stock. In the case of the second company, the profits were £485,419, which is £302,000, or almost $1,500,000, higher than for the previous year and much above anything recorded since the corporation was formed in 1909 by the amalgamation of a number of iron, coal and steel companies. The Workington Company added $1,250,000 to its reserves and paid a dividend on its common stock of 10 per cent, against dividends of 4 per cent in the previous year and 6 per cent in each of the two years prior to that.

It is evident from the showing made by these

companies—and they are probably typical of achievements of British steel companies generally—that the trade restrictions imposed by their government have not been so onerous as to offset the profits made on the greater volume of business forced on them. The steel manufacturers of Great Britain, like their brethren of the United States, have been undoubtedly benefited by the absence of German competition.

Railroad Sliding Scale Suggested

An interesting intimation is given in a circular recently issued by Clark, Childs & Co., bankers and brokers, New York. Referring to the great desirability of an amicable adjustment between railroad managers and railroad labor, the circular proceeds as follows:

> Neither side desires more detailed Government control. Both unions and railroads are managed by reasonable business men. A compromise under which both sides would share in prosperity and adversity is engaging some of the greatest railroad-legal minds. The difficulty is that some roads are weak and some strong. If all had equal resources there could be a sliding scale of wages and profits. As it is, a sliding scale of wages and rates would seem to be a fair proposition.

The suggestion of a sliding scale of wages for railroad labor certainly affords food for thought. If such an adjustment of the labor controversy could be made, railroad managers would be relieved from the recurrence of a demand for higher wages whenever conditions may seem to present to the men a favorable opportunity for exerting pressure. Undoubtedly quite a problem would be encountered in seeking a satisfactory basis on which to build a sliding scale. But perhaps the complications would be no greater than are found in industrial establishments in which the sliding scale for adjusting wages has been introduced for the precise purpose which seems to make it desirable in the railroad field. The main difficulty would of course be to find a basis satisfactory to both sides. If such a basis could be agreed upon, the employees would fully and equitably share in the profits of railroad operations in such prosperous times as are now being enjoyed. They would naturally object to assisting the railroads in enduring the stress of bad times and poor returns, but the scale would have a minimum insuring fair earnings. The business world would hail with great satisfaction such a solution of the railroad wage problem.

The Cincinnati Chamber of Commerce, Cincinnati, Ohio, is conducting a wide-awake foreign trade department under the management of A. S. Wilson. In reaching out for a wider field for Cincinnati products an effort is being made to secure more trade in the Latin countries. An indication of the vigor with which this movement is being pushed is shown by the issue of a 24-page illustrated publication entitled *O Cincinnatian*, which is printed exclusively in the Portuguese language for distribution in Brazil, Portugal and Portuguese possessions.

As illustrating Brazil's financial depression it is reported that the automobiles imported in 1915 numbered 214 and in 1914, 744 as against 3218 in 1913 and 3785 in 1912. Germany and France supplied the bulk before the war. American manufacturers are now making considerable sales.

CORRESPONDENCE

Early Experience with the Open Hearth

To the Editor: In your issue of Aug. 31, 1916, H. H. Campbell, in his interesting article on the "Evolution of American Open-Hearth Practice," says that the first open-hearth furnace in the United States was built at Trenton, N. J., in 1868; one was started in South Boston in 1870, and one in Nashua, N. H., 1873.

It may be of historical interest to your readers to know that at the plant of the Midvale Steel Company, then owned by the William Butcher Steel Works of Philadelphia, a Siemens furnace for melting steel in crucibles was in operation in 1870, and during that same year a Siemens open-hearth furnace was completed, the first heat in which was run in January, 1871. This furnace was first designed to hold 3½ tons. It was afterward enlarged to hold 5, and finally 10 tons.

The experiences of those operating it resemble Mr. Campbell's description. For shop reasons, a ladle holding more than 5 tons could not be used, but an additional ladle of the same size was practicable. The stream from the spout was divided by a "breeches runner" so as to fill the two ladles in about the same time.

G. AERTSEN,
Midvale Steel Company, Assistant to Vice-President.
Philadelphia, Pa., Sept. 5, 1916.

Germany and Russian Manganese Ore

The part played by Germans before the war in the manganese-ore industry of the Caucasus is found in a statement published in the *Bulletin* of the Coal and Iron Exchange at Kharkov, Russia. German companies worked only to a limited extent the large areas of mining lands they had obtained by lease or purchase, but purchased ore from local producers at low fixed prices. Thus the number of producers was constantly diminishing, and the peasants, tempted by German advances and loans, had every inducement to sell their lands. The number of producers declined from 374 in 1906 to 164 in 1913.

The report also states that out of the 16 export firms at Tschiatura only three are Russian, and that the Gelsenkirchen Company alone held in the railroad depots at the beginning of 1914 more than 35 per cent of the manganese ore for export. This company was the principal source of ore for the Krupp Works, and from Jan. 1 to July 13, 1914, it shipped 193,000 tons as compared with 136,000 tons in the first half of 1913.

Sulphate of aluminum is urgently needed by Argentina for clarifying its water supply. It was formerly imported from Germany, but is now difficult to obtain anywhere. American firms are quoting $120 to $185 per ton for it, and the estimated needs for 1917 for the country are placed at 8000 tons. As the result of a protest to the government by the Argentina public health works, a plant to manufacture the compound from native kaolin has been authorized at a cost of $188,000. It is estimated that aluminum sulphate can be manufactured under present conditions at $26 per ton and at $10 per ton less when sulphuric acid falls to normal.

The situation of wage earners after the war is receiving considerable attention in Great Britain. In the report for the second quarter of this year of the Shipconstructors' and Shipwrights' Association, it is stated that "the reward of labor must not be left, as at present, to the operation of supply and demand alone; a minimum wage for all workers must be arranged, and upon that all other charges in the production of anything should be based and built up, and that having been done, labor can join with employers in seeing that wages are maintained and not reduced by sweated and unfair competition from abroad."

Foundrymen's Movement on a New Basis

Opening of the Cleveland Convention—Status of the Association as Incorporated—A Notable Gathering

With an early registration indicating that former attendance records will be broken, the American Foundrymen's Association began its twenty-first annual convention at the Statler Hotel, Cleveland, Ohio, Monday afternoon, Sept. 11. The opening meeting was a joint session with the American Institute of Metals. President R. A. Bull at the outset called attention to the fact that at the last meeting in Cleveland, 10 years ago, the association's membership was less than one-third that of to-day, and that at that Cleveland meeting the foundry exhibitions were started, there being 40 exhibits at that time as compared with 150 this week.

A brief address of welcome was made by L. T. Beeman, director of public welfare, Cleveland, and the response was by Alfred E. Howell, Nashville, Tenn., one of the association's past presidents. President Bull, who is superintendent of the Commonwealth Steel Company, Granite City, Ill., next read his annual address, which was listened to with great interest.

Address of President Bull

President Bull, in the annual presidential address, told in some detail how it came about that the American Foundrymen's Association took over the management of the exhibition feature of the annual conventions. This led to incorporating the association, so that its enlarged business necessities could be transacted more efficiently and the liability of the individual members could be eliminated. Under the older arrangements the members were liable as partners, and without a limited or fixed liability. Resolutions looking to the incorporation were passed at a meeting of the executive board of the association held at Cleveland on Jan. 15, following a suggestion made by Mr. Bull in a letter to the board members on Jan. 4 that such incorporation was advisable. Describing the events following this meeting, President Bull said in part:

THE ASSOCIATION AS INCORPORATED

"Your president and secretary were respectively chosen as temporary chairman and temporary secretary. Following this organization meeting, the temporary officers investigated the rights and privileges of corporations not organized for profit, both in Illinois and Ohio, and at a subsequent meeting of the temporary organization, held in Pittsburgh, Feb. 27, the decision to incorporate in Illinois, not for profit, was reached, because of more favorable regulations in that State. It was decided to invite all members of the executive board of the association, all honorary members of the association, the manager selected for the 1916 exhibition, and the members of the committee on exhibits, to serve as incorporators. This plan could not in its entirety be carried out, as the Illinois statutes require that all incorporators shall be citizens of the United States.

"It is interesting to know that the incorporators, 27 in number, include the following gentlemen, who have in the past rendered inestimable service to our organization: Past Presidents Seaman, Jones, Walker, Brown, Wolff, McFadden, Flagg, Waterfall, Speer, Miles and Howell, and Past Secretaries Penton and Moldenke. The charter was granted to the American Foundrymen's Association, Inc., on July 3, 1916, practically six months after the organization meeting of prospective incorporators was held.

"The object of the corporation is stated in such terms as to indicate very clearly the technical and educational nature of the organization. In this a change has been made, as the phraseology of the old constitution was so broad as to indicate a possible commercial purpose.

"In conformity with the statutes, such a corporation as ours must be composed exclusively of individuals as members; therefore, firms or corporations must indicate the names of representatives who will nominally be known as holding membership individually.

DIRECTORS TO ELECT OFFICERS

"The old executive board has been elastic, including all past presidents. The corporation was required to have a fixed number of directors stipulated in the articles of incorporation. It was decided to designate that there should be sixteen directors, all to be elected annually by and from the active and honorary members. It being the procedure of corporations to have their directors elect their executive officers, provision for such action has been made. In order to secure the continued interest of former executives, whose continued assistance has been of such great value, an advisory board has been created composed of all past presidents and honorary members, excepting those who may be elected to the directorate.

"In naming the directors for the first year, as required when we filed our articles of incorporation, it was contemplated that each director should tender his resignation at this convention and that the members of the corporation at this convention should elect the persons desired to serve as directors.

"The section of the by-laws under the head of amendments is more liberal as to the rights of the board than was the case formerly. An inherent right of directors of a corporation is that of amending by-laws at any regular or properly called meeting of the board, and a by-law cannot legally be written denying this privilege. The original provision for the modification of by-laws by the members remains as before.

"Your president naturally feels a particular pleasure in relinquishing office with the organization seemingly well started on lines of greater usefulness. He takes no credit for any especial part in what has been done to make this possible, but admits the responsibility for instituting negotiations which culminated in events of great importance. He seriously felt the constant need of wise counsel, and invariably received it from the other zealous and far-sighted members of our committee of five, to whom he feels you owe a great deal. He cannot express his deep gratitude for the indefatigable co-operation of the other members of that committee, and only in lesser degree to the exhibitors who enlarged it to a committee of eight, delegated to have charge of the 1916 exhibition.

"I am impressed with the thought that this, our twenty-first birthday—as it can be truthfully regarded—marks the enterprise of youth, and that the future will quickly develop the vigor and service of maturity. Very soon, as I believe, the privilege of membership in the American Foundrymen's Association will be universally claimed by progressive foundrymen engaged not only in the manufacture of gray iron, malleable iron and steel, but of all metals, as contemplated in the by-laws."

FEDERATION OF ENGINEERING ORGANIZATIONS

Following President Bull, Jesse L. Jones, president of the American Institute of Metals, who has charge of foundry alloy work for the Westinghouse Electric & Mfg. Company, spoke briefly. He suggested that a combination of all technical societies be effected, the existing societies becoming members of a great confederation, expressing the belief that if one organization conducted all affairs of the various technical societies their business could be carried on more economically than at present. He named as societies that might be brought together in this manner in one cen-

tral organization the American Society of Mechanical Engineers, the American Society of Civil Engineers, the American Institute of Electrical Engineers, the American Institute of Mining Engineers, the American Chemical Society and the American Society for Testing Materials.

MEMBERSHIP STATIONARY

The annual report of A. O. Backert, secretary and treasurer, showed that the membership on July 31, 1916, was 974, as compared with 973 on the same date last year. While this represents a gain of one with the delinquents included, if the names of the latter were stricken from the records the loss in membership in 11 months would be 55, or 6 per cent. On July 1, 1916, the total active membership in good standing was 918, of whom 784 were active, 118 associates and 16 honorary. As a result of campaigns conducted during the year 41 new names were enrolled.

With over 5000 gray and malleable iron and steel foundries in the United States and Canada, the membership of this association, he mentioned, represents only about 20 per cent of the industry. He regarded this as a sad commentary on the interest displayed among foundrymen in the attainment of progress by organized effort. "The dues are much lower than those of other technical societies," he continued, "and, including the entertainment features at the annual meetings, the members of our association derive direct benefits representing an actual expenditure each year of from $13 to $15, although the dues are only $10. It is certain that the co-operation of the members would prove helpful in increasing the enrollment, and greater efforts on their part are earnestly requested."

Continuing, Mr. Backert said in part: "The entire expense of the exhibition was defrayed without resorting to outside sources for financial assistance, and the only charges made against your association were for the expenses of the special committee of five appointed by your executive board last year to carry on negotiations with the Foundry & Machine Exhibition Company, whose corporate name subsequently was changed to the Exhibition Company. These expenses amounted to $930.77, and were charged to the exhibition account. However, since July 1 this sum has been transferred from the exhibition to the technical fund of your association.

"The manager of exhibits, C. E. Hoyt of Chicago, has given a bond for $5000, which amply safeguards the association. While Mr. Hoyt receives all funds from the exhibitors, gate receipts, etc., these are transmitted daily to your treasurer, who also is under bond, and who deposits such receipts to the credit of the exhibition account."

The Monday session concluded with the appointment of a committee on resolutions consisting of S. B. Chadsey, Massey-Harris Company, Toronto, Ont.; V. E. Minich, Sand Mixing Machine Company, New York, and W. B. Robinson, THE IRON AGE, Pittsburgh.

Tuesday's Proceedings

CLEVELAND, OHIO, Sept. 12, 1916.—(*By Telegraph.*) —The forecast of an excellent attendance at the meetings of the American Foundrymen's Association and the American Institute of Metals which was given by the large registration of the first day was well sustained at the joint session on Tuesday morning. This was the first experience in holding a single continuous session a day rather than the morning and afternoon sessions of previous years and the success of the plan seems already assured.

THE ENGINEER IN THE FOUNDRY

The papers presented on Tuesday morning included symposiums discussing "The Results of Closer Cooperation Betwen the Engineer and the Foundry" and "The Influence of Gating on Castings." In introducing the former discussion, D. W. Sowers, Buffalo, laid particular stress upon the necessity of cultivating a greater field of common knowledge between the engineer and the practical foundry operator. This point was also emphasized by Dr. Richard Moldenke, who cited the fact that in the foundries of Europe the engineer is the one who runs the foundry, and the speaker, therefore, advised technical training for young men as a preface to the work of practical foundry operation. This symposium also included an important contribution from John Howe Hall, High Bridge, N. J., on "The Relations of the Engineer in the Steel Foundry." President Bull in reviewing Mr. Hall's paper called particular attention to the use of manganese in steel castings.

To the discussion of alloys and also to the matter of standard specifications, C. E. Chase, Pittsburgh, contributed an excellent presentation in abstract of his paper covering "The Engineer's Functions in the Non-Ferrous Metal Foundry." Referring to Mr. Chase's remarks regarding the proper methods of testing castings, Dr. Moldenke pointed out that the coupon method of testing must necessarily prove unsatisfactory, since the coupon itself represents conditions different from those within the casting, while in the casting itself a range of conditions exists. It is therefore of greater promise to work from a test bar made to present most representative conditions than drawing one's conclusions from a study of the casting in relation to the test bar. In the matter of specifications for castings applying on export orders it was pointed out that there is little hope for the acceptance of American specifications by European buyers; so that the preparation of international specifications made up of contributions from various countries must sooner or later be undertaken.

IMPORTANCE OF PROPER GATING

In discussing the proper gating of patterns, R. D. Fuller, Cleveland; A. M. Fulton, Pittsburgh, and R. R. Clarke, Pittsburgh, indicated how important to the prevention of bad castings in gray iron, malleable iron, or non-ferrous metals is the correct method of gating.

The "Gating of Patterns for Steel Castings" was read by title in the absence of the author. The paper by Mr. Fulton was especially interesting in its illustration of the use of sinkheads to prevent internal shrinkage, as contrasted with the use of chills. Mr. Clarke presented some interesting examples of methods of gating for difficult castings in aluminum and bronze, illustrations of which will be found in the subsequent publication of this paper.

The reclaiming of foundry sand was again given a large measure of attention, and in addition to the existing committee which is co-operating with the Bureau of Standards in studying the rebonding of sand a new committee was ordered appointed to co-operate with the Bureau of Mines in the matter of sand reclamation. In the past year, progress has been made by the Bureau of Standards in its investigation of what constitutes a good molding sand, and the work is progressing in the direction of preparing a synthetic or artificial molding sand, of which samples were presented by Mr. Carr, of the Bureau.

Speaking of "The Significance of the Fire Waste," Franklin H. Wentworth, Boston, brought home in a forcible address the burden the tremendous annual fire loss in this country, amounting to $230,000,000, imposes upon the individual. He made a plea for a change in our manner of thought, which now accords sympathy to the owners of structures damaged by fire, to an attitude which condemns such, as offending against the public welfare. He also asked for action by the association in promoting the use of fire-preventing construction in foundry buildings, and the matter was referred to the association's committee on safety and sanitation.

The total value of our exports of merchandise in July, as reported by the Department of Commerce, was $445,561,910, as compared with $268,468,702 in July of 1915. The imports totaled $182,722,938, against $143,244,737 in July, 1915. In 1914 the excess of imports over exports in the month of July totaled but $5,538,344, whereas in July, 1915, the exports showed an excess of $125,223,965, and in July of this year an excess of $262,838,972. The excess of exports in the first seven months of 1916, 1915 and 1914 were respectively $1,458,461,241, $961,222,649, and $60,388,789.

DONNER STEEL COMPANY

To Have New Blast and Open-Hearth Furnaces and Bar and Plate Mills

Bar mills and an 84-in. plate mill are to be included in the extensions now under way at the works of the Donner Steel Company, Buffalo, N. Y. A forge and axle plant are also under construction and coke ovens are to be added as soon as the construction program will allow.

Construction work is being rapidly pushed on the additional 600-ton blast furnace and the present furnace is being changed to a 500-ton furnace. These furnaces will be equipped with the Slick patent distributing top.

There is also under construction a reinforced-concrete dock, 1200 ft. in length, with piles, the average length of which are 52 ft., driven 4 ft. centers to rock. The top of this dock will be reinforced concrete, 24 in. in thickness. The ore and limestone will be handled direct from the boats to this dock. The ore-handling equipment consists of three Brown bridges with 7½-ton buckets.

The open-hearth addition consists of seven 100-ton stationary furnaces with the present furnaces changed to make a total of ten 100-ton furnaces. These furnaces will be equipped with waste-heat boilers, Blair ports and valves; also four Bradley 12-ft. gas producers on each furnace. These producers will be supplied with coal from an overhead storage. Two 125-ton ladle cranes and one 75-ton clean-up crane are also to be installed. The 75-ton crane will be used to handle cinder pots and empty steel ladles and can be used as an emergency hot-metal crane.

The rolling mills will consist of an 18-in. Morgan continuous billet mill, in connection with present blooming mill; one 14-in. cross-country bar mill, one 10-in. continuous bar mill, one 7-in. specialty mill, one 84-in. plate mill and one 10-in specialty mill. The mills will be motor driven. The electric power will be furnished from steam driven turbine generators, operated from blast-furnace-gas-fired and open-hearth waste-heat boilers.

Exports of Steel Rails at High Point

Steel rail exports are very large while imports are gradually diminishing. The following comparative table is from Government data, given in gross tons:

	Exports		Imports	
	Total	Per Month.	Total	Per Month
First half of 1916.	241,854	40,319	15,974	2,662
Fiscal Year, 1916	540,919	45,076	53,941	4,495
Fiscal Year, 1915	159,587	13,299	55,092	4,591
Fiscal Year, 1914	328,613	28,218	17,507	1,292
Year 1915	391,491	32,624	78,775	6,543
Year 1914	174,680	14,777	22,571	1,881
Year 1913	480,532	40,046	10,408	867

This shows that the present export rate of 40,000 to 45,000 tons per month is the highest known, that for 1913 having been the largest heretofore.

Imports were a record in 1915 at 6543 tons per month, but have been gradually declining until for the fiscal year ended June 30, 1916, they were 4495 tons per month and for the first six months of 1916, only 2662 tons per month.

British rail exports have dwindled from 41,676 tons per month in 1913 to 4537 tons per month for the first seven months of 1916.

The water tank of the Campbell Flour Mills Company, Ltd., Toronto, Ont., takes the form of a gigantic bag of flour built entirely of steel but shaped and painted to look like a filled bag. The tank holds 40,000 gal. of water and stands 152 ft. above the foundations on a structural steel framework which brings the tank in a conspicuous position, rendering it peculiarly effective for advertising purposes. The bag itself is 37 ft. deep and 18 ft. wide and the total weight supported is over 200 tons. The tank was provided for a sprinkler system and was designed and built by the Chicago Bridge & Iron Company, Bridgeburg, Ont.

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The Hydrol Company, Niagara Falls, N. Y., which is building a factory for the treatment of oils with hydrogen and the manufacture of artificial paraffine is installing preliminary equipment also for the manufacture of dyes out of by-products of coke, to be sent to its plant from Pittsburgh. It is stated that the company will make important tests in this line under the supervision of representatives of the Government.

The Cole Motor Company, with a capital stock of $20,000, has been incorporated by Ewait P. Schlegel, 1002 Jancey Street, Pittsburgh, and Chalmer C. Laughner, P. O. Laughner and P. Schlegel, to deal in and repair automobiles.

Proposed Specifications for Foundry Scrap*

Report of a Committee Appointed by the American Foundrymen's Association to Draw Up Foundry Scrap Specifications

Until the appearance of the chemist in the foundry industry, it was generally believed that each class of work required a special grade of pig iron, determined by fracture, and foundrymen did not believe it possible to use any appreciable quantities of scrap in their mixtures. A little return scrap was melted, usually for castings that did not require machining. The use of steel scrap was not even considered. Some superintendents went so far as to have all nails, hoop-iron, etc., removed from their kindling wood, on the ground that it would seriously injure the quality of the castings.

Today all this is changed. Mixtures containing 50 per cent scrap are the rule, rather than the exception. Under certain conditions even as high as 80 per cent scrap may be employed and steel scrap is used freely in gray-iron foundries.

PROGRESS IN SPITE OF OBSTACLES

This progress has been made in spite of the fact that foundrymen have been greatly handicapped by the want of suitable specifications governing the classification and purchase of scrap materials. Chaos rather than system has ruled and today scrap is the only material the foundryman purchases blindfolded.

It was for the purpose of remedying this condition that this committee was appointed at the Atlantic City convention last year to continue, and if possible conclude, the preliminary work of the 1914-1915 Committee on Specifications for Foundry Scrap. It is the hope of the committee that its suggested specifications are broad enough, yet sufficiently rigid, to enable each foundryman to purchase scrap suited to his peculiar needs. At the same time, an effort has been made to draw up specifications that are fair to the dealer.

The committee realized it was going to be a difficult task to draw up specifications that would meet all requirements. Therefore, a circular letter of inquiry was sent to the 850 active members of the association requesting an expression of their ideas on the subject. Only about 50 replies were received, showing clearly how little thought is given to this important subject. Among the answers, however, were a large number of suggestions of great value and the committee wishes to thank those who so kindly replied.

Many of the replies brought out differences of opinion that indicate the necessity for a large amount of educational work. For instance, one foundryman in New Jersey believes it sufficient to "purchase gray iron and steel scrap on personal inspection." On the other hand, another foundryman, in Massachusetts, prefers an elaborate series of specifications based on chemical analysis. This foundryman states, in part: "For No. 1, I would want light mill machinery scrap that would run from 2.50 to 3.25 per cent silicon, 0.90 per cent in phosphorus, 0.80 per cent manganese and 3.90 per cent in total carbon. This, with a No. 2X iron, with silicon 2.50 per cent, would make good light machine castings." He also says: "I think any foundryman can get any kind of a mixture with almost any kind of scrap and good No. 2X pig iron, if he only knows what he wants. A good many men don't know what they want to get certain results and these men have to rely on the pig-iron salesmen for their information. They, of course, tell them that they must use their irons with a good No. 1 scrap and mix 50-50."

A foundryman in Buffalo is afraid that "any additional grading would be likely to increase the cost of the material." Another, in Texas, thinks that "in a few years, when we begin to get semi-steel scrap, we will have to change our methods of mixing steel with our scrap, which," he anticipates, "will give us some headaches."

A foundryman in western New York wrote that there are only three classifications in general use in that vicinity, namely, stove plate, railroad and agricultural scrap. A Pacific coast foundryman wrote that specifications for scrap material could not be enforced in the far west, "due to the fact that very few foundrymen make any particular classification which is descriptive of the material, and, therefore, it is not necessary for the scrap people to sort it very closely."

CLASSIFICATION BASED ON METAL SECTION

In the view of the committee, however, the keynote of the scrap classification problem was struck by a Philadelphia foundryman, who wrote, "In classifying cast-iron scrap, our thought would be to grade it with reference to the amount of silicon (and other elements) it is likely to contain." Such a result can be reached, in the opinion of the committee, only by arranging the sub-classifications according to metal section, rather than according to the weight of the piece. Foundry practice is so standardized today that castings of similar section, made for the same general purpose, have a common, definite chemical composition, within reasonable limits. Light machinery castings, for instance, with metal sections ½ in. or less, may be assumed to contain 2.25 to 2.75 per cent silicon, 0.08 to 0.10 per cent sulphur, 0.65 to 0.75 per cent phosphorus, 0.40 to 0.70 per cent manganese, and 3.25 to 3.50 per cent total carbon. Heavier scrap, of course, contains less silicon, and analyses assumed from the metal sections will be found to be sufficiently accurate for all practical purposes in figuring mixtures.

MALLEABLE SPECIFICATIONS

The same general principles apply to malleable scrap, which accordingly has been classified on a basis of metal sections. On this point one malleable foundryman in Indiana wrote as follows: "We believe that malleable should be divided into two sub-classifications—of heavy and light material. Heavy castings would be 5 lb. or over with a section of ⅜ in. or over and light castings under 5 lb. with a section under ⅜ in., but all castings with a ¼-in. section should be classified as light. We further believe that pipe fittings should be kept in a separate classification. Cupola malleable should be classified as such with the further sub-classification as above mentioned for regular or ordinary malleable scrap."

Further reference to this question is made in a letter from a New York manufacturer of harvesting machinery, who says: "We would suggest one class of light scrap which would include sections up to ¾ in. in thickness and two classes of heavy scrap, one to contain all heavy scrap over ¾ in. in thickness and less than 24 in. in any dimension, the other to contain all over ¾ in. in thickness and greater than 24 in. in any dimension. We think it useless to make a special classification for cupola malleable, as it would be quite impossible for scrap collectors to determine which is cupola malleable, and as there is so little of this material it would take them a very long time to collect any quantity of it."

STEEL SCRAP SPECIFICATIONS

Although fairly satisfactory specifications for steel scrap have been in use for a number of years, the committee found considerable difference of opinion among steel foundrymen. An Illinois foundryman believes that a classification including short steel rails, knuckles and couplers, railroad steel and structural sheets is sufficient. Other melters prefer more elabo-

*Presented to the convention of the American Foundrymen's Association, Cleveland, Sept. 12, 1916.

rate classifications. One steel foundryman in Michigan buys nothing but drop-forge crop-ends and drop-forge flashings. Converter foundrymen point out the necessity of keeping the phosphorus under 0.04 or 0.05 per cent, at the same time specifying that the pieces be of such size as to permit easy charging in the cupola.

With the foregoing facts and opinions in mind, the committee prepared the specifications for gray iron, malleable and steel scrap presented herewith. They are submitted with the recommendation that they be adopted.

G. E. Jones, chairman; V. H. Meissner, W. J. Nugent, J. G. Garrard and H. Cole Estep.

Cast-Iron Scrap

No. 1 Machinery Scrap.—This material shall consist of cast-iron scrap of first quality which possesses evidence of having been machined, such as planed or turned surfaces, bored or drilled holes, etc. It must be cupola size, no piece to weigh more than 100 lb., and must not exceed 24 in. in length or width. It shall be classified as follows:

No. 1 Heavy, pieces greater than 1 in. in section.

No. 1 Medium, pieces ½ in. and not to exceed 1 in. in section.

No. 1 Light, pieces not to exceed ½ in. in section.

Scrap classified as railroad cast scrap or under any other classification of these specifications, and burnt iron of every description will not be accepted under the foregoing classifications.

No. 2 Machinery Scrap.—This shall consist of cast-iron scrap of first quality which possesses evidences of having been machined, such as planed or turned surfaces, bored or drilled holes, etc. It shall be in the unbroken state. It shall be classified as follows:

No. 2 Heavy, pieces greater than 1 in. in section.

No. 2 Medium, pieces over ½ in. in section and not to exceed 1 in.

No. 2 Light, pieces not to exceed ½ in. in section.

Scrap classified as railroad cast scrap or under any other classification of these specifications, and burnt iron of every description will not be accepted under the foregoing classifications.

No. 3 Rough Scrap.—This shall consist of cast scrap, such as columns, pipes, plates and rough castings of a miscellaneous nature broken to cupola size, pieces not to exceed 100 lb. in weight and must not exceed 24 in. in length or width. It shall be classed as follows:

No. 3 Heavy, pieces greater than 1 in. in section.

No. 3 Medium, pieces over ½ in, and not tc exceed 1 in. in section.

No. 3 Light, pieces not to exceed ½ in. in section

Scrap classified as railroad cast scrap or under any other classification of these specifications, and burnt iron of every description will not be accepted under the foregoing classifications.

No. 4 Rough Scrap.—This shall consist of cast scrap, such as columns, pipes, plates and rough castings of a miscellaneous nature in the unbroken state. It shall be classified as follows:

No. 4 Heavy, pieces greater than 1 in. in section.

No. 4 Medium, pieces over ½ in. and not to exceed 1 in in section.

No. 4 Light, pieces not to exceed ½ in. in section.

Scrap classified as railroad scrap or under any other classification of these specifications, and burnt iron of every description will not be accepted under the foregoing classifications.

No. 5 Machinery Scrap.—This shall consist of burnt machinery scrap of miscellaneous character, but must not include any burnt material included in any other classification of these specifications.

No. 1 Stove Plate Scrap.—This shall consist of the best class of clean stove plate. It must be free from malleable iron and steel parts, grates, burnt iron and other miscellaneous scrap usually collected with this material.

Scrap classified as railroad scrap or under any other classification of these specifications, and burnt iron of every description will not be accepted under this classification.

No. 2 Stove Plate Scrap.—This classification includes all unburnt cast-iron stove parts not included in the No. 1 stove plate classification.

Scrap classified as railroad scrap or under any other classification of these specifications, and burnt iron of every description will not be accepted under this classification.

No. 3 Stove Plate Scrap.—This shall consist of burnt stove parts of every description, but must not include any burnt material included in any other classification of these specifications.

No. 1 Agricultural Scrap.—This shall consist of cast-iron parts of agricultural machinery and shall be free from steel, malleable, chilled iron, such as plow points, etc., and burnt iron of every description.

No. 2 Agricultural Scrap.—This shall consist of chilled iron parts of agricultural machinery and must be free from steel, malleable and burnt iron of every description.

No. 1 Railroad Scrap.—This shall consist only of chilled cast-iron carwheels conforming to the Master Car Builders' Association standards.

No. 2 Railroad Scrap.—This shall consist of miscellaneous cast-iron carwheels not included in the No. 1 classification.

No. 3 Railroad Scrap.—This shall include only plain gray-iron brake shoes, which must be free from steel backs and inserts.

No. 4 Railroad Scrap.—This shall include steel back and insert brake shoes of both driver and car types. It shall not include brake shoes of the No. 3 classification.

No. 5 Railroad Scrap.—This shall consist of railroad burnt iron of every description.

No. 6 Railroad Scrap.—This includes unburnt railroad grate bars and grate bar rests, and journal boxes with steel parts removed.

No. 1 Radiator Scrap.—This shall consist of radiator castings, broken, with all steel malleable and other parts removed. It must be free from scale and excessive rust or corrosion.

No. 2 Radiator Scrap.—This shall consist of radiator castings, not broken, with all steel, malleable and other parts removed. It must be free from scale and excessive rust or corrosion.

Malleable Cast Scrap

Only such scrap as has undergone the annealing process will be accepable under the following classifications:

Automobile Malleable Scrap.—This shall consist of malleable cast-iron parts of automobiles and must be free from steel forgings, stampings and gray-iron parts. Railroad malleable, agricultural malleable and miscellaneous malleable, such as valves, flanges and pipe fittings, will not be accepted under this classification.

Railroad Malleable Scrap.—This shall consist of malleable iron parts of railroad cars and other equipment. It shall be classified as follows:

No. 1 Railroad Malleable, pieces not exceeding ⅜ in. in section and exceeding 24 in. in length or width.

No. 2 Railroad Malleable, pieces not less than ⅜ in. and not greater than ¾ in. in section; also not exceeding 24 in. in length or width.

No. 3 Railroad Malleable, pieces greater than ¾ in. in section and exceeding 24 in. in length or width.

Agricultural malleable and miscellaneous malleable, such as valves, flanges and pipe fittings, will not be accepted in this classification.

Agricultural Malleable Scrap.—This shall consist of malleable cast-iron parts of agricultural machinery. It must be free from steel and cast iron. It shall be classified as follows:

No. 1 Agricultural Malleable, pieces not exceeding ⅜ in. in section and also not exceeding 24 in. in length or width.

No. 2 Agricultural Malleable, pieces not less than ⅜ in. in section and not exceeding ¾ in.; also not exceeding 24 in. in length or width.

No. 3 Agricultural Malleable, pieces greater than ¾ in. in section, and exceeding 24 in. in length or width. Miscellaneous malleable such as valves, flanges and pipe fittings will not be accepted under this classification.

Miscellaneous Malleable Scrap.—This shall consist of valves, flanges and pipe fittings of every description and such malleable cast-iron scrap as fails to conform to other classifications.

Open-Hearth Steel Scrap

HEAVY OPEN-HEARTH SCRAP

No. 1 Heavy Structural Steel Scrap.—This shall consist of all structural shapes, such as channels, angles, I-beams, plates, etc., ¼ in. in section and heavier. It must be of charging box size, not to exceed 5 ft. long and 18 in. wide. No piece shall weigh less than 25 lb. It must be free from iron of every description. This material must not include pieces that are covered with excessive rust or corrosion.

No. 2 Heavy Structural Steel Scrap.—This shall consist of all structural shapes ¼ in. in section and heavier, over 5 ft. long and 18 in. wide. No piece shall exceed 600 lb. in weight. Must be free from bent, curved and twisted pieces, and iron of every description. Must not include any material that is covered with excessive rust or corrosion.

No. 3 Steel Rails.—This shall consist of standard sections, 50 lb. and over, free from frogs, switches, guard rails and crossing rails. Must be of charging box size, not over 5 ft. long and 18 in. wide. Must not include any pieces that are covered with excessive rust or corrosion.

No. 4 Steel Rails.—This shall consist of standard sections under 50 lb. and free from frogs, switches, guard rails, and

crossing rails. Must be of charging box size not over 5 ft. long and 18 in. wide. Must not include any pieces that are covered with excessive rust or corrosion.

No. 5 Steel Rails.—This shall consist of standard sections, 56 lb. and over, not cut to charging box size. Must be free from frogs, switches, guard rails and crossing rails, and must not include any pieces that are covered with excessive rust or corrosion.

No. 6 Steel Rails.—This shall consist of standard sections under 56 lb. not cut to charging box size. Must be free from frogs, switches, guard rails and crossing rails, and must not include any pieces that are covered with excessive rust or corrosion.

No. 7 Heavy Steel Scrap.—This shall consist of guard rails, switches, crossing rails, frogs, exclusive of iron plates, etc. Must be cut apart and be of charging box size, not to exceed 5 ft. long and 18 in. wide, and must not include any pieces that are covered with excessive rust or corrosion.

No. 8 Heavy Steel Scrap.—This shall consist of frogs, guard rails, switches and crossing rails, not cut apart, over 5 ft. long and 18 in. wide. Must be free from bent, curved and twisted pieces, and must not include any pieces that are covered with excessive rust or corrosion.

No. 9 Heavy Steel Scrap.—This shall consist of locomotive drivers, engine truck and coach tires, 36 in. and over inside diameter, and must be free from excessive rust or corrosion.

No. 10 Heavy Steel Scrap.—This shall consist of miscellaneous steel tires under 36 in. in diameter and must be free from excessive rust or corrosion.

No. 11 Steel Tires.—This shall consist of steel tires as covered by classifications Nos. 9 and 10. Must be broken to charging box size, not over 5 ft. long and 18 in. wide.

No. 12 Heavy Steel Scrap.—This shall consist of mild steel castings of a miscellaneous character. No piece shall weigh more than 300 lb. or less than 25 lb. Must not contain malleable or cast iron and must be free from excessive rust or corrosion. Must not exceed charging box size, 5 ft. long and 18 in. wide.

No. 13 Heavy Steel Scrap.—This shall consist of cast steel couplers, coupler heads, knuckles and draw bars. It must be free from iron yokes, etc., and must be free from excessive rust or corrosion.

LIGHT OPEN-HEARTH SCRAP

No. 1 Light Steel Scrap.—This shall consist of steel springs, including all standard railroad coil and elliptical springs. No bar or coil springs under ⅜ in. in thickness or diameter will be accepted. The spring shall be free from plates. Elliptical springs must be cut apart. Must be free from excessive rust or corrosion.

No. 2 Light Steel Scrap.—This shall consist of miscellaneous steel, such as plates, shapes, bars, structural crop ends, forging crop ends, fish plates, steel rail chairs, rail joints, etc. Must be limited to charging box size, not over 5 ft. long and under 18 in. wide. Must be under 25 lb. in weight, and must not include bundle scrap or iron of any description. Must be free from excessive rust and corrosion.

No. 3 Light Steel Scrap.—This shall consist of turnings, drillings and borings from wrought iron and mild steel. Must be clean and free from cast-iron and malleable borings, brass, high-carbon steel borings and other metals. Must be clean and free from dirt and lumps, as well as from excessive rust or corrosion.

No. 4 Light Steel Scrap.—This shall consist of turnings, drillings and borings from high-carbon steel, such as tires and other similar material. Must be clean and free from cast-iron and malleable borings, brass and other metals. Must be clean and free from dirt and lumps. Must be free from excessive rust and corrosion.

No. 5 Light Steel Scrap.—This shall consist of bundled scrap and all light steel scrap under ¼ in. in section, free from tinned and galvanized material. Must not be larger than charging box size, that is, 5 ft. long and under 18 in. wide. Must be clean and free from excessive rust or corrosion.

No. 6 Light Steel Scrap.—This shall consist of miscellaneous cast steel not covered by other classifications. No piece shall weigh more than 25 or less than 5 lb. Must be free from malleable, cast iron, etc., as well as be clean and free from excessive rust or corrosion.

CONVERTER STEEL SCRAP

No. 1 Converter Scrap.—This shall consist of mild open-hearth steel scrap, such as structural shapes, rolling-mill crop ends, forgings and forge crop ends. No piece shall weigh more than 200 lb. or less than 25 lb. and must not exceed 24 in. in length or width. Must be free from excessive rust or corrosion.

No. 2 Converter Scrap.—This shall consist of open-hearth steel scrap, such as rails and high carbon, or hard steel scrap of a miscellaneous character. No piece shall weigh less than 25 lb. or more than 200 lb., or be greater than 24 in. in length or width. Must be free from excessive rust or corrosion.

No. 3 Converter Scrap.—This shall consist of miscellaneous mild steel castings. No piece shall weigh more than 200 lb. or less than 25 lb. Must not contain malleable or cast iron, must not exceed 24 in. in length or width, and must be free from excessive rust or corrosion.

No. 4 Converter Scrap.—This shall consist of miscellaneous mild steel castings. No piece shall weigh more than 25 lb. Must not contain malleable or cast iron, must not exceed 24 in. in length or width, and must be free from excessive rust or corrosion.

No. 5 Converter Scrap.—This shall consist of miscellaneous steel tires, broken. No piece shall exceed 24 in. in length or width. Must be free from excessive rust or corrosion.

No. 6 Converter Scrap.—This shall consist of mild open-hearth steel scrap, such as punchings, shearings, forge flashings, forge crop ends, etc. No piece shall weigh more than 25 lb. or less than 5 lb. Must be clean and free from excessive rust or corrosion.

No. 7 Converter Scrap.—This shall consist of steel springs, including all railroad coil and elliptical springs, but no coil or bar springs shall be under ⅜ in. in thickness or diameter. Must be free from plates. Elliptical springs must be cut apart and must not exceed 24 in. in length, and the material must be free from excessive rust or corrosion.

CRUCIBLE STEEL SCRAP

No. 1 Crucible Scrap.—This shall consist of open-hearth steel punchings and must be free from shearings, clippings, tinned and galvanized material of every description. Must be clean and free from dirt and excessive rust or corrosion.

No. 2 Crucible Scrap.—This shall consist of mild open-hearth steel shearings, forgings, forge flashings and clippings. No piece shall exceed 5 in. wide or 8 in. long. Must be free from dirt, tinned and galvanized material of every description and free from excessive rust or corrosion.

No. 3 Crucible Scrap.—This shall consist of carbon tool steel, such as files, stub ends of carbon tools, carbon steel saw blades, wearing plates, etc. No piece shall exceed 5 in. wide or 8 in. long, and the material must be free from excessive rust or corrosion.

No. 4 Crucible Scrap.—This shall consist of steel springs of miscellaneous character, not exceeding 5 in. in diameter or width and 8 in. long. Must be free from plates and other metals and free from excessive rust or corrosion.

No. 5 Crucible Scrap.—This shall consist of steel horse shoes, horse shoe nails, steel buckles, steel snaps, steel clamps, etc., and must be free from rubber, leather or other substances. Must be clean and free from excessive rust or corrosion.

No. 6 Crucible Scrap.—This shall consist of miscellaneous small soft steel castings, not exceeding 10 lb. in weight or 5 in. wide and 8 in. long. Must be free from malleable, cast iron or other metals, and also must be free from excessive rust or corrosion.

ELECTRIC FURNACE STEEL SCRAP

No. 1 Electric Furnace Scrap.—This shall consist of mild open-hearth steel punchings, but must not include shearings, clippings or other materials. Must be free from tinned and galvanized material of every description, and must also be clean and free from dirt and excessive rust or corrosion.

No. 2 Electric Furnace Scrap.—This shall consist of mild open-hearth steel, such as plates, shapes, structural crop ends, shearings and miscellaneous materials of this character. Must be not less than ¼ in. in section. No piece shall exceed 12 in. wide and 24 in. long, or weigh less than 10 lb. or more than 200 lb. Must be free from excessive rust or corrosion. Bundle scrap and iron of every description will not be accepted.

No. 3 Electric Furnace Scrap.—This shall consist of mild open-hearth steel, such as rolling-mill crop ends, forge crop ends and forgings. No piece shall weigh less than 10 lb. or more than 200 lb. Must be free from excessive rust or corrosion.

No. 4 Electric Furnace Scrap.—This shall consist of miscellaneous steel tires, broken. No piece shall exceed 12 in. wide or 24 in. long, and the material must be free from excessive rust or corrosion.

No. 5 Electric Furnace Scrap.—This shall consist of high carbon open-hearth steel, such as rails, and high carbon or hard steel of miscellaneous character. No piece shall weigh less than 25 lb. or more than 200 lb. or exceed 12 in. wide or 24 in. long. Must be free from excessive rust or corrosion.

No. 6 Electric Furnace Scrap.—This shall consist of mild open-hearth steel, such as plates, shapes, structural crop ends, shearings and clippings, under ¼ in. in section. No piece shall exceed 12 in. wide and 24 in. long. Bundle scrap will be excluded, and the material must be free from hoops, cotton ties, wire, etc., commonly known as busheling, together with

tinned and galvanized material of every description. Must be free from excessive rust or corrosion.

No. 7 Electric Furnace Scrap.—This shall consist of carbon tool steel of miscellaneous character, such as files, stub ends of tools, carbon tool steel rollers, wearing plates, etc. No piece shall exceed 12 in. wide or 24 in. long. Must be free from other metals and excessive rust or corrosion.

No. 8 Electric Furnace Scrap.—This shall consist of steel springs, including all standard railroad coil and elliptical springs. No bar or coil springs shall be under ⅜ in. in thickness or diameter. The springs shall be free from plates and other materials. Elliptical springs must be cut apart and not exceed 24 in. in length. Must be free from excessive rust or corrosion.

No. 9 Electric Furnace Scrap.—This shall consist of coil and leaf or elliptical springs under ⅜ in. in thickness or diameter. The springs shall be free from plates and other material. Leaf or elliptical springs must be cut apart and not exceed 24 in. in length. Must be free from excessive rust or corrosion.

No. 10 Electric Furnace Scrap.—This shall consist of heavy turnings from high carbon or hard steel. Open-hearth steel must be free from light and curly turnings. Must be clean and free from excessive rust or corrosion.

No. 11 Electric Furnace Scrap.—This shall consist of heavy turnings from mild or soft open-hearth steel, free from light and curly turnings. Must be free from excessive rust or corrosion.

Note.—Material coming under all of the foregoing classifications for electric furnace steel scrap, when purchased for the acid process, is limited to 0.04 per cent phosphorus and sulphur.

Weights

Net Tons.—All scrap bought or sold under these specifications shall be handled only on a net ton basis, said ton to consist of 2000 lb.

Variations.—Variations in weights shall be subject to the regulations of the authorized weighing association operating in the territory to which the material is delivered.

Rejections.—The purchaser reserves the right to reject any material failing to conform to these specifications. In the event of a rejection, all demurrage charges and return freight shall be paid by the seller.

Pittsburgh Crucible Steel Comoany Extensions

The Pittsburgh Crucible Steel Company, an interest of the Crucible Steel Company of America, Pittsburgh, has decided to add two 75-ton open-hearth furnaces to its plant at Midland, Pa. These will give the company a total of twelve 75-ton furnaces, and will increase its capacity in the manufacture of high-grade steel about 8000 tons per month, making its total capacity between 40,000 and 45,000 tons per month. The main building will be extended to take care of the new furnaces. There are seven 4-hole pit furnaces, which are ample to take care of the output of the new steel capacity. The steel for the extensions, about 1750 tons, has been placed with the American Bridge Company at Pittsburgh. The Pittsburgh Crucible Steel Company is also considering the building of a heat treating and cold-drawing plant, but a definite decision has not yet been reached. The company is operating its steel works and finishing mills to utmost capacity.

Hewitt Steel Corporation Improvements

The Hewitt Steel Corporation, 111 Broadway, New York, has completely rehabilitated the plant which originally was operated by the Atha Steel Casting Company, at the foot of Chapel Street, Newark, N. J. There are three 30-ton basic open-hearth furnaces. Four new foundry bays have been added, each over 400 ft. long, with traveling cranes of 30 to 50 tons capacity. The boiler capacity has been increased to more than 1000 hp. Most of the open-hearth equipment is new. The plans of the company look to the manufacture of railroad supplies, side frames, bolsters, tender tracks, car couplers, etc., but thus far the plant has been run principally on high carbon billets, and probably will be so engaged until railroad business improves. Herbert H. Hewitt, president of the Magnus Metal Company, is the president of the new company, and R. E. Jennings, 2d, is general manager of the plant.

Pittsburgh and Nearby Districts

In August the Valley Mold & Foundry Company, Sharpsville, Pa., made and shipped from its own plant 23,458 tons of ingot molds, and also bought and shipped to its customers from other plants 1575 tons, making its total shipments 25,033 tons, an average of nearly 1000 tons for every working day, beating its previous record for any one month. The company is taking an average of about 900 tons of molten Bessemer iron per day from the adjacent Shenango Furnace Company. It sells the entire output of basic pig iron from its Alice blast furnace at Sharpsville to the same company.

Samuel Gilmore, E. L. Morris and M. R. Watts, representing the United Coal Company of Pittsburgh, have purchased 2500 acres of coal, 70 houses and mine plants of the Arrow Coal Mining Company and the Reitz Coal Company, in Somerset County, Pa. The price said to have been paid for the coal and developments was $475,000.

Reports that the Crucible Steel Company of America, Pittsburgh, had taken an order from the British government for 35,000 9-in. shells, at a cost of nearly $5,000,000, are officially denied. The company has taken a new British order for howitzer shells, but the number and the amount involved are less than half as stated in the first report.

The Pittsburgh Foreign Trade Commission reports the receipt of an inquiry from the American Trading Company, New York City, for 20 miles of 4-in., 20 miles of 6-in., and 36 miles of 5-in. steel pipe. The commission also reports an inquiry from the Russian Government for 15,000 tons of steel rails, for which it is willing to pay $45 per ton.

The Kelly Mfg. Company, Bucyrus, Ohio, is building an addition to its plant, and will soon be in the market for a double-end punch and shear, with 30-in. throat, provided with structural jaws for punching angles; a ¾-in. riveter, and a radial drill with attachments for holes up to 2 in. in diameter.

About a year ago the McKeesport Tin Plate Company, McKeesport, Pa., then operating 22 hot mills, placed contracts for the building of 20 more hot mills, but as the work progressed the company found it had room for two more. The order was then increased to 22 mills, all of which are nearly finished. The company is now operating 35 hot mills, 8 more will be ready to start in a week or so, and the other new mill will be ready about Nov. 1. The plant also contains 42 cold trains. The starting of the entire 22 new hot mills will give the company an annual capacity of 4,000,000 to 4,500,000 boxes of bright plate per year, no terne plate being made. It now has the distinction of having the largest individual tin-plate plant in the world. All the hot and cold mills and much of the other equipment were built by the United Engineering & Foundry Company, Pittsburgh.

P. Pettler & Sons, Beaver Falls, Pa., recently suffered a loss by fire estimated at $40,000. The destroyed buildings include a two-story structure, 75 x 110 ft., fully equipped. The plant has several other buildings which were undamaged, and business is proceeding as usual.

The first report of the receivers of the Tower Hill-Connellsville Coke Company was filed last week. It shows that from Jan. 21, 1915, the date on which the receivers assumed charge, to July 1, 1916, the gross profits from the sale of coke and coal from the two plants of the company amounted to $272,601.28. The total cash received amounted to $1,019,532.12, and the total disbursements to $881,769.82, leaving a balance of $137,762.30 on hand. The accounts yet receivable will exceed the amounts payable by approximately $30,000. The total amount of coke produced from Jan. 21, 1915, to June 30, 1916, was 493,243 tons.

Joseph E. Thropp's Saxton furnace, Saxton, Pa., blew in Aug. 24, and is running on foundry iron. Before going in blast the furnace was equipped with the C. W. Hunt filling system and a new cinder derrick.

Iron and Steel Markets

NEW CAPACITY ABSORBED

Large Increase in Steel Still Inadequate

Pig-Iron Activity Shifts—Advance in Wrought Pipe—Ore Buying for 1917

Producers and consumers of steel are so beset with delivery problems that for the time new transactions are taking a secondary place. The operation of mills is more satisfactory under September conditions and some headway against accumulated orders should be made in the next six weeks.

The outstanding fact in the present congestion is the small impression made upon it by the year's additions to steel-making capacity. A canvass shows that about 2,700,000 tons of ingots a year is represented in new open-hearth furnaces started up since Jan. 1 and about 500,000 tons more will be in operation before the close of the year. This is an 8 per cent increase on the 40,000,000-ton rate of steel production at the beginning of 1916, or less than the normal gain. There is little promise of any pronounced change in the relation of supply and demand from new capacity before the middle of next year, if then.

New contracting for steel to be delivered in the first half of 1917 is not noteworthy, yet a good many consumers have not covered for that period. In the case of plates a good deal of business for the third quarter of next year is already booked, and plate inquiry is unending. Just now 75,000 tons is before Eastern mills, in the effort of individual users to preempt a place on the books in view of the heavy demands the Government will make with its navy program. A Maine shipyard is in the market for 10,000 tons and Japan, with all her buying of ship steel, still wants 6100 tons.

In the export market the shipping of greatly needed material is getting precedence over new buying. But Russia has just bought 13,000 tons more of barb wire for shipment this year and on 7500 of the Russian cars that have been under inquiry for months there is some better chance of early action.

In rolled steel, prices hold all the strength that has developed from the situation as to semi-finished material. While plates for forward delivery can be had at 3c., from 4c. to 4.5c. is done on prompt material; but universal plates for early delivery are available at $5 to $10 a ton less than sheared plates. In hard bars some competition is seen, sales being made as low as 2.40c., delivered at Cleveland.

Another advance has come in wrought pipe—$2 a ton on black butt weld, $4 on black lap weld and $4 on steel and iron boiler tubes, effective Sept. 7. Oil country material was advanced similarly. Galvanized pipe is not changed.

Much interest attaches to the basis for sheet bar contracts covering the last quarter of the year. For the third quarter $37 to $40 was paid, but it is probable an advance of at least $3 a ton will be made. Very little steel in the form of billets or sheet bars is to be had for early delivery at less than $45.

Pig-iron buying, which was less vigorous in some districts last week, has developed more activity in others, particularly at Pittsburgh and Chicago. The strengthening in Southern iron is more pronounced and in the Middle West this has caused a stronger market for Northern irons. With the exception of Chicago, where Southern and Northern makers have been competing sharply, Alabama iron has come up to a $14.50 basis. Aggressive selling at Chicago brought local iron to $18 for No. 2. In northern Ohio, however, No. 2 iron has advanced to $18.50 at Valley furnace.

At Pittsburgh a large foundry interest bought 25,000 tons, of which two-thirds went to the South. On deliveries in the next six months Southern iron in this case was sold as high as $14.50 and Northern up to $18.50 at furnace.

Basic pig iron is at last making some response to the conditions in steel. While a 20,000-ton sale was made at Youngstown last week at the long-standing $18 price, a 10,000-ton transaction is reported at $18.50, and producers are disposed to hold for this price. An eastern Pennsylvania steel company bought 18,000 tons of basic and 6000 tons was taken in New England. An Iowa steel company has closed for 12,000 tons.

In the Lake Superior ore market at Cleveland an Eastern interest has inquired for a large tonnage of non-Bessemer ore for 1917 delivery, and the sale will probably be made, with the price to be fixed later. Additional reservations of Bessemer and non-Bessemer ores are being made for next year, induced by the expectation that supply and demand will run a very close race in 1917 as in 1916.

Chicago

CHICAGO, ILL., Sept. 12, 1916.

Sales of pig iron in the last week have aggregated a very large tonnage. They included a lot of over 10,000 tons of basic, another of foundry iron of more than 5000 tons, Bessemer iron for export and some sizable lots of charcoal iron. Many important inquiries, one for 5000 tons of foundry iron, are still in the market. Prices of competitive iron have continued to reflect an aggressive desire on the part of producers to sell, particularly furnaces making high phosphorus Northern iron. Market activity in finished steel lines has been without new features of significance. About 10,000 tons of rails are under consideration and several lots of tie-plates. Among new inquiry for cars, that of the Nickel Plate for 500 automobile cars is the most important of domestic prospects, but the Russian Government is figuring on 7500 cars in addition to its recent purchase. Inquiry for steel for export is still being received in amounts from a few hundred tons upward and includes sheets, shipbuilding steel and bars. Local mills are in receipt of an offer of 5000 tons of sheet bars at $45 per ton, the inquiry carrying with it evidence of difficulty in placing it in more logical markets. In anticipation of generally higher prices for

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

Pig Iron, Per Gross Ton:	Sept. 12, 1916	Sept. 5, 1916	Aug. 16, 1916	Sept. 14, 1915
No. 2 X, Philadelphia	$19.50	$19.50	$19.00	$16.00
No. 2 Valley furnace	**18.50**	18.00	18.00	14.00
No. 2 Southern, Cin'ti	**17.40**	16.90	16.40	14.15
No. 2, Birmingham, Ala.	**14.50**	14.00	13.50	11.50
No. 2 furnace, Chicago*		18.50	18.50	14.00
Basic, del. eastern Pa.	19.00	19.00	19.00	17.00
Basic Valley furnace	18.00	18.00	18.00	14.00
Bessemer, Pittsburgh	21.95	21.95	21.95	16.90
Malleable Bess., Ch'go*	19.00	19.00	19.00	14.50
Gray forge, Pittsburgh	18.70	18.70	18.70	14.70
L. S. charcoal, Chicago	19.75	19.75	19.75	16.75

Billets, etc., Per Gross Ton:				
Bess. billets, Pittsburgh	45.00	45.00	47.00	24.00
O.-h. billets, Pittsburgh	45.00	45.00	47.00	24.00
O.-h. sheet bars, P'gh	45.00	45.00	47.00	25.50
Forging billets, base, P'gh	69.00	69.00	69.00	32.00
O.-h. billets, Phila	48.00	48.00	48.00	30.00
Wire rods, Pittsburgh	55.00	55.00	55.00	30.00

Finished Iron and Steel, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy at mill	1.47½	1.47½	1.47½	1.25
O.-h. rails, heavy at mill	1.56½	1.56½	1.56½	1.34
Iron bars, Philadelphia	2.659	2.659	2.659	1.459
Iron bars, Pittsburgh	2.60	2.60	2.60	1.35
Iron bars, Chicago	2.35	2.35	2.35	1.25
Steel bars, Pittsburgh	2.60	2.60	2.60	1.35
Steel bars, New York	2.769	2.769	2.769	1.519
Tank plates, Pittsburgh	4.00	4.00	3.50	1.35
Tank plates, New York	4.169	4.169	3.669	1.519
Beams, etc., Pittsburgh	2.60	2.60	2.50	1.35
Beams, etc., New York	2.769	2.769	2.669	1.519
Skelp, grooved steel, P'gh	2.35	2.35	2.35	1.30
Skelp, sheared steel, P'gh	2.45	2.45	2.45	1.35
Steel hoops, Pittsburgh	3.00	3.00	3.00	1.35

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire,				
Sheets, black, No. 28	4.00	4.00	4.00	2.90
Sheets, galv., No. 28	5.00	5.00	5.00	3.90
Wire nails	2.00	2.00	2.00	1.65
Cut nails	2.60	2.60	2.60	1.70
Fence wire, base	2.60	2.60	2.60	1.70
Barb wire, galv.	3.10	3.10	3.10	2.25

Old Material, Per Gross Ton:				
Iron rails, Chicago	18.75	18.75	18.50	13.50
Iron rails, Philadelphia	20.00	20.00	20.00	18.50
Carwheels, Chicago	**11.75**	11.50	11.50	11.75
Carwheels, Philadelphia	14.50	14.50	14.50	14.00
Heavy steel scrap, P'gh	16.00	16.00	16.00	14.50
Heavy steel scrap, Phila	14.75	14.75	14.75	15.00
Heavy steel scrap, Chgo	**16.00**	14.50	14.25	11.75
No. 1 cast, Pittsburgh	14.50	14.50	15.00	13.00
No. 1 cast, Philadelphia	16.00	16.00	16.00	14.00
No. 1 cast, Ch'go (net ton)	12.00	12.00	11.50	10.00
No. 1 RR. wrot, Phila	20.00	20.00	20.00	16.50
No. 1 RR. wrot, Ch'go (net ton)	**16.50**	16.00	15.25	11.00

Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	$2.90	$3.00	$2.75	$1.60
Furnace coke, future	2.50	2.50	2.50	2.00
Foundry coke, prompt	3.25	3.50	3.25	2.15
Foundry coke, future	3.50	3.50	3.50	2.40

Metals, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	28.00	28.00	26.75	18.00
Electrolytic copper, N. Y.	**28.12½**	28.00	26.50	17.75
Spelter, St. Louis	**9.00**	8.50	8.75	13.75
Spelter, New York	**9.25**	8.75	9.00	14.00
Lead, St. Louis	6.60	6.60	5.90	4.35
Lead, New York	6.75	6.75	6.00	4.50
Tin, New York	*38.25*	38.87½	39.00	33.37½
Antimony, Asiatic, N. Y.	*11.00*	12.00	10.00	27.50
Tin plate, 100-lb. box, P'gh.	$5.75	$5.75	$6.00	$3.15

sheet bars in the last quarter, the market is firmer with respect to sheet prices. A substantial advance has been made in the asking prices for scrap but the higher level can not be considered as entirely established in the absence of consumer buying of any importance.

Rails and Track Supplies.—A few small lots of rails, totaling about 10,000 tons, are under consideration, in which connection the inability of the mills to deliver this year is resulting in the postponement of railroad work planned for this fall. Prices are also being asked on several lots of tie-plates, for which the makers of iron plates are the more likely bidders. Quotations are as follows: Standard railroad spikes, 2.75c., base; track bolts with square nuts, 3.25c. to 3.50c., base, all in carload lots, Chicago; tie-plates, $50, f.o.b. mill, net ton; standard section, Bessemer rails, Chicago, $33, base; open-hearth, $35; light rails, 25 to 45 lb., $40; 16 to 20 lb., $41; 12 lb., $42; 8 lb., $43; angle bars, 2c., Chicago.

Pig Iron.—The week's buying movement in pig iron has involved a number of orders of large size and a general participation by gray-iron foundries throughout the district. It is stated that the Iowa inquiry for 12,000 tons of basic has been closed, as have several lots of malleable iron. There is also important inquiry for charcoal iron, including one lot of 1500 tons for a southern Illinois consumer. The feature of the market has been the competition between Southern and Northern iron having a phosphorus content of 0.50 to 0.80. In several instances Northern iron of this grade has been sold in competition with a price of $14, Birmingham, for Southern. A large implement interest is understood to have secured a part of its total purchase at slightly under that figure. The keenness of competition is indicated by the fact that whereas furnace quotations from the South of less than $14.50, Birmingham, were not admitted a week ago, $18 delivered, Chicago, was done last week and is still available. Among the inquiries still outstanding are one for 5000 tons of foundry iron and several others of over 1000 tons. While the bulk of the iron being bought is for first half delivery, a surprisingly large proportion is for last quarter shipment. Further sales of Bessemer iron for export are reported. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of $1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5	$19.75
Lake Superior charcoal, No. 1	20.25
Lake Superior charcoal, No. 6 and Scotch	20.75
Northern coke foundry, No. 1	$19.00 to 19.50
Northern coke foundry, No. 2	18.00 to 19.00
Northern coke foundry, No. 3	18.00 to 18.50
Southern coke, No. 1 f'dry and 1 soft	18.50 to 19.00
Southern coke, No. 2 f'dry and 2 soft	18.00 to 18.50
Malleable Bessemer	19.00
Basic	19.00
Low phosphorus	34.00
Silvery, 8 per cent	29.50
Bessemer ferrosilicon, 10 per cent	32.50

Structural Material.—Figures are being taken on the equipment for an additional 7500 cars for the Russian Government, the early placing of which is expected. New inquiry for cars from domestic roads is of a miscellaneous nature, save for 500 automobile cars to be bought by the Nickel Plate. Among the orders for fabricated steel the largest is that for 2200 tons for a steel wheel plant at the Gary works of the Illinois Steel Company. Some six additional contracts calling for an aggregate of about 1200 tons are also reported. Nearly all of the fabricators are comfortably fixed in the matter of work in their shops, and have bought as liberally as possible of plain material for first-half delivery. The report of a price of 2.70c., Pittsburgh, for structural shapes, having considerable currency in this market, has little support in the quotations of the principal mills. We quote for Chicago delivery of structural steel from mill, 2.789c.

We quote for Chicago delivery of structural steel from jobbers' stocks, 3.10c.

Plates.—There is little change in the plate situation, prices ranging downward from 4c., Pittsburgh, which is being obtained for wide plates for prompt delivery, to 3c., the generally quoted price for first half contracts. Sales of plates in average widths for early delivery are

being made at prices from 3.25c. to 3.50c. We quote for Chicago delivery of plates from mill at its convenience 3.189c. For prompt shipment we quote 3.439c. to 3.689c. in widths up to 72 in., and for wide plates 4.189c.

We quote for Chicago delivery of plates from jobbers stock 3.40c.

Sheets.—While the strengthening of the market with respect to black sheets in particular has not been sharply marked by the disappearance of all low prices, a distinctly firmer situation obtains. The apparent certainty of higher prices for sheet bars in the last quarter has made sheet mills more conservative in their concessions, and this market reflects the effort to secure a minimum of 3c., Pittsburgh, for open-hearth sheets and 2.90c. for Bessemer. In respect of blue annealed and galvanized sheets, quotations of last week are without change. We quote for Chicago delivery, blue annealed, No. 16 and heavier, 3.139c. to 3.339c.; box annealed, No. 17 and lighter, 2.989c. to 3.039c.; No. 28 galvanized, 4.289c. to 4.389c.

We quote for Chicago delivery of sheets out of stock, minimum prices applying on bundles of 400 or more, as follows: No. 10 blue annealed, 3.40c.; No. 28 black, 3.75c.; No. 28 galvanized, 4.65c. to 4.75c.

Bars.—With an improvement in the quantity of bar iron in orders offered to the mills, a firmer attitude is noted and some sales at 2.40c. are reported. The market, however, continues on the basis of 2.35c. The rerolling mills are making contracts for first half with a strict adherence to the Chicago price of 2.50c. We quote mill shipment, Chicago, as follows: Bar iron, 2.35c.; soft steel bars, 2.789c.; hard steel bars, 2.50c.; shafting, in carloads, 20 per cent off; less than carloads, 15 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 3.40c.; bar iron, 3.40c.; reinforcing bars, 3.40c.; base with 5c. extra for twisting in sizes 1 in. and over and usual card extras for smaller sizes; shafting 10 per cent off.

Rivets and Bolts.—Users of bolts and nuts very generally are being inconvenienced by delayed deliveries or because of inability to place orders for prompt shipment. The mills appear to be making but little progress against their backlog of orders. We quote as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 50-5; cut thread, 40-10-2½; larger sizes, 35-2½; machine bolts up to ⅜ x 4 in., rolled thread, with hot pressed square nuts, 50-10; cut thread, 50; large sizes, 40-5; gimlet-point coach screws, 50-5; hot pressed nuts, square, $2.70 off per 100 lb.; hexagon, $2.70 off. Structural rivets, ¾ to 1¼ in., 4c. to 4.15c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

We quote out of store: Structural rivets, 4c.; boiler rivets, 4.10c.; machine bolts up to ¾ x 4 in., 70-10; larger sizes, 40-10; carriage bolts up to ¾ x 6 in., 60-7; larger sizes, 40-5; hot pressed nuts, square, $3.25; and hexagon, $3.25 off per 100 lb.; lag screws, 70.

Wire Products.—Demand for wire nails continues to grow more rapidly than it can be accommodated by the mills, and jobbers find themselves greatly handicapped in their function of prompt delivery by reason of slow mill deliveries. The beginning of fall trade is being felt in the inquiry for barb wire, but sales of fence continue light. We quote as follows per 100 lb.: Plain wire, Nos. 6 to 9, base, $2.839; wire nails, $2.789; painted barb wire, $2.939; galvanized barb wire, $3.639; polished staples, $2.939; galvanized staples, $3.639; all Chicago.

Cast-Iron Pipe.—The leading interest is the low bidder for 1000 tons of pipe for the city of Chicago. Other new business of size is lacking. We quote as follows, per net ton, Chicago: Water pipe, 4-in., $33.50 to $34; 6-in., and larger, $30.50 to $31, with $1 extra for Class A water pipe and gas pipe.

Old Material.—Prices now being quoted in this market show still further advances, but the strength of the market at the higher level is largely speculative pending the advent of consumer buying in significant quantities. The advance appears to have been built upon anticipations of an approaching buying movement made necessary by the protracted absence of the principal melters from the market, and its effectiveness will doubtless depend upon that buying being inaugurated at an early date. There is still no great amount of scrap being offered for sale, railroad lists especially being small. Current railroad offerings include 2000 tons from the Michigan Central and 2700 tons from the Big Four. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	$18.75 to $19.25
Relaying rails	19.50 to 20.50
Old carwheels	11.75 to 12.25
Old steel rails, rerolling	17.00 to 17.25
Old steel rails, less than 3 ft.	16.50 to 17.00
Heavy melting steel scrap	16.00 to 16.25
Frogs, switching and guards, cut apart	16.00 to 16.25
Shoveling steel	15.50 to 15.75
Steel axle turnings	8.75 to 9.25

Per Net Ton

Iron angles and splice bars	$18.75 to $19.00
Iron arch bars and transoms	20.00 to 20.50
Steel angle bars	15.25 to 15.75
Iron car axles	25.50 to 26.00
Steel car axles	28.00 to 28.50
No. 1 railroad wrought	16.50 to 17.00
No. 2 railroad wrought	15.00 to 15.50
Cut forge	15.00 to 15.50
Pipes and flues	12.00 to 12.50
No. 1 busheling	14.00 to 14.50
No. 2 busheling	9.50 to 10.00
Steel knuckles and couplers	14.75 to 15.00
Steel springs	15.25 to 15.50
No. 1 boilers, cut to sheets and rings	10.25 to 10.75
Boiler punchings	14.00 to 14.50
Locomotive tires, smooth	21.50 to 22.00
Machine-shop turnings	7.50 to 8.00
Cast borings	6.50 to 7.00
No. 1 cast scrap	12.00 to 12.50
Stove plate and light cast scrap	9.75 to 10.25
Grate bars	10.00 to 10.25
Brake shoes	9.75 to 10.25
Railroad malleable	11.50 to 12.00
Agricultural malleable	11.00 to 11.50

Philadelphia

PHILADELPHIA, PA., Sept. 12, 1916.

The already heavy demand for plates took a fresh spurt four or five days ago, and since then inquiries aggregating fully 75,000 tons have been received by makers. It is assumed that consumers are seeking to cover their future requirements as a protection against the heavy demands of the Government naval program. The purchase of two large lots of basic pig iron is reported, one lot of 18,000 tons being taken by a Harrisburg consumer and another lot of several thousand tons by a Bridgeport plant. A price over the market was paid in the first instance. Foundry pig iron continues fairly active, but quotations are not as high, proportionately, as those of steel-making iron. Steel bars and structural material are as scarce as ever and prices are stiff, but building work requiring shapes shows a tendency to lag in the East. Western consumers of both plates and shapes are making inquiry in this district. Old material is quiet so far as new business is concerned.

Pig Iron.—The Harrisburg interest which was in the market for 18,000 tons of basic, first half delivery, has closed for probably the full amount at a price understood to be near $20.50, delivered. Another lot of several thousand tons was taken by a Bridgeport consumer, also at a price not far from $20.50, delivered. Although the already fair demand for foundry iron continues to grow better, its prices are irregular and do not show strength proportionate to those of steel-making iron, a fact which puzzles the producers. One explanation of the situation is that the shortage of labor has cut down consumption, this being demonstrated in New England. Eastern Pennsylvania No. 2 X still ranges from $19.50 to $20, Philadelphia, and Virginia No. 2 X at $20.25 to $21.25. The producer quoting the minimum is selling for last and first quarters, specifying even monthly deliveries, while $21.25 is asked by a producer selling over the first half of 1917. The Norfolk & Western Railway has placed orders for various grades for first half delivery, including 1500 tons of Ohio malleable and 3500 tons of No. 2 X, No. 2 plain and high manganese. Two Virginia furnaces will supply 1200 tons each. In the past 10 days the producer quoting the minimum for Virginia No. 2 X has taken orders for about 14,000 tons. In the week just ended another seller has placed nearly 11,000 tons of miscellaneous grades. The stove manufacturers continue ac-

tive. Charcoal iron is not nearly so active in this city as it is in the West. Plenty of export inquiry continues to appear for standard Bessemer, also for Bessemer running better than 0.05 sulphur. Low phosphorus and occasionally basic also are wanted for export. Standard low phosphorus is strong at $34 to $35, delivered, and one maker reports the sale of 2000 tons. Quotations for standard brands, delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa. No. 2 X foundry	$19.50 to $20.00
Eastern Pa. No. 2 plain	19.25 to 19.75
Virginia No. 2 X foundry	20.25 to 21.25
Virginia No. 2 plain	20.00 to 20.75
Gray forge	18.50 to 19.00
Basic	19.75 to 20.00
Standard low phosphorus	34.00 to 35.00

Iron Ore.—Arrivals at this port in the week ended Sept. 9 consisted of 12,600 tons from Cuba and 7048 tons from Sweden. In the previous week 7700 tons arrived from Cuba.

Ferroalloys.—The market presents little of interest. Both foreign and domestic 80 per cent ferromanganese is held at $175, seaboard, but domestic makers will shade this price. Fifty per cent ferrosilicon is unchanged at $86 to $88, Pittsburgh. There is inquiry for small lots of 11 per cent ferrosilicon, which is quoted at $34.44, Philadelphia. A shipment of 500 tons of English ferromanganese arrived here last week.

Plates.—Inquiry received in the past four or five days aggregates fully 75,000 tons, mostly from domestic shipyards. It is believed that the great activity is due to apprehension on the part of consumers that the Government naval program may absorb so much capacity that they will be left in the lurch unless they cover their future needs at this time. The situation with regard to deliveries is as tight as ever, and is serious for smaller consumers who do not contract far ahead, unless they can pay premiums. The builders of a blast furnace recently were forced to pay a premium of $4000 for plates. A New York boilermaker states that he may have to close his shop despite the fact that he has bought plates for 25 years from two concerns, both of which are now unable to give him the prompt deliveries he requires. While the larger mills continue to quote 4.159c., Philadelphia, as their minimum, delivery at convenience of the mill, lower can be done on contracts, probably 3.50c., Pittsburgh, or 3.659c., Philadelphia, or lower. Some comparatively low bids have been made for delivery of ship plates on the Pacific coast. One mill can make deliveries in six to eight weeks. Large tonnages of ship plates for export continue to be turned down.

Bars.—The nominal quotation for steel bars is 2.759c., Philadelphia, but up to 3.159c., Philadelphia, is quoted for Bessemer bars. Iron bars are unchanged at 2.659c., Philadelphia.

Structural Material.—New propositions are scarce, but material also is difficult to obtain. Bids have been submitted on two new hotels—at Baltimore and Washington, D. C.—but both have been held up, presumably because of the high cost of all materials. Miscellaneous inquiry is good, and again the West is looking to the East for steel. An eastern Pennsylvania mill quotes 2.759c. to 3.159c., delivery at the mill's convenience, which is stated to be in February. Nearby Bessemer shapes are quoted up to 3.659c., Philadelphia. Ship shapes, of course, are in heavy demand.

Billets.—The minimum quotation for open-hearth rerolling billets is unchanged at $48, Eastern mill, and that for forging billets is $65.

Sheets.—The domestic demand is lighter, but there is a good demand from abroad which is now receiving more attention. The quotations for No. 10 blue annealed range from 3.159c. to 3.659c., Philadelphia.

Coke.—Most of the foundries appear to be well supplied with coke. Spot furnace is fairly active. Quotations are unchanged as follows: Spot furnace, $2.75 to $2.85 per net ton at oven; contract, nominally $2.50; spot and contract foundry, $3.25 to $3.50 per net ton at oven. Freight rates from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Old Material.—The market continues very quiet. Coatesville is still under embargo. A large consumer has resumed taking shipments of machine-shop turnings, and these are a little stronger. The dealers are busy executing old contracts; meanwhile a great deal of scrap is being produced, and many consumers are using more than their usual quota of pig iron in place of old material. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$14.75 to $15.25
Old steel rails, rerolling	17.00 to 18.00
Low phos. heavy melting steel scrap	21.25 to 23.50
Old steel axles (for export)	34.00 to 35.00
Old iron axles (for export)	34.00 to 35.00
Old iron rails	20.00 to 20.50
Old carwheels	15.50 to 16.00
No. 1 railroad wrought	15.00 to 15.50
Wrought-iron pipe	13.50 to 14.00
No. 1 forge fire	12.00 to 12.50
Bundled sheets	12.00 to 12.50
No. 2 busheling	10.50 to 11.00
Machine-shop turnings	7.00 to 8.00
Cast borings	6.00 to 7.00
No. 1 cast	16.00 to 16.50
Grate bars, railroad	11.75 to 12.25
Stove plate	11.75 to 12.25
Railroad malleable	13.50 to 14.00

Cincinnati

CINCINNATI, OHIO, Sept. 13, 1916.—(*By Wire.*)

Pig Iron.—The comparatively large tonnage of Southern iron recently sold has put the furnaces of that section in a more independent position. Furnace iron this week is on the $14.50, Birmingham, basis, and competition from Tennessee furnaces that was evident last week at $14 for this year's shipment seems to have disappeared. Southern resale iron also appears to have become a somewhat negligible factor, as most of it is now in the hands of melters or of iron merchants who are not disposed to release their holdings below the regular market price. There is an undercurrent of feeling that Northern producers contemplate an advance over $18, Ironton, but at the moment contracts at this price can be made for delivery through the first half of next year. Business has slackened in this vicinity, but reports from other buying centers are more encouraging. Orders recently received from nearby melters are mostly for small quantities in central Ohio, among them being 500 tons of Southern foundry taken by two separate melters for first half shipment. Indiana foundries are extending their purchases with the idea in view of carrying them through the first half. It is reported that the Standard Sanitary Mfg. Company bought 10,000 tons, with deliveries to run until June 1 of next year, about 7000 tons of which is supposed to have been placed with Southern producers. Malleable sales have been light, and there is only one lot of basic yet to be placed in this territory to fill present mill requirements through the first quarter of next year. Ohio silvery irons are stronger, but $27 at furnace can still be done on an 8 per cent analysis. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	$17.90 to $18.40
Southern coke, No. 2 f'dry and 2 soft	17.40 to 17.90
Southern coke, No. 3 foundry	16.90 to 17.40
Southern coke, No. 4 foundry	16.40 to 16.90
Southern gray forge	15.90 to 16.40
Ohio silvery, 8 per cent silicon	28.26 to 28.76
Southern Ohio coke, No. 1	20.26 to 20.76
Southern Ohio coke, No. 2	19.26 to 19.76
Southern Ohio coke, No. 3	18.76 to 19.26
Southern Ohio malleable Bessemer	19.26 to 19.76
Basic, Northern	19.26 to 19.76
Lake Superior charcoal	21.26 to 22.26
Standard Southern carwheel	24.90 to 27.40

(By Mail)

Coke.—Wise County producers have sold to Tennessee consumers approximately 100,000 tons of furnace coke for shipment in the next 12 months. The price is said to have been close to $3 per net ton at oven. The foundry coke situation is unchanged, with only a few contracts reported that do not extend into next year. Prices are firm and specifications on contracts are good. Connellsville 48-hr. coke is quoted around $2.50 to $2.75 at oven, but Wise County and Pocahontas operators ask premiums of 10c. to 25c. per ton. With the exception of New River foundry coke, which is held at $3.90 to $4 at oven, the other three producing districts are about uniform at $3.50 to $3.75.

Finished Material.—The local warehouses have lately been almost overrun with orders. While they are ex-

periencing considerable trouble in obtaining shipments from the mills to fill the requirements of their customers, they have so far been able to make reasonably prompt deliveries on all orders received. The nearby mills are quoting No. 28 black sheets on a basis of 3c., Pittsburgh, or 3.15c., Cincinnati or Newport, Ky., and No. 28 galvanized sheets are held by them at 4.40c. to 4.50c., Pittsburgh, with the usual 15.8c. per 100 lb. freight added. The local store quotations are as follows: Steel bars and small structural shapes, 3.20c.; twisted steel bars, 3.35c.; wire nails, $2.85 per keg base; barb wire, $3.70 per 100 lb., and No. 10 blue annealed sheets, around 3.50c.

Old Material.—Prices on a number of grades of scrap have been advanced and more business is reported than in the previous week. The firmer attitude of pig-iron producers in the South has had something to do with the situation, but the activity is principally on account of the much better demand from consumers. All kinds of wrought scrap have also taken on an advance and the price situation is more stable than it has been for several months. The following are dealers' prices f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton	
Bundled sheet scrap	$10.75 to $11.25
Old iron rails	15.75 to 16.25
Relaying rails, 50 lb. and up	21.00 to 21.50
Rerolling steel rails	14.75 to 15.25
Heavy melting steel scrap	14.25 to 14.75
Steel rails for melting	13.25 to 13.75
Per Net Ton	
No. 1 railroad wrought	$14.00 to $14.50
Cast borings	4.50 to 5.00
Steel turnings	4.75 to 5.25
Railroad cast scrap	11.25 to 11.75
No. 1 machinery cast scrap	13.00 to 13.50
Burnt scrap	8.25 to 8.75
Iron axles	25.00 to 26.00
Locomotive tires (smooth inside)	21.00 to 21.50
Pipes and flues	9.25 to 9.75
Malleable and steel scrap	11.00 to 11.50
Railroad tank and sheet scrap	8.50 to 9.00

Birmingham

BIRMINGHAM, ALA., Sept. 11, 1916.

Coal and Coke.—The coal trade is as active as scarcity of cars will permit. The domestic mines are recovering from a long period of inactivity and the steam coal demand is also good. Coke remains very strong, the demand taking the entire output. Few additional beehive ovens are available, hence there is little danger of a recession in prices from increased production. Shipments to Texas, the Far West and the Pacific coast have been quite brisk. There is also some coke moving to Mexico. We quote, per net ton, f.o.b. oven, as follows: Standard beehive foundry, $4.25 to $4.50; furnace, $3.25 to $3.50.

Pig Iron.—Two local iron manufacturers have sold in the past 30 days a total of 140,000 tons, comprising basic and foundry, the percentage of each not ascertainable. Combined sales of all makers must have approximated 200,000 tons, which is within 18,000 tons of the make. The Alabama Company is reported to have booked 30,000 tons in the past three weeks. Its regular foundry bookings will be taken care of by the Gadsden stack recently put in. The company making the largest sales reports a stock diminution during August, with present shipments much above its make. The leading interest does not appear to be doing much of the business. The foundry-iron makers will have a still more open field after Oct. 1, when the Woodward Iron Company will turn its No. 1 furnace on basic, for which it is billed to capacity well into 1917. Its furnace already running on basic has its capacity sold for almost a year. A third interest, heretofore an exclusively foundry-iron maker, is figuring on putting a furnace on basic. August's make of basic iron was the largest on record by 4000 tons. Steel consumption in Alabama and the South is at a maximum. One large mill is sold up practically throughout next year. Furnacemen agree in stating that $14.50 for spot and the rest of the year may be done, with $15 asked for 1917. Small lots have been sold for September and October at $14.50 and $15. Two furnace agents report that regular customers who were quoted $14.50 did not buy, which is taken as an indication that better than $14.50 has been done in some quarters. There is a heavy movement of iron for export, some of which was bought months ago. A considerable portion is going to Norway and Sweden. Billets and rails are regularly leaving Southern ports for foreign destinations. General indications are of a stiffening market with a greater production of basic and, in turn, greater opportunity for the foundry iron that is produced. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	$15.00 to $15.50
No. 2 foundry and soft	14.50 to 15.00
No. 3 foundry	14.00 to 14.50
No. 4 foundry	13.75 to 14.25
Gray forge	13.50 to 14.00
Basic	14.50 to 15.00
Charcoal	22.00 to 22.50

Cast-Iron Pipe.—The gas and water pipe shops have taken on greater activity, and yards have been well emptied by the rush shipments to the Far West. Inquiries are increasing and larger volumes are inquired for. The sanitary shops are doing only a fairly good business. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., $28; 6-in. and upward, $25, with $1 added for gas pipe and 16-ft. lengths.

Old Material.—The market has not improved to any extent. There is a good deal of old material on hand, and the largest steel plant is making its own scrap and taking practically none from the yards. However, all the cheap pig iron that has been utilized in foundries and machine shops in place of scrap has about disappeared, and a brisker demand for scrap is looked for. Steel axles fetch a wide range of prices, according to the customer and the amount available at any one time. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old steel axles	$24.00 to $30.00
Old steel rails	10.00 to 10.50
No. 1 steel scrap	9.25 to 9.75
No. 1 wrought scrap	12.50 to 13.00
No. 1 cast scrap	9.50 to 10.00
Extra heavy cast scrap	9.00 to 9.50
Stove plate and light	8.50 to 9.00
Old carwheels	9.50 to 10.00
Tram carwheels	9.50 to 10.00

St. Louis

ST. LOUIS, MO., Sept. 11, 1916.

Pig Iron.—Although all the big consumers are out of the market, the smaller concerns are still buying or making inquiry, though somewhat hesitant about purchases as if loth to believe that prices are as firm as the furnace representatives hold them out to be. It now develops that the aggregate purchases of the large consumers recently reported reached a total in excess of 70,000 tons, additions having been made after the initial buying was done. Of this amount the local furnace took about 25,000 tons at exceptionally good prices, while in one case it is known to have made a sale of some special iron at $22 at furnace. It is still running on foundry iron, but will shortly turn to basic to meet contracted deliveries. During the past week the sales and inquiries have run from 500 tons down, largely for first half delivery, and the total transactions have probably been about 4000 tons, exclusive of a sale of about 6000 tons of malleable delayed in being reported.

Coke.—Transactions have been in small lots at stiffly held prices in consonance with the Connellsville figures and even above where the amounts sought were small.

Finished Iron and Steel.—Finished products have been moving as freely as the constricted supply will permit and there is increasing disposition to contract if only deliveries could be obtained of a satisfactory character. Building operations are increasing both actually and in prospect. Light rails are being fairly well taken, mostly by the coal interests, the lumber concerns being out of the market for the most part. Track fastenings are in good request and all classes of material are thoroughly well specified up to contract allotments. Movement out of warehouse has been active and for such stock we quote as follows: Soft steel bars, 3.15c.; iron bars, 3.05c. to 3.10c.; structural material, 3.15c.; tank plates, 3.55c. to 3.60c.; No. 10 blue

annealed sheets, 3.45c.; No. 28 black sheets, one pass, cold rolled, 3.45c.; No. 28 galvanized sheets, black sheet gage, 4.75c. to 5c.

Old Material.—The scrap market continues strictly under the influence of dealers' operations, though there is a slight tendency on the part of rolling mills and steel mills to take some interet. Most of the transactions are those of dealers taking care of their short sales, though all are acting in the confident expectation of a better market and even higher prices than those which are now quoted. Relaying rails, standard section, are practically out of the market because of lack of supply, though the demand is very heavy. Light rails are easier than standard sections though in short supply compared with requirements. Lists out during the week included the Big Four, 4500 tons; Missouri, Kansas & Texas, 2500 tons; Wabash, 3000 tons; Cotton Belt, 300 tons, Chicago & Alton, 600 tons; Terminal Association, 500 tons; Southern Railway, 3500 tons, and Vandalia, 500 tons. The Frisco and Missouri Pacific are selling from day to day as accumulations are acquired. Altogether the railroad offerings are heavy, but in spite of this the dealers' speculation and the confident optimism are holding prices at a high level. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton

Old iron rails	$17.[illegible] to $17.[illegible]
Old steel rails, rerolling	16.00 to 16.50
Old steel rails, less than 3 ft.	16.00 to 16.[illegible]
Relaying rails, standard section, subject to inspection	23.00 to 24.00
Old carwheels	12.00 to 12.50
No. 1 railroad heavy melting steel scrap	15.00 to 15.50
Heavy shoveling steel	14.00 to 14.50
Frogs, switches and guards cut apart	15.00 to 15.50
Bundled sheet scrap	8.00 to 8.50

Per Net Ton

Iron angle bars	$16.00 to $16.50
Steel angle bars	14.00 to 14.50
Iron car axles	26.50 to 27.00
Steel car axles	27.50 to 28.00
Wrought arch bars and transoms	21.00 to 21.50
No. 1 railroad wrought	16.00 to 16.50
No. 2 railroad wrought	15.25 to 15.75
Railroad springs	15.00 to 15.50
Steel couplers and knuckles	14.50 to 15.00
Locomotive tires, 42 in. and over, smooth inside	20.50 to 21.00
No. 1 dealers' forge	10.25 to 10.75
Cast-iron borings	7.00 to 7.50
No. 1 busheling	13.50 to 14.00
No. 1 boilers, cut to sheets and rings	10.25 to 10.50
No. 1 railroad cast scrap	11.75 to 12.00
Stove plate and light cast scrap	9.25 to 9.50
Railroad malleable	11.00 to 11.50
Agricultural malleable	10.00 to 10.50
Pipes and flues	11.00 to 11.50
Heavy railroad sheet and tank scrap	11.00 to 11.25
Railroad grate bars	9.50 to 10.00
Machine shop turnings	7.00 to 7.50

San Francisco

SAN FRANCISCO, CAL., Aug. 31, 1916.

The past month has brought out heavy specifications in all lines on which delivery could be made before Sept. 1, and there has also been some new buying for prompt shipment. This was entirely attributable to the prospect of advanced freight rates and interruption of rail service, which led local buyers to get as much as possible of their third and fourth quarter stock into their hands. The distributive movement in the building trades and among small consumers has been comparatively light, with a general tendency to hold expenditures down as closely as possible during the period of high prices, though the requirements of shipbuilders and other manufacturers, mining industries, etc., continue very large.

Bars.—Foreign inquiries are increasing again, though no great tonnage has yet been placed. Local mills report plenty of business in nearby territory, and are helped somewhat by the recent Eastern advance. They are gradually improving their service in the matter of assortments, but are still slow on deliveries. The tonnage of iron bars keeps up well. Reinforcing material is in good demand in outside territory, but local building requirements are dwindling. Resale prices on small lots remain at 4c. for steel and 3.90c. for iron. Steel bars from the Steel Corporation's warehouse in carloads to the trade are 3.80c.

Structural Material.—Most local fabricators are operating in a small way on an open-shop basis, no plants of much importance having complied with the union demands. No great effort is being made to get new work; and, indeed, there is little to be had, aside from the usual scattering of insignificant jobs. The high cost of materials has nearly put a stop to speculative construction of large office or business buildings, but there are some inquiries for bridges and industrial buildings. Business in shapes is coming mainly from shipbuilders and manufacturers, who are keeping their requirements covered for many months ahead and have endeavored to accumulate some surplus tonnage the past month. Shapes in carloads from local warehouse to the trade are held at 3.85c. The Schrader Iron Works has taken an apartment-house contract on Leavenworth Street near Sutter. Preliminary surveys have been made for a bridge on the Sacramento River near Rio Vista. Plans will appear shortly for a new library at Sacramento, Cal., and competitive designs are to be submitted soon for the State building in this city. The Palm Iron Works, Sacramento, has 100 tons for the Anderson-Cottonwood Irrigation District. The town of Kelso, Wash., is considering plans for a $55,000 steel bridge; Seattle is figuring on a new $50,000 bridge on the West Waterway, and San Diego, Cal., is preparing plans for a $40,000 bridge.

Rails.—Heavy rail business in California is quiet, though there is a fair amount of activity in the north coast States. Inquiries for light rails are numerous, but most buyers are looking for relayers, of which a large tonnage has been sold at rather high prices. The city of San Francisco has ordered 420 tons of 70-lb. rails for the Twin Peaks tunnel from the United States Steel Products Company.

Plates.—Expansion of shipbuilding plants continues at all important Pacific ports and, while business is retarded by shortage of material, there is considerable contracting for distant delivery. The riveted pipe business is also fairly active, with several important municipal and irrigation inquiries. Oil interests are also buying on a fairly liberal scale. Los Angeles County has taken figures on about 8000 tons of pipe, 8 to 54 in., the larger sizes to be riveted. Plates from the local warehouse in carloads to the trade are quoted at 4.30c., the jobbing price on small lots being 4.75c.

Sheets.—The movement of galvanized sheets is greatly restricted, prices being still too high to permit the customary use of this material in building. A little inquiry is noted for black sheets, but they are always an insignificant item in this market. Blue annealed are moving fairly well to manufacturers and large consumers, but the jobbing demand is light. No. 10 blue annealed sheets from store in small lots are held at 5c.

Wrought Pipe.—Oil-country business continues to show a fairly healthy activity without any great rush. There is some talk of a new line for the Shell Company. A few important waterworks inquiries have recently appeared. While merchants are well stocked, the last few weeks have brought a little spurt in orders for prompt shipment of small pipe. General plumbing requirements, however, are below normal.

Cast-Iron Pipe.—Buyers have been endeavoring to accelerate deliveries as much as possible, but the car shortage has held back many shipments. The town of Glendale, Cal., has ordered about 1000 tons, and Santa Monica, Cal., will shortly take bids for a large water system bond issue. Madera, Cal., has taken bids for 1600 ft. of 6-in.

Pig Iron.—Local melting requirements are hardly as large as a few months ago, but in anticipation of the freight advance Sept. 1 an exceptionally heavy tonnage has been brought in during the last month and heavy stocks have been accumulated. There is little new business, and nothing important either in new contracts or shipping orders is expected for some time. More firmness is noted as to values, No. 1 Southern foundry iron being quoted here at $26.50 to $27 per gross ton.

Coke.—Aside from the heavy tonnage recently shipped in on contracts the market is quiet, most foundries being supplied for several months. Durham coke is now held at $16.75 per net ton, with some Southern brands offered at $15.75.

New York

NEW YORK, Sept. 13, 1916.

Pig Iron.—While the market does not show as many large transactions as have been reported in the past two or three weeks, the activity keeps up, and between foreign and domestic inquiries and sales sellers are kept busy. Pennsylvania furnaces have done rather more of the late business than those at Buffalo. Prices are practically the same, what change there is being in the rather firmer position of furnaces that have been known as low sellers in recent weeks. About $19 at Pennsylvania furnace for No. 2 X foundry is the basis. The American Locomotive Company's inquiry for 5000 tons seems not to have ended in contracts. Whether the company has withdrawn from the market for the present does not appear. A Newark foundry has bought 2000 tons of high silicon iron (3.25 to 3.75 per cent) for delivery in the first half of next year. In New England the purchase of 6000 tons of basic by a Connecticut interest is the largest transaction. There has been some sale of foundry iron there and a malleable foundry is inquiring for 1000 tons. In New York and immediate vicinity several inquiries from pipe foundries have come up, two being for soil pipe plants, one of them for Southern iron. The third is from a water pipe foundry which will probably take 2000 to 4000 tons for the first half. A New York State coupler works is in the market for 3000 to 5000 tons of malleable, deliveries to begin in October at the rate of 700 tons a month. The export inquiry is persistent and for a variety of irons from various countries. Norway recently bought 1000 tons. Italy and Holland are inquiring, the former for Bessemer iron and the latter for foundry. Quite a little low phosphorus and basic iron is wanted for England. Japan is also in the market for low phosphorus, as is also Canada. Probably 25,000 tons of export iron is before the trade and 10,000 tons of this is likely to be bought soon. Practically all the export iron is for early delivery. Vessel room is the principal problem. Holland's recent purchases have amounted to 5000 tons, and Switzerland took 2000 tons. We quote at tidewater for early delivery: No. 1 foundry, $20 to $20.50; No. 2 X, $19.50 to $19.75; No. 2 plain, $19.25 to $19.50; Southern iron at tidewater, $19.25 to $19.75 for No. 1 and $18.75 to $19.25 for No. 2 foundry and No. 2 soft.

Ferroalloys.—Inquiries for ferromanganese are more numerous. Domestic consumers are asking for about 6000 tons, while foreign buyers want 2000 to 3000 tons. The delivery desired in each case is for last quarter and for 1917, with new inquiry for the latter. Small lots for early delivery have been sold at the regular quotation of $175, seaboard, with small sales for foreign consumption bringing a higher price. While $175 can probably be shaded, there is a belief that the great consumption, as well as the indication of an increase as 1917 approaches, rather than a decrease, will result in a stiffening of prices. Spiegeleisen is quiet at $45 to $50, furnace, so far as domestic inquiry is concerned. Foreign inquiries represent about 3000 tons, with little prospect that it can be obtained. Ferrosilicon, 10 per cent, is $30, furnace, with about $2 additional for each 1 per cent increase in silicon. High grade ferrosilicon is in active demand, with specifications on contracts insistent.

Structural Material.—About 31,000 tons of steel for various new enterprises is before the market, but the closing of contracts has been slow. One fabricator reports that he is booked up well into 1917, but that the general and marked inefficiency of labor is a distinct handicap, resulting in a production of not more than 60 per cent of what it usually is when the labor market is normal and business is prosperous. This is regarded as typical of the entire situation. New business is not of large volume, but enough is appearing each week to keep fabricators busy. New propositions not heretofore reported include 600 tons for a telephone building, Springfield, Mass.; 200 tons for a freight house for the Pennsylvania Railroad at Harrisburg, Pa.; 300 tons for an addition to the Vanderbilt Concourse Building; 900 tons for a trading school for girls, New York City, already before the general contractors; 300 tons for a bridge for the Pennsylvania Railroad at Trenton, N. J., bids for which are already in; 200 tons for a small bridge for the Pennsylvania Railroad, with other railroads also inquiring for small bridges. A nine-story apartment, located at Seventy-second Street near Park Avenue, for which Schwartz & Gross are architects, was placed before the market to-day, but the tonnage required was not mentioned. The 6000 to 7000 tons for the Southern Railroad is still up for bids. The American Bridge Company has bid on 700 tons for a bridge for the Chesapeake & Ohio Railroad. New contracts recently awarded are reported as follows: To the Chesapeake Iron Works, 400 tons for a boiler house for the Consolidated Gas Company, Baltimore; to the American Bridge Company, 200 tons for six bridges for the Pennsylvania Railroad; to Levering & Garrigues, 800 tons for the C. H. Ditson Building, Boston, and to the Hay Foundry & Iron Works, 450 tons for the West End Company's apartment on West Eighty-sixth Street. We quote mill shipments of plain structural material at 2.769c. to 3.019c., New York, for delivery in two to three months, with store material at 3.25c.

Plates and Bars.—A Maine shipyard is in the market for 10,000 tons of plates and will take delivery in the last half of 1917 if necessary. Japan is inquiring for two lots of 2600 tons and 3500 tons, respectively, and the general demand for odd lots is brisk for both plates and bars. Inquiries are already appearing for plates, forgings, etc., in connection with the new Government naval program and it is believed that this is acting as a stimulant to other domestic buyers, tending also to stiffen the market. Most mills are booked far ahead, with very little to offer for early delivery. Foreign inquiries continue to appear and domestic consumers, especially of ship plates, are more active in getting protection. Universal plates can generally be obtained at from $5 to $10 per ton less than sheared plates. Car inquiries are very few. It is reported but not confirmed that the Pullman Company has taken an order for 1000 cars for the Western Pacific. Steel bars are quoted at 2.769c. for delivery at convenience of the mill, and as high as 3.169c. for, say, three months, and limited largely to Bessemer steel; bar iron is quoted at 2.669c. and steel plates at 3.169c. to 4.169c., the wider the plates and the earlier the delivery, the higher the price. Out of store iron and steel bars at 3.25c., New York; plates are 4c.

Cast-Iron Pipe.—The only public letting announced in this vicinity is that of New York City, which will open bids on Friday of this week on 218 tons of 12-in. While municipal business continues extremely backward, private buying is of fair proportions. Prices are firm. Carload lots of 6-in., class B and heavier, are quoted at $30.50 per net ton, tidewater, class A and gas pipe taking an extra of $1 per ton.

Old Material.—Aside from the export demand for specialties, the market is quiet. Practically nothing can be done with steel companies in eastern Pennsylvania, while the iron rolling mills are only taking moderate quantities of certain classes of wrought scrap. The demand from Western consumers has almost completely disappeared. Brokers quote buying prices for the Eastern trade about as follows to local dealers and producers, per gross ton, New York:

Heavy melting steel scrap (open-hearth specification)	$11.75 to $12.00
Old steel rails (short lengths) or equivalent	12.50 to 12.75
Relaying rails	27.50 to 28.00
Relaying rails (for export)	30.00 to 32.00
Rerolling rails	16.75 to 17.00
Rerolling rails (for export)	19.00
Iron car axles (for export)	35.00
Steel car axles (for export)	37.00
No. 1 railroad wrought	18.00 to 18.25
Wrought-iron track scrap	15.50 to 16.00
No. 1 yard wrought, long	13.50 to 14.00
No. 1 yard wrought, short	11.75 to 12.00
Light iron (nominal)	3.50 to 4.00
Cast borings (clean)	7.00 to 7.25
Machine-shop turnings (nominal)	4.50 to 4.75
Mixed borings and turnings (nominal)	4.50 to 4.75
Wrought pipe	11.50 to 12.00
Old carwheels (nominal)	15.00 to 15.50
Malleable cast (railroad)	12.00 to 12.50

Foundries are buying a little more freely, but no inquiries are being received for forward delivery.

Dealers' quotations to consumers of cast scrap are as follows:

No. 1 cast (machinery)	$15.75 to $16.00
No. 2 cast (heavy)	14.00 to 14.50
Stove plate	11.50 to 12.00
Locomotive grate bars	10.00 to 10.25

Cleveland

CLEVELAND, OHIO, Sept. 12, 1916.

Iron Ore.—An Eastern consumer has an inquiry out for a large tonnage of non-Bessemer Lake Superior ore for next season's delivery. If this purchase is made at the present time it will doubtless be at a price to be fixed later. Quite a few additional reservations are being made for both Bessemer and non-Bessemer ores. There is little if any falling off in the ore movement, and shippers are taking all the wild tonnage that is being offered. While the going rate remains at $1, as high as $1.50 free is being asked for vessel capacity for October. Receipts at Lake Erie docks in August amounted to 8,051,827 gross tons out of total shipments of 9,850,140 tons. The dock balance Sept. 1 was 5,845,228 tons, or 1,343,000 tons less than on the corresponding date a year ago, showing the proportion of the direct shipments to the furnaces to be much larger this year than usual. It is expected that the dock balance Dec. 1 will be about 1,000,000 tons behind last year. We quote prices as follows, delivered lower Lake ports: Old-range Bessemer, $4.45; Mesaba Bessemer, $4.20; old-range non-Bessemer, $3.75; Mesaba non-Bessemer, $3.55.

Pig Iron.—The market is quite active and firm. Northern Ohio foundries are buying freely for their first half requirements. The Westinghouse Electric & Mfg. Company has purchased about 6000 tons of foundry iron for delivery during the first and second quarters, dividing the business between Cleveland furnaces at $18.50 at furnace for No. 2, and $18 for No. 3. Several other sales in lots up to 1000 tons are reported, and a number of new inquiries are pending. Local prices are unchanged at $18.50 at furnace for No. 2. There is considerable inquiry for basic, Bessemer and malleable iron, and a local interest has taken on some additional Bessemer and malleable iron for export. The leading sanitary interest, which has covered for its last and first-quarter requirements, has included in its purchase about 10,000 tons of Southern iron, taken at $14.50, Birmingham, for both deliveries. The Southern market is now firmer, and it is claimed that No. 2 foundry cannot now be had for delivery after the first of the year below $15, $14.50 being the general quotation for the last quarter. The firmness in Northern foundry iron is attributed to the advance in Southern prices. Silvery iron has become fairly active, sales being made at $27 at furnace, for 8 per cent. We quote, delivered Cleveland, as follows:

Bessemer	$21.95
Basic	18.95
Northern No. 2 foundry	18.80
Southern No. 2 foundry	$18.50 to 19.00
Gray forge	18.50
Jackson Co., silvery, 8 per cent silicon	28.62
Standard low phos., Valley furnace	33.00

Coke.—There is a scarcity of both furnace and foundry coke for prompt shipment and prices are firm. Some demand has sprung up for prompt shipment of foundry coke. We quote standard Connellsville foundry coke at $3.25 to $3.50 per net ton at oven for prompt shipment and contracts, although most producers are asking higher prices. Standard furnace coke is held at $2.90 to $3 for prompt shipment.

Finished Iron and Steel.—There is still a fairly heavy demand for steel bars and structural material for early delivery. There is also considerable demand for wire rods, which have sold as high as $65 for prompt shipment. Specifications are heavy, but new inquiry for contracts is light, although many consumers have not covered for their first quarter requirements. Plates continue in good demand with prices ranging from 4c. to 4.50c., Pittsburgh, for early delivery. Steel shell discards are in good demand and this steel is being sold at $35 by a local mill. A Youngstown mill is reported to have sold a round tonnage of discards for rolling into sheets. The hard steel-bar market is still irregular, and while some mills are holding to 2.50c., sales have been made at as low as 2.40c., delivered, Cleveland. An order for 1000 tons of hard steel bars for approaches to the Superior Avenue viaduct, Cleveland, is pending, the contract for this work having been placed with the Bates & Rogers Construction Company, Chicago. The only new structural inquiry is for 1000 tons for an extension to the John Harkness Brown Building, Cleveland, bids for which will be received Friday. Bar iron is quoted at 2.40c. to 2.50c., Cleveland. The demand for sheets is fairly heavy. The call for black sheets in light gages from manufacturers of roofing and other products and from jobbers has improved materially. Prices are firm. Most mills are holding to 3c. for black sheets. We quote sheets at 2.90c. to 3c., Ohio mill, for No. 28 black; 2.90c. to 3.30c. for No. 10 blue annealed, and 4.15c. to 4.50c. on No. 28 galvanized. Warehouse prices are 3.25c. for structural material; 3.65c. for plates, and 3.25c. for iron bars.

Bolts, Nuts and Rivets.—Bolt and nut specifications are heavy, but not a great deal of new business is coming out at present. Local manufacturers report some price shading in the Chicago district, mostly by jobbers. Some rivet business has been taken for the first quarter delivered at the price prevailing for the last quarter. We quote rivets at 4c., Pittsburgh, for structural and 4.10c. for boiler rivets. Bolt and nut discounts are as follows:

Common carriage bolts, ⅜ x 16 in., smaller or shorter, rolled thread, 50 and 5; cut thread, 40, 10 and 2½; larger or longer, 35 and 2½; machine bolts within h. p. nuts, ⅜ x 4 in., smaller and shorter, rolled thread, 50 and 10; cut thread 50; larger and longer, 40 and 10; lag bolts, gimlet or cone point, 50 and 5; square h. p. nuts, blank or tapped, $2.70 off the list; hexagon h. p. nuts, blank or tapped, $2.70 off; c. p. c. and t. sq. nuts, blank or tapped, $2.40; hexagon nuts, all sizes, $2.80 off; cold pressed semi-finished hexagon nuts, all sizes, 60 and 5.

Old Material.—The market continues very dull, but is somewhat firmer. Dealers are hopeful of an advance next month and are selling very little material except that on track. Trading is almost entirely between dealers. The sale of small lots of heavy melting steel is reported for Massillon delivery. Cleveland dealers have marked up local prices on heavy melting steel 50c. per ton, and this grade is quoted at $16.25 to $16.75 for delivery in the Valley and at other northern Ohio points. Other local prices are unchanged. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton	
Steel rails	$14.75 to $15.00
Iron rails	18.50 to 19.00
Steel car axles	32.00 to 33.00
Heavy melting steel	15.50 to 16.00
Carwheels	12.75 to 13.00
Relaying rails, 50 lb. and over	22.50
Agricultural malleable	12.50 to 12.75
Railroad malleable	14.00 to 14.25
Steel axle turnings	12.00 to 12.50
Light bundled sheet scrap	12.00 to 12.25
Per Net Ton	
Iron car axles	$24.00 to $25.00
Cast borings	5.75 to 6.00
Iron and steel turnings and drillings	5.25 to 5.50
No. 1 busheling	11.00 to 11.25
No. 1 railroad wrought (nominal)	15.00 to 15.50
No. 1 cast	13.00 to 13.50
Railroad grate bars	10.00 to 10.50
Stove plate	10.00 to 10.25

Buffalo

BUFFALO, N. Y., Sept. 12, 1916.

Pig Iron.—There has been a resumption of buying activity from the lull reported last week, or at least a resumption of inquiry from users of pig iron earnestly seeking to place orders. The majority of the furnaces of the Buffalo district, however, are almost entirely sold up for the remainder of the year and for first quarter and half of 1917, two of the principal producers being practically out of the market. Of the nine merchant stacks of the district, it now looks as though hardly more than two of them may be relied upon (and this in part only) to supply the needs of melters over an extended period. According to report, one interest is booking orders steadily day by day for 1917 delivery equal to its full daily output. If this situation con-

tinues there remains but one available merchant stack for Buffalo district needs that may later develop. Orders the past week have been composed of about two-thirds foundry and malleable and one-third basic. Prices have stiffened to such an extent that differentials between grades have practically disappeared, the minimum for all grades being $19. The maximum for the high grades remains the same as previously reported. We quote, first quarter and half delivery, f.o.b. furnace, Buffalo, as follows:

No. 1 foundry	[illegible]
No. 2 X foundry	[illegible]
No. 2 plain	[illegible]
No. 3 foundry	[illegible]
Gray forge	[illegible]
Malleable	[illegible]
Basic	[illegible]
Bessemer	21.00 to [illegible]
Charcoal, regular brands and analysis	21.00 to 22.00

Finished Iron and Steel.—Such buyers as have been able to place contracts for future delivery are specifying for their monthly quotas far in advance of the time specifications are due. Inquiry in all lines of finished products is large, coming in in increasing volume. It is not unlikely that a good many projects will have to be dropped or postponed owing to shortage of finished steel and inability to secure requisite quantities by the time required. Prices are firmly held.

Old Material.—There has been considerable improvement in demand during the week, particularly in heavy melting steel and in steel axles for export. Prices are held stiffly, with a tendency toward an advance in some lines but not sufficiently so to change quotations. Dealers, however, anticipate early advances, especially in such lines as move in sympathy with pig iron. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	$15.50 to $16.00
Low phosphorus steel	20.00 to [illegible]
No. 1 railroad wrought scrap	17.25 to [illegible]
No. 1 railroad and machinery cast scrap	15.50 to 16.00
Steel axles	[illegible]
Iron axles	24.00 to [illegible]
Carwheels	13.00 to 13.50
Railroad malleable	15.00 to 16.00
Machine shop turnings	[illegible]
Heavy axle turnings	12.00
Clean cast borings	7.50 to 7.75
Iron rails	18.00 to [illegible]
Locomotive grate bars	11.50 to 12.00
Stove plate (net ton)	11.00 to 11.50
Wrought pipe	12.00 to 12.50
Bundled sheet scrap	11.50 to 12.00
No. 1 busheling	13.00 to 13.50
No. 2 busheling	11.00 to 11.50
Bundled tin scrap	15.00 to 15.50

Pittsburgh

PITTSBURG, PA., Sept. 12, 1916.

Conditions in the steel trade show no important change. The new demand for pig iron is heavier, and prices on basic seem to be in line for an advance. The scarcity of semi-finished steel in the forms of billets and sheet bars still exists, but it is not believed to the same extent as a month or more ago. While mills are not quoting actively, they are holding what steel they can spare at the high prices that have ruled for some time. An advance of $1 per ton on black butt-weld pipe, $4 on black lap weld and $4 on steel and iron boiler tubes has been made, effective from Sept. 7. On other lines of finished steel products prices are remarkably strong, and buyers are placing contracts quite actively for delivery in first quarter and first half of next year.

Pig Iron.—There is a good deal more inquiry for both Bessemer and basic. A leading dealer bought recently 10,000 tons of basic for delivery over first half of 1917 at $18.50, Valley furnace, the higher price having been paid on account of the extended delivery. The Brier Hill Steel Company bought last week 20,000 tons of basic from a Youngstown furnace for delivery over the remainder of the year, and into first quarter, for which $18, or slightly higher, was paid. A consumer in the Wheeling district is inquiring for 10,000 to 12,000 tons of basic and a local consumer is inquiring for 5000 to 10,000 tons. The movement in foundry iron is active, the Standard Sanitary Mfg. Company having bought 25,000 to 26,000 tons, of which 17,000 tons to 18,000 tons is Southern iron, for its works in Louisville, Ky., New Brighton, Pa., and North Side, Pittsburgh. Deliveries are last quarter this year and first quarter 1917. For the Southern iron as high as $14.50, Birmingham, was paid, and on the Northern iron up to $18.50, Valley, for No. 2. The Westinghouse Electric & Mfg. Company will probably buy 20,000 to 25,000 tons of foundry for its Cleveland works if the prices named by the furnaces are satisfactory. An inquiry is in the market for 4000 tons of high silicon Bessemer iron, and a Youngstown consumer is about closing for 15,000 to 20,000 tons of basic. It would be impossible to buy basic iron for delivery in first half of 1917 at less than $18.50 at furnace, and some sellers will not meet that price. It is also doubtful whether any more basic iron for delivery this year could be had at $18. In the absence of any sales as yet above $18 for this year's delivery, we continue to quote basic iron $18, Valley furnace, for this year, and $18.50 for first quarter and first half of 1917. We quote standard Bessemer iron at $21; No. 2 foundry, $18.50; malleable Bessemer, $18.50, and gray forge, $17.75 to $18, all at Valley furnace, the freight rate to the Pittsburgh and Cleveland districts being 95c. per ton.

Billets and Sheet Bars.—Much interest attaches to the price for sheet bars to be charged the tin-plate and sheet mills for last quarter of this year. For the present quarter the price ranges from $37 to $40, and it is said that for last quarter it will be at least $3 per ton higher. This will be taken up by the steel companies with the mills not later than Sept. 20. Some large consumers are getting sheet bars at a flat price up to the end of the year, said to be somewhat under $40, and of course this will not be changed. The new inquiry for semi-finished steel is still very active. Some of the large steel companies are buying small ingots from steel casting plants, and then breaking them down and rolling them into sheet bars after reheating. Prices on steel depend altogether on the party that is offering it, the kind of steel it is and the quantity. Recently some steel changed hands from dealers to consumers around $42 to $43, but the mills are quoting $45 to $46 and higher. None of the mills would quote billets and sheet bars at less than $45, and some are refusing to quote at all, stating they need their entire output for their own finishing mills. Soft Bessemer and open-hearth billets and sheet bars are nominally $43 to $45, but steel has sold above this price, and probably below it. Mills do not quote less than $45, and a Cleveland maker is quoting billets and sheet bars at $46, Cleveland. We quote forging billets at $69 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take $1 extra.

Sheets.—We continue to note a heavy demand for galvanized and blue annealed sheets, which is serving to some extent in maintaining prices on these grades. Inquiries from railroads are fairly large and mills report specifications against contracts active. We quote Nos. 9 and 10 blue annealed sheets at 2.90c. to 3c., for delivery at convenience of the mill. No. 28 Bessemer and open-hearth black sheets, 2.90c. to 3c.; No. 28 galvanized, Bessemer, and open-hearth, 4.15c. to 4.25c.; Nos. 22 and 24 black plate, tin-mill sizes, H. R. & A., 2.90c.; Nos. 25, 26 and 27, 3c. to 3.10c.; No. 28, 3.10c. to 3.15c., and No. 29, 3.20c. to 3.25c. These prices are for carloads and larger lots, f.o.b. mill, Pittsburgh.

Tin Plate.—Pressure on the mills for deliveries is still very heavy and growing more insistent. There is also pressure from consumers to have mills take orders for first quarter and first half delivery, but in most of these cases the mills are refusing to quote. A fairly large lot of tin plate has been sold for the Pacific coast trade for delivery in first quarter of 1917, the price to be fixed later. Export inquiry is heavy and it is very evident that deliveries on some contracts will run over into next year. None of the mills talks less than $5.50 per base box on contracts for 1917 delivery, and some think the price should be $6. To regular customers mills

are quoting tin plate from stock at $5.50, while production tin plate is quoted at $5.75 and up to $6 to the domestic trade. For export, $6 to $6.25 per base box is quoted. We quote 8-lb. coated ternes at $8.50 to $8.75 for 200 lb., and $8.75 to $9 for 214 lb., Pittsburgh.

Ferroalloys.—It is stated that some users of ferrosilicon have covered through the entire half of 1917, one consumer taking 3000 tons, another about 3500 tons, and others smaller amounts. The new demand for ferromanganese is more active, foreign being held at $175, seaboard, but domestic is offered at $5 to $10 per ton under this price. We quote 18 to 22 per cent spiegeleisen at $40 to $45, and 25 to 30 per cent $55 to $65, at furnace. On 50 per cent ferrosilicon we quote $88 to $89 in lots up to 100 tons; over 100 tons, $87 to $88; and over 600 tons, $86 to $87, all per gross ton, f.o.b. Pittsburgh. We quote Bessemer ferrosilicon as follows: 9 per cent, $30; 10 per cent, $31; 11 per cent, $32; 12 per cent, $33; 13 per cent, $34.50; 14 per cent, $36.50; 15 per cent, $38.50; and 16 per cent, $41. Seven per cent silvery is $28.50; 8 per cent, $29, 9 per cent, $29.50; 10 per cent, $30; 11 per cent, $31; and 12 per cent, $32. These prices are f.o.b. furnace, Jackson or New Straitsville, Ohio, or Ashland, Ky., all having a freight rate of $2 per gross ton to Pittsburgh.

Structural Material.—The new inquiry continues to be quite active. The American Bridge Company has taken 1850 tons for extensions to the open-hearth steel plant of the Pittsburgh Crucible Steel Company, Midland, Pa., and 700 tons for a steel bridge for the Pittsburgh & Lake Erie Railroad over the Beaver River at Beaver, Pa., and the McClintic-Marshall Company has taken 1500 tons for a Southern Railway bridge. It is stated that the Westinghouse Machine Company, which recently received bids on 6000 tons of steel for its proposed new plant at Essington, Pa., near Philadelphia, has about decided not to go ahead with this project for the present on account of the high prices submitted and the long time named for deliveries. Export inquiry is still heavy, and a local mill is credited with having taken about 15,000 tons more of plain material for delivery in second quarter of next year. We quote beams and channels up to 15 in. at 2.60c. to 2.75c. at mill for such deliveries as the mills can make, which would likely be in the early part of 1917, while small lots from stock for fairly prompt shipment bring 3c. and higher, Pittsburgh.

Steel Rails.—Only small scattering orders for standard sections are being placed. The new demand for light rails is active from the coal mining and lumber interests, much of the new business being placed going to the rerolling rail mills, which are quoting lower prices than the mills that roll light rails from billets. We quote 25 to 45 lb. sections at $47; 16 and 20 lb., $48; 12 and 14 lb., $49; and 8 and 10 lb., $50, in carload lots, f.o.b. at mill, the usual extras being charged for less than carload lots. We quote standard section rails of Bessemer stock at 1.47½c., and of open hearth 1.56½c., Pittsburgh.

Plates.—The new inquiry for steel cars is a little more active, but some of the larger inquiries have been withdrawn on account of the high prices quoted. The New York, Chicago & St. Louis is in the market for 500 40-ton steel frame automobile cars, and the Western Pacific is inquiring for 1000 wooden box cars, 1000 stock cars and 150 steel hopper cars. It is reported that the Chicago, Milwaukee & St. Paul will buy 5000 miscellaneous cars, but this is not confirmed. The Minneapolis & St. Louis has withdrawn its recent inquiry for 500 to 1000 box cars, and the Carnegie Steel Company has taken similar action on its inquiry for 88 steel hoppers, 70 gondolas and 15 flat cars. It is said some of the large steel car companies will soon be short of work, as they have received few new orders for steel cars for a long time. Indications are that the great scarcity in plates will run into next year, partly owing to the expected heavy buying by the Government for its naval program, and still higher prices are predicted. The minimum mill price on ¼-in. and heavier sheared plates is 3c. for delivery in first quarter and first half of 1917. For delivery in two to four months, ¼-in. and heavier plates are quoted from 3.75c. up to 4.50c. at mill.

Cold-Rolled Strip Steel.—The pressure from consumers on makers of cold-rolled strip steel to book their contracts for first half of 1917 delivery has become very strong, and it is likely some makers will open their books in a short time for such contracts. Consumers are largely covered for this year, but it is stated that as yet none of the makers has sold for delivery into next year. Several small contracts for shipment this year have been made at $6 base. We quote cold-rolled strip steel at $6 base on contracts for delivery over the remainder of the year, and $6.50 to $6.75 in small lots for fairly prompt shipment. Terms are 30 days net, less 2 per cent off for cash in 10 days, delivered in quantities of 300 lb. or more when specified for at one time.

Wire Rods.—The active demand for rods is greater than the supply, and prices are very firm. On some special grade rods for export delivery one maker quoted above $60 per ton at mill. Most domestic consumers are covered for the remainder of this year and into first quarter and first half of next year at prices ranging from $50 to $60 per ton on soft Bessemer and open-hearth rods. The price of $50 was made in only a few cases to consumers whose products enter into direct competition with mills that furnish them rods. We quote soft Bessemer, open-hearth and chain rods, at $55 to $60 per ton, f.o.b. Pittsburgh, and it would be a very exceptional case to secure the $50 price.

Nuts and Bolts.—Most consumers are covered over the remainder of this year, but the new demand is still quite active and makers are back in deliveries eight to ten weeks or longer. Prices are very firm and may be advanced in the near future. Makers claim that with steel bars at 2.60c. and higher there is little profit in nuts and bolts at present prices. The discounts are as follows, delivered in lots of 300 lb. or more, where the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days:

Carriage bolts, small, rolled thread, 50 and 5 per cent; small, cut thread, 40, 10 and 5 per cent; large, 35 and 5 per cent.

Machine bolts, h. p. nuts, small, rolled thread, 50 and 10 per cent; small, cut thread, 50 per cent; large, 40 and 5 per cent.

Machine bolts, c. p. c. and t. nuts, small, 40 and 10 per cent; large, 35 per cent. Blank bolts, 40 and 5 per cent. Bolt ends, h. p. nuts, 40 and 5 per cent; with c. p. nuts, 35 per cent. Rough stud bolts, 15 per cent. Lag screws (cone or gimlet point), 50 and 5 per cent.

Forged set screws and tap bolts, 10 per cent. Cup and round point set screws, case-hardened, 60 per cent. Square or hexagon head cap screws, 55 per cent. Flat, button, round or fillister head cap screws, 30 per cent.

Nuts, h. p. sq., tapped or blank, $2.70 off list; hex., $2.70 off. Nuts, c. p. c. and t. sq., tapped or blank, $2.40 off; hex., $2.50 off. Semi-finished hex nuts, 60 and 5 per cent. Finished and case-hardened nuts, 60 and 5 per cent.

Rivets, 7/16 in. in diameter and smaller, 45, 10 and 5 per cent.

Rivets.—The new demand is not active, as consumers are largely covered over the remainder of this year, and makers report buyers are specifying freely. Export demand is heavy. A local maker shipped two carloads of rivets to India last week. Prices, which are being shaded to some extent by jobbers, are as follows: Buttonhead structural rivets, ½ in. in diameter and larger, $4 per 100 lb., base, and conehead boiler rivets, same sizes, $4.10 per 100 lb., base, f.o.b. Pittsburgh. Terms are 30 days net, or one-half of 1 per cent for cash in 10 days.

Railroad Spikes and Track Bolts.—The new demand for railroad spikes is very dull and has been for some time. Some makers are operating to 50 per cent or less of capacity. The demand for track bolts is reported fairly active and prices are firm. We quote track bolts with square nuts at 4.50c. to 4.75c. to railroads and 5c. to 5.25c. in small lots to jobbers, base. Track bolts with hexagon nuts take the usual advance of 15c. per 100 lb. Prices on railroad spikes, which are only fairly strong, are as follows:

Standard railroad spikes, 4½ x 9/16 in. and larger, $2.65 to $2.75; railroad spikes, ½ and 7/16 in., $2.75 base; railroad spikes, ⅜ in. and 5/16 in., $3.05 base; boat spikes, $2.80 base, all per 100 lb., f.o.b. Pittsburgh.

Wire Products.—Mills report specifications against contracts for all kinds of wire and also for wire nails coming in freely, but the new demand for woven wire

fencing is dull, owing to the high prices ruling. Makers are not trying to push sales of fence wire, being perfectly satisfied to make the other grades for which there is a good demand and at high prices. Export demand for wire nails and barb wire is still heavy. Two local mills are now working on orders for about 50,000 tons of barb wire for shipment to Russia. It is stated that shipments of wire nails now going out are largely on the $2.50 basis and that no new orders are being accepted at less than the $2.60 price. Prices to the large trade are as follows: Wire nails, $2.60, base, per keg; galvanized, 1 in. and longer, including large head barbed roofing nails, taking an advance over this price of $2, and shorter than 1 in., $2.50. Bright basic wire is $2.65 per 100 lb.; annealed fence wire, 6 to 9, $2.55; galvanized wire, $3.25; galvanized barb wire and fence staples, $3.45; painted barb wire, $2.75; polished fence staples, $2.75; cement-coated nails, $2.50, base, these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing remain at 61½ per cent off list for carload lots, 60½ per cent for 1000-rod lots and 59½ per cent for small lots, f.o.b. Pittsburgh.

Iron and Steel Bars.—Most of the business in iron and steel bars for the remainder of this year has been placed, and the mills also have large contracts on their books for delivery in first half of 1917. There is still a heavy export inquiry for steel rounds for shrapnel, but local mills are filled up so far ahead they are not keenly going after this business. We quote merchant steel bars at 2.60c. at mill, for delivery at convenience of the mill, which would be in last quarter of this year or first quarter of 1917; while for prompt shipment from warehouse, 3c. to 3.10c. is quoted. We quote refined iron bars at 2.60c. to 2.70c., and railroad test bars, 2.70c. to 2.80c, f.o.b. Pittsburgh.

Shafting—Large consumers, such as automobile builders and the screw stock machine trade, are covering on their needs of shafting for first half of 1917 at about 20 per cent off list, and it is said a few contracts have been placed at 15 per cent off. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots for delivery in last quarter of this year and first quarter of 1917, and 10 per cent off in less than carload lots, f.o.b. Pittsburgh, freight added to point of delivery.

Merchant Steel.—The new demand is still active, some large inquiries being in the market for delivery through the first half of 1917. Some mills are refusing to quote for delivery beyond this year, believing that later on they will be able to secure higher prices. Shipments are very heavy, and the mills are much behind in deliveries. We quote: Iron finished tire, ½ x ½ in. and larger, 2.60c., base; under ½ x 1½ in., 2.75c.; planished tire, 2.75c.; smooth channel tire, ¾ to ⅞ and 1 in., 2.85c. to 2.90c.; 1⅛ in. and larger, 3.10c.; toe calk, 3.10c. to 3.15c., base; flat sleigh shoe, 2.75c.; concave and convex, 2.85c.; cutter shoes tapered or bent, 3.25c. to 3.35c.; spring steel, 3.25c. to 3.50c.; machinery steel, smooth finished, 2.90c. to 3c., all f.o.b at mill

Hoops and Bands.—Most consumers are covered over the remainder of this year, and some into the first quarter of 1917. New demand is light, but specifications against contracts are coming in freely. For current orders hoops are 3c. and steel bands 2.60c. at mill, with extras on the latter as per the steel bar card. For fairly prompt shipment steel bands are quoted at 2.75c. and higher

Wrought Pipe.—Effective Thursday, Sept. 7, discounts on butt weld iron and steel pipe were lowered one point, an advance of $2 per ton; lap weld black iron and steel pipe, two points, an advance of $4 per ton, and oil country goods were advanced about $4 per ton. The abnormally heavy demand and the very high prices ruling on steel are given as the principal reasons for this advance. No changes were made in galvanized pipe. On butt-weld sizes, the mills can make fairly prompt deliveries, but on lap-weld are sold up for five to six months ahead. The new discounts are given on another page.

Boiler Tubes.—Discounts on both iron and steel tubes have been lowered two points, an advance of $4 per ton. This was anticipated by the trade, and is due to the fact that the mills are sold up for six to eight months ahead, and also to the high prices ruling for steel. The new discounts are given on another page.

Coke.—High blast-furnace coke for prompt shipment continues scarce and is bringing $2.90 to $3 per ton. It is believed, however, that with the increased supply prices will be easier in the near future. We quote best grades of furnace coke on contracts at $2.50 to $2.60 per net ton at oven. It is a little early to talk of contracts for furnace coke for next year, but some makers say they will not sell at less than $2.75, and their price may be higher when the time comes to make contracts. We quote best grades of 72-hr. foundry coke for spot shipment at $3.25 to $3.50, and on contracts, $3.50 to $3.75 per net ton at oven.

Old Material.—Reports that the leading local consumer would pay up to $17 for selected heavy steel scrap are incorrect. This consumer bought some time ago about 80,000 tons of heavy steel scrap, but had an embargo on shipments until Sept. 1, when it was removed and it has since asked dealers from whom it bought to defer shipments as much as possible, as it was congested with scrap and having trouble in finding room to store it. None of the local consumers is buying scrap, except one interest which has lately taken probably 5000 tons or slightly more at about $16.50, delivered, for selected grades. All other kinds of scrap are quiet, but prices are firm and there is an undertone of strength in the market which may result in higher prices in the near future. The recent large sales of steel discards, and the fact that basic iron is in heavy demand and likely to bring higher prices, are expected to improve the scrap market before long. Prices quoted by dealers for delivery in Pittsburgh and points that take the same rates of freight, per gross ton, are as follows:

Heavy steel melting scrap Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	$16.00 to $16.25
No. 1 foundry cast	14.50 to 14.75
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	16.50 to 17.00
Hydraulic compressed sheet scrap	13.50 to 14.00
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	11.25 to 11.50
Bundled sheet stamping scrap	10.25 to 10.50
No. 1 railroad malleable stock	14.50 to 14.75
Railroad grate bars	10.25 to 10.50
Low phosphorus melting stock	19.75 to 20.00
Iron car axles	28.00 to 28.50
Steel car axles	28.00 to 28.50
Locomotive axles, steel	33.00 to 35.00
No. 1 busheling scrap	14.00 to 14.25
Machine-shop turnings	7.00 to 7.25
Old carwheels	13.25 to 13.50
Cast-iron borings	8.00 to 8.25
*Sheet bar crop ends	17.00 to 17.50
No. 1 railroad wrought scrap	18.00 to 18.75
Heavy steel axle turnings	10.50 to 10.75
Heavy breakable cast scrap	12.25 to 12.50

*Shipping point

British Steel Market

Pig Iron Easier—American Billets in Strong Demand but Very High

(*By Cable*)

LONDON, ENGLAND, Sept. 13, 1916.

The Cleveland pig-iron position is somewhat easier and the needs of France are less urgent, with deliveries elsewhere freer. A few cargoes are going to Russia by way of Norway. American billets are in demand but transactions are hindered by the stiff terms, 3½-in. billets for September-October delivery being quoted at £14. Steel bars have sold at £16 10s. c.i.f. Liverpool for nearby arrival. Tin plates are dull, with government orders at 28s. and upward and stock plates at 36s. Ferrosilicon is quoted at £27. We quote as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, [illegible] to 33s.

Steel bars, Siemens, export, f.o.b. Liverpool, £20 5s.

Steel ship plates, Scotch, delivered Newcastle, £8 17s. 6d.
Steel rails, export, f.o.b. works, £10 17s. 6d.
Hematite pig iron, f.o.b. Tees, about 140s.
Sheet bars (Welsh) delivered at works at Swansea Valley, £10 7s. 6d.
Steel bars, export, f.o.b. Clyde, £18.
Ferromanganese (nominal), £35.
Ferrosilicon, 50 per cent, c.i.f., £27, against £29, last week.

Government Control Absolute—Stock Tin-Plate Business Active

LONDON, ENGLAND, Aug. 29, 1916—(*By Mail*).

The steel industry is absolutely under government control and ordinary merchant business has now become an utterly negligible quantity. There is an unceasing demand for various classes of material for the home trade or export, but it is practically impossible to get orders through for nearby delivery even for small lots. No relief is in sight because of the phenomenal pressure of war requirements, the inadequate output of crude iron, especially of hematite, and the further drain of men called up.

Cleveland foundry iron is unchanged, the undertone being strong, but with no stock at the furnaces business continues limited, the great bulk of the output being regularly absorbed by running contracts. Deliveries remain under close official control and business with neutrals is absolutely impossible. Preparations are being made for blowing in additional furnaces soon. The demand for hematite is as strong as ever and the booking of orders here is more particularly difficult, for the output is already earmarked for many months ahead. The increase of operations is difficult, chiefly owing to the dearth of labor.

In the manufacturing iron and steel sections, the congestion of orders for munition work is as intense as ever and deliveries are in arrears. Mild steel bars and steel hoops are practically unobtainable and bar iron for early delivery is extremely scarce.

The American semi-finished steel market is very bare, and much higher prices are now obtainable for the small quantities offering for nearby shipment. British consumers are badly in need of material and France is still inquiring for billets, but much longer terms of delivery are now required. For 3-in. material, Oct.-Dec., about $75 c.i.f. is being asked. Sheet bars and wire rods are hard to get at any price.

Business in galvanized sheets for export has remained virtually at a standstill owing to the prohibition in force. Permits are difficult but the tone is firm.

A great deal of business has been done in tin plate at smartly advancing prices, the chief feature being the brisk demand for the home trade for stock plate, the supply of which is rapidly diminishing. The price of stock plate is expected to go to a considerable premium, there being no restriction on trading in this material. Quotations now range up to 35s—basis 20x14 f.o.b. It may be recalled that shipments were allowed to neutrals under license, but this has been stopped by the new regulation. This trade has been hard hit by the war, and it is now feared that the output may be cut down eventually to 30 to 35 per cent of the normal, owing to the steel famine.

German Pig Iron in July a War Record

Germany's July pig-iron output of 1,134,306 metric tons was the largest of the war, with a daily rate of 36,590 tons. The June output was 1,081,507 tons at 36,050 tons per day, the record till July. The output in July, 1915, was 1,064,899 tons, and in July, 1914, it was 1,564,345 tons. The July output this year was made up of 174,782 tons of foundry iron, 12,612 tons of Bessemer iron, 723,754 tons of basic iron, 206,183 tons of steel-making iron and spiegeleisen and 16,975 tons of forge iron.

The Anti-Blind Reflector Company, Johnstown, Pa., with a capital stock of $10,000, has been formed by Fred G. Smith, 444 Franklin Street, Johnstown, William C. Miller and Rhean C. Smith, to manufacture automobile lamps, reflectors and accessories.

Iron and Industrial Stocks

NEW YORK, Sept. 13, 1916.

The phenomenal earnings of numerous industrial corporations have at last so impressed the public that a heavy general buying movement has made its appearance, carrying prices of many stocks to new records. United States Steel common has gone well over par for the first time in its history, while Republic Steel common, Lackawanna Steel, Midvale Steel and others have advanced with long strides. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week has been as follows:

Allis Chal., com.	[illegible]	Nat. Steel Spring, com.	45½-48¾
Allis Chal., pref.	[illegible]	Republic, com...	55 - 67½
Am. Can, com.	[illegible]	Republic, pref...	113 -114¾
Am. Can, pref.	114¾-115	Sloss, com.	49½- 51½
Am. Car & Fdy., com.	[illegible]	Sloss, pref.	96
Am. Car & Fdy., pref.	117¾-118½	Tenn. Coal & Iron	124½- 141½
Am. Loco., com.	77¼- 78¾	Pipe, pref.	52¾- 53⅞
Am. Loco., pref.	100¾-100¾	U. S. Steel, com.	100¾-100¾
Am. Steel Fdrys.	44½- 45¼	U. S. Steel, pref.	118¼-119
Bald. Loco., com.	[illegible]	Va. I. C. & Coke,	45 - 56
Bald. Loco., pref.	104 -104¼	Westing. Elec.	63¾- 63¾
Beth. Steel, com.	490 -524½	Am. Rad., com.	396 -399
Beth. Steel, pref.	136 - [illegible]	Am. Rad., pref.	134
Colorado Fuel...	49 - [illegible]	Am. Ship, com...	46 - 49
Deere & Co., pref...	[illegible]	Am. Ship, pref.	94
Gen. Electric....	170¾-173½	Chic. Pneu. Tool.	72½- 74½
Gt. No. Ore Cert.	38¾- 40¾	Lake Sup. Corp..	10⅝- 11¾
Int. Harv. of N. J., com.	115 - 117	Wayagamack	9½
Int. Harv. Corp., com.	78 - [illegible]	Cruc. Steel, com..	78¾- 85¾
Int. Harv. Corp., pref.	105¾	Cruc. Steel, pref..	118 -119
Lacka. Steel.....	78½- 81¼	Harb.-Walk. Refrac., com.	102 -102½
Nat. En. & Stm., com.	247¾-274½	Harb.-Walk. Refrac., pref.	105
Nat. En. & Stm., com	95	La Belle Iron, com.	57 - 59½
N. Y. Air Brake.	136½-139	La Belle Iron, pref.	133½-134
Pitts. Steel, pref.	98 - 99	Carbon Steel, 1st pref.	78 - 80
Pressed Stl., com.	54½- 59½	Dom. Steel, com.	59
Pressed Stl., pref...	100	Dom. Steel, pref.	58⅞
		Driggs-Seabury..	75 - 88
		Midvale Steel....	621½- 695¾

Dividends

The Safety Car Heating & Lighting Company, regular quarterly, 2 per cent, payable Oct. 2.

The Allis-Chalmers Mfg. Company, regular quarterly, 1½ per cent on the preferred stock, payable Oct. 16.

The Electric Storage Battery Company, regular quarterly, 1 per cent on the preferred and common stock, payable Oct. 2.

The Baltimore Tube Company, regular quarterly, 1¾ per cent on the preferred and common stocks, payable Oct. 1.

The Paige-Detroit Motor Car Company, stock dividend of 50 per cent. Last May the directors of the company declared a stock dividend of 50 per cent, and in July, 1915, a stock dividend of 100 per cent was distributed.

The Canadian General Electric Company, regular quarterly, 1¾ per cent on the common stock, payable Oct. 1.

The J. I. Case Threshing Machine Company, regular quarterly, 1¾ per cent on the preferred stock, payable Oct. 2.

The Sloss-Sheffield Steel & Iron Company, regular quarterly, 1¾ per cent on the preferred stock, payable Oct. 2.

New Structural Shop at Washington

Barber & Ross, Washington, D. C., are erecting for their own use a structural-steel fabricating shop, with electric crane yard equipment. The shop will be 80 x 300 ft., of steel-frame construction, with slag roof and corrugated sides, and equipped with overhead cranes. The storage-yard crane will have a span of 72 ft. and a runway of 380 ft., to handle standard and Bethlehem shapes, of which a stock of approximately 2000 tons is carried. The company will fabricate for local delivery and for shipment throughout the South. It has 10 acres of land adjoining its present plant and siding facilities on the Baltimore & Ohio Railroad.

Duplex Process Started at Donora

The duplex process of making steel was started last week by the American Steel & Wire Company at its Donora, Pa., works. A 1300-ton metal mixer was built and installed in the plant by the Pennsylvania Engineering Works, New Castle, Pa., also two 25-ton Bessemer converters, a four-hole soaking pit and there are also 11 60-ton open-hearth and two 60-ton acid furnaces. The introduction of the duplex process is expected to increase the output of the steel works from 20 to 25 per cent.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, effective from April 10, 1916, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c.; Pacific coast (by rail only), 65c.

Structural Material.—I-beams, 3 to 16 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 2.60c. to 2.75c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs	.10
Angles, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	20 to .80
Deck beams and bulb angles	.30
Handrail tees	.15
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Plates.—Tank plates, ¼ in. thick, 6 in. up to 100 in. wide, 3c. to 4c., base, net cash, 30 days, or ½ of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras

	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers)	.10
Boiler and flange steel plates	.15
"A. B. M. A." and ordinary firebox steel plates	.20
Still bottom steel	.30
Locomotive firebox steel	.50

Marine steel, special extras and prices on application.

Gage Extras

	Cents per lb.
Rectangular, 1¼ in. thick, over 6 in. wide to 100 in. wide	Base
Lighter than ¼ in., to 3/16 in., up to 72 in. wide	.10
*Lighter than ¼ in., including 3/16 in., over 72 in. to 84	.20
*Lighter than ¼ in., including 3/16 in., over 84 in. to 96	.30
*Lighter than ¼ in., including 3/16 in., over 96 in. to 100	.40
*Lighter than ¼ in., including 3/16 in., over 100 in. to 102	.45
Lighter than 3/16 in., including No. 8, up to 72 in. wide	.15
*Lighter than 3/16 in., including No. 8, over 72 in. to 84	.25
*Lighter than 3/16 in., including No. 8, over 84 in. to 96	.35
Lighter than No. 8, including No. 10, up to 60 in. wide	.30
Lighter than No. 8, including No. 10, over 60 in. to 64	.35

Up to 72 in. not less than 10.2 lb. per sq. ft. will be considered ¼ in.

Over 72 in. must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.

Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.

Over 72 in., ordered weight 3/16 in., take No. 8 price.

Over 72 in., ordered weight No. 8, take No. 10 price.

Width Extras

Over 100 in. to 110 in. inclusive	.05
Over 110 in. to 115 in. inclusive	.10
Over 115 in. to 120 in. inclusive	.15
Over 120 in. to 125 in. inclusive	.25
Over 125 in. to 130 in. inclusive	.50
Over 130 in.	1.00

Length Extras

Universal plates 80 ft. long up to 90 ft. long	.05
Universal plates 90 ft. long up to 100 ft. long	.10
Universal plates 100 ft. long up to 110 ft. long	.20

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over	
Lengths under 3 ft. to 2 ft. inclusive	.25
Lengths under 2 ft. to 1 ft. inclusive	.50
Lengths under 1 ft.	1.55
Circles 3 ft. in diameter to 100 in.	.30
Circles over 100 to 110 in. (width extra)	.35
Circles over 110 to 115 in. (width extra)	.40
Circles over 115 to 120 in. (width extra)	.45
Circles over 120 to 125 in. (width extra)	.55
Circles over 125 to 130 in. (width extra)	.80
Circles over 130 in. (width extra)	1.30
Circles under 3 ft. to 2 ft. inclusive	.55
Circles under 2 ft. to 1 ft. inclusive	.80
Circles under 1 ft.	1.85
Half circles take circle extras.	
Sketches, not over four straight cuts, inc. straight taper	.10
Sketches having more than four straight cuts	.20
Plates sheared to a radius take complete circle extras.	

*Including extra for width.

Wire Rods.—Including chain rods, $55 to $60.

Wire Products.—Prices to jobbers effective Aug. 5: Fence wire, Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, $2.55; galvanized, $3.25. Galvanized barb wire and staples, $3.45; painted, $2.75. Wire nails, $2.60. Galvanized nails, 1 in. and longer, $2 advance over base price; shorter than 1 in., $2.50 advance over base price. Cement-coated nails, $2.50. Woven wire fencing, 61½ per cent off list for carloads, 60½ off for 1000-rod lots, 59½ off for less than 1000-rod lots.

The following table gives the price per 100 lb. to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	6 to 9	10	11	12&12½	13	14	15	16
Annealed	$2.60	$2.65	$2.70	$2.75	$2.85	$2.95	$3.05	$3.15
Galvanized	3.30	3.35	3.40	3.45	3.55	3.65	4.10	4.20

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect on black pipe from Sept. 7, 1916, and on galvanized pipe from July 24, 1916, all full weight:

Butt Weld

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
⅛, ¼ and ⅜	62	35½	⅛ and ¼	51	24
½	66	51½	⅜	52	25
¾ to 3	69	55½	½	56	38
			¾ to 1½	59	43

Lap Weld

2	63	50½	1¼	46	31
2½ to 6	66	53½	1½	52	38
7 to 12	63	49½	2	53	39
13 and 14	63½		2½ to 4	55	42
15	51		4½ to 6	55	42
			7 to 12	54	41

Reamed and Drifted

1 to 3, butt	67	53½	¾ to 1½, butt	54	37
2, lap	61	48½	1¼, lap	41	25
2½ to 6, lap	64	51½	1½, lap	47	32
			2, lap	48	33
			2½ to 4, lap	51	36

Butt Weld, extra strong plain ends

⅛, ¼ and ⅜	58	40½	⅛, ¼ and ⅜	51	34
½	63	50½	½	56	43
¾ to 1½	67	54½	¾ to 1½	60	45
2 to 3	68	54½			

Lap Weld, extra strong, plain ends

2	61	49½	1¼	48	33
2½ to 4	64	52½	1½	53	39
4½ to 6	65	51½	2	55	42
7 to 8	59	45½	2½ to 4	57	45
9 to 12	54	40½	4½ to 6	56	44
			7 to 8	50	38
			9 to 12	45	33

Butt Weld, double extra strong, plain ends

½	54	43½	½	43	31
¾ to 1½	57	46½	¾ to 1½	46	34
2 to 2½	59	48½			

Lap Weld, double extra strong, plain ends

2	53	43½	1½	42	30
2½ to 4	56	45½	2	42	30
4½ to 6	54	44½	2½ to 4	44	35
7 to 8	49	35½	4½ to 6	43	34

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts on less than carloads, freight to destination added, effective from Sept. 7, 1916, are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1½ in.	33	1½ in.	25
1¾ and 2 in.	45	1¾ and 2 in.	37
2¼ in.	42	2¼ in.	34
2½ and 2¾ in.	48	2½ and 2¾ in.	40
3 and 3¼ in.	53	3 and 3¼ in.	45
3½ to 4½ in.	54	3½ to 4½ in.	46
5 and 6 in.	47	5 and 6 in.	39
7 to 13 in.	44	7 to 13 in.	36

Locomotive and steamship special charcoal grades bring higher prices.

1¾ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Sheets.—Makers' prices for mill shipments on sheets of U. S. standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Blue Annealed Sheets

	Cents per lb.
Nos. 3 to 8	2.85 to 2.95
Nos. 9 and 10	2.90 to 3.00
Nos. 11 and 12	2.95 to 3.05
Nos. 13 and 14	3.00 to 3.10
Nos. 15 and 16	3.10 to 3.20

Box Annealed Sheets, Cold Rolled

Nos. 17 to 21	2.70 to 2.80
Nos. 22 and 24	2.75 to 2.85
Nos. 25 and 26	2.80 to 2.90
No. 27	2.85 to 2.95
No. 28	2.90 to 3.00
No. 29	2.95 to 3.05
No. 30	3.15 to 3.25

Galvanized Sheets of Black Sheet Gage

Nos. 10 and 11	3.15 to 3.25
No. 12	3.25 to 3.35
Nos. 13 and 14	3.25 to 3.35
Nos. 15 and 16	3.40 to 3.50
Nos. 17 to 21	3.55 to 3.65
Nos. 22 and 24	3.70 to 3.80
Nos. 25 and 26	3.85 to 3.95
No. 27	4.00 to 4.10
No. 28	4.15 to 4.25
No. 29	4.30 to 4.40
No. 30	4.55 to 4.65

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin,	Lead		Spelter	
	Lake	Electro-lytic	New York	New York	St. Louis	New York	St. Louis
Sept. 6	28.00	28.00	38.87½	6.75	6.60	8.75	8.50
7	28.00	28.00	38.87½	6.75	6.60	8.75	8.50
8	28.00	28.00	38.50	6.75	6.60	8.87½	8.62½
9	28.00	28.00		6.70	6.55	9.00	8.75
11	28.00	28.00	38.87½	6.70	6.55	9.12½	8.87½
12	28.00	28.12½	38.75	6.75	6.60	9.25	9.00

NEW YORK, Sept. 13, 1916.

Copper is strong and some heavy buying has been quietly done. Tin is quiet and easier. Prompt lead commands a premium. Activity in spelter has stiffened the market. Antimony is dull and lower.

New York

Copper.—Buying on the part of the allied governments, and by domestic consumers for fourth quarter delivery, has stiffened the market. Prompt metal is very scarce, and for that delivery resellers are asking from 28.12½c. to 28.25c. The producers are well sold up so far as the earlier positions go, and several are not quoting prompt or nearby. For October they ask 28c., and 27c. for first quarter. Lake is about 27.75c., December shipment, with little to be had this side of that month. Late last week the Russian Ministry of Munitions purchased 5000 tons, and it is declared the metal has sold on Russian account, October delivery, at 28.50c. The allied governments have inquired for 125,000 tons, action on which is yet pending. Delivery on this large quantity is to be in 1917. It is understood that negotiations were halted by the price question, Great Britain not being willing to pay over 26c. Electrolytic at London was quoted yesterday at £132, against £130 a week previous. The exports this month, including yesterday, total 10,472 tons. The mills making finished brass and copper products are busier than ever, partly because of new contracts placed for rods and sheet brass. One large mill is quoting brass rods at 39c., although 34c. can be done in other directions. Two or three large mills have all they can do this year. Brass wire is difficult to obtain.

Tin.—For the most part the market has been dull and the quotation for spot Straits is a little lower at 38.25c. Resale Banca has continued a factor. While it is believed that the supply is nearing its end, a little is moving every day. Late last week offerings of 37.50c., January and February delivery, failed to elicit orders. On Monday of this week the market was almost at a standstill and offerings of tin soon to arrive at 38c. induced but little business. Yesterday there was inquiry for about 100 tons of futures, and fair inquiry also for Banca, but actual sales were few. Consumers are well covered, many of them with tin for which they paid more than the present market. Arrivals this month total 865 tons, and there is afloat 3980 tons.

Lead.—In the past week the market has appeared quiet on the surface, but it has leaked out that some fair purchases have been made, mostly for prompt and early shipment. There have been some good inquiries from abroad. The independent producers are asking and getting premiums over the prices of the leading interest, which are nominal at 6.50c., New York, and 6.42½c., St. Louis. For prompt metal 6.75c. is quoted, and in a special transaction 6.87½c., Philadelphia, was paid. The leading interest has been restricting its sales to regular customers, sometimes refusing to take business at all. Yesterday's quotation at St. Louis was 6.60c.

Spelter.—Extensive foreign inquiries and good buying by domestic brass mills have imparted a decidedly better tone to the market. Spot has advanced to 9.25c., New York, and 9c., St. Louis. The bulk of the business was for forward deliveries. Sales for October delivery have been made at 9c., New York. Last quarter is quoted at 8.75c. to 8.87½c., New York. Canadian interests are in the market for 500,000 lb., action on which is pending. Nearby metal is scarce, not so much because of a shortage as because of the unwillingness of the producers to let out too much metal.

Antimony.—Purchases have been made at 11c., duty paid, but there is very little doing. Chinese producers are refusing to accept present prices, preferring to hold for higher figures.

Aluminum.—No. 1 virgin aluminum, 98 to 99 per cent pure, is unchanged at 60c. to 62c. per lb.

Old Metals.—The market is strong, with an active demand. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible	25.00 to 25.50
Copper, heavy and wire	24.00 to 24.50
Copper, light and bottoms	21.00 to 22.00
Brass, heavy	14.00 to 15.00
Brass, light	11.50 to 12.00
Heavy machine composition	19.00 to 20.00
No. 1 yellow rod brass turnings	14.00 to 15.00
No. 1 red brass or composition turnings	15.00 to 16.00
Lead, heavy	6.25
Lead, tea	2.00
Zinc	7.00 to 7.50

Chicago

SEPT. 11.—The metal market of the past week has not been active and price changes have been of minor importance. Reports indicate a tendency to concessions from copper and lead quotations in this market. We quote: Casting copper, 26c.; Lake copper, 27.75c.; tin, carloads, 39c., and small lots, 41c.; lead, 6.55c. to 6.60c.; spelter, 9c.; sheet zinc, 15c.; Cookson's antimony, 50c.; other grades, 14c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 19.50c.; copper bottoms, 17.75c.; copper clips, 18.50c.; red brass, 17c.; yellow brass, 13c.; lead pipe, 5.25c.; zinc, 6c.; pewter, No. 1, 28c.; tinfoil, 33c.; block tin pipe, 37c.

St. Louis

SEPT. 11.—Non-ferrous metals have been sluggish, closing to-day as follows: Lead, 6.62½c. to 6.75c.; spelter, 8.62½c. to 8.75c.; tin, 38.75c. to 38c.; Lake copper, 28.50c.; electrolytic copper, 28c.; antimony, Asiatic, 12c. In the Joplin ore market, weakness continued, with the top price for zinc blende, $65, while the range was down as low as $40. The average for the week was $51. Calamine ranged from $35 to $45, with the average for the week about $40. Lead ore was steady at $65 for 80 per cent. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 8c. to 8.50c.; heavy yellow brass, 11.50c.; heavy red brass and light copper, 14.50c.; heavy copper and copper wire, 17c. to 18c.; zinc, 5¾c. to 6c.; lead, 4¾c. to 5c.; pewter, 24c.; tinfoil, 31c.; tea lead, 3½c.

India's Pig-Iron and Steel Output in 1915

India's production of pig iron in 1915, according to recent data of the British Iron and Steel and Allied Trades Federation, was 270,027 gross tons, as compared with 234,726 tons in 1914. The output of steel ingots was 103,474 tons, against 66,603 tons in 1914. The finished steel production was 68,634 tons, made up of 15,780 tons of heavy rails, 953 tons of light rails, 432 tons of sleepers and fish plates, 28,481 tons of joists and girders, 5881 tons of angles, tees and channels and 17,107 tons unenumerated.

Japan's Iron-Ore Supply

Japan's iron-ore resources are estimated at 80,000,000 tons from its island possessions alone, according to a recent investigation by the Department of Agriculture and Commerce. The deposit of magnetic ore at Kamaishi is placed at 35,000,000 tons, with 5,000,000 to 6,000,000 tons of such ore from other mines in eight provinces. Red iron-ore deposits in six provinces are figured at 30,000,000 tons and deposits of brown ore in other localities at 10,000,000 tons.

The McLean Construction Company, with a capital stock of $25,000, has been incorporated by L. O. McLean, 829 Oliver Building, Pittsburgh, Richard Townsend and Tony De Donne, to engage in general construction work.

The Electric Furnace in Steel-Making

A Symposium on the Advantages and Practical Results Already Derived from Three Operating Units

IN the symposium on "Electric Furnace Practice," which was the leading feature of the steel session of the American Foundrymen's Convention on Thursday morning, Sept. 14, a number of important papers were offered representing several of the leading electric furnaces now in operation in this country. Records of the operations of the Heroult, Synder and Grönwall-Dixon furnaces were presented by men familiar with their actual exploits. Abstracts of the papers are here given with the exception of the one on the Grönwall-Dixon furnace, a special article descriptive of this having appeared in THE IRON AGE, Sept. 7, 1916.

Electric Furnace Practice in Making Steel Castings

BY T. S. QUINN*

THE ever increasing demand for a higher grade of small steel castings, influenced the Lebanon Steel Foundry, Lebanon, Pa., to consider the electric furnace to supplant the crucible furnaces, which up to that time constituted the melting equipment. Having decided on a basic furnace as being the most economical from a standpoint of the local scrap market, the Heroult furnace, of 1-ton capacity, was installed in March, 1915. It was provided with Thury regulators, steel non-water cooled holders, and Gray tilting device, and is of the three-phase type. The bottom and side walls are magnesite up to the slag line, and the side walls and roof are silica brick.

Three weeks after the first heat was poured the stack of the crucible furnaces was thrown, and the furnaces themselves were dismantled. This provided space for another electric furnace, should the normal expansion of business warrant it. In July, 1916, a second unit was installed of the same type, but of 2 tons capacity, and proportionately higher powered. The 1-ton furnace has a transformer capacity of only 225 kva.; the 2-ton size has 600 kva. capacity.

The product of both furnaces is small steel castings, averaging 5 to 10 lb. in weight. The castings are made for automobile, motor truck and general machinery purposes.

DATA OF THE ONE-TON FURNACE

I do not feel warranted at this time in making any statements in reference to the 2-ton furnace, as the length of time that it has been in operation is too short from which to draw intelligent conclusions. Up to Aug. 1, 1916, the 1-ton furnace made more than 2000 heats on the original basic bottom. In that time it has not been out of service except for relining, which it was customary to do on a Saturday or Sunday. The magnesite bottom, which was set in layers of 1 in. to 1½ in., is still in the furnace. In setting a bottom in this fashion a monolithic mass is obtained that cannot be equalled by a bottom rammed in with magnesite, tar and pitch. The life of a lining varies from 100 to 125 heats, and the life of a roof from 125 to 150 heats.

Amorphous-carbon electrodes are used, the consumption averaging about 25 lb. per net ton of steel in the ladle. This low electrode consumption for a small furnace of the three-phase type probably is due to the fact that shortly after the furnace went into operation, the solid copper type electrode holders were abandoned, and low carbon steel holders substituted. Each holder has two hinges, and the bus-bars are continued on out past each hinge, to prevent any heating at this point. The advantages of this holder include the absence of any water cooling and freedom from breakage, due to torsional stresses. The ease with which an electrode can be slipped also is a decided advantage.

The operation of the furnace for the past year has been on a 24-hr. schedule, and while lack of transformer capacity was a serious handicap to maximum production, the furnace made an average of six to seven heats in 24 hr. A 1-ton furnace built to-day would have more transformer capacity, and with say 450 kva. as many heats could undoubtedly be made in 12 hr., at the same time effecting economy in power consumption.

POWER CONSUMPTION MODERATE

Actually, the power consumption has averaged 950 kw.-hr. per net ton of steel in the ladle, which is about what might be expected of a 1-ton furnace with insufficient power back of it. Even in the short length of time in which the 2-ton furnace has been in operation, it has been demonstrated satisfactorily that steel can be put into the ladle at the same temperature for the same purpose, with a kilowatt-hour consumption not exceeding 750 per net ton, and undoubtedly the power consumption on 3-ton and 6-ton furnaces is considerably less than this. Every effort is made to minimize the length of time between heats, and it not infrequently happens that bottom is made, and the charge is in the furnace, and the current on by the time the previous heat is poured, a matter of some 8 or 10 min.

The practice on this furnace has been to patch the banks with dolomite as soon as the heat is out of the furnace, and the charge is then introduced, consisting generally of what is known as heavy melting steel scrap. This scrap may have practically any analysis, as long as it is of chargeable size, and the carbon not too high. Coke is next placed under the electrodes on top of the scrap. Then the electrodes are lowered and the current turned on to the full capacity of the transformers in summer time, although in winter the furnace is often operated with a consant overload on the transformers of 25 per cent.

DETAILS OF THE PRACTICE

In about 20 min. a puddle of molten metal is formed under each electrode, and the surges of current become violent as the electrodes arc on the metal. Lime is now added with spar and sand, and the furnace again settles down and works steadily, and in about 1¾ hr. the charge is completely melted, at which stage of the operation the phosphorus has gone into the slag, where it is retained as phosphate of lime. Generally this reaction is sufficiently complete without the aid of any oxidizing agent other than the rust that is on most scrap. At this juncture the melter pours a test bar, breaks it, and by examination ascertains whether his carbon is high or low, and either ores down or pigs up, until this element is in order. If much ore is required of course more lime must be added to maintain sufficient basicity in the slag to take care of the phosphorus.

The furnace is tilted slightly and the slag is pulled off by means of a rake, an operation that takes, in skilled hands, about 3 min. The furnace is put back

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into place, and the second slag is made with lime, spar and sand, and at this stage of the heat the deoxidizing and desulphurizing period begins. As soon as the slag is melted, and is of the proper consistency, powdered coke is added, and in about 20 min. under the intense heat of the arcs, the slag becomes reduced, calcium carbide forms, and the sulphur goes into the slag, where it is retained as calcium sulphide. This reaction is very complete. However, the mere fact that a calcium carbide slag has been formed is no indication that the steel under it is thoroughly deoxidized, and it is necessary to hold the metal under this slag at least 20 to 30 min. to completely kill it. Manganese and silicon are next added, and the atmosphere of the furnace, and the condition of the slag at this stage of the heat is such that if for any reason it should be desirable to do so, the heat could be held in the furnace for an indefinite length of time without any appreciable loss in the manganese or silicon content in the steel, providing the slag is carefully watched and protected from any possible oxidation from the doors, etc.

To be able to introduce into a furnace a given amount of manganese, silicon, chrome, vanadium, etc., and hold it in the metal for an indefinite period, theoretically getting in the steel just what was introduced, is proof of the almost perfect deoxidizing possibilities of the electric furnace and of the condition of the steel as it comes from the furnace, the advantages of which must be apparent to operators of converter and open hearth, who are obliged to finish their metal in the ladle, resulting in an inferior product.

THE USE OF ALUMINUM

Were the whole heat to be put into a big ladle, and bottom-poured direct into the molds, there would be no necessity for the use of any aluminum, but as the practice necessitates the pouring of the metal from the furnace into a big ladle, and again pouring it into shanks, and from the shanks into the molds, it must be plain that this practice is very severe on the metal. No matter how thoroughly the steel might be deoxidized in the furnace, the tendency of the metal when it is handled so many times, and at a temperature sufficiently high to pour very light work, is to absorb some oxygen, and a small addition of aluminum is made in each shank as a preventative rather than a cure. There have been periods, however, when no aluminum was added even in the shanks for weeks at a time, but this practice taxes the skill of the melters to the utmost and is not to be recommended, when shanking steel in small quantities at high temperatures.

The finishing of a heat in the electric furnace requires very nice judgment on the part of the operator, and as the process is comparatively a new one, a scarcity of experienced melters is probably often the cause of much steel being put out in the market as "Electric Steel" which is not worthy of the name.

THE PROPERTIES AND COST OF THE STEEL

Too much cannot be said of the physical properties of electric steel, when properly made. With a view of ascertaining what electric steel would pull in comparison with steel from the converter, and open hearth, some 20 test bars were taken from as many consecutive heats. The chemical and physical properties were as follows:

	Per Cent
Carbon	0.23
Silicon	0.2
Manganese	0.6
Phosphorus	0.018
Sulphur	0.028
Ultimate tensile strength, lb. per sq. in.	71,417
Elastic limit, lb. per sq. in.	43,417
Elongation, per cent in 2 in.	31.66
Reduction of area, per cent	1.66

It will be noted that the average elastic ratio was 61 per cent of the ultimate tensile strength. The only heat treatment that the test bars received was a slow anneal at about 1600 deg. Fahr. Of the same analysis and with the same simple heat treatment, no tests from the converter, or open-hearth have come to the author's attention approaching these figures.

Information on the cost of steel in the ladle for casting purposes, governed as it is by local conditions, is of little use for purposes of comparison, unless all the variable factors entering into it are known. Therefore, the author refrains from touching on this phase of the manufacture of steel in the electric furnace.

However, the fact that there are in this country over 100 electric furnaces in operation is sufficient evidence that the electric furnace is commercially able to make its way.

To-day the development of the furnace is hampered, if not threatened, by instances of dissatisfaction with the product, probably because it is the trend of the times to commercialize any important discovery on a large scale, and it is possible that the exploitation and installation of electric furnaces has been so rapid that the development of metallurgical and operative skill has not been in proportion. Certainly the electric furnace does not call for any better operative talent than the open-hearth, and it is only reasonable to assume that when electric furnace practice is established and standardized as has been the case with the open-hearth, it will come into its own.

The Electric Furnace in the Foundry

BY EUGENE B. CLARK*

THE principal advantage of the electric furnace method of steel production is the high quality of the steel which it is possible to produce. Thorough refinement is possible. The cost of installation is high per ton of daily output. The cost of operation under average conditions approximates closely to the cost of operating the open-hearth or the converter. If favorable operating costs are to be obtained, the electric furnace is less flexible than the converter. It should be operated continuously in order to secure low costs, and continuous operation of the electric furnace may not fit in nicely with the requirements of the foundry.

Notwithstanding these disadvantages, the use of the electric furnace has grown rapidly in recent years, due partly to the demand for a high grade of metal and partly to the desire on the part of foundries whose business is increasing to try out the electric furnace. Probably the principal reason for the rapid increase in the number of electric furnace installations, however, is the enthusiastic activity of men engaged in their development and sale and the desire of the progressive foundryman to be as well equipped as his competitor. One furnace installation has led to others in many cases. This may seem like robbing the electric furnace of the credit for developing on its own merit, though it is not so intended. I wish to be clearly understood as not speaking in a manner at all derogatory to the electric furnace, and yet I feel that so much enthusiasm has been displayed in presenting its advantages that a word of conservatism and caution will not be out of place.

DISADVANTAGES OF THE ELECTRIC FURNACE

A belief hastily arrived at that the electric furnace is a cure for all the evils and troubles in the foundry will inevitably lead to disappointment. The electric furnace has some marked advantages, and it also has some annoying disadvantages. A foundryman contemplating the installation of such a furnace should clearly understand both. If he wants to produce an extremely high grade of molten metal and has a market for a product which will require this highly refined steel, then he has a very strong argument for the installation of an electric furnace. Many electric furnaces have been installed, however, where such conditions have not existed. It should be understood that all the metal

*President, Buchanan Electric Steel Company, Buchanan, Mich.

which goes through an electric furnace is not necessarily of a high grade. While it is possible to produce such metal, it is by no means true that the furnace itself will produce it unless it be operated properly.

The average steel foundry in the past has not been equipped and organized to produce highly satisfactory results from a metallurgical standpoint. The foundryman uses steel merely as an incident in his business. The older methods of producing steel have been to a large extent "rule of thumb." The operation of an electric furnace can be reduced to routine practice with satisfactory results, but this will not be accomplished without the serious effort of a skilled metallurgical management. It is not possible for the average foundry to buy an electric furnace, set it up and start it, like a molding machine. Steel making has its annoyances, no matter what method may be used, and it should be realized clearly that the finer the apparatus, the more skillfully must it be operated to attain to excellency of results. It is something like photography. Almost anyone can obtain pretty fair results with an ordinary camera. An unusually fine camera will permit of much better results, but the camera itself is only the tool. The photographer must be highly skilled to get the best results out of the finest camera.

The very fact that an intending user of an electric furnace will be confronted right at the start with an embarrassing number of different types of furnaces which he may install, each one of which goes by the name of the man who was interested in its development, is evidence of the great variety of ideas and opinions of different men as to what style and type of electric furnace is best. The intending purchaser must decide between not only an arc or an induction furnace, and between various types of each, but, having decided on the general type, he then is confronted by the necessity of selecting a Heroult, a Stassano, a Girod, a Snyder, a Grönwall-Dixon, a Rodenhauser, a Rennerfelt, or one of a number of others. Such a list certainly is confusing. They cannot all be the best, and the thinking man quickly reaches the conclusion that where there are so many differences of opinion there must be many knotty problems.

MELTING OPERATION IS PRELIMINARY

If the true advantage of the electric furnace is to be realized, the melting operation is merely the preliminary one. After that a metallurgical treatment of the molten bath is to be accomplished. This is done by the proper manipulation of slags. It is at this point that skill and metallurgical knowledge is necessary. Inasmuch as high-grade steels must be lower in phosphorus and sulphur than the average scrap available for charging, it is necessary, generally speaking, to build the electric furnace with a basic lining. The heat supplied electrically is in such intense and concentrated form and the restricted size of the furnace brings the walls in such close proximity to the arc that delicate regulation is necessary to introduce the heat into the metal without at the same time scorifying the roof, walls and banks of the furnace. This situation is further complicated by the fact that the highly basic slag required for proper refinement is such a poor conductor of heat. Also, when the furnace lining is attacked the composition of the slag is immediately altered and the metallurgical reactions seriously interrupted. When the proper reducing conditions are obtained during the refining period, the copious white fumes which fill the furnace make it difficult for the melter to watch the brickwork and to know when a fluxing temperature has been reached.

The absence of a flame, with attendant excess of air, in the electric furnace, while making possible the attainment of conditions peculiar to electric refining, and while in many ways a highly desirable feature, will not of itself insure deoxidized metal. The bath in an electric furnace is as much oxidized as any open-hearth heat—in fact, dephosphorization absolutely requires an over-oxidized bath. Successful refining, to be thoroughly done, requires the complete removal of the first slag and the making of a second slag under the action of which the metal is to be thoroughly deoxidized and desulphurized. The proper manipulation of these slags must be in the hands of a man who knows what he wants to do and how to do it. In other words, he must have metallurgical knowledge. The chemical reactions are simple and easily understood, but they are accomplished under conditions which are not easily controllable except under the guidance of skilled operators.

THE QUESTION OF COST

Finally, the question of cost must always be borne in mind. It is easy to destroy or seriously damage the lining of a furnace in the efforts to control a refractory heat and bring it out of the furnace as high-grade steel. At best, the life of roof and walls is short, compared to that of the open-hearth, and the small tonnage produced necessarily means high repair cost per ton of steel. In unskilled hands, the electric furnace is likely to prove a source of disappointment in its performance, but when perfection of practice is reached the electric furnace will produce metal of the highest quality. If such a grade of steel is required, and *if it can be used profitably*, the electric furnace will amply repay its difficulties of operation. I have no hesitation in saying that if a foundryman requires a better steel than can be produced readily by other processes, and if he is willing to provide the skilled operating management necessary to produce such steel, he can install an electric furnace with the assurance that he has the best piece of metallurgical apparatus available to secure his desired results.

Ideal Electric Furnace for the Foundry

BY F. J. RYAN, E. E. MC KEE and W. D. WALKER*

A SHORT study of all electric steel furnaces now admitted to be practical will show that the single phase, or single electrode furnace is in all respects one of the most simple. Its great simplicity in operation and constructon eliminates confusing details and makes it possible for the foundry to change from converter or crucible steel practice to that of electric steel with least loss of time and with least change in the existing organization.

Many statements have been made that this or that electric steel furnace can or cannot operate on an acid or basic lining. This is a question of metallurgical skill in the operation of the electric furnace, and not of furnace construction. The fundamental principle in electric steel furnace construction is the proper application of heat and the reduction of heat losses. Heat may be conserved as well in a basic as in an acid lined furnace, except for the additonal loss due to radiation resulting from the increased time necessary to refine the metal. It is an advantage to have a way to reduce the voltage and the power input while holding the metal for refining so as to minimize this loss and to save the linings and the steel from overheating. As regards the application of the heat, single-electrode practice differs radically from three-electrode furnace practice, in the speed of melting down, but in any event both single and three-electrode furnaces are now operating on both basic and acid linings with commercial results.

*The Snyder Electric Furnace Company, Chicago, Ill.

COST OF PRODUCTION

Each power unit lost means a loss of profit on the ultimate product. As power is converted into heat in an electric steel furnace, time becomes a vital element of cost because efficiency in the use of heat consists in applying a certain quantity to secure a given result in the shortest possible time. The largest loss of heat in any heating equipment is that of radiation, and as radiation is time multiplied by surface, time again becomes an important cost element.

The reason why a single-electrode or single-phase furnace can produce the finished product in a short space of time is because in the single-phase furnace it is possible, with a high voltage and a long arc, to put into the furnace more power within a given period of time.

The simplicity of the electrode control apparatus in the single-electrode furnace has made it possible to develop the open roof type electric steel furnace. This type allows quick charging, preferably by mechanical means, thereby increasing the number of heats and cutting down heat losses during charging.

The number of heats that can be secured from an electric steel furnace also has an important bearing upon the consideration of the initial price of the equipment. The logical method of measuring the capacity of electric steel furnace equipment is by output over a given period of time and not by holding capacity. We must therefore admit that the furnace which can produce the greatest amount of material over a given period of time is the most economical unit when figured holding capacity for holding capacity. The single-electrode furnace delivers the quick heats and allows great production.

In Table 1 is a summary of the results obtained in a ¾-ton single-electrode Snyder furnace in the plant of the Gerlinger Steel Casting Company, Milwaukee, Wis. This furnace was lined basic. It was guaranteed

Table 1—Operation of a ¾-Ton Single-Electrode Basic Furnace at the Gerlinger Steel Casting Co., Milwaukee, January, February and March, 1916

Total output, tons	274.23
Total electricity, kw-hr	146,160
Average kw-hr. per ton	533
Average lb. per heat	1,885
Average cost per ton metal in the ladle	$28.93

to produce 3 tons of steel per 12 hr. with power consumption at the furnace not in excess of 880 kw-hr. per ton of steel. In actual practice this furnace has often produced four heats of 2000-lb. for a total of 4 tons in slightly more than 11 hr. The power consumption on the primary side of the transformer averaged only 533 kw-hr. per ton over the period of three months. A larger single-electrode furnace has since been installed by this company and is now operating with satisfactory results.

In Table 2 is a statement of physical tests of material produced in the plant of the Thomas Davidson Mfg. Company, Montreal, Canada. These results were obtained during the production of blanks for high-

Table 2—Chemical and Physical Tests on 4.5-In. High Explosive Shell Steel Made at Plant of Thomas Davidson Mfg. Co., Montreal, in Single-Electrode Acid Furnace

Carbon, Per Cent	Manganese, Per Cent	Sulphur, Per Cent	Phosphorus, Per Cent	Yield Point, Gross Tons	Tensile Strength, Gross Tons	Elongation, Per Cent
0.45	0.87	0.039	0.039	22.5	48.3	23.2
0.44	0.88	0.041	0.037	19.4	38.5	22.6
0.45	0.80	0.049	0.036	24.1	48.3	23.2
0.58	0.80	0.047	0.042	22.3	47.9	20.1
0.43	0.78	0.045	0.040	22.9	48.3	26.8
0.45	0.69	0.047	0.033	19.1	35.4	26.2
0.46	0.70	0.039	0.038	22.5	44.5	25.6
0.48	0.70	0.039	0.039	20.7	39.9	21.3
0.41	0.78	0.047	0.038	20.7	41.6	25.0
0.34	0.85	0.045	0.040	21.5	46.3	19.5
0.41	0.76	0.041	0.045	22.1	47.4	23.6
0.46	0.80	0.041	0.055	23.5	48.7	23.2
0.45	0.62	0.039	0.041	22.7	41.7	23.2
0.49	0.65	0.039	0.047	23.9	49.5	15.8

Silicon varied from 0.17 to 0.29 per cent.

explosive shells in a 1½-ton single-electrode furnace lined acid. The chemical and physical tests prove the control possible on this type of lining for foundry work.

Table 3 shows a record of a complete day's run in the plant of the Dayton Steel Foundry Company, Dayton, Ohio. This performance, the production of 14 heats of a ton apiece, melting cold steel scrap, over a period of 24 hr. and 40 min. is hard to believe. The furnace which made this run is a 1½-ton single-electrode furnace lined acid. The question naturally arises why this furnace was charged with only 2000 lb. if it is a 3000-lb. furnace. This depends upon the practice in the individual foundry. Some overload and some underload their furnaces. In a similar furnace to that at Dayton, the Crucible Steel Casting Company, Milwaukee, Wis., has charged as high as 3800 lb. and averages above 3000 lb. In a furnace rated at 1500 lb. the Gerlinger Steel Casting Company, Milwaukee, Wis.,

Table 3—Operation of a Single-Electrode Acid Furnace in the Plant of the Dayton Steel Foundry Co., Dayton, Ohio, June 9, 1916

Electrode Time	Power On Time	Power Off Time	Finished Time	Charge pounds
[illegible]	[illegible]	4:00	4:12	2000
4:17	4:25	6:39	6:51	2000
6:53	6:59	7:13	7:26	2000
7:33	7:41	9:03	9:14	2000
9:15	9:41	10:[illegible]	11:01	2000
11:05	11:22	12:34	12:44	1800
12:45	1:24	[illegible]	2:40	2000
2:45	3:01	4:11	4:20	2000
4:22	4:46	5:56	6:06	2000
6:08	6:44	7:21	7:34	2000
7:50	7:51	8:48	9:08	2000
9:09	9:30	10:35	10:45	2000
10:48	11:06	12:20	12:32	2000
12:55	1:10	2:30	2:46	2000

Total time, 24 hours 40 minutes. Average melting time, 72 minutes.
Total output, 27,800 pounds. Average pouring time, 12 minutes.
Average charging time, [illegible] minutes. Average time per heat, 106 minutes

has charged as high as 2200 lb. and averaged over 1800 lb.

The electric furnace, no matter of what type, has now passed beyond the experimental stage and has entered into actual commercial operation, entirely separated from chance or unknown results. The steel foundryman can feel that in interesting himself in the electric steel furnace he is making a step forward in his field and business. The past year has indicated clearly the position that the electric steel furnace is to take in connection with the steel founding industry. Recent statistics covering the growth of electric steel for castings show that while in 1914 there was a production of 8551 tons of electric steel, the output for 1915 had jumped to 23,064 tons, an increase of nearly 200 per cent.

THE GRÖNWALL-DIXON FURNACE

The paper by John A. Crowley on a year's operation of the Grönwall-Dixon electric furnace at Detroit, Mich., already referred to, contains many interesting results in the field of electric high-grade alloy and carbon steels.

The X-Ray on Reinforced Concrete Columns

Successful experiments in photographing the iron reinforcements of concrete work with Roentgen rays are reported from Switzerland by E. Stettler of the Swiss Railway Department, and they are attracting much attention among Swiss engineers. U. S. Consul George N. Ifft, St. Gall, Switzerland, notes that by the use of special plates, adapted to any construction, Mr. Stettler has apparently obtained serviceable pictures of the inner structure of cement blocks. To eyes accustomed to pictures of great detail and much light and shadow the first results of the Roentgen exposure may seem rather meager, but the iron reinforcements in the pictures are shown in their proper size and location, as are also the connections and crossings, so that the imperfect ones can be clearly recognized.

The effects of vibration in structures are being studied by the Aberthaw Construction Company, 27 School Street, Boston, Mass., and a preliminary report of the investigation has been published in the shape of a 24-page pamphlet, which can doubtless be had for the asking. Some brief references are made to the effect of vibration on machine outputs, on the shop repair item, on the difficulties with line shafting, on the transmission of sound, and of vibrations in congested communities and even on the effect of vibration on the human element.

OBITUARY

J. Wallace Page

J. Wallace Page, founder of the Page Woven Wire Fence Company and known as the father of the woven wire fence industry, died Saturday, Sept. 9, at his home in Adrian, Mich., aged 73 years. He was born on a farm in Lenawee County, Mich. He received his education in public schools and Adrian College. When barely 20 he enlisted in the Union army and served from 1863 to the end of the Civil War. For 20 years thereafter he was a farmer.

Seeing the desirability of more dependable fences, Mr. Page turned to the use of wire, although it then cost 14c. per lb. He did not favor barb wire for this purpose but conceived the idea that the nearest approach to permanency in a fence would be secured by making it of horizontal wires tied together with sufficient vertical cross wires to preserve the spacing. His first woven fence had cross wires about one foot apart, woven by hand, a wire at a time. It was erected in May, 1883, and subsequently he sold three miles of it to acquaintances, obligating himself to weave it. The following spring wooden looms were built by Mr. Page and a neighbor farmer in an old wagon shop in the village of Rollin, a mile from the farm. With these primitive contrivances several thousands of rods of fencing were slowly woven, much of which is still in service.

Mr. Page then associated with him his cousin, Charles M. Lamb, a farmer boy of 18, who had mechanical instincts, in efforts to evolve a more efficient weaving apparatus. This proved a happy selection, for throughout the entire history of the Page enterprise the major portion of the machinery and the appliances used in fence-making have been the products of Mr. Lamb's genius and industry, and the erection and operation of the large plant at Monessen, Pa., were under his general supervision. The work of construction of the power fence-weaving loom was done in the city of Hudson, and fence was woven there from 1886, but in 1888 the loom was removed to a small building which still constitutes a portion of the Adrian plant of the company.

It took many years of hard work and educational effort to bring farmers to see the advantage of woven wire fencing, but in the course of time patience, perseverance and the liberal expenditure of money in advertising brought their reward. Until 1898 the manufacturing activities of the company were confined within the Adrian plant, which had by that date expanded to many times the original floor space. It was then made apparent that the company must at some time produce its own wire. Plans were made for a wire mill and a location was secured at Monessen, Pa., near Pittsburgh. Hardly had the wire mill been placed in operation, when it was discovered that wire rods were almost as much of a market problem as had been the finished wire, and it was found necessary to add to the Monessen plant steel manufacturing facilities capable of supplying the company's needs from the pig iron to the galvanized wire. Mr. Page was the official head of the corporation from its creation down to a few years ago, when physical troubles compelled some relaxation from arduous activity and at the time of his death he was first vice-president of the company. He leaves two sons and a daughter.

WILLIAM H. JONES, vice-president of the International Harvester Company, died Sept. 1, at Pasadena, Cal. Concerning him, Cyrus H. McCormick, president, said: "He had come as a boy from a farm in Wales to a farm in Wisconsin; he had learned at first hand the farmer's needs, and he learned personally how to make and to sell the machines that met these needs. From farm hand to farm machinery salesman, from salesman to agent, to superintendent of agents, to the organizer and director of a successful manufacturing company, was the road he traveled between 1866 and 1881. It was not an easy road. Twenty hours a day, it is told of him, was not too long to work when he was selling mowers and reapers up and down Wisconsin in the sixties. By these experiences he became the master of every detail in the harvester business. To the formation of the Harvester Company Mr. Jones brought the Plano works, one of the five principal plants of the consolidation."

FRANK MCMILLAN STANTON, treasurer of the Mohawk and Wolverine copper mining companies, and one of the most prominent mining engineers in the country, died Sept. 12 at his home at Whitestone, Long Island, aged 52 years. He was born in New York City, and was the son of the late John Stanton, long a leading figure in the copper trade. He was graduated from the Columbia School of Mines in 1887. For 23 years he was superintendent of the Atlantic Mining Company. In 1910 he retired on account of failing health and visited the mining districts of Europe for a vacation. In 1914 he was elected to the offices he held at his death. In addition, he was president of the Fort Mountain Talc Company, a director of the First National Bank of Houghton, the Ohio & Kentucky Railroad, the Copper Range Company, and a number of other corporations.

LEVI J. GUNN, one of the founders of the Millers Falls Company, died Sept. 9 at his home in Greenfield, Mass., aged 86 years. He was born in Conway, Mass., learned the machinist trade, and in 1853 removed to Greenfield, where he worked in local shops until 1864, when, in company with Charles H. Amidon, he began the manufacture of clothes wringers. In 1868 the Millers Falls Company was started and he became treasurer and manager, continuing in these capacities until 1901, when he was elected president of the company. He held this position until 1910, when he retired. He had been a member of the State Senate and of the Governor's Council and active in financial affairs.

JOHN V. BEEKMAN, for many years a valued officer of the Lidgerwood Mfg. Company, Brooklyn, died Sept. 11 at his home in Plainfield, N. J., aged 75 years. From 1873, when the company was established, until a few years ago he had charge of its shops and of the designing of all machinery. After his retirement from active service he continued his connection with the company in an advisory capacity.

FREDERICK WISTAR MORRIS, formerly a member of the firm of Morris, Wheeler & Co., Philadelphia, retiring a few years ago, died Sept. 5 at his summer home at Chelsea, Atlantic City, aged 74 years. He leaves his widow, two sons and four daughters.

JOHN A. BERGER, one of the founders of the Berger Mfg. Company, Canton, Ohio, manufacturer of sheet metal building products, died Sept. 8, aged 69 years. He retired from actual business several years ago.

Puddlers working in bar-iron mills in the Central West that sign the Amalgamated Association scale will be paid $9.30 per ton for September and October, the highest price ever paid for puddling under the Amalgamated scale, being an advance of 50c. per ton over the rate for July and August. The Girard Iron Company, which operates a large non-union puddling plant at Girard, Ohio, and the Youngstown Sheet & Tube Company, which has a puddling plant at East Youngstown, Ohio, always pay the Amalgamated rate for puddling and will advance their puddlers at once to the $9.30 rate.

A cooling tower, 150 ft. long, 50 ft. wide and 75 ft. high has been completed at the Anderson, Ind., plant of the American Steel & Wire Company. It was built by the Wheeler Condenser & Engineering Co., Carteret, N. J. It has a yellow pine frame with cypress sheathing and filling. It has two chimneys which rise above the cooling stacks and create the air circulation by natural draft. The capacity of the tower is 7300 gal. a minute cooled from 115 to 85 deg.

The Fairmont Mining Machinery Company, Fairmont, W. Va., will increase its plant capacity about 50 per cent at an early date. About 100 additional workmen will be added.

German Pig-Iron Syndicate Renewed

The German Pig-Iron Syndicate has been renewed until the end of 1920, after long negotiations. It is one of the largest of the German cartels and is an important factor in the German steel industry. The new organization consists of 34 companies, or less than the number in the original syndicate. Some of the producers have amalgamated while others now consume their own pig iron.

The total of allotments remains the same, but the percentages have been changed considerably. The allotment of the Gelsenkirchen works, the largest member, is increased from 234,000 tons in 1915 to 283,000 tons in 1918; that of the Gutehoffnungshütte from 101,000 tons to 141,000 tons; that of the North German Steel Works in Bremen from 100,000 tons to 150,000 tons, and that of the Hohenzollern works at Emden from 50,000 tons to 110,000 tons. All the blast furnaces recently established on the German seacoast show large prospective increases in output.

Since the war the sales have been little more than half the allotments. For 1914 and 1915 the estimated total allotment was 2,840,796 tons; for 1916 and 1917 it is 2,955,796 tons; for 1918, 2,992,446 tons, and for 1919 and 1920 it is 3,002,466 tons, indicating an expected large demand.

Included in the new syndicate are the Hoesch Steel Works, the Bochum Works and a group of smaller ones in the Siegen district. The Hoesch Works consumes all it makes, and the Siegen makers have an understanding with the syndicate which restricts their output and confines their competition to their own locality. The Phoenix Steel Works gives notice that it will leave the syndicate at the end of this year, probably because it will use its own pig-iron output.

Federal Export Corporation

The Federal Export Corporation, 111 Broadway, New York, through its Paris office, recently secured a contract to supply the Paris-Orleans Railroad, France, with about 6000 steel tires for locomotives, tenders and cars, and also with car springs, etc. It has had other contracts for railroad material, some of which was shipped to the Eastern Railway of France and the General Omnibus Company of Paris. The corporation has so far been active principally in France, but ultimately will extend to other countries. It has an office and several representatives in Paris, and is in receipt of daily cables from that city. It has sold a quantity of steel products to French consumers through its Paris office.

Allied Machinery Company

The Allied Machinery Company of America, recently acquired as a subsidiary by the American International Corporation, elected the following officers and directors Sept. 8: Chairman, Samuel McRoberts; president, R. B. Sheridan; vice-president, Charles E. Carpenter; vice-president and treasurer, R. P. Tinsley; secretary, Ames Higgins; assistant treasurers, Everett Brown and Percy Mayes; assistant secretary, Kenneth F. Clark; directors, G. J. Baldwin, John E. Gardin, Robert F. Herrick, Samuel McRoberts, Oscar E. Stevens, Charles E. Carpenter, J. F. Hartley, W. S. Kies, R. B. Sheridan, R. P. Tinsley.

Further information regarding the plans of the Mansfield Sheet & Tin Plate Company, Mansfield, Ohio, to enlarge its plant has been given out by the board of directors. It is intended to erect a new mill building on the site recently acquired adjoining the present plant and to equip it with electrically operated mills, increasing the capacity from 2800 to 6000 tons per month. It is hoped to have the new plant in operation by March.

Part of the rolling-mill plant at Duncannon, Pa., was destroyed by fire Sept. 10 at a loss of about $20,000. Operations will be impeded, if not suspended, until the building is replaced and new machinery installed. The plant is owned by the Lebanon Iron & Steel Company, Lebanon, Pa.

PERSONAL

The death of George Gilmour, chief engineer of the Travelers Insurance Company, Hartford, Conn., has made several important changes necessary in the engineering and inspection division. The company has been engaged in safety engineering for the purpose of accident prevention for more than 20 years, and Mr. Gilmour was prominent in this work. John L. Thompson, who has been Mr. Gilmour's chief assistant, assumes general charge of the division with the title of superintendent. He is a graduate of the Sheffield Scientific School of Yale University. Allan D. Risteen takes the title of director of technical research and safety publication work. He is a graduate of the Worcester Polytechnic Institute. William P. Eales, formerly supervising inspector at the Philadelphia branch office, has been transferred to the home office, assuming the title of assistant superintendent. William Ferguson, formerly supervising engineer at Detroit, has been transferred to the home office as traveling supervising engineer.

J. C. Weston, since 1914 general sales manager of the United States Tire Company, has accepted the position of vice-president of the Mitchell Motors Company, Racine, Wis., in charge of sales and promotion to succeed Otis C. Friend, who left Aug. 15 to become vice-president and general manager of the United Motors Company, New York.

Charles S. Slaker, sales manager of the Janesville Machine Company, Janesville, Wis., has resigned to become general sales manager of the Stover Engine & Mfg. Company, Freeport, Ill., the recent consolidation of the Stover Engine Works and the Stover Mfg. Company.

Dr. George S. Hessenbruch, assistant chief engineer of power plants of the Union Electric Light & Power Company, St. Louis, Mo., and superintendent of works of the St. Louis County Gas Company, Webster Groves, Mo., has severed his connection with these companies and opened offices in the Victoria Building, St. Louis, as consulting engineer, making a specialty of gas and gas works operation and construction, and particularly gas coal by-products. He has had a long experience in both construction and operation.

P. V. Carney, assistant superintendent of the Bessemer converter department, South works, Illinois Steel Company, has resigned to become superintendent at the South Bethlehem works of the Bethlehem Steel Company.

Fred M. Wertz has resigned as sales manager for the Thurlow, Pa., plant of the American Steel Foundries, to take charge of the New Haven, Conn., plant of the Penn-Seaboard Steel Corporation of Philadelphia.

Expansion of a German Steel Plant

The Stahlwerk Becker Actien Gesellschaft, Willich, Germany, doubled its capital stock on June 30 last to $3,808,000 (16,000,000 marks). It paid 25 per cent in dividends in the 1914-15 year, and it is reported that the distribution will not be less for the present fiscal year. At present, according to U. S. Consul Henry C. A. Damm, of Aix La Chapelle, Germany, this company is dependent upon outside sources for its raw material, but it is planned to acquire iron mines and to build new blast furnaces, tin-plate mills, pipe and tube plants and coke ovens, and to enlarge the electric steel and wire-drawing plants. The company expects that after the war there will be a large and urgent demand for some time for quality steel of all kinds.

The Mutual Motors Company, manufacturer of the Marion-Handley automobile, has bought the large plant at Jackson, Mich., owned by the Imperial Automobile Company, which it has been occupying under lease for the last year and a half. The plant has facilities for the production of 100 automobiles a day. The plot comprises about 17 acres, with substantial buildings and with ample room for expansion.

STRIKES AND SETTLEMENTS

The New England Situation

F. H. Payne, vice-president of the Greenfield Tap & Die Corporation, Greenfield, Mass., who is also vice-president, not secretary, of the F. E. Wells & Son Company of the same place, makes a few corrections in the statement which appeared relative to his companies on page 561 of THE IRON AGE of Sept. 7. The name of the Wells Company should have been printed F. E. Wells & Son Company and not A. H. Wells. Further, the F. E. Wells & Son Company has absolutely nothing to do with the Greenfield Tap & Die Corporation, being a company by itself. The Greenfield Tap & Die Corporation has three divisions, called the Wells Brothers Company division, the Wiley & Russell Mfg. Company division and the A. J. Smart Mfg. Company division. Mr. Payne also says: "We have had 176 men walk out of our Wiley & Russell plant, out of 376; 43 out of our Smart plant, out of 128; and 86 out of our Wells plant, out of 409, productive labor. The demands made upon our three divisions of the Greenfield Corporation and upon the F. E. Wells & Son Company were the same, namely, 8 hr. and time and one-half for overtime, double pay for Sunday, etc. All of our factories run 54 hr. We have posted notices that the employees who wish to be reinstated must return for work within two weeks from the time they struck; otherwise their places will be filled."

Conferences held last Friday and Saturday between the management of the Pittsfield, Mass., plant of the General Electric Company and the striking employees were fruitless. The strike has been extended to nearly every department, and only a small portion of the force of 6300 hands is reported to be at work. A statement issued by General Manager Chesney on Saturday practically reiterated his position as given out at the beginning of the trouble.

It is feared that trouble will develop at the Goodell-Pratt Company's plant, Greenfield, Mass.

The 600 strikers at the plant of the Westfield Mfg. Company, Westfield, Mass., voted, Sept. 7, to return to work Sept. 11. President Walker is to investigate at once the cases of the four men laid off, and the framing of a new working agreement, to replace the one which expired a week ago, is to be taken up not later than Thursday.

Conditions in New Haven and Bridgeport, Conn., show some improvement, but the foundries in the latter city are operating only in a limited way.

Nashville Machinists Win Demands

Three of the five principal machine shops in Nashville, Tenn., met the demands of their employees for an 8-hr. day when these demands were presented, and are now operating on that basis. At last reports, 25 machinists from two other shops were still out, although the steam fitters and other workmen in these shops remained at work.

Some of the steam fitters and helpers employed at the plant of the Wilmington Steel Company, Wilmington, Del., are on strike in an effort to secure an increase of 5c. per hour.

The Harvey Spring & Forging Company, Racine, Wis., has distributed among its employees checks equal to from 1 to 5 per cent of the annual wage, depending upon the length of continuous service. The company expects to make this profit-sharing plan a regular feature, the bonus to be paid each year, about Aug. 1. All men in continuous service for one year received 1 per cent; two years, 2 per cent; three years, 3 per cent; four years, 4 per cent; and five years or more, 5 per cent.

Powdered coal burning is to be employed by the Armstrong Whitworth Company, Montreal, Que. The Bonnot Company, Canton, Ohio, has closed a contract for the Holbeck system for the present smaller heating furnaces, the ingot annealing, pot annealing and rolling mill furnaces, and also for new tire annealing, reheating and continuous ingot heating and other heating furnaces.

Co-operation in Export Trade Must Wait

WASHINGTON, D. C., Sept. 9, 1916.—After more than nine months' consideration, the omnibus revenue act was finally passed, and signed by President Wilson yesterday. As predicted in this correspondence, the chief provisions of the measure were formulated by the conference committee, including a complete revision of the munitions sections. The estimates as to the amount of revenue the measure will raise vary, some of the majority leaders placing it as high as $240,000,000. The most conservative estimate places the amount at approximately $200,000,000. The tax upon the net profits of munitions manufacture was fixed at 12½ per cent.

Notwithstanding strenuous efforts made, the proposition to include in the revenue measure the provisions of the Webb bill authorizing the formation of combinations in the export trade, and exempting such combinations from the operation of the Sherman and other anti-trust acts, was defeated, certain Senators announcing that they were ready to prolong the session indefinitely to prevent such inclusion in the bill.

The Senate and the conference committee followed the action of the House in limiting the salaries of members of the tariff commission to $7,500 per annum, and under the terms of the tariff commission sections the President can appoint defeated Congressmen to the commission, or other men who are undesirable, for such important work as may fall to this commission. The tariff commission sections of the act are as previously outlined in this correspondence. W. L. C.

Selling Farm Machinery in Russia

A way for developing an agricultural machinery business in Russia is discussed in London *Engineering* by a correspondent, who urges co-operation with the Russian Zemstvo Union, one of which has been formed in each district of Russia and Siberia, of wealthy farmers, peasants, etc., who are at present dealing with the supplies for the army. This union, he says, could be approached at the present time by manufacturers, to enter into co-operation with them to supply the Russian or Siberian farmer, on the conclusion of hostilities, with agricultural machinery or implements, say on a three years credit. The Zemstvo could arrange for the supply and for collecting the payments on the machinery co-operatively, a percentage of the crop from the farm each year being put aside to pay for the machinery, the Zemstvo paying the total amount to the manufacturer. The manufacturers would thus have a wealthy society to guarantee the payments, and, being a local society, it would know the conditions of each farm. Manufacturers would require to amalgamate and to deal through a central office with the Zemstvo Union in Russia. It would be necessary to see that this ring of manufacturers received the necessary financial backing.

Higher Costs of Electrical Machinery

Advances have been made on all kinds of machinery, but in some cases they have not kept pace with the increased costs of the builders. This is true in the electrical field. Small generators and motors, of necessity have been marked up, but selling prices are not on a line with manufacturing costs. Records taken from the books of a manufacturer of portable electric tools are of interest. The following shows the increases in manufacturing costs of a ½-in. drilling machine, as compared with the same manufacturer's records two years ago:

	Increase
[illegible] aluminum	$2.40
[illegible]	.75
Copper wire	1.00
[illegible]	.50
[illegible] standard chuck	2.75
Labor (approximately)	1.50
Total increase	$8.90

These drilling machines were quoted before the war at $68, and the price to-day is $72, an advance of only $4. As will be seen, the increase in manufacturing costs is more than twice as much.

Machinery Markets and News of the Works

MOTOR CAR PLANTS EXPAND

Ford to Spend Millions at Detroit

General Situation Continues Healthy, Though Deliveries Still Hamper Business—Big Export Company Placing Stock Orders

Detroit reports unusual industrial activity. The plan of the Pennsylvania Lines to enter that city will mean the expenditure of a large amount of money. That the Ford Motor Company intends to spend millions in enlarging its plant is confirmed. The Studebaker Corporation is also planning to expend about $1,500,000 for new buildings in Detroit.

In New York, both sales and inquiries are more numerous, and more would be done in this city and elsewhere were prompt deliveries of standard machine tools more easily obtained. The buying of 70 lathes for export to Russia is reported, and the Allied Machinery Company of America is placing large stock orders. Gould & Eberhardt, Newark, N. J., who are building a new plant at Irvington, N. J., have been buying recently.

A general improvement is noted in Cincinnati, although business placed in that city by the automobile factories is lighter. In Cleveland, the Peerless Motor Car Company will erect three new buildings to be devoted to the manufacture of pleasure cars, permitting its present plant to be used for the manufacture of motor trucks. Dealers in Cleveland could sell more tools were deliveries easier.

In Chicago, inquiry from industrial sources is of good volume, and the demand in Milwaukee continues persistent.

Business in San Francisco was halted by fear of a railroad strike, but it is now going forward again. Exports from San Francisco in 1915 were 100 per cent greater than in 1910.

In the Pacific Northwest, distress is being caused by a shortage of cars; otherwise, conditions are good. The production of lumber, most important in Washington and Oregon, is proceeding on a normal basis.

New York

NEW YORK, Sept. 13, 1916.

As was expected, the passing of Labor Day brought an increased number of inquiries from miscellaneous directions. Incidentally not a few orders were placed without the formality of inquiring. Practically all of the activity is on the part of industrial buyers. It is noteworthy that the larger manufacturers have great confidence in the future, and when they see a need do not hesitate to fill it. It is not expected that this month's business will be as heavy as that of August because of the large orders for big lathes in the latter month. The current buying by munitions makers at the present time is confined to one or two tools now and then.

The Allied Machinery Company of America is placing large stock orders. A firm of dealers recently received two orders for Russia, one specifying 50 machines and the other 20. They have not been shipped as yet. Shipments to Italy have been delayed because of difficulty in securing steamship space.

Of late there has been a good call for bench and precision lathes, the former being used for gage and fuse work. Deliveries on some makes of precision lathes are several months away.

Gould & Eberhardt, Newark, N. J., makers of shaping and gear cutting machines, continue to buy equipment for their new plant at Irvington, N. J.

Jabez Burns & Sons, manufacturers of machinery for coffee, etc., 600 West Forty-third Street, New York, will build a six-story addition to their factory on a site 50 x 100 ft.

The Eastman Kodak Company, Rochester, N. Y., has taken out a permit for the erection of an addition to one of its camera manufacturing departments, 43 x 148 ft., to cost about $40,000. It will be four stories, of reinforced concrete.

James Cunningham, Son & Co., Rochester, N. Y., have doubled their foundry capacity and have erected a four-story addition to take care of their increased business. They manufacture automobile ambulances, etc.

The Rochester Ball Bearing Company, 203 State Street, Rochester, N. Y., has been incorporated with a capital stock of $5,000, and will specialize in the manufacture of steel balls and ball thrust bearings. Joseph B. Robinson, Barnards, N. Y.; Carl M. Weber, 25 Bengal Terrace, and George C. Hannemann, 611 Garson Avenue, Rochester, are the directors.

The McCoy Iron Works, structural and ornamental iron worker, which maintains an office and works at Seaman Avenue and Mattano Place, Perth Amboy, N. J., has purchased a factory site, 100 x 400 ft., on Mortimer Street, Utica, N. Y., and has taken option on adjacent sites, 25 x 400 ft. and 50 x 100 ft. It is having plans drawn for the erection of a bridge shop, office, garage and storage building, to be built next spring. The bridge shop will be 65 x 280 ft., one story, of steel and corrugated iron. The company will require some bridge shop equipment, although its specifications for this are not yet complete. The plant will have railroad siding connection and will be used for fabricating bridge and structural steel work. M. A. McCoy is president.

The city of Batavia, N. Y., has awarded a contract for an automatic electric sewage pump to Root, Neal & Co., Buffalo.

The Rice & Adams Dairy Machinery Company, Buffalo, N. Y., will shortly take bids for the construction of a three-story factory, 60 x 150 ft.

The Delaware, Lackawanna & Western Railroad Company, 90 West Street, New York, will take bids on the construction and equipment of a powerhouse at Buffalo, estimated to cost about $18,000. G. L. Ray is chief engineer.

The Crescent Tool Company, 200 Harrison Street, Jamestown, N. Y., will erect a one-story factory, 48 x 171 ft., to cost about $15,000.

The Raritan Copper Works, Perth Amboy, N. J., is taking bids for a two-story addition to its foundry, 33 x 43 ft., to cost about $8,000.

The J. F. Turner White Metal Works, Highland Park, N. J., is taking bids for the construction of a two-story addition to its factory, 39 x 63 ft., to cost about $8,000.

The New Jersey Water Service Company, Haddonfield, N. J., is taking bids for the erection of a one-story pumping station, 24 x 47 ft., to cost about $3,500.

The Interstate Machine Company, Troy, N. Y., has complete plans for a two-story factory which it will erect at Seventh Avenue and Down Street.

The Underwood Paper Company, Glens Falls, N. Y., has let general contract for the construction of a mill, 80 x 100 ft., two-stories, and a machine shop, 75 x 50 ft., at Plattsburg, N. Y., to cost $90,000. Thomas F. Adriance is vice-president and manager.

The McKinnon Chain Company, Tonawanda, N. Y., Wm. L. Notman, secretary, has let contract for a one and two-story addition, 96 x 43 ft., to its plant on Fremont Street and the Erie Railroad.

The Rand Company, 97 Goodell Street, North Tonawanda, N. Y., manufacturer of bank and office furniture and systems, is having plans prepared for a three-story addition, 67 x 102 x 125 ft., of reinforced concrete, estimated to cost $45,000. J. H. Rand is president.

The Barden & Robeson Corporation, Penn Yan, N. Y., has filed incorporation papers with a capital stock of $100,000 to manufacture hubs, spokes, woodenware, etc. G. L. and M. R. Barden, and R. J. Robeson, are the incorporators.

The McKinnon Dash Company, Buffalo, is building a one-story brick addition to its factory at Amherst and Kail streets.

The Cataract Refining & Mfg. Company, Marine National Bank Building, Buffalo, W. G. Noncrief, president, is erecting a two-story addition, 62 x 80 ft., at its plant at Gilbert and Manitoba streets and the Erie Railroad to cost $18,000.

The New England Dressed Meat & Wool Company, Howard and Babcock streets, Buffalo, is adding a third story to its brick engine and boiler house at a cost of $10,000.

The Tolhurst Machine Works, Troy, N. Y., is erecting a one-story warehouse addition, 60 x 120 ft., to its plant on Green Island. William H. Tolhurst is president.

The Brown-Lipe Gear Company, Syracuse, N. Y., has let general contract for the remodeling and enlargement of its factory at Fayette and Geddes streets.

The Hahn Paper Company, Watertown, N. Y., has let contract for the erection of a storehouse and machine shop at its plant to cost $15,000.

Contract has been awarded by the Kerr Turbine Engine Company, Wellsville, N. Y., for the erection of a pattern storage building.

New England

BOSTON, MASS., Sept. 11, 1916.

The Baldwin Chain & Mfg. Company, Worcester, Mass., has leased the four-story factory building being erected by the Worcester Cold Storage & Warehouse Company on Hygeia Street. The company expects to take posession by Jan. 1 and will operate the plant as a branch factory, moving its heavier machinery from the Chandler Street plant, which will then be used only for the manufacture of its lighter products. The company is a large producer of automobile chains and sprockets and is sharing in the general prosperity of the automobile industry.

The New Britain Machine Company, New Britain, Conn., has purchased land on Elm Street to provide for future expansion of its plant.

The National Lamp Works of the General Electric Company, Providence, R. I., is asking bids on an addition, 80 x 100 ft., with three wings, 60 x 144 ft. each, two stories.

The R. E. Kidder Company, Worcester, Mass., has been incorporated with capital stock of $15,000. The directors are William H. Brown, president; Frederic C. Condy, 344 Main Street, treasurer, and S. H. Clary.

The American Brass Company, Waterbury, Conn., has awarded to the Turner Construction Company, New York, a contract for the erection of a factory, 50 x 202 ft., three stories, on South Main Street.

The Improvements Mfg. Company, Boston, Mass., has been incorporated with capital stock of $50,000 to manufacture machinery. The directors are John F. Towle, president; Basil V. Szabo, Cambridge, treasurer, and J. O. Burdett.

The Waterbury Farrel Foundry & Machine Company, Waterbury, Conn., has bought the Earle House, an old Waterbury landmark, to provide room for plant expansion. No definite plans for the use of the property have been made.

The Weco Mfg. Company, Boston, Mass., manufacturer of electric and gas heating appliances, has been incorporated with a capital stock of $50,000. The directors are William H. Williams, president; Harry B. Eaton, Waban, treasurer, and D. H. Fisher.

Baltimore

BALTIMORE, MD., Sept. 11, 1916.

The Poole Engineering Company, Woodbury, Md., is reported to have preliminary plans in preparation for a one-story addition to its gun shop, 50 x 75 ft., to cost about $2,500.

The Electric Hose & Rubber Company, Twelfth and Durest streets, Wilmington, Del., has had plans prepared for a one-story machine shop, 40 x 100 ft., to cost about $8,000.

The Anderson Pneumatic Tire & Spring Company, Union Trust Building, Washington, D. C., has had plans drawn for a one-story factory, 100 ft. square, to cost about $30,000.

Barber & Ross, Eleventh and G streets, N. W., Washington, D. C., manufacturer of fire escapes, will erect a steel frame building, 50 x 100 ft., at a cost of about $[illegible]. It will remove its equipment from the present shop to the new plant, which will have an annual capacity of about [illegible] tons. Electric cranes will be required. Harry Blake is general manager.

Philadelphia

PHILADELPHIA, PA., Sept. 11, 1916.

The Swind Machinery Company, Widener Building, Philadelphia, is seeking equipment suitable for the manufacture of bicycle spokes, requiring one machine for making the heads and another for rolling the threads.

The Keystone Motor Mfg. Company, manufacturer of automobile motors, which started the construction of a new plant at East Greenville, Pa., on a tract of over six acres acquired for that purpose, has now completed it and has removed from 40 North Sixth Street, Reading, Pa., its former location. It has also erected a new foundry, which is now running on semi-steel for cylinder castings. A. H. Yocum is president and general manager.

The Cameron Engineering Company, East Stroudsburg, Pa., has started the construction of a machine shop, 71 x 112 ft., one story, to cost about $10,000.

The John E. Sjostrom Company, 1719 North Tenth Street, Philadelphia, cabinet maker, is having plans prepared for rebuilding its four-story factory at an estimated cost of $30,000.

Work was started a few days ago on an 180-ft. addition to the West End machine shop of the Steelton plant of the Bethlehem Steel Company. A 100-ft. addition was added recently. Work has also been started on the installation of a 500-ton press in the eye-bar mill. Extensive improvements are also contemplated for the bridge shop.

Shoemaker & Co., Pottstown, Pa., have received contract to construct an addition, 40 x 120 ft., to the steel plate mill of the Nagle Steel Company at Pottstown. Other improvements are contemplated. The Nagle Steel Company is running both its Glasgow and Seyfert mills night and day, employing 200 workmen.

The Ball Seal Generator Company, Easton, Pa., has been incorporated with a capital stock of $10,000 by Edmund F. Gephardt, Charles P. Ayres, Raymond L. Gephardt, George Macon, Jr., and William A. Tydeman to manufacture steam and hot-water generators and specialties.

The American Makers' Corporation, Perkasie, Pa., has been incorporated with a capital stock of $10,000 by Frank R. Hair, Enos A. Wampole, Tobias S. Bissey, Irwin Y. Barringer and Christian P. Fox to manufacture toys and novelties.

Chicago

CHICAGO, ILL., Sept. 11, 1916.

The general trade in machine tools is being maintained in good volume. A pronounced increase in sales to domestic manufacturers, including twenty 20-in. drilling machines, thirty 27-in. lathes and a lot of 30-in. lathes has offset the slight decline in export business. Many of these orders are being filled with tools of less prominent make, inasmuch as builders of the long-established standard lines are in little, if any, better position to make deliveries. Unfilled orders on their books are still eight and nine months old.

The expected outpouring of used tools, particularly special purpose equipment, has not yet made its appearance. In Chicago the demand for second-hand machinery still exceeds the supply. Dealers, however, are more cautious and are unwilling to pay as high prices as formerly, or those asked in most instances.

Railroads are buying only those tools needed for immediate use. Most of the Pennsylvania's requirements are being filled at Pittsburgh.

The Northern Pacific Railway, St. Paul, Minn., has under consideration shop extensions involving an expenditure of from $2,000,000 to $10,000,000, which will include a plant to repair and probably manufacture steel cars at Milwaukee. F. G. Prest is purchasing agent.

C. E. Krebs, for the past eight years superintendent of the Forsyth Brothers Company, has organized the Krebs Mfg. Company, 341 East Ohio Street, Chicago, and will specialize in the manufacture of tools and dies.

The Douglas Iron Works, Chicago, has been incorporated with a capital of $1,000 by E. Peterson, Isadore Brown and Irving Zimmerman, 155 North Clark Street.

Morrice Leviton, 155 North Clark Street, Chicago, architect, has awarded contracts for a two-story automobile repair shop, 30 x 50 ft., to cost $7,000.

Thomas C. Dennehy, 229 West Randolph Street, Chicago, is building a one-story auto service station, 94 x 110 ft., at 18 East Twenty-fifth Street to cost $20,000.

The Armstrong Brothers Tool Company, Chicago, has awarded contracts for a three-story addition to its machine shop and a one-story forge shop at an estimated cost of $[illegible].

Myron H. Spades, 110 South Dearborn Street, Chicago, is having built a one-story factory, 133 x 266 ft., and a foundry and forge shop, 60 x 161 ft., to cost $45,000. It will be occupied by the Accurate Engineering Company, 2419 West Fourteenth Street.

The Wheeling Corrugating Company, Chicago, has purchased property, 124 x 627 ft., at the corner of Harvard Street and Campbell Avenue, upon which it will construct a factory to cost $50,000. Paul Gerhardt, 64 West Randolph Street, is the architect.

The Burnside Steel Company, Chicago, has been incorporated with a capital of $100,000 by H. F. Wardwell, 80 East Jackson Boulevard, George L. Pollock and J. R. Pollock.

The National Ox-Hydric Company, Chicago, has changed its name to the National Machinery Company and has decreased its capital stock from $500,000 to $5,000.

The American Printing Ink Company, Chicago, will erect a two-story factory at 2314-16 West Kinzie Street, to cost $30,000. S. S. Joy is the architect.

The Orkney Springs Company, Chicago, has been organized with a capital of $500,000 by James E. McGrath, 69 West Washington Street; Charles C. Cirese and J. Fred Reev.

Fire in the boiler room of the Velie Carriage Company, Moline, Ill., caused a loss of about $1,300.

The S. Ward Hamilton Company, Chicago, manufacturer of steel specialties, is building a factory at Harvey Ill., and expects to have machinery installed and begin operations about Oct. 15.

The Boone Tire & Rubber Company, Belvidere, Ill., will not let contracts for its new building or equipment for at least 60 days. The initial plant, however, will contain 25,000 sq. ft. of floor space and the buildings will be U-shaped. The main building will be 50 x 180 ft., with two wings, 60 x 120 ft., and will have a capacity of 150 casings per day. I. V. Maclean, formerly president and general manager of the Hawkeye Tire Company, is president.

Cincinnati

CINCINNATI, OHIO, Sept. 11, 1916.

Considerable improvement is noted in the machine-tool business, not confined to any particular branch of the trade. The railroads are now buying more machines, but, on the other hand, business with automobile factories has let up a bit. Orders from the general trade for single tools are increasing in volume and lately drilling machines have shown some improvement. Makers of sugar machinery are shipping out some large outfits, most of which are consigned to Cuba. Wood-working machinery is slow. The local foundries are all busy and outside contract work is easy to obtain.

The Springford Mfg. Company, Cincinnati, has been incorporated with $10,000 capital stock by Anthony Bury, Albert Ficks and others. It will fit up a plant on York Street for manufacturing automobile springs.

The Max Wocher & Sons Company, Cincinnati, manufacturer of surgical instruments, is planning an addition to its plant on College Street.

The Globe Register Company, Cincinnati, has commenced work on its new four-story factory on East Sixth Street, estimated to cost $80,000. Some equipment will be required

The Cincinnati Milling Machine Company, Oakley-Cincinnati, has taken out a permit for a one-story addition to its plant, estimated to cost $30,000. It will be used principally for storage purposes.

It is reported, but not officially confirmed, that the Hirsch Rolling Mill Company, St. Louis, Mo., intends to establish a branch plant in Cincinnati.

The plant of the Dayton Iron & Metal Company, Dayton Ohio, was badly damaged by fire last week. Repairs have been commenced.

The Pasteur-Chamberland Filter Company, Dayton, Ohio, is the name of a new company that has taken over the interests of the Pasteur Filter Sales & Repair Company, the Automatic Lamp Control Company and the Dayton Spinning & Novelty Company. An addition to its plant is considered.

The Fyr Fyter Company, Dayton, Ohio, whose incorporation was recently noted, will build a plant for the purpose of manufacturing fire extinguishers. R. C. Iddings is general manager.

It is rumored that the Pennsylvania Railroad intends to enlarge its repair shops at Piqua, Ohio.

The Shawnee Refrigerating Company, Xenia, Ohio, has awarded contract for an addition to its plant.

The General Service Company, Portsmouth, Ohio, recently incorporated with $10,000 capital stock, by E. D. Stevens and others, will fit up a general machine shop for repair work

The Puritan Brick Company, Wellston, Ohio, expects to add enough equipment to its plant to nearly double its present output.

Cleveland

CLEVELAND, OHIO, Sept. 11, 1916

The demand for machine tools has quieted down some what. No new lists have come out but a steady volume of orders is noted, mostly for single machines. The American Steel & Wire Company is expected to place orders shortly for about 12 machine tools for shops in connection with its new by-product coke plant in Cleveland. An inquiry is pending from Pickands, Mather & Co., Cleveland, for a lathe grinder, drilling machine and hack saw for use at one of the ore mines Complaint is still heard among dealers that with deliveries better their volume of sales would be much larger. While lathes are not as scarce as some time ago, owing to the fact that dealers are getting shipments on stock orders, some lathe builders and other machine-tool manufacturers are falling further behind on deliveries.

The Cleveland Co-operative Stove Company, Cleveland, having outgrown its present quarters and with no room for further expansion in the vicinity, has acquired a site on Harvard Avenue, on which it plans the erection of a continuous gray-iron foundry, 135 x 900 ft. A foundry about half this size will be built for the present with a view of making an extension later. Work will begin as soon as plans can be prepared and contracts placed.

The Cleveland Metalcraft Company, Cleveland, maker of metal furniture, will enlarge its plant by the erection of an extension about 60 x 60 ft. Some additional press equipment will be required.

The Peerless Motor Car Company, Cleveland, will place a contract shortly for the erection of three buildings for the manufacture of pleasure cars, allowing its present plant to be devoted exclusively to the manufacture of motor trucks. The plans provide for a three-story reinforced concrete building, 60 x 270 ft., a three-story building, 53 x 161 ft. for body making and chassis assembling, and a one-story building of the saw tooth type to be used for final assembling Plans have been prepared by Ernest McGeorge, engineer, Leader-News Building, Cleveland.

The Guide Motor Lamp Mfg. Company, 11,400 Madison Avenue West, Cleveland, is planning the erection of a one-story addition, 50 x 120 ft

The Dann Products Company, Cleveland, maker of automobile specialties, has had plans prepared for a one-story steel and brick factory, 101 x 301 ft., at 1084 East 152nd Street

The Cleveland Copper & Brass Rolling Mills Company, Cleveland, has been incorporated with a capital stock of $10,000 by H. J. Klosser, G. L. Branch, A. C. Altman, and others

The Lake Erie Boiler Works Company, Cleveland, has been incorporated with a capital stock of $10,000 by W. J. Keenan, Thomas E. Greene and others.

Clifford S. Goby and others are interested in the Motor Trucks Company, Cleveland, which has been incorporated with a capital stock of $25,000

The Grabler Mfg. Company, Cleveland, will enlarge its plant by the erection of a foundry building, 35 x 125 ft.

The Urbana Tool & Die Company, Urbana, Ohio, maker of jigs, fixtures and dies, has acquired the property formerly occupied by the Urbana Woolen Mill Company, consisting of a two-story building, 60 x 150 ft., which it will occupy as a manufacturing plant, and a small building, 50 x 50 ft., which will be used as a hardening department. The company has ordered additional equipment and will move into its new quarters at an early date. It started in business five years ago with two employees and now furnishes employment for 100 tool and die makers and expects to increase this number to 200 within the next few weeks.

The New York Blower Company is planning to build a new plant in Bucyrus, Ohio. A building 80 x 200 ft. is contemplated with provision for additional wings of the same dimensions.

The American Clay Machinery Company, Bucyrus, Ohio, will erect a new factory, 60 x 200 ft., in addition to remodeling the Shunk foundry plant which it recently purchased. It is stated that the company intends to remove to Bucyrus its foundry and clay-working machinery departments now located in Willoughby, Ohio.

It is reported from Bucyrus, Ohio, that the Kelly Motor Company will shortly be in the market for a double end punching and shearing machine with 30-in. throat, a 3-in.

riveting machine and a radial drilling machine for holes up to 2 in. in diameter.

The Carroll Foundry & Machine Company, Bucyrus, Ohio, has placed a contract with the Bellefontaine Bridge & Iron Company for a new brick and steel machine shop, 88 x 178 ft., to replace one recently burned. Among the new equipment to be installed will be a 25-ton electric traveling crane, a rotary converter and an air compressor.

The Citizens Ice Company, Toledo, Ohio, will build an ice-making plant with a capacity of 100 tons per day. Electrically operated ice-making machinery will be required.

The A. Howard Company, Galion, Ohio, has been incorporated with a capital stock of $500,000 to take over the buggy manufacturing business of Adam Howard and also to manufacture automobiles. The plant will be equipped for turning out an assembled car. A. Howard is president and general manager.

The Woodward Machine Company, Wooster, Ohio, will shortly enlarge its plant by the erection of an addition, 80 x 80 ft.

Milwaukee

MILWAUKEE, WIS., Sept. 11, 1916.

The persistent demand for machine tools continues; and while the situation is without particular feature, all shops are keeping very busy. Likewise enough business is now on the books to maintain this condition for many months more, even if it were possible for tool builders to hire all the men that are needed at this time to make it possible to deliver orders on schedule time. Payrolls which were affected by the machinists' strike at the middle of July are gradually increasing, the strikers being thoroughly dissatisfied with the lack of success of the walkout and going back to work. Indications are that all machine shops will experience a busy winter, although without the high pressure of last winter's operations. Collections in the metal-working industry, as in other lines, are as good as they have ever been. The Milwaukee employment bureau reports a heavy demand for machinists, lead and zinc miners, and sawmill and lumbering labor. Standing calls for machine shop and foundry labor are on file from many firms in the Milwaukee district and all help of this kind is placed as soon as it presents itself.

William Childs, of the Falls Motor Corporation, Sheboygan Falls, Wis., is establishing a commercial pattern shop at that point for the benefit of the numerous metal-working industries in the vicinity. Quarters have been leased in the Brickner Building and equipment will be installed at once for the manufacture of foundry and machine shop patterns in wood and metal. F. F. Williamson, formerly of the Westinghouse pattern shops, Pittsburgh, has been placed in charge.

A farm tractor plant will be opened soon at Lodi, Wis., by Earl McFarland and John C. Westmont, who have completed the test models. The tractor will be assembled, parts and units being purchased from specialists in each line. Castings are being furnished by the Gisholt Machine Company and the Fuller & Johnson Mfg. Company, Madison, Wis.; motors by the Waukesha Motor Company, Waukesha, Wis.; transmissions by the Foote Brothers Gear & Machine Company, Chicago.

The Orfordville Light & Power Company, Orfordville, Wis., is contemplating numerous improvements to increase its capacity and will probably be in the market for a 200-hp. Diesel type oil engine, etc. A. E. Tomlin is secretary.

The Briggs & Stratton Company, 258 Milwaukee Street, Milwaukee, awarded the general contract to the O. H. Bossert Company, Milwaukee, for erecting its new automobile specialty and ignition device plant on Hopkins Road and Center Street. It will be five stories and basement, 60 x 220 ft., of reinforced concrete and brick, and will cost $100,000 complete. Herman J. Esser, Camp Building, is architect.

Peil Brothers, Bloomer, Wis., are enlarging their machine and smithing shop and will do a commercial and automobile repair business.

The Simms Foundry Company, Racine, Wis., maker of gray-iron castings and patterns, has completed the transfer of the business from the former Racine Foundry Company, and Horace R. Simms is now in active charge. The Simms Company is capitalized at $40,000.

The Northern Boiler & Structural Iron Works, Appleton, Wis., specializing in paper and pulp mill equipment, is contemplating the erection of a new plant, the present quarters having been outgrown. Definite plans will not be made until a site is selected.

The Allis Chalmers Mfg. Company, West Allis, Wis., is having bids taken for a one-story shop addition, [illegible] x 200 ft. Klug & Smith, Mack Block, Milwaukee, are the architects.

The Spencer Sign Service Company, Rice Building, Stevens Point, Wis., electric signs and appliances, has moved to new and larger quarters in the former Shemanski shop at Portage and Union streets. Victor Prais and Spencer Swancutt are the owners.

William Heck, Kewaunee, Wis., has purcahsed a site on Clemont Street, Antigo, Wis., and will erect a public garage and repair shop costing $8,000.

The Harvey Spring & Forging Company, maker of automobile and vehicle springs and forgings, is so crowded for room that tentative plans are being made for the erection of a new shop, probably 100 x 190 ft., one-story.

John M. Howarth, Wausau, Wis., has contracted with the Wausau Foundry & Machine Company for a small production of candy-pulling machines and confectioners' equipment, and later intends to establish a plant of his own.

The Cedarburg Foundry Company, Cedarburg, Wis., which recently passed into the control of Frank E. Walsh and E. M. Heid, West Allis, Wis., is now in operation and is pouring from 4 to 5 tons of metal daily.

The J. I. Case Plow Works, Racine, Wis., has purchased a site, 120 x 120 ft., adjoining its main office, and giving it possession of the entire block at Mead, Water and Sixth streets. No improvements are contemplated at this time.

The Mitchell Wagon Company, Racine, Wis., is enlarging its facilities to cope with the demand for automobile bodies for the Mitchell Motors Corporation, Racine. Additional operating room is being provided. The bodies are sheet-metal products.

The Quincy Garage & Supply Company, Hancock, Mich., has awarded contracts for a garage and machine shop, 60 x 110 ft., to be ready about Nov. 1.

The Up-to-date Auto Company, Prairie du Sac, Wis., is installing considerable machine-tool equipment and enlarging its force to handle custom machine work. The business is owned by David and Edward Gray.

Detroit

DETROIT, MICH., Sept. 11, 1916.

The past week registered unusual industrial activity in Detroit which will be reflected in the continued prosperity of the metal and machinery trades. Of greatest importance was the announcement of the Pennsylvania Lines that it would spend a large amount of money in entering Detroit and constructing a belt line parallel to the present Terminal Railroad. The company states that it will run cars from Toledo to Carleton, Mich., over the Pere Marquette lines, and from there to Detroit will construct a line of its own, in addition to the belt line to run around the city.

Confirmation of the announcement that it would spend many millions in duplicating its present plant has been made by the Ford Motor Company. The new factory is being constructed on land adjacent to the present plant. F. L. Klingensmith is general manager.

The Studebaker Corporation, South Bend, Ind., announces that practically all of the $1,500,000 recently voted will be spent in Detroit in erecting new buildings. When the work is completed, additions to the Detroit plants will include machine shops, forging shops and assembling plants. At least 1000 more men will be employed and the output of the Studebaker plants at Detroit will be increased from 75,000 to 100,000 automobiles a year.

These three announcements mark the beginning of the fall industrial activity, and machinery men state that their business is already responding. Construction records for the past month show an increase of $1,000,000 over the same month last year, and partially explains the unusual demand for wood-working machinery. Grinders and milling machines continue in demand. Deliveries are still from four to six months behind.

An investigation conducted by a Detroit newspaper this week showed that nearly all of the larger cities in the State are suffering from a lack of skilled labor, due to the inability to supply houses of any kind for the working men. Detroit, Jackson, Muskegon, Kalamazoo, Grand Rapids and Saginaw report the worst conditions. The larger factories in these cities are working day and night.

The Auto Traffic Signal Company, Detroit, will shortly begin the erection of a factory to manufacture the Roberts' auto traffic signal. W. C. Jewell, Ford Building, Detroit, is general manager.

Approximately $1,000,000 was involved in a deal last week by which the Lozier Motor Car Company sold its property

at Mack Avenue and the Terminal Railroad to the Motor Products Company. Fifteen of the sixty acres purchased are covered by modern factory buildings. It is understood that the Motor Products Company, which was recently formed to take over the business of five manufacturers of motor car parts, will enlarge the factories which it has purchased, while the Lozier Company will use the money obtained in the sale in buying or erecting another factory.

J. A. Anderson, Grand Rapids, is forming a company and making plans for the erection of a factory for the manufacture of a four-cycle valveless motor. The Grand Rapids Association of Commerce is furthering the project, and a company capitalized at $250,000 is being formed, with Beverly Deuel as secretary.

The Ideal Foundry Company, Grand Rapids, is to build a pattern shop, 40 x 100 ft., two stories, estimated to cost $8,000.

The Valley City Chair Company, Grand Rapids, is planning the erection of a three-story factory at an estimated cost of $60,000. It will be 60 x 300 ft.

The Grand Rapids Blow Pipe & Dust Arrester Company, Grand Rapids, is planning a new factory, 50 x 220 ft. Wernette-Bradfield-Mead are acting as engineers and architects.

B. E. Park & Son, engineers, are preparing plans for an addition to the plant of Eagle-Ottawa Leather Company, Grand Haven, Mich.

The Rich Twist Drill Company, Battle Creek, is constructing new buildings which will require the employment of 150 more mechanics.

The Vegetable Parchment Company, Kalamazoo, has announced plans for the erection of a new plant next summer to cost $300,000.

The Kellar Tool Company, formerly of Fond Du Lac, Wis., will shortly begin the erection of a factory building in Grand Haven, Mich. It will be 90 x 300 ft., and will give employment to 200 mechanics.

The Standard Malleable Iron Works, Muskegon Heights, Mich., has increased its capital stock from $100,000 to $250,000, and will enlarge its plant as soon as labor is obtainable.

Construction of a sawmill has been begun by the Michigan Lumber Company, Manistee, Mich. Machinery will be installed at once.

The Detroit United Railroad announces the erection of a new freight station to cover three city blocks in Detroit. The plans for the new incoming and outgoing station provide for the most modern freight-handling equipment. Frank W. Brookes is president.

Indianapolis

INDIANAPOLIS, IND., Sept. 11, 1916.

The National Motor Vehicle Company, Indianapolis, Ind., has begun the erection of two additional buildings on a plot 140 x 410 ft. The structures will be 60 x 300 ft., three stories and 140 x 328 ft., one story, both of concrete, and will cost in all about $150,000. It is expected the buildings will be completed by Nov. 9.

The Floyd County Veneer Mills, New Albany, Ind., has incorporated with $10,000 capital to manufacture wood products. George B. Lapping, Guy W. Theiss and Robert A. Lapping are the incorporators.

R. H. Humphrey, Corydon, Ind., proposes to establish a factory in New Albany, Ind., to manufacture automobile, bed and wagon parts, consolidating existing plants at Corydon and DePauw, Ind.

The International Steam Control Company, Indianapolis, has been incorporated with $25,000 capital stock to manufacture a steam-controlling device. The directors are Henry Langsenkamp, Cole Stickle and William Lightford.

The Universal Tool & Die Company, Indianapolis, has been incorporated with $10,000 capital stock to carry on a general foundry and machine shop business. Charles J. McHugh, Edward W. Hohlt and Durward River are the directors.

The Superior Machine Tool Company, Kokomo, Ind., has increased its capital stock from $180,000 to $360,000.

Improvements to cost $10,000 will be made to the substation at Hartford City, Ind., of the Muncie Lighting Company, including three new generators.

The O. K. Machine Company, Fort Wayne, Ind., has been incorporated with $10,000 capital stock to manufacture machinery, machine tools, etc. The directors are Nestor Fries, Linus J. Johnson and Gustav W. Fries.

The Schlundt Motor Company, Evansville, Ind., has been incorporated with $25,000 capital stock to manufacture automobiles. Jabez Woolley, Clarence A. Reitz and Arthur J. Schlundt are directors.

A two-story brick and steel addition, 32 x 135 ft., is being built to the plant of the Tractor-Hartley Motor Car Company, Hagerstown, Ind. It will give 8640 additional sq. ft. of floor space. The total improvements will cost about $22,000.

The Willard F. Meyers Hardwood Saw Company, Bedford, Ind., has increased its capital stock from $6,000 to $16,000.

The Central South

LOUISVILLE, KY., Sept. 11, 1916.

Dealers in mill and factory supplies are watching the car shortage situation with considerable apprehension. Railroads serving Kentucky and neighboring coal fields are doing little better than a two-day car service each week and many factories are dependent on this supply. Coal development projects in eastern Kentucky are numerous and equipment inquiries frequent. Electrical equipment manufacturers report prospects improving and deliveries easier, although a local motor manufacturer notes loss of an order worth $6,000 on account of inability to make delivery inside of four months.

The Visible Measure Gasoline Dispenser Company, Louisville, has incorporated with $40,000 capital to manufacture a gasoline-vending apparatus, with force pump and transparent measuring chamber. The device will probably be manufactured under contract at present. J. Henry Brady, William A. Earl and William A. Pell are incorporators.

N. B. Turpin, Irvine, Ky., has the contract to build an addition to the electric light plant and install additional machinery.

A. L. Carpenter and Ross Lucas, Uniontown, Ky., have sold the Home Lighting Company to an unnamed purchaser operating various western Kentucky properties. The plant will be improved.

S. Walton Forgy, Elkton, Ky., has purchased the Franklin Electric & Ice Company at Franklin, Ky., for $62,000, for an unnamed client, who will expend $13,000 in improvements.

The Roy C. Whayne Supply Company, Louisville, Ky., is in the market for manganese crushing rolls, 32 to 36 in. x 16 to 18 in.

The City Commission, Lexington, Ky., has passed a smoke prevention ordinance, which will become effective on Jan. 1, 1917.

The Lenox Saw Mill Company, Lenox, Ky., is asking for prices on three 150-hp. horizontal tubular boilers, with stacks and Dutch oven settings, 18 x 72 in.

The Little River Lumber Company, Townsend, Tenn., is installing power and machinery equipment at a cost of $50,000 in its new mill, built to replace the one destroyed by fire. W. B. Townsend is president.

The Southern Locomotive Valve Gear Company, Knoxville, Tenn., has contracted for a factory to cost $20,000, which will be equipped at a cost of $50,000, to manufacture locomotive valve and power reverse gears. L. D. Tyson is president.

St. Louis

ST. LOUIS, MO., Sept. 11, 1916.

The machine-tool business, which showed a little hesitancy while the railroad strike threatened, resumed its stride toward the close of the week and is approximating the volume it has held for several months and which is quite satisfactory. Practically all the business is of the small-lot or single-tool order. Collections are good, while financial conditions remain easy, both as to investment and commercial funds.

The Knobnoster Electric Company, St. Louis, has been incorporated with a capital stock of $20,000 by R. W. Morrison, W. S. McCall and Harry C. Loehr and will equip an electric light and power plant at Knobnoster, Mo.

The Broadway Motors Company, Broadway and Cass Avenue, St. Louis, has leased quarters for a garage, repair shop and salesroom. W. N. Morrison and A. M. Zerweck are the owners.

The Bowman-Blackman Machine Tool Company, St. Louis, has been incorporated with a capital stock of $20,000 by Ralph B. Bowman, G. H. Blackman and H. H. Bowman to continue and enlarge an existing machine-tool business under the same name.

The Winter Garden & Ice Company, St. Louis, which will operate an ice skating rink and an ice-manufacturing plant has acquired its building and will proceed with the alterations and installation of about $100,000 of equipment at once. H. W. Eddy is in charge.

The new beverage plant of the Anheuser-Busch Brewing Association, St. Louis, to be constructed at once, is to be equipped with machinery for a 24-hr. capacity of 2,000,000 pint bottles.

John Payton, Novinger, Mo., and others, who own mining property nearby, are reported in the market for coal-mining equipment and a power plant.

The National Machine Company, 914 Main Street, Kansas City, Mo., will equip a plant for the manufacture of fence guys. Lewis Alverson is manager.

The Greenlease Motor Car Company, Kansas City, Mo., will erect a garage and machine shop for repair work.

The Farmers' Gin & Seed Company, Emmett, Ark., has been incorporated with a capital stock of $14,000 by J. I. Wade, Charles T. Faulkner, E. H. Hood and R. D. Smith and will equip a cotton compress and ginnery.

The Snowden Engineering Company, capital stock $500,000, has been organized to equip a 600-hp. steam-driven electric plant at Cave Springs, Ark. G. H. Snowden, president and S. A. Farrell, secretary, are both of Kansas City, Mo.

M. B. Sanders, Little Rock, Ark., will install a central power and heating plant to cost $15,000 at Little Rock College, Little Rock.

The Arkansas Buick Automobile Company, Little Rock, Ark., has been incorporated with a capital stock of $15,000 by E. M. Rowe, president, and others, and will equip a repair plant, machine shop and garage.

The Shawnee Gas & Electric Company, Shawnee, Okla., will install two 3000-hp. and one 1000-hp. turbines with condensing apparatus, boiler feed pumps and boilers. Plans are being made for additional horsepower later.

The Hickory Coal Company, Tulsa, Okla., Henry Adamson in charge, will rebuild and re-equip its powerhouse burned with a loss of $10,000.

The Western Flint Glass Company, Checotah, Okla., has been incorporated with a capital stock of $15,000 by George J. Miller, T. G. McDaniel and Maryetta Miller and will install machinery for the manufacture of bottles.

The Bristow Garage, Bristow, Okla., has been burned with a loss of $20,000, of which $5,000 was on machine-shop equipment, which will be replaced and the garage rebuilt.

The Sterling Sales Company, Tulsa, Okla., is reported in the market for one 300-kw. transformer and about 300 small transformers, of 110 and 220 volts, primary, with 11 and 22 volts secondary, respectively. L. A. Fitzer is general manager.

The McMahon Refining Company, Jennings, Okla., is reported in the market for stills of 100 and 200 bbl. capacity.

The West Point Handle & Lumber Company, West Point, Miss., will erect a handle factory near Columbus, Miss.

Robert A. Griedry, Hayes, La., is reported in the market for wood-working equipment for the manufacture of automobile wheel spokes and similar products.

The Gulf Refining Company, main office Pittsburgh, Pa., will equip an oil distributing plant at Lake Charles, La., including a pumphouse.

E. L. Vinet, Crowley, La., has leased his fully equipped machine shop and plans to build a larger one, 50 x 100 ft.

Texas

AUSTIN, TEX., Sept. 9, 1916.

Machinery and tool trade conditions in Texas and the Southwest, both present and prospective, are highly satisfactory. Money from the cotton crop is rapidly finding its way into general circulation, and this as well as other favorable factors, is having a stimulating effect upon business and the industrial situation.

Shortly before the war started the Texas Power & Light Company, Dallas, entered into a contract with the city of Denison to construct and have completed by Dec. 31, 1916, a new power station to cost not less than $400,000. It is now announced that on account of the unfavorable condition of the money market the company will be unable to construct the plant within the agreed time. It will ask the City Council to enter into a new contract whereby it shall be stipulated that a power station to cost from $750,000 to $1,000,000 shall be erected on Red River within three years. The company has tentatively decided to construct a large power generation station at Austin for supplying power for an extension of its transmission line to that city and thence to San Antonio.

The Borderland Sugar Corporation of New York, which has just increased its capital stock from $500,000 to $2,000,000, will make improvements to its sugar mill at San Benito.

The American Petroleum Company has begun grading the site for its proposed new oil refinery which is to be located on the Ship Channel near Houston. It is planned to lay a pipe line from the refinery to the Sour Lake field. It will also be connected with the Humble and other Gulf coast fields. The plant will cost about $2,000,000. J. S. Cullinan is in charge.

The Wichita Valley Refining Company, Iowa Park, will make improvements and additions to its plant, including the installation of a 500-bbl. agitator. The present capacity of the plant is 1000 bbl. per day.

Birmingham

BIRMINGHAM, ALA., Sept. 11, 1916.

The machinery trade has improved considerably in the past few weeks and now shows a healthy demand all around. Hydroelectric apparatus for the new graphite mining field in Clay County, Ala., is especially active. Lumber mills are ordering more supplies and gasoline engines are on the active list. Collections are good. High prices will make up for the loss in crop yields.

The Foley Stave Company, Troy, Ala., will build a stave factory on a site recently obtained.

The Hillsboro Lumber Company, Tampa, Fla., has been incorporated by J. L. Greer, Greer, Fla., A. H. McFarlan, and others, with a capital stock of $100,000.

The Howard Transportation Company, Fort Lauderdale, Fla., it is reported, will increase its capital to $1,000,000 and build docks and other terminal facilities on inland waterways.

The Hillyer, Spearer & Dunn Company, Jacksonville, Fla., has been organized with a capital stock of $200,000 to manufacture schooners, lighters, barges and other vessels. Four four-masted schooners are under contract.

San Francisco

SAN FRANCISCO, CAL., Sept. 5, 1916.

Machinery business in general has been greatly interrupted during the last fortnight by apprehension of a railroad strike, but with the immediate danger over a large volume of business is waiting to be placed. Notwithstanding some unfavorable features which cannot be lost sight of, the total of bank clearings in San Francisco for August surpassed the former high record, made last May, by some $8,000,000; the total being $287,323,010. The foreign trade department of the Chamber of Commerce has compiled figures showing the total exports from San Francisco for 1915, amounting to $79,731,268, a gain of 100 per cent over 1910.

Machine-tool houses report a fairly good general demand, with increasing inquiries from the small shops, which have had a busy summer. Many are still holding off, intending to buy when prices recede. Orders from mining districts are falling off, as the season of curtailed operation is approaching; but work is being rushed for deliveries to interior Alaska and the mountain districts. Implements and irrigation equipment are in strong demand, and some large orders have been placed for rice and bean cleaning machinery both for the Orient and local use. Several new shipbuilding contracts are reported. Power equipment, electric, steam and gas, continue in steady demand.

The Columbia Steel Company is planning to add another open-hearth furnace to its steel casting plant at Pittsburg, Cal., and several new cranes are to be installed.

The Moran Meat Packing Company is negotiating for a lot, as site in Oakland.

The San Diego Gas & Electric Company, San Diego, is building a garage and machine shop, and will put in a new gas generating and lampblack drying plant.

The School Board, San Mateo, Cal., is considering the addition of a foundry, forge and machine shop to the manual training department in the high school.

The Pacific Gear & Tool Works, San Francisco, has had plans drawn for a two-story machine shop to be added to its plant on Folsom Street.

The National Mill & Lumber Company has secured a permit to build a wood-working plant on the tidal canal near High Street, Oakland.

The principal improvement work to be done in Yosemite Valley in the near future will be the construction of a 750-hp. hydroelectric plant to cost about $100,000.

The Board of Public Works, San Francisco, has awarded contracts for machinery for the Cherry Creek power station of the Hetch Hetchy project, the power to be used for construction work. The Pelton Water Wheel Company will supply the hydraulic equipment and the generators will be furnished by the General Electric Company.

The Diamond Match Company has announced plans to double its factory at Chico, Cal., with an expenditure of about $100,000 for new machinery.

The Regan Forge & Engine Company is building a forge and machine shop on Smith's Island, in Los Angeles Harbor. A 25-ton steam hammer will be installed now, with provision for a cupola later.

The Santa Fe Railroad has placed a contract in Los Angeles for the construction of a 34-stall roundhouse at Las Vegas, N. M. The plant will include a machine and blacksmith shop and powerhouse. W. M. Catlin, Los Angeles, is local purchasing agent.

The Yubá Construction Company, Marysville, Cal., will install a pumping plant for Reclamation District 1600 at Woodland, Cal.

The Gallagher Machinery Company, Salt Lake City, Utah, has purchased property and will erect a new plant.

The Ogden Iron Works, Ogden, Utah, has been incorporated with a capital of $100,000 by Joseph Scowcroft, Marriner Browning, R. B. Porter and L. T. Dee. It will absorb the Western Foundry & Machine Company and will erect a plant on the ground occupied by the latter company.

The Pacific Northwest

SEATTLE, Sept. 5, 1916

For the first time in months, lumber production for the past week registered normal in Washington and Oregon. It is claimed this does not mean an abandonment of the individual mill principle of curtailment, so much as it does a policy of preparedness, mill crowding through urgent orders in anticipation of the interruption of traffic. Shipments by rail, while slightly increased, are still considerably below production, due to severe car shortage in Oregon. While the volume of orders has been encouraging, the level of values is somewhat discouraging from the mill standpoint.

Frank Waterhouse & Co., Seattle, shippers, have recently chartered five cargo steamships to ply between Seattle and Vladivostock and ports in Japan and China. The vessels will take a total of 33,000 tons of cargo.

The Matthews Shipbuilding Company, Hoquiam, Wash., has recently received contracts for two wooden motor vessels for the W. R. Grace Company, to have a lumber-carrying capacity of 2,000,000 ft. each and will be equipped with motors of the internal combustion type.

Announcement is made that the Northwest Steel Company and the Willamette Iron & Steel Works, Portland, have closed contracts for two additional steamships to be built for Lauritz Kolster, Stavenger, Norway, at a cost of $1,000,000 each. This makes a total of seven vessels contracted for by the two companies.

The Valveless Engine Corporation, Spokane, Wash., George Chandler president, contemplates the construction of a plant to manufacture a new type of engine.

Lou S. Smith of the Oregon-Washington Railroad & Navigation Company is at the head of a project to install a lime plant in the vicinity of Ilwaco, Ore. Machinery for the plant will be ordered immediately, and is to be in operation by Nov. 1.

The Southern Pacific Company, it is reported, plans the establishment of shops, roundhouse, etc., in Eugene, Ore.

The Moscow Fire Brick & Clay Products Company, Moscow, Idaho, has obtained a 25-year lease on a site on which a $20,000 brick plant will be constructed, to make fire and face brick exclusively. It will have a capacity of 35,000 bricks every 10 hr. and will cost about $35,000.

The American Can Company, Portland, Ore., plans extensive improvements to the local factory to cost about $7,000.

The idle Gilbert Hunt Mfg. Company plant in Walla Walla, Wash., one of the largest threshing machine factories in the Northwest, is to be reopened. J. D. Morris, W. A. Toner and others are promoting the project. It is estimated that $50,000 will be required to put the plant in operation.

The Alaska Steamship Company, Seattle, operating between Seattle and Alaska, plans the construction of three passenger liners and the purchase of four cargo vessels at a cost of more than $3,000,000. The latter will be 350 ft. long.

The Columbia Engineering Works, Linton, Ore., plans the construction of a shipbuilding plant in Portland. It now has a contract for a 1000-ton schooner.

The Belmont-Banner Mining Company, Spokane, plans the installation of an air compressor, hoist and pumps at its properties on Beaver Creek.

The D & M Vulcanizer Mfg. Company, Walla Walla, Wash., plans to establish a manufacturing plant.

Myrtle Creek, Ore., voted $27,000 for a municipal light and water plant. A hydroelectric power plant of 180 hp. or more is planned.

Canada

TORONTO, Sept. 11, 1916

The Dominion Steel Products Company, Brantford, Ont., has commenced the erection of a plant, in which it will install the latest type of machinery for the manufacture of shells. A permit has been granted the company for the erection of a machine shop to cost $2,000.

The British Canadian Nickel Company, which will erect a plant at Sudbury, Ont., will develop its own hydroelectric power.

The American Brake Shoe Company, St. Thomas, Ont., will install equipment so as to operate all its machinery by electric motors.

Armour & Co., Chicago, Ill., has called for tenders for the erection of a four-story packing and powerhouse on Craig Street, Montreal, of brick and reinforced concrete construction. R. C. Clark, Chicago, Ill., is the architect.

The Feldspar & Clay Products, Ltd., recently incorporated with a capital stock of $1,500,000, has purchased the plant and property of the Crown Portland Cement Company at Wiarton, Ont. The company will manufacture potash.

The Abitibi Power & Paper Company, Montreal, has decided to double the capacity of its paper plant, and financial arrangements have been completed. The company's projected output of news print will be about 400 tons a day.

The Maple Leaf Tire Company, Belleville, Ont., has commenced the construction of a new plant just outside the city limits. The cost will be $100,000.

The International Land & Lumber Company, Ottawa, will erect a 100-ton pulp mill on the Ashuapmauch River in the Lake St. John district. Among those interested in the company are J. L. Bate, R. N. Bate and Thomas Asquith, all of Ottawa.

D. B. McDonald, Winnipeg, promoter of the Manitoba Power, Pulp & Paper Company, states that plans have been prepared for its plant to be erected at Grand Rapids on the Saskatchewan River. It will include a sawmill, paper factory, pulp mill and hydroelectric power plant. The capacity of the pulp and paper mills will be 100 tons per day. The whole scheme will represent an outlay of $2,000,000.

Thorold, Ont., proposes to purchase a new pump and motor at a cost of $4,500. D. J. C. Munro is clerk.

The Automobile Club of Canada, Montreal, has had plans prepared for the erection of workshops, garage and club house to cost $1,000,000. G. A. McNamee, 909 New Birks Building, Montreal, is secretary.

The Northern Pacific Railway, 34 Nassau Street, New York, is having plans prepared for freight terminals at New Westminster, B. C.

S. L. Yolles, 67 Baldwin Street, Toronto, will erect a garage to cost $20,000.

The Canadian Pacific Railway Company has let contract for the erection of a powerhouse and other buildings at McAdam, N. B., to Henry Post, Woodstock, N. B., at a cost of $28,000.

The contract has been awarded for the erection of a roundhouse at McLennan, Alta., for the Edmonton, Dunvegan & British Columbia Railway.

Lymburner, Ltd., 360 St. Paul Street, East, Montreal, manufacturer of brass castings, etc., will build a reinforced concrete addition at a cost of $12,000.

William Davies, Ltd., 521 Front Street East, Toronto, has let contract for abattoir buildings to the Wells Brothers Company of Canada, 96 Gould Street, Toronto. The approximate cost of the plant to be $500,000.

The general contract for erecting a machine shop for the Russell Motor Car Company, 276 King Street, West, Toronto, has been awarded to the Deacon Construction Company, Weston, Ont., at a cost of $40,000.

Chatham, N. B., will purchase a semi-Diesel oil engine, direct-connected to dynamo and exciter, to cost $13,600. D. J. McIntyre is clerk.

The Martin Aeroplanes, Ltd., Windsor, Ont., has been incorporated with a capital stock of $100,000 by Charles S. King, William R. Bond, Oscar F. Flemming of Windsor, Ont.; Walter L. McGregor of Ford, Ont., and others to manufacture aeroplanes, motors, parts, etc.

Keenan Brothers, Ltd., Owen Sound, Ont., are in the market for an automatic shingle saw.

William Lee, Ltd., Montreal, has been incorporated with a capital stock of $200,000 by William Lee, James F. Miller, Hugh Wylie and others to manufacture musical instruments, gramophones, etc.

The Rapid Tool & Machine Company, Ltd., Lachine, Que., has been incorporated with a capital stock of $40,000 by John MacNaughton, James G. Cartwright, N. Bogue and

others, all of Montreal, to manufacture gages, tools, machinery, etc.

Negotiations have been closed whereby the Partridge Rubber Company of Montreal has purchased the business and plant of the Standard Tire & Rubber Company of Guelph, Ont., for about $150,000.

The Stern Tire & Tube Company of Canada, Toronto, has been incorporated with a capital stock of $1,000,000 by James L. Ross, 20 King Street East; Arthur S. Macrae, 123 Tyndall Avenue; Douglas J. MacLean, West Hill, Toronto, and others.

The Central Canada Stone Company, Ltd., Toronto, has been incorporated with a capital stock of $100,000 by Britton Osler, 801 Dominion Bank Building; James B. Taylor, 78 Belhaven Road; Charles L. Valens, 516 Brunswick Avenue and others.

The Port Hope Sanitary Mfg. Company, Ltd., Toronto, has been incorporated with a capital stock of $1,250,000 by Britton Osler, 801 Dominion Bank Building; Wellington A. Cameron, 59 Grenville Avenue; Byron B. Spence, 15 Constance Avenue and others, to manufacture furnaces, stoves, boilers, plumbers' supplies, etc.

The Dominion Building Products, Ltd., has been organized with head office at Galt, Ont., and will begin the erection of a plant there in a few weeks. It will also erect plants at Toronto, Owen Sound, Sudbury and Picton. Among those interested in the new company are David D. Williams, 263 Christie Street, Toronto; W. J. Heron, Galt, Ont., and John T. Jackson. The company will manufacture sand brick by a process invented by John T. Jackson of Toronto.

Damage amounting to $20,000, which was done to the furnace room and machine shop of the St. Thomas Construction Company, St. Thomas, Ont., Sept. 5, will be repaired immediately.

English capitalists under Sir Robert Perks have taken over the plant of the New Brunswick Pulp & Paper Company at Millerton, N. B., and will rebuild it on a larger scale.

The Ontario Paper Company, Thorold, Ont., has let contract for an addition to its plant and machine shop.

Plans are being prepared for a factory building to be erected at New Toronto by the DuPont Fabrikoid Company, 120 Broadway, New York, estimated to cost $150,000. W. A. Cotton is manager.

Government Purchases

WASHINGTON, D. C., Sept. 11, 1916.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until date not set, schedule 109, five portable radial drilling machines for Newport; schedule 112, two 6-ft. radial wall-type drilling machines for Puget Sound; schedule 115, two 36-in. tool grinding machines for Philadelphia; schedule 130, one 3-in. plain radial drilling machine, one 16-in. high-speed sensitive drilling machine, one 2-wheel emery grinding machine, one portable drilling machine and one surface grinding machine, three motor-driven screw cutting lathes, one universal milling machine and one 24-in. extension base tool-room shaping machine, all for Brooklyn.

NEW TRADE PUBLICATIONS

Electric Hoists.—Shepard Electric Crane & Hoist Company, Montour Falls, N. Y. Bulletin No. 1501. Refers to an electric hoist for use where travel close to the ends of the runways is an essential feature. Among the installations for which it is particularly adapted are short-span I-beam cranes, jib cranes and short stationary runways. An engraving of the hoist itself and one of it installed on a plain trolley are included. If desired the hoist can be furnished on the geared trolley type.

Taps and Dies.—Standard Tool Company, Cleveland, Ohio. Catalog No. 22. Lists an extensive line of taps and dies, twist drills, reamers, milling cutters, chucks, taper pins and special tools. Illustrations and brief description are given and a number of tables of sizes are included.

Shearing and Rod Cutting Machine.—W. W. & C. F. Tucker, 516 Asylum Street, Hartford, Conn. Catalog No. 1. Calls attention to a line of bench shearing and rod cutting machines. Illustrations and brief descriptions of the several sizes of machines are presented, followed by a general description of them and tables of the capacities and dimensions of each.

Judicial Decisions

ABSTRACTED BY A. L. H. STREET

BREACH OF SPECIAL MANUFACTURING CONTRACT.—The general rule of law that the measure of damages for breach of a contract to accept delivery of articles contracted to be bought is the excess of the contract price above the market value of the articles in the hands of the aggrieved seller, being inapplicable in a case where machinery specially manufactured has no market value, the manufacturer is entitled to recover the full contract price. (United States Circuit Court of Appeals, Second Circuit, Fisher Hydraulic Stone & Machinery Company vs. Warner, 233 Federal Reporter, 527.)

INJURY TO YOUTHFUL EMPLOYEES.—The New Jersey workmen's compensation act does not apply to injuries sustained by a child under 14 years of age in the course of his employment in violation of a law limiting the age of employees, and an ordinary action at law based on the employer's common-law liability may be maintained. (New Jersey Court of Errors and Appeals, Hetzel vs. Wasson Piston Ring Company, 98 Atlantic Reporter, 306.)

VIOLATION OF SUNDAY LAWS.—An owner of a manufacturing establishment who is present while it is being operated on Sunday, overseeing the work, as usual, is guilty of violating the law against performance of unnecessary labor on the Sabbath, although he may perform no manual labor. Nor may he justify himself on the ground that he observes another day of the week as the true Sabbath, if the operations of the factory disturb other persons in the neighborhood. (New York Supreme Court, Appellate Division, People vs. Adler, 160 New York Supplement, 539.)

A PHASE OF CONDITIONAL SALE.—In a suit by the seller of an article to recover possession under a clause of the contract of sale reserving title in him until payment of the price, the defendant buyer is entitled to set up a claim to damages for breach of warranty as to the condition of the article, to reduce or extinguish the seller's claim for a balance due on the agreed price. (New York Court of Appeals, Peuser vs. Marsh, 113 Northeastern Reporter, 494.)

ASSIGNMENT OF BOOK ACCOUNTS.—In Pennsylvania, title to book accounts cannot pass by assignment unless there is either written assignment or its equivalent. Should the same accounts be assigned to two different parties, the first to give notice to the debtors takes the prior right to collect them. (United States District Court, Eastern District of Pennsylvania, In re Hawley Down-Draft Furnace Company, 233 Federal Reporter, 451.)

FREIGHT AND DEMURRAGE CHARGES.—A railroad company's acceptance of a payment as covering all charges accruing on a shipment of steel and surrender of the shipment does not preclude it from claiming a balance actually due under its published schedules for unloading and storage, although lien against the property is thereby lost. (Delaware Court of Chancery, In re Arlington Hotel Company, 98 Atlantic Reporter, 186.)

DELIVERY OF FREIGHT TO CONSIGNEE.—Freight will be deemed to have been delivered to the consignee, so as to discharge the carrying railroad company from liability, when it appears that possession has been turned over to a transfer company authorized to receive all freight addressed to the particular consignee, although the latter may refuse to accept actual delivery from the transfer company. (Arkansas Supreme Court, Yazoo & Mississippi Valley Railroad Company, 187 Southwestern Reporter, 656.)

TRAVELING SALESMEN AND THE NEW YORK COMPENSATION ACT.—A traveling salesman is not entitled to an award under the New York workmen's compensation act for injury sustained while riding in a public conveyance from one place to another in the transaction of his employer's business; that not being a hazardous occupation within the meaning of the act. (New York Supreme Court, Appellate Division, Mandle vs. A. Steinhardt & Bro., 160 New York Supplement, 2.)

THE IRON AGE

New York, September 21, 1916

ESTABLISHED 1855 VOL. 98 : No. 12

Two Fundamentals in Purchasing

Establishing and Visualizing Definitions, Particularly of Small Articles—Classifying Suppliers in Exact Terms of Products Obtainable

BY H. B. TWYFORD*

In a recent number of this journal an article of mine was published containing some suggestions and recommendations concerning purchasing, and several letters have been received requesting more information governing the actual operation of this department of a business.

While it is not possible to give specific rules and forms which could be adopted by every establishment, nevertheless helpful suggestions may be obtained by some and others may be able to apply to their own uses the methods illustrated, modified to suit their particular requirements or conditions.

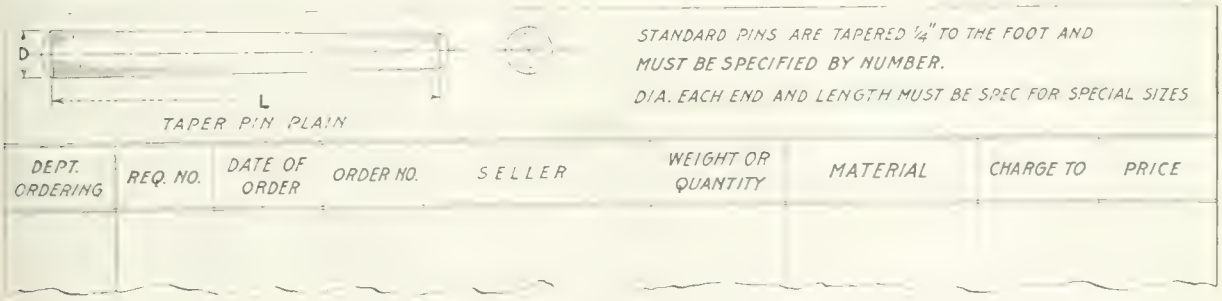


FIG. 1—RECORD OF PURCHASE ORDERS

All orders for taper pins should be recorded on this sheet or card. Whenever possible, the article should be illustrated as shown, as it shows the correct method of specifying dimensions. Standard definitions are thus enforced for every purchase By the constant visualization of these illustrations and definitions in the daily routine clerical work, mistakes are avoided For instance, a requisition comes into the purchasing department for "10 gross of hack saw blades," the supposition being that everybody knows the size always used. Somebody may know that 12-in. blades, 14 teeth, are required, but if to this instance hundreds of others are added it becomes a positive necessity to have standard definitions enforced

There are two great fundamentals to be determined in making every purchase. One is the question of buying the right article and the other is the question of buying from the right source. If these two essentials are properly taken care of the subsequent work of the department will proceed smoothly and easily. This means that the physical and mechanical work of the department will be conducted at a high percentage of efficiency. Quotations will be obtained quickly and goods will be bought at lowest market prices. Deliveries will be made at approximately exact dates promised and following up shipments facilitated. Invoices will be received and checked promptly. Useless and superfluous correspondence regarding prices, shipments and invoices will be avoided.

However ably conducted a purchasing department may be it is no exaggeration to say that at times every phase of its work mentioned above suffers as a consequence of insufficient attention being given to one or both of the two fundamentals named. In those cases where they are neglected or treated as of no importance, the conditions under which the department operates are laborious and sometimes almost chaotic. A little additional care and work is necessary at first, but this is offset many times over by the advantages and benefits secured by starting right.

BUYING THE RIGHT MATERIALS

The buying of right materials depends mainly on correct definitions and specifications. The actual decision as to the specific article or material does not always come within the jurisdiction of the purchasing agent. In practically all our large manufacturing establishments, railroads and public service corporations, exhaustive tests and experiments have predetermined the question of the most suitable material and a complete specification covering it should be furnished the purchasing agent. For the purpose of canvassing the market for prices and placing orders a sufficient number of these specifications should be kept on file properly indexed

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ready for reference and use at a moment's notice.

It may seem from this that the work of the purchasing agent is largely confined to specializing on price and delivery, but a great deal more than this is involved, for he should know something of the previous history of the material he is buying and its antecedent manufacturing processes. It is often useful to have some general knowledge of the physical and chemical characteristics of the material. The average buyer is commercially rather than technically trained and it is not to be assumed that a man buying a wide variety of materials can be thoroughly informed technically regarding all his purchases. But he can have a superficial knowledge of technical and mechanical subjects which he will find of inestimable value.

Having a well arranged filing system with folders containing a sufficient number of the specifications furnished by the engineering staff or those which embody detailed technical terms, there remains an enormous number of small articles for which standard definitions should be established. This can well be done by the purchasing department, as it is familiar with the practice of the manufacturers. This applies to such things as bolts, nuts, screws, washers, all kinds of small tools such as hack-saw blades, drills, files, etc., also supplies of every description, such as brushes, brooms, waste, packing materials, etc.

To those not actually engaged in the work of purchasing, it may seem inconceivable that so many petty questions could arise, as frequently happens, in connection with the correct specifying of these small articles. The writer has had to handle large batches of requisitions as they arrived in the purchasing department from various sources and the same article has often been described in varying ways. For instance, one man will give the thickness first and the length second, while another will reverse this, or perhaps give the length of oval head and countersunk head rivets including length of head in both cases, whereas the length of the former should be given from under the head.

Such things as these are a source of constant annoyance and entail a large amount of work on the purchasing staff in unraveling the ambiguous descriptions and straightening out the kinks. This must be done before prices can be obtained or orders placed. This is a serious handicap to the economic administration of the department and the establishment, but can be rectified by better methods.

There are many purchasing departments who look upon this feature of the work of buying as a necessary evil and there are far too many which do not exercise sufficient care to beat the requisitions into uniform and intelligent shape before going into the market. Probably every business house could recite instances of receiving from buyers unintelligible descriptions and definitions, or, as frequently happens, the inquiry or order is worded in such a way as to be applicable to more than one article.

What this means to the business world cannot be calculated, but that it is a serious economic loss is undeniable and practically every business house would testify to this effect.

There are no valid reasons why a foreman should describe an article one way, the storekeeper another way and the purchasing agent still another. The purchasing department can be largely instrumental in securing the adoption of uniform and standard definitions. In fact, that department is best fitted to do it because it is in constant touch with the manufacturers and vendors and should be conversant with their standard practices.

Some large manufacturers have compiled in book form standard definitions and illustrations. These are excellent in their way, but do not fit every case, and cannot be made comprehensive enough to cover many articles in the nature of supplies. They are purely reference data and are naturally only referred to when in doubt. A man frequently thinks he knows the correct definition of an article and does not refer to his standard practice book—quite often he is wrong.

A good scheme is to have the definitions visualized so that the daily routine work cannot be accomplished without being brought into contact with them. In the storekeeping and purchasing departments several forms are used which can be utilized for this purpose. There are the following: Stores record, record of sources of supply, quotation record, purchase order record; and we will take the last named for purpose of illustration, as in Fig. 1. If standard methods are put in force for defining each article and printed on one or all of these forms as necessity dictates, the men using and referring to them cannot get away from the daily visualization of them and it becomes second nature to correctly specify each item.

These definitions or specifications may consist of only two or three words or figures. They should be short and concise, but at the same time complete. Brevity and clarity are essential.

Having in good working order a system such as outlined, the buyer is always sure of getting the exact article and material needed; he is positively certain when he asks for prices that bids are based on his actual requirements, and he knows that there will be no "come backs" and no questions asked to

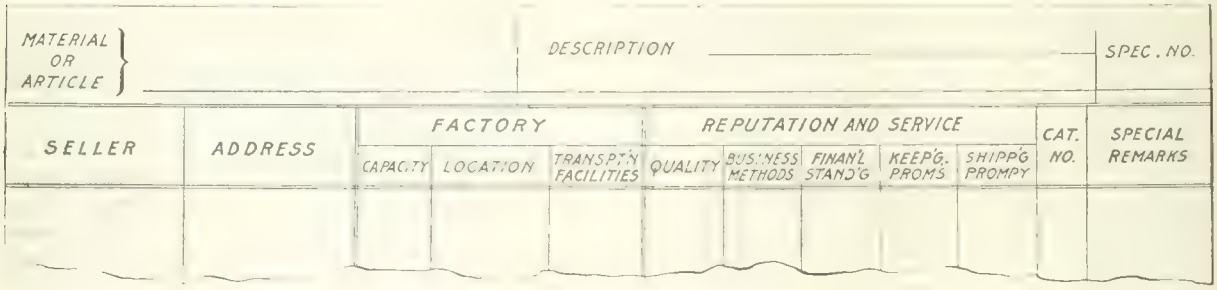


FIG. 2—RECORD OF SOURCES OF SUPPLY

By keeping a record as indicated by this form a purchasing agent creates for himself a market of exactly those concerns who are best fitted to supply anything he buys. As explained in the text, this is a positive insurance against high prices and poor deliveries. If an article cannot be properly described in the space allotted, it should have a numbered specification in the files. It is important to know where the factory is located of those articles which are purchased through supply houses. Some of the information on this record can be indicated by code signs, words or figures.

clear up moot points and ambiguous meanings. He also has the positive assurance that all bidders are quoting for exactly the same article.

BUYING FROM THE RIGHT SOURCES

This is the second great fundamental alluded to and is of equal importance with the first. A register should be kept; either card index or loose-leaf ledger system can be used. See Fig. 2. Owing to the constant changes in manufacturing methods and to the fact that suppliers are frequently adding to the lines which they handle, this list can never be considered permanent. It is really the buyer's market and he can make it largely what he wills.

If this phase of purchasing is closely and assiduously followed up very valuable results will be achieved. To get the best prices, a purchasing agent must go to those concerns who are best fitted to supply his actual requirements. Invitations to quote for material cannot be sent out on a hit or miss principle. At the present time there is an enormous demand for nuts and all manufacturers are booked far ahead with orders. They naturally do not want to be put to the trouble and inconvenience of answering superfluous inquiries. Yet specifications are sent to them promiscuously by many purchasing departments.

Some of these manufacturers make only nuts for machine bolts, some for machine screws, some make only punched nuts and others only milled nuts. Now these and manufacturers of all other materials and articles can be segregated into those who are able to supply the purchaser's requirements and those who are not.

The economic administration of the business world would be very favorably affected if a closer and more direct connection were established between buyer and seller and loose and promiscuous shopping and bidding avoided. These better conditions can be largely established by the buyer. If he is not accurate in specifying his requirements or if he approaches houses which are unable to furnish his requirements, the loss in efficiency is not only his, but has a distinct effect over a very wide area. The seller is placed at a disadvantage and every business concern would testify to the fact that their expenses are largely increased by the time, work and outlay they incur in answering and attending to such inquiries and from which they have no hope of securing orders. This expense must be added to the cost of the goods and is eventually paid by some buyer.

It is incumbent, therefore, on the purchaser to confine his activities in canvassing the market to those houses which can supply exactly what he wants. This can be accomplished by research work and information derived from various sources. The trade papers can be referred to to great advantage; the commercial registers are useful, but for one's particular necessities the lists given in them frequently need further subdivision with the useful names culled and useless ones eliminated.

This subject could be elaborated on almost indefinitely, but enough has been said to emphasize its importance to the business world in general. The advantages to the buyer are positive and obvious. The right kind of competition will have been created because the firms bidding will be those best able to supply the goods required. Insurance against wasted energy will be secured. The danger of getting inferior quality will be practically eliminated and uncertain and irregular deliveries avoided.

This is an outline of the work of purchasing up to the actual placing of the orders, and if this has been properly done the subsequent routine work should be almost wholly clerical. By the competent and efficient handling of the various problems up to the point named, the purchasing agent has practically secured for his department the absolute assurance of the best results in the matter of price, quality and delivery.

Armor Plant Site Hearing

WASHINGTON, D. C., Sept. 16, 1916.—Secretary of the Navy Daniels conducted a public hearing Sept. 13 and 14 in connection with the act of Congress providing for the establishment of a Government armor plate factory, listening to representatives of commercial organizations urging the advantages of sites in 23 States. Department officials and others awaited the hearings with considerable interest to learn whether the Bethlehem, the Carnegie and the Midvale Steel companies would offer their properties to the Government. Representatives of all three companies were present, but only as spectators, making no statement. Previous to the hearings the three companies had been sent an invitation to make proposals.

The next step to be taken by Secretary Daniels will be to appoint a naval board to which will be referred the sites offered and the briefs filed in support of them. More than 50 printed briefs with maps and drawings were filed, and there were numerous typewritten briefs concerning the advantages of the sites they described. It was plain to see that the offers of sites were backed in most instances by commercial organizations of the unmistakable "booster" type, and that the promoters lacked in a marked degree knowledge of the requirements of a satisfactory site and environment of a highly specialized factory such as an armor plant. Places isolated from a fuel supply, without industrial activities of any kind, and with apparently nothing to offer but vacant land, filed elaborate briefs and maps.

There is a strong impression here that if the Government does actually embark in the erection of an armor plant, politics will play a strong part in the selection of the site. It is intimated that the plant will be located in the South, probably in the Birmingham district of Alabama. Senator Underwood and members of the Alabama delegation in the House, appeared before the Secretary in favor of sites in Birmingham, Gadsden, and Tuscaloosa, Alabama. Senator Chilton introduced a delegation which offered a site at Huntington, W. Va. Senator Swanson and Representative Carlson of Virginia introduced a delegation which offered sites in Norfolk, Richmond, Petersburg, Hopewell, and Alexandria. Senator James also appeared with a delegation offering Wickliffe, Paducah, Middlesboro and Cadiz, Kentucky. R. B. Beach, industrial commissioner of the Chicago Association of Commerce, presented an argument, not only for Chicago, but for the manufacturing district extending from Gary, Ind., to Waukegan, Ill.

Breaker Island, in the Hudson River at Troy, covering 175 acres, 100 miles north of West Point, and 150 miles north of New York City, was offered. It was argued that it would be advantageous to the Government to place the plant on this island because it would be within a mile of the Watervliet arsenal. Congressman Vare was at the head of a delegation which urged the Philadelphia Navy Yard as the ideal place for the plant, laying considerable stress on the fact that the report of the Tillman committee made such an assertion in favor of Philadelphia. Numerous Ohio cities presented claims for the plant and all filed voluminous briefs.

The belief prevails that when the whole matter is threshed out, armor will continue to be made at the plants of the Bethlehem, the Carnegie and the Midvale companies, on terms that will be advantageous to the Government and also to the companies. W. L. C.

The Secretary of the Navy will resume hearings on Friday of this week to decide where to locate the Government armor plant. Many additional towns and cities have asked to be heard.

The Human Factor in Foundry Production

Luther D. Burlingame, Industrial Superintendent of the Brown & Sharpe Mfg. Company, Describes Its Methods to New England Foundrymen

The first fall meeting of the New England Foundrymen's Association, held at the Exchange Club, Boston, Sept. 13, was made unusually interesting by a talk on "The Human Element in Foundry Production" which provoked a long and animated discussion of the problems confronting foundrymen—the scarcity of skilled labor, the influx of untrained foreign workers brought about by this condition, the wisdom of various types of welfare work, and yet more striking as an evidence of present prosperity, the problem of housing the automobiles and motor cycles of employees. There was keen interest in every phase of the pressing questions of instructing, protecting, and increasing the efficiency of foundry workers, the talk ranging over such widely dissimilar subjects as compulsory use of proper shoes and leggings, adequate installations of shower baths, formation of rifle clubs, and noon-day concerts and "movie" shows.

Following the dinner, which is always a feature of these monthly meetings, President Stephen E. French introduced as the speaker of the evening Luther D. Burlingame, industrial superintendent of the Brown & Sharpe Mfg. Company, Providence, R. I., who said in part:

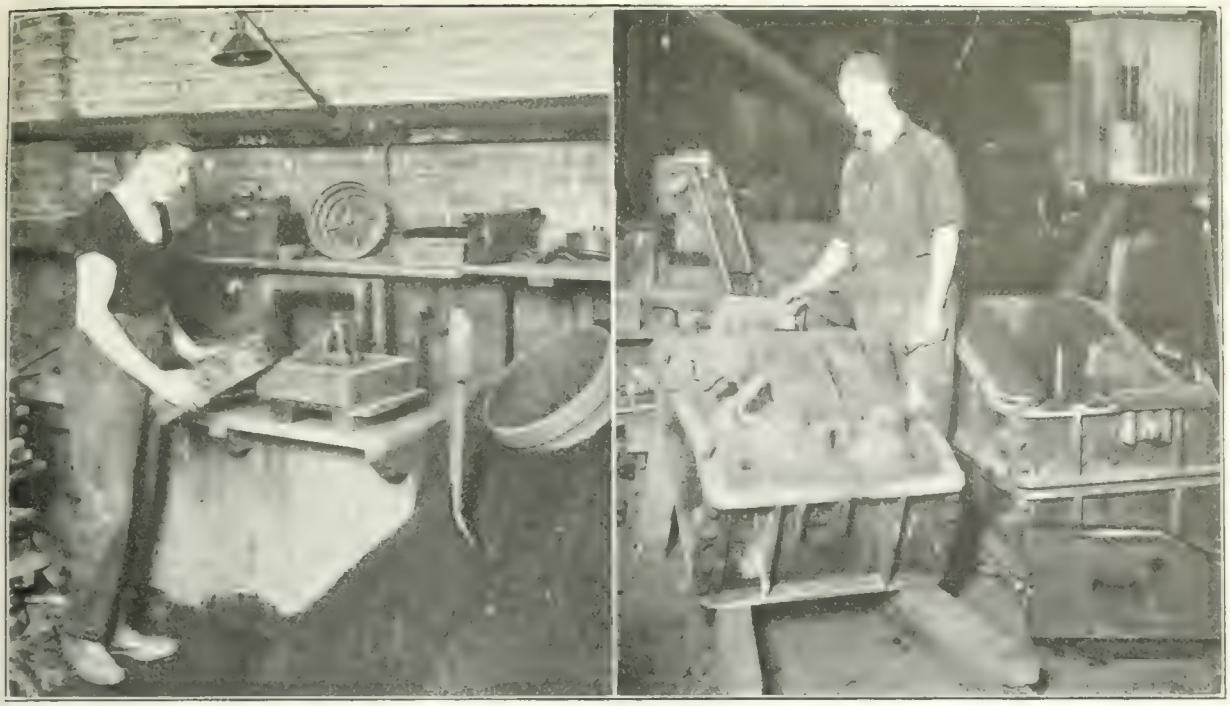
There are three important factors in production—the equipment, the systems employed, and the human element. While in the past greater weight has been given to the first two factors and the human element has been left to take care of itself, a radical change is now taking place in the relative importance given to these factors and it is more and more being appreciated that the human element is, in the last analysis, the one most important in securing the results desired.

Andrew Carnegie said when he was actively connected with the steel industry that if some great catastrophe destroyed all his steel plants and equipment but left the personnel of his organization, he would have courage to start anew; but if all his vast equipment remained and he had to build up a new organization from the beginning with a new force of men, he would not feel that life was long enough to accomplish the task. It is not believed that any apologies are





One of the Naturalization Classes of the Brown & Sharpe Mfg. Company. The company provides the teaching of English and civics to foreign-born workmen. Guards are provided on the handles of wheelbarrows used on the charging floor, as shown in the upper picture. The buckle leggings shown on this workman have been discarded because of the difficulty of removing them quickly in case of necessity.



Types of the Boys Found Among the Apprentices in the Brown & Sharpe Foundry. In molding they serve for three years at standard rates of 14, 16 and 18 cents per hour, but are frequently given piece work so that they earn materially more than the established rates. They pay $25 at the completion of a trial period as an evidence of good faith and are paid a bonus of $100 at the successful completion of their term

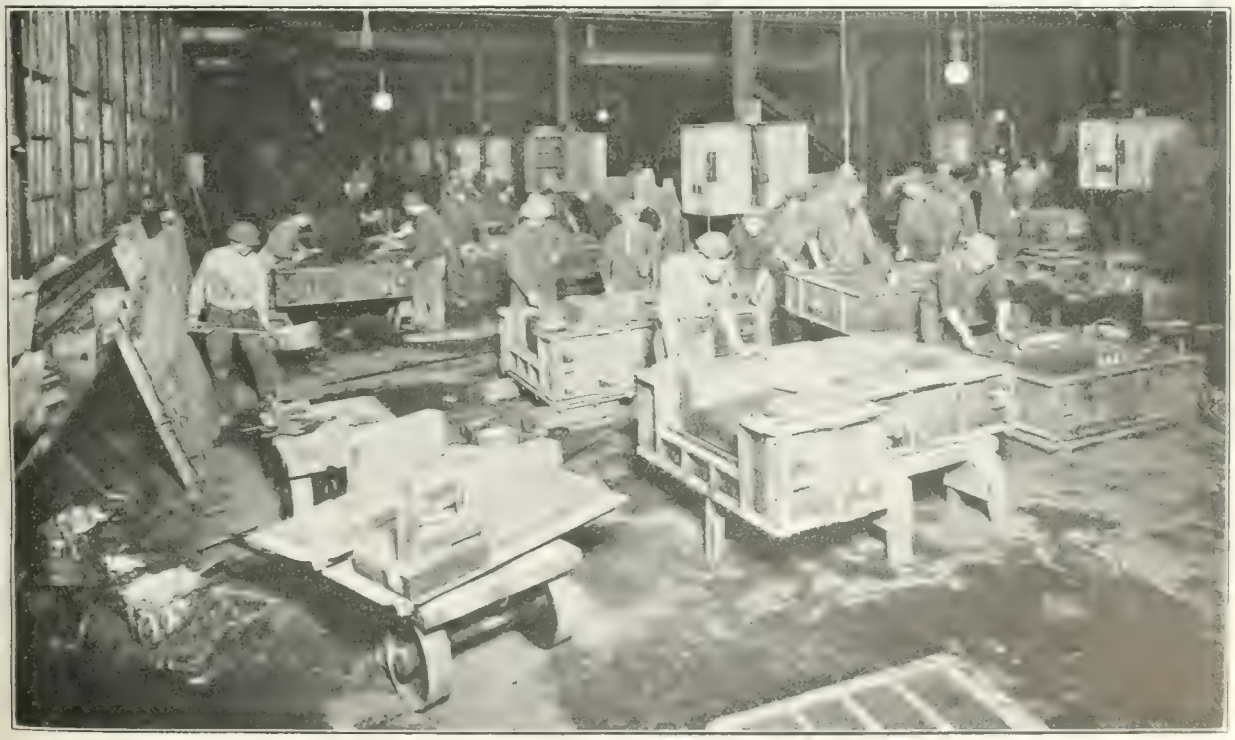
necessary in making the man and dealings with him the subject of this address.

APPRENTICESHIP

At this time, when foundrymen as well as those having the management of other lines of industry are asking, "Where are the skilled workmen? How can we supply the need?" it is well pointedly to inquire, "What are you doing to-day to provide for this need in the future?" I believe that there is only one answer to this question and that is that every foundryman should be training young men through apprenticeship to learn the various branches of the business as distinguished from men who are hired as operatives simply to perform one operation in which in a short time they can become reasonably skillful, but which does not fit them for responsibility in the trade. I know the thought which comes into the minds of many: "It costs more than the returns we get. It takes the time of experienced men to instruct 'green' boys, and as soon as we have one trained he leaves and goes somewhere else."

It is believed that a systematic plan of apprenticeship, entered into seriously, with terms just to both the employer and the apprentice, and with sufficient guidance and backing from the management, will bring results which will offset the objections just pointed out and that, as a consequence, the whole trade will profit from the results obtained. A conference board on apprenticeship composed of representatives from several of the leading national organizations is now working on this problem.

At the foundry of the Brown & Sharpe Mfg. Com-



This View of the Brown & Sharpe Foundry Shows the Type of Metal Flasks in Use

pany the course of apprenticeship for molders occupies three years, the ages at which boys are taken to learn this trade being 17 to 20 years. They are paid 14, 16 and 18c. per hour during the apprenticeship years. The apprentice pays $25 at the close of the trial period as a guarantee of good faith, or it might be considered as a payment for the privilege of learning the trade. At the successful completion of his term of apprenticeship he is paid a bonus of $100. These apprentices are given experience in bench work, floor work and in the core room. They also have, during working time, two hours per week of school work, devoted to subjects related to their trade and tending to increase their efficiency. This school work consists of simple mathematics, based entirely on foundry problems and having to do with the sizes of flasks, weight of iron poured, etc. The course also includes reading lessons in connection with foundry practice and methods.

Apprentices are also taken in the core-making department for a period of one and one-half years, the rates of pay for the successive periods of six months being 14, 15 and 16c. per hour. In this case $25 is paid by the apprentice at the close of the trial period and a bonus of $50 is paid to him at the successful completion of his apprenticeship. In both these forms of apprenticeship the boys have piece work or job work during a considerable portion of their time, so that those who are efficient can earn materially higher wages than the scheduled rates.

Pattern-making, so closely allied with foundry work, also has its apprentice system, these apprentices serving for four years and being given some experience in the foundry during the course of their apprenticeship.

While a fair proportion of these apprentices remain after completing their time, it is not felt to be wholly to the disadvantage of the company to have good men go out to other foundries because, as in the case of machinist apprentices they often become missionaries to make the name of the company widely and favorably known in a way to turn business later to the home shop. In many cases these boys, even when they leave for a time, return later to become valued workers for the company.

Some time ago I heard Clarence H. Howard of the Commonwealth Steel Company say that when he went to take charge of that plant the first thing he did was to give attention to the boys, getting them together, becoming acquainted with them, and putting the stamp of his personality upon them. He took pains to impress upon them that the future managers and skilled workmen of that business were to be selected from among them and that it was worth their best efforts to fit themselves for such positions.

SANITATION AND HEALTH

After securing and training our men, an important duty of the management is to see that proper provisions are made for their comfort, health and safety. These matters often become factors in determining whether men will stay or leave, and sometimes have a deciding influence rather than the question of pay.

Among the most important matters to consider are the provisions for an ample and pure water supply and clean and ample wash and toilet rooms, with lockers or other suitable provision for clothing, so separated from the smoke and grime of the foundry as to preserve the workmen's self-respect when he changes his clothes to go on the street. Shower baths in connection with this equipment are important adjuncts. [It was brought out later by questions from the audience that at the Brown & Sharpe foundry the men's clothing is dried by steam pipes under the lockers and during the winter by direct circulation of hot air; that there is one shower bath for each 20 workmen and that they are generally used, and that the men are not permitted to leave the foundry with unwashed faces and hands, under penalty of dismissal.]



Core Room of the Brown & Sharpe Foundry

Securing adequate light and pure air are especially difficult problems in the foundry and require consideration at the time of the construction of the buildings. Successful provision along these lines, with some method of properly controlling the temperature, should have much to do with comfortable working conditions.

While the important consideration is to keep men well, provision for caring for them when ill also has its place. Here the service of a first aid department and a shop dispensary, where a skilled physician and experienced assistants are in attendance, can help cases of acute illness arising in the foundry and keep men at work who might otherwise be out on account of sickness. Such a service can also diagnose cases which may threaten to become more serious and so help them as to avoid the consequences which might follow neglect.

For many years a relief association conducted by the workmen with the co-operation of the Brown & Sharpe Mfg. Company has paid sick and death benefits which have been of material aid in "bridging over" in

times of greatest need. A co-operative investment and insurance plan is also being put into effect.

SAFEGUARDING

The first aid and dispensary equipments are also of direct help in case of accidents. The important consideration here, however, is to prevent accidents by the safeguarding of all points of danger and the instructing of the men in safe methods of work.

In the Brown & Sharpe foundry much attention has been given to this matter of accident prevention. At times the company has felt that it was making great gains in reducing such accidents, but with the present congested condition of business and the necessity of hiring a large number of inexperienced men there have been periods of relapse when it has seemed impossible to keep down the accidents.

It was thought at one time that the combination of wearing congress shoes, inspected periodically to see that they were in good repair, together with leggings coming over the tops of the shoes, would almost eliminate burning accidents to the feet. An early form of legging which was used proved quite efficient in this respect but, owing to its being attached by buckles, the process of removing it was found to be too slow when a burning accident did occur. The N. A. S. O. legging was then substituted, a form with which foundrymen are now becoming familiar through the fact that the National Founders' Association is represented on the board which is working to standardize matters of safeguarding. This style of legging snaps on the leg in such a way that it can be readily removed in case of burning. It has, however, the objections that it easily rises above the shoe tops, especially after becoming a little worn, or when used by a long-legged man, and burning accidents then occur, the hot iron entering at the top of the shoe. The use of a chain passing under the foot to hold the legging down in place is being experimented with, also the making of leggings of varying lengths to suit the workmen. It is hoped that some still better method than any so far suggested may be brought to light, one which will entirely prevent these painful and slow-healing burns.

THE DRINK QUESTION

The encouragement of sobriety and the securing of a sober class of foundrymen are direct factors in the promoting of health and the avoiding of accidents. A remarkable movement is now going on throughout the industries to eliminate the drink evil and I believe it will be found that, when normal conditions are restored —following the present situation where the demand for labor is so great that it is felt that some things must be "winked at" which ordinarily would not be tolerated —it will mean a still further elimination from the industries of those who are subject to the drink habit— this as a protection to the manufacturer against the enactment of compensation legislation, etc., and because of a growing conviction that the drink evil is a menace to efficiency.

Following strong resolutions along these lines passed by the National Safety Council at its annual convention, the efficiency journal 100 *Per Cent* said editorially: "We congratulate the National Safety Council on its stand and trust that these resolutions will develop into a real campaign. Liquor does not mate with clear thinking, presence of mind, keen perception, careful or skillful manipulation of machinery, nor does it promote prosperity and self-respect. Either liquor or efficiency must go, and efficiency is here to stay."

TEACHING ENGLISH

A new labor problem comes from the bringing together of many nationalities, a much larger proportion of workmen than in the earlier days coming from countries where English is not the native tongue. This introduces not only misunderstandings resulting in spoiled work and lowered efficiency, but also in an increased accident rate and loss of time from sickness. Under these circumstances there is not the common ground of interest which formerly existed.

One step toward bringing about a better condition in this respect, which the foundryman can well consider a part of his legitimate work, is in taking such measures as are possible to teach the rudiments of English to workmen who need such instruction. The fact that it is often the workmen who need it the most who are least responsive and require the most pressure to make them get the benefit of such teaching, makes the problem the more difficult. Coupled with this, it is desirable to have these foreign-born workmen interested in becoming American citizens and in identifying themselves with our institutions if, as is usually the case, they are to make their homes and bring up their families here.

It very easily becomes a habit, however, for foremen and fellow-workmen to treat this class of employees as mere numbered units in factory production, without giving any thought to the fact that they are human beings, and it is believed that this is one of the important reasons for some of the serious labor troubles which have occurred. A little pains taken to get the workman's point of view and make him feel that there is a human interest taken in him and his welfare will, it is believed, largely overcome this feeling. It is important, however, that such dealings shall not be along paternal lines in a way to make the workman feel that he is being exploited.

PRESENT ABNORMAL CONDITIONS

The whole labor question is seriously complicated in these days by abnormal conditions, starting with the rush for munition work where, in such centers as Bridgeport, the need of workmen became so great that many concessions were made to build up new industries and to keep others going, regardless of the influence on the future, and thus paving the way for the serious labor troubles which have been affecting not only New England but the whole country. A recent illustration is found in the threatened strike on the great railroad systems and the stepping in of the National Executive and Congress to legislate so as to avert the strike, but in a way such as many of us believe will not permanently solve the problem but will simply encourage more serious disturbances as time goes on.

In recent times some investigations have been made to ascertain the cost of "hiring and firing" employees. All such investigations have shown that the cost is much greater than is commonly believed. Also, that when the figures are worked out it is found that a much larger number of new employees are hired to maintain the force in a given year than should be necessary. With a true appreciation of the cost of this constant shifting of force and an earnest effort to remedy the difficulty, it is believed that not only the workmen themselves will be better off but that the standard of efficiency in our American foundries will be materially raised.

Time Required for Steam-Hydraulic Forging

The time required for forging billets in the steam-hydraulic press is given in an article by A. Myslin in the *Uralian Engineer*, abstracted in the *Journal* of the American Society of Mechanical Engineers of September, 1916. The steam-hydraulic process of forging is compared with the purely hydraulic process from the point of view of power consumption per unit weight of output. The investigation upon which it is based was made on a 90-ton hydraulic press, working with an accumulator, and having a daily output of about 17 tons of plates, and on a 5000-ton steam-hydraulic press whose daily output was 35 tons of 6-in. shells. The shells were made from a billet forged to an octogon section from an 1800-lb. ingot. The time study given below was made on this latter operation.

	Min.
1. Withdrawing ingot from furnace, conveying it to the press and locating it for forging	1.5
2. Forging	10.7
3. Straightening	3.5
4. Time lost between completion of (3) and the beginning of (1) on the next succeeding ingot	1.5
NOTE.—During this time some of the men remove the billet from the press and convey it to the sand bath	
5. Changing hammer heads and dies and tightening them up (average per forging)	1.6
6. Time lost due to crane trouble (average per forging)	0.7
Total time for forging one ingot under normal conditions	29.5

NEW ANNEALING FURNACE

Employs Surface Combustion with 580 B.t.u. Gas—Articles Treated Uncovered

Two annealing furnaces are now in operation at the plant of the Remington Arms Company, Eddystone, Pa., employing the surface combustion principle and giving a neutral or reducing atmosphere which makes it possible to treat the forgings without packing or otherwise protecting them against possible oxidation. The surface combustion system of utilizing gaseous fuel, discussed in THE IRON AGE of Dec. 7, 1911, and of Feb. 8, 1912, involves the delivery of the gas against or through refractory material, with the result that the surface of the incombustible material becomes and remains incandescent. The present installation was designed and installed, under patents granted to Prof. Charles E. Lucke of Columbia University, by the Surface Combustion Company, 30 East Forty-second Street, New York.

The furnaces were provided for annealing rifle parts immediately after forging. The furnaces, two in number, are of the car-bottom type. They are 20 ft. long, 12 ft. wide and 9 ft. high. The charge to each furnace varies from 20,000 lb. to 40,000 lb., depending upon parts handled.

The surface combustion high pressure system, it is claimed, inspirates all the air necessary for complete combustion and maintains automatically constant mixture proportions without motors, blowers or air piping. It is controlled from a central pulpit.

A mixture of water and coal gas, averaging 580 B.t.u. per cu. ft., is supplied by the Philadelphia Suburban Gas & Electric Company, Chester, Pa. The gas is delivered and metered under a pressure of 25 lb. The gas is metered by a rotary pressure meter and a Bailey flow meter.

During the heating up period, each furnace consumes about 10,000 cu. ft. of gas per hour. When temperature has been reached, this is dropped to about 5000 cu. ft. per hour. For a maximum weight charge, approximately 72,000 cu. ft. of gas is used by each furnace. Two charges per furnace can be secured per 24-hr. day. Cost of gas in this case is based on a sliding scale rate. The approximate average rate for this work is 43 cents per 1000 cu. ft.

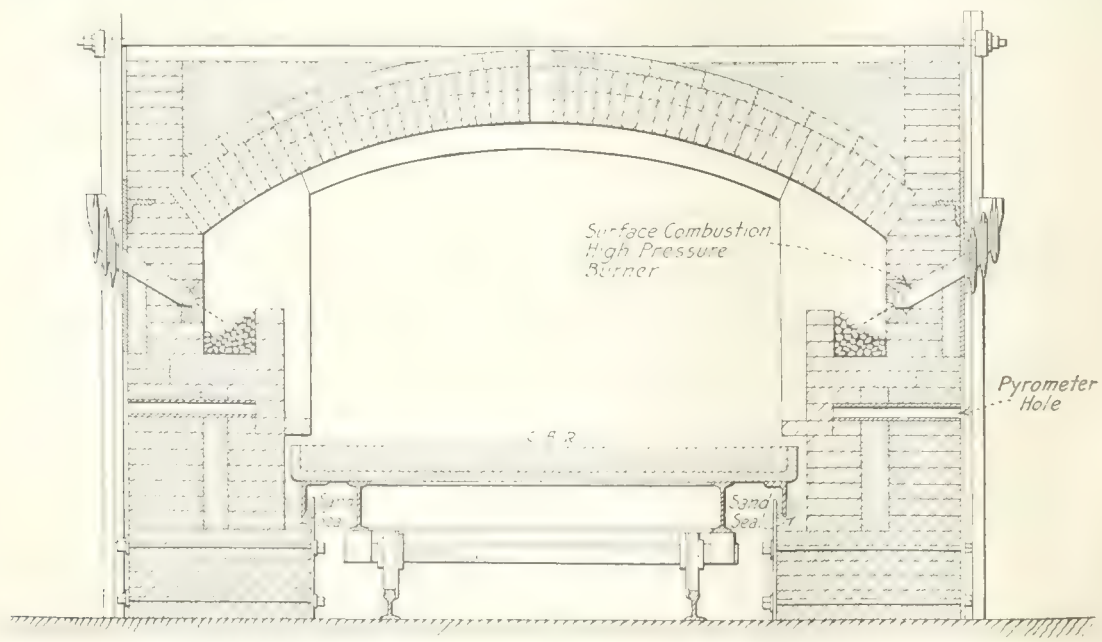
The temperature of the anneal is 1550 deg. Fahr. The time of the operation is as follows: The charge is placed in the cold furnace, fuel is turned on full until the furnace has reached correct temperature. The time it takes to reach the temperature varies with the weight of charge. For a 40,000-lb. charge, it takes about 5 hr. After the temperature has been reached it is held for 4 hr. to allow the heat to soak into the work. After this 4-hr. soak, the fuel is turned off and furnace is allowed to cool slowly, the work not being taken out until a temperature of 400 or 500 deg. Fahr. has been reached.

A flat car, with a fire-brick top, serves as the bottom of the furnace when in place. This car affects a seal with the furnace walls by means of a sand seal. Two cars are used in each furnace, meeting at the center. Each furnace has two doors which, when closed, rest on top of the cars, the cars themselves extending out beyond the furnace walls about 6 in. The cars ride on rails which run right through each furnace and extend about 20 ft. beyond in both directions. The cars are handled by winches, and the doors are operated by air hoists.

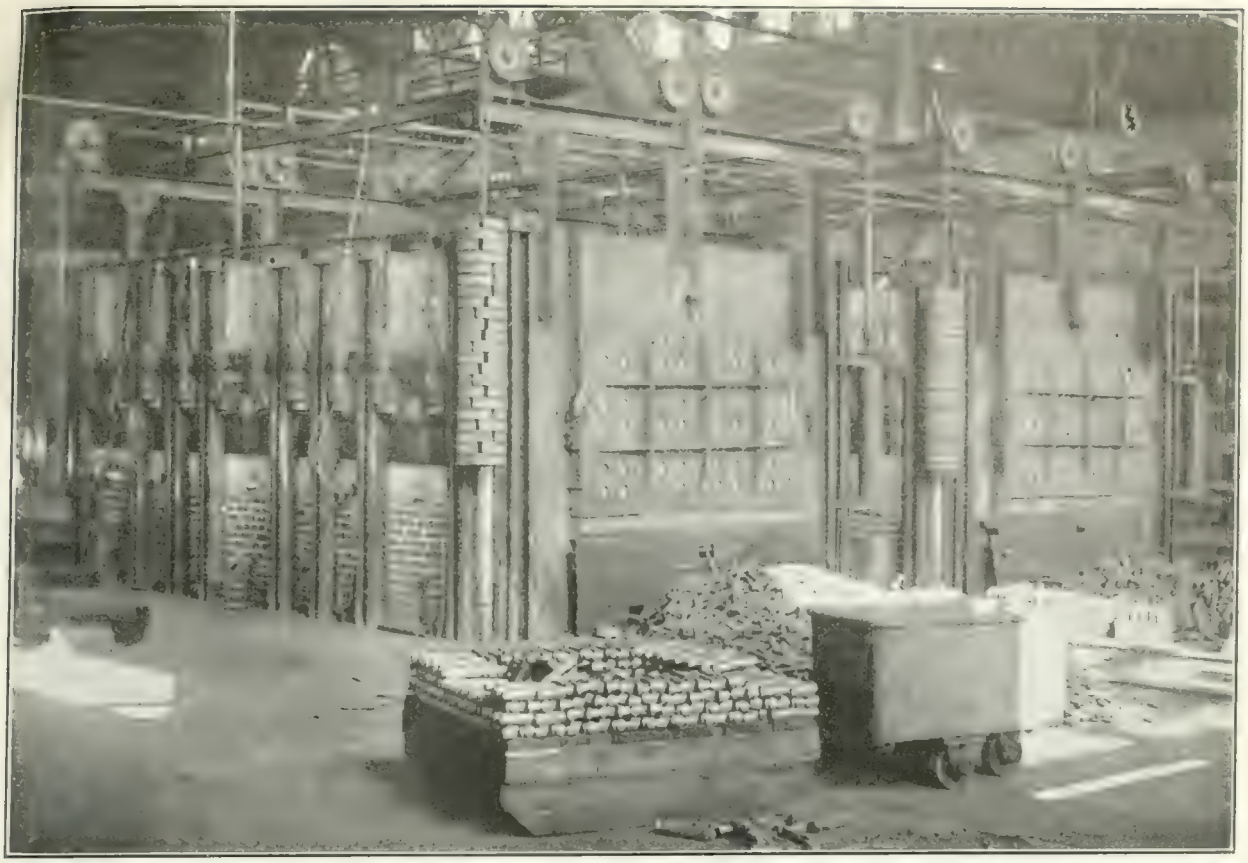
The furnaces are of the heavy-rail-buck-stave type with red brick outside. The firebrick lining is backed up by cork-brick insulation. Heavy tie rods tie the buck staves both across and end to end. To prevent leakage of cold air in, giving an oxidizing atmosphere and lowering the furnace efficiency, a furnace back pressure is carried, the flue openings being adjusted to a size to get this condition. The furnaces are designed to develop and utilize the maximum possible amount of radiant heat, and the flues are arranged to distribute the hot gases uniformly and to release them at the lowest possible temperature. Each furnace is equipped with 20 surface combustion high-pressure burners.

Both furnaces are controlled from a central control point by a single valve which regulates the pressure supplied. By raising or lowering the pressure, the gas supplied is increased or decreased, thereby raising or lowering the temperature. All pyrometer readings are also taken at this point from a multiple point indicating instrument. Four couples are located in each furnace, one in the center on each side of each car. A small amount of a man's time suffices to hold the furnaces to the exact temperature called for. The temperature control is found to be accurate.

Readings on an orsat apparatus have shown neither oxygen nor carbon monoxide and an average of 15.2 per cent carbon dioxide. This shows that there is no excess air and no unburned gases. When the furnaces were first put into operation, it was planned to pack the rifle parts in large steel boxes with covers sealed with clay. This was to prevent oxidation. Believing that an absolutely reducing atmosphere could be maintained, which would produce a minimum of scale, a trial was made, simply stacking the parts, uncovered, on the car top. The trial was successful and the operation



The Refractory Material in the Trough at Each Side, Kept at Incandescence by the Series of High-Pressure Gas Burners, Radiates Heat to the Furnace Roof and Thence to the Material on the Car, Which Forms the Furnace Floor. The material treated is not covered



Angle View of Two Surface Combustion Furnaces in Works of Remington Arms Company. Control point can be seen in center on right. Bottom of door rests on top of car. To keep cold draught from circulating under cars, metal shields are placed over opening. The high-pressure burners can be seen on the side of the near furnace

has since been handled in this way. To maintain this reducing atmosphere the mixture is adjusted to give a flue gas reading of about 1.2 per cent carbon monoxide.

The furnaces were installed in competition with fuel oil costing 4½ cents per gallon. Several oil-fired furnaces of practically the same size and doing the same work were in operation prior to the installation of the surface combustion furnaces.

SAFETY IN STEEL WAREHOUSES

Joseph T. Ryerson & Son Conducting Contest—Method of Rating and Making Awards

To promote interest in safety and keep accident prevention foremost in the minds of their employees, Joseph T. Ryerson & Son, Chicago, New York and St. Louis, are conducting a safety-first contest modeled after the Dodge plan. The plan is as follows:

Records are based on fewest number of accidents which cause days lost after the day on which the accident occurs, and also on the fewest number of days lost after the day on which the accident occurs.

A standard of 1000 points is set for perfect record. To attain this record, workmen or department must have no accidents causing the loss of full days.

For each accident causing full day's absence after day of accident, a number of points is deducted from 1000, equal to the ratio of one man to the total number of men in the department. For instance, in a department with 100 men, this will equal $1/100 \times 1000 = 10$ points.

For each day lost on account of accident after the day of the accident, a number of points is deducted from 1000 equal to the ratio of one day's time to the total number of days all men work in the department. For instance, in a department of 100 men working 25 days per month, or a total of 2500 working days, this will equal $1/2500 \times 1000 = 0.4$ point.

No department, however, will be penalized for more than 30 days' lost time on any one accident.

For fatal accidents, or accidents causing loss of fingers, toes, limbs, eyes, or permanent disability, a penalty of 30 days' lost time is charged in the month the accident occurs.

After all penalties for accidents have been deducted from 1000 and all penalties for days lost have been deducted from 1000, the two remainders will be added and divided by two. After the results have been considered, the rewards, based on the records, are made as follows:

The department having the highest record in a month is given the guardianship of a prize pennant, hung on exhibition in some suitable place, to be held by it for one month.

All men who have worked one year in the department which for the year maintains the highest record are rewarded by 16 hours' time off, with full pay, equal to a Friday and Saturday.

All men who have worked in that department less than one year, but nine months or more, are rewarded with 10 hours' time off, with full pay.

All men not working in the winning department, but who have a record of 1000 points for the year, not having had an accident which caused a full day's loss of time, will be rewarded by 16 hours' time off, with full pay.

The rewards are made by either time off, as described above, or its equivalent in wages, whichever the management decides.

Foremen of the winning department for a month are rewarded by an addition of 5 per cent to their monthly bonus, or, if they have no schedule, of 5 per cent of their monthly wages.

The foreman of the department which wins the annual prize is rewarded by a prize to be chosen by the executive committee.

The contest, which is open to all workmen, lasts for one year, ending May 31, 1917. In addition to the ordinary methods of accident prevention by means of safety guards on machinery, warning and instruction signs, safety bulletin boards telling of accidents and how to avoid them, letters inclosed in pay envelopes, etc., the company has created committees to supervise, suggest and assist in making the plants safe. There are three committees—executive, central and departmental. Each departmental committee is composed of a foreman, a Betterment Department representative and two members of the department, the last two being changed every month so that all employees have a chance to serve. Inspections of machinery are made every week.

The Atlantic Steel Company, Atlanta, Ga., reports its net profit in August, $116,921. Gross earnings for eight months were $574,718; reserve interest dividends and replacements, $191,750; net, $382,968.

Quebec Bridge Disaster Charged to Casting

One of the Four Cast-Steel Bearings Supporting the 5000-ton Span While Being Lifted Into Place Believed to Have Collapsed

THE failure of one of the cast-steel bearings through which the weight of the 5000-ton span of the Quebec bridge was transmitted to the lifting girders in the operation of raising the member from floating scows to its permanent position is given as the cause of the disaster which befell that structure on Sept. 11. The scheme of erection comprehended lifting by means of hydraulic jacks. The span was carried at each end by a cross or lifting girder to which were attached the heavy so-called chains made up of 30-ft. articulating lengths of steel plates. As the bearing

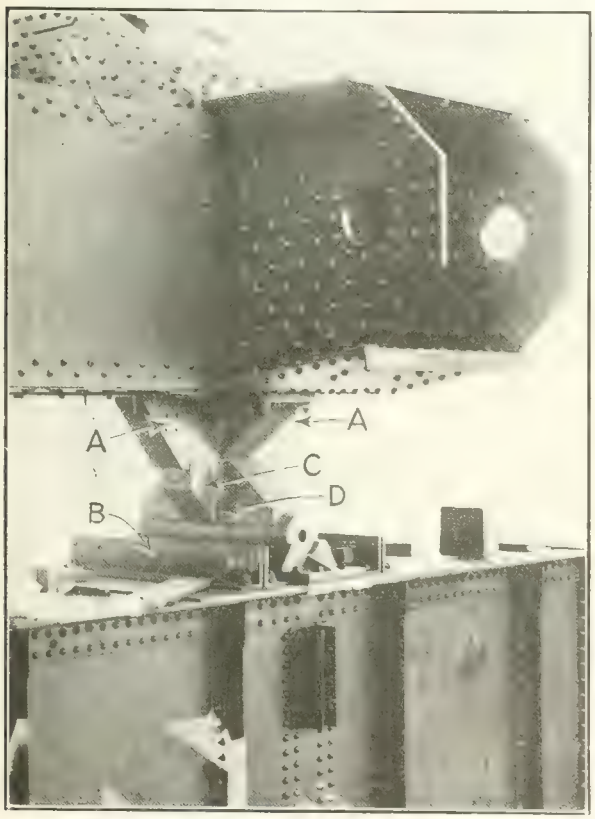


Fig. 1—Rocker Joint Bearing Transmitting Load of Span to Lifting Girder

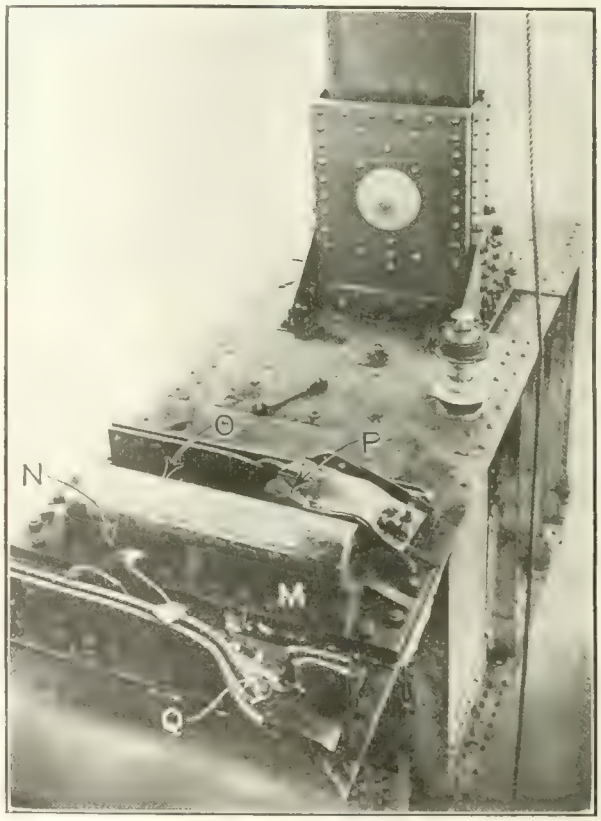


Fig. 2—The Southwest Bearing of the Span After the Failure

for the span on each girder were two groups of steel castings, one group toward each end of the girder. Each group was designed as a rocker joint to allow movement about the transverse and longitudinal axes of the bearing.

The detail of the rocker-joint bearing is indicated in Fig. 1. The main features are three steel castings and two forged pins. The latter are at right angles to each other and, with the castings, form a universal joint. The photograph does not represent the detail as it was when the span was being hoisted. Previous to floating, and after this photograph was taken, two hitch connections were added. These hitch connections carried the lifting girder when the span was being floated up the river to the site of the bridge. Then when the span was on the barges, centering plates were added to insure the absolute centering of the lifting girder on the bearing when the load of the span was transferred to the hoisting chains. These plates were shop-fitted and bore against a chipped surface on the arm *C* of the intermediate casting. A black streak at *D* shows where the chipping was done in one of the angles of the casting. The plates and castings were match-marked to make it impossible to put them in place until the girders were accurately centered on the intermediate casting. Once in place they prevented movement in a direction parallel with the length of the span.

That the rocker-joint bearing of the southwest corner of the span was responsible for the failure is the firm conviction of the *Engineering Record*, which finds that the span did not slip from the hanger, and that the conditions of damage on the lifting girders point to a collapse in the bearing.

The condition at the southwest corner after the span had fallen is shown in Fig. 2. The picture was taken looking in a southwesterly direction. In other words, the face of the girder shown is toward the channel, while the hanger is the westerly, or upstream, one of the pair. It will be noted that the centering plate that had been bolted on at *M* has been sheared off. The plate attached at *N* is ripped loose and lies twisted in front of its former position. The plate that was at *O* has disappeared, while the remaining plate *P* lies crushed against the pin, with the hitch connection of that side lying over it. The pin is scored in a diagonal direction, and has been rotated through a circumferential distance of 1½ in. toward the reader.

It is certain from this photograph, the *Engineering Record* holds, that the span did not "dip" off the pin. If it had, the plate *P* would have disappeared, the scoring of the pin would not have been diagonal, the pin would not have been rotated, and the damage to the angles at *Q* would not have occurred. In no way, it believes, except by the falling of the span through the breakage of one of the castings or of a pin above, could the damage have been wrought. The failure of a pin is

unlikely. Something broke and precipitated the span outward toward the river and toward the longitudinal axis of the structure. The angle of movement was about 30 deg. with the bridge axis, as is indicated by the break at *Q*, the scoring of the pins and the position of the hitch connection resting on the plate *P*.

The southeast lifting girder is shown in Fig. 3. The view is taken from the channel side looking eastward, or downstream. It will be noted that the centering plates are, all four, still bolted to the lower castings. All of them are flared outward, while the one nearest the reader in the view has been battered down in the crash. The pin shown, the *Engineering Record* says, is the shorter tranverse pin which carried the load from the upper to the intermediate casting. The explanation is that the falling of the southwest corner twisted the southeast corner of the span in a counter-clockwise direction (looking at it in plan) and at the same time carried it in a clockwise direction, considered in a vertical plane parallel with the lifting girder. The counter-clockwise movement accounts for the flaring of the plates. This movement, it is believed, also explains bridge. On this pin was seated the suspected steel rocker casting, which in turn carried a short transverse pin, 8 x 26¾ in. The upper shoe, attached to the base of the end post of the span, rested on this transverse pin. This detail served as the universal joint needed during the five weeks that the suspended span stood on its end supports, awaiting the day of floating and hoisting.

Something must have broken in the northeast quarter of the shoe detail, *Engineering News* says. It could have been only the intermediate or rocker casting. The fracture most probably occurred near the root of the front lower pin-bracket of this rocker, putting the bearing on the lower pin out of service; and in all likelihood the fracture entered the upper pin seat and one of the upper brackets also. Concentration of the 1200-ton load on the fracture edges must have caused crushing, tipping of what was left of the rocker, and some backward movement of the lower shoe and lifting girder.

It was incidental to this quickly-passed stage of the catastrophe that the westerly fragment of the rocker

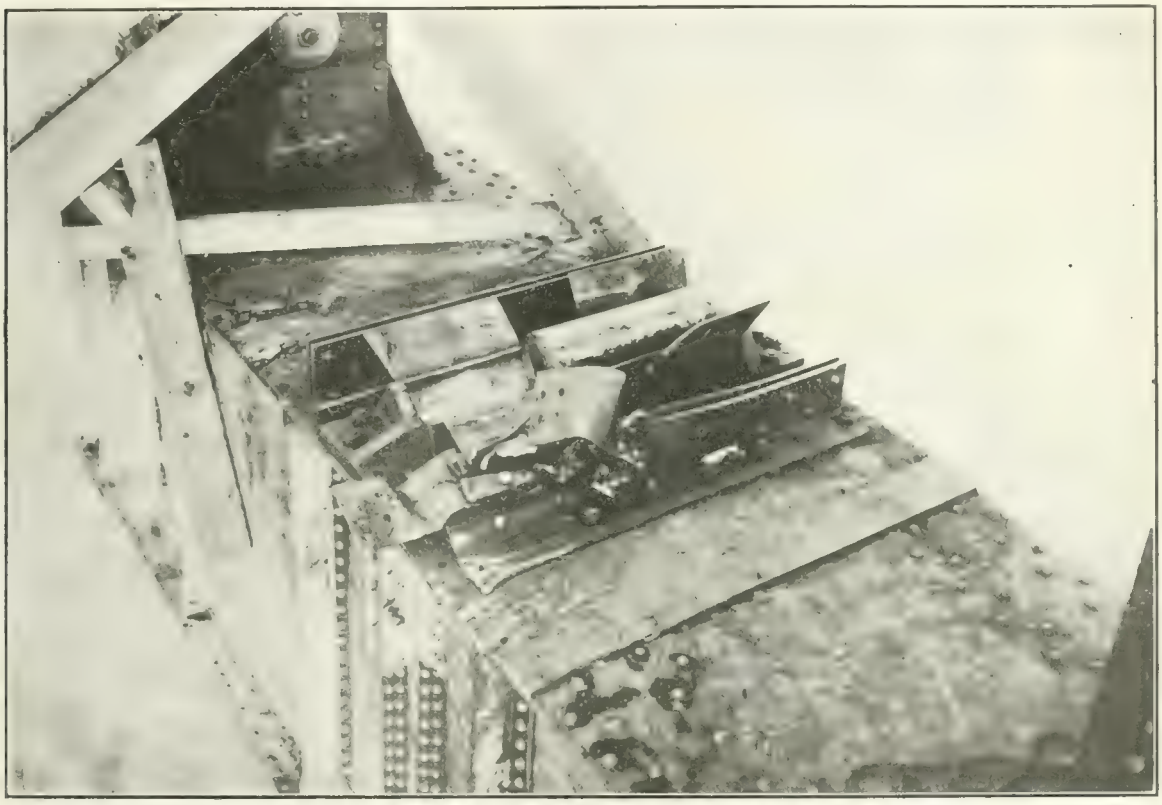


Fig. 3—Flared Centering Plates on Southeast Corner Are Taken to Indicate that Intermediate Casting Rotated in Going Off, Leaving Transverse Pin in Seat of the Longitudinal Pin

how the transverse pin came to fall into the longitudinal bearing, after the longer pin had disappeared. The shorter pin was probably not thrown about through a right angle but probably to a less degree. Caught by the flaring plates, it was directed into the place of the longer one.

The cantilever arms and anchor spans of the bridge are untouched. The hoisting equipment, it is added, has been proved entirely adequate and the design of the hoisting apparatus has been fully vindicated. In consequence, the St. Lawrence Bridge Company, contractor for the structure, has determined, it is understood, to proceed at once to the building of a duplicate span and to its erection by the identical method.

Engineering News also finds that the bridge first smashed down through the southwest supporting rocker and then skidded diagonally off this seat as the hanger was kicked backward southwesterly, and that subsequently at the three other supports it twisted or pulled away. That journal describes the rocker joint bearing as follows: On the top of the lifting girder there was a steel shoe casting with a longitudinal pin groove, carrying a 9½ x 46½-in. pin parallel to the line of the bore down on the two west centering plates, curling one of them over and forcing the other off by downward shear. In the same action, however, the fragments of the broken rocker were ejected from between its two pins like a smooth wet orangeseed, and, the impulse kicking back the entire swinging girder, the corner of the span fell free, only grazing the pin and the girder cover-plate as it went off.

The Cohen-Schwartz Iron & Steel Company, St. Louis, Mo., is fitting up new yards adjoining its old location and expects to have everything ready for business by Oct. 1. The most modern and approved machinery is being installed for handling and preparing scrap. The plant covers about 12 acres and has six siding tracks and two spurs, capable of accommodating 75 cars at one time. The company also announces that it has opened a branch office in the Oliver Building, Pittsburgh, Pa., for the purchase and sale of scrap iron, steel and metals, under the management of S. W. Platt, formerly manager of the Pittsburgh office of the Canton Iron & Metal Company.

New Foundry Trade Advance at Cleveland

Uniform Cost System to Become Operative—Electric Steel, Molding Sand and Malleable Castings the Leading Features of Discussions

The Cleveland convention of the American Foundrymen's Association and the contemporary meeting of the American Institute of Metals were carried through the week of Sept. 11-16 with the record-breaking momentum of many notable achievements. The attendance was remarkable. An approximate registration of 1100 included 888 members as compared with 513 in 1915. The long-sought roll of 1000 members was reached and then exceeded by a good margin through a surprising influx of applications.

The attendance at the several technical sessions was by far the largest ever seen. The amount of discussion and its keenness, while due in part to the numbers present, must also be credited to the fact that the papers treated largely of general problems incidental to the foundry business as it is in any shop, so that many present were able to offer profitable suggestions despite the conditions of impromptu discussion.

The 1916 meeting, the twenty-first of the association, also marked the beginning of its career as a corporation conducting its own associated exhibits. The number of exhibitors and the excellence and diversity of equipment shown, as already published, were paralleled by the record of efficient and harmonious management of the exhibit under the new auspices.

The arrangements by the Cleveland committee for plant visitation, entertainment and the annual banquet gave a well rounded program for each day, and the smoothness of its execution was a matter of comment. The banquet was an event of distinction, and the American Foundrymen's Association may well base its hopes of future growth and attainment upon the type of ideals and of enterprise that gave character to that gathering. The presentation of a chest of silver to R. A. Bull, the retiring president, impressively reflected, in the manner of its giving, the animating spirit of the occasion.

Sessions on General Foundry Practice

Brief mention was made in the issue of Sept. 14 of the Tuesday morning session at which, as on Wednesday morning, subjects common to gray iron, malleable and steel foundries were considered. President R. A. Bull presided on both days. In the symposium entitled "The Results of Closer Co-Operation Between the Engineer and the Foundry," the principal point of the paper is again worth emphasis, namely, that foundry management must strive toward a fusion of the viewpoint of the engineer who designs the casting with that of the practical foundryman who makes it. Each must be brought to a better understanding of the other's methods and equipment and of the consideration which each has to take into account. It was pointed out by D. W. Sowers, Buffalo, N. Y., that this co-operation is needed much more often than it is practised even in the case of what may be termed "plain work." He cited especially the precautions necessary to be taken in the molding of castings having machined surfaces so that, for example, chills when used will not conflict with later machining or so that the cleaning action of the metal as it cools will not bring to the finished surfaces the impurities which might have been disposed of otherwise by a different method of molding or pouring. The importance of the statement, in the paper of John Howe Hall, referring to faulty specifications, correct alloys and elastic limit, is such as to call for its publication in greater detail elsewhere in this issue. The excellent presentation by C. E. Chase of the functions of the engineer in respect of the non-ferrous metal foundry likewise warrants a more detailed report than space here permits. As an engineer Mr. Chase laid special stress on the fact that the engineer is now profiting in a degree heretofore impossible because of the growing tendency among plant operators to exchange practical information and experiences directly or through the medium of technical associations and the trade press, and to get away from the idea of hoarding "trade secrets." He urged upon the practical foundrymen the self-interest promoted by interchange of this kind.

The discussion of this symposium recognized the inevitable approach of a period of competition, more keen and extended into wider markets than ever before experienced, with success depending upon a collaboration between engineer and foundryman which will insure correct designs, minimum costs, a knowledge of what is to be done before manufacturing begins and a higher plane of efficiency.

The treatment of the "Influence of Gating on Castings" was also referred to in the issue of last week. It was stated by B. D. Fuller of Cleveland that nothing so indicates the mechanical ability of a molder as his method of cutting a gate.

THE RECLAMATION OF SAND

The paper by H. B. Swan, Detroit, relating to "Waste Foundry Sand," introduced what was this year as it was at Atlantic City a topic of the greatest interest. Mr. Swann's paper set down a résumé of conditions existing at a large number of foundries as applied to the reclamation of sand, based on answers received to a questionnaire. The wide divergence in replies on the one hand and on the other the economies that are being effected in some instances indicated the opportunities of improving conditions. The importance of sand reclamation is, of course, especially pronounced in the case of foundries unfavorably situated. Foundries whose sand costs them $2.25 or less are not so much concerned. In the case of a New England foundry, whose cost for good Jersey sand averages $3.25 per ton, to which must be added the 50 cents per ton involved in waste and disposal, the matter is of greatest importance and excellent results have been obtained by the use of mullers for intensive mixing. Following a period of experiment at this foundry it was found that the amount of new sand required in a certain facing had been decreased four tons per day, or about 40 per cent. A core sand mixer, formerly containing new sand and flour representing a cost of $1.10 per ton, is now made for 27 cents per ton; the new sand and flour are entirely omitted, a small percentage of clay replacing both. The saving was effected through securing a more intimate mixture.

R. F. Harrington, in relating the above experience, expressed the opinion that while clay may replace the new sand to a considerable extent in certain mixtures, it must be used judiciously in order that the facing

may not become too close. It was stated in Mr. Swan's paper that the cost of disposing of used sand ranges from 30 cents per ton to as high as $1.50 per ton. Much of this expense, he shows, may be avoided by working over the used sand. It was further stated that "in attempting to use burned sand in new core-sand mixtures the cores are weak, soft, require an excessive amount of binder and do not resist the action of the metal well." Where sea coal has been used either in facing sand or in the core sand mixture it becomes coked and it is impossible to wash it out.

THE ESTABLISHMENT OF STANDARDS FOR SAND

The above paper and its discussion were associated with the following paper, a report of the work of the United States Bureau of Standards with reference to molding sand. This report was prepared by Director Stratton and in his absence was presented by C. P. Karr. Reference was also made in the discussion to the report of the committee of which Dr. Moldenke is chairman and which is co-operating with the Bureau of Standards in the investigation of molding sands. Mr. Karr presented results and data of experiments already conducted in the sizing of sand and the determination of melting point. The objects toward which these investigations are being directed include:

1. The creation of a standard sand available to the trade generally, with which any sand may be compared and its proper place in a scale of desirability determined.

2. To have this standard sand represent as nearly fool-proof qualities as possible, i.e., to be capable of being rammed hard, yet retaining sufficient venting power to give good results.

3. The standardization of melting point, especially for facings for steel castings.

4. The standardizing of sieve mesh sizes and a better nomenclature for sands graded by screening.

5. With reference to sand reclamation, more complete information regarding the bonding values of clays.

It was shown by Dr. Moldenke that the tendency was clearly in the direction of preparing an artificial molding sand for use as a standard, available knowledge as to the desired qualities of a good sand now being sufficient. In this tendency we should but be following European practice. In the matter of a melting point requirement for steel facing sand, Mr. Karr recommended that specifications call for a melting point of 1650 deg. Cent., detailing the experiments recently made in determining the fusing points of sand.

To aid the bureau in the establishment of standard screen meshes upon which depends the value of any grading of sands by size a resolution was adopted authorizing the executive board to urge the adoption of such a standard. To further the investigations with reference to the bonding values of clays and the general problem of reclamation a committee was ordered appointed to co-operate with the U. S. Bureau of Mines in a manner similar to that in which the Bureau of Standards Committee is working. Mr. Karr presented detailed data showing the sizing, moisture content, melting point, transverse and permeability tests which have already been made on sands and from which standards for the artificial molding sand may be determined.

HOW SHALL APPRENTICES BE SECURED

The report of the representatives of the American Foundrymen's Association on the Conference Board on Training Apprentices was read by B. D. Fuller, chairman. It outlined the results of the meeting of the board, April 22, 1916, at New York. In the opinion of the board the problem of vocational education is still so undeveloped as to make the enlistment of federal financial aid premature and that for a time the furtherance of such education may better be left to the States.

The discussion called out by this question of apprentices promptly indicated how closely it touches every operating foundry. It was not difficult to see also the different angles from which the problems of recruiting the ranks of the molder is viewed. The practical foundryman sees hope only in the restoration of the system of bound apprentices under which he served his time and a correction of the evil of one foundry stealing apprentices from the other. Those who have engaged in developing the science of founding and of specialization and have been associated with engineering training look to the raising of the esteem in which founding is held as an occupation and as a science to correct the depletion of the supply of molders.

In particular, Dean Connelly, of the Carnegie schools at Pittsburgh, decried the disposition of the foundryman to demean his own business by reference to the working conditions of the foundry. The dean made a plea for support in inculcating the idea in the minds of young men that founding as much as any other trade or art offers opportunity for the expression of individuality and that in its importance in industry it is fundamental. Trained to this viewpoint, young

THE election of J. P. Pero, general superintendent of the Missouri Malleable Iron Company, East St. Louis, Ill., as president of the American Foundrymen's Association honors one who has been particularly active in organizing the men of the foundry for educational and social purposes. In December, 1887, he created the New England Foundry Foremen's Association, the pioneer among associations in the foundry trade, and in 1909 he was responsible for the organization of the St. Louis association. Mr. Pero comes from a long line of founders. Nor will the family tradition cease, since J. P. Pero, Jr., is engaged in the malleable foundry business at Franklin Park, Ill. Mr. Pero was born in Massachusetts in December, 1856, though his youthful spirit and great energy belie the fact. At 14 he entered upon his apprenticeship in a gray iron foundry at Worcester, Mass. In 1875 he left Worcester to begin as a journeyman in the employ of the Chapman Valve Company, where he remained for five years. Subsequently he served as foreman in various foundries of New England, including four years with the Yale & Towne Mfg. Company. In 1888 he first became associated with malleable work, entering the employ of the Malleable Iron Fittings Company, Brantford, Conn., where he was engaged for 10 years. In 1909 he made his present connection with the Missouri Malleable Iron Company. Mr. Pero is of the most progressive school of foundrymen, a student of the metallurgy of cast iron and of founding as an art. He adds a capacity for management and business detail which in the organization of the American Foundrymen's Association has been largely drawn upon, and the sequence of office which brings the senior vice-president of the association to the president's chair was never more happily operative. At no time has the association's outlook been brighter.



J. P. PERO, PRESIDENT AMERICAN FOUNDRYMEN'S ASSOCIATION

men will be less reluctant to enter the foundry. The technical and vocational school and the study of the engineering side of molding in itself are of greatest value in this respect. It would have been a valuable contribution to the discussion could someone have harmonized the viewpoints by tracing the changes in methods of manufacture, showing particularly how the function of the all-around molder has been modified and how the division of labor has logically created the specializing employee.

The discussion also brought up the question of methods of training inexperienced help quickly in order to meet the existing emergency of labor shortage, but little was suggested in this connection. The topic was dismissed with a resolution providing for a committee to draft apprenticeship regulations for submission to the executive board for action.

TO PUT UNIFORM COST SYSTEM INTO EFFECT

The report of the committee on foundry costs, B. D. Fuller, chairman, presented immediately following the opening of the Wednesday morning session, stated that while plans had been considered during the year for putting into effect the proposed methods of cost keeping, conditions had not warranted any actual steps in that direction. The general problem of foundry costs was more fully discussed in connection with the address of C. H. Scovell, Boston. Mr. Scovell brought to the discussion an unusually wide experience as a professional accountant in the work of other associations in establishing uniform cost accounting in the plants of their members. The keynote of his remarks was the urgency for real action to make proposed cost accounting systems effective in the trade. He said that if the American Foundrymen's Association would profit from the experience of other associations in adapting itself to the cost committee's proposed plan, it would engage the services of an expert accountant to visit a large number of foundries to investigate the individual condition under which they are operating, formulating from the data a workable system applicable to all. It is the first essential that there should be a common understanding of what elements enter into cost and in what way each is applied. Mr. Scovell related in detail the experiences of some other associations in their effort to establish uniform cost systems.

Stanley G. Flagg, Jr., pointed out the tendency to indifference to the matter of costs in these abnormal times when the chief concern is to produce the castings, price being secondary. It was emphasized by J. H. Wilson that the two conditions under which cost keeping are especially necessary are those of very good business and very bad business—in the former case because the foundrymen should choose from the excess of work offered him, only the most desirable, a choice impossible without an accurate knowledge of cost, and in the latter case because of the necessity of making the lowest possible price without losing money. Mr. Fuller reiterated the necessity of emphasis upon knowing what individual castings cost instead of quoting on work on the basis of classes of castings. It will be found, he maintained, that some castings are sold for one-half, and less, of their actual cost and also that a realization of the high actual cost of some castings will result in changes in design that will make them cheaper.

In order that the association's propaganda for the establishment of uniform cost accounting may bear fruit, a resolution was offered by Secretary Backert, recommending that the cost committee investigate the plans of other associations and report the results of that investigation with recommendations, within three or four months, to the Board of Directors, who shall be authorized to act. The resolution was adopted.



Part of the Foundry Supply Section in the Coliseum

THE FAILURES OF PROFIT-SHARING

A paper was presented by C. E. Knoeppel, New York, on "Profit-Sharing as a Factor in Preparedness." Mr. Knoeppel briefly abstracted his paper and made the general statement that social and industrial unrest are the basis of industrial unpreparedness. He supported his belief in the need of change in this respect by quoting from Premier Asquith, "After the war there must come a better distribution of wealth between capital and labor." Profit sharing plans will contribute to this end only when they are conceived in a sense of justice and with primary intent of sharing profits with employees. Mr. Knoeppel pointed out that two-thirds of existing profit-sharing plans have been a failure: First, because of the attitude of union labor, which has

not only opposed these plans on general principles, but also because of a lack of understanding of them and because they had no part in their devising; second, because these plans do not take into consideration individual attainment; third, in some cases because of the remoteness of the reward and also, as applied to non-union labor, because of the lack of participation by the men in preparing the plan and putting it into effect. Mr. Knoeppel's paper outlines some proposed profit-sharing plans.

STANDARD SPECIFICATIONS ADOPTED FOR SCRAP

The report of the association's committee on specifications for foundry scrap, published in THE IRON AGE of Sept. 14, was presented by C. E. Jones, chairman. It indicates the manner in which the committee had consulted with scrap users in all sections of the country and in all branches of foundry work before working out the proposed specification. The report presents in detail suggested specifications for cast iron scrap, malleable cast scrap, open-hearth steel scrap, converter, crucible and electric furnace steel scrap. Following a discussion in which were brought out the importance of establishing standards to which foundrymen could adhere and upon which they could insist, in the purchase of scrap, as well as of the desirability of accrediting the specifications thus brought together, the report of the committee was accepted and the specifications adopted as those of the American Foundrymen's Association.

The report of the A. F. A. committee on safety and sanitation, V. T. Noonan, Columbus, Ohio, chairman, was accepted with modifications of the printed text. Chief among the changes was the marking of the subject divisions of the code by letter instead of Roman numerals and the numbering of the sections from No. 1 under each division rather than continuously through the code. The installation of safety devices with respect to equipment was enlarged upon very considerably and many specific references added. M. F. Alexander expressed the hope that some of the provisions of the code might be still further modified.



Section in Coliseum Showing Grinding Machines and Air Compressors

Malleable Founders More Inclined to Publicity

In point of attendance the meeting for the discussion of the papers pertaining especially to the malleable castings industry greatly exceeded expectations. The interest shown was immediately given further impetus by reason of the paper read by F. J. Lanahan, Fort Pitt Malleable Iron Company, Pittsburgh, discussing the use of malleable castings in car construction.

Mr. Lanahan, introducing the subject matter of his paper, endorsed the earlier plea of Vice-President Pero, who presided over the malleable session, asking that in next year's program special prominence might be given to malleable castings through a generous contribution of papers. The castings which enter into car construction have an essential bearing upon the continuous service and ultimate life of the car. The suitability of malleable castings is therefore of special significance, having to do with the fact that they are lighter and stronger than gray iron, smoother and less costly than steel and, while as strong as forgings, also less expensive. But the superior qualities of malleable castings, it was added, are their undoing so far as any ill repute into which they have fallen is concerned, for metal sections are so pared down as often to make their failure certain. Manufacturers have been to blame, who in their ignorance or eagerness to secure business permitted designs to be used from which only castings foredoomed to failure could result. The paper, which will be abstracted more fully in another issue, goes into the merits of malleable castings and details some of the features of design which should be incorporated in the principal car castings. Mr. Lanahan, in conclusion, urged upon the manufacturer that, having a knowledge of what the virtues and the limitations of malleable castings are, he correct the errors of the past and aggressively push for the wider use of his product. He urged the buyer, also, to utilize the founder's experience.

SPECIFICATIONS FOR MALLEABLE CASTINGS

In the absence of changes in the specifications for malleable iron castings in the past year the report of the committee was brief and in the nature of a progress report. It contained the suggestion that the association should seek to anticipate the demands of the car-building, automobile, agricultural implement and other industries rather than wait for events.

GREATER FAMILIARITY WITH MERITS URGED

In speaking of his paper on "What Is the Normal Fracture of Good Malleable Iron?" Enrique Touceda said that it had been written especially for the engineer, the inspector and the manufacturer to give them, as is given to salesman marketing a product, some of the answers to adverse criticism and he urged a better knowledge of these properties so that the defense of malleable castings might be convincingly spontaneous. The paper analyzes in detail the significance of different fractures, illustrating with photo-micrographs. Special prominence was given to an explanation of the silvery fracture where a section is broken in tension, the appearance being a result of light effect upon the grain of the metal which is pulled out in sharply pointed needles. Attention was also directed to the erroneous impression that the strength of malleable castings is in the skin. All of his tests, Mr. Touceda stated, had shown that the first break came in the core and the maximum elongation in the skin. He also announced that recent tests had pointed to a unique property of malleable iron in that as the ultimate strength increased, elongation increased. The paper will be found at greater length in another issue.

LARGE VERSUS SMALL FURNACES

An interesting discussion developed out of the reading of the paper descriptive of a 25-ton air furnace, as published in THE IRON AGE of Sept. 14. Mr. Pero suggested that in the more frequent use of furnaces smaller than 25 tons economy of space was sacrificed for the greater advantages of placing smaller units to give shorter carrying distances for iron resulting in less fatigue for the men, lower labor cost and hotter iron. He stated that there was so little general use for overhead cranes in the average malleable foundry that the installation of necessary carrying equipment, especially for charging, was neglected where it would be a distinct advantage. In his own foundry the prevention of cooling of the metal before pouring was accomplished by having the light work to which the men carried the iron, near the furnace while a rapid overhead carrier took the metal to the heavy work floor at greater distance. In this connection Mr. Davis of Moline, Ill., emphasized the importance of the method of metal distribution, stating that the efficiency of a shop chiefly depends upon the way iron is got to the floors.

Stanley G. Flagg, Jr., Philadelphia, said that his firm regularly operated a 25, 26 and 27-ton furnace and the objections in the matter of carrying distances had been overcome by proper arrangement of the work. Their heavy work is poured from full ladles carried on an overhead carrier. They also used a crane over the furnace for charging. In a large furnace it is advisable to have tap holes at different levels so that the top metal may be taken off earlier, thus preventing a burning of the metal. A 25-ton furnace should melt at the rate of three tons per hour.

New Interest in Steel Foundry Problems

The steel sessions on Thursday and Friday were conceded to be the best in the association's experience. The attendance on Thursday in particular was large, enthusiastic and representative, due chiefly to the fact that electric steel was the feature. The papers were full of the latest developments in this important department of the industry, and in the discussions representatives of all steel-making processes took part. Friday's session



Operating Molding Machines, Hand Traveling Crane, and Cleaning Equipment



View of Molding Machines in Another Section of the Annex

which was not so largely attended, was marked by the discussion of a metallurgical problem of much interest to steel foundrymen—the use of titanium in steel for castings.

THE ELECTRIC FURNACE PAPERS

Thursday's symposium on "Electric Furnace Practice" embraced four papers dealing with three electric furnaces now in use in the United States. While steel for the foundry was uppermost, the adaptability of the electric furnace to other grades of steel was not lost sight of, particularly in the case of the Grönwall-Dixon furnace, which thus far has operated in this country only on high-grade alloy and carbon steel for billets.

The Snyder electric furnace was represented by a paper, "The Ideal Electric Furnace for the Steel Foundry," written by F. J. Ryan, E. B. McKee and W. D. Walker, and presented in abstract by C. M. Booth of the Snyder Electric Furnace Company, Chicago. He was introduced by W. A. Janssen, vice-president of the association, who presided.

Some recent developments in the use of the Heroult electric furnace were given in two papers—"The Electric Furnace in the Foundry," by E. B. Clarke, president Buchanan Electric Steel Company, Buchanan, Mich., and "Electric Furnace Practice in the Manufacture of Steel Castings," by T. S. Quinn, secretary-treasurer Lebanon Steel Foundry, Lebanon, Pa. Each was presented in abstract by the author. John A. Dixon, of the John A. Crowley Company, Detroit, Mich., gave a brief abstract of Mr. Crowley's paper on "The Grönwall-Dixon Electric Melting and Refining Furnace." This furnace was described in an article in THE IRON AGE, Sept. 7, 1916, and abstracts of the three other papers were published in THE IRON AGE, Sept. 14, 1916.

THE DISCUSSIONS

J. J. Bever, of the Otis Steel Company, Cleveland, asked Mr. Booth what the loss was in melting with the Snyder furnace. The reply was that in acid practice it had been found to be only 1 per cent, while for basic melting no data were available.

R. F. Flintermann, president Michigan Steel Casting Company, Detroit, in discussing Mr. Clarke's paper, said that this company's experience in operating for some time two Heroult furnaces showed that extreme care was necessary at all times, and that one of the greatest difficulties was keeping the metal free from slag contaminations. He had found the chemical and physical properties of electric steel the best, and believed that a year or two would see great developments from the use of electric furnaces.

The Training of Operatives

John A. Dixon, in response to questions, said a misconception was prevalent regarding skilled help in operating an electric furnace. He had found no difficulty in fitting men in two to three months to operate successfully an electric furnace—men who were by no means trained, but of ordinary ability and experience. The use of such men he considered impossible in open-hearth practice.

While the Grönwall-Dixon furnaces had not become prominent in connection with steel castings in this country, Mr. Dixon cited the experimental work of a 500-lb. furnace of this type which, operating basic, in Detroit, had made 118 heats on one roof.

Current Consumption

Replying to M. G. Tielke, secretary-treasurer of the Crucible Steel Casting Company, Cleveland, who asked why the current consumption was put at 550 kw.-hr. per ton for liquid alloy steel and at 500 kw.-hr. for steel castings, Mr. Dixon attributed the difference to the time consumed in taking analyses of alloy heats.

T. S. Quinn observed in his paper that a consumption of less than 950-kw-hr. per ton of steel on his 1-ton Heroult furnace would probably have been possible had the transformer capacity been larger. M. G. Tielke offered the experience of the Crucible Steel Casting Company in the use of its 1-ton Heroult furnace where the transformer capacity was so large that on 118 heats the average consumption had been only 645 kw.-hr.

E. L. Crosby, Detroit Edison Company, Detroit, who was called upon, drew attention to the development in Detroit in the use of electric power where now a 6-ton and a 3-ton Heroult furnace were operating as well as a

5-ton Grönwall-Dixon, with a 10-ton furnace of this type under construction. He expected decided progress in all districts in the use of electric power for industrial purposes.

The Rennerfelt Furnace

While the Rennerfelt electric furnace was not represented on the program, the chair called on C. H. Vom Baur, of Hamilton & Hansell, New York, who spoke of the furnace as a polyphase unit operating either acid or basic. In general he regarded the electric furnace as by no means a cure-all for the steel-maker's troubles, but emphasized the importance of the personal element. The question of refractories is now a serious one to many, since the average material for a basic furnace is by no means as good as it was two years ago. Mr. Vom Baur spoke of a 1½-ton Rennerfelt furnace operating abroad and producing ingots of alloy and other steels where the power consumption at the start was 816 kw.-hr. per metric ton, but at the end of the fifth week it had fallen to 611 kw.-hr. per ton. The average for seven weeks was 602 kw.-hr. per net ton of metal. The percentage of crop was 11.48 per cent, with 3.39 per cent lost in burning off and from scrap on the floor.

Edwin F. Cone, New York, called attention to the relative consumption of ferromanganese in the various steel-making processes. He said the electric process had a distinct advantage in that an addition of 7 to 8 lb. of 80 per cent ferromanganese per net ton of steel introduced an average manganese content of about 0.60 per cent into the steel, while in the open-hearth process about 17 lb. per ton and in the small converter very much more was needed to achieve the same result. He regarded these facts as showing the more healthy or non-oxidized condition of electric steel.

Mr. Cone also made a comparison of the quality of steel from the electric and other processes based on many static tests he had made. Referring to the high elastic ratio of 61 per cent in the electric steel tests in Mr. Quinn's paper, the speaker said that static results of steel castings depend largely on the heat treatment and the method of taking the elastic limit. In Mr. Quinn's tests the heat treatment had been slow cooling from the proper temperature and the elastic limit was taken by the drop of the beam, checked by the dividers. With these two conditions of testing as a basis, Mr. Cone's experience with electric steel confirmed Mr. Quinn's results of an elastic ratio of 61 to 62 per cent, whereas in the case of open-hearth steel castings or converter and crucible metal the average elastic ratio from a large number of tests was never over 51 to 52 per cent. Acid open-hearth castings in which 0.16 to 0.18 per cent of vanadium had been incorporated showed an elastic ratio of 61 per cent tested under the conditions referred to, whereas converter or open-hearth castings, if cooled quickly in the air, gave an elastic ratio of 60 to 62 per cent. Without having figures for electric steel so heat-treated the speaker thought it reasonable to assume that it would run over 70 per cent.

Comparison of Electric and Bessemer Steel

"Electric and Converter Steel Compared" was presented by Peter Blackwood, Blackwood Steel Foundry Company, Springfield, Ohio, and was decidedly in favor of converter steel as opposed to electric, the author granting practically no merits to the latter.

E. B. Clarke, Buchanan, Mich., taking up Mr. Blackwood's reference to the inferior quality of electric castings when machined, stated that he had always detected a difference between electric and any other steel when being machined in that the former appeared tougher and more uniform.

ALUMINA IN STEEL

A paper of noteworthy research merit was contributed by G. F. Comstock, metallurgist of the Titanium Alloy Mfg. Company, Niagara Falls, N. Y., on "The Presence of Alumina in Steel." The author had a large number of photomicrographs thrown on the screen. A liberal synopsis was given in THE IRON AGE, Sept. 14, 1916. Coming at the close of a rather long session little discussion was offered, but in reply to a question as to the results of tests when alumina was present, Mr. Comstock said that he had not made many, but he believed a few small inclusions had no bad effect.

The scheduled paper on "The Manufacture of Manganese Steel Castings," by W. S. McKee, American Manganese Steel Company, Chicago, was not presented.

TITANIUM IN STEEL-MAKING

The use of ferrotitanium in steel castings was the feature of the steel session Friday morning. W. A. Janssen read his paper "The Use of Titanium in the Manufacture of Steel Castings." Particular attention is called to the benefits obtained by the use of ferro-carbon-titanium in basic practice as carried out at the plant of the Bettendorf Company, Davenport, Iowa.

A written discussion from N. Petinot, electro-metallurgical engineer, New York, was read. After stating that the addition of titanium to steel properly made results in advantages, particularly in those grades of steel which are reduced to sections, Mr. Petinot took exception to Mr. Janssen's statement that titanium does not form alloys:

> It is possible to make steel containing titanium, and without excessive loss of titanium, if the carbon-free alloy is used, but if the ferrotitanium used has a carbon content, the titanium existing in it as a double carbide of iron and titanium, it is impossible to get any appreciable titanium content in the steel, even when figuring on a large loss.
>
> The same has been found true in making vanadium steels and it is for this reason that carbon-free ferrovanadium is always used instead of the grade with a carbon content, such as was imported a few years ago from abroad, in which the vanadium is present as a carbide of vanadium or rather [illegible] double carbide of iron and vanadium

IS VANADIUM A DEOXIDIZER?

Mr. Petinot took exception to the author's statement that the amount of titanium necessary depends on the kind of steel to be treated, *i.e.*, that 13.2 lb. per ton of a 15 per cent alloy should be added to rail steel, while for steel castings only 1.5 to 2 lb. per ton is sufficient, by saying:

> I think this statement requires some explanation. A heat of steel made for rails, requiring 0.65 to 0.95 per cent of carbon should finish less oxidized than a steel casting heat of 0.17 to 0.40 per cent carbon and consequently should not require more, at least not six times more, deoxidizer than the latter.
>
> Vanadium is not a deoxidizer and the usual loss of 10 to 25 per cent of the vanadium addition does not indicate a deoxidation of the steel. The same phenomenon is observable when ferrochromium is added to steel. Is chromium therefore a deoxidizer? It is more generally accepted by metallurgists that the loss of vanadium is due to the fact that small pieces of the alloy become coated with slag and are thus wasted by floating to the top of the metal. If considered as a deoxidizer it would certainly be a very expensive one.

AS A SUBSTITUTE FOR MANGANESE

> I agree with Mr. Janssen that vanadium steel, like all other alloy steels when properly made, can be improved by ferrotitanium as the final addition, but I do not agree with him when he says that he can by the use of the titanium reduce his manganese content from 0.75 to 0.50 per cent and get the same physical results.
>
> In making heats of steel in acid or basic open-hearth furnaces, we all know the fluctuation in sulphur from heat to heat when the final test piece is analyzed. We also know from experience that when heats are high in sulphur and low in manganese, cracks appear more freely in the castings, manifesting the phenomenon of red shortness.
>
> Steel-makers also know how hard it is to obtain the right percentage of manganese content in the steel, and many of us have found from experience that occasionally while aiming for a manganese content on the high side of the specification, the final analysis of the heat shows it to be on the low side, or that the heat has a low manganese content. If Mr. Janssen by the use of ferrotitanium can reduce his manganese from 0.75 to 0.50, I would ask him what the low limit is that he gets when aiming for 0.50 per cent and if he has found a way to get exactly the amount of manganese he wishes.
>
> I would also ask him what limits of sulphur he usually gets in his grades of steel with a manganese content of 0.50, particularly in acid steel. I have had some experience making ingots of acid steel for forgings in which I tried to re-

(Continued on Page 673)

President Farrell at Duquesne's Celebration

The borough of Duquesne, Pa., in which the Duquesne blast furnaces and steel works of the Carnegie Steel Company are located, held a silver jubilee celebration last week, having been founded in 1891. On Wednesday evening, Sept. 13, the Duquesne Board of Commerce gave a banquet, at which James A. Farrell, president of the United States Steel Corporation, and officers of the Carnegie Steel Company were present. E. J. Hamilton, general superintendent of the Duquesne steel works and blast furnaces, was toastmaster. Over 400 persons were present.

The principal address was made by Mr. Farrell, who referred to the Duquesne plant as one of the largest of the Steel Corporation, turning out more than 1,100,000 tons of pig iron and nearly 1,400,000 tons of steel ingots each year. The plant employs 5000 workmen and the payroll is about $5,500,000. Mr. Farrell said that 1916 will probably go down in history as one of the most remarkable years the American iron and steel industry has known. He added that without resorting to prophecy it may be assumed that 1917 will see blast furnaces and steel works in the United States operating at capacity. He referred to the rapid growth of Duquesne and the fine community spirit existing there. He paid a high tribute to the work of Homer D. Williams, who had been called from Duquesne to the presidency of the Carnegie Steel Company, and to that of E. J. Hamilton, Mr. Williams' successor.

Addresses were also made by Homer D. Williams, by Robert Garland, president of the City Council of Pittsburgh, and others. The original Duquesne steel plant was built in 1886-1888 by the Pittsburgh Bessemer Steel Company to roll steel rails. The company encountered difficulties in getting raw material, and the plant passed to the control of Carnegie, Phipps & Co. All the original equipment was long ago dismantled. Later the Bessemer steel plant was torn out, and for some years the Duquesne plant has been strictly an open-hearth proposition. The plant now has six blast furnaces making over 3,000 tons of pig iron per day, and there are two open-hearth plants containing 32 furnaces. The steel is finished into slabs, billets, sheet bars, splice bar shapes and merchant steel bars. The last-named is the leading product of the Duquesne works, the present capacity being about 650,000 tons of steel bars per year. This will be further increased when a new bar mill and other improvements are completed. Welfare work has been carried on very extensively at the Duquesne works for many years.

To Assist in Developing Russian Resources

Frederick Holbrook, senior partner in the engineering and contracting firm of Holbrook, Cabot & Rollins, and a vice-president of the American International Corporation, sailed yesterday for Petrograd, Russia, in the interests of the latter company. He will make his headquarters in Petrograd. Several American engineers and others are also going to Russia for the American International Corporation, and under the direction of Mr. Holbrook will investigate the possibilities of developing the natural resources of Russia, and assist Russian interests in building railroads, opening mines and establishing steel works and other industries. Mr. Holbrook's trip is the third he has made to Europe since the outbreak of the war. He spent several months in Russia this year, and previously went to France accompanied by representatives of the Lackawanna Steel Company.

M. Speer has severed his connection as general manager with the Sharon Iron & Metal Company, Sharon, Pa., after five years of service, and has engaged in business in Youngstown, Ohio, under the name of the Speer Iron & Metal Company, with offices in the Stambaugh Building. He expects to equip a yard shortly.

The H. Koppers Company, Pittsburgh, Pa., has awarded a contract for the castings and steel for the construction of a coke-oven plant at Pueblo, Colo., to the United Iron Works, Springfield, Mo.

MASTER PATTERNMAKERS

A New Association Formed at the Foundrymen's Convention

Prior to last week's meeting of foundrymen at Cleveland inquiry was made as to the feasibility of starting a technical association of master patternmakers. Over 200 names were obtained of those actively interested. On Sept. 14 about 30 master patternmakers present at the Cleveland convention were invited by E. C. Anderson of the Thomas E. Coale Lumber Company, Philadelphia, to attend a preliminary meeting and dinner at the Hotel Statler. Among those in attendance were A. Crowe, superintendent pattern department Youngstown Sheet & Tube Company, Youngstown, Ohio; Ira Cole, superintendent American Road Machinery Company, Delphos, Ohio; F. E. Delano, superintendent pattern shop, General Electric Company, Erie, Pa.; W. J. Hamman, foreman American Road Machinery Company, Delphos, Ohio; W. J. Heger, superintendent pattern shop, Willys-Overland Company, Toledo, Ohio; George R. Hogg, superintendent pattern department United Engineering & Foundry Company, Youngstown, Ohio; John Howarth, superintendent pattern department Westinghouse Electric & Mfg. Company, Cleveland; C. D. Morris, manager Oak Street plant, United Engineering & Foundry Company, Youngstown, Ohio; John Pemberton, superintendent pattern shop, General Electric Company, Lynn, Mass.; J. H. Taylor, superintendent pattern shop, Fore River Shipbuilding Company, Quincy, Mass.; S. A. S. Wormsted, superintendent pattern shop, Goulds Mfg. Company, Seneca Falls, N. Y.; E. C. Anderson and A. Warren Anderson, Philadelphia. Robert I. Clegg, Cleveland, acted as temporary chairman and C. G. Kisner as secretary.

After a general discussion of the possibilities of the proposed organization, it was decided to appoint an advisory committee to consider the various matters incidental to starting the movement. The committee was made up of John Pemberton, Lynn, Mass.; A. Crowe, Youngstown, Ohio; J. H. Taylor, Wollaston, Mass.; F. E. Delano, Erie, Pa., and J. Shay, Bridgeport, Conn. A tentative constitution was offered and will be critically considered by the advisory committee and also mailed to the entire list of names.

It is expected to hold an annual meeting at the same time and place as the American Foundrymen's Association. The objects of the new organization as outlined by the proposed constitution are "the improvement of the art and practice of patternmaking, to promote social intercourse among the members of the association, to provide for the exchange of technical experience, to encourage uniform standards in shop methods, and in general to advance whatever shall tend to the dignity and reputation of pattermaking and the well being of members of the association."

Office headquarters have been opened at 206 Bellevue Court Building, Philadelphia.

Alumina in Steel

The photomicographs used to illustrate the article in THE IRON AGE of Sept. 14, 1916, on "The Presence of Alumina in Steel," by G. F. Comstock, were all reduced about one-third from an original magnification of 200, except Fig. 6, which originally was 29 diameters. This important fact was not stated in connection with the article as was intended.

Henry S. Berry has been elected president of the Owensboro Forging Company, Owensboro, Ky.; S. R. Ewing, vice-president, and S. R. Ewing, Jr., secretary, treasurer and general manager. The company has just completed extensive additions to its plant, which is now equipped with gas-burning japanning ovens.

The Mansfield Sheet & Tin Plate Company, Mansfield, Ohio, will install six hot mills, four roughing mills and eight stands of cold rolls in the extension to its plant which it recently decided to build.

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Steel Trade After the War

Opinion as to what will occur in the steel trade after the war has passed through a period of evolution. During the first ten or twelve months of the war it was not even recognized that the American steel industry was to be really prosperous at any time during the war, so that any vague notions then entertained as to what might happen after the war are not worth recalling, when the view as to the course of trade during the war was so mistaken.

The earliest view that need be considered was that upon its becoming known that the war was to end there would be a complete collapse, to be followed possibly, but not certainly, by a recovery to fairly prosperous conditions. The rapid rise in prices in the early months of this year, from a level on January 1 substantially equal to the top level reached in 1907, suggested that a collapse might occur before the end of the war. With the view most commonly entertained now in the ranks of steel producers, if not of steel consumers, that a very strong steel market is to obtain throughout the duration of the war there is an increase of belief that in the main prosperous conditions will rule in the steel industry for some time after the war.

That the steel trade expects the war to last for another year at least is indicated by its adoption, even up to the present time, of plans for increases in capacity that are directly predicated upon a continuance of war demand, and that it expects a good demand, on an average, in the years to follow appears from the large plans that are being prosecuted in such leisurely fashion as to indicate no hope of the capacity involved being brought in before the war ends.

In considering the prospective demand after the war, irrespective of prices, it may be helpful to consider what would occur should the war cease now. Orders for shipbuilding material would hardly be canceled; and if they were, the disturbance would not be in proportion to the total tonnage on books, because the deliveries are extended over so great a period of time. Certainly undertakings involving the use of fabricated steel would not be dropped, the expectation being rather that the end of the war will see an increase in investment structures. Automobiles would be salable as formerly and automobile material would be required as at present. Automobile exports represent only a very small percentage of the production. The demand for agricultural implements and everything required by the farmer, at reasonable prices, would be stimulated rather than otherwise. The railroads could hardly be moved to a more conservative course, as to buying, than they are pursuing now. Once the shock were passed, the actual ultimate demand might assert itself in full volume.

The opinion is strongly held in many quarters that the steel industry, and industry in general for that matter, must eventually liquidate in the matter of costs. The best judgment seems to be that such liquidation can only be effected, in practice, through the medium of a period of greatly restricted activity. It is not assured, however, that a drastic readjustment will be necessary. There are those who believe that in the present belligerent countries the returning soldiers will demand, and receive, much higher wages than formerly. In our own country there must be felt the influence of continued light immigration during the war, and there certainly is no good reason for concluding that there will be a real flood of immigration after the war.

A feature of demand for steel is that it grows while it sleeps. As steel enters so largely into construction work, the actual needs accumulate in periods of uncertainty and are expressed in larger volume than ever when the uncertainty is removed. The demand in neutral countries must be banking up. Though their progress is retarded they must be making some progress. The supplies of steel they have obtained in the past two years have been but a small fraction of normal. The end of the war would bring ocean freights down instantly, and that would effect a very attractive reduction in prices of steel delivered to the non-producing countries. The export trade would probably give a very fair account of itself.

As to the demand for steel in the United States, a long range view may be illuminating. As indicated in our presentation a week ago, the steel ingot producing capacity on July 1, 1917, will be about 45,000,000 tons a year. The capacity five years earlier was probably in the neighborhood of 33,000,000 tons, showing a total increase of 36 per cent. This is an average annual increase of 6.4 per cent,

which would be less than a rate of doubling in ten years, as it represents an increase of 86 per cent in such a period. As during a considerable part of these five years production has been at a low rate, and as a great deal of the material produced has been exported, there has easily been room for a considerable volume of domestic demand to accumulate, to be expressed in actual orders at some future time, while apart from this consideration it is a fact that the productive capacity is not increasing, on the whole, at a rate with which the steel industry has been familiar in the past.

Exporters Cannot Co-operate

Brief announcement was made last week of the failure in the United States Senate of the effort to pass the Webb bill authorizing the formation of combinations in the export trade. This ignominious ending of a praiseworthy movement received far much less attention in the daily press than it deserved. The bill had been fathered by the Federal Industrial Commission and was so free from what might be considered objectionable features that it should have encountered no difficulty in its passage through the Senate and its enactment into law. Unfortunately, however, the Senate embraces among its members some who feel that they must antagonize anything favored by manufacturing interests and see a menace to the public welfare in any proposition that even hints at co-operation. If the Webb bill had gone through, with this well-known feeling among certain political leaders, that would have been accepted as an indication that the animosity against manufacturers was at last softening and that a better era had dawned. But it seems that this was too much to expect. In view of what other countries are doing to promote the interests of those who seek foreign trade, it is to be hoped that our government may in time come under the control of men of broader vision.

Labor Saving and Labor Shortage

It is being borne in upon the managers of manufacturing plants that the acute labor shortage with which they are now contending is not to be of the temporary variety of past experience. Heretofore industry has looked to an approaching winter season, or, farther ahead, for immigration to bring about an adjustment of the supply of labor. But whether relief from labor shortage has been timely or not, lack of sufficient help has always been looked upon as one of the necessary evils of industrial prosperity and a condition for which the cure would come as the volume of business declined. There is no such prospect to-day. Some estimates have put the demand for skilled and unskilled workers for the manufacturing operations of the country alone at 5,000,000 in excess of the supply. The duration of this shortage is wholly indeterminate. It is not certain that even a pronounced slump in business will effect an adjustment.

The problem of working out a better adjustment of the supply and demand for labor squarely confronts the plant executive. It is a golden opportunity for the manufacturer of labor-saving equipment. Never has there arisen a situation giving such a powerful impulse to the devising of mechanical contrivances to replace hand labor. Plant operators are turning to the possibilities in this direction with an eagerness that makes equipment selling well-nigh a benefaction. In the foundry industry where, in the opinion of many practical men, there has been an over-equipment of plants, managers are ready to install any improvement that will eliminate manual operations. Operators of malleable foundries, for example, who, because the lightness of the average product of their shops required no general overhead conveying equipment, have been slow to use charging and carrier devices, are now conspicuous in seeking such apparatus. The exhibit of foundry and machine shop equipment in connection with the meeting of the American Foundrymen's Association at Cleveland last week unmistakably revealed this situation. The designer and builder of machinery for the foundry, the machine shop or the general manufacturing plant has now ready to hand his greatest opportunity for service and profit.

Japanese Ship Subsidies to Be Reduced

An interesting item of news from Japan is that the government is considering the reduction of national assistance to shipbuilders. The remarkable growth of Japanese shipping has not been a mere accident, but is due to a considerable extent to the stimulus afforded by the government through the payment of subsidies to shipbuilders. While this country has done nothing for the preservation of its commerce on the Pacific Ocean, but has even dealt it deadly blows, Japan has for some years been appropriating large sums for the cultivation of its shipping industry. This was done so opportunely that when the European war broke out and many ships were diverted from commercial to naval purposes by the belligerents, Japanese shipowners profited prodigiously. The highly remunerative freight rates earned by ships have since then been an even greater stimulant to the growth of Japanese shipping than the government subsidies. This growth, however, has resulted in a very heavy increase in the amount which the government is called upon to pay to its shipbuilders. The payments in 1914 amounted to $815,000 and will this year be $1,561,000, while next year they are expected to run up to about $2,900,000 and to reach an even higher sum for 1918. Such an unforeseen development has caused the Japanese authorities to consider the advisability of reducing the amount for encouraging shipping, but it is to be done very carefully so that the progress of the shipping industry may not be checked.

Mortality statistics just published show that in 1915 the death rate in the United States was the lowest ever known, having been only 13.5 per 1000 of population. This compares with a rate of 16 per 1000 ten years before and of practically 19 a decade earlier. These figures are a significant indication of the very great advance which has been made in both medical science and proper methods of living. Undoubtedly some credit must also be given to the attention now being paid to accident prevention.

The Properties of Conductivity Steel

Its Use for Conductor Rails—Experience as to the Effect of Various Impurities—Actual and Theoretical Resistance

IN a recent issue of the *Journal* of the West of Scotland Iron and Steel Institute are two interesting papers on "Conductivity Steel." They are by C. H. Ridsdale and S. W. Melsom respectively, and while concerned chiefly with the methods of testing these steels for conductivity, they contain a good deal of information regarding their manufacture. Mr. Ridsdale is connected with the North Eastern Steel Company of Middlesborough, which was probably the pioneer company in England making steel for conductivity purposes, using the basic Bessemer process for this purpose as far back as 1883 or 1884. At that time most of the steel went into billets for telegraph wire, but since 1898 most of it has been for conductor rails.

With the growth of subways, elevated roads, and the electrification of railroads the demand for steel for conductor rails is rapidly increasing and the manufacture of such rails in the United States is becoming more marked. For this reason the papers mentioned, giving retails of the practice in England, are of considerable interest. An abstract of Mr. Ridsdale's paper is as follows:

Steel for conductivity purposes is, or should be, the softest class of steel made. Owing to the small quantity of metalloids it has a higher density than other ordinary forms of steel, and also very little segregation. Speaking broadly, the more nearly it approaches in chemical composition to pure iron, and the lower it is in carbon, silicon, sulphur, phosphorus, manganese or other constituents, the better it is in conductivity. While this is correct as a general rule, it must not be taken absolutely, especially as between steels made by different processes. As an example, a specific instance may be given of two steels of fairly typical composition:

	Basic Bessemer, Per Cent	Basic Open-Hearth, Per Cent
Carbon	0.03	0.09
Manganese	0.36	0.17
Sulphur	0.05	0.04
Phosphorus	0.06	0.04
Silicon	None	None
Resistance in "times copper of equal volume"	6.7	7.00

Conductivity steel is simply the "blown" or "bath" metal (purified by oxidation) with the smallest quantity of deoxidizer or "recarburizer" added that will just enable it to roll. Thus it is metal only just removed from redshortness. Indeed, this is the main trouble that steelmakers have to face. In the endeavor to keep the steel very soft and low in resistance they have all the time to work within such a narrow margin that from time to time they overstep the line, and the steel breaks up in the rolls giving scrap or defective rails. Also when not so pronounced as this, in steel near the limit, parts of the section which grow cold sooner than the rest are liable to show a number of fine hair cracks close together when they drop to low red, although it will roll quite sound at a bright red heat.

It may be useful to mention here that slight cracks due to redshortness, as for instance fine saw edges along flanges or corners (which, if present in ordinary track rails would certainly disqualify them) are no disadvantage for the purpose of a conductor rail which has no weight to carry. Indeed they should be regarded with favor as they are an indication that the rails have a very low resistance.

Mr. Ridsdale then describes in detail his methods of testing, which will not be gone into here, and he has some very interesting observations on matters of practical bearing which arise from the peculiar properties of conductivity steel. The extreme softness of the steel renders special care necessary in order to avoid bending the rails, especially when in long lengths.

The following conclusions are given from the author's experience regarding the effect of various bodies on conductivity in actual practice:

Oxygen is not detrimental up to the limits which steel will carry and yet roll with only slight redshortness.

Aluminum is said to reduce vastly the conductivity in wire, but the author has no direct experience on this point.

Carbon has a very pronounced effect in reducing the conductivity.

Phosphorus reduces the conductivity, but apparently not to the same extent that carbon does.

Silicon reduces the conductivity probably even more than carbon does.

Sulphur apparently only reduces the conductivity very slightly, and in some cases almost appears to improve it. This is probably owing to its removing some of the manganese from the combined condition. It cannot, however, be present to any large extent, or the steel which is usually low in manganese would not roll at all.

Manganese reduces the conductivity materially, very much as carbon does, but its effect appears to vary more.

Copper is stated to increase the conductivity greatly, but this has not been borne out by experience, at any rate as regards such small quantities as it might be commercially practicable to add.

To sum up, from personal observations over many years, it may be said that the relative effects in increasing resistance are, per 0.01 per cent of the substance present in excess of that in ordinary conductivity steel:

Carbon,	from 0.05 to 0.07 times copper
Manganese,	from 0.05 to 0.07 times copper
Sulphur,	from 0.08 to 0.10 times copper
Phosphorus,	from 0.02 to 0.03 times copper
Silicon,	from 0.08 to 0.10 times copper

The higher value to be taken when within the ordinary limits for conductivity steel, say not over 0.10 per cent carbon or 0.40 per cent manganese, and the lower value when above this.

Too much importance must not be attached,

Material	Carbon, Per Cent	Manganese, Per Cent	Sulphur, Per Cent	Phosphorus, Per Cent	Silicon, Per Cent	Resistance. Times Copper at 20 Deg. C. of Equal Area: Actual	Resistance. Times Copper at 20 Deg. C. of Equal Area: Theoretical
Conductivity steel (average)	0.04	0.40	0.06	0.06	None	6.87	Taken as basis
Ordinary soft steel (average)	0.086	0.49	0.06	0.062	None	7.72	7.73
Medium hard steel (individual)	0.24	0.45	0.06	0.05	0.02	8.58	8.43
Hard steel (individual)	0.375	0.95	0.078	0.075	0.028	11.75	11.70
Hard steel (average)	0.412	0.92	0.08	0.072	0.028	11.57	11.67
Hard steel (individual)	0.45	0.87	0.06	0.06	0.028	11.40	11.71
Hard steel, high silicon	0.46	0.72	0.06	0.07	0.336	13.07	13.07
Hard steel, low manganese	0.48	0.36	0.04	0.04	0.06	9.54	9.31

however, to these figures, as they are not based upon sufficiently systematic investigation. Further, as these values are not always the same in different qualities of the same make of steel, or in corresponding qualities of different makes, it is questionable whether any investigation, no matter how painstaking, will reveal a definite and reliable co-ordination.

As illustrating the effect of composition the accompanying table gives some average and individual actual tests, showing side by side the actual and theoretical resistance. The latter is calculated on the basis and from the factors given.

The method of manufacture of these steels is not given. One other point of interest in connection with conductor rails is the average effect which is obtained when rails of different resistance are coupled up. Thus a rail of eight times the resistance of copper and another of six yield the same resistance as two of seven, and specifications therefore allow a proportion of rails with a maximum above the average specified. G. B. W.

Eliminating Difficulties in the Steel Foundry

Co-operation Between the Designing Engineer and the Foundryman Will Remove Many Causes of Rejected Castings

In a symposium entitled "Results of Co-operation Between the Engineer and the Foundry," presented at the Cleveland meeting of the American Foundrymens Association, Sept. 11-15, John Howe Hall, of the Taylor-Wharton Iron & Steel Company, High Bridge, N. J., discussed some of the difficulties which arise in the steel foundry, due to imperfect understanding by the foundry of the desires of the designing engineer, or to the latter's lack of knowledge of the limitations of steel foundry practice.

Steel foundry difficulties may usually be classed under (1) Physical and chemical specifications; (2) attempting to make castings of a design unsuited to steel foundry work. Specifications that cannot be well executed may be divided into several general classes: A—That which includes chemical or physical tests that are out of the ordinary. B—Specifications calling for a manganese content to be under a figure which is now known to be quite low for good steel. C—Specifications of alloy steel, when a good grade of ordinary carbon steel will give better results or specification of alloy steel without specifying the amount of alloy that is desired. D—Specification of a high elastic limit or specification of an elastic limit which cannot be obtained without heat treatment, which is impossible on account of the design of the casting. E—Specification of one kind of alloy steel when the experience of the foundry is that an entirely different alloy steel will give better results. F—Specification of both physical and chemical properties of the steel which are antagonistic.

EXAMPLES OF SPECIFICATION TROUBLES

An instance of the first class of specification is the limiting of sulphur or phosphorus to a figure which can only be obtained with an electric furnace or crucible steel. Frequently the price to be paid for the casting will not warrant steel of this character. Difficulties such as are cited above can usually be overcome by a conference between the steel foundryman and the designing engineer. A high elastic limit is often called for by the engineer with the expectation that the steel can be machined under heat treatment. If an elastic limit is specified which cannot be obtained without special heat treatment, the design of the casting often is such that heat treatment cannot be given without cracking it. Such cases, of course, can be handled either by modifying the elastic limit desired, or by modifying the design of the casting to remove all danger of its cracking in the heat treatment. In case of the specification of one kind of steel where, in the judgment of the foundry, a different steel would serve the purpose, a conference with the engineer may be the source of much information for both parties. The engineer may specify a steel which in his belief will be the best for the particular purpose, but without any adequate experience upon which to base this belief. Or, he may be specifying it in a purely experimental way in which event the foundrymen may obtain valuable data by co-operating with him. On the other hand, the foundry may be able to advise the engineer that the experiment is not worth while as the foundry has already made the same experiment.

Many of the above troubles can be eliminated by the use of standard specifications prepared by societies of recognized standing and adhered to by both makers and buyers of castings. Even some of these standard specifications will cause trouble by over-specifying. For instance: One specification gives the physical properties desired in steel and also the heat treatment by which these properties can be obtained. This heat treatment secured the physical properties desired in certain classes of steel, but in another class of steel a special heat treatment was necessary to secure the same property. A strict adherence to the letter in the specifications ruled out entirely the practice of a foundry which used steel of the second class. Equally important to the foundryman is the necessity of securing uniformity of specifications of steel castings on the part of various representative societies. Overlapping of specifications in one instance so reduced the range of physical properties allowed that it was difficult, if not impossible, to obtain castings which would pass inspections under the three sets of specifications under which the work was being carried on.

THE QUESTION OF DESIGN

Troubles due to design are so numerous that it is impossible to mention all of them. Aside from the rather obvious error of specifying a casting so thin that it cannot be run in cast steel at all, the more common errors are so designing a casting that it cannot be made without showing bad cracks, or designing it so that it cannot be made truly sound. High shrinkage of cast iron, sometimes aggravated by the sulphur in the steel and the necessity of pouring the casting very hot are chiefly responsible for cracked castings. Trouble may arise by a customer insisting upon a steel casting being made from patterns used for gray iron castings without any change in the design. Foundrymen from experience usually can predict from examination of the pattern whether or not the casting will be lost, and suggestions on his part to the designing engineer will save much trouble and expense.

It frequently happens that castings are so designed that it is impossible to make them truly sound. This is usually due to the fact that sections are so distributed that there is no place to attach a sink head of sufficient size or proper design to fill the fluid shrinkage of heavy sections. In such cases, a conference with the designing engineer will lead to a change in the pattern which will enable the casting to be made truly sound.

Copper imports at Havre, France, in 1915 are reported as 105,496 metric tons against 63,905 tons in 1914, nearly all coming from the United States as ingots, bars or sheets. Of the 1915 total, 103,962 tons is designated as for consumption in France, with total exports credited with 457 tons.

STRIKES AND SETTLEMENTS

New England Troubles Diminishing

In Pittsfield, Mass., a conference has been arranged between the management of the General Electric Company and its striking employees. There seems to be a general feeling that some compromise will be reached and that the trouble will not long continue. In Greenfield, Mass., the strike is still in force, but it is reported that more men are at work than a week ago. In Bridgeport, Conn., the report of the molders' strike is the same; the men are still on strike, but there is a gradual increase in the number at work in the foundries.

Strikes Successful at Nashville

Two more shops at Nashville, Tenn., have met the demands of their machinists for an 8-hr. day, on a scale of 45c. per hour. Their men had been on strike three weeks. All of Nashville's important shops are now on the 8-hr. day basis.

Violence at Milwaukee

Public interest in the machinists' strike for an 8-hr day in the Milwaukee district has been revived, after a lull of two weeks or more, because of strikers' efforts to intimidate men who remained at work or returned to employment. A number of arrests for violence have been made and riot notices have been served on the sheriff of Milwaukee County, a socialist. This is the first time that such action has been brought under the Wisconsin riot statute—service of which lays the county liable for all damages caused by strikers or their sympathizers. No new strikes have been declared for nearly a month. On Sept. 18 the strike completed a period of 60 days, and the unions have made no headway in inducing the employers to recede from their position.

MILWAUKEE, Sept. 19, 1916.—(*By Telegraph.*)—The end of the machinists' strike is in sight before Sept. 30. The majority of strikers at the plants of the Nordberg Mfg. Company, Bucyrus Company and Allis-Chalmers Mfg. Company returned to work Monday and Tuesday without concessions, and more are expected to return during the week. The Metal Trades Association reports nearly 55 per cent of strikers already returned and shops now operating with 71 per cent of normal forces.

Brass Plants Heavy Buyers for 1917

Information from reliable sources is that 30,000 tons of brass has been ordered since Sept. 1 for export. These orders call for brass in the forms of rods and discs for use in the manufacture of fuses and cartridge cases. The sizes specified in these purchases emphasize the growing ability of the Allies to make their own fuses and smaller sizes of shells and shell cases. One producer states that the only limit to the volume of the recent orders was the ability of the mills to accept such contracts for early delivery.

The business in exports for munitions use is estimated to be from 20 to 25 per cent of the present mill output, and most of the mills are endeavoring to protect their established domestic trade. The leading interest in the brass industry has requested many of its larger customers to anticipate their requirements up to next June. During the week it was reported that two Connecticut mills had purchased 35,000,000 lb. of copper and another mill had contracted for about 50,000,000 lb. of copper and spelter. It is understood that these contracts are to cover requirements during the first quarter of 1917.

The Panama Canal will, at an early date, issue specifications and call for bids for the construction of two colliers equipped with self-discharging gear, authorized by Congress, with limit of cost at $1,500,000 each. These colliers are to be essentially a duplication of the colliers Ulysses and Achilles constructed by the Maryland Steel Company, carrying 12,000 tons of cargo coal. Major Earl I. Brown, Washington, D. C., is general purchasing officer.

Koppers Coke Ovens at Sparrows Point

The H. Koppers Company, Pittsburgh, has closed a contract with the Bethlehem Steel Company for the erection at Sparrows Point, Md., of 240 13¼-ton Koppers by-product coke ovens, to be arranged in four batteries of 60 ovens each, and also a benzol plant of such capacity that all the benzols from the entire plant of 360 ovens can be recovered and delivered as pure products. The benzol plant will be one of the largest in the world. The Koppers direct sulphate process will be installed in connection with the new ovens. The by-product plant and building will be extended. The present coke plant consists of 120 Koppers ovens, in two batteries of 60 ovens each. Owing to the amount of work the H. Koppers Company now has in hand the new plant is not expected to be ready for operation before the early part of 1918. Work on the building of Koppers ovens at other places is progressing as fast as the supply of labor and materials will permit. The plant of 204 ovens built for the Youngstown Sheet & Tube Company at East Youngstown, Ohio, has been in successful operation for some time. The plan of reducing the width of ovens, as put in effect at this and other plants, has proved quite successful. The Koppers ovens being erected for the United Furnace Company at Canton, Ohio, will be started late this month, or early in October. The 94 Koppers ovens being built for the LaBelle Iron Works across the Ohio River from Steubenville, Ohio, are nearly finished, and the company will start heating them this month.

Railroad Car Business

With another 1000 cars bought by the New York Central, this of the Pressed Steel Car Company, following 4000 of recent closing, further lots from the same source are expected to come to light in the early future. The Western Pacific has apparently placed 1000 cars with the Pullman Company and the Illinois Central has ordered 500 refrigerator cars of the Haskell & Barker Car Company. The Missouri Pacific has come into the market for 1500 gondolas and 1000 box cars, the Western Maryland for 2000 hoppers, and the 2000 various type cars for the Missouri, Kansas & Texas are again up for consideration. The inquiries from abroad for 12,000 cars for Italy and for 10,000 to 20,000 cars for France appear somewhat vague as to authenticity. Of smaller lots, mention may be made of 50 to 100 stock cars wanted by the Atlantic Coast Line and 50 box cars by the Dupont Powder Company. The Pullman Company is to build 25 baggage and express cars for the Lehigh Valley; the Pressed Steel Car Company, 30 hoppers for the Bethlehem Steel Company, and the Haskell & Barker Car Company, 250 ore cars for the Minneapolis, St. Paul & Sault Ste. Marie.

The Sulphide Corporation, Ltd., a smelting works 10 miles from Newcastle, Australia, is operating at capacity, employing about 450 men, working three shifts of 8 hr. each, according to U. S. Consul Lucien N. Sullivan of Newcastle. There are three smelting furnaces of respectively 150,100 and 50 tons capacity of bullion turned out daily, the ore treated being about three times the amount of bullion produced. The gold and silver contents are high, but no separation is made there, the pig lead being shipped to England and Sydney for refining. The weekly output is at present (August, 1916) bullion containing 585 oz. of gold, 61,434 oz. of silver and 685 tons of lead. The company's mines are located in the Broken Hill district.

The report is current that the Shepard Lathe Company, Cincinnati, Ohio, has been purchased by a company headed by C. H. Norton, president Western Machinery Company, Cincinnati, and that the output of the plant will be increased at an early date.

The Wheeling Mold & Foundry Company, Wheeling, W. Va., has closed its plant on account of labor troubles. The company has been working on large contracts for shells for Russia.

The Export Freight Rate Hearing

WASHINGTON, D. C., Sept. 18, 1916.—The suspension board of the Interstate Commerce Commission gave a hearing to-day to representatives of the Pollak Steel Company, Ashland-Ironton Manufacturers' Association, Curtis & Co. Mfg. Company, Whitaker-Glessner Company, Central Steel Company, Inland Steel Company, and others, on the proposed increase in export freight rates on iron and steel. The tariffs of the carriers which are scheduled to become effective Oct. 1 establish the same rate on iron and steel for export from Central Freight Association and Trunk Line Association territories as on domestic traffic, and it is asserted that the increase amounts to 50 per cent.

The representatives of the steel companies asked the board to suspend the proposed increases pending investigation of the subject. It was asserted that the carriers are seeking to obtain part of the profits which the manufacturers are making under present conditions and that the increases are not justified. Representatives of the carriers maintained that when the rates were established foreign competition was severe and they were made unusually low, but that no such competition now exists and therefore there is no reason for the preferential export rate. The board took the arguments under advisement and will file its recommendation with the commission within a short time.

W. L. C.

An Australian Commission to the United States

The Australian Government has decided to appoint an industrial commission to visit the United States to investigate and report upon methods of manufacture and production and the conditions of employment therein. It will consist of six representatives of Australian manufacturers, one from each State, the selection in each case being made by the government from three nominations offered by the chambers of manufacturers of each capital city and the central labor organization from each state. The industries to be investigated are iron and steel; engineering and allied trades; timber, building material, etc.; leather; textiles; paper and foodstuffs. Each section of the commission will furnish a report on the industry it represents, separate reports being made by the representatives of the manufacturers and the workmen. The return of the commission is expected within six months of its departure with all expenses borne by the government.

James Mitchell, president Alabama Power Company, who has just completed a visit to its properties, says the company will at an early date build five additional electric steel furnaces in the plant contiguous to the Anniston Ordnance Company's works at Anniston, Ala. The investment, he says, will be about $1,000,000. The first unit of the plant has been a thorough success. The Ordnance works, which have been successfully making 6-in. shells for the Allies, have received large additional orders.

The Cornwall Ore Banks Company, Lebanon, Pa., a subsidiary of the Bethlehem Steel Company, has purchased approximately two and a half acres from the Lackawanna Iron & Steel Company. The buyer plans to improve its property to increase its output of iron ore. New machinery will be installed. The cost is estimated at about $30,000. Harrison Souder, Lebanon, Pa., is superintendent.

J. H. Sheadle, vice-president of the Cleveland-Cliffs Iron Company, Cleveland; vice-president of the Lake Carriers' Association, and long prominent in the Lake Superior iron-ore industry, is critically ill at Syracuse, N. Y., where he was stricken while on his way to the White Mountains.

The Wagner Electric Mfg. Company, St. Louis, announces the opening of a sales office and service station at 922 North Pennsylvania Street, Indianapolis, Ind., in charge of Charles M. Welch.

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New Steel Plant at Lorain

CLEVELAND, Sept. 20, 1916.—(*By Telegraph.*)—A new steel plant will be built at Lorain, Ohio, by J. C. Cromwell, Cleveland, and associates, who have acquired a 252-acre river front site adjoining the plant of the National Tube Company. While plans are not fully complete, it is understood that it is the intention to erect shortly initial units that will include four small open-hearth furnaces and a mill the type of which is not announced.

The Alliance Machine Company, Alliance, Ohio, will make extensions to its plant about doubling its capacity and involving an expenditure of about $500,000 for buildings and equipment.

INITIAL STRAINS IN STEEL RAILS

Results of a Recent Investigation—Permanent Set Due to Gagging

In reporting on the derailment of a passenger train on the Western Maryland Railway at York Road, Pa., Jan. 7, 1916, due to a broken rail, James E. Howard, engineer-physicist of the Interstate Commerce Commission, gives details of tests conducted at Sparrows Point, Md., in conjunction with representatives of the Western Maryland Railway and the Maryland Steel Company, in the examination of the rail that failed. The report covers 20 printed pages, and Mr. Howard's summary of it is as follows:

"The result of this investigation shows that the failure of the rail which caused the derailment was due to a split head. Rail failures of this kind are not of infrequent occurrence, since lateral flow of the metal of the head, the result of wheel pressure, leads to this type of fracture. The immediate cause of the disturbance of the metal of the head is therefore the wheel pressures, but back of this is the matter of structural soundness of the steel, which is the vital feature in many instances and is the important one in the present rail. Sound steel will display a certain amount of ductility when tested by tension, and will display a greater amount when cold swagged, cold drawn, or cold rolled—that is, when its own strength is not called upon to cause the extension.

SEAMINESS RATHER THAN SEGREGATION

"In rails of medium hardness fins form along the sides of the head, illustrating the primitive ductility of the steel, the metal which forms these fins coming chiefly from the top of the head. Seaminess of the steel detracts from this ability to flow in a lateral direction, hence when the rail contains seamy metal in the head there is a tendency, when strained laterally, to develop incipient cracks which ultimately extend and finally result in split heads. If the surface metal is softer than that of the interior of the head, then such a condition in conjunction with seaminess increases the tendency to form split heads. The real danger, it would appear, has to do with seminess rather than segregation.

"The symmetrical arrangement of those marks which appear on the cross-section of etched rails and represent seaminess, place the responsibility for their presence on the state of the metal in the ingot. Investigation has shown that seaminess in the base has the same character as that which is found in the head, and certain base fractures are attributable to such seaminess. In the web, however, less trouble is experienced from this cause. An improvement in ingot conditions should effect an improvement in both the metal of the head and the base, and definite information should be acquired on the structural state of the metal in the ingot in a sufficient number of examinations to demonstrate fully the extent to which the causes of seaminess prevail, as well as what remedial measures can be adopted to prevent their recurrence.

"It is important, as a mill question, to remove the causes of seaminess, while in reference to track maintenance it is necessary to exercise diligent scrutiny in the detection of rails which are failing, and which present evidence of the same by surface indications. This rail apparently displayed evidence of a split head on the running surface prior to its complete failure, in showing a general increase in width, and also in exhibiting a dark line along the middle of the head, the latter being a feature which is commonly recognized as the visible indication of a split head. It so chanced that this was a relaid rail, but that circumstance is believed to have no direct bearing upon its failure.

"Briefly summarized, it is a desideratum that the causes of seaminess be eliminated from the ingot or elsewhere, if not confined to ingot conditions, but until there is assurance of the elimination of the causes of seams, reliance must be placed on track inspection for the detection and removal of rails having split heads. Since the depth of the seam in the head of a rail is many times its width, the detection of a split head is confined to evidence which is furnished by the lesser dimension of the seam, and such inspection becomes, essentially, a rigorous matter.

INITIAL STRAINS AND GAGGING EFFECTS

"This report contains further data upon the state of initial strains which affect rails. Rails are exposed to repeated alternate stresses, and it has been shown by laboratory tests that an increase in the fiber stresses of steel exposed to repeated stresses lowers its limit of endurance, which diminishes very rapidly when the loads attain certain limits, that is, when the fiber stresses approach the elastic limit of the metal. It is further known that the direct bending stresses of rails in the track are very high in comparison with the unit stresses which are deemed prudent to use in other engineering structures. The presence of initial strains from cooling during fabrication and those due to the cold rolling action of the wheels on the running surface of the head increase the total stresses of the rails when the wheels are in certain positions. Necessarily, these initial strains should be taken into consideration in judging of the strength and ability of the rails to endure the loads which are imposed upon them in the track. It does not appear, however, that such consideration has been given the subject.

"The present report also contains measurements on the initial strains in rails under normal conditions of cooling, when the rate of cooling was accelerated, when it was retarded, and strains present in annealed sections. The effects of gagging are also shown. The subject of gagging throughout the history of rail making has been a discursive theme, without attaining definite ends. In respect to the present results, the magnitudes of the initial strains in the gagged sections were found to be lower than those in the corresponding section which cooled normally. In the head, the normal condition of a state of compression was reversed and initial strains of tension were introduced. Laboratory tests of an early date showed such a reversal of strains would be expected as a result of gagging.

"The report invites attention to the distinction which should be made between the permanent sets of tension or compression which are given the rail by the process of gagging and the initial strains which result therefrom. A few observations were made on the transmission of stresses by heating one part of the rail, the head being shortened by rapidly heating the base. This temporary contraction of the metal of the head was, of course, lost when the temperature of the rail was equalized. The effects of sudden heating have a bearing upon the strains momentarily introduced in rails when 'wheel-burns' occur, as well as influencing the strains in brake shoes and the rims and plates of wheels. The transmission of strains occurs immediately, while a slower action attends the equalization of temperature."

The Sydvarangar iron-ore fields of Norway, regarded as practically inexhaustible but low in iron content, about 34 to 35 per cent, would be regarded as almost valueless were it not for the Grondal separating process, the results of which are now regarded as successful. The mines have at present a yearly capacity of about 650,000 tons of ore, and extensions in progress will permit the export of about 900,000 tons in 1918. In 1915 the mines produced 1,506,006 tons of crude ore and 600,000 tons of slig, a part of which was transformed into 267,000 tons of briquettes. Exports last year reached only 500,000 tons because of shipping difficulties, with the stock of slig, etc., at 500,000 tons at the end of the year.

The college of engineering, University of Wisconsin, Madison, has completed the installation of apparatus for testing automobile and aeroplane engines. The outfit consists of an electric dynamometer and a gas engine manograph. The dynamometer has a capacity of 150 hp. at from 220 to 3500 r.p.m. The college will conduct experiments in co-operation with various manufacturers in Wisconsin.

Judicial Decisions

ABSTRACTED BY A. L. H. STREET

WARRANTY IN SALE OF IRON ORE.—Where a written contract was made for sale of iron ore, without the incorporation of any warranty concerning the percentage of manganese to be present in the ore delivered, the buyer could not rely upon any verbal statement which may have been made on that point in the negotiations leading up to the making of the agreement. When a written contract is upon its face couched in such terms as import a complete legal obligation, without any uncertainty as to the object or the extent of the engagement, it is conclusively presumed that the whole engagement of the parties and the extent and manner of their undertaking were reduced to writing in the contract. (United States Circuit Court of Appeals, Sixth Circuit, Hamilton Iron & Steel Company vs. Groveland Mining Company, 233 Federal Reporter, 388.)

DAMAGES FOR BREACH OF CONTRACT TO MANUFACTURE MACHINERY.—In an action by a jobber of machinery to recover damages for claimed breach of contract for the manufacture and delivery of machinery, it is decided that, as a general rule, the damages to be recovered for breach of any business contract are limited to those which follow as a natural and direct consequence of the breach, and which may reasonably be supposed to have been contemplated by both parties at the time the agreement was entered into, not including loss of speculative profits. That is, no damages may be assessed against the manufacturer on account of supposed loss of profits which the buyer might have made on uncertain resales. But it appearing that the manufacturer was advised when the contract was entered into that the buyer had placed the contract to provide machinery to fill orders from third persons, the manufacturer, if in default in deliveries, must reimburse the buying jobber for profits actually lost. This rule would not apply, however, if the buyer could readily supply his needs by buying the necessary machinery elsewhere at a price which would reduce the damage. In such case the buyer would be bound to minimize his loss, and could not recover more than the excess of the price paid elsewhere to obtain the necessary machinery, above what the defaulting manufacturer agreed to sell it for. (Missouri Supreme Court, Weber Implement Company vs. Acme Harvesting Machine Company, 187 Southwestern Reporter, 874.)

German Steel Shipments Lower

The shipments of the German Steel Works Union for July, 1916, were 282,875 metric tons, against 298,753 tons in June and 258,092 tons in July, 1915. They were made up of 69,386 tons of semi-finished steel, 130,465 tons of railroad material and 83,024 tons of shapes. The July shipments were next to the lowest for 1916, with the average of July 1 at 293,471 tons per month. The 1915 monthly average was 270,510 tons.

The Eastern Car Company, Halifax, N. S., has completed its first contract for 1000 cars for France and expects to begin delivery next month on the second French order, calling for 3000 cars. Work is also being commenced on 500 freight cars for the Canadian Government Railways. The company is negotiating for a contract to build 4000 cars for another foreign government.

The plant of the Washington Steel & Iron Company, Leavenworth, Wash., which has been unsuccessful in its efforts to manufacture steel direct from ore, is to be dismantled and sold, according to O. C. Moore, Spokane, secretary of the company. The plant was built several years ago.

The Homestead Valve Mfg. Company, Pittsburgh, has appointed the O. C. Keckley Company, 608 South Dearborn Street, Chicago, as Western representative, having charge of the sale of Homestead valves in parts of Illinois, Iowa and Wisconsin.

An Offer to Buy Thomas Iron Company

At a meeting of the stockholders of the Thomas Iron Company, Easton, Pa., on Sept. 12, an offer of $3,500,000 for the company's blast furnace, ore, railroad and other properties was made by Dr. H. D. Heller, representing a syndicate in which are said to be Philadelphia, New York and Baltimore interests. Dr. Heller is a stockholder in the company and at his request a committee of stockholders was appointed to meet the intending buyers to carry on the negotiations. Dr. Heller was made chairman of this committee. The syndicate, it is said, is headed by William H. Bilyeu, vice-president of the Northern National Bank of Philadelphia, and R. L. Pierson of Philadelphia. It is reported to be the purpose of the syndicate to spend considerable money in improving the property. The price stated would pay off outstanding obligations of the company and net the stockholders upwards of $2,500,000 or somewhat over par, which is $50 a share. Until its presentation at last week's meeting nothing was known of the impending liberal offer, either by the management or by any of the larger stockholders of the company.

At the organization meeting of the newly elected directors of the Thomas Iron Company held at Easton, Pa., Sept. 14, Walter A. Barrows, Jr., was elected president and general manager; Major Fred R. Drake, vice-president; Oliver T. Case, secretary, and L. K. Diffenderfer, treasurer. The directors are Fred R. Drake, J. Samuel Krause, Thomas E. Ritter, Edwin Thomas, A. D. Chidsey, J. Mark Mauser, David E. Steckel and Walter A. Barrows, Jr. Major Drake succeeds Edwin Thomas as vice-president.

French Iron and Steel Imports

The principal imports of iron and steel into France during the last three years are given as follows in metric tons:

	1915	1914	1913
Pig iron	160,760	15,883	32,669
Blooms, billets and bars	580,430	16,888	19,379
Iron and steel [illegible]			
stock	84,831	100	6,[illegible]
Iron and steel plates	76,[illegible]0	6,[illegible]	13,760
Tin plates	68,110	21,878	19,[illegible]
Iron and steel wire	14,711	7,197	6,[illegible]
Rails	10,958	17	1,7[illegible]

In 1915 England furnished 677,560 tons of the total; the United States, 143,770 tons, and Spain, 65,510 tons. In 1914 and 1913 the United States supplied only 3217 tons and 2991 tons, respectively, of the totals.

Large Order for Locomotives

The New York Central has ordered 230 locomotives, for delivery in the last quarter of 1917, the American Locomotive Company to furnish 115 of these and the Lima Locomotive Corporation, 115. The New York, Chicago & St. Louis has ordered 10 Mikado locomotives from the Lima Locomotive Corporation. The New York, New Haven & Hartford Railroad is inquiring for 28 Santa Fé locomotives and the Pere Marquette for 13 locomotives.

Implement Makers' Convention

The National Implement and Vehicle Association will hold its twenty-third annual convention at the Hotel Traymore, Atlantic City, N. J., Oct. 18, 19 and 20. The sessions of each day will be from 9 to 12 o'clock and from 2 to 4. The program is one of unusual interest and speakers of national repute on industrial and agricultural questions have been provided. The annual dinner is set for Friday night, Oct. 20.

At a meeting of the board of directors of the Carbon Steel Company, Pittsburgh, Sept. 19, dividends of 6 per cent were declared on the second preferred stock and 6 per cent on the common stock, both payable in full Sept. 30 to stock of record Sept. 25. Last June this company declared a dividend of 8 per cent on the first preferred stock, 4 per cent of which was paid July 5 last and the other 4 per cent will be paid Jan. 5 next.

Iron and Steel Markets

TENDENCY STILL UPWARD

Demand for Steel Is Unflagging

Railroad and Shipyard Buying for Delivery Late in 1917 and Early in 1918

The drift of the steel trade is toward higher prices and greater difficulties in delivery. In brief, the situation is that Europe will take whatever amount of steel American mills will agree to deliver when wanted, and that domestic buyers are providing for their wants in the first half of 1917 at prices they were unwilling to consider two months ago.

Consumers are acting on the more definite signs that with the war prolonged through 1917 the steel works of the country will continue to have to choose between buyers. A significant case is the buying of 230 locomotives by the New York Central. Deliveries are not wanted before the last quarter of 1917. Locomotive works could build them earlier, but the railroad looked rather to the steel situation and to the large impending foreign orders.

The placing here of 1000 locomotives and thousands of cars for Russia is a matter of a short time and the car requirements of France and Italy are put at 20,000 to 30,000. In the home market about 7000 are to be bid on, of which 2500 are for the Missouri Pacific, 2000 for the Western Maryland and 2000 for the M., K. & T. Of 5000 just placed, 3000 are for the New York Central and the seller of these has covered for steel for the second quarter of 1917.

To what pass the plate situation is coming is seen in the placing of three vessels at a Pacific Coast yard for the first quarter of 1918, or nearly 18 months ahead. On large lots of plates for delivery in the first half of next year as high as 4c. has been quoted. Including 68,000 tons on which the Government took bids this week, nearly 300,000 tons of plates have been before the mills lately in the effort to make sure of deliveries when wanted.

Building suffers less from high prices. August contracts took up 64 per cent of a month's capacity of bridge and structural works, against 47 per cent in July. Steel company additions are still taking a large tonnage. For a Chester, Pa., power house 6000 tons is wanted and 7500 tons for the Thames River bridge of the New Haven Railroad.

France offers 35,000 tons of rails here, but is not likely to get the deliveries wanted. At Pittsburgh a road that covered its supposed needs for 1917 has just ordered 15,000 tons more, taking Bessemer rails, as open-hearth could not be had. Chicago rail inquiries represent 8000 tons. In the Central West an industrial company has been quoted $50 on 800 tons of standard sections. There is great activity in light rails, and discard steel is finding a large outlet in this form. An 8000-ton sale was made for export.

Scarcity in wire and tin plate is indicated, both having been sold in a large way for export. Woven wire fence has been advanced about $2.50 per ton. Tin plate mills have made large sales for the first half of 1917 and will have a large carry-over from this year. Contracts are made with the price to be fixed later, probably $5.50 per box.

The Pearson oil interests are in the market for 100 miles of 6-in. line pipe. The recent advance in wrought pipe followed liberal contracting at the last price.

Steel billet and sheet bar contracts for the fourth quarter, it now appears, will be at $5 a ton above the third quarter basis, though some belated deliveries will be made in October and November at the old price. Northern Ohio sheet mills are in the market. One Cleveland sheet mill, recently finished, will not start in view of the high level for raw material.

Cast iron pipe, usually a laggard even with pig iron moving up, has advanced $1 a ton.

With other markets quieter, Chicago reports the heaviest buying of pig iron since the movement began. Some good export sales were included and the total for the district since Sept. 1 is put at 250,000 tons. Prices are firmer in Central Western districts. The smaller foundries are beginning to come in as the bargains on which the movement started disappear.

Basic iron sales in 5000, 10,000 and 20,000-ton lots at Pittsburgh have strengthened that market, which is probably 25 cents higher. Exports of Bessemer iron bid fair to run on indefinitely. A round lot of basic iron is before the Eastern market.

British makers of 80 per cent. ferromanganese are meeting prices recently made by domestic sellers and as low as $164 has been done, as against $175 on the last contracts.

Pittsburgh

PITTSBURGH, PA., Sept. 19, 1916.

The market is steadily gaining strength, both in demand and prices, and indications point to higher values on pig iron, semi-finished steel and finished material before the end of the year. Consumers have accepted the situation and have decided that there is no use in holding off any longer in covering their needs for the next six or nine months; as a result, they are placing orders freely and at prices which they refused to consider a month or two ago. The mills are getting more and more congested with orders, and the matter of price is cutting very little figure. The larger steel mills state that their chief trouble is to try to make their output go around and come anywhere near satisfying their customers. It is a wonderful condition that now exists in the steel trade. Mills are turning down orders every day at prices that would give them enormous profits, but they cannot take the business and make the deliveries. There is a shortage in supply of semi-finished steel, plates, plain structural material, wire nails, tin plate, lap weld pipe and seamless tubing, and on some other lines. Indications are there will not be enough wire nails, tin plate and one or two other

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton	Sept. 21, 1916	Sept. 14, 1916	Aug. 23, 1916	Sept. 22, 1915
No. 2 X, Philadelphia	$19.00	$19.00	$19.50	$16.25
No. 2, Valley furnace	18.50	18.50	18.25	14.50
No. 2, Southern, Cin'ti	17.40	17.40	16.40	14.40
No. 2, Birmingham, Ala.	14.00	14.00	13.50	11.50
No. 2, furnace, Chicago*	18.00	18.00	18.00	14.25
Basic, del'd eastern Pa.	19.00	19.00	19.00	17.25
Basic, Valley furnace	**18.25**	18.00	18.00	15.00
Bessemer, Pittsburgh	**22.20**	22.00	19.00	16.95
Malleable Bess., Chgo*	19.00	19.00	19.00	17.00
Gray forge, Pittsburgh	**18.95**	18.70	18.70	14.70
L. S. charcoal, Chicago	19.00	19.00	19.75	17.75

Billets, etc., Per Gross Ton				
Bess. billets, Pittsburgh	45.00	45.00	45.00	34.50
O. H. billets, Pittsburgh	45.00	45.00	45.00	36.00
O. H. sheet bars, Pgh.	45.00	45.00	45.00	36.50
Forging billets base, Pgh.	69.00	69.00	69.00	52.00
O. H. billets, Phila.	48.00	48.00	46.00	36.00
Wire rods, Pittsburgh	55.00	55.00	55.00	39.00

Finished Iron and Steel, Per Lb to Large Buyers	Sept. 21, 1916 Cents	Sept. 14, 1916 Cents	Aug. 23, 1916 Cents	Sept. 22, 1915 Cents
Bess. rails, heavy, at mill	1.41½	1.41½	1.41½	1.25
O. H. rails, heavy, at mill	1.56½	1.56½	1.56½	1.34
Iron bars, Philadelphia	2.60	2.60	2.60	1.60
Iron bars, Pittsburgh	2.60	2.60	2.60	1.85
Iron bars, Chicago	2.75	2.75	2.75	1.85
Steel bars, Pittsburgh	2.60	2.60	2.60	1.85
Steel bars, New York	2.769	2.769	2.769	1.619
Tank plates, Pittsburgh	4.00	4.00	4.00	1.85
Tank plates, New York	4.169	4.169	4.169	1.619
Beams, etc., Pittsburgh	2.60	2.60	2.50	1.85
Beams, etc., New York	2.769	2.769	2.669	1.619
Skelp, grooved steel, Pgh	2.75	2.75	2.75	1.85
Skelp, sheared steel, Pgh	2.45	2.45	2.45	1.40
Steel hoops, Pittsburgh	3.00	3.00	3.00	1.85

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire, Per Lb to Large Buyers	Sept. 21, 1916 Cents	Sept. 14, 1916 Cents	Aug. 23, 1916 Cents	Sept. 22, 1915 Cents
Sheets, black, No. 28	3.00	3.00	2.90	1.90
Gal. sheets, No. 28	4.00	4.00	3.90	3.50
Wire nails, Pittsburgh	2.50	2.50	2.50	1.75
Cut nails, Pittsburgh	3.00	3.00	3.00	1.60
Cut nails, Chicago	3.00	3.00	3.00	1.60
Fence wire, base, Pgh.	3.00	3.00	3.00	2.60

Old Material, Per Gross Ton				
Iron rails, Chgo.	**19.25**	18.75	18.50	13.50
Iron rails, Chgo. dlvd.	20.00	20.00	20.00	18.50
Carwheels, Chgo.	14.75	14.25	14.00	14.00
Carwheels, Phila. dlvd.	15.00	15.00	15.00	14.00
Heavy cast, Phila. dlvd.	**16.25**	16.00	16.00	14.25
Heavy cast, steel, Phila.	14.00	14.00	14.00	13.00
Heavy steel scrap, Chgo.	**16.25**	16.00	15.75	14.75
No. 1 cast, Pittsburgh	14.00	14.00	14.00	13.00
No. 1 cast, Philadelphia	16.00	16.00	16.00	14.00
No. 1 cast, Chgo. (net ton)	**12.25**	12.00	11.50	10.00
No. 1 RR. wrot, Phila. (net ton)	20.00	20.00	20.00	16.50
No. 1 RR. wrot, Chgo. (net ton)	16.00	16.50	15.25	11.00

Coke, Connellsville, Per Net Ton at Oven				
Furnace coke, prompt	$2.80	$2.80	$2.80	$1.60
Furnace coke, future	**2.75**	2.50	2.50	2.00
Foundry coke, prompt	3.25	3.25	3.25	2.15
Foundry coke, future	3.50	3.50	3.50	2.40

Metals, Per Lb to Large Buyers	Sept. 21, 1916 Cents	Sept. 14, 1916 Cents	Aug. 23, 1916 Cents	Sept. 22, 1915 Cents
Lake copper, New York	**28.25**	28.00	27.25	17.87½
Electrolytic copper, N. Y.	**28.50**	28.12½	26.87½	17.75
Spelter, St. Louis	**9.50**	9.60	9.50	13.00
Spelter, New York	**9.75**	9.75	9.75	13.25
Lead, St. Louis	**6.85**	6.60	6.50	4.32½
Lead, New York	**7.00**	6.75	6.62½	4.50
Tin, New York	**38.50**	38.25	38.50	33.00
Antimony, Asiatic, N. Y.	11.00	11.00	12.50	27.50
Tin plate, 100 lb. box, Pgh.	$5.75	$5.75	$6.00	$3.15

products to meet the consumptive demand this winter, while in plates there has practically been a famine for some months. Pig iron, which was quiet for so long, has become very active, and the long expected advance in Bessemer and basic has come, both grades being at least 25c. per ton higher, with some sellers quoting $1 per ton higher than a month ago. Prices on semi-finished steel will be at least $5 per ton higher on contracts for billets and sheet bars in the last quarter than in the present quarter. Advances are looked for in sheets, wire goods, pipe and other products for which the demand is far greater than the supply. Scrap, which has been demoralized for some time, is showing more strength and prices are firmer. The coke market is fairly active for spot, which is readily bringing $2.85 to $2.90 at oven for prompt shipment. The output of semi-finished and finished steel this month will be heavier than in August, but the larger steel mills claim it will be at least two or three months before they are able to catch up to any extent on their accumulation of orders.

Pig Iron.—The local market has been very active and prices on Bessemer and basic are up from 25c. to 50c. per ton. A consumer in the Wheeling district has bought upward of 20,000 tons of basic iron from five or six different furnaces, 1000 tons for January and 3500 to 4000 tons each month, Feb. to June, inclusive, at prices that averaged about $18.25, Valley furnace. It is confirmed that the United Steel Company has bought 20,000 tons of basic for next year. The West Leechburg Steel Company has bought about 5000 tons of basic for first half of 1917 on the basis of about $18 or slightly higher, Valley furnace. The Colonial Steel Company is in the market for 5000 tons of basic and the Mesta Machine Company for 3000 tons of Bessemer for first half of next year. We note a sale of 2000 tons of low phosphorus basic to an Eastern consumer at $18.50, Valley furnace. We also note sales of small lots of Bessemer, 2000 tons or more, at $21.25 to $21.50, Valley furnace. On an inquiry for 1000 tons of standard Bessemer for first four months of next year, one furnace quoted as high as $22, Valley, and would not shade that price. There is still a fairly large lot of Bessemer and basic iron to be bought, and it is believed this will bring $18.50 for basic and $21.50 or higher for Bessemer at Valley furnace. We note a sale of 2000 tons of malleable Bessemer iron at $18.50, Valley furnace. A local consumer has bought 4000 tons of No. 2 foundry for first half at $18.50 and another 2000 tons for the same delivery at the same price. We note other sales of No. 2 foundry, all for first half delivery, of close to 5000 tons at $18.75, Valley furnace. On Oct. 1 the export rate on pig iron from the valleys to New York will be increased from $2.14 to $2.98 per ton, and this will likely act against much export business in Bessemer and foundry iron being placed with Valley furnaces. We quote standard Bessemer iron, $21.25 to $21.50; basic, $18.25 to $18.50; No. 2 foundry, $18.50 to $18.75; malleable Bessemer, $18.50 to $18.75, and gray forge, $18 to $18.25, all at Valley furnace, the freight to the Pittsburgh and Cleveland districts being 95c. per ton.

Later.—The Colonial Steel Company, Pittsburgh, has bought 5000 tons of basic for delivery in the first half of next year at $18 or slightly higher, Valley furnace, and 2000 tons of Bessemer, same delivery, at about $21. The Shenango Furnace Company, which has been furnishing upward of 900 tons of molten Bessemer per day from its furnaces at Sharpsville to the Valley Mold & Iron Company at the same place, has arranged with M. A. Hanna & Co., Cleveland, to secure about 27,000 tons of molten Bessemer from their Claire furnace at Sharpsville for the Valley Mold Company, as the latter may need it all for the manufacture of ingot molds.

Billets and Sheet Bars.—It now develops that the advance in prices on 4 x 4-in. billets and sheet bars to consumers contracting for the fourth quarter of this year will be from $5 to $7 per ton, instead of about $3, as recently suggested. The leading steel interest has already fixed its prices for fourth quarter, and its minimum price for that delivery will not be less than $45, and, in some cases, probably as high as $47. Consumers seem willing to pay this heavy advance if they are assured of getting a supply as fast as they need

the steel. One large consumer is said to have offered $50 for 1500 tons additional of sheet bars for delivery in the last three months to a mill that has a contract for its full supply. Recently a large steel company shipped a good sized quantity of small billets to a concern, but through an error the carbons in these ran 0.15 and higher, while the consumer wanted 0.10. The maker of the steel quickly found a buyer for it at $2 per ton higher than the original customer was to pay. This is cited as showing the scarcity of steel and the indifference of consumers as to prices charged if they can get it. We quote soft Bessemer and open-hearth steel billets and sheet bars at $45 to $50 at mill, Youngstown or Pittsburgh, and the lower price would be readily paid by consumers if they could find steel at that figure. We quote forging billets at $69 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take $1 extra.

Ferroalloys.—Ferromanganese is lower. Foreign and domestic are being offered at about $164 per ton, seaboard, equal to $166.65, Pittsburgh, the freight being $2.65 per ton. It is probable that some grades of domestic could be bought at about $160 per ton on a firm offer. We quote 18 to 22 per cent spiegeleisen at $40 to $45, and 25 to 30 per cent $55 to $65, at furnace. On 50 per cent ferrosilicon we quote $88 to $89 in lots up to 100 tons; over 100 tons, $87 to $88, and over 600 tons, $86 to $87, all per gross ton, f.o.b. Pittsburgh. We quote Bessemer ferrosilicon as follows: 9 per cent, $30; 10 per cent, $31; 11 per cent, $32; 12 per cent, $33; 13 per cent, $34.50; 14 per cent, $36.50; 15 per cent, $38.50, and 16 per cent, $41. Seven per cent silvery is $28.50; 8 per cent, $29; 9 per cent, $29.50; 10 per cent, $30; 11 per cent, $31, and 12 per cent, $32. These prices are f.o.b. furnace, Jackson or New Straitsville, Ohio, or Ashland, Ky., all having a freight rate of $2 per gross ton to Pittsburgh.

Steel Rails.—Some time ago a leading railroad covered on its supply of open-hearth steel rails for 1917 delivery, but later found it had not bought enough. It first sent out an inquiry for 10,000 tons more and later increased it to 15,000 tons, and a contract for the latter amount of Bessemer steel rails has been placed with the Carnegie Steel Company for delivery in last half of next year. This was the very best delivery that the road could get on its inquiry, and it was forced to accept Bessemer rails in place of open-hearth. The Hocking Valley is in the market for 5000 tons for next year, and several other roads for smaller amounts. The Carnegie Company is now quoting on standard sections only for delivery in last quarter of next year, its present obligations taking its entire output of standard sections through the third quarter. The new demand for light rails is not very active. Several makers of light rails have been using discard steel in making them, as it is well adapted for that purpose. A leading re-rolling mill recently took a contract for 8000 tons of light rails for export, and it is said secured about $3 a ton higher than the domestic price. We quote 25 to 45 lb. sections at $47; 16 and 20 lb., $48; 12 and 14 lb., $49, and 8 and 10 lb., $50, in carload lots, f.o.b. at mill, the usual extras being charged for less than carload lots. We quote standard section rails of Bessemer stock at 1.47½c. and of open-hearth 1.56½c., Pittsburgh.

Plates.—There is more new inquiry for steel cars and some contracts have been booked. The New York Central has placed 2000 box cars with the American Car & Foundry Company, 1000 with the Pressed Steel Car Company, 1000 with the Haskell & Barker Car Company and 1000 steel gondolas with the Standard Steel Car Company. It is also said to be in the market for 230 or more locomotives. The Soo Line has bought 250 steel ore cars from the Haskell & Barker Car Company, and the Bethlehem Steel Company has bought 30 steel hoppers from the Pressed Steel Car Company. The minimum mill price on ¼-in. and heavier plates is 3c. at mill for delivery in first quarter and first half of next year. One leading local plate mill is out of the market on any plates for delivery before the second quarter of 1917. For delivery in two to four months ¼-in. and heavier plates are quoted from 3.75c. to 4c. and higher at mill.

Structural Material.—In spite of the high prices and the delay in getting deliveries, new inquiry is active. Considerable work is being placed. The American Bridge Company has taken 2300 tons for extensions to the open-hearth building of the American Rolling Mill Company, Middletown, Ohio; 750 tons for two barges for the Aluminum Ore Company to transport ore from Arkansas to the smelter of the Aluminum Company of America in East St. Louis, Ill., and 600 tons for coal-handling towers for the Carnegie Steel Company at Clairton, Pa. Mill prices on beams and channels up to 15-in. remain at 2.60c. to 2.75c. at mill for such deliveries as the mills can make, which would not be before next year, while small lots from stock for fairly prompt shipment bring 3c. to 3.25c., Pittsburgh.

Sheets.—As it is evident that some sheet mills will have to pay at least $5 per ton more for sheet bars for fourth quarter delivery than they are paying for third quarter, this is expected to be reflected soon in higher quotations on sheets by these mills. However, deliveries on contracts for sheet bars that should have been made in this quarter will drag along into October and November, and of course these sheet bars will be furnished at the third quarter price. There is still a heavy export demand for galvanized and blue annealed sheets and prices on all grades are firm. We quote Nos. 9 and 10 blue annealed sheets at 2.90c. to 3c., for delivery at convenience of the mill. No. 28 Bessemer and open-hearth black sheets, 2.90c. to 3c.; No. 28 galvanized, Bessemer, and open-hearth, 4.15c. to 4.25c.; Nos. 22 and 24 black plate, tin-mill sizes, H. R. & A., 2.90c.; Nos. 25, 26 and 27, 3c. to 3.10c.; No. 28, 3.10c. to 3.15c., and No. 29, 3.20c. to 3.25c. These prices are for carloads and larger lots, f.o.b. mill, Pittsburgh.

Tin Plate.—The new demand is much beyond the capacity of the mills to supply and all will carry over into 1917 orders for a very large amount of tin plate that should have been delivered this year. Large quantities have been sold for delivery in the first quarter and first half of 1917, mostly to the Pacific coast trade, no price having been stipulated, but the price is to be the same as that agreed upon by the mills for the first half of 1917, and which is likely to be about $5.50 per base box for 108 lb., 14 x 20 bright plate. The demand from Russia, France and Italy is very heavy, one inquiry a few days ago being for 100,000 boxes for Russia on which payments were guaranteed in this country. A leading mill booked in one day last week 135,000 boxes for delivery in the first quarter of next year, the price to be fixed later. It is evident that the tin-plate mills will run to their utmost capacity for many months. To regular customers mills are quoting tin plate from stock at $5.50, while production tin plate is quoted at $5.75 and up to $6 to the domestic trade. For export, $6 to $6.25 per base box is quoted. We quote 8-lb. coated ternes at $8.50 to $8.75 for 200 lb., and $8.75 to $9 for 214 lb., Pittsburgh.

Rivets.—Most consumers are covered over the remainder of the year and are specifying freely, while the export demand is reported to be quite heavy. Some jobbers who have stocks of rivets bought when prices were lower than they are now are cutting makers' prices to some extent. Makers' quotations are as follows: Buttonhead structural rivets, ½ in. in diameter and larger, $4 per 100 lb., base, and conehead boiler rivets, same sizes, $4.10 per 100 lb., base, f.o.b. Pittsburgh. Terms are 30 days net, or one-half of 1 per cent for cash in 10 days.

Railroad Spikes and Track Bolts.—The new demand for track bolts is reported fairly active, with prices ruling firm, but for railroad spikes is dull, and specifications against contracts from the railroads are quiet. In fact, the new demand for railroad spikes has been the dullest of any of the finished steel lines for some months. We quote track bolts with square nuts at 4.50c. to 4.75c. to railroads and 5c. to 5.25c. in small lots to jobbers, base. Track bolts with hexagon nuts take the usual advance of 15c. per 100 lb. Prices on

railroad spikes, which are only fairly strong, are as follows:

Standard railroad spikes, 4½ x 9/16 in. and larger, $2.60 to $2.75; railroad spikes, ½ and 7/16 in., $2.75 base; railroad spikes, ⅜ in. and 5/16 in., $3.00 base; boat spikes, $2.80 base, all per 100 lb., f.o.b. Pittsburgh.

Cold-Rolled Strip Steel.—None of the mills has yet opened books for contracts for the first half of 1917, but some will likely do so about Oct. 1. We note contracts in the past week for 300 to 400 tons for delivery this year at $6 per 100-lb. base. We quote cold-rolled strip steel at $6 base on contracts for delivery over the remainder of the year, and $6.50 to $6.75 in small lots for fairly prompt shipment. Terms are 30 days net, less 2 per cent off for cash in 10 days, delivered in quantities of 300 lb. or more when specified for at one time.

Wire Rods.—The demand is heavy and there is a scarcity in the supply. Several local makers of rods are refusing to quote on export inquiries, stating that demands of regular customers will more than take the entire supply of rods they have over their own needs. We quote soft Bessemer, open-hearth and chain rods at $55 to $60 per ton, f.o.b. Pittsburgh, but to some consumers, $50 per ton has been named in contracts where the rods go into products that come in competition with mills that make their own rods.

Nuts and Bolts.—The new demand is reported fairly active and prices are very firm. Most consumers are covered over the remainder of the year and makers are back in deliveries eight to ten weeks or longer. The export demand is strong, and considerable shipments of nuts and bolts are being made to Russia, England, South America and elsewhere. The discounts are as follows, delivered in lots of 300 lb. or more, where the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days:

Carriage bolts, small, rolled thread, 50 and 5 per cent; small, cut thread, 40, 10 and 5 per cent; large, 35 and 5 per cent.

Machine bolts, h. p. nuts, small, rolled thread, 50 and 10 per cent; small, cut thread, 50 per cent; large, 40 and 5 per cent.

Machine bolts, c. p. c. and t. nuts, small, 40 and 10 per cent; large, 35 per cent. Blank bolts, 40 and 5 per cent. Bolt ends, h. p. nuts, 40 and 5 per cent; with c. p. nuts, 35 per cent. Rough stud bolts, 15 per cent. Lag screws (cone or gimlet point), 50 and 5 per cent.

Forged set screws and tap bolts, 10 per cent. Cup and round point set screws, case-hardened, 60 per cent. Square or hexagon head cap screws, 55 per cent. Flat, button, round or fillister head cap screws, 30 per cent.

Nuts, h. p. sq., tapped or blank, $2.70 off list; hex., $2.70 off. Nuts, c. p. c. and t. sq., tapped or blank, $2.40 off; hex., $2.80 off. Semi-finished hex. nuts, 60 and 5 per cent. Finished and case-hardened nuts, 60 and 5 per cent.

Rivets, 7/16 in. in diameter and smaller, 45, 10 and 5 per cent.

Iron and Steel Bars.—For such deliveries as they can make on steel bars, the mills are holding firmly for the 2.60c. price and state they are booking heavy contracts at this figure for delivery through the first half of next year. Steel rounds for shrapnel are still being made very largely by the Carnegie Steel Company at Bessemer, Youngstown and other plants, and also by other mills. Most of the large contracts for steel bars have been placed by the leading consumers, but the current demand for both iron and steel bars is heavy and mills are back in deliveries 8 to 10 weeks or longer. We quote merchant steel bars at 2.60c. at mill, for delivery at convenience of the mill, which would be in last quarter of this year or first quarter of 1917; while for prompt shipment from warehouse, 3c. to 3.10c. is quoted. We quote refined iron bars at 2.60c. to 2.70c., and railroad test bars, 2.70c. to 2.80c., f.o.b. Pittsburgh.

Wire Products.—Makers predict a famine in the supply of wire nails this fall and winter, and possibly also in barb wire, on the latter due to the large purchases by Russia and other foreign countries. Buyers are specifying heavily against contracts for wire nails, plain wire and barb wire, but fence wire is dull, farmers refusing to pay the high prices. In spite of this latter fact, the discounts on woven wire fencing were lowered last week (price advanced), making the discount on carload lots 60 per cent off. Nearly all the contracts for wire nails on which the mills are now working are on the $2.50 basis, but they have also received good orders on the $2.60 price, which is very firmly held. Prices to the large trade are as follows: Wire nails, $2.60, base, per keg; galvanized, 1 in. and longer, including large head barbed roofing nails, taking an advance over this price of $2, and shorter than 1 in., $2.50. Bright basic wire is $2.65 per 100 lb.; annealed fence wire, 6 to 9, $2.55; galvanized wire, $3.25; galvanized barb wire and fence staples, $3.45; painted barb wire, $2.75; polished fence staples, $2.75; cement-coated nails, $2.50, base, these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing remain at 60 per cent off list for carload lots, 59 per cent for 1000-rod lots and 58 per cent for small lots, f.o.b. Pittsburgh.

Shafting.—Two leading makers say they have not yet opened their books on contracts for delivery in the first quarter and first half of 1917, but will likely do so early in October. Several others have already booked contracts from automobile builders and the screw stock machine trade for the first quarter at about 20 per cent off and smaller contracts for the same delivery at 15 per cent off. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots for delivery in last quarter of this year and first quarter of 1917, and 10 per cent off in less than carload lots, f.o.b. Pittsburgh, freight added to point of delivery.

Merchant Steel.—Mills report the new demand heavy, and say that, in spite of the fact they are turning out more product than ever before, they are not able to catch up on back deliveries to any extent. It is said that several contracts for some grades of merchant steel have been made for delivery through the first half of 1917 at prices very close to $10 per ton higher than are ruling at present. The output this month is expected to show an increase over August. We quote: Iron finished tire, ½ x ½ in. and larger, 2.60c., base; under ½ x 1½ in., 2.75c.; planished tire, 2.75c.; smooth channel tire, ¾ to ⅞ and 1 in., 2.85c. to 2.90c.; 1⅛ in. and larger, 3.10c.; toe calk, 3.10c. to 3.15c., base; flat sleigh shoe, 2.75c.; concave and convex, 2.85c.; cutter shoes tapered or bent, 3.25c. to 3.35c.; spring steel, 3.25c. to 3.50c.; machinery steel, smooth finished, 2.90c. to 3c., all f.o.b. at mill.

Hoops and Bands.—While most consumers have covered their needs for the remainder of this year, one leading maker has so far refused to sell for delivery into 1917. The current demand is fairly active and specifications against contracts are heavy. Steel hoops are firm at 3c. and bands at 2.60c., with extras on the latter as per the steel bar card.

Wrought Pipe.—It is reported that the Pearson oil interests are in the market for 100 miles of 6-in. pipe for a line from the Oklahoma fields to Fort Worth, Texas. The company desires to lay this line this year, but may have trouble in finding a mill that can make the delivery. The recent advance in prices is being firmly held, but it is said most of the trade bought for several months ahead prior to this advance. Mills are sold up on lap-weld pipe, both galvanized and black, five to six months ahead, but on butt-weld sizes they can make deliveries in two to three weeks. Discounts on black and galvanized iron and steel pipe are given on another page.

Boiler Tubes.—The new demand for both locomotive and merchant tubes is very heavy and mills are sold up for five to six months or longer. The recent advance in prices is firmly held. Discounts now in effect are given on another page.

Coke.—There is still quite an active demand for blast-furnace coke, the supply of which is limited on account of labor shortage in the coke regions, and best grades for prompt shipment are held at $2.85 to $2.90 per ton at oven. Some sellers are asking $3 for prompt blast-furnace coke, and also ask this price for delivery over the remainder of the year. We quote $2.75 to $3 per net ton at oven on contracts. We quote best grades of 72-hr. foundry coke for spot shipment at $3.25 to $3.50, and on contracts $3.50 to $3.75, per net ton at

oven. The Connellsville *Courier* gives the output of coke in the upper and lower Connellsville regions for the week ended Sept. 9 as 384,374 net tons, a decrease from the previous week of 16,736 tons.

Old Material.—The undertone of the local scrap market is decidedly better, and a buying movement by large consumers is expected in the near future. Prices on selected heavy melting steel scrap are firm, small lots changing hands between dealers at $16.25 to $16.50. The Carnegie Steel Company states it is not in the market for heavy steel scrap at any price. Borings and turnings are dull and prices somewhat demoralized. There have been no important sales in the past week. Prices quoted by dealers for delivery in Pittsburgh and points that take the same rates of freight, per gross ton, are as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	$16.25 to $16.50
No. 1 foundry cast	14.50 to 14.75
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	16.50 to 17.00
Hydraulic compressed sheet scrap	13.50 to 14.00
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	11.25 to 11.50
Bundled sheet stamping scrap	10.25 to 10.50
No. 1 railroad malleable stock	14.50 to 14.75
Railroad grate bars	10.25 to 10.50
Low phosphorus melting stock	19.75 to 20.00
Iron car axles	28.00 to 28.50
Steel car axles	28.00 to 28.50
Locomotive axles, steel	33.00 to 33.50
No. 1 busheling scrap	14.00 to 14.25
Machine-shop turnings	7.00 to 7.25
Old carwheels	13.25 to 13.50
Cast-iron borings	8.00 to 8.25
*Sheet bar crop ends	17.00 to 17.50
No. 1 railroad wrought scrap	18.00 to 18.75
Heavy steel axle turnings	10.50 to 10.75
Heavy breakable cast scrap	12.25 to 12.50

*Shipping point.

Chicago

CHICAGO, ILL., Sept. 18, 1916.

Heavy selling of pig iron, plates, shapes and bars has characterized the past week. Sales of pig iron by local interests for export and domestic consumption will easily total 250,000 tons since Sept. 1. The amount of steel-making iron sold for export has now reached a figure that has a direct bearing on the strength of this market and the only problem of unsold tonnage which any of the furnaces are facing has to do with the last quarter of the year. Orders for steel bars, totaling more than 25,000 tons, and for shapes and plates about the same quantity, represent new contracts entered into by fabricators in the week, while a local jobber placed an additional order for 20,000 tons of plates and bars. It is significant that much of the above structural steel and bar business was taken by mills on the basis of 2.50c., Pittsburgh, while the plates were booked on the basis of 3c. In contrast, various mills report sales of shipbuilding plates for delivery up to July, 1917, at 4c., Pittsburgh. In general specifications are very heavy, greatly exceeding shipments. Even new business is not less than daily production which has now materially improved with the advent of cool weather. The scrap market presents evidence of an interesting effort to raise the level of prices, regardless of demand. The fact that old material values have been disproportionately low, while unusually small quantities of scrap are coming on the market, is contributing to the success of this endeavor.

Pig Iron.—Last week witnessed the heaviest buying of pig iron thus far recorded in the present movement. A considerable part of the iron taken is standard Bessemer for export, the Iroquois furnaces having been booked freely on this iron while another maker of Bessemer has withdrawn from the market for the remainder of the year. Sales of steel-making iron now clearly constitute a strengthening influence in the market. Malleable, basic and strong Northern foundry iron, 2.25 per cent and over in silicon, are held at $19 at the furnace; Northern foundry 1.75 per cent and over in silicon can be had at $18.50, while high phosphorus Northern irons continue to be quoted on a basis competitive with Southern iron. Since the closing of recent sales of 6000 tons and 2000 tons to Iowa interests, there has been little activity in basic iron, while malleable sales are also relatively small. The principal activity has been in foundry iron, and as yet very little falling off in the amount of inquiry is noticeable. An active selling of charcoal iron is also reported. The ruling prices for Southern iron are less clearly established. It is known that $18, Chicago, was done on Northern iron competing against a Southern quotation last week and also that a Southern furnace sold high phosphorus iron, taking advantage of a favorable freight, on the basis of $18.25, Chicago, while another large interest was soliciting, for immediate acceptance, a limited amount of business on the basis of $14.50, Birmingham. Others of the Southern producers have advanced their quotations to $15. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of $1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5	$19.75
Lake Superior charcoal, No. 1	20.25
Lake Superior charcoal, No. 6 and Scotch	20.75
Northern coke foundry, No. 1	$19.00 to 19.50
Northern coke foundry, No. 2	18.00 to 19.00
Northern coke foundry, No. 3	18.00 to 18.50
Southern coke, No. 1 f.dry and 1 soft	18.50 to 19.00
Southern coke, No. 2 f.dry and 2 soft	18.00 to 18.50
Malleable Bessemer	19.00
Basic	19.00
Low phosphorus	34.00
Silvery, 8 per cent	29.50
Bessemer ferrosilicon, 10 per cent	32.50

Rails and Track Supplies.—There is comparatively little railroad activity. A few inquiries have appeared for rails, among which were 5000 tons from the Pennsylvania Lines and 3000 tons from the Chicago & Alton. There is a floating inquiry for spikes and bolts, with some uncompleted negotiations for tie-plates. Quotations are as follows: Standard railroad spikes, 2.75c., base; track bolts with square nuts, 3.25c. to 3.50c., base, all in carload lots, Chicago; tie-plates, $50, f.o.b. mill, net ton; standard section, Bessemer rails, Chicago, $33, base; open-hearth, $35; light rails, 25 to 45 lb., $40; 16 to 20 lb., $41; 12 lb., $42; 8 lb., $43; angle bars, 2c., Chicago.

Structural Material.—Liberal buying by the larger fabricating shops, one interest alone taking 10,000 tons, featured the week. In addition to the several large purchases, there was booked a sprinkling of smaller orders. For the most part the business was taken by the mills on the basis of 2.50c., Pittsburgh, rather than 2.60c. Contracts were booked, nominally for first half delivery, but with the understanding that mill convenience would govern. Contracts for the fabrication of steel included one of 400 tons for a skating rink at Chicago, taken by A. Bolter's Sons; one of 375 tons for the Stewart-Warner plant extension at Beloit, taken by the Federal Bridge Company, and another of like amount for the Soo Line, awarded to the Minneapolis Steel & Machinery Company. The American Bridge Company took a small contract at Cleveland and another at Milwaukee. In addition to the inquiry of the Nickel Plate for 500 box cars, the New York Central is taking prices on 1000 gondolas, the Elgin, Joliet & Eastern on 300 hoppers, and the Great Northern on 125 all-steel passenger coaches. We quote for Chicago delivery of structural steel from mill 2.689c. to 2.789c.

We quote for Chicago delivery of structural steel out of jobbers' stock 3.10c.

Rivets and Bolts.—Makers of bolts and nuts are for the present more largely concerned in the effort to handle customers' specifications than with the making of new contracts. On new business the published discounts usually apply, but the majority of consumers are protected under much more favorable contracts. We quote as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 50-5; cut thread, 40-10-2½; larger sizes, 35-2½; machine bolts up to ⅜ x 4 in., rolled thread, with hot pressed square nuts, 50-10; cut thread, 50; large sizes, 40-5; gimlet-point coach screws, 50-5; hot pressed nuts, square, $2.70 off per 100 lb.; hexagon, $2.70 off. Structural riv-

ets, $\frac{3}{4}$ to $1\frac{1}{4}$ in., 4c. to 4.15c., base Chicago, in carload lots; boiler rivets, 10c. additional.

We quote out of store [illegible] rivets, $\frac{1}{2}$ in. and smaller, 4.10c.; machine bolts, up to [illegible] in., 60-10 for larger sizes, 40-10; carriage bolts, up to [illegible] in., 60-10 for larger sizes, 40-10; hot pressed nuts, square, $3.75; and hexagon, $3.75 off per 100 lb. f.o.b. shipping point.

Plates.—Plates unquestionably present the feature situation in the market. The inquiry for shipbuilding steel coming in this market, particularly from the Orient, shows no signs of recession, and the amazing fact is that buyers are offering to make outright purchases of plates for delivery as far ahead as July, 1917. In the narrower widths, conditions are less extreme, but prompt delivery can be had at little less than 3.50c., Pittsburgh. We quote for Chicago delivery of plates from mill, at its convenience, 3.189c. For prompt shipment we quote 3.439c. to 3.689c. in widths up to 72 in., and for wide plates 4.189c.

We quote for Chicago delivery of plates from jobbers' stocks, 3.50c.

Sheets.—The abnormal relation of prices for black sheets to plate prices is one of the conspicuous incongruities of the situation. For standard quality one-pass sheets, sales of which are somewhat heavier, quotations are firmer, ranging from 2.90c. to 3c., Pittsburgh, but a local consumer advises that, on a recent inquiry, prices were had from 2.75c. to 3.10c. Blue annealed prices are steadier, with a minimum of 3c., Pittsburgh. There is little activity in galvanized sheets and quotations approximate 4.20c., Pittsburgh. We quote for Chicago delivery, blue annealed, No. 16 and heavier, 3.189c. to 3.339c.; box annealed, No. 17 and lighter, 3.039c. to 3.189c.; No. 28 galvanized, 4.389c. to 4.439c.

We quote for Chicago delivery of sheets out of stock, minimum prices applying on bundles of 2,- or more, as follows: No. 10 blue annealed, 3.40c.; No. 28 black, 3.25c.; No. 28 galvanized, 4.65c. to 4.75c.

Bars.—Buying for first half delivery by fabricators, the manufacturing trade and local jobbers ran sales of steel bars up into large figures, one interest alone selling about 25,000 tons, the prices ranging from 2.50c. to 2.60c., Pittsburgh. The buying of bar iron is also more active, although there has at no time been an accumulation of backlog such as has characterized the selling of steel. We quote mill shipment, Chicago, as follows: Bar iron, 2.35c.; soft steel bars, 2.789c.; hard steel bars, 2.50c.; shafting, in carloads, 20 per cent off; less than carloads, 15 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 3.10c.; bar iron, 3.10c.; reinforcing bars, 3.10c. base with 5c. extra for twisting in sizes $\frac{1}{2}$ in. and over and usual card extras for smaller sizes; shafting net list.

Wire Products.—New inquiry from abroad for barb wire has been received in the last few days, but Western producers have generally declined to quote. Domestic demand for nails and barb wire is an increasing problem. We quote as follows per 100 lb.: Plain wire, Nos. 6 to 9, base, $2.839; wire nails, $2.789; painted barb wire, $2.939; galvanized barb wire, $3.639; polished staples, $2.939; galvanized staples, $3.639; all Chicago.

Cast-Iron Pipe.—The only new business of moment last week was the award of 1000 tons at Chicago to the United States Cast Iron Pipe & Foundry Company. Prices of pipe have been advanced $1 per ton, and we quote as follows, per net ton, Chicago: Water pipe, 4 in., $34.50; 6 in. and larger, $31.50, with $1 extra for Class A water pipe and gas pipe.

Old Material.—Market prices of steel and rolling-mill scrap continue to advance, though buying by consumers is still light. Quotations on cast scrap have also begun to move upward and stove plate is stronger. The general level of prices is now closely approaching that of the last buying movement of the early summer. Obviously dealers in scrap are of the opinion that too little is being bought to make the deterrent effect of higher prices of consequence. The apparent scarcity of scrap is, if anything, more pronounced. The railroads, the largest individual source of supply, are conserving their car supply and labor and are picking up very little old material. Railroad lists of the past week were of little importance as to tonnage. Dealers' yards also are manufacturing a much less than normal quantity, labor shortage being a factor. In addition there is a disposition to hold back scrap in the expectation of a higher market when fall consumer buying resumes. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

[illegible]	$[illegible] to $19.—
[illegible]	[illegible] to 20.50
[illegible]	[illegible] to 12.—
Old steel rails, rerolling	17.00 to 17.25
[illegible]	[illegible] to 18.00
[illegible]	[illegible] to 16.—
[illegible]	[illegible] to 16.—
[illegible]	[illegible] to 16.—
Steel axle turnings	[illegible] to 9.—

Iron angles and plate cuts	$18.50 to $19.00
Iron rails, rerolling	20.00 to 21.00
Steel rails, rerolling	[illegible] to 18.—
Iron car axles	[illegible] to 27.00
Steel car axles	26.00 to 28.00
No. 1 railroad wrought	16.00 to 17.00
No. 2 railroad wrought	15.00 to 16.00
Cut forge	15.00 to 15.50
Pipes and flues	12.00 to 12.50
No. 1 busheling	14.00 to 14.50
No. 2 busheling	9.00 to 10.00
Steel knuckles and couplers	14.75 to 15.00
Steel springs	14.25 to 15.00
No. 1 boilers, cut to sheets and rings	10.25 to 10.75
Boiler punchings	14.00 to 14.50
Locomotive tires, smooth	21.50 to 22.00
Machine-shop turnings	[illegible] to 6.00
Cast-borings	6.50 to 7.00
No. 1 cast scrap	12.25 to 12.75
Stove plate and light cast scrap	[illegible] to 10.25
Grate bars	10.00 to 10.25
Brake shoes	9.75 to 10.25
Railroad malleable	11.50 to 12.00
Agricultural malleable	11.00 to 11.50

Philadelphia

PHILADELPHIA, PA., Sept. 19, 1916.

The overwhelming demand for plates shows no abatement; it gets worse. That the condition is widespread is shown by the efforts of Westerners to buy in this market, wanting both plates and shapes. It is estimated that inquiries for commercial ships in the past week totaled 100,000 tons of plates and shapes, entirely aside from the huge requirements of the Government. Plate quotations are stronger than ever. Bars are active, and for prompt deliveries Bessemer steel or shell-discard material must be depended on. One large mill has sold its shell-discard steel for a period of eight months. The demand for structural material is not so urgent as for other products, but the demand from jobbers and other directions is strong and the mills have all they can do. Pig iron shows a slight increment of strength, but in general the market is unchanged. Many small or fair sized inquiries are out for foundry iron. Low phosphorus is in heavy demand for next year's delivery and several round lots have been taken. The representatives of English makers of 80 per cent ferromanganese have lowered their quotation to $165, seaboard, to meet domestic competition. Heavy melting steel continues without interest, but some scrap specialties are in demand at stronger prices.

Pig Iron.—No large inquiries or sales are reported, but there has been a good run of small and medium sized transactions which made up an excellent total. Prices are a little firmer, with less inclination on the part of buyers to search for the absolute minimum, as finding the lowest price involves more or less trouble and does not command grades commonly regarded as standard. Considerable buying has been at prices ranging from $20 to $20.25 for No. 2 X, Philadelphia, and occasionally higher. The deliveries specified are mostly for first quarter or first half. With regard to present consumption, a good sign is seen in the insistent demand that deliveries be not delayed. A Lansdale pipe plant has inquired for a round tonnage of pipe iron. No further interest in basic has developed. For standard low phosphorus there is a steady and heavy demand for both domestic and export shipment. Quotations are exceedingly strong, and some makers contemplate advancing their prices. Domestic consumers are eager to buy for next year, and several lots of 5000 tons and upward have been closed. Low phosphorus has been bought for export to England, France and Canada on the basis of $34 to $35, Philadelphia.

Lebanon low phosphorus has been fairly active at $30 to $32, furnace. The situation in Virginia iron is unchanged at $17.50 to $18.50, furnace, or $20.25 to $21.25, Philadelphia, for No. 2 X. One maker booked orders for 3500 tons in the week. Quotations for standard brands, delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa. No. 2 X foundry	$19.50 to $20.00
Eastern Pa. No. 2 plain	19.25 to 19.75
Virginia No. 2 X foundry	20.25 to 21.25
Virginia No. 2 plain	20.00 to 20.75
Gray forge	18.50 to 19.00
Basic	19.75 to 20.00
Standard low phosphorus	34.00 to 35.00

Iron Ore.—In the week ended Sept. 16 the only arrival of foreign ore consisted of 7700 tons from Cuba.

Ferroalloys.—Representatives of English makers of 80 per cent ferromanganese have been authorized to quote $164 to $165, seaboard, first half delivery, thereby meeting the price recently quoted by domestic makers. Inquiry for at least 3000 tons is before the trade, one large steel company having asked for a price on 2000 tons, according to report. Representatives of a steel company named in this connection say it is not in the market. Blast-furnace ferrosilicon has been in excellent demand, and at least 1000 tons has been taken in the past few days. The quotation for 11 per cent material is unchanged at $34.44, Philadelphia. The arrival of 180 tons of English ferromanganese at this port last week is reported.

Plates.—In the past week inquiry for plates and shapes required in the construction of commercial ships aggregated about 100,000 tons, plates representing about 80 per cent of the total. Government bids to be opened to-day cover about 10,000 tons for two vessels, one to be constructed at Philadelphia and one at Boston—a hospital ship and a fuel carrier. The private yards in which are to be built the fighting units continue to ask the plate and shape makers for information on which to base their bids. Early naval construction will require 150,000 to 200,000 tons. One large mill when approached with an inquiry as to what it could be expected to supply replied that it did not care to give any assurances whatever. It quotes 4.159c. as its minimum, delivery at the mill's convenience, but has turned down offers made in excess of this price. Demand for first and second quarter delivery is heavy. A buyer wanting 1000 tons in the first quarter was offered that quantity in July or later at 4.15c., Pittsburgh, and was quoted 4.50c., Pittsburgh, for first quarter. The plates were wanted for shipment to Canada. An attractive tonnage of flange and fire-box plates, comparatively nearby delivery, was recently taken by an eastern Pennsylvania mill, on the basis of 4.50c., Pittsburgh, for tank plates. Westerners are asking for plates in this territory, but getting little satisfaction. In directions where the output and sizes are limited, probably 3.659c., Philadelphia, could be done, delivery in about eight weeks.

Bars.—While 2.60c., Pittsburgh, is the nominal price of open-hearth steel bars, up to 3.159c. is being obtained for Bessemer bars and for bars rolled from discarded shell steel. Prompt deliveries of the latter can be made. The demand is active. Iron bars are moving steadily at 2.659c., Philadelphia.

Structural Material.—Jobbers are taking material eagerly, and in many cases have it disposed of before the cars are unloaded. The scarcity of large building projects makes delivery of heavy shapes somewhat easier than lighter sizes, but all are difficult to get. No action has been taken on the projected plants of the Philadelphia Electric Company at Chester, requiring upward of 10,000 tons, and of the Westinghouse Machine Company at Essington, near Chester, about 5000 tons. The minimum quotation is 2.759c., Philadelphia, for open-hearth material, although up to 3.009c., Philadelphia, is asked for Bessemer steel. Western consumers have offered 2.75c., Philadelphia, equal to 2.901c., Pittsburgh.

Billets.—Open-hearth rerolling billets are unchanged at $48, Eastern mill, and forging steel at $65. One large steel company has sold its production of discard shell steel for the next eight months.

Sheets.—No. 10 blue annealed sheets are quoted at 3.159c. to 3.659c., Philadelphia.

Coke.—The coke producers continue hampered by a scarcity of men, which, together with their sold-up condition, makes coke not easy to get. Spot furnace is quoted at $2.75 to $2.85 per net ton at oven, and contract at $2.50. Spot foundry is quoted at $3.25 to $3.50 per net ton at oven, and contract at $3.15 to $3.40. Freight rates from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Old Material.—No interest is shown in heavy melting steel, the market being largely one of specialties. Wrought pipe, rerolling rails and railroad wrought are stronger. Among sales of old material made here last week by the Panama Railroad, about 1000 tons of carwheels brought $12.95 per net ton and 66 tons of old axles $36 per net ton, f.o.b. cars. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$14.75 to $15.25
Old steel rails, rerolling	18.00 to 18.50
Low phos. heavy melting steel scrap	21.25 to 23.50
Old steel axles (for export)	34.00 to 35.00
Old iron axles (for export)	34.00 to 35.00
Old iron rails	20.00 to 20.50
Old carwheels	15.50 to 16.00
No. 1 railroad wrought	21.00 to 22.00
Wrought-iron pipe	14.50 to 15.00
No. 1 forge fire	12.00 to 12.50
Bundled sheets	12.00 to 12.50
No. 2 busheling	10.50 to 11.00
Machine-shop turnings	7.50 to 8.00
Cast borings	9.00 to 9.50
No. 1 cast	16.00 to 16.50
Grate bars, railroad	11.75 to 12.25
Stove plate	11.75 to 12.25
Railroad malleable	13.50 to 14.00

St. Louis

ST. LOUIS, MO., Sept. 18, 1916.

Pig Iron.—Demand was active among the relatively smaller consumers and probably an aggregate of 15,000 tons was sold, while some 5000 tons is awaiting decision. Consumers are beginning to believe that there is little likelihood of lower prices within the period of need, and are endeavoring to cover themselves for the remainder of this year and the first half of next. Included in the sales were one of 1200 tons and one of 2000 tons, No. 2 and No. 3 Southern; 600 tons of No. 2 and 400 tons of No. 3. To a large extent the purchasers have been the stove foundries.

Coke.—Small lots have been sold at prices a little out of line with the regular quotations. By-product is quoted firmly on a parity with Connellsville and Virginia prices.

Finished Iron and Steel.—The steady absorption of finished products goes on. Demand is better for structural material, but warehouses are inclined to take care of their regular customers before considering the needs of others. Some movement in light rails for coal interests and track fastenings is noted. Warehouse business is active, with some prices marked up. For stock out of warehouse we quote as follows: Soft steel bars, 3.15c.; iron bars, 3.05c.; structural material, 3.15c.; tank plates, 3.80c.; No. 10 blue annealed sheets, 3.45c.; No. 28 black sheets, cold rolled, one pass, 3.40c.; No. 28 galvanized sheets, black sheet gage, 4.80c.

Old Material.—The scrap market is sharply stronger. Steel mills, foundries and rolling mills seem disposed to enter the market even at present high prices, while dealers are still inclined to speculate and also are buying to cover their short interests. The situation is one in which the prices are based chiefly on the last-named factors, aided by the encouragement given as a result of consumer interest in the market. The railroads are not offering much additional material, and this is also helping to hold prices up. The only lists out during the week included one of 350 tons from the Chicago, St. Paul, Minneapolis & Omaha and one of 200 tons from a local industry. Dealers are unable to find relaying rails, either light or standard section, though the former are not so strongly held as the

latter. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton

Old iron rails	$17.25 to $17.50
Old steel rails, rerolling	16.50 to 17.00
Old steel rails, less than 3 ft.	16.50 to 17.00
Relaying rails, standard section, subject to inspection	23.00 to 24.00
Old carwheels	12.50 to 13.00
No. 1 railroad heavy melting steel scrap	15.75 to 16.25
Heavy shoveling steel	14.50 to 15.00
Frogs, switches and guards cut apart	15.50 to 16.00
Bundled sheet scrap	8.00 to 8.50

Per Net Ton

Iron angle bars	$16.50 to $17.00
Steel angle bars	14.50 to 15.00
Iron car axles	27.00 to 27.50
Steel car axles	28.00 to 28.50
Wrought arch bars and transoms	21.50 to 22.00
No. 1 railroad wrought	16.50 to 17.00
No. 2 railroad wrought	15.75 to 16.25
Railroad springs	15.50 to 16.00
Steel couplers and knuckles	15.00 to 15.50
Locomotive tires, 42 in. and over, smooth inside	21.00 to 21.50
No. 1 dealers' forge	12.50 to 13.00
Cast-iron borings	7.00 to 7.50
No. 1 busheling	14.00 to 14.50
No. 1 boilers, cut to sheets and rings	10.25 to 10.50
No. 1 railroad cast scrap	12.50 to 13.00
Stove plate and light cast scrap	9.25 to 9.50
Railroad malleable	11.00 to 11.50
Agricultural malleable	10.00 to 10.50
Pipes and flues	11.00 to 11.50
Heavy railroad sheet and tank scrap	11.00 to 11.25
Railroad grate bars	9.50 to 10.00
Machine shop turnings	7.00 to 7.50

Cincinnati

CINCINNATI, OHIO, Sept. 20, 1916.—(*By Wire.*)

Pig Iron.—The minimum price of Northern foundry, malleable and basic was advanced Tuesday to $18.50, Ironton, for shipment in the remainder of the year or through the first half. More foundry iron business was booked at the previous quotation of $18 than was made known, and the furnaces in the Ironton district are now in a comfortable position to maintain the advance. The price situation in the South is not quite so strong. Resale iron there is competing with furnace iron around $14, Birmingham, and it is also reported that some furnace iron can be obtained on firm offers for movement this year at the same figure. The majority of sales made lately have been on a basis of $14.50 for No. 2 foundry, while some special irons have brought $15. First half quotations range from $14.50 to $15. Quite a number of nearby small orders have been booked in the past few days, but large sales in this territory are scarce. A southern Ohio melter bought approximately 400 tons each of Northern and Southern foundry iron and two 600-ton lots of Southern iron were taken by a northern Ohio consumer. A Michigan manufacturer ordered 500 tons of Lake Superior charcoal and a local agency sold 2500 tons of Southern foundry to two central Illinois melters, with shipments extended to July 1. The general inquiry is light, and most of the business coming in is secured through the individual efforts of traveling salesmen. A Louisville firm is asking for 500 tons of Southern foundry iron, but confirmation cannot be obtained of the report that a basic user in this vicinity contemplates making further purchases at an early date. Malleable is slow, no sales having been reported lately. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	$17.90 to $18.40
Southern coke, No. 2 f'dry and 2 soft	17.40 to 17.90
Southern coke, No. 3 foundry	16.90 to 17.40
Southern coke, No. 4 foundry	16.40 to 16.90
Southern gray forge	15.90 to 16.40
Ohio silvery, 8 per cent silicon	28.26 to 28.76
Southern Ohio coke, No. 1	20.76 to 21.26
Southern Ohio coke, No. 2	19.76 to 20.26
Southern Ohio coke, No. 3	19.26 to 19.76
Southern Ohio malleable Bessemer	19.76 to 20.26
Basic, Northern	19.76 to 20.26
Lake Superior charcoal	21.20 to 22.20
Standard Southern carwheel	24.90 to 25.40

(By Mail)

Finished Material.—Jobbers state that their particular concern now is to get shipments from the mills fast enough to take care of customers' requirements. The demand for structural material of all kinds is good, and as a consequence prices vary to a considerable extent, depending upon the supply. Plates ¾ in. and up are quoted from warehouse at 3.75c., base, Cincinnati; steel bars, strong at 3.20c.; twisted steel bars, 3.35c.; wire nails, $2.85 per keg, base; barb wire, $3.70 per 100 lb. Both black and galvanized sheets are in excellent demand and the nearby mills are paying particular attention to filling orders for their regular customers. We quote No. 28 galvanized sheets at 4.65c., Cincinnati or Newport, Ky., and No. 28 black at 3.15c. to 3.25c. The mill price on No. 10 blue annealed is also now 3.15c. to 3.25c. There is considerable difficulty in obtaining prompt shipment on hoops and bands. We quote hoops at 3c., Pittsburgh, and bands at 2.60c.

Coke.—Furnace coke is stronger than it has been for some time, but no additional contracts have come to light. Connellsville furnace coke is quoted all the way from $2.70 to $2.85 per net ton at oven for shipment this year and from $2.50 to $2.85 for yearly contracts. Wise County producers are asking 10c. to 15c. per ton above these figures. Foundry coke is obtainable around $3.50 at oven in all three fields for either prompt or future shipment. Only a small amount of spot shipment business is being transacted. The inquiry is very light, but a particularly good feature of the foundry coke situation is that the consumption is somewhat better than at this time last month.

Old Material.—Prices continue to advance, and with the exception of borings and turnings practically all grades have moved up 50c. per ton. Old iron axles were marked up last week $1.50 per ton, making the price higher than it has been for a long time. Heavy melting steel scrap is in better demand, and there is also a heavy call for No. 1 machinery cast. The following are dealers' prices f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton

Bundled sheet scrap	$11.25 to $11.75
Old iron rails	16.25 to 16.75
Relaying rails, 50 lb. and up	21.50 to 22.00
Rerolling steel rails	14.25 to 15.75
Heavy melting steel scrap	14.75 to 15.25
Steel rails for melting	13.75 to 14.25

Per Net Ton

No. 1 railroad wrought	$14.50 to $15.00
Cast borings	4.00 to 5.00
Steel turnings	4.75 to 5.25
Railroad cast	11.75 to 12.25
No. 1 machinery cast	13.50 to 14.00
Burnt scrap	8.75 to 9.25
Iron axles	26.00 to 27.50
Locomotive tires (smooth inside)	21.50 to 22.00
Pipes and flues	9.75 to 10.25
Malleable and steel	11.00 to 12.00
Railroad tank and sheet	9.00 to 9.50

Cleveland

CLEVELAND, OHIO, Sept. 19, 1916.

Iron Ore.—We note the sale of 10,000 tons of ore for this season's delivery and several other inquiries for small lots are pending. Most of the shippers have about all they can do to get down the ore already sold, but if they find they can handle a little more later they will take on a few small lots. Some additional reservations for next season are reported. The movement continues very heavy and if the record so far this month is kept up, September shipments may equal or exceed those of August. We quote prices as follows, delivered lower Lake ports: Old range Bessemer, $4.45; Mesaba Bessemer, $4.20; old range non-Bessemer, $3.75; Mesaba non-Bessemer, $3.55.

Pig Iron.—The market continues quite active in all grades and prices are firmer. Some of the furnaces are so well sold up for the first half of next year that they are rather indifferent about taking on additional orders at the present time. A Cleveland interest has advanced its Valley price on foundry iron to $19 for No. 2 and has made some sales at the advance. However, $18.50 foundry iron can still be had in the Valley. Foundry iron is quoted at $18.50, Toledo, and the market is not as firm there as at other northern Ohio points. The Erie price has been advanced to $19. A Canton consumer has taken 10,000 tons of basic iron for early delivery. Three sales aggregating about 15,000 tons of basic are reported at $18.50 for the first quarter delivery, and the market seems well established at that

price. Bessemer is still quoted at $21, Valley furnace. A Cleveland producer which has recently taken considerable Bessemer iron for export advanced its quotation to $22 on an inquiry for about 10,000 tons late in the week. A good volume of orders for foundry iron is coming out in this territory. A Cleveland automobile foundry has taken 4000 tons from a local furnace for first half delivery and a number of other sales are reported in lots up to 1000 tons. Southern iron is fairly active. A number of sales are reported for first half in lots up to 500 tons at $14.50, Birmingham, and one 650-ton lot at $15. A small amount of $14 Southern iron is still to be had for this year's delivery. We quote, delivered Cleveland, as follows:

Bessemer	$21.00
Basic	18.00
Northern No. 2 foundry	18.50
Southern No. 2 foundry	$18.50 to 19.00
Gray forge	18.50
Jackson Co., silvery, 8 per cent silicon	28.62
Standard low phos., Valley furnace	33.00

Coke.—There is some inquiry for furnace coke for prompt shipment, and consumers are having a great deal of trouble in picking up small lots because of the continued scarcity. There is practically no new demand for foundry grades. Standard Connellsville foundry coke is held at $3.25 to $3.50 per net ton at oven for prompt shipment and contract. We quote standard Connellsville foundry coke at $2.90 to $3 for prompt shipment.

Bolts, Nuts and Rivets.—The volume of bolt and nut specifications is not as heavy as a few weeks ago and makers are catching up somewhat on deliveries in some lines. The new demand is not quite as active as it has been. The production of rivet plants is being curtailed by the inability to secure shipments of steel. We quote rivets at 4c., Pittsburgh, for structural rivets and 4.10c. for boiler rivets. Bolt and nut discounts are as follows:

Common carriage bolts, ⅜ x 16 in., smaller or shorter, rolled thread, 70 and 5; cut thread, 40, 10 and 2½; larger or longer, 35 and 2½; machine bolts within h. p. nuts, ⅜ x 4 in., smaller and shorter, rolled thread, 60 and 10; cut thread, 50, larger and longer, 10 and 10; lag bolts, gimlet or coach point, 50 and 5; square h. p. nuts, blank or tapped, $2.50 off the list; hexagon h. p. nuts, blank or tapped, $2.70 off; c. p. c. and t. sq. nuts, blank or tapped, $2.40; hexagon nuts, all sizes, $2.80 off; cold pressed semi-finished hexagon nuts, all sizes, 60 and 5.

Finished Iron and Steel.—The delivery situation is more serious than at any previous time during the past few months. Some manufacturers have been forced to cut down production because of the lack of sufficient steel, and with mills unable to improve their deliveries this situation threatens to become worse. The scarcity of semi-finished steel continues. Several Ohio mills are in the market for additional tonnage of sheet bars for the last quarter. The Empire Rolling Mill Company, which was recently inquiring for sheet bars, has decided because of the condition of the market to further postpone the starting up of its new Cleveland sheet mill. A number of railroads have come into the market with tentative inquiries for rails for 1917 delivery, and there is a definite inquiry from the Ann Arbor road for 2500 tons. An industrial company has an inquiry out for 800 tons of standard rails for early delivery on which it has been quoted $50, Pittsburgh. The only new structural contract placed is for 500 tons for an addition to the plant of the Mansfield Sheet & Tin Plate Company, which was taken by the Massillon Bridge & Structural Company, Massillon, Ohio. The warehouse situation has become quite serious owing to the depletion of stocks and the inability to secure shipment from mills. This is particularly true of structural material. There is a possibility of an advance in some warehouse prices, particularly plates. The demand for plates continues very heavy and a local mill is now quoting a minimum of 4.25c., Pittsburgh, for early delivery. The volume of export plate business is heavy. Prices on steel bars and structural material for early shipment are firmer, a mill that is able to make fairly prompt deliveries now quoting bars at 2.75c. to 3c., Pittsburgh, and shapes at 2.85c. to 3c. The demand for black and galvanized sheets is more active. Black sheets are firm, and are generally quoted at 3c. to 3.15c. and higher, Ohio mill, for No. 28. We quote blue annealed sheets at 2.90c. to 3.10c. for No. 10, and galvanized at 4.15c. to 4.30c. for No. 28. Bar iron is quoted at 2.40c. to 2.50c., Cleveland. Warehouse prices are 3.25c. for structural material; 3.65c. for plates and 3.25c. for iron bars.

Old Material.—There is a decidedly better feeling in the scrap market and higher prices are being asked for several grades. Most of the activity is between dealers who are covering on old contracts on which they are short. However, some of the mills which have not been buying scrap for some time are now coming into the market. Not much scrap is being offered at the present time owing to the fact that producers are holding for higher prices and brokers are having difficulty in securing material to cover on contracts, and they are not eager to take on additional orders at the present time. They are offering $16.75 to $17 for heavy melting steel for round lots for Youngstown and Canton delivery but will pay only $16.50 for small tonnages. The demand for borings has improved. Some local demand has sprung up for busheling, which has been inactive for a number of weeks and sales have been made up to $13, or nearly $2 a ton higher than recent quotations. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton	
Steel rails	$15.25 to $15.75
Iron rails	18.50 to 19.00
Steel car axles	32.00 to 33.00
Heavy melting steel	15.75 to 16.25
Car wheels	12.75 to 13.00
Relaying rails, 50 lb. and over	25.00
Agricultural malleable	12.50 to 12.75
Railroad malleable	14.00 to 14.25
Steel axle turnings	12.00 to 12.50
Light bundled sheet scrap	12.00 to 12.25
Per Net Ton	
Iron car axles	$24.00 to $25.00
Cast borings	6.00 to 6.25
Iron and steel turnings and drillings	5.50 to 5.75
No. 1 busheling	12.75 to 13.00
No. 1 railroad wrought	15.50 to 16.00
No. 1 cast	13.00 to 13.50
Railroad grate bars	10.00 to 10.50
Stove plate	10.00 to 10.25

Birmingham

BIRMINGHAM, ALA., Sept. 18, 1916.

Pig Iron.—Making or selling pig iron is not the puzzle in the Southern field now; moving it is the problem. Lack of cars as well as dearth of ship-room has had much to do with postponement of a number of export shipments. Meanwhile, all operators agree that the market remains on a basis of $14.50 for spot and rest of year, with $15 asked, and sometimes obtained, for 1917. It is evident to some operators, who failed to make bookings at $14.50, that as low as $14 was done on a lot of new business early in the month. They, in turn, unite in making the statement that around the 15th of the month they heard no more of $14 metal, nor of anything done under $14.50. The leading interest is reported as having participated in very recent business at $14.50 and even $15, which ought to indicate the market, because it has not been an active solicitor. It develops that bookings of basic iron have been very large. Orders independent of the leading interest have perhaps been around 100,000 tons. The Anniston stack, recently blown in, is well booked for several months ahead on sales made at a minimum of $14 and a maximum of $15. A very large interest reports the sale of its make so far this month as well as for last month. Another interest made a variety of bookings at $14.50 and $15 for spot and the rest of the year. The market is quite firm. Export inquiry is active. The Tennessee Company is making ferromanganese at one of its Bessemer stacks. The large machine shops are taking quantities of iron and the foundry outlook is most promising. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	$15.00 to $15.50
No. 2 foundry and soft	14.50 to 15.00
No. 3 foundry	14.00 to 14.50
No. 4 foundry	13.75 to 14.25
Gray forge	13.50 to 14.00
Basic	14.50 to 15.00
Special	22.00 to 22.50

Coal and Coke.—There is only one cry of distress in the Southern coal field and that is the car shortage.

A leading steam coal operator places the betterment in demand at 40 per cent, others much lower, but all agree on a general improvement. Domestic mines have raised prices for fall and winter delivery. All coal that can be delivered is more or less at a premium. Coke suffers from the car shortage. The demand is as stiff as it has been for several months. Some furnace coke sold during the week at $3.75 per net ton at oven. Standard beehive foundry makes bring $4.25 and $4.50.

Cast-Iron Pipe.—The water and gas pipe factories are busy on a batch of small orders, but report a dearth of large business. The outgoing movement is quite heavy, and yards have now very little stock. Operations remain on the same basis as for months. Pipe for the oil fields is moving in quantities from the North Birmingham plant of the leading interest. The sani tary shops are running 60 per cent of capacity. We quote, per net ton, f.o.b. pipe shop yards, as follows, 4-in., $28; 6-in. and upward, $25, with $1 added for gas pipe.

Old Material.—Dealers are somewhat at a loss to account for the comparatively small demand, attributing it partly to the disappearance of the trade with Pennsylvania, incident to advanced freight rates. Wrought scrap is reported active, but other classes, although moving a trifle more liberally, are not going in quantities desired. Enormous accumulations of scrap at shrapnel mills is partly the cause of the backward conditions. Prices, however, are somewhat stiffer. We quote, per gross ton, f.o.b. Birmingham, dealers' yards, as follows:

Old steel axles	$25.00 to $30.00
Old steel rails	11.50 to 12.00
No. 1 steel	10.50 to 11.00
No. 1 wrought	12.50 to 13.00
No. 1 cast	10.50 to 11.00
Extra heavy cast	10.00 to 10.50
Stove plate and light	8.50 to 9.00
Carwheels	11.00 to 11.50
Tram carwheels	10.50 to 11.00

San Francisco

SAN FRANCISCO, CAL., Sept. 12, 1916.

The restoration, for the present at least, of stable traffic conditions has brought a much better feeling on this coast, and a seasonable resumption of activity in the jobbing movement of finished products has been noted since Sept. 1, notwithstanding the interruption of two holidays. Local building shows much improvement, and there is considerable special buying for municipal and large corporation requirements, as well as for marine work. On the other hand, specifications and mill bookings in several lines have fallen off, owing to the accumulation of stocks last month. Oriental inquiries are again on the increase. The Eastern steel mills generally have made a change in the terms of their contracts with Pacific coast buyers, stopping the former privilege of cancellation at will and requiring that the full tonnage contracted for be taken. This works a hardship on many manufacturers of this district, whose business is of such a nature that their requirements cannot be gaged accurately in advance. The change is regarded favorably by some of the merchants, however, on the ground that it discourages undesirable speculation by persons not regularly in the trade. As far as can be learned, no contracts have yet been made here for delivery next year.

Bars.—The recent improvement in building is stimulating the movement of reinforcing bars, concrete construction being used throughout in many manufacturing buildings now under way. Stocks of merchant bars are fairly large and jobbers are buying little from the mills, though the distributive trade is active. Specifications for both steel and iron bars are coming out well from the larger consumers, whose requirements are in many cases above normal. Foreign business is assuming more importance, though local mills are disposed to take care of their regular trade before booking further export orders. The jobbing prices remain at 4c. for steel and 3.90c. for iron bars.

Structural Material.—Bridge inquiries continue fairly numerous, with more in sight. Contracts for fabricated material for large buildings are appearing but slowly, though there is a good deal of tentative figuring. Most of the shops are now in fair shape, having considerable small work on hand. Contracts have been let for a lot of steel bridges near Baker City, Ore.; the Northwest Steel Company, Portland, has the fabricating contract for a new post office in that city; a contract has been let for a steel bridge at Klamath Falls, Ore., and Navajo County, Ariz., has let a number of bridge contracts to Mesmer & Rice and the Omaha Structural Steel Works. Bids will be taken Sept. 28 for a 108-ft. steel bridge in San Bernardino County, Cal. Plans have been submitted for a new $500,000 library for Stanford University. Frederick & Nelson, Seattle, Wash., are preparing to build a large department store. Plans are under way for a large steel-frame church on Filbert Street, this city.

Plates.—Shipbuilding requirements keep wide plates fairly well cleaned up, and new inquiries in this line are continually appearing. The small jobbing trade has revived in good shape. Riveted pipe business continues an important item, Los Angeles having just received new bids for pipe requiring nearly 8000 tons of plates and sheets. The local jobbing price remains at 4.75c.

Sheets.—Corrugated sheets still find very little demand, but flat galvanized sheets are moving much better in a distributive way, and black sheets also receive some attention. Blue annealed sheets continue in good demand for large pipe work and manufacturing requirements, with some improvement in the small trade. There is also a steadily increasing foreign demand.

Tin Plate.—The larger Pacific coast canning interests are beginning to make provision for the coming year's requirements, which in the case of Puget Sound salmon interests will be much heavier than this year. The placing of the business may be affected somewhat by the recent consolidation of several important canning interests. Some urgent inquiries are also appearing from Oriental packers, who want delivery before Jan. 1, but seem to have some difficulty in placing their orders.

Wrought Pipe.—The advance announced Sept. 7 has had little effect on local conditions. Oil-field business is in good shape, and the jobbing trade has improved slightly, but with rather heavy stocks in the hands of most merchants there is little new buying. A few good-sized municipal contracts have been placed.

Cast-Iron Pipe.—The postponement of the freight advance has, of course, suspended the high prices recently announced for Pacific coast points. Business is quiet, either from municipalities or corporations. Small inquiries are expected shortly for waterworks at Vallejo, Cal., and the local Presidio, and new bids are to be taken on a 4-in. line for the naval training station, Yerba Buena Island.

Pig Iron.—The recent heavy movement in anticipation of the expected freight advance has been followed by a practical cessation of new business, as there is an exceptionally heavy tonnage in melters' hands. Little revival is expected before November, though the foundries continue busy. Local agents quote No. 1 Southern foundry iron at $26.50 to $27 per gross ton.

Coke.—Most consumers have ordered out all the coke under contract, and now have enough to last practically for the rest of the year. There is accordingly little new business, and quotations are nominal.

Old Material.—Cast-iron scrap is moving to the foundries at about the same rate as for the past year, the demand being fairly active. Supplies are ample, however, and prices on ordinary offerings are around $16 per net ton, with some sales made above that figure. The principal consumers have their steel scrap requirements pretty well covered and are buying little. Such sales as are made are usually within the former range of $10 to $12 per gross ton.

Ferroalloys.—Both ferromanganese and ferrosilicon are moving out of stock in small quantities, with ade-

quate offerings for all present needs. The Noble Electric Steel Company is producing a limited quantity of silicomanganese and has just shipped an experimental carload to Liverpool, as there is no local market for this material at present.

New York

NEW YORK, Sept. 20, 1916.

Pig Iron.—Transactions have not been as large as in the preceding week, but there are indications that a number of the smaller foundries are looking about for their iron for the first half of 1917. This is true to some extent in New England, where the average foundry of small or moderate size has been carrying a good deal of pig iron in yard. One of the largest sales of the week was 5000 tons of malleable to a western New York railroad equipment company, deliveries being largely for this year. At Poughkeepsie a purchase of 2500 tons by a plow company is reported, though this was made nearly a fortnight ago. In New Jersey a foundry making furnace castings closed for 1500 tons for the first half, the business going to three or four furnaces. Another New Jersey sale was of 1200 tons, also for 1917. Virginia iron has not figured in transactions in this district, but the prices of Virginia furnaces range from $17.50 to $18.50 for No. 2 X at furnace. Foreign inquiry keeps up. England is still in the market for steel-making iron and there is some demand for foundry iron for western Europe. Vessel room is hard to get, apart from any question of rates. South America has bought some foundry iron in the past week. Some furnaces are rather firmer in their views and two Buffalo interests are now asking close to $19 for No. 2 X for forward delivery. We quote at tidewater for early delivery: No. 1 foundry, $20 to $20.50; No. 2 X, $19.50 to $20; No. 2 plain, $19.25 to $19.50; Southern iron at tidewater, $19.75 to $20.25 for No. 1 and $19.50 to $19.75 for No. 2 foundry and No. 2 soft.

Ferroalloys.—British producers of 80 per cent ferromanganese have reduced their quotation $10 per ton to $165, seaboard, but few sales by them are reported at the new price. The change has largely been caused, it is understood, by the fact that American producers have recently been offering and selling several thousand tons at $165, delivered. It is reported that domestic makers have now stiffened their quotations to $165, furnace. There are still inquiries in the market from both domestic and foreign consumers, but they are not large. About 200 tons was sold for foreign use. Spiegeleisen is quoted at $45, furnace, with little demand, though some domestic material is on the market. Ferrosilicon, 50 per cent, is strong. On a recent large foreign inquiry of 1000 tons, $98, New York, was bid. Spain and Italy are asking for ferrosilicon and other ferroalloys.

Finished Iron and Steel.—Signs point toward higher prices, at least such views are held by sellers. A continued inflow of inquiry helps to account for the attitude, though much of this proffered business is for far future delivery, as for ship-building purposes. All branches of the finished steel business do not show the same picture; indeed, in many lines 1917 buying is discouraged and in cases refused. Car buying by the railroads is looking upward and more tonnage jobs in structural steel are under consideration, but the steel trade does not find that the buyer has yet accustomed himself to think in terms of present price levels without comparison with the much lower ones of early 1915. The longer the wait the greater will be the volume of buying, it is held, when car purchases and building projects are no longer postponed. In foreign demand an inquiry for 35,000 tons of rails for France stands out, and tentative inquiries are noted for 10.000 to 20,000 cars for France and 12,000 cars for Italy. A sale of 2000 tons of 1½ and 2 in. angles for one of the European belligerents at 3.25c. at mill has been made. One mill has in the past week quoted on about 35,000 tons of ship plates for mid 1917 shipment, asking 4c., Pittsburgh. About 12,000 tons of structural steel work has been put under contract for sizeable jobs as enumerated below, and upward of 17,000 tons has come to light in the way of fresh undertakings. The largest single award involves about 6000 tons for the Paterno apartment superstructure, Grand Central terminal area, leaving the substructure, 3500 tons, still pending at this writing. The Passaic Structural Steel Company is to do this work and also 500 tons for the Campagna apartment, Ninety-fourth Street and West End Avenue. Large new work includes some 6000 tons for the Chester Waterside power station, Chester, Pa., for the Beacon Light Company and some 7500 tons for the New Haven's Thames River bridge, the latter an early expectation. It is understood that the mail and express building at the New York Central terminal area is shortly to have thirteen stories added, and the hotel in the same district is again being talked of. Bids go in on Sept. 28 for 1600 tons of subway work at the 239th Street yard and 1500 tons for the Racquet and Tennis Club is up for figures. The work closed includes also the following: 1100 tons to the Harris Silvers Baker Company for the Ferguson apartment, Amsterdam and Eighty-seventh Streets; 1000 tons, placed in the East, with the Wisconsin Bridge Company for the Federal Rubber Company, Cudahy, Wis.; 600 tons to A. E. Norton, Inc., for a Bing & Bing apartment, West Sixtieth Street; 800 tons to the Hinkle Iron Company for the Tishman apartment at Seventy-second Street and Lexington Avenue; 900 tons to Milliken Brothers, Inc., for a trade school for girls, and 600 tons to the New England Structural Company for the New England Telephone Company at Springfield, Mass. Two 250-ton jobs have also been closed; one for the Elmira Reformatory and the other for elevated railroad work at Eighth Avenue and 151st Street. We quote mill shipments of plain structural material at 2.769c. to 3.019c., New York, for delivery in two to three months. Steel bars are quoted at 2.769c. for delivery at convenience of the mill, and as high as 3.169c. for, say, three months, and limited largely to Bessemer steel; bar iron is quoted at 2.669c. and steel plates at 3.169c. to 4.169c., the wider the plates and the earlier the delivery the higher the price. Out of store shapes and iron and steel bars are quoted at 3.25c., New York; plates, 4c.

Old Material.—The demand is running largely to specialties. Iron rolling mills are fair buyers of wrought scrap, pipe and borings, while the only demand for steel scrap is from brokers who are resuming shipments to Pittsburgh. Heavy melting steel scrap for Pittsburgh shipment is bringing $13.25, New York. Blast furnaces are taking some mixed borings and turnings. Brokers quote buying prices for the Eastern trade about as follows to local dealers and producers, per gross ton, New York:

Heavy melting steel scrap (eastern Pennsylvania specifications)	$11.75 to $12.00
Old steel rails (short lengths or equivalent	12.50 to 12.75
Relaying rails	27.50 to 28.00
Relaying rails (for export)	30.00 to 32.00
Rerolling rails	17.00 to 17.25
Rerolling rails (for export)	19.00
Iron and steel car axles (for export)	35.00 to 37.00
No. 1 railroad wrought	19.00 to 19.25
Wrought-iron track scrap	15.50 to 16.00
No. 1 yard wrought, long	13.50 to 14.00
No. 1 yard wrought, short	11.75 to 12.00
Light iron (nominal)	3.50 to 4.00
Cast borings (clean)	6.75 to 7.00
Machine shop turnings (nominal)	4.50 to 4.75
Mixed borings and turnings (nominal)	4.50 to 4.75
Wrought pipe	12.00 to 12.50

Foundries are evidently somewhat better employed, as they are buying in larger volume. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

No. 1 cast (machinery)	$15.75 to $16.00
No. 2 cast (heavy)	14.00 to 14.50
Stove plate	11.50 to 12.00
Locomotive grate bars	10.00 to 10.50
Old carwheels (nominal)	15.00
Malleable cast (railroad)	12.00 to 12.50

Cast-Iron Pipe.—No special feature has marked the business of the past week. Municipal lettings are conspicuous by their absence and private buying has not been especially heavy. The long looked for advance has

materialized, and carload lots of 6-in., class B and heavier, are now quoted at $31.50 per net ton, tidewater, class A, and gas pipe taking an extra of $1 per ton.

British Steel Market

Foundry Pig Iron Easier but Hematite Scarce—American Billets Slow

(*By Cable.*)

LONDON, ENGLAND, Sept. 20, 1916.

The position of Cleveland foundry pig iron is easier and the embargo has been removed on sales to Scotland. Forge iron is slow and makers are accumulating stocks. The hematite scarcity is intense. American billets are slow, with 4-in. quoted at $68 to $70 for January-March delivery c.i.f. Liverpool; but the stiff terms are discouraging business. Tin plates are dull and practically unchanged. We quote as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 33s. to 35s.
Steel black sheets, No. 28, export, f.o.b. Liverpool, £20 5s.
Steel ship plates, Scotch, delivered local yards, £13 17s. 6d.
Steel rails, export, f.o.b. works, £10 17s. 6d.
Hematite pig iron, f.o.b. Tees, about 140s.
Sheet bars (Welsh) delivered at works in Swansea Valley, £10 7s. 6d.
Steel bars, export, f.o.b. Clyde, £18.
Ferromanganese (nominal), £35.
Ferrosilicon, 50 per cent, c.i.f., £27.

Buffalo

BUFFALO, N. Y., Sept. 19, 1916.

Pig Iron—The market is very strong for all grades, but particularly for steel-making irons. Malleable also shows an increased demand. A considerable tonnage of the various grades has been sold during the week, taking into account the fact that most producing interests are well sold up and not soliciting business. Sales included 2000 tons of Bessemer at $22 at furnace and smaller quantities of forge iron at $19 at furnace. A large number of inquiries are still before the market and are likely to materialize into orders—as far as they can be accommodated by furnaces—before the end of the week. Some makers report that shipping instructions for iron under contract are in excess of their ability to meet the demands made. We quote as follows, f.o.b. furnace, Buffalo, for delivery to and including the first half of 1917:

No. 1 foundry	$19.00 to $20.00
No. 2 X foundry	19.00 to 19.50
No. 2 plain	19.00 to 19.25
No. 3 foundry	19.00
Gray forge	19.00
Malleable	19.25 to 19.50
Basic	19.00 to 20.00
Bessemer	22.00
Charcoal, regular brands and analysis	21.00 to 22.00

Old Material.—The demand continues strong in nearly every line. Heavy melting steel is still leading, with increased dealings in wrought and cast scrap. Steel axles for export continue in great demand. The price for iron axles has this week advanced to the same price as for steel axles. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	$15.50 to $16.00
Low phosphorus steel	20.00 to 20.50
No. 1 railroad wrought scrap	17.50 to 18.00
No. 1 railroad and machinery cast scrap	15.50 to 16.00
Steel axles	32.00
Iron axles	32.00
Carwheels	13.00 to 13.50
Railroad malleable	15.50 to 16.00
Machine shop turnings	6.00 to 6.50
Heavy axle turnings	12.00
Clean cast borings	7.50 to 7.75
Iron rails	18.00 to 18.50
Locomotive grate bars	11.50 to 12.00
Stove plate (net ton)	11.50 to 12.00
Wrought pipe	12.00 to 12.50
Bundled sheet scrap	11.50 to 12.00
No. 1 busheling	13.00 to 13.50
No. 2 busheling	11.00 to 11.50
Bundled tin scrap	15.00 to 15.50

Finished Iron and Steel.—Inquiry for finished material, both in the form of open orders and outright contracts, has increased. The general situation is stronger than it has been at any time so far. Mills are turning down business right along, not being in position to take forward contracts. If the books were opened a flood of orders could be secured. Considerable activity is being displayed in cold-rolled steel, which has had a tendency to advance. Plates are almost unobtainable at any price. There has been considerable activity in inquiry from Canadian users of wire rods. The Buffalo Structural Steel Company will supply the steel for a movable tower for the new Central Elevator on the Buffalo River, about 150 tons.

Iron and Industrial Stocks

NEW YORK, Sept. 20, 1916.

Not for a long time has the stock market been so active as for the most part of the past week. Prices rose sharply on many securities, Steel Corporation common and Republic common, as well as a few others, making new high records. Profit taking caused some recessions on Monday of this week. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com.	24¼ - 27¼	Pressed Stl., pref	100 - 103
Allis-Chal., pref.	70¼ - 82	R. Steel Spring, com.	61¼ - 64½
Am. Can, com.	63 - 66⅞	Ry. Steel Spring, com.	100¾ - 101¾
Am. Can, pref.	112 - 113	Republic, com.	63¾ - 69¾
Am. Car & Fdy., com.	63 - 68¾	Republic, pref.	110¼* - 116
Am. Car & Fdy., pref.	115¾ - 116½	Sloss, com.	57¼ - 60⅜
Am. Loco., com.	78 - 83½	Sloss, pref.	97¼ - 98½
Am. Loco., pref.	104½ - 106⅞	Tob. com.	22 - 23
Am. Steel Fdries.	57 - 60¾	Tob. pref.	94 - 95⅝
Bald. Loco., com	81¾ - 92	U. S. Steel, com.	104 - 109¼
Bald. Loco., pref	106 - 106½	U. S. Steel, pref.	119 - 121⅛
Beth. Steel, com.	525 - 580	Va. I. C. & Coke.	54 - 58½
Case (J. I.), pref	84	Westing. Elec.	62⅜ - 64¼
Colorado Fuel	54½ - 56¾	Am. Rad., com.	399 - 400
Deere & Co., pref	90 - 92	Am. Ship, com.	49 - 50½
Gen. Electric	170 - 174½	Am. Ship, pref.	94
Gt. No. Ore Cert.	111¼ - 114¾	Chic. Pneu. Tool.	73 - 76½
Int. Harv. of N. J., com.	116 - 118	Lake. Sup. Corp.	111½ - 115
Int. Harv. of N. J., pref.	117⅞ - 119¾	Warwick	9¾
Int. Harv. Corp., com.	77⅝ - 78	Crue. Steel, com.	82⅜ - 97½
Int. Harv. Corp., pref.	108 - 109	Crue. Steel, pref.	117 - 120¾
Lacka. Steel	838½ - 864	La Belle Iron, com.	59¼ - 62
Nat. En. & Stm., com.	274½ - 311	Can. Car & Fdry., pref.	72 - 80
Nat. En. & Stm., pref.	95	Carbon. Stl., com.	86 - 90
N. Y. Air Brake	139¾ - 146	Central Foundry, com.	12 - 13½
Pitts. Steel, pref.	99 - 101½	Central Foundry, pref.	23 - 29
Pressed Stl., com.	58 - 61	Driggs-Seabury	80 - 110¾
		Midvale Steel	694 - 744

*Ex-dividend

Dividends

The directors of the Lackawanna Steel Company, at a meeting Sept. 13, being advised that the company had paid off all of the moneys borrowed in connection with the redemption on March 31 last of the company's two year 6 per cent notes, thus completing the payment during the past two years of $10,000,000 face value of funded indebtedness, and that the company was now free of floating indebtedness, and that the privilege of discounting payments for current supplies was being regularly availed of, felt, that in view of the large current earnings it was proper to begin distributions to the stockholders. They therefore declared out of surplus net earnings of the company a dividend of 6 per cent on the common stock, payable in four quarterly instalments on Sept 30 and Dec. 30, 1916, and March 31 and June 30, 1917.

The Westinghouse Air Brake Company, regular quarterly, $2 per share, payable Oct. 21.

The Union Switch & Signal Company, regular quarterly, $1.50 per share each on the common and preferred stocks, payable Oct. 14.

The Brier Hill Steel Company, regular quarterly, 1¾ per cent on the preferred and 1½ per cent on the common stock.

The Gulf States Steel Company, initial quarterly, 2 per cent on the common stock, payable Jan. 2. This pays the stock on a 5 per cent basis. The directors also declared an additional 2 per cent on the second preferred stock, half of which is payable Nov. 1 and half Feb. 1.

The American Brake Shoe & Foundry Company, regular quarterly, 1¾ per cent on the common and 2 per cent on the preferred stock, payable Sept. 30.

The Toledo Machine & Tool Company, extra of 3 per cent in addition to the regular monthly dividend of 2 per cent.

The Billings & Spencer Company, regular quarterly, 2 per cent, and extra 3 per cent, payable Oct.

The Crucible Steel Company of America, [illegible] per cent on account of the accumulated dividends on the preferred, payable Oct. 1.

The Wheeling Steel & Iron Company, 3 per cent, payable Sept. 30.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, effective from April 10, 1916, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c.; Pacific coast (by rail only), 65c.

Structural Material.—I-beams, 3 to 16 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 2.60c. to 2.75c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs	.10
Angles, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.60
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.00
No charge for cutting to lengths 3 ft. and over	

Plates.—Tank plates, ¼ in. thick, 6 in. up to 100 in. wide, 3c. to 4c., base, net cash, 30 days, or ½ of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras

	Cents per lb.
Tank steel	Base
Flanging steel (not flange steel for boilers)	.10
Boiler and flange steel plates	.15
"A. B. M. A." and ordinary firebox steel plates	.20
Still bottom steel	.50
Locomotive firebox steel	.50
Marine steel, special extras and prices on application	

Gage Extras

	Cents per lb.
Rectangular, 1¼ in. thick, over 6 in. wide to 100 in. wide	Base
Lighter than ¼ in., to 3/16 in., up to 72 in. wide	.10
*Lighter than ¼ in., including 3/16 in., over 72 in. to 84	.20
*Lighter than ¼ in., including 3/16 in., over 84 in. to 96	.30
*Lighter than ¼ in., including 3/16 in., over 96 in. to 100	.40
*Lighter than ¼ in., including 3/16 in., over 100 in. to 102	.45
Lighter than 3/16 in., including No. 8, up to 72 in. wide	.15
*Lighter than 3/16 in., including No. 8, over 72 in. to 84	.25
*Lighter than 3/16 in., including No. 8, over 84 in. to 96	.35
Lighter than No. 8, including No. 10, up to 60 in. wide	.20
Lighter than No. 8, including No. 10, over 60 in. to 64	.35
Up to 72 in. and not less than 10.2 lb. per sq. ft. will be considered ¼ in.	
Over 72 in. must be ordered ¼ in. thick or edge, or not less than 11 lb. per sq. ft. to take base price.	
Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.	
Over 72 in., ordered weight 3/16 in., take No. 8 price	
Over 72 in., ordered weight No. 8, take No. 10 price	

Width Extras

Over 100 in. to 110 in. inclusive	.05
Over 110 in. to 115 in. inclusive	.10
Over 115 in. to 120 in. inclusive	.15
Over 120 in. to 125 in. inclusive	.25
Over 125 in. to 130 in. inclusive	.35
Over 130 in.	.50

Length Extras

Universal plates 80 ft. long up to 90 ft. long	.05
Universal plates 90 ft. long up to 100 ft. long	.10
Universal plates 100 ft. long up to 110 ft. long	.50

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over	
Lengths under 3 ft. to 2 ft. inclusive	.25
Lengths under 2 ft. to 1 ft. inclusive	.50
Lengths under 1 ft.	1.00
Circles 3 ft. in diameter to 100 in.	.50
Circles over 100 to 110 in. (width extra)	.55
Circles over 110 to 115 in. (width extra)	.60
Circles over 115 to 120 in. (width extra)	.65
Circles over 120 to 125 in. (width extra)	.75
Circles over 125 to 130 in. (width extra)	.85
Circles over 130 in. (width extra)	1.00
Circles under 3 ft., to 2 ft., inclusive	.60
Circles under 2 ft. to 1 ft. inclusive	.80
Circles under 1 ft.	1.00
Half circles take circle extras	
Sketches, not over four straight cuts, no straight taper	.15
Sketches having more than four straight cuts	.25
Plates sheared to a radius take complete circle extras	

*Including extra for width.

Wire Rods.—Including chain rods, $55 to $60.

Wire Products.—Prices to jobbers effective Aug. 5: Fence wire, Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, $2.55; galvanized, $3.25. Galvanized barb wire and staples, $3.45; painted, $2.75. Wire nails, $2.60. Galvanized nails, 1 in. and longer, $2 advance over base price; shorter than 1 in., $2.50 advance over base price. Cement-coated nails, $2.50. Woven wire fencing, 60 per cent off list for carloads, 59 off for 1000-rod lots, 58 off for less than 1000-rod lots.

The following table gives the price per 100 lb. to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	6 to 9	10	11	12&12½	13	14	15	16
Annealed	$2 60	$2 65	$2 70	$2 75	$2.85	$2 95	$3.05	$3.15
Galvanized	3 30	3.35	3 40	3 45	3 55	3.65	4 10	4 20

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect on black pipe from Sept. 7, 1916, and on galvanized pipe from July 24, 1916, all full weight:

Butt Weld

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
⅛, ¼ and ⅜	62	37½	⅛ and ¼	51	24
½	66	51½	⅜	52	25
¾ to 3	69	55½	½	56	38
			¾ to 1½	59	43

Lap Weld

2	63	50½	1¼	46	31
2½ to 6	66	53½	1½	52	38
7 to 12	63	49½	2	53	39
13 and 14	63½		2½ to 4	55	42
15	51		4½ to 6	55	42
			7 to 12	54	41

Reamed and Drifted

1 to 3, butt	67	53½	¾ to 1½, butt	54	37
2, lap	61	48½	1¾, lap	41	25
2½ to 6, lap	64	51½	1½, lap	47	32
			2, lap	48	33
			2½ to 4, lap	51	36

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	58	40½	⅛, ¼ and ⅜	51	34
½	63	50½	½	56	43
¾ to 1½	67	54½	¾ to 1½	60	45
2 to 3	68	55½			

Lap Weld, extra strong, plain ends

2	61	49½	1¼	48	33
2½ to 4	64	52½	1½	53	39
4½ to 6	63	51½	2	59	42
7 to 8	59	47½	2½ to 4	57	45
9 to 12	54	40½	4½ to 6	56	44
			7 to 8	50	38
			9 to 12	45	33

Butt Weld, double extra strong, plain ends

¼	54	43½	½	43	31
⅜ to 1½	57	46½	¾ to 1½	46	34
2 to 2½	59	48½			

Lap Weld, double extra strong, plain ends

2	53	43½	1½	42	30
2½ to 4	55	45½	2	42	30
4½ to 6	54	44½	2½ to 4	44	35
7 to 8	49	39½	4½ to 6	43	34

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts on less than carloads, freight to destination added, effective from Sept. 7, 1916, are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1½ in.	.33	1½ in.	.25
1¾ and 2 in.	45	1¾ and 2 in.	.37
2¼ in.	.42	2¼ in.	.34
2½ and 2¾ in.	.48	2½ and 2¾ in.	.40
3 and 3½ in.	.53	3 and 3½ in.	.45
3½ to 4½ in.	.54	3½ to 4½ in.	.46
5 and 6 in.	.47	5 and 6 in.	.39
7 to 13 in.	.44	7 to 13 in.	.36

Locomotive and steamship special charcoal grades bring higher prices.

1¼ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Sheets.—Makers' prices for mill shipments on sheets of U. S. standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Blue Annealed Sheets

	Cents per lb.
Nos. 3 to 8	2.85 to 2.95
Nos. 9 and 10	2.90 to 3.00
Nos. 11 and 12	2.95 to 3.05
Nos. 13 and 14	3.00 to 3.10
Nos. 15 and 16	3.10 to 3.20

Box Annealed Sheets, Cold Rolled

Nos. 17 to 21	2.70 to 2.80
Nos. 22 and 24	2.75 to 2.85
Nos. 25 and 26	2.80 to 2.90
No. 27	2.85 to 2.95
No. 28	2.90 to 3.00
No. 29	2.95 to 3.05
No. 30	3.15 to 3.25

Galvanized Sheets of Black Sheet Gage

Nos. 9 and 11	3.15 to 3.25
Nos. 12	3.25 to 3.35
Nos. 13 and 14	3.25 to 3.35
Nos. 15 and 16	3.40 to 3.50
Nos. 17, 18 and 19	3.55 to 3.65
Nos. 20 and 21	3.70 to 3.80
Nos. 22, 23 and 24	3.85 to 3.95
No. 27	4.00 to 4.10
No. 28	4.15 to 4.25
No. 29	4.30 to 4.40
No. 30	4.55 to 4.65

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin,	Lead		Spelter	
Sept	Lake	Electro-lytic	New York	New York	St. Louis	New York	St. Louis
13	28.00	28.25	38.75	6.75	6.65	9.37½	9.12½
14	28.00	28.25	38.50	6.75	6.65	9.50	9.25
15	28.00	28.37½	38.50	7.00	6.85	9.50	9.25
16	28.25	28.37½		7.00	6.85	9.50	9.25
18	28.25	28.37½	38.25	7.00	6.85	9.62½	9.37½
19	28.25	28.50	38.50	7.00	6.85	9.75	9.50

NEW YORK, Sept. 20, 1916.

Copper continues in active demand; nearby is scarce and higher. Tin has been quiet, but a busier market is indicated. Lead has advanced sharply on all sides, but is now more settled. A good business has been done in spelter, which caused moderate advances. Antimony shows no life.

New York

Copper.—Prices are difficult to determine because of their variation and the large amount of business that has been done very quietly. In the past few days orders for at least 40,000 tons of brass rods and disks have been placed, and the makers have covered their requirements for the material. Nearby metal is scarce, and one producer has announced his withdrawal from the market for the remainder of the year. For the first half of 1917 he asks 27.50c. for electrolytic. Others offer electrolytic at 28c., December delivery, while still others quote 27.75c. to 28c. for the same position and nearby at 28.50c. to 29c. First quarter ranges from 27.50c. to 28c. Lake is entirely nominal, the producers being sold out for the remainder of the year. Altogether a business running into many millions of pounds has been done in the past 10 days. The London market for electrolytic is stronger at £130 10s., against £132 a week ago. The exports of the month, including yesterday, total 16,310 tons. Stock in France and Great Britain on Sept. 15 amounted to 7118 tons, against 7514 tons Sept. 1, a decrease of 396 tons.

Tin.—For the most part the market has been quiet. It is firm, however, and the undertone is good. That a buying movement is not far off is generally held by the trade for several reasons. One is that there has been no lively buying for a long time, and meanwhile old contracts are being liquidated and stocks used up. It is felt that consumers must soon replenish their supplies. On Sept. 13 a moderate amount of interest was shown in futures and some sales resulted. On Monday probably 100 tons of metal changed hands, including spot Straits and Banca, and a little from the Far East. Yesterday the demand for futures was good, but little business resulted, for the reason that sellers would not meet buyers. The arrivals this month total 1590 tons, and there is afloat 3590 tons. The quotation for spot Straits yesterday was 38.50c.

Spelter.—In the past day or two the market has been comparatively quiet, but last week a heavy business was done, a concomitant of the buying of copper by the makers of brass rods and disks. Considering the large quantity of the metal which has been purchased recently, it is considered remarkable that prices have not gone to a higher level than was reached. The quotations for prompt yesterday were 9.75c., New York, and 9.50c., St. Louis. Fourth quarter is held around 9.37½c., St. Louis, and first quarter at 9c., St. Louis. All grades have been active, especially choice brands and prime Western. A good deal of the latter is now being used by the brass mills, which find it satisfactory for certain grades of brass products. The exports continue heavy, those of the month, including yesterday, amounting to 6723 tons.

Lead.—Twice in the week the American Smelting & Refining Company advanced its quotation. On Sept. 14 it raised its New York quotation from 6.50c. to 6.75c., and yesterday it made a further advance to 7c. Up to the time when 6.75c. was passed by the leading interest a heavy business was done, nearly everyone sharing in the activity, but since then, while some good sales are being made, the market has become somewhat spotty. Late last week many sales were made under the surface, the bulk being for prompt and September delivery, to domestic buyers. October sold well also, commanding up to 6.70c., New York. The leading producer at this time was unwilling to sell for October except at an average price. Independent makers have been getting premium prices for some time, and this is held accountable for the advances referred to. They occasioned no surprise, except that it had been wondered why they had not come earlier. Yesterday independents were asking 7c. to 7.10c., New York, and 6.85c., St. Louis. The exports are light, amounting this month, including yesterday, to 771 tons.

Antimony.—The market has continued stagnant. Oriental grades are to be had at 11c., duty paid.

Aluminum.—The market is a little stronger, No. 1 virgin metal, 98 to 99 per cent pure, commanding 61c. to 63c.

Old Metals.—The market continues active. Dealers' selling prices, which are higher, are as follows:

	Cents per lb.
Copper, heavy and crucible	26.00 to 27.00
Copper, heavy and wire	24.00 to 25.00
Copper, light and bottoms	23.00 to 24.00
Brass, heavy	14.00 to 15.00
Brass, light	11.00 to 12.00
Heavy machine composition	19.50 to 20.00
No. 1 yellow rod brass turnings	14.00 to 15.00
No. 1 red brass or composition turnings	16.00 to 17.00
Lead, heavy	6.25
Lead, tea	5.75
Zinc	5.00 to 5.50

Chicago

SEPT. 18.—Sharp advances in copper and lead as the result of large purchases at the end of the week have featured the market. Tin has been somewhat neglected with a tendency toward price shading. We quote: Casting copper, 26.375c.; Lake copper, 28.25c.; tin, carloads, 39c., and small lots, 41c.; lead, 6.75c. to 6.90c.; spelter, 9.50c.; sheet zinc, 15c.; Cookson's antimony, 50c.; other grades, 14c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 19.50c.; copper bottoms, 17.75c.; copper clips, 18.50c.; red brass, 17c.; yellow brass, 13c.; lead pipe, 5.25c.; zinc, 6c.; pewter, No. 1, 28c.; tinfoil, 33c.; block tin pipe, 37c.

St. Louis

SEPT. 18.—Non-ferrous metals have been quiet, closing to-day as follows: Lead, 6.75c. to 6.80c.; spelter, 9c. to 9.25c.; tin, 41½c.; Lake copper, 29c.; electrolytic copper, 28½c.; antimony, 12 to 12½c. In the Joplin ore district the tone was firmer, with zinc blende ranging from $65 down to $50 per ton, with the average for the week $57.50; calamine, $30 to $40, with the average for the week, $39; lead ore, $70, with a few sales reported as high as $75. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 9c.; heavy yellow brass, 12c.; heavy red brass and light copper, 17c.; heavy copper and copper wire, 19c.; zinc, 6c.; lead, 5c.; tea lead, 3.50c.; pewter, 25c.; tinfoil, 31c.

New Export Company Organized

O. Kafka has resigned from the American Steel Export Company and has established the Vulcan Steel Products Company, with offices at 120 Broadway, New York, to carry on a general export business in iron and steel and to represent several independent mills. Salesmen have been engaged to go to various European countries, where they will open offices. Mr. Kafka was associated with the Cambria Steel Company officers who established the American Steel Export Company. The export company became independent of the Cambria Steel Company when the latter was taken over by the Midvale Steel & Ordnance Company.

Another industrial building, for the use of small manufacturers, may be built in Baltimore. Two such buildings have been erected and all the space in them is taken. A. S. Goldsborough, secretary of the Factory Site Commission, City Hall, Baltimore, is seeking capital for the third.

PERSONAL

Important changes in the operating departments of the Ohio works of the Carnegie Steel Company at Youngstown, Ohio, will go into effect Oct. 1. W. E. Donaldson, superintendent of transportation and labor, and for three years in charge of the commercial slag department, will be made special agent for the United States Steel Corporation, and will be placed in charge of the slag department, with headquarters with the Carnegie Company, Pittsburgh. William Griffin, chief of the company's safety department in the Youngstown district for the past eight years, will succeed Mr. Donaldson. Mr. Griffin will be succeeded in the safety department by George Davis, formerly employed in the safety department at the Ohio works, and for some years with the safety department of the company at Sharon and Farrell, Pa., but more recently employed by Worth Bros. Company, Coatesville, Pa. The commercial slag department of the United States Steel Corporation is a new enterprise that has grown up within the past six years, as a result of the good roads movement and the recognized superiority of crushed furnace slag to sand and gravel in such construction.

Homer C. Johnstone, formerly with the Midvale Steel Company, has been appointed manager of the steel department of Gaston, Williams & Wigmore, Inc., 140 Broadway, New York. He served for 14 years as manager of the Chicago and New York offices of the Midvale company.

Elmer E. Yake, Annville, Pa., has been made works engineer for the Gilbert & Barker Mfg. Company, Springfield, Mass. He is a graduate of Lehigh University and was formerly connected with the Maryland Steel Company and the Pennsylvania Steel Company, but more recently with the American Iron & Steel Mfg. Company, Lebanon, Pa.

Walter V. Hill, secretary-treasurer of the S. G. V. Automobile Company, Reading, Pa., has been appointed purchasing agent for the Curtiss Aeroplane Corporation, Buffalo, N. Y.

F. Hallett Lovell, Jr., for many years president and principal owner of the Lovell-McConnell Mfg. Company, Newark, N. J., maker of the Klaxon automobile horn, having sold his interest in the company to the United Motors Company, will remain as a director, but his time will be chiefly devoted to the other manufacturing concerns in which he is interested, among them F. H. Lovell & Co., Arlington, N. J., maker of marine and railroad supplies, of which he is president and principal owner.

J. S. Norris has been appointed sales representative of the Cincinnati Screw Company, Cincinnati, Ohio, and will have offices in the Galt House at Sixth and Walnut Streets. The company's plant is located at Twightwee, Ohio, a Cincinnati suburb.

C. J. Barr, superintendent of the steel plant and furnace divisions of the Tennessee Coal, Iron & Railroad Company at Ensley, Ala., has resigned to accept the management of the Algoma steel mills at Algoma, Ont., Canada. He is succeeded by W. G. Mathias, assistant general superintendent, who went to Birmingham from the Illinois Steel Company. Karl Landgrabe, superintendent of blast furnaces, succeeds Mr. Mathias and is in turn succeeded by W. H. Oldham, superintendent of the company's blast furnaces at Bessemer, Ala., while Superintendent Ledbetter of the Oxmoor furnaces succeeds Mr. Oldham.

The Milwaukee Refrigerator Transit & Car Company, Milwaukee, announces that, effective Sept. 15, the office of traffic manager is abolished. J. J. O'Connor is appointed assistant general manager, in charge of the operating department, and G. G. Allen, assistant general manager, in charge of the manufacturing department.

Franklin G. Hubbard, who for 18 years has been connected with the engineering department of the Western Electric Company's plant at Hawthorne, Ill., has resigned to become associated with the H. E. Harris Engineering Company, Bridgeport, Conn., engineer, designer and maker of special machines, dies and tools. He becomes vice-president of the latter company, and its plant will be under his supervision.

W. H. Eulass, who has been with Joseph T. Ryerson & Son for 17 years, and for the past 4 years manager of the New York office, has resigned, and on Oct. 1 will become connected, in an executive capacity, with the Jewel Tea Company, of which he has been made a director. He entered the employ of Joseph T. Ryerson & Son as a salesman, then becoming general superintendent. In the latter position he had charge of the construction of the Chicago warehouse, one of the best in design and equipment in the country.

George M. Judd has been elected secretary of the American Brake Shoe & Foundry Company, succeeding Henry C. Knox, resigned. Mr. Knox will remain as treasurer.

A. L. Humphrey, vice-president and general manager Westinghouse Air Brake Company, Wilmerding, Pa., has been elected a director and member of the executive committee of the Union Switch & Signal Company, Swissvale, Pa.

S. S. Bean, Winnipeg, Can., has been appointed sales manager of the Janesville Machine Company, Janesville, Wis., succeeding Charles S. Slaker, who resigned to become sales manager of the Stover Engine & Mfg. Company, Freeport, Ill.

Joseph Devereaux, some 20 years with the New York sales office of the Cambria Steel Company, has joined the staff of the American Steel Export Company, Woolworth Building, New York.

F. W. Beach, formerly sales manager of the Massillon Rolling Mill Company, Massillon, Ohio, has been appointed general manager of the La Salle Steel Company, Chicago.

Effective Oct. 1, Joseph T. Ryerson & Son announce the appointment at their New York office of H. B. Heneage as New York sales manager of the commercial division and H. A. Gray as New York sales manager in the railroad and machinery division.

H. L. Lautenschlaeger has been appointed head of the material-follow division of the purchasing department of the Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa.

Archibald G. Smith, general superintendent of the open-hearth steel plant of the Youngstown Iron & Steel Company, Youngstown, Ohio, has resigned, and it is stated will go with the Trumbull Steel Company, Warren, Ohio, which is considering the building of an open-hearth steel plant to supply steel for its sheet and tinplate mills. His successor has not yet been appointed.

Combustion Engineering Salesmen Meet

A meeting of the sales managers and executives of the Combustion Engineering Corporation, 11 Broadway, New York, manufacturer of Type E stokers, Coxe stokers and Grieve grates, was held Sept. 15 and 16. The meeting was called by George E. Learnard, vice-president, in order to enable the men who are directing the sales effort of the company to become more thoroughly acquainted, interchange ideas and become more familiar with a number of recent improvements which have been made in the company's products.

After a meeting lasting from 9 a. m. on Friday until after 5 p. m., a complimentary dinner was given by Mr. Learnard at Sherry's, after which the party attended the New Amsterdam Theatre as his guests. The business meeting was continued on Saturday with short talks by the Chief Engineer, John Van Brunt, and Mr. Learnard, as well as several of the representatives. Those present were: R. C. Beadle, E. H. Finlayson, M. L. Schulte, George Bechtel, C. L. Bachmann, J. C. Brennan, J. M. Hopwood, A. E. Weicket, J. Van Brunt, E. P. Meritz, John Morris, John Morris, Jr., H. Schied, W. S. Robertson, R. H. King, G. E. Learnard, J. V. Santry, J. Hagan, H. T. Thompson, H. H. Leathers, J. T. Beard, Jr., J. D. Harrison, L. E. Pollard, M. P. Talmage, A. B. Natcher and H. E. Kleffel.

Safety Congress; Iron and Steel Section

The National Safety Congress has an attractive program for its fifth annual safety congress to be held in Detroit, Oct. 17 to 20. There are 40 pages, scheduling papers and discussions, and 140 speakers will take part. Every field is included in which safety first has any place, and the results of the deliberations are expected to be important. The program for the iron and steel section on Thursday and Friday mornings, Oct. 19 and 20, is as follows:

"Achievements and Possibilities of Accident Prevention in American Industries," by Dr. F. L. Hoffman, statistician, Prudential Life Insurance Company, Newark, N. J.

"Employment," by A. H. Young, superintendent of labor and safety, Illinois Steel Company, South Chicago, Ill.

Discussion by J. M. Larkin, secretary steels committee, Fore River Shipbuilding Company, Quincy, Mass.

"Origin of Safety Methods and Prevention of Infection," by Dr. C. C. Booth, chief surgeon, Republic Iron & Steel Company, Youngstown, Ohio.

Discussion by Dr. L. A. Shoudy, chief surgeon, Bethlehem Steel Company, South Bethlehem, Pa.

"The Duties of the Visiting Nurse," by Miss Florence Wright, Clark Thread Company, Newark, N. J.

"Safety in Rolling Mill Operations," by Charles R. Hook, general superintendent, American Rolling Mill Company, Middletown, Ohio.

Discussion by P. R. Baker, assistant general superintendent, Lukens Iron & Steel Company, Coatesville, Pa.

"Electric Hazards," by D. M. Petty, superintendent electrical department, Bethlehem Steel Company, South Bethlehem, Pa.

Discussion by S. C. Coey, assistant master mechanic, Youngstown Sheet & Tube Company, Youngstown, Ohio.

"Safety in Coke Oven Operations," by K. M. Burr, safety inspector, Illinois Steel Company, Gary, Ind.

General discussion.

"Police and Fire," by G. W. Atwood, Youngstown Sheet & Tube Company, Youngstown, Ohio.

Report of nominating committee and election of officers.

Employers' Association of Rhode Island

A group of 146 employers, representing more than 50 different industries and employing more than 60,000 hands, at a meeting in Providence, R. I., Sept. 14, organized the Employers' Association of Rhode Island. It will have permanent offices at 421 Butler Exchange Building, Providence. The following declaration of principles was adopted:

We stand primarily for law, order and industrial peace, but oppose all oppressive restrictions which retard progress and interfere with the individual liberty of the employer as well as the employee.

We stand for the open shop and oppose limitations of output, restriction as to the use of tools, machinery or material except such as are unsafe.

We oppose the boycott, the sympathetic strike and the compulsory use of the union label.

We recognize the right of the employee to organize, but hold that any such organization should not interfere with the right of the individual to work as he sees fit.

The officers elected for the coming year are as follows: President, M. J. Houlihan; vice-president, Webster Knight; secretary, E. L. Walker, Jr.; treasurer, Frederick A. Ballou. Board of Managers, Henry D. Sharpe, John P. Farnsworth, L. W. Downes, Walter A. Field, R. W. Reid, W. C. Fisher, T. W. Waterman, Henry S. Chaffee and William L. Sweet.

Norway's Copper Supply

Information has just reached the U. S. Department of State to the effect that an agreement has been entered into between the governments of Great Britain and Norway whereby the latter places an embargo on the exportation of raw copper and receives uninterruptedly copper importations from the United States but releases an amount equivalent to such importations for shipment to England. The amount at once available is said to be 3000 tons.

The Brown & Sharpe Mfg. Company, Providence, R. I., has opened an office in Pittsburgh, Pa. in room 2538, Henry W. Oliver Building. This office will be in charge of J. F. Lyon.

OBITUARY

MATHIAS PFATISCHER, consulting engineer of the Electro Dynamic Company, Bayonne, N. J., died in Roselle, N. J., Sept. 10, after having been with the company for 27 years. He was an electrical engineer and a prominent inventor. He invented the electric steering gear, with which battleships, naval cruisers and other vessels are equipped. He designed the electrical equipment on the first two large steamships built in the United States, the St. Louis and St. Paul, which included several novel features, such as the electric ship telegraph, propeller shaft electrical revolution indicators and electric rudder indicator, also being the originator of running wires in conduit aboard steamships, etc. He was instrumental in developing a single phase alternating current motor about 18 years ago, which is known to-day as the Wagner a. c. motor. In 1904 he invented the inter-pole variable speed motor, which revolutionized the design of direct current motors, and in 1908 was awarded the John Scott Medal by the Franklin Institute of Philadelphia for this invention. He was a member of the American Institute of Electrical Engineers, Electric Power Club, Technical Society of New York, Franklin Institute and Elektrotechnische Verein Society of Berlin, Germany. He leaves his widow and one daughter.

ALEXANDER TALMAN WHITING, vice-president and secretary of the Whiting Foundry Equipment Company, Harvey, Ill., died Sept. 12 at his home in Chicago, aged 64 years. He was born at Sault Ste. Marie, Mich. After residing in Detroit for many years, he removed to Chicago in 1893 and with his brother, John H. Whiting, established the Whiting Foundry Equipment Company. He was prominent in the Illinois Manufacturers' Association and the Chicago Association of Commerce. He leaves his widow, one son and two daughters.

JAMES DAVID MILLER, secretary and treasurer of the Auto Parts Mfg. Company, Milwaukee, died suddenly from apoplexy Sept. 10, aged 62 years. He had been a resident of Milwaukee for 30 years. He was assistant superintendent of the Allis-Chalmers main works until 1912, when he resigned to become manager of the Auto Parts Company.

ALEXANDER WATSON BLACK, one of the organizers and formerly a director of the Pittsburgh Crucible Steel Company, died at his home on Sewickley Heights, near Pittsburgh, Sept. 17, aged 69 years. For about 20 years he was connected with the Black Diamond Steel Works of Park Brother & Co., Ltd., at Pittsburgh.

SAMUEL C. PRATT, member of the firm of Beals & Co., Buffalo, wholesale iron, steel and hardware merchants, died Sept. 15 after an illness of about one month. He had been active in the extensive business of the firm for more than 25 years.

New Shipyard Lays Its First Keel

The Pennsylvania Shipbuilding Company laid the keel of its first ship—a 7000-ton oil tanker—at its Gloucester (N. J.) plant Sept. 9, in the presence of the officers of the company, city officials, Government marine inspectors and officials of other shipbuilding companies. Although the work of constructing the new shipyard was started only six months ago, and several of its buildings are still incomplete, work will be rushed on the first ship, and in the near future keels of other ships intended for the merchant marine will be laid.

The company is building six 7000-ton oil tankers and four 12,500-ton cargo boats. All will be equipped with steam turbines and reduction gears for a speed of 11 knots. The main office of the company is in the Land Title Building, Philadelphia. The officers are H. E. Norbom, president; Charles H. Moyer, vice-president; Henry Lysholm, general manager, and George S. Hoell, secretary and treasurer.

Pittsburgh and Nearby Districts

The Jones & Laughlin Steel Company, Pittsburgh, has started a butt-weld furnace at its new tube plant at Aliquippa, Pa. One more butt-weld and two lap-weld furnaces are being built and will be completed this year.

The Brier Hill Steel Company, Youngstown, Ohio, in one day recently turned out 1700 tons of semi-finished steel and has started another soaking pit furnace in its steel plant to take care of additional output.

The Youngstown Iron & Steel Company, Youngstown, Ohio, will make large additions to its pressed steel department. A new building, 80 x 160 ft., will be erected, while the present building, 80 x 300 ft., will be remodeled. The contract for the structural steel has been placed with the Hunter Construction Company. The company is operating its open-hearth steel plant at Lowellville and its sheet mills and pressed steel department at Youngstown to their utmost capacity, with orders ahead for some months.

The Chamber of Commerce of Massillon, Ohio, in order to induce new industries to locate in that city, has decided to engage in an advertising campaign. The board of directors has made a liberal appropriation for the purpose and the work will start in a short time.

The payroll disbursement in the Youngstown district for August was $3,888,129. This was a gain over July of $163,138 and a gain over August, 1915, of $1,286,597. The September payroll is expected to reach $4,000,000.

The Pittsburgh & Lake Erie Railroad has been ordered by the Interstate Commerce Commission to pay the Pittsburgh Steel Company $14,186.25, with 6 per cent interest from Nov. 1, 1913, for excess freight charges. Certain allowances are made to steel companies in the Pittsburgh district having their own locomotives for transferring cars from the main lines to the mills by the railroad named. The allowance had not been made to the Pittsburgh Steel Company, which applied to be placed on the same basis as others.

The Standard Screw Company, Corry, Pa., has been incorporated with a capital of $20,000 by S. V. Stewart, F. N. Ames, L. R. and C. F. Bliss, and L. T. McElroy.

The National Forge & Tool Company, Erie, Pa., states that it has not yet decided to remove its plant from Erie to Irvine, Pa., as reported. It is possible that its plants at Irvine and Erie may be consolidated next year.

Within the next six weeks or two months the output of open-hearth steel at Farrell and Sharon, Pa., will be greatly increased. The Carnegie Steel Company is building three 60-ton open-hearth furnaces at Farrell, which will be completed about Oct. 1, and will increase the steel output at this plant about 12,000 tons per month. The American Steel Foundries has completed one 60-ton furnace at its Sharon plant and a second will be ready in a month or six weeks. The six open-hearth furnaces at the Sharon works of the Carnegie Steel Company have been rebuilt for using powdered coal and a large increase in output is expected. The Shenango Valley is now making a very much larger output of open-hearth steel than ever before in its history.

The Edgewater Steel Company, Pittsburgh, which has taken over the Kennedy-Stroh Corporation, has increased its stock from $5,000 to $2,000,000, filing notice of its action with the State Department at Harrisburg.

The Huntington Alloy Company, Huntington, W. Va., has been succeeded by the Steel Products Company, incorporated by Thomas W. Harvey, R. P. Aleshire, secretary and treasurer, Paul Hardy, and others, with a capital stock of $100,000, and is continuing the manufacture of war munitions.

Cherry Valley furnace of M. A. Hanna & Co., at Leetonia, Ohio, which was blown out Aug. 5 for relining and repairs, will go in blast again this week on foundry iron.

The Carnegie Steel Company, fearing a shortage in the supply of natural gas this winter, is making a pulverized coal installation at its Homestead works to supply fuel for 24 open-hearth steel furnaces and a similar installation at its Clairton works to supply fuel for 8 open-hearth furnaces. This is not a new move by the Carnegie company, as pulverized coal has been used for several years for fuel in the open-hearth steel plant at its North works at Sharon, Pa. The two plants at Homestead and Clairton are expected to be ready for operation about Dec. 1. Last week the idle Edgar Thomson furnace of the company was put in blast after being extensively repaired and relined, and all of the 11 Edgar Thomson furnaces are now in operation. The company has only four of its 59 blast furnaces idle. These are one Bellaire at Bellaire, Ohio, which is being rebuilt; one Lucy and one Isabella at Pittsburgh, which are being relined, and the Zanesville, Ohio, stack, an isolated furnace which has not been active for some years.

The first of the fall and winter meetings of the Pittsburgh Foundrymen's Association was held in the Fort Pitt Hotel on Monday evening, Sept. 18, preceded by a dinner. The attendance was fairly large. Dean Holsworth, University of Pittsburgh, made an interesting address on "Preparedness." Ralph Hickman, Richmond Radiator Corporation, Uniontown, Pa., was elected an active member.

The Keystone Rubber & Tire Company, Pittsburgh, will establish a plant at Penn Station, on the main line of the Pennsylvania Railroad, 25 miles from Pittsburgh, for the manufacture of automobile truck tires. The company will occupy a three-story steel and brick building, 60 x 190 ft., with power house, and expects to be manufacturing in about 90 days.

Sheet and tin-plate workers employed in mills that sign the Amalgamated Association scales will receive an advance in wages of 3 per cent dating from Sept. 1. The sheet workers are now receiving 12 per cent over the base of the scale, which is 2.15c. for gages 26, 27 and 28, Bessemer black sheets. Tin-plate workers are now receiving 11 per cent over the base of the tin-plate scale, which is $3.50 per base box for 14 x 20 bright plate.

The Union Drawn Steel Company, Beaver Falls, Pa., manufacturer of cold rolled steel shafting, will build a new plant at Gary, Ind., work on which will start as soon as plans have been completed. The main building will be 150 x 456 ft. The steel required, about 1000 to 1100 tons, has been placed with the American Bridge Company at Pittsburgh. The same line of products will be made at Gary as are now made at Beaver Falls.

Effective Monday, Sept. 18, the McKeesport Tin Plate Company, McKeesport, Pa., gave its hot tin-mill workmen, shearmen and openers an advance in wages ranging from 10 to 20 per cent, depending on the class of labor. This company is now operating 35 hot tin mills, will start 5 more in a few days, another about Oct. 1, and the final mill about Dec. 1.

Sheet and Tin-Plate Association Organized

Walter W. Lower, formerly chief cost accountant of the Pittsburgh Crucible Steel Company, Midland, Pa., and prior to that with the Lackawanna Steel Company, Buffalo, N. Y., has been elected secretary and treasurer of the National Association of Sheet & Tin Plate Manufacturers, organized at Pittsburgh in the latter part of July. He assumed his new duties on Sept. 18. The other officials are W. S. Horner, W. S. Horner & Co., Pittsburgh representatives of the American Rolling Mill Company, Middletown, Ohio, president, and Joseph B. Andrews, Newport Rolling Mill Company, Newport, Ky., vice-president. The association has opened headquarters in rooms 421-422 Oliver Building, Pittsburgh. No meetings have been held since early in the summer, but a meeting will be held late this month. The first work the association will take up will be the adoption of a standard form of contract for the sale of sheets and tin plate, probably the same form of contract adopted some time ago by the American Iron and Steel Institute. A standard method of arriving at costs will also be taken up at an early date.

The Iroquois Iron Company, Chicago, has increased its capital stock from $5,000,000 to $6,000,000.

New Foundry Trade Advance at Cleveland

(*Continued from page 646*)

duce the manganese content on account of the high price of ferromanganese. Such grades of steel averaged in carbon 0.40 to 0.65 per cent, in manganese 0.60 to 0.75 per cent, in silicon 0.22 to 0.25 per cent. I treated such steels with 8 lb. per net ton of an alloy containing 15 per cent of titanium, being the same alloy as that used by Mr. Janssen, and each ton the manganese was around 0.4 to 0.5 per cent and the sulphur about 0.40. The ingots likewise treated to manifest red shortness by cracking at the rolling mill, and I assumed that this was produced largely by the high sulphur and low manganese content, and not by any oxide left in the steel since such steels had a high silicon content and had been treated with titanium as a final deoxidizer and cleanser.

What I wish to make clear is that I do not think that it is possible safely to diminish the manganese content of steel for castings from 0.75 to 0.50, as stated by Mr. Janssen, by merely using 6 lb. of 15 per cent ferrotitanium per ton of steel and that at it is possible the titanium has nothing to do with it. However, such steel, if treated with titanium will be certainly found cleaner and freer from segregation, regardless of the manganese content.

Mr. Janssen, in replying, held that the question of titanium as an alloy is a moot question, and that if titanium is present in the steel it does not have the same function as manganese, vanadium, etc. If it should possess any merit as an alloy, as determined later, it would be better to use the carbon-free alloy to introduce the titanium. The question of the amount of the alloy necessary depends on whether the prevention of segregation as well as the deoxidation of the steel is the end desired. He insisted that vanadium is a deoxidizer, and that most metallurgists believe it to be, while nickel and chromium are merely alloying elements.

As to the use of titanium as a substitute for manganese, Mr. Janssen asserted that he had been able to reduce his manganese content from 0.75 to 0.50 per cent by the use of titanium and still obtain as good and better static properties; that 0.20 per cent carbon steel with 0.75 per cent manganese without titanium hardly ever exceeded 62,000 lb. per sq. in. in tensile strength, whereas by the use of titanium and a reduction in manganese to 0.50 per cent, the tensile strength of the treated steel rose to 68,000 lb. per sq. in. This had been hit upon in seeking some method of conserving the ferromanganese supply. He understood others had tried to do the same thing, but with poor success. In his furnace practice he insisted on the use of a pig iron containing 1 to 1.50 per cent manganese.

EFFECT OF MANGANESE IN PIG IRON

Edwin F. Cone spoke of the results obtained by Mr. Janssen in substituting titanium for manganese as remarkable, but raised the question whether the use of a manganese pig iron in the charge should not be given the credit. A manganese pig iron is becoming recognized as more important in the production of basic steel because of the beneficial effect of the manganese in neutralizing oxidation during the melting and refining, and it is becoming more generally recognized that the steel is better from the use of such a pig iron. Mr. Cone believed a distinction should be kept clearly in mind between the addition of titanium alloy to acid steel and to basic steel.

In reply to a question as to the time and form in which the titanium alloy was added, whether in slabs or lumps to the bath or as small lumps to the ladle, and whether before or after the silicon and manganese, Mr. Janssen said that he had found the best results to proceed from adding the alloy in very small pieces to the metal in the ladle after the silicon and manganese additions.

An important discussion was submitted by L. Selmi, chief chemist and metallurgist of Corrigan, McKinney & Co., Cleveland, Ohio, as follows:

I do not care to call my work research work, but it covers about 120 heats of acid open-hearth steel for casting rolls. Of these 30 were cast straight with no addition whatsoever. 30 were treated with aluminum in the ladle in varying amounts of 4 ounces to one pound of aluminum per ton of steel. 30 were treated with Goldschmidt carbon-free titanium alloy in varying amounts of from 4 to 8 lb. of alloy per ton of steel, and 30 were treated with ferro-carbon-titanium from 4 to 10 lb. per ton of steel. Of these heats with 30 of each steel [illegible] were cast, open-pot and the carbon varied from 0.50 to 0.70 per cent. They were used in casting 14-in. rolls so that [illegible] was obtained from a 20-ton heat. Our object in doing this was to find out the treatment which would [illegible] from segregation and blowholes. [illegible] to keep a complete record of the heats as well as that of the working [illegible].

The temperature of the steel was taken with a Simatco pyrometer at tapping [illegible] ladle. In all of these heats, with no exception, the ladle was held for 10 minutes. We endeavored to vary the tapping temperatures with the analysis of the steel wanted. The average Fahrenheit temperature of the steel as we observed it was:

	—Temperature, Deg. Fahr.— From Furnace	From Ladle	Difference, Deg. Fahr.
1—No addition	2,850	2,770	80
2—Aluminum addition	2,840	2,780	60
3—Goldschmidt titanium addition	2,900	2,850	50
4—Ferro-carbon, titanium addition	2,940	2,780	160

The apearance of the rolls disclosed that those that had received no treatment whatever and those that had been treated with the Goldschmidt titanium alloy were by far the best. Next in line were those treated with aluminum, but the least success was experienced with those treated with the carbon titanium.

The nature of the defects encountered in these rolls were pine tree crystal structures in pockets and numerous blow holes which invariably settled on the upper part of the rolls. A large uniform sink-head was allowed for all the rolls because we tried to have as near the same condition in each case as was consistent with practice.

All these rolls were examined under the microscope, and a specimen taken from the same position in each case; these revealed that in the first three experiments very small amounts of slag inclusions were present. In the fourth, besides all the small amounts of slag inclusions, there were noticeable blow holes and pine tree structures which were surrounded by a thin film of slag. In all of the rolls that were treated with the Goldschmidt alloy we also noticed that small crystals known as pink slag or titanium nitride were present. This proved to us that the titanium alloy added reacted with the nitrogen occluded in the steel and was thereby changed into titanium nitride, which passed out as slag, on account of its low specific gravity, but leaving very small traces behind entrapped in the steel.

In the carbon-titanium rolls we failed to observe such pink slag and to us this was sufficient proof that the carbon titanium had not dissolved at the temperature of the steel and therefore had failed to cause any reaction with the steel other than the reaction of the graphitic carbon contained in the titanium alloy, which reacted with the oxides of the slag as soon as the slag touched the ladle causing the slag to foam over on every heat. We also interpreted that the drop in temperature that was observed in the carbon-titanium heats was caused by this very reason that the reaction of the graphitic carbon with the oxides of the slag formed large amounts of carbon monoxide which had to find its way out of the slag and, in doing so, caused the slag to froth up in open channels. So the radiation losses were greater than in the case where the Goldschmidt alloy was used, as in this case the slag blanket did not raise up but remained quiet on the top of the metal.

The average analyses of the titanium used were as follows:

	Goldschmidt, Per Cent	Carbon Titanium, Per Cent
Titanium	25.50	12.00
Manganese	0.60	Trace
Carbon	0.06	6.50
Aluminum	4.75	2.00
Silicon	0.85	1.50

Phosphorus and sulphur were not determined but were present in the alloys in very small quantities.

G. F. Comstock of the Titanium Alloy Mfg. Company asked Mr. Selmi whether a microscopic examination of the slags did not reveal the pink crystals or slags when the carbon-titanium alloy was used, but none when the carbon-free alloy was used. In reply

Mr. Selmi said his examination had also extended to the slags microscopically, and that he found no pink slag in the slag when the carbon titanium had been used but a large amount in slag from a heat treated with the carbon-free alloy.

As a substitute for manganese Mr. Selmi said he had never been able to obtain any satisfactory results from using a titanium alloy.

ACID AND BASIC STEEL FOR CASTINGS

The question of the relative merits of acid or basic steel for castings was treated by Edwin F. Cone, New York, in a paper, "Acid vs. Basic Steel for Making Castings." The chairman stated that for a long time the committee had desired this subject discussed, offering it at one time to an acid steel foundryman, who replied that there was nothing to say, since acid steel was best. Obtaining a similar refusal from a manufacturer of basic castings, it was decided to call on a neutral.

The principal discussion was offered by President R. A. Bull, who read in part as follows:

The significant dividing line between acid and basic castings is not that which falls between foundries making castings to be machined and those which do not, but is a geographical one separating the East from the Middle West. The manufacture of steel castings in this country naturally began in the Eastern States, and at a period when deoxidizers were employed with indifferent success. About the time when steel foundries began to flourish in territory contiguous to the Mississippi, the manufacture and use of satisfactory deoxidizers experienced important development. The example of the Western pioneers in the steel casting industry in experimenting with the treatment of metal made on a basic bottom was followed by many progressive founders in the Middle West. The East has been slow to discontinue its acid practice. Most of its foundry melters do not favor a change to conditions with which they are inexperienced. Meanwhile, in the Central and Western States, the success attending basic practice for general steel foundry work has justified those who pinned their faith to it.

The West has taken the lead in developing several phases of steel foundry practice, notably molding in green sand. Not longer ago than nine years since a prominent Eastern technical journal published over the signature of one of its staff a statement that substantially affirmed the impossibility of making steel castings in green sand. At that time, probably 20 per cent of the tonnage of steel castings made in this country was molded in green sand in Central and Western States.

The reduction in the silicon content, which Mr. Cone claims often amounts to 50 per cent, is not really a serious matter. It would be if 50 per cent were an average decrease, and if an appreciable quantity of steel were thus affected.

The percentage of metal affected by reduced silicon content is an important factor to which Mr. Cone refers only by the indefinite phrase "the last part of the heat." And to absolve basic founders from prejudice, we will here admit to a reduction not only in silicon content but in manganese content, to which latter fault Mr. Cone makes no reference.

Analyses of hundreds of 58,000-lb. basic heats requiring an average time of 50 minutes to pour, in a steel foundry whose practice is not claimed as superior to that of other well-regulated shops, show that no appreciable change in composition occurs under anything like normal conditions except in the last 1000 lb. teemed. The observant foundryman has convenient means at hand for partly controlling and wholly ascertaining this change. Control is gained by maintaining to reasonable depth the slag covering the metal in the ladle. Experience shows that an excessive amount of slag has greater influence on the chemical composition of the underlying metal than does a moderate coating required for heat conservation. Determination of the extent of change is, of course, by holding for chemical analysis the castings poured in the last part of the heat.

The extent to which changes occur under average conditions may be intelligently gaged by quoting average silicon and manganese determinations of a month's run in a large basic foundry which melted approximately 6600 tons of metal last month. The average percentage of silicon in the metal poured in the middle of each heat was 0.36 per cent, while the percentage of the same element in the last metal out of the nozzle was 0.264. Corresponding tests for manganese showed, respectively, 0.77 per cent and 0.68 per cent. The maximum loss in silicon content averaged 26 per cent, while that for manganese content averaged 11.7 per cent. I submit the question if such losses are serious when confined to 2 per cent of the metal lying just beneath the slag, particularly when the pouring of flask and other shop equipment whose perfect homogeneity is unnecessary, calls for a considerable portion of such percentage.

As to results in the castings to be machined, extended experience shows conclusively that the use of acid scrap is quite unnecessary in the attainment of steel castings, most of which requir machining and which are condemned on rigid railroad inspection, if not reasonably free from porosity, and if not possessing physical properties in conformity with recognized specifications.

Mr. Cone has referred in general terms to some remarkable results in the physical properties of basic steel castings, as compared with those made from acid steel. This might reasonably be attributed to the greater purity of basic steel whose phosphorus and sulphur percentages are appreciably lower than can be obtained in acid practice under commercial conditions. Those who make frequent physical tests of steel representative of properly made basic castings will testify to its excellent quality. The foundryman is interested in still another factor, namely, the ability to cast successfully in basic steel designs peculiarly susceptible to shrinkage cracks, very difficult to make in acid steel.

Mr. Cone's figures show a gradual tendency of acid steel to lose favor in the foundry industry. Whereas 15 years ago the percentage of acid steel was 68.4 per cent, two years ago it had fallen to 44.7 per cent. The rise to 54.7 per cent in 1915 is, in my opinion, not due to a change of preference on the part of steel founders generally, but to the scarcity and high cost of basic linings in the past two years, due to the European war.

To a question as to whether hydraulic castings had ever been successfully made in basic steel, Mr. Cone testified that while excellent castings for such purposes had been made of acid steel, unusually superior ones had been made from acid scrap on a basic bottom, as referred to in the paper. As to a difference microscopically, the author stated that the few samples of basic steel he had examined all showed less ingotism than acid steel, though this could not be offered as final or conclusive.

"Theory and Practice in Gating and Heading Steel Castings" was presented by Ralph D. West, West Steel Casting Company, Cleveland, who offered some valuable evidence and suggestions from practical experience. In reply to Mr. West's question whether any of the foundrymen present were using chills extensively, Jacob Walther, Dayton Steel Casting Company, Dayton, Ohio, said that he used them as much as possible the year around in preference to brackets, etc.

The two other scheduled papers, "Alloy Steel Castings," by David Evans, Chicago Steel Foundry Company, Chicago, and "The Small Open-Hearth as a Flexible Unit for Either Large Steel Foundries or General Jobbing Shops," by Frank Carter, Milwaukee, Wis., were not presented.

John Howe Hall, as chairman of the association's committee on specifications for steel castings, made a detailed report at the opening of Friday's session. Reference will be made to this in a later issue.

Gray Iron Founders' Session

With Benjamin D. Fuller presiding, the section of the association especially interested in gray iron castings met on Friday morning. The first paper, "The Effects of Different Mixtures on the Strength of Chilled Car Wheels," was presented in abstract by the author, G. S. Evans of the Lenoir Car Works. The data and photomicrographs presented in the paper were the result of tests extending over a period of two years, in which results were especially sought showing the effect of varying percentages of coke and charcoal pig iron. In all, some 60 different mixtures were cast, the percentages of scrap, charcoal and coke pig being varied between minimum and maximum limits. The paper goes into detail regarding various typical mixtures,

giving also the drop and thermal tests, Brinell hardness and transverse strength. The conclusions are that no gain in strength is obtained by increasing the percentage of either charcoal or coke pig iron beyond approximately 12 per cent and that the substitution of charcoal pig iron for coke pig does not result in any clearly defined beneficial effect on the strength of the wheels as shown by various tests. The experiments seemed to show that charcoal iron losses its special properties when remelted in the cupola. The effects, if any, of the different mixtures on the microstructure of either the chilled or gray portions of the finished wheels are not such as to be clearly defined. The foundry practice, including the melting, casting and annealing, appears to be largely responsible for the ultimate strength of the finished wheels; and the greatest possible source of betterment of the output as a whole results from the standardization of this practice.

It was brought out in the discussion that the line of demarkation between the chill and gray portions of the wheel metal section appears not to be affected by the proportions of charcoal or coke iron used. High silicon iron accentuates this distinction and gives a sharply cut-off chill. Ferromanganese was used only to bring the manganese in the finished product up to a certain standard, the amount varying only within a small range, depending upon the analysis of the pig. The ferromanganese was introduced through the cupola.

SEMI-STEEL FOR CASTINGS OF THIN SECTION

In presenting the subject of semi-steel, David McLain, Milwaukee, refrained from reading the text of his paper, contenting himself with a description of the numerous photomicrograph illustrations as they were thrown upon the screen. The points brought out, both by Mr. McLain and in the discussion, have been largely touched upon at other times in THE IRON AGE, the principal emphasis being placed upon the necessity of using good coke and, where a high percentage of steel scrap is used, of pouring the metal amply hot. Semi-steel is a high carbon metal, the steel scrap being responsible for a large absorption of carbon from the coke. The micrographs also show that hard spots are not found in semi-steel and the many samples of semi-steel castings shown by the author of the paper illustrate the adaptability of semi-steel to the manufacture of thin section castings.

HIGH-CARBON COKE ESSENTIAL

In another issue the interesting paper covering the "Use of By-Product Coke in Foundries," by George T. Long, Chicago, will be given quite fully. The paper left little opportunity for discussion other than to give new emphasis to the important bearing of a good quality coke, both as to structure and carbon, upon the character of the castings. It was pointed out that coke running 88 to 90 per cent in carbon can always be had if that specification is insisted upon, and also that by-product coke is not different from beehive coke in that the best structural quality is obtained from those coking periods during the week which are most protracted, as over the week end.

The paper by Prof. Thomas Turner, University of Birmingham, England, "The Thermal Reactions of Cast Iron," was read by title and at the suggestion of Chairman Fuller a vote of thanks was extended to the author for this contribution at a time when conditions in Great Britain are so unfavorable to such effort.

USING ALL-SCRAP MIXTURES

The use of cheaper materials as outlined in a paper of that title by Charles C. Kawin, Chicago, had to do with the employment of large percentages of scrap in cupola mixtures, the paper pointing out that all-scrap mixtures are quite practicable with the use of some ferromanganese and the author giving four suggested mixtures typical of an all-scrap charge. Mr. Kawin contends that except for such differences as may be due to mechanical conditions associated with the pouring of castings in the foundry, the results obtained in castings depend entirely upon the analysis of the metal poured, regardless of the materials from which that metal is melted.

BORINGS IN THE CUPOLA

In the absence of Mr. Murphy, the author, the paper on "The Use of Borings in Cupola Operation," was read only by title. The paper covers the subject generally and will be abstracted in a later issue. The discussion of the paper indicated that foundries using borings have, in general, secured approximately similar results. To use them with good results, it appears to be necessary that they be inclosed in a container or held together in briquettes instead of being charged loosely and that the percentage of borings in relation to the charge must not be too high, or hardening and shrinkage of the iron will result. The borings also should be clean and free from oxidation. Dr. Moldenke, in a written discussion of the paper, predicted the increased use of briquetting in the preparation of borings for cupola melting as against the method of charging them in cans, stove pipe or other containers which, at best, is an unsatisfactory arrangement. The discussion will be more fully reported in connection with the paper.

Business and Social Features

In the elevation of the senior vice-president, J. P. Pero, to the presidency of the American Foundrymen's Association for 1916-1917, the nominating committee's report followed precedent. Benjamin D. Fuller, Cleveland, was chosen senior vice-president, and A. O. Backert, Cleveland, was re-elected secretary-treasurer. The list of directors for the ensuing year includes, in addition to past presidents and present vice-presidents, representatives of the exhibit function of the association, and is as follows: R. A. Bull, Granite City, Ill.; C. E. Hoyt, Chicago; H. B. Swan, Detroit; B. D. Fuller, Cleveland; Stanley G. Flagg 3rd, Philadelphia; S. B. Chadsey, Toronto, Ont.; Alex. T. Drysdale, Burlington, N. J.; Alfred E. Howell, Nashville, Tenn.; J. P. Pero, East St. Louis, Ill.; S. T. Johnston, Chicago; A. O. Backert, Cleveland; H. S. Covey, Cleveland; Maj. Joseph T. Speer, Pittsburgh; V. E. Minich, New York; H. A. Carpenter, Providence, R. I., and W. A. Janssen, Davenport, Iowa.

At a business meeting on Friday the association adopted a resolution in which it joins with other technical societies in urging upon Congress additional financial assistance for the conduct of the work of the Bureau of Standards.

The report of the committee on resolutions expressed appreciation of the excellent work done by those officers of the association who had had the direction of the exhibit and acknowledged the great success of the undertaking.

The meeting concluded with the induction into office of President-elect Pero and the senior vice-president, Benjamin D. Fuller.

The Annual Banquet

The purpose of the executive officers that the annual banquet of the American Foundrymen's Association shall reflect the most wholesome social aspects of the convention was carried out with signal success. Ladies attended in almost equal number with the men. An atmosphere of close personal association was created. A gracious contribution to the program was the singing of a number of songs by Miss Pero, the daughter of the president. The presentation of a chest of silver to the retiring president, R. A. Bull, was a feature of unusual interest, indicative of the spirit of co-operation and personal regard which has been created in the executive board of the association. President Pero's remarks were exceptionally happy.

The address by the Secretary of War, Newton D. Baker, was not disappointing to those who are well acquainted with his exceptional ability as an orator. He spoke of "Nation Building" in a patriotic rather than

a political vein, linking the activities of the foundry industry and all industry with the problem of national welfare.

The enterprise which marked all the work of the Cleveland committee was strikingly evidenced in the showing of moving pictures during the banquet and at its close. Pictures of association and local officers were thrown on the screen and in addition over 1000 ft. of film, covering the plant visitation, entertainment features and views in the machinery exhibit.

Visits to Cleveland Foundries

The plant visitation program was one of the important features of the convention. A large number of visiting foundrymen took advantage of the opportunity afforded to inspect a number of the leading Cleveland foundries that threw open their doors. These included the foundries of the Ferro Machine & Foundry Company, the Interstate Foundry, the Allyn-Ryan Foundry Company, all specializing on automobile castings; the new continuous foundry of the Westinghouse Electric & Mfg. Company; the plant of the West Steel Castings Company, which specializes on light steel castings; the heavy gray iron foundry of the City Foundry Company, specializing on machinery work, and the stove foundry of the Best Foundry Company in the suburb of Bedford. Other plants were also visited, including malleable, steel and brass foundries. A great deal of interest was shown in the up-to-date molding machines and other equipment in operation. An interesting trip was that made to the blast furnaces of the Cleveland Furnace Company on the Cuyahoga River flats, automobiles being provided for taking the foundrymen to this plant.

Success of the Exhibition

The foundry exhibition was pronounced the most successful ever held, both in point of attendance and in number of sales made by the exhibitors, as well as in the character of the exhibits, as described in these columns last week. While other exhibits have drawn as large an attendance, none have been witnessed by so many men connected with foundries and directly interested in the equipment shown. The exhibitors report a very gratifying number of orders. The great interest taken in foundry machinery is attributed in some degree to the present prosperity of the foundry industry, also to the scarcity and high price of labor, causing foundry managers to add labor-saving equipment wherever possible. The exhibit was kept open during the day, starting with Tuesday and closing Saturday afternoon.

Record Sessions of Institute of Metals

Discussions at the Cleveland Convention Deal Largely with Brass Foundry Practice — The Evolution of Die Casting

The convention of the American Institute of Metals at Cleveland last week had an attendance much larger than usual and the papers presented were nearly all on topics of a general interest, bringing out considerable discussion. The registration of members exceeded 150, as compared with about 100 in previous years. Sessions for the presentation of papers were held on Wednesday, Thursday and Friday forenoon in addition to the joint meeting with the American Foundrymen's Association on Tuesday.

OFFICERS RE-ELECTED

During a business session held at the closing meeting Friday, Jesse L. Jones, Westinghouse Electric & Mfg. Company, East Pittsburgh, was re-elected president and W. M. Corse, Titanium Alloy Mfg. Company, Niagara Falls, N. Y., was re-elected secretary. George C. Stone, New Jersey Zinc Company, was elected first vice-president, and other vice-presidents were elected as follows: R. S. B. Wallace, National Cash Register Company, Dayton, Ohio; William B. Price, Scovill Mfg. Company, Waterbury, Conn.; G. K. Burgess, U. S. Bureau of Standards; DeCourcy Browne, Goldschmidt Thermit Company, New York; Harold J. Roast, James Robinson Company, Montreal; G. P. Salter, Ohio Brass Company, Mansfield, Ohio; F. H. Schultz, H. B. Mueller Mfg. Company, Decatur, Ill.; W. A. Cowan, National Lead Company, and H. S. Gulick, Moore-Jones Brass & Metal Company, East St. Louis, Mo.

The officers were selected by a nominating committee appointed at the Wednesday session, consisting of N. K. B. Patch, Lumen Bearing Company, Buffalo, N. Y.; G. H. Clamer, Ajax Metal Company, Philadelphia, and L. W. Olson, Ohio Brass Company, Mansfield, Ohio. The ticket named was unanimously elected. Mr. Cowan was appointed chairman of the committee on papers for the ensuing year.

NO MERGER WITH FOUNDRYMEN'S ASSOCIATION

The Institute took formal action declining to merge with the American Foundrymen's Association, deciding that it is to its interest to remain an independent organization. A report of a special committee on a possible consolidation with a view of effecting economy in the operation of the Institute was made by Secretary Corse. He said that the executive committee felt that while the two organizations have much in common, there are some members of the Institute, such as men in rolling mills and refining plants, who are not interested in foundry problems and that it would be unwise to bring about the merger. The Institute should be a place for a practical brass foundryman as well as for the metallurgist, and he felt that the metallurgical side of the brass foundry is more important than that of the iron foundry because the brass foundry has to do with fifty metals while the iron foundry has only the one metal. The growing value of the Institute was shown by the presentation of more valuable papers and he said the executive committee wished to avoid any danger that might result from a consolidation. George C. Stone, who acted as chairman during this session, said the executive committee was unanimous in its decision to have the Institute remain as an independent organization. R. R. Clarke observed that the sessions this year more than ever showed that the Institute is bringing the practical and technical men together and that they are co-operating more closely. C. P. Karr suggested that efforts be made to get more of the prominent metallurgists, including college professors, to join the Institute and prepare papers. Mr. Corse replied that frequently papers were secured from prominent metallurgists who are not members.

The action of the executive committee in favor of remaining a separate body was formally approved.

Secretary Corse announced that Dr. Burgess had suggested that the Bureau of Standards act as a clearing house for information regarding the properties of alloys and had requested the Institute to aid in collecting this information. In connection with this he said that the advisory committee would hold a meeting in Washington this fall, probably in October. The members were told that if they can furnish information regarding some of the properties of alloys, the Bureau of Standards, with the instruments at its disposal, can

provide the remainder. Mr. Karr stated that hydrostatic tests are of as much importance as others, the hydrostatic pressure being of particular interest to makers of plumbing fixtures, and that these tests should be made. P. E. McKinney thought steps should be taken to standardize hydrostatic tests, there being nothing at present on which to base these tests. It is decided that this is a subject that should be handled by the American Society for Testing Materials and the secretary was instructed to communicate with that society with a request that it formulate the hydrostatic standards.

At the opening session Wednesday, Secretary Corse reported that the Institute had 300 members July 1 as compared with 314 on the same date a year ago, but that there is now a gain in membership, owing to the fact that 35 to 40 new members have been taken in since July 1. Attention was called to the fact that the committee of the Institute holds a meeting twice a year with the U. S. Bureau of Standards. W. H. Bassett of the American Brass Company, chairman of the committee to standardize sizes of crucibles, submitted a report containing a list of standard sizes which was accepted. Dr. Burgess of the Bureau of Standards called attention to the need of greater support of the Bureau's work. He said a great deal of new research work was to be taken up speedily, but the required staff and facilities were lacking, although an appropriation of $50,000 made by Congress would help a great deal.

BRASS FOUNDRY OPERATIONS

The subject of the first paper Wednesday was "The Brass Foundry," this being presented by E. A. Barnes, Fort Wayne Electric Company, Fort Wayne, Ind. In this the facilities for molders in the brass foundry as it existed 30 years ago were compared with those of the present day. At that time there were only two choices of fuel—coal and hard coke—while to-day gas, fuel oil and electricity are also available for melting purposes. The present-day brass foundry would not be up-to-date unless it had compressed air for use in blowing off patterns and operating molding and jarring machines and squeezers. Even the individual workbench of the modern brass foundry is equipped with an air nozzle and rapping hammer, enabling the workman to get along without the assistance of his neighbor except in special cases. In spite of the use of improved power-operating molding machines he felt that only a start has been made in introducing modern labor-saving machines in the foundry. He said that the value of an efficiency engineer and chemist to a brass foundry is now unquestioned.

One of the problems that has been solved by the brass foundry with which he is connected (which was referred to in the paper), was the producing commercially of large quantities of a duplex thermostatic metal. It was necessary to cast or otherwise fuse together a brass alloy and a plate of nickel steel, providing the alloy would stand rolling down to .003 in. thick or less, the finished duplex sheet to be exactly 50 per cent brass and 50 per cent nickel steel. In order to secure the required results it is necessary to have control of the casting of the yellow brass, which meant the necessity of pure copper. Many experiments were tried, but either the brass cracked into small pieces or became detached from the steel plates. An alloy was finally developed having the proper characteristics. Samples of the duplex thermostatic metal were shown.

Schoop Coating for Patterns

The paper referred to the question when it is best to make use of metal patterns for repeat work. The writer's experience was that it was best to make a first-class wooden pattern and use it as long as possible, as changes are frequently made after the first castings have been put in use and wooden patterns can usually be changed more readily than a metal pattern. His shop has been on the lookout for some method of increasing the life of wooden patterns and has been experimenting with the Schoop metal coating process for applying a copper or lead coating to fragile and complicated wood patterns, the metal coating being designed to render the patterns waterproof and stiffen them so they will hold their shape and wear better. The process has not been used in the shop long enough to be pronounced an absolute success, but some of the patterns plated by means of the process have given surprisingly satisfactory results.

Another problem solved in the shop was the making of an aluminum casting that would take a high polish. All the standard alloys were tried, but the castings invariably were full of small black specks due to gas in the metal. A satisfactory casting was finally produced by adding 8 to 10 per cent of tin to the alloy. The paper referred to the development of the pressed metal process for producing brass and aluminum parts more homogeneous, tough and perfect than can be made by ordinary casting methods. In this process a blank of copper or aluminum bar of sufficient size to contain the amount of metal required in the finished part is heated to a fairly high temperature and this hot blank of metal is forced into a steel mold corresponding to the desired metal part. By means of a hydraulic press, a high pressure is exerted to force the metal into the mold. The results obtained by this process of forming the brass and aluminum parts were declared to be remarkable. In regard to further progress in foundry methods the speaker said:

> I feel that it is to the melting end of the foundry itself that we must look for the greatest advances in the near future. I believe that all of the present methods of melting will soon be replaced by much more efficient processes, either electrically or by burning a gas derived from coal oil and mixing with air which produces the ridiculous form of gas now used. The advances that have been made in electrical furnaces, ovens and retorts lead me to expect that in the near future electricity will compete on favorable terms with the various fuels for foundry melting purposes. I believe there is no doubt that some of the great electrical men are investigating along these lines and the results of their research should be disclosed in the near future.

Various subjects referred to in the papers were brought up in the discussion, particularly the Schoop metal coating process. The opinion was expressed that it will be necessary to keep the Schoop equipment in operation 24 hours a day to make it economical, because of the rental charge for the equipment. President Jones referred to a process that is successfully used for welding copper and aluminum, but stated it is available only for small wire.

PROGRESS IN DIE CASTING

In an interesting paper on the "Evolution of the Die Casting Process," Charles Pack, Doehler Die Casting Company, Rochester, N. Y., discussed the metal casting art from early historic time down to the present. He illustrated his paper with a large number of lantern slides, starting with a picture from a wall painting in an Egyptian tomb dated 1500 B. C., indicating that the Egyptians alloyed their metals and poured them into ingot molds, the furnace consisting merely of a hole dug in the ground to hold the crucible and fuel. Other pictures showed the development of the metal casting industry during more recent times. He stated that casting in sand as a commercial method began about 1708 and that the metal mold resulted from the demand for a cheaper method of producing type after the advent of printing. Although die casting as an industry dates back not over 25 years some of the fundamental principles were practiced as far back as the 15th century. During the first half of the nineteenth century many casting machines were patented using the plunger type casting principle but varying in design. The first application of this principle to the manufacture of die castings, as understood today, appears in a patent issued in 1827 for a plunger type machine for casting babbitt bearings. Machines of this type with varying designs were used for casting tin and lead alloys on a small scale but die castings did not receive recognition as a standard metallurgical product until 1907 when the Doehler machine was patented. Referring to the use of die castings the paper contained the following:

> The [illegible] be mentioned the following:

1. [illegible] on magnetos.

2. Tone arm, elbow and sound box for talking machines.

3. Automobile oil pumps, wing nuts, horn, speedometer and many other parts of motor vehicles where high tensile strength is not essential.

4. Automatic vending machines—internal and external parts of gum, cup, stamp and cigar vending machines.

5. Electrical devices, such as oscillating fans and signaling devices.

The zinc alloy die casting showed such a great saving of time and labor over the rough sand casting that many manufacturers, without entering into a thorough study of the merits of this product, literally fell over each other in their mad scramble to use zinc die castings in the place of brass, aluminum and iron castings in sand. The natural result of this situation was that die-casting plants began to spring up in unlimited numbers, many of them being owned and managed by men entirely unfamiliar with the metallurgical principles involved. Under these conditions it is not surprising that zinc die castings were used for many purposes where their low tensile strength, or corrosive properties should have prevented their use. The result of this was that some manufacturers became prejudiced against the use of zinc die castings.

The reliable die-casting manufacturers then set to work improving their process and alloys. The enormous demand for aluminum and brass die castings was partially met by the introduction of aluminum die castings made by the Doehler process. These die castings made from the standard No. 12 aluminum-copper alloy have now been on the market for three years. The castings have been found eminently satisfactory as evidenced by their use on 75 per cent of the better grade motor cars.

The aluminum department of our company using the Doehler process is now producing a larger number of castings than the zinc department, showing the enormous demand for this product. That aluminum die-castings are not used to even a larger extent must be attributed to the fact that the present war has given one company in this country entire control of the aluminum supply.

DISPOSAL OF OLD METAL

"How a Large Manufacturing Concern Disposes of Its Old Metal" was told in a paper presented by J. M. Bateman, Western Electric Company, Cleveland, and read by title. The paper described briefly the methods employed at the Hawthorne works of the Western Electric Company for reclaiming its waste metal. Waste sheets of brass, copper, German silver, etc., from which parts are punched, are separated according to material and compressed in an electrically operated Minich baling press into bales approximately 2 x 2½ x 3 ft., weighing about 1100 lb. In addition a Logemann hydraulic bundling press is used which makes bales only about one-tenth as large as those made in the Minich press. For separating the dust and dirt from the small chips and metal shavings from the machine department a mechanical separator is used, consisting of a sifter oscillated by a small motor. In addition there is a magnetic separator for separating the iron from the brass in the small parts. This consists of a revolving drum with an annealed iron face and within the drum is fastened a series of electro magnets. The metal is separated by passing through this drum and the chips are placed in sacks for convenience in handling. Junked cable is reclaimed by being placed in a gas heated brick enclosed oven where it is heated until the lead sheath has been melted and the paper insulation has been burned from the wire. The molten lead is run into a refining furnace and poured off into molds. The copper wire left in the furnace is compressed into brick form.

"The Reclamation of Brass Ashes" was the subject of a paper by Arthur F. Taggert, Hammond Laboratory, Yale University, that was read by title. In discussing this subject Mr. Corse said that his company is using a Hill crusher or mill, the tailings being run from the crusher to a concentrating table. This crusher has been made into a constant instead of an intermittent mill so that it does not have to be shut down to take the concentrates out and good results are being obtained by operating it in this way. A small hand ladle is used for dipping in the barrel to take out material and put it on the concentrating table. Large pieces are separated by means of a ¼-in. screen so that these do not pass to the concentrating table.

BRASS CASTINGS WITH THIN WALLS

"The Making of Thin Walled Castings" was the title of a paper by R. S. B. Wallace, National Cash Register Company, Dayton, Ohio. The paper stated that excellent results are being obtained in making thin walled ornamental castings of large area in brass and bronze by using the same method as is used in making such work in iron. This paper described the method used in the brass foundry in making ornamental castings for the outside case of a cash register. The preparation of sand requires a great deal of attention. The molds are poured in cast iron flasks with machined joints. When possible molds are made on molding machines and a pattern plate is used. Metal is melted in coke fired pit furnaces and is poured very hot. In reply to a question Mr. Wallace stated that suitable pyrometers are not available so that the melter uses his eye to determine the proper temperature of the metal.

The session closed with a paper on "Alloys to Withstand Internal Air Pressure," by S. D. Sleeth, Westinghouse Air Brake Company, Wilmerding, Pa.

THE BURNING-IN PROCESS

At the opening of the Thursday session C. P. Karr of the Bureau of Standards presented a report on a series of comparative tests of zinc and bronze. A paper on the "Deterioration of Muntz Metal," by Dr. H. S. Rawdon, United States Bureau of Standards, was scheduled but was not presented, the paper not having been completed. A joint paper on "The Initial Stress Produced by the Burning-In of Manganese Bronze," prepared by Paul D. Merica and C. P. Karr of the Bureau of Standards, was read by Dr. Merica. The paper referred to an investigation made in connection with the failure of a number of manganese valve castings in the Catskill Aqueduct. Large castings of this material, after several months' service, developed fissures through which leakage took place under only a few pounds of pressure. As a result of the local heating of welding and consequent unequal contraction of different constrained parts of the castings, the stresses remained, being particularly severe near and within the burned-in areas, this probably being responsible for subsequent failure at these points. The conclusion drawn from the experiments is that the burning-in of constrained portions of manganese bronze castings produces in general local initial tensional stresses within and near the burned-in zone, of value equal to the true elastic limit of the material, unless the shape of the casting is such that extensive distortion may occur, and that such castings should, therefore, be either pre-heated carefully for welding so that all parts of the castings cool down together or that the castings should be subsequently annealed.

Jesse L. Jones stated that he had used the burning-in process for collector rings and tests showed that the process was successful. In the discussion following the presentation of the paper the statement was brought out that the failure of the burning-in of either ferrous or non-ferrous metal was due to the fact that the severe stress set up by the hot metal striking the cold metal and by the shrinking of the hot metal has either been ignored or not given proper attention.

INSPECTION OF BRONZE AND BRASS

A very interestng paper under the caption "Notes on the Inspection of Bronze and Brass," prepared by Ernest Jonson, engineer inspector of the New York Board of Water Supply, was read by Secretary W. M. Corse. A brief resume of this paper follows:

Brass and bronze castings are subject to various defects which are difficult to discover by surface inspection or even by hydrostatic testing, when such a test is practicable. The defect which most commonly occurs results from the inclusion of oxide in the casting. This occurs in two ways: Either the molten metal contains an admixture of oxide, owing to insufficient protection of the molten metal from the air, or the dross from the surface of the crucible or furnace charge gets into the mold and is caught at some point where the flow is slight, and is thus prevented from coming to the surface in the risers. In the former case the entire casting

is bad and the best way to discover this defect is to make tensile tests on specimens cut from a coupon cast from the same melt. The admixture of oxide is indicated by the greatly reduced elongation and by the low ultimate strength. The tensile tests should, therefore, be specified for all important brass and bronze castings, no matter whether a certain strength and elongation are of mechanical value or not. If a tensile test is impractical oxidation may be discovered by making a bending test on a machined specimen. A number of small cracks on the outside of the bend would indicate the presence of oxide.

The writer's experience has been that oxidation of metal in the crucible is a very common defect especially of the mixtures of high percentage of copper, that is of the bronzes. It is his belief that in foundries where textile or hydrostatic tests are not made the metal is quite frequently allowed to become oxidized in the crucible because this defect does not show on the surface of the casting. To specify bronze castings merely by the mixture is therefore useless. A bronze casting may be made of the correct mixture and may show no surface indication of defects, and still may be nothing but a honeycomb of metal, the cells of which are filled with oxide. The presence of included dross is more difficult to discover. If a hydrostatic test cannot be made, it is practically impossible to find such defects unless they happen to come to the surface of the casting and even a hydrostatic test does not always reveal such defects. The best assurance against this kind of defects is correct molding. The molding of a casting should be planned while the casting is being designed. Whenever practical castings should be poured from the bottom. In determining the position of the casting in the mold, extensive flat upper surfaces should be avoided as dross may accumulate by being caught under the flat surfaces of the mold or core.

Another source of trouble is insufficient risers. The number of risers should not be left to the foundryman, who may be prejudiced by considerations of economy in favor of fewer and smaller risers than are needed for high quality work. Brass and bronze castings should not be rejected because of defects which can be remedied. The minor leaks in hydraulic castings may be stopped by peening. It is the common belief that certain brass and bronze mixtures are normally porous and permit water to pass through them under a high pressure. This belief, however, is erroneous, at least up to a pressure of 1000 lb. per sq. in. If water comes through a casting at less pressure it is an indication that the metal is not clean or that the casting is porous. Peening is a questionable method of treating defective spots in brass or bronze castings. If the defect is small a hole may be drilled and a plug of the same metal may be screwed in. If plugging is not practical defective spots should be cut out and the cavity filled with new metal. In welding defective spots in castings, except in those of certain specified dimensions, shrinkage stress must be prevented by keeping the casting heated to a high temperature while the weld is being made and until it has solidified. Another way to prevent cracking is to anneal the casting immediately after the weld has been made. Annealing is also used to some extent to eliminate initial stress by lowering the elastic limit. A source of defect in brass work lies in the heat treatment by workmen unfamiliar with the properties of brass, who accustomed to do such work on iron and steel are liable to ruin the brass by overheating.

The discussion of this paper called out expressions as to whether the gating of a mold should be at the bottom or the top. E. A. Barnes, Fort Wayne Electric Company, told of the method finally adopted in his shop for the pouring of hemispheric bell-shaped ice machine castings. First these were poured from a crucible and many of the castings were imperfect. Then the drop-pouring method was adopted and now 98 per cent of the castings are perfect. R. R. Clarke, Pennsylvania Lines West, Pittsburgh, declared that drop-pouring was not economical and said that in their shop they were pouring many kinds of molds with gates at the bottom. While many foundrymen were prejudiced against bottom gating he thought they would see that this method was right if they went into the matter further.

WELDING REPAIRS TO NON-FERROUS CASTINGS

S. W. Miller, Rochester Welding Company, Rochester, N. Y., gave a talk on "The Application of the Oxy-acetylene Welding Process in the Repair of Defective Non-Ferrous Castings." He said that brass and bronze alloys cannot be welded with the same alloy and that it required many tests to find the proper welding material. He had welded pieces ½ x ¾ in. in size and they had been bent over cold after they had been ground down to size. The appearance of this welding shows clean, satisfactory work, but the subject will be known better, he added, after more complete tests have been made.

In welding valve bodies, the first castings on which this work was attempted were badly distorted because of the heat, but these distortions are now very slight and do not impair the castings. A satisfactory welding material must readily unite and be applicable to any quality of brass or bronze. He did not think it possible to weld Admiralty or gun metal. Any material having tin in it will not do for welding purposes. Welding material must have a deoxodizer, but zinc will not answer. Many castings can be reclaimed in a brass foundry, and he believes the oxy-acetylene process properly applied will be a great advantage, especially in times when large production is desired. In welding manganese bronze a very small amount of aluminum must be used in the welding material. Pure copper can be welded satisfactorily and practically free from blow holes by using a copper and phosphorous welding material.

A paper on "A Curious Case of Corrosion of Tinned Sheet Copper" was presented with lantern slides by Dr. Paul D. Merica. The case referred to was that of the Library of Congress in Washington, which is covered with tinned sheet copper material installed about 1894. Furrows or pits have appeared on the surface of this roof.

Dr. H. S. Rawdon, United States Bureau of Standards, was not present and his paper, entitled "Notes on the Occurrence and Significance of Twinned Crystals in Electrolytic Copper," was read by title.

A paper on "The Annealing Properties of Copper," by G. V. Ceasar and G. C. Gerner, Hammond Laboratory, Yale University, was presented but not read or discussed.

COPPER-ALUMINUM-IRON ALLOYS

The first technical paper Friday was entitled "Some Copper-Aluminum-Iron Alloys," prepared by W. M. Corse and G. F. Comstock and presented by the former. This paper gave some of the preliminary results obtained in the examination of these alloys, and without reading the paper Mr. Corse referred to some of the results of the investigation. He said it is possible to add iron to aluminum and copper alloys, thus increasing the tensile strength and particularly the yield point. The addition of the third metal to the binary alloy helps to break up the large crystalline structure which characterizes the binary alloys and to improve the physical qualities of the combination.

The paper includes a table which shows that for the same aluminum content there is always an increase of proportional limit, yield point and tensile strength with increasing iron content, and in general a rather less substantial degree in elongation and reduction of area. In the same way, with constant iron content, the proportional limit, yield point, and tensile strength increase with increasing aluminum, while the elongation and reduction of area decrease. Other tabulated tests indicate that the proportional limits and yield points increase fairly regularly with the iron content; the ultimate strengths do not change much after 4 per cent iron, and the ductility drops decidedly. The best alloys, considering both strength and ductility, appear to be those containing between 3 and 4 per cent iron.

"Physical Test of Common High Brass Taken Parallel and at Right Angles to the Direction of Rolling" was the title of a paper illustrated with lantern slides, prepared by William B. Price and Philip Davidson, Scovill Mfg. Company, Waterbury, Conn., and read by Mr. Price. This paper referred to the investigation of the physical properties of cold rolled brass tested longitudinally and transversally, this test referring particularly to specifications in the manufacture of brass shrapnel casings.

MANGANESE FOR HARDENING ALUMINUM CASTINGS

"Aluminum Castings and Forgings" was the title of an interesting paper by P. E. McKinney, United States Navy Yard, Washington. He said that in the manufacture of light castings, the properties that may

be decided as most desirable are low specific gravity, a fair amount of strength and freedom from brittleness, good machining properties, the maximum resistance from corrosion and good casting qualities and freedom from hot shortness. Pure aluminum is entirely too soft to produce satisfactory castings for most purposes, and it is the universal practice to stiffen up the alloy with some hardening element, copper being the most widely used hardener. Various combinations containing manganese with or without copper and with a minimum aluminum content of 95 per cent have been used in foundry practice for the past two years with gratifying results, the use of manganese in relative small quantities hardening the alloy without destroying its ductility as in the case of copper or zinc. Special furnaces are not required in the production of aluminum containing manganese, which can be melted in natural draft pit furnaces. The paper, in part, was as follows:

PROCEDURE IN MELTING ALUMINUM ALLOYS

In melting aluminum alloys, clay crucibles or clay-lined crucibles are preferable. No charcoal or carbonaceous covering is used on the metal, as carbon combines with this alloy, forming a very brittle compound. Gates and sprues from castings must be carefully cleaned and freed from sand, as practically all the sand introduced into the pot is reduced to silicon which materially weakens the alloy. In cases where there is danger of introducing sand into the crucible it has been found very beneficial to introduce a powdered flux which is made by melting together 60 per cent of potassium chloride and 40 per cent of kryolite and powdering the mixture. This flux tends to dissolve the silica and keeps it from combining with the aluminum.

In preparing the alloy for casting purposes an empty crucible is set in the furnace and heated to a bright red heat. The requisite amount of hardening alloy is added and melted as quickly as possible. As soon as the hardener is melted the draft is cut down by opening the cover of the furnace and aluminum is added in small increments as fast as it will melt, timing the additions so as to keep to temperature of the mixture at not more than a faint red heat. The crucible is drawn from the furnace just before the last of the aluminum is melted in order to prevent the metal becoming overheated. This is a very important point, as overheated aluminum will absorb silica from the walls of the crucible at a very rapid rate, and it has been found that once overheated this aluminum is practically worthless for future use. Just before pouring there is added to the contents of the crucible about ¼ oz. of zinc chloride and the metal is thoroughly stirred with a clay-covered skimmer. This zinc salt tends to reduce the oxides and dross in the metal and puts it in ideal condition for casting purposes. Alloys of aluminum containing manganese have a slightly greater shrinkage than those containing copper alone, and due allowance must be made by using ample risers and chill plates on intricate castings.

The paper stated that alloys of aluminum containing manganese have been found to work very freely in cold rolling or hot forging. The same type of ingot molds are used in preparing aluminum for forgings as for brass forging ingots. In making drop forgings from aluminum a little preliminary forging is desirable. The ingot can be cut or dropped and forged to approximate shape at a temperature from 1150 to 1200 deg. Fahr., after which they can be finished in the dies.

In reply to questions, Mr. McKinney stated that it is preferable to use steel crucibles for aluminum alloy, if they are to be had. Difficulties due to sluggishness in the metal is overcome by the use of fluxes. The statement was made that nichrome crucibles were all right with brass but went to pieces with aluminum. Mr. McKinney said that the use of iron crucibles is more or less a questionable practice, but that wrought iron crucibles are more satisfactory than those made of cast iron The statement was also brought out that the physical properties in cast aluminum and alloys are improved particularly in automobile castings by the use of up to 1 per cent of iron.

CRACKING OF CARTRIDGE CASES

A paper on "Seasoning Cracks and the Self-Annealing of Brass," by W. Arthur, Frankford Arsenal, Philadelphia, brought out considerable discussion of this subject, particularly in reference to the cracking of artillery and cartridge cases. Cadmium was stated to be a contributing cause. Mr. Arthur said that some other alloy might eventually have to be used for cartridge cases because of the seasoning cracks and that copper-aluminum alloy might be desirable. He said the British government was having the same trouble that this country is with its cartridge cases.

In connection with a paper on "Co-operation with the Metal Industries in Metallographic Work," by C. H. Mathewson, director Hammond Laboratory, Yale University, which was read by title, W. B. Price spoke in high praise of the work of the Hammond Laboratory. The closing paper on "Electrolytic Refining of Copper," prepared by F. L. Antisell, Raritan Copper Works, Perth Amboy, N. J., was read by Mr. Corse and described the electrolytic copper refining process.

Federal Motor Truck Business Expansion

The Federal Motor Truck Company, Detroit, held a most successful sales conference at Cedar Point, Ohio. last week. It was attended by 150 district managers and dealers from every State in the Union. They assembled in Detroit on Wednesday where they took a steamer, chartered for the purpose, to Cedar Point, arriving about 6 p.m. Addresses and discussions by executives and salesmen occupied the morning and afternoon business sessions, held in the large convention hall. Traffic research, sales promotion and advertising were the principal topics. New 1917 models of Federals were on display and were the center of interest, after their arrival on Friday. For one of the new models alone, the dealers placed definite orders with the director of sales, J. F. Bowman, amounting to over $1,000,000.

A banquet on Friday evening was the closing feature of the conference. Chief Pitt, of the fire department of Middletown, Conn., came from New England to tell the Federal dealers how a Federal truck had saved his city $1,800 per year. Another speaker was E. St. Elmo Lewis, who told the dealers that the best salesmen were the men who could dominate the situation with a prospect. He said, "You have got to know enough about the business of a store or firm to get the authority to tell how to apply your product, motor trucks, to its problem."

M. L. Pulcher, vice-president and general manager of the Federal Motor Truck Company, conducted the convention, and in one of his talks to the men said: "The company is just concluding the most successful year in its history. Production has jumped away beyond our estimates and sales have kept pace with the production. New buildings have been necessary, until the Federal company now occupies acres where five years ago the space was feet. Further expansion is necessary, and new buildings will be started in the spring to take care of the increased output which will be speeded up to fill the orders which you have placed."

Edward LeBas & Co., Beaver Building, 82-92 Beaver Street, New York, are supplying the trade with "Proctor's Useful Tables," which are of special value to those who are transacting foreign business and are quoted ocean freights in shillings. The tables are designed to save time in figuring the conversion from shillings per gross ton to cents per 100 lb. Copies of these tables are furnished at the nominal price of 2c. each, or 10c. per dozen.

The New York office of the Munning-Loeb Company, Matawan, N. J., manufacturer of electroplating and buffing apparatus and supplies, has been removed from 417 Canal Street to the Taylor Building, 39 Cortlandt Street. G. C. Backus is in charge.

All-Geared Head for Foster Screw Machine

BY OSKAR KYLIN

The all-geared head shown in the accompanying illustrations has just been designed and tested out, and is about to be put on the market by the Foster Machine Company, Elkhart, Ind. It is to meet the increasing demand for single pulley drive screw machines, a demand caused by the added advantages of instantly obtainable speed changes in the geared head machine, and the greatly increased pulling power, owing to the much higher belt speed that can be employed in this style of a head as compared with a back-geared cone head.

One interesting feature in regard to the design of the head is the unit principle of design employed, the geared head itself being a new unit made to fit the standard Foster No. 5 screw machine. The cone in the standard back-geared machine is substituted by a three-gear cluster mounted on a sleeve journaled on the spindle. This gear cluster is arranged to engage a triple sliding gear cluster mounted on a shaft directly above the spindle, and shown plainly in Fig 3. This shaft is journaled in bronze boxes carried by the main head casting. The method of operating the sliding gear cluster is visible in Fig. 4, the means of operating being a rod and hand lever, which means has proved to be rapid and convenient.

On this same shaft are mounted two friction gears with the cone type friction, arranged to engage either of these gears. The purpose of this friction is to stop, start and reverse the machine, one of the gears being engaged by the reversing idler, mounted beneath the main driving pinion seen in Fig. 3. The means of operating the reversing friction clutch is shown in Fig. 1, being the lower of the two horizontal levers.

For driving the geared-head machine, a belt of 2½-in. width on a 10-in. pulley is employed. The speed of the pulley is 900 r.p.m., giving a belt speed of 2350 ft. per min. A single belt under ordinary shop conditions, and figuring a very conservative value, can deliver 6.2 hp. to the machine. The reversing friction in the head is powerful enough to pull a still heavier load than this without slippage. This amount of power is, however, greatly in excess of the requirements of the machine, a 2-hp. motor being ample for the general run of work done. If the work should be of unusually heavy character, demanding more power, a 3-hp. motor can be used to advantage. Fig. 2 shows the machine arranged with a 2-hp. General Electric 1800 r.p.m. motor mounted on the leg. The high-belt speed employed makes it possible to use a high speed motor of small frame. Attention is called to the method of guarding the belt as well at the motor as on the machine.

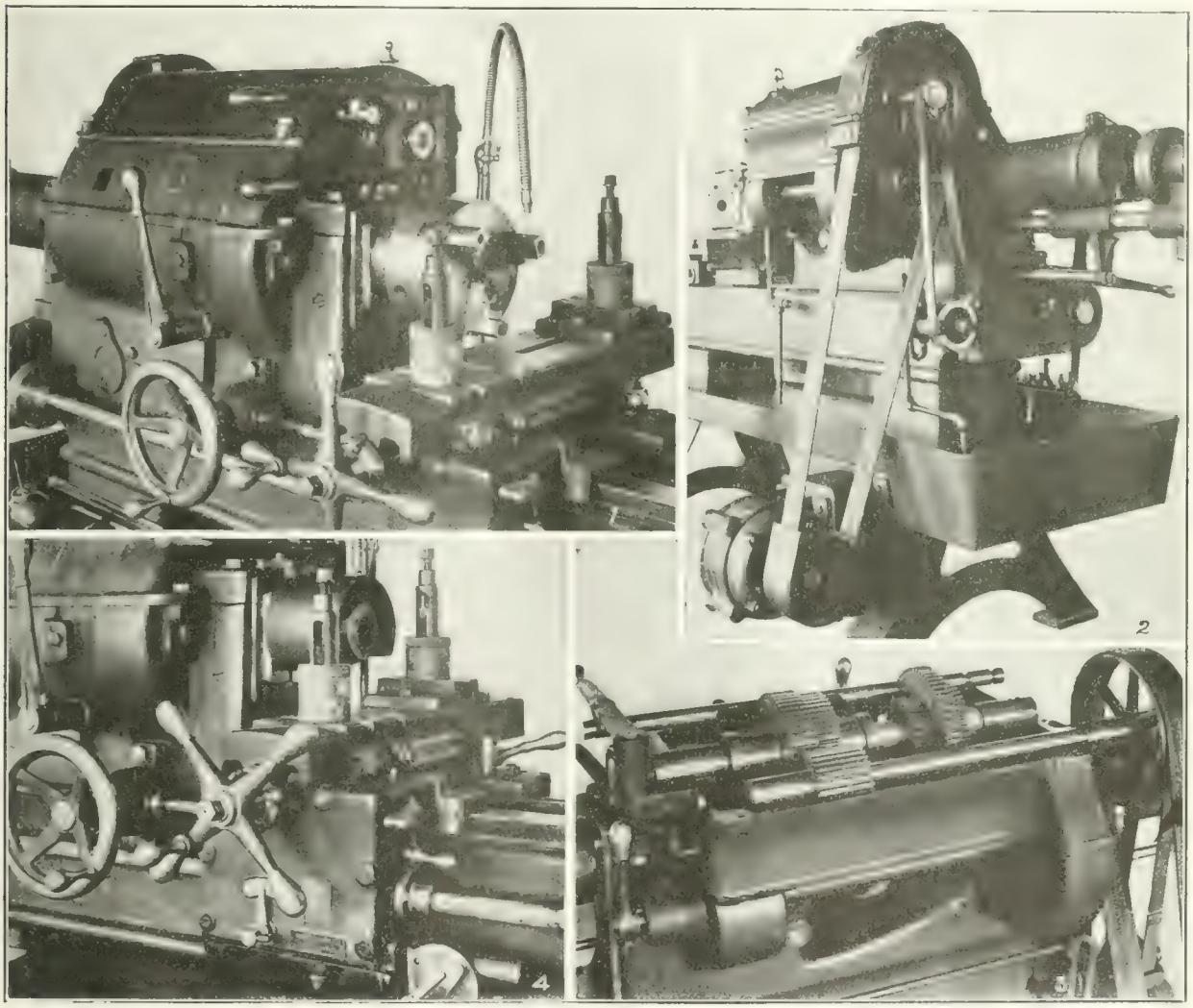


Fig. 1.—All-Geared Head for Foster No. 5 Screw Machine. Fig. 2.—Rear View of the Geared Head Arranged for Motor Drive. Fig. 3.—Arrangement of Gears in Head. Fig. 4.—Cross Slide Equipped with Hand Longitudinal and Power Cross Feed

Fig. 1 shows the machine equipped with a three-jaw geared scroll chuck clearing the cut-off slide. Fig. 4 shows the collet type automatic chuck, the capacity of which on the Foster No. 5 screw machine is 1 13/16 in. The diameter of the scroll chuck is 7½ in. and the swing over the cut-off 8¼ in. The cut-off slide and carriage is shown in Fig. 4, and is equipped with hand longitudinal and power cross feed with four feed changes.

The six speed changes are obtainable in the geared head and are in geometrical progression, ranging from 34 to 466 r.p.m. They are indicated, together with the corresponding movements of the levers, on the speed chart mounted on the head, and seen in Fig. 1.

Acid and Basic Steel for Castings*

A Discussion of the Inherent Differences—Acid Scrap on a Basic Bottom—German and American Output Compared

BY EDWIN F. CONE

CONSIDERATION of this subject is practically confined to open-hearth steel; and the question is not so much one of the acid as a competitor of the basic as it is one of comparison. About 85 per cent of the steel going into steel castings in this country is made in the open-hearth furnace. In 1915 the open-hearth output was 84.9 per cent of the total; in 1914 it was 87.1 per cent. Castings from the converter and the crucible are regarded as acid steels, while those made from the electric furnace are either acid or basic But in the latter cases melting conditions are so different from those ruling in the open-hearth furnace that the steel can hardly be considered when discussing the open-hearth product.

USES OF ACID AND BASIC CASTINGS

There has been recognized for a long time a distinct dividing line between acid and basic steel castings. Castings which before being put to their final use are necessarily machined all over or to a large extent are almost universally specified and made of acid open-hearth steel. All other castings, principally bolsters, draw-bars, knuckles, etc., are poured from basic steel. This is the recognized practice.

The principal reason for this is not that one is inherently stronger than the other, but because acid steel, when properly made, is usually sounder and freer from defects. Hence it is less liable to reveal defects when machined and is therefore less subject to rejection. There is in fact only one distinct handicap which prevents basic steel from possessing a decided advantage over acid steel for casting purposes. When the basic steel has left the furnace and is covered with its slag in the ladle, a reaction at once starts between the steel and the slag consisting of a combination between the calcium of the slag and the silicon of the steel, by which silicon leaves the metal and goes into the slag and phosphorus leaves the slag and goes into the metal. The result is that the latter part of the heat is high in phosphorus and low in silicon—often low enough to cause the metal to be porous when cast.

In acid steel, of course, the conditions are largely the opposite. It is purely a melting and not a refining process, and if carefully carried out the steel is inevitably sounder. This is the main reason why it is specified for machined and jobbing castings in general.

In the steel foundry department of one of the largest steel plants in this country I was astonished to see a few years ago a 25-ton basic heat being poured for 45 minutes into small molds. It is hardly necessary to recount that toward the end of the heat the crop of "cauliflower" sink heads was a large one. It was then the custom in that plant to order from the open-hearth department a 0.25 per cent carbon heat for castings and the molding floor was sent any heat ready at the specified time, whether acid or basic. The losses were always large.

ATTEMPTS TO OVERCOME SLAG CONTAMINATION

To overcome a low silicon content in the last stages of a basic heat it is customary often to start with a high initial silicon, perhaps 0.40 to 0.45 per cent especially where considerable time must elapse in pouring the heat. But even then, a basic slag being more highly oxidized than an acid slag, the metal at the end of the operation is more highly charged with oxygen, tending to less sound steel. The average basic heat will analyze lower in silicon at the end than at the beginning of the pour, often by 50 per cent.

Attempts to avoid this slag contamination of basic steel in the ladle have been many. Some have tried to remove the slag from the ladle and substitute an acid slag, but without gratifying success, so far as I know. Only one really effectual means of avoiding slag contamination has been accomplished. This consists in tapping a heat through one ladle into another, leaving the slag in the first ladle. By tapping the metal from the furnace into a ladle containing a nozzle and stopper about 6 inches in diameter, and then bottom-pouring the metal into a second ladle, all the slag can be retained in the first ladle. Such a method is claimed to be entirely effectual in overcoming the slag contamination, but to carry it out the steel must of course be run excessively hot in order to undergo this transfer and still be suitable to avoid misruns. In addition the metal is not benefited but rather injured by being made excessively hot. The furnaces also are injured more quickly and the fuel cost is higher, making the practice virtually prohibitive.

THE ADDITION OF FERROALLOYS

It can hardly be gainsaid that the best steel is made entirely in the furnace and not in the ladle. The acid process has a distinct advantage in that additions of ferromanganese and ferrosilicon can be made without difficulty directly to the metal in the bath, whereas in the basic practice this is not the case. Though many acid foundries add the manganese to the metal as it flows into the ladle, careful investigations show that the steel is better if these additions are made to the furnace, even though the consumption of manganese is greater.

The functions of the silicon and the manganese as purifiers, scavengers and strengtheners of the steel are more thoroughly and efficiently performed by the intimate mixing and contact secured by finishing the steel in the furnace. You can't make as good a loaf of bread by introducing part of the ingredients after the kneading.

THE QUESTION OF OXYGEN

To what extent oxygen in steel is harmful is not definitely decided. An authority stated recently that the results of extensive investigations warrant the conclusion that oxygen in steel, if it exceeds 0.01 per cent, tends to produce brittleness under shock. He gives the oxygen content of acid and basic open-hearth steels, as deduced from a large number of analyses as follows:

	Per Cent
Acid open-hearth steel	0.010
Basic open-hearth steel	0.019

The difference here cited is not a large one and it is just as easy to make a high oxygen acid heat as a poor basic heat if the furnace practice is not carefully watched.

Basic open-hearth steel, however, other things being equal, is of necessity the more highly oxidized one. In commercial steel castings this question is not likely an important one, as many basic castings are used successfully under conditions necessitating the withstanding of severe shocks. It is, however, a fact that more manganese is necessary as a neutralizer of this more highly oxidized condition than is the case in acid steel.

In electric steel castings, even from a basic bottom, the manganese consumption is decidedly lower than with the acid or basic open-hearth. This shows the healthy condition of the steel, especially as to its oxygen content. From one-third to one-half as much manganese is necessary in electric practice as in the open-hearth to achieve the same results.

*From a paper presented Sept. 15, 1916 [illegible] Foundrymen's Convention at Cleveland, of [illegible] on the editorial staff of THE IRON AGE, New York.

In normal times basic steel is considered less expensive to make because of cheaper pig iron and scrap. But these are more or less offset by the greater cost of the furnace lining and lime additions necessary. The result of the refining action of the basic furnace is a steel purer in respect to phosphorus and sulphur than is the acid steel. It is doubtful whether this alone is a particular advantage. Electric steel can be made so low in these two elements as to be considered by some a disadvantage.

Because selected materials must be used in making acid steel, many engineers have thought that a better grade of steel results. This is not a full statement of the case. It is the inherent conditions of the two processes that rule. Electric steel from the poorest scrap on a basic bottom can be made that is equal or superior to the finest crucible steel made from the most expensive selected stock.

COMPARATIVE PHYSICAL PROPERTIES

As to comparative physical properties, one of the largest makers of both acid and basic steel castings in the country gives it as his opinion that basic steel shows higher ductility for a given tensile strength than acid steel and as good an elastic ratio. I am unable to verify this statement from investigation. I have, however, seen some remarkable results from basic steel castings, superior to those from acid steel.

So many factors enter into this question that a very thorough investigation would be necessary to decide it. If basic is better, it is doubtless due to the fact that the refining conditions are an important factor. In the acid process old scrap is constantly remelted; the only virgin metal is the pig iron. In the basic, old scrap is refined in remelting and the proportion of pig iron or virgin metal is twice as great. These may be important factors.

BASIC CASTINGS FROM ACID SCRAP

A very interesting modification of the usual basic process for producing steel castings is being practised successfully by a large foundry in this country. The results obtained are interesting and striking. Acid quality scrap is used on a basic bottom. The only difference between the procedure at this foundry and at regular acid foundries is that they buy the same scrap that the acid producers use and a grade of pig iron similar in every way except its silicon content. The operation in other respects is the same as regular basic practice. Less lime by 50 per cent is used or necessary. The additions are made as in usual basic practice. The time for refining and hence for completion of a heat is less, as well as the wear on the furnace.

While the probable expense of this practice per ton of metal in the ladle may perhaps be more than for acid metal, though the opposite is claimed by the interested parties, it is asserted that the metal is better than either acid or regular basic and that the percentage of rejected castings is less by a considerable margin.

In favor of this argument is the fact that the absence of considerable refining, with consequently less chemical action, tends to produce a less oxidized metal resulting in one low in phosphorus or sulphur or containing less inherent wildness. Castings made by this procedure are continually competing with the same castings from acid foundries; they are reported as unusually sound and free from cracks and other defects. Locomotive frames, ship castings and machinery parts have been on the market from this foundry for five or six years now and are reported by users or inspectors as of the highest grade. It is claimed that the theory that basic steel is not suitable for the castings commonly made in acid has been exploded. It is at least a fact that here is a case where miscellaneous jobbing castings of all sizes, from very small to large ones, are made in basic steel and with excellent commercial results.

GERMAN AND AMERICAN STEEL CASTINGS

It is interesting to compare the relative open-hearth steel casting output of this country and the casting output of Germany. The following table gives parallel figures of the percentage of acid steel castings in the total steel foundry output of the two countries for the last 15 years:

	United States		Germany	
Years	Acid Open-Hearth Castings, Per Cent of Total	Total Open-Hearth Castings, Gross Tons	Acid Castings, Per Cent of Total	Total Castings, Metric Tons
1901	68.4	301,822	37.0	107,210
1902	69.6	364,879	40.0	116,524
1903	66.3	400,348	34.3	131,756
1904	67.0	362,854	30.3	152,814
1905	60.9	526,540	35.1	186,131
1906	56.5	719,891	41.0	189,313
1907	50.9	746,725	40.4	211,498
1908	50.4	311,777	40.1	192,883
1909	49.0	601,040	40.3	206,456
1910	49.7	863,351	42.5	262,811
1911	53.3	571,191	37.9	269,372
1912	49.0	870,848	31.1	321,663
1913	49.1	910,216	30.1	362,916
1914	44.7	664,317	29.1	298,338
1915	54.7	735,332	27.8	694,015

In this country there has been a gradually decreasing proportion of acid castings since 1901, with the exception of the years 1911 and 1915. In Germany the basic predominates and is surprisingly larger than in the United States. This is especially true in the last two years under war conditions, though as a general rule Germany's use of basic castings is more extensive than ours. Since 1906 the falling off in the proportion of acid castings there has been quite pronounced.

Speculation as to the cause of this difference in conditions in the two countries is not likely to be profitable. We have often heard it said that German efficiency has produced better castings than American practice, be it acid or basic steel. It is probable that the general use to which they are put is not greatly different in the two countries. If this is so, the Germans must possess some method by which their basic castings are more acceptable than ours or else American foundrymen have too little faith in the metal they make. Is the desire in this country for tonnage rather than quality the answer? Or do the Germans produce a large proportion of their castings from acid scrap on a basic bottom?

THE GAIN IN BASIC

The gain of the basic on the acid castings has been pronounced in both countries. There is no reason why the basic should not continue to gain. With rapid advances in metallurgical practice it is not unlikely that a way will be found whereby basic may become equally interchangeable with acid for steel castings. To what extent electric steel castings may affect this question is important. As bearing on this, it is interesting to note that of the total steel casting output of the United States in 1909, only 0.05 per cent was electric steel. In 1915, electric steel castings comprised 2.6 per cent of the total and the output has only begun to grow.

American Steel and Machinery for Sweden

Ivar Alfsen, who has been in the United States for the past 10 years, for a good portion of that time connected with the American Woodworking Machinery Company, Rochester, N. Y., as export manager, has become manager of the machinery department of H. Schiander's successor, at Moss, Norway. The firm is engaged in the machinery import trade for Norway, Sweden, Denmark and Finland, and is arranging to establish connections with American manufacturers in iron and steel, metal working and other machinery lines, particularly connections in structural steel, wrought and cast iron pipe, tin plates, rails and machinery for shipyards.

The Fourth Annual Efficiency and Welfare Conference under the auspices of the Pennsylvania State Department of Labor and Industry and the Engineers' Society of Pennsylvania will be held at the Capitol, Harrisburg, Nov. 21, 22 and 23. Representatives from practically all the larger iron and steel plants and other industries in the State and many engineers will be present. Among the topics for discussion will be new industrial legislation, accident prevention, occupational diseases, problems of employment and unemployment, avoidance and settlement of labor disputes, Americanization of alien workers, fire prevention and other manufacturing problems.

NO HALT IN ACTIVITY

Western Tool Builders Enlarging Plants

British Order Causes Fear of Further Restrictions on Shipments to Neutral European Countries

Purely domestic industrial demand for machine tools is active and the future looks good. Deliveries of standard tools are being pushed further off, but buyers do not hesitate to place orders even when it is made clear that several months must elapse before they can get desired machines. The buying is scattered, tools of all kinds and sizes being sought to balance equipments.

Dealers who have shipped extensively to Holland, Sweden, Norway and Denmark are apprehensive over a ruling of Great Britain to the effect that the Netherlands Oversea Trust will not be permitted to receive shipments from America, while letters of assurance will not be granted for American shipments to the other countries named. It is too early to say what the results will be. Usually the restrictions have not been so severe as appeared on their face.

The steel mills have been large buyers in Cincinnati, and the automobile makers have been a little more active. Despite high building costs tool builders are enlarging their facilities. Extensions are under way for the following: American Tool Works Company, R. K. Le Blond Machine Tool Company, and the Cincinnati Milling Machine Company.

Milwaukee tool builders are running behind on deliveries because of the insistent domestic demand. In that city also plant extensions are numerous. Kearney & Trecker have enlarged their facilities.

The demand for standard machines is brisk in Detroit, although it requires from four to seven months to fill orders. Housing labor is a great problem in that city, it being reported that many workmen are going to other places because of the high rents they are obliged to pay.

The Pacific Northwest continues to suffer from a shortage of freight cars. Overflow work from the shipyards is giving smaller shops plenty to do. The Alaskan trade shows a steady growth.

Trade in Canada is far above previous records, and exports of manufactured goods are in excess of imports. Hot weather in August reduced the production of shells.

New York

NEW YORK, Sept. 20, 1916.

Scattered buying of all kinds and sizes of machine tools indicates a healthy condition in the metal-working industries. No large lists are out, and the tools being bought are those required to balance production equipment. The demand has tightened up deliveries in many directions, but buyers who are informed that they cannot have machines before December or January do not refrain from placing their orders.

The many inquiries are being followed up in an energetic manner, such as is usual in normal times. In the great war flurry many salesmen were called in from the road, while others traveled merely to appease their trade, for the reason that orders poured in without much exertion on their part.

Dealers have lately done a good business in lathes for export. Some who have been shipping to Holland, the machines being consigned to the Netherlands Oversea Trust, are wondering to what extent their business with that country will be curtailed by an announcement cabled Sept. 15 that the British Government will refuse to allow the Holland combination to accept further shipments from America.

The cable further announced that Great Britain would decline to grant letters of assurance for American shipments to Holland, Sweden, Denmark and Norway. British exporters are stated to be under the ban also. This means that shipments are likely to land in the British prize court, and it is believed to be questionable whether steamship companies will take the risk of accepting goods destined for the countries in question. Two reasons are advanced for the new restrictions, the first being a desire on the part of Great Britain to control supplies at the source, and the second that the British Government has found the detention of suspected ships to be exceedingly expensive because of the resultant claims for damages.

Several interests have cabled for details of the new prohibition and until these are received it is too early to say just how business will be affected. Several dealers have machines in their warerooms already boxed and marked for shipment to the Netherlands Oversea Trust.

The Russians are buying occasionally, and some French inquiries are before the trade.

H. M. Albee & Son, 35 Halsey Street, Newark, N. J., machinists, are erecting a one-story reinforced concrete factory, 48 ft. square, on a plot 48 x 100 ft., and will devote it to the manufacture of special machine parts.

The Lovell-McConnell Mfg. Company, 190 Wright Street, Newark, N. J., manufacturer of automobile and marine electrical appliances, warning signals, etc., has been acquired by the United Motors Company, and its name has been changed to the Klaxon Company. D. A. McConnell, formerly vice-president, becomes president and general manager; and W. P. Coghlan, formerly secretary, becomes secretary and treasurer. F. Hallett Lovell, Jr., former president, retires from the company.

The Mignon Wireless Corporation, Elmira, N. Y., manufacturer of radio apparatus, has increased its working capital from $10,000 to $25,000. Ernest C. Mignon is president.

The Sintered Ore Company, Buffalo, is building a fan room addition to its plant at the foot of Hamburg Street and the Buffalo River.

The Atterbury Motor Car Company, Buffalo, is repairing fire damage to its plant, Elmwood and Hertel avenues, at a cost of $20,000.

The Donner Steel Company, Buffalo, has recently taken out building permits for its new bar mill, an addition to the blooming mill, a forge and axle building and a shipping building. Work on these structures is being rushed.

The plant of the Delaney Forge & Iron Company, Perry Street and the Lehigh Valley Railroad, Buffalo, was swept by fire on the night of Sept. 15 with a loss of $200,000. The principal loss was in the forge building and machine shop and the power plant, recently equipped with up-to-date electric motors and other machinery. The plant and business of the company were recently purchased by John T. Dillon and a number of capitalists of Titusville, Pa. Work will be resumed at once and the damaged portion of the plant rebuilt.

The Robertson Company, Peekskill, N. Y., will soon let contracts for the erection of a stove factory, 100 x 115 ft., Geo. W. Robertson, 257 Water Street, New York, is treasurer.

The Northern Iron Company, Port Henry, N. Y., has let contract to the West Side Structural Company, Watervliet, N. Y., for remodeling its factory and building an addition, 80 x 100 ft.

The Hood Furnace & Supply Company, Corning, N. Y., has completed plans for a plant which it will erect at once.

Pomeroy & Stellrecht, machinists, 60 Indiana Street, Buffalo, have taken out a building permit for a one-story reinforced concrete factory and machine shop which they will erect at Kensington and Fillmore avenues.

The Chevrolet Motor Company, 816 Eleventh Avenue, New York, which has acquired a large building for service purposes, is taking bids for a three and five-story addition, 100 x 150 ft., to cost about $20,000.

The Alexander Smith & Sons Carpet Company, Yonkers, N. Y., has started the construction of a one-story boiler house.

Plans have been completed by the commanding officer of the Watervliet Arsenal, Watervliet, N. Y., for alterations and additions to its shops to cost about $100,000.

The almshouse committee of Camden County, Camden, N. J., is taking bids for the construction of a one-story boiler house, 48 x 51 ft.

Millville, N. J., will take bids in a few weeks for a pumping station to cost about $2,000. Newton B. Wade is the engineer.

Catalogs Wanted

H. Miller, Ltd., Hazebrouck, France, desires to receive catalogs, descriptive matter, etc., covering tinning equipment, apparatus for blow pipe soldering and oxy-acetylene welding.

Philadelphia

PHILADELPHIA, PA., Sept. 18, 1916.

The Victor Motor Company, 1530 Chestnut Street, Philadelphia, has taken over the business of the Victor Car Company of Philadelphia, automobile maker. Twelve acres of land have been purchased at Grubbs Landing, Del., five miles north of Wilmington on the Pennsylvania Railroad, of which five acres are to be utilized by the Victor Motor Company for a plant and the other seven acres are to be developed by the American Guaranty & Trust Company of Wilmington for housing employees. The factory will be put up in units, the first being 80 x 425 ft., with a separate powerhouse. An engineer will be selected and bids will be taken in about two weeks. It is planned to have the structure complete by Dec. 1. It will be one story, of steel frame construction.

Edwin A. Moore, Robeson Street, below Weiser, Reading, Pa., manufacturer of special gray-iron castings, is building an addition to its coreroom, 40 x 60 ft., and has started the construction of an ell, 60 x 120 ft., to its foundry, which will call for an addition of about 50 per cent to the output, principally for special machinery castings.

The Pennsylvania Saw Company, Frackville, Pa., it is reported, will double its output for the next six months in order to fill a special order received. The working force will also be increased.

With the sale of the equipment of the Atlas Powder Company, at Mount Carbon, near Pottsville, hope of reopening this plant is now abandoned. The buildings were erected with the view that the war would last less than a year; and since the wooden structures were rotted out by the acid fumes, the company decided to close the plant.

The Keystone Door Check Company, Harrisburg, Pa., has started the construction of a factory at Palmyra, Pa., 28 x 70 ft., for the manufacture of hardware, etc., employing about 25 workmen at the start.

The Ingersoll-Trenton Watch Company, Trenton, N. J., has recently added 30 expert watchmakers and is planning to put on others this week. It is producing 1000 watches a day, but is to increase its output to 1200 shortly.

The Bethlehem Steel Company, South Bethlehem, Pa., has started the construction of a one-story boiler house, estimated to cost $50,000. The Stone & Webster Engineering Corporation, 147 Milk Street, Boston, Mass., is the engineer and builder.

George B. Hopkins, Hanover, Pa., maker of automobile bodies, etc., is taking bids for the construction of a one-story addition to his factory and office building, estimated to cost $12,000.

The Pennsylvania Equipment Company, Coleman Building, Philadelphia, is in the market for a second-hand plate punch, with 42-in. gap, to punch holes on 1-in. plate, and for a second-hand edge planer, open housings, 30 ft. long, to plane 1⅛-in. plates.

J. Pearce, 334 North Sixty-fifth Street, Philadelphia, has taken out permit for a machine shop, to be erected on Vine Street at a cost of about $500.

J. Alfred Clark, Thirty-fifth Street and Gray's Ferry Road, Philadelphia, has been granted a permit for an addition to his foundry to cost about $1500.

The W. Steele & Sons Company, 1600 Arch Street, Philadelphia, has been granted permit for the construction of a one-story brick and concrete powerhouse, 64 x 100 ft., for S. B. & B. W. Fleisher, Eighth and Chestnut streets, Philadelphia, at a cost of about $70,000.

Ford Bros & Co., 1610 South Front Street, Philadelphia, coppersmiths, have awarded contract to Henry C. Dahl, 231 South Eighth Street, Philadelphia, for the construction of a two-story brick and concrete machine shop, [illegible] x 74 ft., estimated to cost $3200.

The Watson Mfg. Company, manufacturer of incubators, brooders, etc., Lancaster, Pa., has awarded contract to Samuel H. Baily for the erection of its new plant at an estimated cost of $31,000.

The Department of Public Works, Philadelphia, is advertising for bids to be received until Oct. 3, for one pump of 25,000,000 gal. per day capacity for the Queen Lane Station and for another pump of 35,000,000 gal. per day capacity for the Lardner's Point Station. The total cost is placed at about $500,000.

New England

BOSTON, MASS., SEPT. 18, 1916.

There is but little change in the strike situation in the various New England cities now affected.

The Pennsylvania Seaboard Steel Corporation has bought the idle plant of the National Steel Foundry Company, Wheeler Street, New Haven, Conn. Frederick Wertz, who is to be superintendent of the New Haven plant, has a crew of men at work putting the shop in condition. It is expected that between 300 and 400 men will be employed.

The American Graphophone Company, Bridgeport, Conn., has awarded the contract for a power house, 80 x 85 ft., two stories.

The New York, New Haven & Hartford Railroad Company, New Haven, Conn., is asking bids on a roundhouse and repair shop, 48 x 136 ft., with two wings, each 40 x 50 ft., to be erected at Danbury, Conn.

The New England Westinghouse Company, Springfield, Mass., has awarded a contract for a factory building, 36 x 274 ft., one story, to be erected on Page Boulevard.

Work has been started on an addition to the plant of the National Scale Company, Chicopee, Mass.

The Arcade Malleable Iron Works, Worcester, Mass., is to build additions to its plant on Albany Street.

The Goodell-Pratt Company, Greenfield, Mass., is planning to build an addition, 40 x 80 ft., three stories.

The Bay State Metal Corporation, Brockton, Mass., is asking bids on the construction of a factory, 65 x 160 ft., one story; an office building, 32 x 43 ft.; and a boiler house, 24 x 38 ft.

The foundry to be built at Manchester, N. H., by George A. Leighton, as previously reported, will be occupied by C. E. Boulter and M. L. Webber, who have been connected with the United States Navy Yard, Kittery, Me.

The Howes-Larsen Tool Company, Milford, Conn., incorporated with capital stock of $25,000 by John T. Howes, Henry E. Larsen and Anton Christensen, will occupy the plant on Buckingham Avenue, formerly occupied by Thomas Bogan.

The Waterbury Mfg. Company, Waterbury, Conn., has awarded a contract for a factory addition, 104 x 200 ft., six stories, to be erected on North Main Street.

The Connecticut Company, Waterbury, Conn., has awarded a contract for an addition, 100 x 150 ft., two stories, to its machine shop on West Main Street.

Baltimore

BALTIMORE, MD., Sept. 18, 1916.

New additions and repairs planned by the Wilmington Steel Company, Wilmington, Del., will cost about $10,000.

Work is being rushed on the buildings for the Pyrites Company, Ltd., South Wilmington, Del. An office building has been completed and two large main buildings are being erected. E. G. Gray is manager.

The Central Metal & Supply Company, 609-611 East Lombard Street, Baltimore, has leased a building at North and Maryland avenues.

The Baltimore Copper Smelting & Rolling Company, Fourth Avenue and Fifth Street, Canton, Md., is considering the construction of additions to increase its output.

For the manufacture of portable bath equipment, the Kwick-Bath Mfg. Company, Petersburg, Va., has been formed. G. B. Baker is secretary-treasurer.

A power plant and mill will be built by the Richmond Lumber Company, Fourth and Decatur streets, Richmond, Va.

A large addition is being built to the plant of the Brylgon

Steel Casting Company, New Castle, Del., now owned by the American Manganese Steel Company, and it is understood manganese and welding furnaces will be installed.

It is stated that the Tindel-Morris Company, Eddystone, Pa., is rushed with orders for steel forgings.

Chicago

CHICAGO, ILL., Sept. 18, 1916.

Active selling of machine tools continues and in a steadily widening market among domestic manufacturers. The larger units are buying steadily, while the number of new organizations is perhaps larger than in a previous period of expansion. In standard lines of tools deliveries are still a handicap to sales and dealers are dependent upon the delivery of machines for which orders were placed as long ago as eight, ten and twelve months. The Italian Government is still a buyer of equipment for ammunition manufacture, while for shipbuilding and other industrial works in Italy a number of orders are reported. With all of the business that is still appearing, and despite the remoteness of a change in the disordered conditions of trade, conservative dealers are recognizing that the buying of equipment will reflect the earliest tendency toward a slowing up in demand and the process of repairing fences in natural territory is already being undertaken.

The Armstrong Brothers Tool Company, 333 North Francisco Avenue, Chicago, is building a steel and brick addition to its drop forging department, 50 x 70 ft., and is also erecting a reinforced concrete fireproof building, 60 x 130 ft., four stories, to be used as a finished stock warehouse, shipping department and offices. These additions will largely increase the company's facilities for taking care of its increasing business.

The Imperial Brass Mfg. Company, 1200 West Harrison Street, Chicago, Ill., manufacturer of brass specialties, is taking bids for an addition to its plant which will double its floor space, giving it a total of 50,000 sq. ft., and will more than double its present foundry space. The plant has been operating day and night for many months on domestic orders. The new equipment has been provided for.

The Chicago Hardware Foundry Company, Chicago, has awarded the contract for an addition to its plant.

The Golconda Portland Cement Company, Golconda, Ill., has been organized and will erect a plant at Golconda, Ill., which will cost $1,000,000.

The Bradley Foundry Company, Kankakee, Ill., has been organized with a capital of $5,000 by J. F. Cady, F. H. Seidel, O. Gommell and Edward Unruh.

The Bettendorf Oxygen Hydrogen Company, Davenport, Ia., has increased its capital stock from $50,000 to $100,000.

The Twin City Four Wheel Motor Drive Company, St. Paul, Minn., will erect an addition to its plant, to cost $30,000.

Indianapolis

INDIANAPOLIS, IND., Sept. 18, 1916.

The Studebaker Corporation, South Bend, Ind., has let contracts to James Stewart & Co., New York, for a machine shop, 300 x 900 ft., and a foundry, 150 x 1100 ft., to be erected on a site now occupied by the lumber yards of the company. According to the announcement the machine shop will have double the present facilities and the foundry will have four cupolas and a daily melting capacity of 250 tons. The buildings will be ready for occupancy by July 1, 1917. The cost of the improvements is estimated at $1,500,000.

Fire destroyed the machine room at the plant of the McDougall Kitchen Cabinet Company, Frankfort, Ind., Sept. 15.

The Hiatt Mfg. Company, Winchester, Ind., has been incorporated with $10,000 capital stock to manufacture furniture, office fixtures and novelties. The directors are G. E. Leggett, E. R. Hiatt and A. F. Huddleston.

The Fehring Carriage Company, Columbus, Ind., is building two additions to its plant, 27 x 100 ft. and 50 x 50 ft., respectively.

The National Tile Flooring Company, Connersville, Ind., has been incorporated with $50,000 capital. The directors are Edward P. Hawkins, Charles A. Rieman and Marion K. Jamison.

The Anthony Auto Lifter Company, Ft. Wayne, Ind., has been incorporated with $10,000 capital stock to manufacture auto lifters and other devices. C. O. Blee, W. O. Chaney and G. F. Seymour are the directors.

The Remy Electric Company, Anderson, Ind., will build a three-story addition to its plant, 60 x 245 ft. The engineers are Shank & Williams, Dayton, Ohio.

Detroit

DETROIT, MICH., Sept. 18, 1916.

The demand for machine tools continues to be unusually brisk, with the shops reporting excellent prospects for a record fall trade. Inquiries were greater and more tools were bought the past week than since early last spring. The delivery on some makes of machines, particularly lathes, has improved; but standard machines are requiring from four to seven months for shipment. The demand for woodworking machinery has lessened. Metal workers in Detroit are paying from 30 to 40 per cent of their wages in most cases for rent, and are reported as leaving the city. The lack of housing facilities in the larger cities of Michigan has caused increasing dissatisfaction among laborers, many of whom are moving to Cleveland and Chicago. Collections in all fields in Detroit are excellent, but the tendency in the investment of money is now toward conservatism.

The Federal Motor Truck Company, Detroit, is planning the erection of another addition to its plant to take care of the office and administrative forces. The additions to the factory are nearly completed and machinery is being installed. The company plans to double its output next year. M. L. Pulcher is vice-president and general manager.

The new Harroun Motors Corporation, recently incorporated with a capital stock of $10,000,000, has purchased the Prouty & Glass Carriage Company's plant at Wayne, Mich., with adjacent land, and is planning to begin the manufacture of popular-priced automobiles at once. An addition to the plant will be constructed. Ray Harroun, president of the new company, is expected to be in Wayne this week.

It is stated that the Pennsylvania system has purchased 250 acres of land just west of the new Harroun Motors Corporation plant in Wayne for the establishment of division headquarters and sidings.

The Kalamazoo Paper Company, Kalamazoo, Mich., is planning to put up a new coating mill to cost about $150,000, while the Riverview Coated Paper Mill Company will build a factory to cost $500,000. The two companies, composed of the same stockholders, have operated the two factories as separate parts of the same plant until recently.

The International Metal Stamping Company, Detroit, has been incorporated for $300,000 to manufacture stamped metal goods. The principal stockholders are O. L. Currier, 146 Philadelphia Avenue, Detroit, and F. J. Fisher, 110 Chandler Avenue.

The Sligh Furniture Company, Grand Rapids, is to add one story to its main plant.

The Knapp Machine Company, North Avenue, Grand Rapids, is to construct a new building.

The Grand Rapids Salvage Company has secured contracts for part of the steel for the addition to the Floor Board Company's plant at Ionia, Mich., and the Excelsior Wrapper Company's addition to its plant on Godfret Avenue, Grand Rapids.

The New Era Spring & Specialty Company, Detroit, has been incorporated for $50,000 by William S. Daniels, 864-878 Woodward Avenue, Detroit; Ethel B. Fulmer and William B. Blood.

Within 60 days the entire plant of the National Twist Drill & Tool Company, Detroit, will be in operation. A total of 150,000 sq. ft. of floor space has been added to the plant, the present output of which is 20,000 drills daily, along with cutters, reamers and special tools. The company was established in 1903 and now employs 500 men.

The Ideal Foundry Company, Grand Rapids, has awarded contract for its pattern shop and office building to H. Hofstra & Son, Grand Rapids. It will be 40 x 100 ft., two stories, of brick and mill construction.

The Kalamazoo Malleable Iron Company, Kalamazoo, Mich., has been incorporated for $125,000 by W. S. Dewing, Dwight L. Curtenius and George S. Burdeen.

The Grand Rapids Refrigerator Company, Grand Rapids, is planning an addition to its enameling plant.

Five demonstration cars are being built for the General Engineering Company, Detroit, recently incorporated for $200,000 to manufacture a steam automobile with either gasoline or kerosene as fuel. The company will plan shortly to manufacture the cars on a large scale. Among the officers of the company are Claude L. Lewis, 2704 West Grand Boulevard, Detroit, and Morgan J. Hammers, 805 Pasednena Apartments, Detroit.

The National Brass Company, manufacturer of brass hardware, Grand Rapids, Mich., has filed plans for the erection of a two-story addition, 45 x 185 ft., to be used as a boiler and engine room and as a plating, tumbling and lacquering room. It also contemplates building an iron and

brass foundry soon. I. A. Dexter is vice-president and manager.

The Keller Pneumatic Tool Company, manufacturer of shipping, caulking and riveting hammers, etc., Fond du Lac, Wis., will remove to Grand Haven, Mich., following the completion of a new plant there, which will take some months more. A branch plant will be maintained at Fond du Lac. Work will be started at Grand Haven on the construction of the first of three factory buildings, 90 x 300 ft. The company will be capitalized in Michigan with a capital stock of $200,000. W. H. Keller is president and general manager. The production of jigs, fixtures, gages, punches, dies, boring bars and other special tools has been added to its product.

The Chopa Piston Ring Company, Detroit, was recently incorporated with a capital stock of $500,000 not $1,000,000, as was stated in the IRON AGE of Aug. 31.

The plant of the National Silica Company, Monroe, Mich., was destroyed by fire with an estimated loss of $50,000.

The Campbell Foundry Company, Muskegon, Mich., has let the contracts for its new building, work to be begun at once.

The Republic Motor Truck Company, Alma, Mich., has announced that it will erect a new 1000-ft. brick building. The company has recently increased its capital stock from $500,000 to $1,000,000 and this is the third addition to its plant within a year.

Cincinnati

CINCINNATI, OHIO, Sept. 18, 1916.

Steel mills are reported to have lately ordered more machine tools than at any previous time in the history of the local trade. While lathes predominate in these purchases, radial drilling machines were also in demand. The demand for shaping machines is also good. Business from munition manufacturing plants has fallen off to only single tools for replacement purposes. Auto-truck and automobile makers are contracting for more tools than they were a month ago, but in some cases deliveries are hard to obtain on time. The second-hand machinery business is good, but the call for small lathes does not seem to be as brisk.

In spite of the high cost of material and labor, quite a lot of construction work on manufacturing plants is going on or contemplated. Foundations for the large plant of the American Tool Works Company have been completed and it is hoped to have the buildings completed before Jan. 1. Work is also progressing rapidly on the new plant of the R. K. LeBlond Machine Tool Company. The Cincinnati Planer Company's new addition is nearing completion, and as previously noted the Cincinnati Milling Machine Company recently took out a permit for an addition to its plant estimated to cost $30,000. Other smaller additions to different plants are either under way or contemplated.

Cullen & Vaughn, contractors, Hamilton, Ohio, have been awarded a contract for an addition to the plant of the Fisher Can Company.

The Colin-Gardner Paper Company, Middletown, Ohio, contemplates making changes in its power plant. Equipment details are not yet available.

The Quartz Spark Plug Company, Dayton, Ohio, has been incorporated with $25,000 capital stock by B. F. Weaver and others.

It is reported that the Seagrave Mfg. Company, Columbus, Ohio, manufacturer of motor-driven fire fighting machines, is contemplating adding to its manufacturing facilities. An addition to its plant has just been completed.

R. A. Jones & Co., Covington, Ky., makers of soap presses, are in the market for a universal cutter and reamer grinder. They recently completed a large plant that is now in full operation.

Cleveland

CLEVELAND, OHIO, SEPT 18, 1916

The Peters Machine & Mfg. Company, Cleveland, will enlarge its plant by the erection of a one-story brick addition, 120 x 200 ft

The American Fork & Hoe Company, Cleveland, will shortly begin large extensions to its plant at Geneva, Ohio. These will include a two-story brick building, 40 x 60 ft., and an extension, 42 x 109 ft., to its forge shop. Other extensions previously announced are now under way.

The D. & M. Mfg. Company, Cleveland, Ohio, has purchased the site and building of the Ohio Sash Weight & Foundry Company in Youngstown, Ohio, and will establish a plant for the manufacture of gas and gasoline flatirons and other metal specialties. It is said the plant will be enlarged by the erection of a new building, 40 x 150 ft.

The Ohio Blower Company, Cleveland, Ohio, has purchased a two-acre site on Detroit Avenue near West Ninety-first Street and extending back to the Nickel Plate Railroad, and will shortly begin the erection of a new plant. Plans for the first unit, a four-story building, 60 x 200 ft., have been prepared by the Osborn Engineering Company. In additions to its present production of ventilators, exhaust systems, etc., the company will manufacture automobile bodies.

The Packard Electric Company, Warren, Ohio, will enlarge its plant by the erection of a three-story and basement building, 64 x 140 ft. When completed the capacity of the plant will be more than double. The company manufactures transformers, insulating material and other products.

It is announced that a manufacturing plant will be established in Ravenna, Ohio, by the United Factory & Machine Company, which will be organized with a capital stock of $125,000 by William Blecker of Canton, Ohio.

The Kelly-Springfield Tire Company, Springfield, Ohio, has placed contracts for the erection of a three-story addition to its plant at Wooster, Ohio. It will be 48 x 50 ft.

The Buckeye Aluminum Company, Wooster, Ohio, will enlarge its plant by the erection of an extension, 70 x 100 ft., permitting it to double its output; and will also build a power plant, in which will be installed a 250-hp. engine.

The Sterling Company, Wellington, Ohio, will shortly begin the erection of a new foundry building, 60 x 120 ft.

The Gartland & Carroll Foundry Company, Sandusky, Ohio, has been incorporated with a capital stock of $100,000 by John J. Carroll, Thomas H. Gartland and others. The company has commenced the erection of a gray iron foundry.

The Herrold Tool & Forge Company, Columbiana, Ohio, has been incorporated with a capital stock of $25,000, to succeed the Herrold Tool Company, and will manufacture hand tools and other products.

Milwaukee

MILWAUKEE, WIS., Sept. 18., 1916.

Milwaukee machine tool builders are getting further behind on orders, due to the insistent domestic demand for all classes of machines. One large maker of milling machines is 60 days behind and is sold up to May 1 on some lines, while capacity on others is fully occupied until July 1, 1917. The major part of the demand is for single tools, standard types, but numerous bookings are for small lots. Export business is almost negligible in the total volume of transactions. Tool builders continue to increase their capacity, but find it inadvisable to enlarge plants to the desired point because of the scarcity of labor. The machinists' strike, which is still going on, but slowly waning, has made necessary extraordinary efforts to whip unskilled labor into shape. Plant extensions are more generally reported, and a number of enlargements will be carried out the coming fall and winter. The metal-working industry is rapidly improving and indications point to a more profitable winter than a year ago.

The Waukesha Motor Company, Waukesha, Wis., maker of automobile, truck and tractor motors, has increased its capital stock from $200,000 to $1,000,000 to provide for extensions and to better accommodate the rapidly expanding business. A new administration building is under construction, and tentative plans are being prepared for large additions to the testing and machine shops. The assembling department will also be increased.

The P. B. Yates Machine Company, Beloit, Wis., manufacturer of sawmill and wood-working machinery, is rushing work on the new machine shop and general manufacturing building undertaken some time ago. It will be 266 x 296 ft., occupying a full city block, and affords 110,000 sq. ft. of floor space. The structure will contain a craneway, 64 ft. wide, 275 ft. long, and 30 ft. in the clear, equipped with a 10-ton electric crane. Lateral craneways, with 2-ton and 3-ton cranes, lead to the interior. Three large freight elevators, as additional facilities for handling materials will also be installed. The capacity of the plant will be increased from 40 to 50 per cent.

The Kearney & Trecker Company, maker of milling machines, West Allis, Wis., which has been making numerous additions to its plant, has broken ground for a new blacksmith shop, 54 x 64 ft.

The Argola Investment Company, Milwaukee, is taking bids for the erection of a garage and repair shop, 50 x 150 ft., two-stories and basement.

The Steam Appliance Company, Sixth and Arthur

Burnham Street, West Allis, has awarded contracts for the construction of a foundry, 50 x 52 ft.

The Gorton Machine Company, Racine, Wis., has awarded contracts for the erection of a brick and steel machine shop, 75 x 180 ft., one-story, to be ready about Dec. 1. E. B. Funston & Co., Racine, are the architects.

J. H. Light, Kaukauna, Wis., will build a garage and repair shop, 50 x 100 ft.

The Agrimotor Engineering Company, LaCrosse, Wis., has been organized by C. W. Lewis, for many years sales manager of the LaCrosse Plow Company, and will design farm implements, tractors and accessory lines, and act as agent for patentees and manufacturers.

It is reported that the Lyons Boiler Works, DePere, Wis., which has been closed for nearly a year, will resume operations Oct. 1 under the management of the Joliet Bridge & Iron Company, Joliet, Ill.

The Capitol Culvert Company, Madison, Wis., is making tentative plans for rebuilding the steel culvert plant destroyed by fire Sept. 10, with a loss of $35,000.

The Industrial Controller Company, 886 Greenbush Street, Milwaukee, maker of electric controlling devices and machine shop appliances, is preparing to triple the size of its main shop by a two-story addition, 60 x 125 ft. Henry C. Hengels, architect, Milwaukee, is in charge.

The Parker Pen Company, Janesville, Wis., manufacturer of fountain pens, is reported to be contemplating the erection of a new factory to cost about $75,000. George S. Parker is president.

The Christensen Engineering Company, Milwaukee, which increased its capital stock from $300,000 to $1,000,000, will increase its facilities for the production of compressed air starter mechanism for internal combustion engines. The company has a large volume of orders, both domestic and export. Plans for enlargement are not quite mature, but are said to contemplate new construction and machine-tool equipment. Nels A. Christensen is president.

The John Dotsch Steel Metal Works, 412 Grand Avenue, Menominee, Mich., has been purchased by the Square People's House Furnishing Company, which will continue operations and specialize in hot air furnaces and stoves. Clarence Peterson is retained as manager.

The Eau Claire Mfg. Company, Eau Claire, Wis., has completed the transfer of the equipment, patterns, jigs, tools and other machinery of the Bloomer Machine Works to the Eau Claire plant. It will manufacture the Keller gasoline engine and continue to do general machine repairing, brass and gray iron casting, welding, etc. The Bloomer works will discontinue operations and the plant will be sold.

The H. F. Roehrig Company, Arpin, Wis., is erecting a two-story reinforced concrete garage and shop, 48 x 80 ft.

The Riverside Paper & Fibre Company, Appleton, Wis., is electrifying its entire plant, enlarging the machine room capacity 100 per cent, and making other improvements and changes costing nearly $100,000.

The Felker Brothers Mfg. Company, Marshfield, Wis., maker of steel culverts, road drags and farm machinery, is erecting another main shop addition, 42 x 80 ft., and a small welding and cutting shop.

The Central South

LOUISVILLE, KY., SEPT. 18, 1916.

Wood-working and construction equipment, including boilers and dynamos and various types of hoisting apparatus with power attachments, are in big demand. Inquiries continue numerous and the outlook is for a busy winter. Dealers are unanimous in saying that they could increase sales largely if they could get deliveries promptly. A considerable proportion of current inquiries make early shipment a condition.

The Smokeless Piston Ring Company, Lexington, Ky., has been incorporated with capital stock of $3000, and will manufacture. The incorporators are E. M. McKee, Bradley Wilson and M. Don Forman. The company is authorized to incur an indebtedness of $25,000.

The Flickerless Shutter Company, Louisville, Ky., has been incorporated, with capital stock of $60,000, to manufacture a shutter for moving picture projection machines. M. C. Fullenlove, E. F. Stemmelen and Emanuel Levi are the incorporators.

J. E. Greenleaf and L. B. Herrington, Richmond, Ky., who recently incorporated a company to establish a hydraulic power plant on the Dix River, near Lancaster, Ky., to develop 2800 hp., announce that they will push the project.

The Kentucky Utilities Company, Lexington, Ky., is announced to have been the purchaser, through S. Walton Forgy, Elkton, Ky., of the Princeton Electric & Ice Company at Princeton, Ky. The plant will be considerably improved.

The Nicholson System Fuel Saving Device, Louisville, Ky., recently incorporated with $20,000 capital, has changed its name to the Nicholson Grate Mfg. Company.

The plant of the Paducah Box & Basket Company, Paducah, Ky., was damaged to the extent of $10,000 by fire.

The Van Buren County Railroad Company, Chattanooga, Tenn., has been incorporated with capital stock of $300,000 to build and operate a steam railroad. The incorporators are E. N. Haston, J. J. Lynch, C. P. Cuthbert, I. G. Phillips and M. M. Allison.

The Columbian Iron Works, Chattanooga, Tenn., which is working on a contract for 50,000 6-in. shells for the British army, is reported to have secured a second contract for 100,000 of the same shells. H. M. Lofton is superintendent.

A. J. Sheldon, Bristol, Tenn., will rebuild the garage recently burned at a loss of $12,000.

The Maryville Ice & Packing Company, Maryville, Tenn., contemplates increasing the capacity of its ice-manufacturing plant from five to 20 tons.

The City Commission, Memphis, Tenn., announces that it will proceed at once to sell $1,500,000 of municipal bonds, and to build the authorized electric light and power plant. F. W. Ballard, Cleveland, Ohio, is engineer for the commission.

The John G. Duncan Company, Knoxville, Tenn., is asking for dealers' prices on 100-hp. locomotive or Scotch marine boilers, and also on 125 50-hp. Scotch marine boilers.

The Nashville Railway & Light Company, Nashville, Tenn., has installed a 2000-kw. motor generator at its local steam plant. Most of the company's power is from transmission lines of the Tennessee Power Company.

The Day Pulverizer Company, Knoxville, Tenn., recently incorporated with a capital stock of $10,000 to manufacture pulverizers for farming, which is at present having its machines made on contract by a local manufacturer, desires to get in touch with manufacturers specializing in the production of hard steel shapes or finished parts. The company will sign a contract for the manufacture of hammers for its machines. James A. Day is general manager.

St. Louis

ST. LOUIS, MO., SEPT. 18, 1916.

Business has continued good in the machine-tool trade, with no special outstanding feature. Dealers are quite well equipped to take care of requirements, except where immediate delivery is essential. No large lists are coming into the market, though the aggregate of single-tool demand is good.

The Tevis Motor Company, St. Louis, Mo., has been incorporated with a capital stock of $15,000 by C. H. and L. G. Tevis and E. J. Mauntel.

The Ayres Automobile Company, St. Louis, Mo., has been incorporated with a capital stock of $15,000 by Joseph T. and C. E. Ayres and Samuel Breadon.

The Excelsior Springs Water, Gas & Electric Company, Excelsior Springs, Mo., will install a 575-kw. electric generator, direct-connected to Corliss engine.

The Standard Motor Corporation, Kansas City, Mo., has been incorporated with a capital stock of $20,000 by R. W. Garrett, M. P. Comstock, C. F. Bolton and others.

The Southwestern Rubber Company, Kansas City, Mo., has been incorporated with a capital stock of $16,000 by Harry A. Young, George F. Knight and Benson Stephens to manufacture rubber casings and tubes.

The Queen City Auto & Truck Company, Springfield, Mo., has been incorporated with a capital stock of $16,000 by Joseph L. Carroll, Oliver Wyatt and Charles H. La Rue.

The Stoeker-Smith Mfg. Company, Kansas City, Mo., has been incorporated with a capital stock of $20,000 by Arnold L. Stoeker, Wright Smith and Samuel M. Woodson to manufacture hotel kitchen equipment.

The Citizens Gin Company, Texarkana, Ark., has been incorporated with a capital stock of $10,000 by A. M. McDaniel, H. Clark, F. E. Wilson and others and will establish a cotton gin.

The Farmers' Gin Company, Texarkana, Ark., has been incorporated with a capital stock of $10,000 by J. W. Smith, H. F. Borcherding and C. H. Schroeder and will erect a ginning plant.

Thomas N. Crumpler, Lowry, Ark., will re-equip his burned cotton compress and gin, requiring a boiler, gin stand, engine and other equipment.

The Planters' Cotton Oil Company, Pine Bluff, Ark., has been incorporated with a capital stock of $125,000 by Leo

M. Andrews, D. B. Niven and T. H. Gregory and will add equipment to a plant which they have acquired.

Henderson & Wood, Walnut Springs, Ark., will erect a garage, 60 x 100 ft., and install machine-shop equipment.

The V. M. Lord Mfg. Company, Oklahoma City, Okla., will install equipment for the manufacture of oil cans, iron drums, etc. V. M. Lord is president; O. H. Smith, vice-president, and E. B. Lord, secretary.

The Blue River Power Company, Oklahoma City, Okla., has been incorporated with a preliminary capital of $15,000 by W. M. Lucas, W. H. Bingham and D. C. Teter, all of Tishomingo, Okla., and will equip a hydroelectric plant.

The Anderson Motor Sales Company, Muskogee, Okla., has been incorporated with a capital stock of $15,000 by C. C. Anderson, W. W. Anderson and C. L. Anderson.

Granite, Okla., will build a waterworks plant to cost about $25,000. The Benham Engineering Company, Oklahoma City, Okla., is preparing plans.

Wetumka, Okla., will expend about $40,000 on its waterworks plant.

Birmingham

BIRMINGHAM, ALA., Sept. 18, 1916.

A steady increasing demand for hydroelectric machinery is incident to the conversion of old steam plants and the fitting of new ones with electric apparatus. High prices and delay in delivery have stopped some proposed structural operations. The movement of wood-working machinery is quite good. The autumnal prospect gets better as the days pass.

The Louisville & Nashville Railroad, W. H. Courtenay, Louisville, chief engineer, has plans prepared for the expenditure of $80,000 in rehabilitating coal docks at Mobile, Ala. The plans include electrically operated hoists, etc.

The Birmingham Slag Company, Birmingham, will add crushing machinery at a cost of $75,000. C. E. Ireland is manager.

The Tennessee Chemical Company, Americus, Ga., will double the capacity of its plant.

The Bird-Wilcox Company, Atlanta, manufacturer of oxy-acetalyne welding and cutting apparatus, will build an addition to its plant.

The Pacific Northwest

PORTLAND, ORE., Sept. 12, 1916.

The past week has brought some improvement in business. Shortage of cars and ships still hamper the movement of crops and lumber, but conditions generally are prosperous. The Southern Pacific is short approximately 1100 cars in Oregon and prospects for any material relief in the immediate future appear slight.

The rush of shipbuilding at the large tidewater plants has thrown an overflow of jobbing work to many small shops at both coast and interior points, resulting in many inquiries for standard tools, and despite present prices many additions are being made. Large buying is done mainly by marine plants, which appear to have covered their principal requirements, but are still placing scattered orders for special equipment. A healthy demand is noted everywhere for power equipment and miscellaneous machinery.

The Alaska business is steadily growing. Shipments from that territory in August, most of which passed through Seattle, included copper ore valued at nearly $3,000,000, canned salmon worth over $2,000,000, and nearly $2,000,000 in gold bullion. New construction continues at many Alaskan mines and the salmon canning interests are preparing to make many improvements the coming year.

The Northwest Steel Company, Portland, is preparing to lay the keels for two more steamers this month, having two already under construction.

The St. Helens Shipbuilding Company, St. Helens, Ore., has six sets of ways ready for the construction of wooden vessels, all of which are to have either steam or oil engines, with full equipment of lumber-handling machinery.

The sawmill of the Oregon Lumber Company, Baker, Ore., was recently destroyed by fire, with a loss of $40,000.

The Wallace Shipyards, Vancouver, B. C., has recently laid the keel for a steel steamship of 5000 tons, 300 ft. long, ordered by the Kishimoto Steamship Company of Osaka, Japan.

Plans for a lumber mill of 200,000 ft. daily capacity, to be built at Sutherlin, Ore., for W. L. Roach, of Muscatine, Iowa, are being prepared by A. B. Pracna, Seattle.

The Grays Harbor Shipyards, Aberdeen, Wash., will lay the keel shortly for a third Swayne-Hoyt vessel, 299 ft. long, with capacity of 2,000,000 ft. of lumber.

J. F. Duthie & Co., Seattle, have completed plans for their one-story machine shop, 90 x 150 ft., to be constructed at 3262 Kitsap Avenue at a cost of $5,000.

Announcement has been made that A. O. Anderson & Co., of Norway, will place an order for a fleet of lumber carriers to cost $22,000,000. They have established offices in Seattle and Portland. Fourteen vessels have already been contracted for in Pacific coast yards, two of 10,000 tons and six of 8000 tons cargo. The remaining six vessels will be auxiliary power schooners. Five are now under construction at Astoria, Ore. Orders for lumber carriers will also be placed shortly. The boats now under construction will be rated at 85,000 tons aggregate cargo capacity.

The Vancouver Shipyards, Ltd., Vancouver, B. C., contemplates enlargements to its yard, which will more than treble the present size.

The Seattle Construction & Dry Dock Company, Seattle, will construct a floating drydock with a tonnage of 12,000 tons to cost between $400,000 and $500,000. Work will begin immediately.

The plant of the Oregon-Portland Cement Company, Oswego, Ore., will be re-opened Oct. 1 to full capacity.

The Wellington Coal Company, Seattle, plans the establishment of a coal-handling plant on Latona Avenue to cost $25,000.

The Three Ply Veneer & Box Company, Seattle, has been incorporated for $500,000 by J. H. Moore, W. T. Coleman and N. M. Vedder. It is understood the plant will be established in the vicinity of Seattle.

The plant of the Midland Lumber Company, Midland, Wash., valued at $75,000, which was destroyed by fire recently, will be rebuilt immediately. D. A. Swan is president.

E. L. Clark, St. Maries, Idaho, is interested in a new company which has purchased the plant of the Modern Box Factory Company. It has a capital stock of $25,000, and will be known as the St. Maries Modern Box Factory Company. The plant will be completely remodeled and new machinery installed. Mr. Clark will be president and general manager.

Texas

AUSTIN, TEX., Sept. 16, 1916.

An unusually large demand exists for machinery for manufacturing plants of various kinds. Much attention is also being given to improving public utility plants. The demand for machinery for rehabilitating industries in Mexico shows a marked increase, now that the railroads of that country are again open for regular traffic.

The Texas Southern Electric Company, Kingsville, will install new machinery in its electric light and power plant.

The San Antonio, Gonzales & Houston Interurban Company has been reorganized and is surveying a new route for its proposed electric railway between San Antonio and Houston, 225 miles distant. Steve Holmes, Leesville, Tex., is president. An electric power station will be built.

The Mission Ice & Fuel Company, Mission, will install new machinery in its ice factory to cost about $50,000.

The Whitewright Oil Mill Company, Whitewright, has been incorporated with a capital stock of $35,000 to build and operate a cotton-seed oil mill. D. S. McMillan is a stockholder.

The Greenville Cotton Oil Company, Greenville, will install machinery for cleaning, shelling, sorting and crushing peanuts. The plant will cost about $35,000.

The Panhandle Gin Company, Quanah, will build a cotton gin to cost about $15,000. G. A. Simmons is a stockholder.

The City Commission of Houston has approved plans for two additional units of the municipal wharves which are to be built at an estimated cost of $185,000.

Canada

TORONTO, Sept. 16, 1916.

Canadian trade is far above that of any previous period in the country's history. Exports of manufactured articles are considerably in excess of imports. Nearly all iron and steel makers turning out shells and other munitions, as well as those working for the domestic trade, are operating their plants at full capacity. The scarcity of labor has latterly been a great drawback to manufacturers, who have been compelled to take on women to fill the places formerly occupied by men, but as farming operations are pretty well over for the season, more men are becoming available in

the urban labor market. This will be a much needed factor in the filling of war orders and will add to the productive power of Canadian plants. Many new factories are being erected throughout the Dominion, a considerable number of which are branches of companies in the United States. New additions are being erected to old plants which find difficulty in keeping up with their orders, and in anticipation of a greater volume of business at the conclusion of the European war.

During August, as in July, the output of Canadian munition factories was less than anticipated, one of the reasons being the high temperatures which were very general. Some factories were shut down for brief periods because of inability to get parts, and others were closed for lack of efficient labor. A broadening tendency in the demand upon industrial plants is more evident. Manufacturers who lost their trade when the war broke out are adapting their plants to produce articles for which there is now a market. Great mining activity and the more vigorous exploitation of forest wealth are creating heavy demands upon engineering plants, some of which have on their hands more orders than in normal times.

The Canada Cycle & Motor Company, a subsidiary of the Russell Motor Company, is erecting a plant at Weston, Ont., for the manufacture of bicycles, skates, etc., which will cost in the neighborhood of $500,000. T. A. Russell, 276 King Street West, Toronto, is president of the company.

The Maple Leaf Tires, Ltd., has secured a factory site of 22 acres at Belleville, Ont., and building operations will be commenced at once. The main building will be nearly 300 ft. long and will be of concrete and steel construction and will cost, approximately, $100,000.

The Peter Lyall & Sons Construction Company, Montreal, has completed arrangements with the Canadian Pacific Railway for the rental of a 300-ft. strip of land adjoining the Lyall Company's shell plant, in Westmount, Que.

It is reported that contracts have been let to the Foundation Company, Ltd., Montreal, for the International Nickel Company's plant to be located at Port Colborne, Ont., on the east side of the lake front. The works will cover a site of 23 acres and will cost more than $3,000,000.

The Dauphin Milling Company, Dauphin, Man., is in the market for a Corliss engine, head flywheel to right, size about 15 x 36 in. stroke.

The Pacific Steel Products Company's plant at Vancouver, B. C., was totally destroyed by fire Sept. 11, with a loss of $150,000. The plant had been in operation for only five weeks.

Plans for the construction of a waterworks for Kitchener, Ont., have been approved by the Provincial Board of Health The plant will cost $100,000. Herbert Johnston is engineer.

Plans are being prepared for the erection of a galvanizing plant for the McClary Mfg. Company at London, Ont., to be of brick and concrete construction and cost $30,000.

The Canadian Ingersoll-Rand Company, Sherbrooke, Que., is building a machine shop there to cost $70,000.

The John Inglis Company, 14 Strachan Avenue, Toronto, has commenced the erection of a brick and steel forge plant to cost $6,000.

Ewing & Murphy, 18 Cameron Street, Toronto, has commenced rebuilding its planing mill to cost $6,000.

The Canadian Northern Railway, Winnipeg, has let the contract for the erection of a machine shop at Rainey River, Ont., to cost $8,000.

The Sheet Metal Products Company of Canada, River and Gerrard streets, Toronto, has let the contract for the erection of an addition to cost $6,500.

C. J. Mitchell, Brantford, Ont., has let the contract for the erection of a garage to cost $20,000.

Fire destroyed the plant of the Canadian Canners and badly damaged the Laidlaw Lumber Mill at Sarnia, Ont. The damage will amount to $50,000.

R. H. Buchanan & Co., 234 Craig Street West, Montreal, are in the market for a 16-in. x 6-ft. pin-turning lathe.

The Consolidated Steel Foundries, Ltd., Montreal, has been incorporated with a capital stock of $500,000 by Louis E. Bernard, Wilfred A. Handfield, John A. Sullivan and others to manufacture rails, machinery, tools, implements, etc.

The Canadian Zinc Products Company, Ltd., Montreal, has been incorporated with a capital stock of $[illegible] by Robert F. Macy, Portland, Me.; Leland D. Adams, Arthur R. Holden and others of Montreal, to manufacture metals, zinc products, etc.

The Canadian K. K. Company, Ltd., Elora, Ont., has been incorporated with a capital stock of $40,000 by Charles L. Dunbar, Leo W. Goetz, Helen M. McTague, John Sutherland and others, all of Guelph, Ont., to manufacture machinery, iron, steel, etc.

The factory on Buchanan Street, Toronto, owned by the Harry Webb Company, was totally destroyed by fire with a loss upward of $100,000. The machinery destroyed was stated to be exceptionally valuable and the cost of replacing it will be in the neighborhood of $75,000.

Henry Schaake, machinery dealer, New Westminster, B. C., has leased a site on Tenth Street, on which he proposes to erect a machine, pattern and boiler shop to cost about $70,000. Work will begin immediately.

Government Purchases

WASHINGTON, D. C., Sept. 18, 1916.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, schedule 138, for eight turret-turning motors; schedule 139, for two emery grinding machines, two woodworker's lathes, two motor-driven drill presses, two 30-in. motor-driven band saws and two motor-driven saw tables, all for Brooklyn; schedule 143, for four water-tube boilers for Norfolk; schedule 160, for 16 portable electric drilling machines, 16 portable bench grinding machines and 16 screw cutting lathes, for various navy yards.

The chief of ordnance, War Department, Washington, will receive sealed proposals until Oct. 11, for furnishing 50,000,000 rounds of ball cartridges, caliber 0.30, model 1906.

The purchasing officer of the Panama Canal, Washington, will receive under circular 1081 proposals for furnishing one duplex air compressor.

The chief signal officer, War Department, Washington, will receive bids until Oct. 12, under proposal 849, for furnishing primary aeroplanes in lots of from six to eighteen.

The following bids were received by the chief of ordnance, Navy Department, Sept. 13, for furnishing 1200 14-in. target projectiles:

The Birmingham Machine & Foundry Co., Birmingham, Ala., $63.95 each; begin delivery 200 days, will deliver 100 each month thereafter.

The Tredegar Company, Richmond, Va., $70.95 each; begin delivery 253 days, will deliver 250 each month thereafter.

The Bethlehem Steel Company, South Bethlehem, Pa., $94.86 each; begin delivery one year, will deliver 400 each month thereafter.

The Raleigh Iron Works Company, Raleigh, N. C., $76.95 each; begin delivery 500 days, will deliver 150 per month.

Beginning Oct. 15, the Johns Hopkins University, Baltimore, will give evening courses in engineering, in order that those engaged during the day may have an opportunity to continue their technical training. Three branches will be taught—mechanical, civil, and electrical. There will be lectures on all the subjects, as well as practical work in the laboratory and drafting room. While some of the instructors will be selected from those now teaching at the university, others will be added to the staff.

The Hook Foundry Company, Marcus Hook, Pa., has been formed and is now turning out gray-iron castings. James F. Powers, who formerly operated a foundry at Elkton, Md., is the general manager. The buildings used were formerly occupied for the manufacture of steel products, but the plant was closed a number of years ago. All the machinery has been improved and brought up to date.

The Howell Electric Motors Company, Howell, Mich., manufacturer of squirrel-cage and slip-ring polyphase electric motors, in all standard speeds and from one-half to 100 hp., has increased its capital stock from $30,000 to $100,000. H. N. Spencer is president; C. L. Daun, vice-president and manager; W. M. Spencer, secretary-treasurer, and C. F. Norton, sales manager.

Rectangular flat end gages, guaranteed accurate to within 0.00001 in., are now made as an American product by Wismach & Ibsen, 1513 Richards Street, Milwaukee. They are obtainable in sets for either inches or millimeters, together with holders for the various combinations of the gages for given lengths.

THE IRON AGE

New York, September 28, 1916

ESTABLISHED 1855 VOL. 98: No. 13

The Place of the Basic Bessemer Process

It Had Only a Temporary Foothold in the United States—Its Extra Costs and the Reasons for Germany's Preeminence as a Producer

BY H. H. CAMPBELL

IN 1877 Thomas took out patents for the basic converter and immediately there were ironmasters all over the world dreaming dreams soon to be dispelled. It had been known for 20 years that silicon and carbon could be burned out of pig iron by forcing a blast of air through liquid metal, and now it was shown that by using lime additions with a basic lining, the phosphorus could be eliminated by a short overblow after the carbon had been burned. Within a few years basic Bessemer converters sprang up in every iron district of Europe, and for long years many plants struggled for existence where natural conditions were unfavorable. The younger generation may not know that two basic Bessemer plants were started in the United States, the first at Steelton, Pa., in 1883, and the other at Pottstown, Pa., a few years later. At both plants good steel was made, but the operating costs were high; and in every place and in every country they are higher than in acid practice on account of the following conditions:

EXTRA COSTS

1. Dolomite bricks are used for the lining of the converter and these are expensive, while their life is short, complete renewal being necessary after making 4000 or 5000 tons of steel.

2. Burnt lime must be added before beginning the blow, in sufficient quantity to neutralize all the silica produced and to absorb all the phosphoric acid.

3. The loss is greater. At Middlesbrough in England it runs 16 per cent; but in the best practice with direct iron it has been brought down to 10 per cent, although this may have been for only a short period.

4. More labor and more careful attention to details are required than in an acid plant, and these things cost money in the United States.

Considering the greater conversion cost, it is plain that if the basic Bessemer is to compete with the acid vessel, the market price of the pig iron used must be considerably lower than that of standard Bessemer iron. This was hardly the case even during the eighties, while after the development of transportation facilities on our Great Lakes, say about 1890, the regular Bessemer pig iron became nearly as cheap as any iron in the market. It must be understood also that the basic converter calls for an iron of a certain special composition in respect to phosphorus, manganese, silicon and sulphur; and very few ores will give this special iron. To understand the subject we must take up these elements separately.

PHOSPHORUS

The basic converter requires an iron with about 2 per cent of phosphorus, because practically all the heat produced during the blow comes from the oxidation of this element. In the early days a still higher percentage was necessary owing to irregular operation; and even to-day there are slow-running plants which need as much as 3 per cent of phosphorus, but it is possible to get along under good practice and fast working with 1.8 per cent. There are comparatively few ores that will give a pig iron carrying as much as this; but there was little trouble on this score when the basic converter was started, for on every side there were great heaps of puddle cinder, while large quantities of this material were being turned out every day from the old iron works. It remained to be discovered that a by-product ceases to be a by-product just as soon as there is a demand for it.

In the principal iron districts of Europe, it was many years before the phosphorus problem became serious; but trouble had to come sooner or later. Nearly 20 years ago, the manager of a wrought-iron plant in England said that the sale of puddle cinder was an important source of profit, while a neighboring basic Bessemer plant complained that cinder cost more than good ore. It must be remembered also that basic Bessemer plants used the same ore as the iron works and that the soft steel produced supplanted wrought iron; so the steel plants on the one hand drove the puddle furnaces out of business, and then expected to be supplied with an unlimited amount of cinder.

Thus the last 30 years have brought about a complete change in the position of phosphorus in the metallurgical world. What were once heaps of worthless slag soon became mines of ore, and to-day Sweden exports large quantities of high phosphorus ores, which are valuable just because they contain the very element that not long ago was regarded as the *bête noire* of the steel industry.

MANGANESE

It has been found necessary to have a certain proportion of manganese in the pig iron used in the basic converter, to avoid overoxidation after the

overblow and consequent waste of the recarburizer. This oxidation is an ever present danger and it has been decided that the phosphorus should not be carried below 0.06 per cent, which hardly jibes with American specifications that insist the phosphorus shall be under 0.04 per cent. In fact, most basic Bessemer steel works would refuse to consider a specification calling for below 0.08 per cent of phosphorus and would strenuously object to any limit at all.

So it is almost always necessary to add manganiferous ore in the blast furnace in order to get a pig iron with over 1 per cent of manganese, and preferably 2 per cent or more; and of course these additions increase the cost of the pig iron. One plant near Hannover in Germany has ore that gives a pig iron with about 3 per cent of phosphorus and 3 per cent of manganese, and this is the only works in the world which does not have to go to heavy expense in buying either phosphorus or manganese or both.

SILICON

It is almost necessary that basic Bessemer pig iron should be low in silicon, and it is desirable that this element should be above 0.50 per cent. If the silicon is high, the following difficulties will appear:

1. It is the universal rule in basic Bessemer practice that burnt lime shall be put into the vessel before the pig iron is run in, and the proportion must be such that the final slag will contain about 50 per cent of CaO and not over 10 per cent of silica, and preferably as little as 6 per cent. It is plain that doubling the silicon in the iron necessarily doubles the amount of burnt lime required; and this is by no means a small item of expense.

2. During the first few minutes of the blow the silicon in the iron rapidly oxidizes and the resulting silica attacks right and left indiscriminately both the lumps of lime and the lining of the converter. When the silicon is low the temperature is also low; but when there is 1 per cent of silicon or more, the newly formed slag is hot and fluid and it makes inroads into the lining.

3. A normal slag carries nearly 10 per cent of chemically combined iron, to say nothing of mechanically held shot, and doubling the volume of slag doubles the waste of metal in the cinder.

4. Doubling the amount of slag increases the loss due to slopping. In the best practice the basic converter ejects little more than the acid vessel; but when the pig iron carries over 1 per cent of silicon, the loss from this cause is serious.

5. Doubling the volume of slag means that the final slag contains only half the proportion of phosphorus. Under good conditions the phosphoric acid should run from 16 to 20 per cent and then the slag commands a high price as a fertilizer; but if it contains only 8 or 10 per cent it is hardly marketable, for the lower the percentage of phosphoric acid the greater the proportion that is "insoluble," and therefore not available for plant food.

SULPHUR

It has been stated that iron for the basic converter should not carry over 0.50 per cent of silicon, but this specification often produces high sulphur, and even in the best European practice the sulphur is much higher than in our basic pig iron. Some sulphur is eliminated in the mixture, through liquation of sulphide of manganese, which oxidizes on exposure to the air; so that the atmosphere for quite a distance around the mixer is pungent with sulphurous acid; but this action cannot be relied on to accomplish any radical elimination of sulphur. The blast furnace is the proper place to deal with this element.

NORTHWESTERN EUROPE

These metallurgical limitations rendered impracticable, or at least unprofitable, the use of the basic Bessemer converter in many places where operations were started more than 30 years ago. The United States has no suitable ore and, as already explained, the basic process has never made a place for itself in our country. Sweden has enormous deposits of high phosphorus ore, but there is no coal and the output of basic Bessemer steel is only 50,000 tons per year. Russia has only a limited amount of good ore, the rest being high in silica, while the coal is high in sulphur, and this country makes only 150,000 tons of basic Bessemer steel per year. Austria produces 300,000 tons, but half of the ore is brought from Sweden. Great Britain turns out less than 500,000 tons per year and production is steadily declining.

In accordance with the inexorable law of the survival of the fittest, the production of basic Bessemer steel has centered in northwestern Europe, where the basic converter forms the basis of the whole steel industry. Before the war the output in Belgium from the basic converter was about 2,000,000 tons per year; northeastern France produced nearly 3,000,000 tons and western Germany 10,000,000 tons. The basic Bessemer steel made in this little territory amounted to about 15,000,000 tons, or one-fifth of all the steel of every kind produced in the world.

MINETTE ORE

The foundation stone of all this activity is the Minette deposit in German and French Lorraine. This ore contains only from 30 to 35 per cent of iron in the natural state; but it is not so bad as it appears at first glance. If we imagine this ore to be subjected to a red heat, or "after ignition," as we would say, it will have the following composition: Iron, 45.7 per cent; silica, 7.9 per cent; lime, 13.5 per cent; alumina, 6.6 per cent; manganese, 0.4 per cent; sulphur, 0.05 per cent; phosphorus, 0.82 per cent, giving a pig iron with 1.68 per cent of phosphorus. The ore varies widely, but the foregoing figures are calculated from the laboratory results on over 1,000,000 tons shipped to Belgium from French Lorraine.

The poverty of this ore is not without its compensations, for the large amount of slag produced in the blast furnaces takes care of the sulphur; and some furnaces have run for weeks, or even months, with the silicon in the pig iron always between 0.30 per cent and 0.50 per cent; while at the same time the sulphur was kept below 0.10 per cent. Considerable manganiferous ore must be added to the furnace mixture, but such ore is quite abundant in western Germany, while additional phosphorus is obtained from Swedish ore. It was stated early in this article that the deposit near Hannover in Germany furnishes the only ore in the world which alone by itself will give a pig iron suitable for making basic Bessemer steel; but this Minette ore just described can be used by the addition of a moderate amount of phosphorus and manganese to the blast-furnace mixture, and this is why the great iron district reaching from Metz to the North Sea has come into being.

POSITION OF GERMANY

From a merely geographical point of view, either Belgium or France might have developed this Minette field; but it was Germany that immediately adopted the basic converter just as soon as

it had been tried in England, and even before it was well under way. England has the honor of starting both the acid and the basic Bessemer, but it was left to the United States to show the world what an acid vessel could do, while Westphalia was to develop the possibilities of the basic converter. It is rather hard to explain just how this all came about, but the facts are clear.

Looking for a moment at the acid Bessemer in our own country, we know that from the beginning almost every works made from two to five times as much steel as the best plants across the water. For many years Europeans refused to believe that we told the truth about our output, and even a personal visit by some of their metallurgists would not convince them that operations could be carried on every day continuously under whip and spur. In the late nineties, however, the facts were too well known to be disputed, and an English plant that desired to increase its output installed American equipment in its Bessemer department. Any of our foremen, with a nucleus of American workman, could have doubled the tonnage in two months, but the British steelworkers refused to wake up, and it was necessary to build a second plant and run both of them at what we would call half speed.

The Germans have done for the basic Bessemer just what we did for the acid converter; but they have not reached and never can reach the rate of production that is so common in this country, because in a basic plant there are so many little things to watch all the time and so many extra operations. The adding of the lime, the decantation of the slag and the delay that seems to be necessary after the addition of the recarburizer, all make for slower work, while, as already stated, the converter lining has a shorter life. Under these conditions it is a notable achievement when a plant of three 20-ton converters turns out 35,000 tons of steel in a month.

There are also technical problems at every step, for a variation in the proportion of silicon in the pig iron will mean a change in the weight of lime added; again, any variation in the speed of the blowing engine makes a difference in the length of the overblow, while there is no sharp warning corresponding to the drop of the carbon flame, to mark the end of the operation. Worst of all is the danger of excessive rephosphorization when the recarburizer is added; for rephosphorization always takes place to some extent, say as much as 0.02 per cent, and it may be three times as much if conditions are not just right. Finally, the composition of the slag must be kept constant so that it can be sold as a fertilizer. All these technical and practical problems were worked out in Germany long ago, and all successful basic Bessemer practice is a copy of what has been done on the banks of the Rhine.

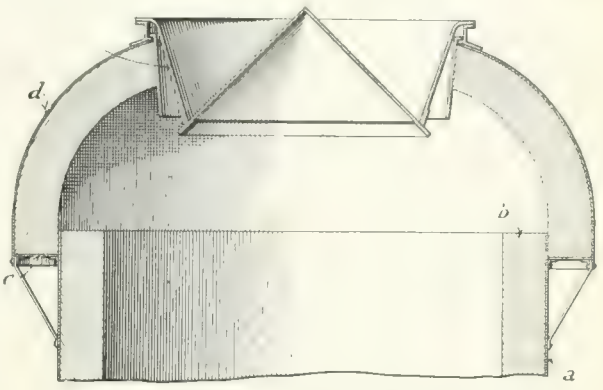
IMPORTANCE OF THE BASIC CONVERTER

Here in the United States we are apt to forget how important a part the basic converter plays in the steel industry. In 1913 it made nearly one-quarter of all the steel of the world, and almost as much as the acid Bessemer and the acid open-hearth put together. During the ten years from 1903 to 1913 the world's output from the acid converter increased only 8 per cent, but the production from the basic vessel nearly doubled. A great part of this basic Bessemer steel comes from Belgium and from that portion of France which is in the war zone; so all figures for the last two years are worthless. But there is every reason to suppose that production will be resumed and will increase soon after the declaration of peace.

A New Blast-Furnace Top

A novel construction for a blast-furnace top has been invented (U. S. 1,193,750—Aug. 8, 1916) by William H. Bailey of Gary, Ind., chief engineer Indiana Steel Company. The inventor set out to devise a top to be supported independently of the masonry shaft of the furnace. The reason, as he states it, was that the masonry shaft of a blast furnace is subject to considerable longitudinal movement under expansion and contraction, and if the masonry lining for the top is directly connected to the masonry shaft and the masonry top is anchored in any manner by structural work, as is usually necessary, the top will be distorted shortly after blowing in.

A vertical sectional view through the upper portion of a blast furnace to which the new top has been applied is given in the illustration. The shell *a* of the furnace has a masonry lining, both shell and lining terminating at *b*. A plate *c*, in the form of an annular, laterally projecting shelf, is secured to the shell *a* by an angle, the outer edge



Details of a Top for a Blast Furnace

of the shelf being braced by members secured to the shell at a lower point. The shell *d* for the top is secured to the outer edge of the shelf *c*, and lined with masonry as usual. The masonry rests on the shelf *c*, and both the covering *d* and the lining are supported by the shell of the blast-furnace shaft, and are located entirely outside of it. This permits of an increase in the size of the top and provides for efficient distribution of the burden through the hopper and the bell.

While the top is not connected to the blast-furnace shaft, it is rigidly secured to the shell so as not to be blown off. Another advantage is that the construction permits of the use of a masonry lining for the top without lessening the space within which distribution may be made and providing ample space for the location of down-comers in the top if desired.

Iron-Ore Exports from Newfoundland

Iron-ore exports from Newfoundland for the fiscal year 1914-15 were 511,990 tons, of which 17,500 tons went to the United States, 382,260 tons to Canada, 41,300 tons to Holland, and 69,930 tons to the United Kingdom. For the fiscal year 1913-14 the total exports were twice as much, or 1,245,797 tons. The United States received 170,590 tons of this total; Canada, 785,-245 tons; Holland, 122,332 tons; Germany, 51,790 tons, and the United Kingdom, 115,840 tons.

The employees of the Remy Electric Company, Anderson, Ind., manufacturer of magnetos, have resumed night studies in electric work. The course will cover a period of 32 weeks. It will be the second year of the scheme. Graduates this year will receive a certificate of training for the automobile accessory field.

THE AUTOMATIC LAND CRUISER

Part Played by American Company in Developing the "Tanks" of French Battlefields

BY W. E. FREELAND

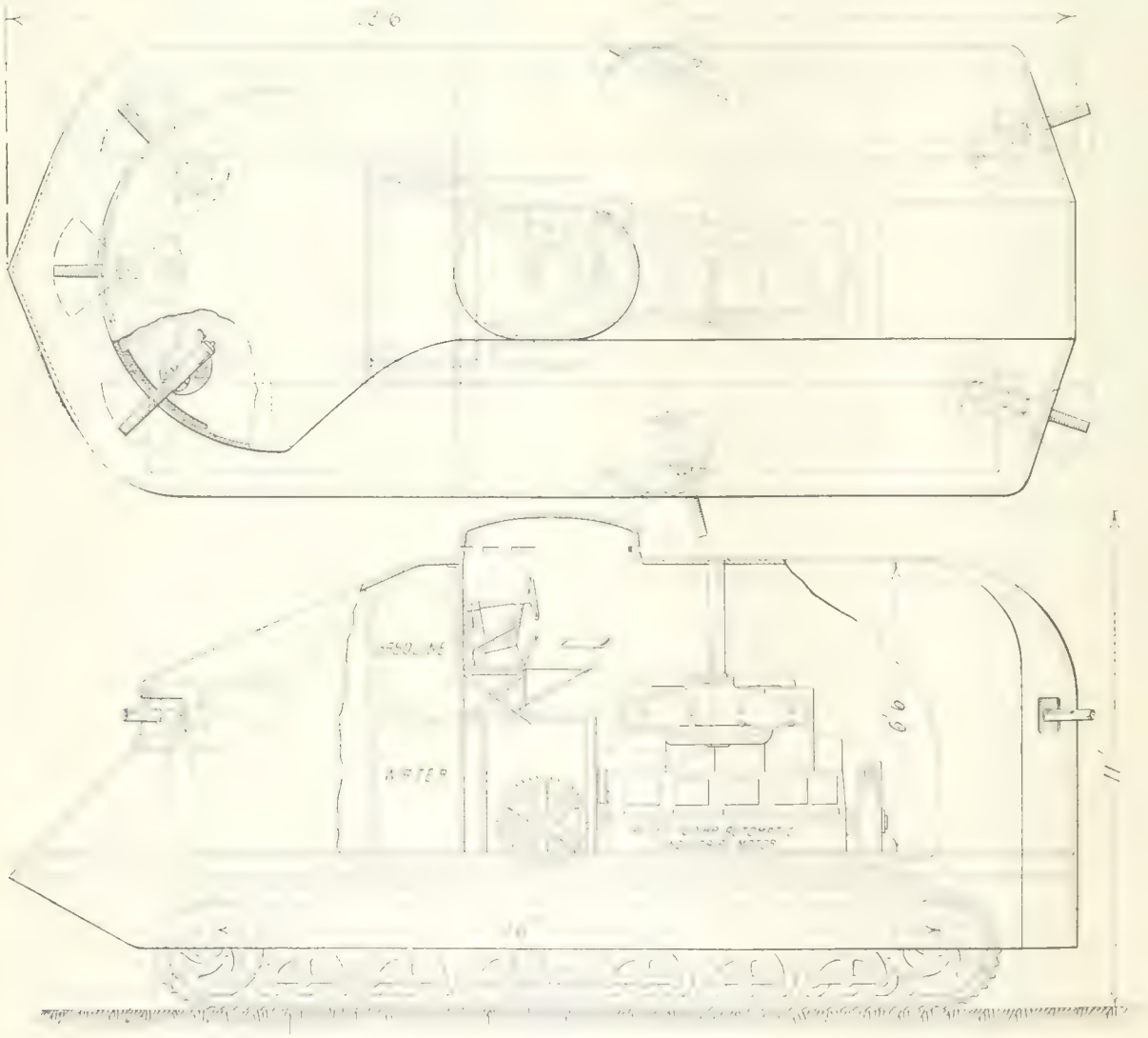
"It is now generally admitted that the armored tractor car which met with such wonderful success in the great battles on the Somme front is originally an American invention. It is true, as Mr. David Lloyd George says, that the big machines were built by the Munitions Department and that Col. Winston Spencer Churchill urged their adoption at an early stage of the war, but the idea came from the United States.

"Designs of the death dealing machine were submitted to the War Office more than a year ago, but Great Britain declined to finance their manufacture unless the tractors were made in England. This was finally agreed to. The man who brought the designs to Great Britain declines to permit the use of his name, declaring that for business reasons he does not desire to dim the glory of those credited with their introduction. He says he has designs for a tractor which probably will be even more effective."—The New York *Herald*, Sept. 20, 1916.

To understand how America furnished the inspiration for the building of these effective offensive weapons for the modern trench warfare, it is necessary to go back to the early summer of 1915 to the offices of the Automatic Machine Company, Bridgeport, Conn. This company has for years supplied many of the heavy duty gasoline engines used in the large tractors built in this country and was familiar with the conditions under which tractors were working in the Oregon forests, the Louisiana lowlands and the streets of our large cities. Norman Leeds, treasurer of the company, realizing that the trench fighting of the present day had made a practical deadlock of offensive and defensive, conceived the idea that an armored tractor of the "alligator" type would make it possible to cross trenches, enfilading them, and that with sufficient power neither wire entanglements nor shell-pitted ground nor ruined walls nor any of the debris of the battlefield would offer any serious obstacle to this leviathan armadillo.

Tractors of the alligator type 24 ft. between driving wheel centers were already in use in Oregon. With the huge power and stability of these machines, it would be easily possible to cover them with armor to withstand the fire of 3-in. guns and a comparatively small crew would be as effective as many hundreds of unprotected men.

Mr. Leeds proposed that at least a thousand such



The land cruiser so called, was suggested [illegible] engines. The idea was to put the offensive in warfare in the ascendency, that is, it was a means of overcoming the trench defense. The design was purely one of principle and not of detail. Any machine of this type, the thought was, would accomplish the object, as long as it was capable of traveling over the trenches and rough ground. The details of gun equipment or armor and the shape of the machine were matters to be decided upon by the British Government.

machines should be built for use in a mass formation. The front line "cruisers" would be used to conquer the territory over which they traveled; the rear lines, meantime, would be producing a curtain of fire beyond them to protect the front line while engaged in their work of reducing the fortified lines of the enemy.

It was but the work of a few days to make a preliminary sketch of the "automatic land cruiser" as he called the creation which appeared in considerable detail upon his drafting board July 9, 1915.

At this point Mr. Leeds called in Alec McNab, of the McNab Company, Bridgeport, manufacturer of marine appliances and an inventor of note, much of whose work has been connected with various phases of warfare. Mr. McNab is a retired engineer-commander of the Royal Navy and at once became greatly interested in the development of the project. After a few days of joint effort, the revised sketch here shown was produced on July 14, 1915. It is this last plan which was submitted to the British War Office.

From this point let us carry along the story in the terse language of Mr. McNab who, in a signed statement, gives these facts:

I sailed from New York on steamer St. Paul on July 17, 1915, arriving at Liverpool on July 25.

On Tuesday, July 27, 1915, I went to the War Office and saw Colonel Holden, Chief of the Army Service Corps, in which I went thoroughly into the matter and explained the apparatus to him. He, however, told me that this was not pertaining to his department.

On Sunday, Aug. 15, 1915, I left for Paris, arriving there same evening. On Aug. 17, I formally presented the blueprints of the caterpillar tractor to the officers at the French war office. Much more interest was shown than had been accorded through Colonel Holden, at the British war office.

On Friday, Aug. 20, I left Paris for London. However, previously I cabled Mr. Leeds of the Automatic Machine Company, stating that if he cared to cable over necessary expenses, I had every reason to believe that a good order would be forthcoming through the French war office for automatic engines to be installed on these tractors.

On Monday, Aug. 23, I saw Gen. E. W. Moir, comptroller of munitions inventions at Whitehall, London, informing him that I had left a blueprint of the caterpillar tractor with full particulars with Colonel Holden of the A. S. C. British War Office, prior to my departure for Paris. General Moir was so interested by my verbal explanation that he immediately sent me to Colonel Holden with a letter stating that he was to obtain these blueprints at once.

On returning the blueprints, as per General Moir's instructions, and on thoroughly going over the matter with him, he stated that I should hear further regarding developments in the course of a few days.

On Wednesday, Aug. 25, I received a letter from the Naval Armored Car Division at Pall Mall, asking me to attend a meeting of officers who were going to confer in regard to the caterpillar tractor. I attended this meeting as requested, which extended for several hours, and was advised that the matter would be taken up further with me in "*due course.*" At that time I also advised them that should I not be in the country to communicate with Norman Leeds, at the Automatic Machine Company, Bridgeport, Conn. Nothing further was done; therefore this report is at end; however, I am firmly of the opinion that the recent advance on the Somme has been entirely due to this very caterpillar tractor.

On my second return to Paris, on Tuesday, Jan. 11, 1916. I was fortunate to meet my personal friend, Monsieur Corcas, secretary to M. Albert Thomas, Minister of War. M. Corcas was very much perturbed that I should have left Paris in August of last year very suddenly, as it seems that the Minister of War and other high officials were so very interested in the caterpillar tractor as submitted that they desired a further conference with me, but were unable to accomplish this, owing to my departure.

In the sketch as carried over the seas by Mr. McNab, Mr. Leeds had no thought of presenting a finished product. The question of proper armament and its disposition was one to be settled by men expert in modern ordnance, not by an American engine builder. What the American wanted was to sell engines and at one time in the negotiations, according to Mr. McNab's statement, and more particularly found in correspondence and cablegrams which are in the file containing the full record of the negotiations, the prospects for an engine contract were bright.

The land cruiser as submitted to the war office was sketched in about the smallest dimensions which would be effective; there were no mechanical obstacles to be overcome in the building of much larger machines. The length over all is 23 ft. 6 in.; the width, 10 ft.; the height, 11 ft. The distance between centers of drive wheels is 16 ft. The alligator type of drive was selected in place of the more common caterpillar type because of the greater bearing surface which would enable it to cross trenches of about 8 ft. in width and would give it more stability and tractive surface on badly broken ground and because it would have no exposed front wheels to become caught or shot away. The weights are equalized throughout the apparatus as far as possible. The engine is placed a little aft of the center to compensate for the front or fighting end with its heavier weight of armament and ammunition.

Time will tell how much has been borrowed from these sketches in the building of the "tanks," as Tommy Atkins terms them.

New Standards of Testing Materials Society

All of the revised standards, amended standards and proposed new standards of the American Society for Testing Materials have been approved by a mail ballot which has recently been canvassed. The list of standards covering specifications, tests and methods of testing and of making analyses includes 103 titles as compared with 88 in the 1915 Year-Book. The standards are effective from Sept. 1, 1916, except the revised standard specifications and tests for Portland cement, which by action at the last annual meeting will not become effective until Jan. 1, 1917.

The amendments to the by-laws also carried and this means that the publication of the Year-Book has been discontinued as an annual and instead will appear as a biennial publication beginning with the 1916 book of "A. S. T. M. Standards." This volume will contain about 800 pages and is expected to be issued toward the end of October.

The membership of the society has now risen to 2104 members, a net gain of 33 since the annual meeting.

The Missouri, Kansas & Texas Railroad, which has general offices at Dallas for its Texas lines, has set aside a tract of land adjacent to its new terminals in San Antonio as sites for manufacturing plants. It is stated by T. L. Peeler, industrial commissioner of the railroad, that more than 30 concerns have already obtained locations in the new industrial center, and that they will build plants as soon as the railroad terminals are finished.

The workmen's compensation board of Pennsylvania announces that it will provide counsel to appear in the courts in behalf of persons without funds who have been awarded compensation and whose employers have appealed cases to courts. This policy, it is stated, will also apply to dependents of those killed and whose compensation claims may be contested.

Use of Titanium in Making Steel Castings*

How Best to Add It—Its Efficiency as a Deoxidizer Compared with Other Agents—As a Substitute for Manganese

BY W. A. JANSSEN

NOTWITHSTANDING all that has been said concerning the harmful effects of phosphorus and sulphur in steel, the occluded oxides and gases, such as iron oxide, Fe_2O_3, and an undefinable oxide, probably FeO, free oxygen, nitrogen and occluded slags are the real causes of many of the troubles of the steel-maker. It is with the occurrence of these elements and their elimination that he is especially concerned. It has been definitely demonstrated that the presence of oxygen, and possibly nitrogen, in steel reduces its static strength, dynamic properties and abrasive values and increases its tendency to corrode. To-day the presence of oxygen and oxides in steel is considered more harmful than even relatively large amounts of phosphorus and sulphur. In a measure the same is true of nitrogen, although the investigations in this direction have not been sufficiently complete and the results are variable and uncertain.



Fig. 1—Cracks Extending Through Small Groups of Alumina Inclusions in Titanium-Treated Steel to Which Aluminum Also Was Added

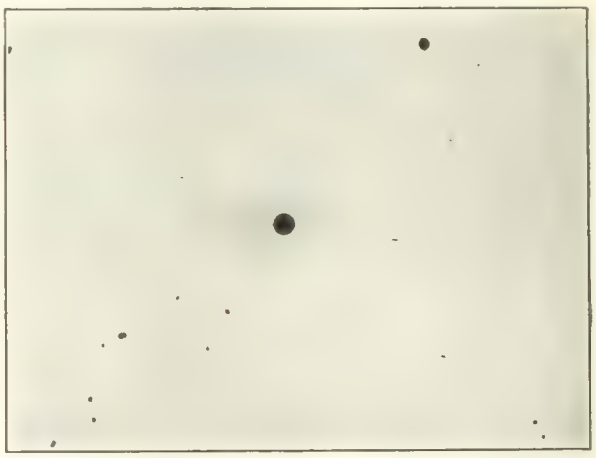


Fig. 2.—Typical Small Groups of Silicates and Sulphides in Titanium-Treated Steel

With the advent of ferroalloys of silicon and manganese containing high percentages of the active elements came the hope of an assured uniform quality of steel. As deoxidizers, modern ferroalloys are efficient in a measure, but have certain limitations. It is the function of these deoxodizers to combine with the occluded oxides; the resulting products rise and become a part of the slag. Unfortunately the temperature of the metal and its resultant fluidity do not always permit these to complete their cycle and rise to the slag; they are entrapped as inclusions and the occluded gases are not entirely deoxidized. The known presence of oxides in excess of the amount which can be deoxidized by the usual additions of ferrosilicon and ferromanganese is not permitted because of specification tolerances for manganese and silicon content.

SILICON NOT A STRONG DEOXIDIZER

Silicon, comparatively speaking, is not a strong deoxidizer, and when it is added to steel a portion of it remains in the steel either as an alloyed constituent, or the products of its oxidation may remain as inclusions. The usual analyses for silicon do not disclose whether or not the silicon is present in the steel as an alloyed silicide, as silica or as the silicate. Even if the silicon manifest itself as a silicide, showing a high silicide percentage, a wild heat is apt to result, requiring the use of a further deoxidizer (aluminum) when pouring the molds. In conjunction with manganese, double silicates of iron and manganese frequently are formed. Such a constituent may contribute to excessive segregation, although singularly, a dirty steel often discloses very little segregation.

Titanium, until a comparatively few years ago looked upon as one of the rare metals, undoubtedly is one of the most powerful deoxidizers and denitrogenizers known. At the present time it may be obtained as one of the ferroalloys. Its chief value lies in its positive action in the removal of the occluded oxides, nitrogen and entrapped slags, due to the fusibility of titanic oxide as formed and its greater stability as compared with iron oxide. Its function is further augmented by the increased fluidity due to the increased temperature because of the exothermic reaction, thereby permitting freer movements of the oxidized products to slag.

HOW TO USE TITANIUM

The present-day method of using ferrotitanium is to augment the incompleted cycle with ferrotitanium after the other deoxidizers have been added. These may be added in the ladle, or in the furnace before tapping. After the titanium has been added, it is *imperative* and *essential* that the ladle be held from 5 to 10 minutes before pouring in order to allow time for the completion of the reactions. No fear need be had of the chilling of the metal inasmuch as the temperature is raised appreciably, due to the exothermic reaction. It is essential that the titanium be not added until after the additions of ferrosilicon and ferromanganese have been made. On account of the greater affinity

*From a paper presented Sept. 15, 1916, at the American Foundrymen's Convention in Cleveland, Ohio. The author is superintendent of the Bettendorf Company, Davenport, Iowa

of titanium for oxygen, the ferrosilicon and ferromanganese must be given an opportunity to complete their primary deoxidation, thereby eliminating selective oxidation. It is also essential that the ferrotitanium be added as soon thereafter as possible so that the alloy does not become a part of the slag and there perform its deoxidation.

Titanium at about 800 deg. C., combines with nitrogen to form the stable titanium-nitride which usually finds its way to the slag. Microscopic examination, however, sometimes reveals the existence of occluded tiny, hard, pink crystals of titanium-nitride, which, however, are less harmful in effect than the occluded nitrogen. With all these beneficient effects, its use beyond a certain amount is of no avail and in a measure harmful.

Titanium, singularly, does not form alloy steels as do the other deoxidizers, such as silicon, manganese and vanadium. Many analyses of titanium treated steels do not reveal a titanium content higher than 0.025 per cent. With the use of alloys containing more than 10 to 15 per cent titanium, the results are not as effective, owing to the slower rate of solution.

The amount of ferrotitanium used depends in a measure on the kind of steel to be treated. In rail steel, an addition of 13.2 lb. of the 15 per cent alloy per net ton, representing a metallic titanium addition of 0.10 per cent is satisfactory. In the use of titanium for steel castings the addition of 1½ to 2 lb. per 1000 lb. of metal charged, in addition to the usual ferrosilicon and ferromanganese additions is usually sufficient to deoxidize the steel. The amount of ferrotitanium added, however, should be dependent on the quantity of impurities which are to be removed and the process of manufacture.

VANADIUM AND TITANIUM COMPARED

During the past few years specifications for steel castings for specific designs and service have demanded the use of vanadium. Although the presence of vanadium in steel undoubtedly has improved its physical properties, it is questionable whether vanadium manifests its maximum efficiency in plain carbon steels, especially within the carbon range of steel castings. The vanadium addition is calculated as an alloying constituent, the amount present in the final product being within three or four points of the desired calculated content. Vanadium has manifested its greatest value when used in conjunction with chromium and nickel as a deoxidizer. Vanadium is only 70 per cent as efficient as titanium and has but little effect on nitrogen.

WHEN STEEL BECOMES STRONGER

With the elimination of the occluded oxides and slags, steel, because of its increased density and homogeneity, has improved static and dynamic properties. A comparative test of 20 untreated and treated heats showed an increase in the ultimate strength of approximately 15 per cent with no reduction in elasticity and contraction. A remarkable endurance test was conducted by Enrique Touceda on untreated and titanium-treated steels of practically the same chemical composition. The test was conducted in a Wright-Souther machine at a fibre stress of 38,872 lb. The untreated steel withstood 2,676,000 revolutions at this pressure, whereas the titanium-treated steel withstood 18,274,900 revolutions at pressures varying from 38,872 up to 45,939 lb. fibre stress.

Many tests made on rails and machine parts indicate the ability of titanium-treated rails to withstand shocks and abrasion, the life of gears and rails being about 50 per cent greater than those made of untreated steels. In a comparative test on gears it was found that titanium-treated gears, although made of 0.20 per cent carbon steel, too soft to be ordinarily considered acceptable for machine parts, outlasted untreated steel gears of the same composition three to one.

TITANIUM AS A SUBSTITUTE FOR MANGANESE

With the present high cost of ferromanganese and the attendant shortage of supply, the writer has carried on some extensive experiments to conserve his ferromanganese without affecting the quality of the product. Realizing that the manganese present in steel castings contributes only indirectly in increasing the strength, the purpose of these experiments was to reduce the manganese from 0.75 to 0.50 per cent. To be assured of the same strength, the usual ferromanganese addition was reduced from 320 lb. for a 20-ton heat to 200 lb. and the ferrotitanium addition increased from 60 to 120 lb. Tensile tests for these heats showed an average ultimate strength of 68,000 lb. for a 0.20 per cent carbon steel, with an average elongation of 30 per cent and a reduction of area of 47 per cent.

It can be well appreciated that the use of ferrotitanium in making steel castings is no longer an innovation, but rather a necessity to offset the vagaries and shortcomings of present-day practice.

Brass Manufacturers Hold Quarterly Meeting

The National Association of Brass Manufacturers concluded its autumn meeting at the Traymore Hotel, Atlantic City, Friday evening, Sept. 15. The meeting was successful in every respect. Numerous important matters were disposed of, among them being the following:

The question of equalization of freight rates and establishing a proper scale or chart covering them; reaffirmation of an order passed at Cleveland March 17, 1910, adopting as a standard uniform center 7½ in. for all bath cocks with ball offset couplings; adoption of a uniform distance from rear of flange of bath cock to the center line of couplings of 2¾ in. minimum to a maximum of 3 in., which will facilitate matters very materially with both jobbers and plumbers; adoption of a standard hose nozzle and swivel nut for bath cocks, which makes the taper on the nozzle of the bath cock, the swivel and the hose connection of a standard size, so that they will be interchangeable; appointment of a committee to present a uniform standard thread and taper of all basin cock shanks so that they will be likewise interchangeable.

The matter of guarantee on goods, which is considered more or less of a useless and meaningless form and a relic of the darker ages, was discussed at some length and a committee was appointed to give it further consideration.

The meeting having been polled as to the labor situation, trade conditions and future prospects, the result showed that the majority had been compelled to raise wages since the meeting held in Chicago in June, and several had been visited with strike troubles. The outlook was reported as being very good.

The next meeting will be held in New York City Dec. 13 and 14, at which time a banquet is to be provided, along with suitable entertainment, the arrangements for which were placed in charge of a committee. A number of new members were taken in.

The scale of operations in the motor-truck field is indicated in the recent purchase by Stedman Bent, hauling contractor of Philadelphia, Pa., of fifty 5-ton trucks from the White Company, Cleveland.

The Commercial Club, Richmond, Ind., is raising $100,000 for a factory fund. In the first three hours of canvassing $30,000 was subscribed.

FIRE RISK IN THE FOUNDRY

Causes of Foundry Fires and the Precautions Which Will Prevent Them

Since 1906 there have been 475 fires in foundries, according to reports received by the National Fire Protection Association. In a paper presented at the Cleveland meeting, Sept. 11-16, of the American Foundrymen's Association by Franklin H. Wentworth, secretary of the National Fire Protection Association, the causes of these fires are tabulated and methods of preventing similar fires are outlined. Most of the fires were preventable, and many of them were due to hazards not usually associated with foundry. For instance, five fires were due to the dipping of hot cast-iron pipes, made in the foundry, into asphaltum or tar to rustproof them.

The cupola is the most prolific cause of foundry fires. Over 40 per cent of the fires from known causes originated here, and nearly all of these could have been prevented by such simple precautions as removing combustible material from the vicinity of the cupola, using only non-combustible roof coverings, and equipping the cupola with a hood or other device to prevent sparks from being showered over the neighborhood. Next to the cupola the core oven is the most frequent cause of fire. This hazard, also, could be almost entirely eliminated by giving careful attention to the construction of core ovens and their surroundings. Among the most frequent common causes are locomotive sparks and heating. The former is in part explained by the fact that many large plants have their own locomotives which enter various buildings, while the latter is no doubt largely due to the habit of constructing in the foundry proper for the use of the foreman or superintendent a rough office with a carelessly installed stove.

The record shows that 62.7 per cent of all foundry fires occurred at night, and for this reason they may smolder for several hours unless a watchman is present to detect the fire. However, 32.9 per cent of all foundry fires were discovered by the watchman, which is a very good record. It is doubtful if there is any industry in which a watchman has better opportunities to prevent loss by fire than in a foundry, and consequently great care should be used to select a suitable man for this position.

An examination of the record of automatic sprinklers in this class of property indicates that they have been very successful, for there were only 2.5 per cent of the fires classed as unsatisfactory and only 3.8 per cent of fires in buildings equipped with automatic sprinklers resulted in large losses.

FOUNDRY FIRE HAZARDS

Foundries have special fire hazards which are not present in other industries. Some of these are as follows:

1. *Preparing the Mold.*—Drying out the moisture from the mold by means of temporary stoves or furnaces placed directly in the mold, by means of heating flues conducting heated air to the surface of the mold, or by means of portable torches, forms a hazard which has caused some, although a small number, of fires.

2. *Core Ovens.*—Over 15 per cent of the reported foundry fires are traceable to the core oven. Nearly all could have been prevented. Special effort should be made to remove all woodwork from the vicinity of the core ovens and their flues. If this is impossible, the woodwork should be covered with sheet metal, with lath and plaster or Portland cement, or an asbestos covering. A flue or oven too hot to be touched by the hand is dangerous. Stacks or flues passing through the roof should be protected by metal thimbles. Lumber and flasks should be kept from the top of core ovens. The ovens should be kept in good repair, and all cracks should immediately be filled with cement. Where possible, the core ovens should be outside the building, only the door opening into the foundry.

3. *Melting Metal.*—The cupola has been the cause of 42.7 per cent of all foundry fires, the larger portion of these resulting from sparks from the cupola. Fires from the cupola may be prevented by the observance of the following rules: (1) All roofs within possible range of sparks from the cupola should be covered with non-inflammable material; (2) the cupola should be equipped with a hood or other device to prevent sparks from being showered over the neighboring roofs; (3) all unprotected inflammable material should be removed from proximity to the cupola walls.

Where fireproof roofs are not used they should be covered with metal with no exposed wood ventilators, frames or skylights. Special precaution should be taken to prevent the roof igniting at the point where the cupola stack passes through it. Charging floors for cupolas should be of non-combustible material, such as iron, brick or concrete. There is considerable danger of fire when the cupola is dumped, and a hand hose should always be placed nearby for such emergency. The brass furnace does not present as serious a hazard as the iron furnace. It should not, however, be in proximity to woodwork, and should never be used in rooms which do not have fireproof floors.

4. *Pouring.*—Fires may be caused by the ignition of wooden flasks when the molds are poured. Such fires usually can be extinguished by throwing sand upon them. Hot metal, also may be spilled upon the floor or on combustible material nearby. If all combustible substances are kept out of the foundry, there is little likelihood of fires starting from the handling of hot metal. A few fires have been caused by the explosion of molds, due probably to excessive moisture. This cause is comparatively rare. Many fires have resulted from hot smoldering wooden flasks, and as soon as the castings and sand have been shaken out, the flasks should be removed from the foundry. They should not be put into storage until several hours have elapsed, in order to insure that there are no live sparks in them. The only damage from iron flasks is that they may be placed, while hot, against a combustible wall.

5. *Cleaning and Finishing.*—In general there is but little fire danger in the cleaning of castings. Where the castings are pickled, care should be used in the storage of the acids used. In grinding castings there is a slight hazard from accumulations of emery wheel dust, which if wet may heat and ignite spontaneously. The rag wheels used for burnishing, buffing and polishing present a little danger from overheated bearings, spontaneous combustion or sparks from the dust. A good dust collecting system, with metal blower pipes discharging into a fireproof receptacle is advisable. Lint should not be allowed to collect in the room, and the receptacle frequently should be cleaned.

6. *Special Hazards.*—Many establishments which are primarily foundries carry on some other process in conjunction with the foundry work, and it is necessary to consider this feature in the proper study of the fire hazards of such a plant. Dipping of piping and pipe fittings in asphaltum or tar, to protect them from corrosion, should be carried on in a detached building. Painting, lacquering and japanning are other special processes which also should be carried on in a separate building particularly constructed for the purpose. The increasing use of fuel oil for heating core ovens and small portable torches for numerous other purposes has introduced an appreciable hazard into foundries. This material should be stored in an approved manner, and special precautions should be taken to see that all piping, tanks, etc., are maintained in good condition and free from leaks. It is advisable to have piping so arranged that in case of emergency the supply can be readily shut off at the source, and the piping drained.

AUTOMATIC SPRINKLER PROTECTION

It was at one time thought that automatic sprinklers were not suitable for use in foundries on account of the supposed danger of water being discharged on molten metal. Experience has shown, however, that this does not present any danger whatever and that automatic sprinklers can be used just as advantageously in foundries as in other properties. The fire record of foundries indicates that sprinklers have been very efficient when installed in such properties, and that if the system is properly laid out there is small chance of a fire reaching serious proportions. Sprinklers are

particularly effective in foundries because of the fact that a great many of the fires occur in the night after smoldering for several hours. These fires might not be discovered until they had made considerable headway. An automatic sprinkler system will promptly check any such fires and at the same time announce their discovery if an alarm system is included in the equipment.

Bolles Iron & Wire Works Expanding

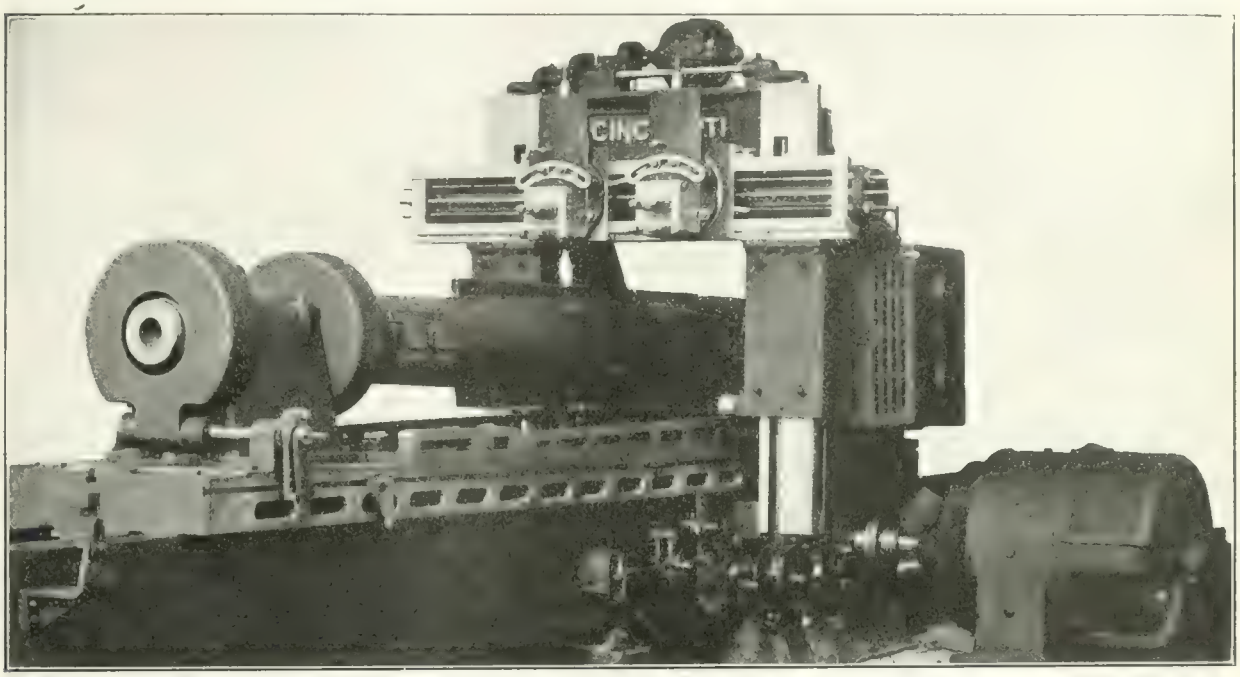
The J. E. Bolles Iron & Wire Works, Fourth and Porter streets, Detroit, Mich., manufacturer of plain and ornamental iron, wire work, etc., has increased its capital stock from $150,000 to $500,000 to provide for expansion. It has purchased the Fox Brothers' factory site on Hastings Street and East Milwaukee Avenue, covering three acres, with frontage on the Michigan Central, Grand Trunk and Wabash railroads, where it will erect a new plant in sections. The first section will be of modern steel construction, 135 x 460 ft., with mezzanine floor. The heavy forging and press department will be 60 x 460 ft., with an overhead 10-ton traveling crane. The company is placing contracts for several very heavy machines for forming stair treads and metal furniture, including a stair-tread press claimed to be the largest so far known, capable of forming a steel tread ¼ in. thick by 10 ft. long. Its drop forge department will turn out light forgings and metal stampings. The eight present departments will be increased to twelve. The plant will be entirely electrically equipped. The present plant, which is only six years old and contains 51,000 sq. ft., has been outgrown and the building will be turned into a loft building. The new plant is to be ready for occupancy April 1, 1917, and will include a bronze and malleable iron foundry, on which work will not commence until next spring. The company has seven months of contracts ahead at the present time. The directors are J. E. Bolles, Adam Kolb, J. B. Mansfield, Alfred J. Jones and E. B. Newton, the last named having been added recently to the board.

The Federal Export Corporation, 111 Broadway, New York, has under negotiation the purchase of several thousand tons of steel billets for shipment to foreign buyers. It has received additional orders for railroad material from the General Omnibus Company of Paris and the Eastern Railways of France, also for wire rods required by French industrial companies. J. R. Munoz, secretary of the company, who recently went abroad, is now at its Paris office.

Machining Howitzer Guns on a Planer

The Cincinnati Planer Company, Oakley, Cincinnati, Ohio, has recently completed a 48x48x18-ft. planing machine especially adapted for planing 9.2-in. howitzer guns. The table is started on its cutting stroke in the regular way and the cross rail, instead of maintaining a fixed position, is guided by the rollers over the cams on the table, causing the rail to rise and fall while the table passes under it, thereby providing a taper attachment. At the end of the return stroke, the ratchet lever on the worm shaft strikes the tappet at the side of the bed, making the lever pass through an arc which gives the worm a partial revolution. The gun is thus revolved an amount equal to the feed usually provided by the feed gears.

The cross rail, which has a sliding fit on the housings, is provided with two special brackets. These are bolted under the rail and are further held to the housing face by a clamp on both the outside and inside.



Planing Machine Rigged to Guide the Cross-Rail and Cause It to Rise and Fall as the Table Moves

A roller is mounted on each of these brackets at the lower end and projects over the side of the table on a cam which is mounted on each side of the table. This cam has a contour corresponding exactly to that of the gun.

It will be noted that the combination of these two motions, that is, the turning of the gun on centers at the end of each stroke and the raising and lowering of the crossrail, while the table is in motion, causes the tool to plane both a curve and a taper on the outside of the gun. When planing the straight rectangular projections on the gun the rail is raised a little clear of the cams and bolted fast to the housings, as is done in ordinary planing. The ratchet lever is also disengaged and the feed obtained through the regular feed gears on the end of rail.

The front center or headstock shown at the end of the table is provided with a large expansion chuck. This is a part of the spindle on which a large worm wheel is mounted on the opposite end. The worm that engages this large wheel is keyed to a shaft, having a ratchet lever mounted on the outer end. This ratchet lever engages the tappet fastened at the side of the bed at the end of each stroke and revolves the gun for the next cut as before stated.

Trigg furnace, seven miles west of Cadiz, Ky., which has been out of blast for many years, is reported to have been purchased by Tennessee interests, who have also acquired 5000 acres of mineral and timber lands, with the purpose of starting the furnace again.

The Use of Borings in Cupola Operations*

The Various Methods for Introducing Them and the Cost—Briquetting Regarded as Not Economical—Discussion by Doctor Moldenke

-BY JAMES A. MURPHY-

THE melting of iron borings and even steel chips in the cupola for the double purpose of reducing mixture costs and bettering quality is not by any means a new theme for foundrymen to discuss, for in one form or another they have been successfully melted for many years, some methods being more successful and more economical than others.

About thirty years ago a patent was granted to Asa Whitney, of Philadelphia, covering a method of melting borings in wood boxes. This method is in use at the present day by some leading foundries and the results from a quality point of view seem to warrant its continuance. Many other methods are employed, some of which have been subjects of exploitation, and several patents of doubtful value have been granted. A number of the methods indicate an ignorance of the principles involved, while others are freakish, and not a few are pure fakes.

MELTING LOOSE CHIPS UNSATISFACTORY

The melting of chips loose in the cupola has been tried both alone and in combination with regular mixtures with very indifferent results. When melted alone the necessary heat will not penetrate the mass, the under and outer edges of the charge only being melted to varying depths depending on the quality of the fuel, the blast pressure and the thickness of the charge. When chips are charged promiscuously with the pig and scrap, the pyrotechnical display at the door and top of the cupola stack indicates the destruction of the elements of which they are composed. Both of these methods have long been abandoned. A few foundrymen, however, lay a thin bed of borings on the cupola bottom. The melting iron coming down on the borings melts and absorbs them, but this is done at the expense of heat that may be badly needed by the iron. I consider this method for either chips or other small particles hazardous in the extreme where particular castings are made.

In the middle eighties a foundryman in Scranton, Pa., conceived the idea of filling old powder cans with these borings and charging them into the cupola the same as pig and scrap. The method was said to be very successful and was continued as long as the supply of old cans held out. For years, nothing was found for a substitute except wooden boxes.

ACCIDENTAL DISCOVERY OF A CONTAINER

Along about 1904 Stanton Griffith, foundry superintendent of the Fairbanks-Morse Company, Beloit, Wis., was experimenting with the melting of borings in various kinds of containers, none of which was as satisfactory as Mr. Griffith desired. As Newton's discovery of the law of gravitation was accidental, so the method that I am going to describe was accidental to Mr. Griffith through the obstreperousness of a tomato can that found its way into the household furnace where it remained intact for some time, a decided obstacle to good and thorough combustion. Its remarkable state of preservation after going through the fierce fire that is necessary to keep a Beloit home warm and comfortable certainly classed it as an ideal container for melting borings, but as its size was against it a similar but larger can was made from regular lengths of stovepipe, crimping the can in at each end when full.

This method proved so successful that I was attracted by it, and from the results of several tests that I made I concluded that no other method gives as good, as economical or as reliable results.

TEN-TON HEATS SHOW SMALL LOSSES

The stovepipe lengths will hold about 50 lb. It is preferable to use either a wood, iron or steel disk for the top or bottom of the cartridge. The containers can be filled at the machines by machinists' helpers at very little if any cost, as the borings must be taken away anyway. The cost of preparation for the cupola is about $2.50 per ton.

On three different occasions I melted 10 tons of these canned borings alone, using a blast pressure of from 9 to 10 oz., our regular blast being from 14 to 16 oz. All three of these heats showed a loss of less than 2 per cent, which seems remarkable. The charges were carefully weighed under my own supervision. A 10-ton ladle was weighed on a crane scales and then placed under the cupola spout, and when the contents of the cupola were run into it, it was weighed again with the above results.

The iron in each case was white and in no way fit for commercial machinery castings. It showed no tendency to stick to the ladle, but was hot and fluid. A 6 x 6-in. section poured from the ladle was white all through, not a trace of graphitic carbon being visible near the center. The melting of borings in cans or cartridges is being practised by a large number of foundries engaged in both light and heavy work. There is no patent on the process. It is beyond question a thoroughly successful method.

In 1908 a patent was granted to Walter F. Prince for melting borings in a vertical tube or casing having a higher melting point than the chips. The method at first was open to many serious objections, some of which have since been removed. Borings can be successfully melted by this method, but it lacks what might be called mobility, as all the borings are only in one part of the cupola in a vertical column, with fuel only partly surrounding it, whereas, with the cartridges, they can be distributed among the charge, giving a better mixture and insuring more even melting.

BRIQUETTING NOT ECONOMICAL

The briquetting of borings by the German method, that is, subjecting them in suitable molds to great pressure, is a successful method, but the cost is high and there is a considerable melting loss. It is said that the breaking or spalling of the corners and edges of the briquettes represents a great loss. The briquetting of borings through the use of cement, canna pitch or any other wet binder is without question a great failure. The rapid generation of oxygen when moisture comes in contact with the borings soon leaves only a lump of rust to put in the cupola and when used in this way is productive of bad castings, as pin holes and so-called blow-holes are prevalent. The melting loss by this method I found by experiment to reach as high as 60 per cent, while the resultant metal was bad. Castings poured with it for experimental purposes were very unsound and literally honeycombed with holes, while on the other hand castings poured from similar metal, taken from a ladle that was filled from the cartridges, was sound all the way through and showed no signs of pin holes or any other unsoundness.

CONCLUSIONS

As a practical proposition the use of borings in binder bound briquettes is a failure. The briquettes made under enormous pressure are satisfactory, but the

*A paper here given substantially in full, presented at the American Foundrymen's Convention in Cleveland, Ohio, Sept. 15, 1916. The author is with the Hooven, Owens & Rentschler Company, Hamilton, Ohio.

cost and melting loss are much higher than when melted in cans or cartridges.

The tube method introduced by Mr. Prince has very narrow limitations as to the amount used, this being governed by the size of the tube which of necessity must be comparatively small. If a multiplicity of tubes is used there is great danger of oxidation, as no fuel is underneath them. They can only be placed in one position in the cupola and that a specially prepared one on the side with a special door cut for the purpose. The attendant labor and waste of filling close to terrific heat is another objection.

With the cans or cartridges no extra labor is involved on the charging floor and the given amount to be put on any charge can be as evenly distributed throughout the charge as any component part of it. The cost of canning the borings exclusive of the labor of filling them is about $2.50 per ton. This filling labor should hardly be counted under most circumstances, as the borings must be taken away from the machines and the helper may as well fill the cans as to use any other receptacles.

Borings melted by this method are a decided strengthener of castings and tend to give a closer grain. I have used them in various percentages in all kinds of work from the heaviest parts of high class machinery down to light automobile castings with unvarying beneficial results.

The cost of wooden boxes is also about $2.50 per ton and the cost of tubes very little less. The cost of briquettes varies greatly. So many variables have to be taken into account and the method is so unreliable that it is not worth pursuing.

Discussion

Dr. Moldenke submitted a written comment on Mr. Murphy's paper as follows:

I regret very much to differ with Mr. Murphy on some of his facts and conclusions derived in connection with the use of cast borings in foundry practice. Unquestionably all the methods he enumerates will give good results if operated under correct melting practice, and all of them will give bad results if the charging is bad, or the cans, briquettes or stovepipes become damaged and allow loose borings to drop into the bed and before the tuyeres.

Mr. Murphy's estimate of the cost of the several processes is not altogether correct, as while he may be right about wooden boxes and his cartridges at $2.50 a ton ready for charging into the cupola, the method of Mr. Prince costs no more than about $1.50 a ton (exclusive of royalty) and that of briquetting under high pressures about the same. The two last mentioned methods give good results, as does Mr. Murphy's can method, where medium and heavy castings are the rule, and these will machine nicely and without blow-holes, if the charging and melting have been done properly.

For very light castings, however, particularly where high speed machining is essential, no process of using cast borings will fill the bill, as the melting of material so prone to oxidation as this is bound to harden the metal. The mistake made in introducing both the tube and the briquetting methods into foundries has been in going to specialty shops machining enormous numbers of very light castings. Here the saving in the mixture is more than offset by the extra cost of machining, and it does not pay.

For general work, as stated, the three methods work out all right if carried out correctly. Mr. Murphy's can method costs the most, Mr. Prince's is cheaper, but has the disadvantage of the tubes opening up and spilling the borings, if in careless hands. The briquettes under high pressure work all right if not made too large in cross-section and the pressure is sufficiently high. That Mr. Murphy's conclusion in regard to briquettes that "the method is so unreliable that it is not worth pursuing" is entirely incorrect is shown by the fact that to-day there are 25 high pressure briquetting plants in Europe in full operation and supplying hundreds of foundries with their borings in briquette form. In this country the cost, including royalty, will run between $1.25 and $2 a ton, depending upon the weight of borings compressed at each impulse.

A further criticism I must make is in regard to Mr. Murphy's remarkable tests in melting canned borings, his loss being less than 2 per cent. I cannot accept this as possible, and rather judge that some error in manipulation has escaped his attention. I have had many samples of cast borings analyzed for their iron content. The very best of them—sold at a premium for their comparative freedom from extraneous matter—gave less than 90 per cent actual iron. Ordinarily cast borings run nearer 85 per cent iron than 90 per cent. This accounts for the comparatively poor reports gotten when any process of melting borings, whether in cans, tubes or as briquettes, is carried out, using borings only. These results show from 12 to 20 per cent loss in melting, but it is forgotten that from 10 to 15 per cent of the borings was not iron in the first place.

Again, any rusting from exposure of the borings before canning or briquetting means just so much iron removed from the possibility of melting, as iron oxide (rust) goes into the slag.

In view, therefore, of the importance of saving values, the use of borings should be encouraged, but in their proper place. It will pay foundrymen making medium and large castings, and small castings not requiring machining, to look into the matter carefully, as economy will soon be the order of the day. The European foundrymen have done so, and the briquetting process, under very high pressure, seems to have filled the requirements best, as the tube, can and other methods of introducing borings in their loose form have not remained live issues.

New Steel Casting Shop for Chicago Territory

A new foundry, designed to supply steel castings weighing from a few ounces to over twelve tons, is nearing completion at Benton Harbor, Mich., by the Superior Steel Castings Company. It is located on a 10-acre site near the Pere Marquette, Big Four, Michigan Central and two Interurban freight stations as well as the Lake Michigan docks of the Graham & Morton Line and Benton Transit Company. The buildings are all of steel construction with electrically driven machinery throughout the foundry as well as the carpenter and pattern shops. The main section of the foundry is served with a 20-ton electric traveling crane with a 5-ton auxiliary hoist, also a 10-ton electric traveling crane and air at 100 lb. pressure for pneumatic tools. The main building covers 30,000 sq. ft. of space besides the storage bins and yards for flasks and metals.

The foundry is further equipped with a 12½-ton acid-bottom open-hearth furnace, which uses oil for melting, and is capable of making 21 heats per week, having just been proved in that respect. The charging floor is of steel-plate construction, served with an electric elevator, enabling quick and easy handling of raw materials. A considerable portion of the work is molded in green sand but a good quantity of dry sand molds are made. Most of the small work is handled in the bench room, which is 36 x 100 ft., fitted with trays and other special equipment for this class of work.

A large car-type annealing furnace, with oil burners and pyrometer, has been provided for the special heat treatment of the steel castings. The cleaning department, which occupies the south end of the main building, is completely equipped with floor and swing grinders, Pangborn sand blast with dust arresters, Oxweld cutting torches to remove large heads and gates, etc.

The principal officers of the Superior Steel Castings Company are as follows: S. E. Doster, president; W. R. Gilmore, vice-president and general manager; C. A. Pratt, secretary and treasurer. The main office is at the works.

Two evening courses of study in heating and ventilation, taking the form of lectures, are announced by the New York School of Heating and Ventilating, room 511, World Building, New York City. The series of elementary lectures will occur on Monday evenings beginning Oct. 9, and an advanced course has been scheduled for Wednesday evenings.

Manufacture and Properties of Semi-Steel*

Its Use as Projectiles — Some Historical Facts—Steel as a Reducer of Carbon—Benefits of Manganese—Strength and Endurance

BY DAVID M'LAIN

WHILE it is true that semi-steel has not been recognized in iron and steel nomenclature, still, as it ranks among the most valuable products of the gray-iron foundry, it should be accorded proper recognition and standard chemical specifications covering the different classes of castings should be clearly defined. I will admit it is rather unfortunate that any cast metal containing from 3 to 10 per cent steel is designated as semi-steel, and in this particular we are in hearty agreement with those who consider that semi-steel is a misnomer. Our contention always has been that no metal could be defined as semi-steel unless it contained from 25 to 50 per cent steel.

More than 1,000,000 tons of semi-steel was made last year, and every foundryman sooner or later must be able to make real semi-steel, as engineers are continually demanding stronger metal, and lighter sections for castings that must stand higher tests.

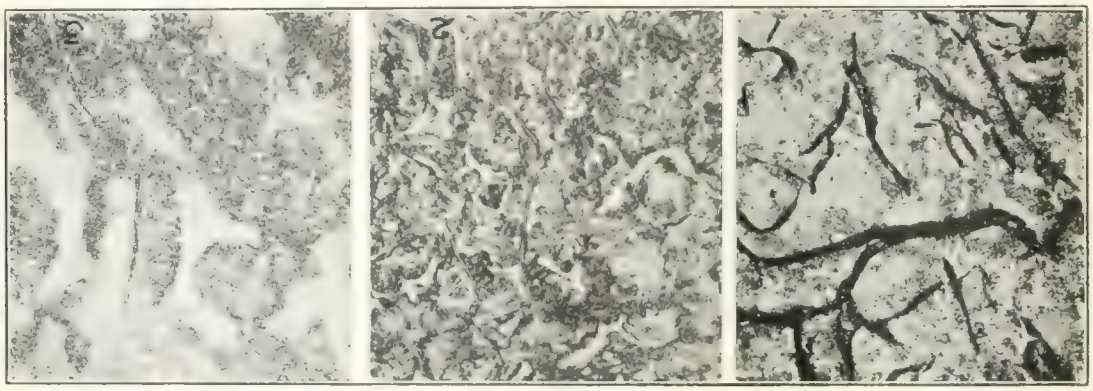


Fig. 1—Photomicrograph of Gray Iron, Showing Graphitic Carbon; Fig. 2, Structure of Large Piston Containing 35 Per Cent Steel; Fig. 3, Structure of Gray-Iron Cylinder

HISTORICAL FACTS

The aim of this discussion on semi-steel is to place before the members of this association and the foundry trade in general a few plain truths about it. Many of these statements deal with historical facts dating back 15 years. For 50 years or more, foundrymen have added steel to iron in the ladle, while comparatively few melted slight amounts of steel in the cupola, but up to 1902 or 1903 I could find no record of any man having used large percentages of steel in castings of light section.

Years ago I brought foundrymen from their own shops to see the steel charged in the cupola in a converter steel plant. They saw the metal coming from the cupola and yet remarked that you may be able to do this in the steel foundry, but you never could do it in the iron foundry.

In 1899, A. Christensen, the well-known inventor of the street railway air-brake, built a foundry to make gray-iron, steel and brass castings, of which plant I was superintendent for five and one-half years.

A DIFFICULT CASTING

One pattern in particular, a cylinder head, had proved very difficult, as the walls were only 5/16-in. section, while they were hydraulically tested to 200 lb. per sq. in. In those days other engineers allowed 1 in. and more section for 200 lb. pressure, but Mr. Christensen saw the light in advance. It was a great advantage to the mechanical world that he did, as it was only a few years later that the automobile industry started in earnest. To-day, it is truly wonderful when it is known that some cylinders only 5/32-in. section are being made with 10 to 20 per cent steel and tested to 200 lb. At that time the losses on the cylinder head castings were exceedingly heavy, so much so that every foundry making them sustained large financial reverses.

After a long series of experiments it was finally decided to drop gray iron and turn our attention to the use of steel scrap. After 10 weeks' experimenting experts finally claimed the section should be increased, but Mr. Christensen would not accede to their wishes. Foundrymen advised that the pattern should be changed, but he would not listen to it, as he claimed: "When the metal was right, the castings were good." Later developments proved that he was correct.

From the start I believed that steel scrap in the mixture would enable us to close the grain of the metal, but the great danger was that the metal would be too low in carbon, as all leading authorities claimed that "steel reduces carbon."

DOES STEEL REDUCE CARBON?

All textbooks, whether by technical or practical men, maintained that steel reduced carbon, that it was not a good thing to use as it caused "hard spots," that "a higher melting temperature was necessary," etc. Even to-day my claim that steel melts first puzzles some chemists, metallurgists and others, who evidently do not take into consideration that steel has a great affinity for the elements and absorbs a large quantity of carbon from the fuel.

The total carbon, as calculated, in the iron will remain practically the same, but as the steel content of the mixture will add to the total weight of the resultant metal without a corresponding gain in carbon, the total carbon, of course, will be less than if all iron had been used. That condition, however,

*From a paper presented Sept. 15, 1916, at the American Foundrymen's Convention, Cleveland, Ohio.

does not exist when melting steel scientifically in the cupola. Steel in melting absorbs carbon from the fuel.

COKE SAVINGS

To prove that less coke is required when melting steel, let me quote a few records made by progressive American foundrymen:

Daily Tonnage	Melting Ratio	Pounds Coke Required	Daily Saving, Pounds	Yearly Savings, Tons	Saved Per Year on Coke at $5.50	Coke at $6	Coke at $7
5	6 to 1 increase to 8 to 1	1,666 1,250	416	62	$341	$372	$434
15	6 to 1 increase to 9 to 1	5,000 3,333	1,667	250	1,250	1,500	1,750
30	7 to 1 increase to 10 to 1	8,571 6,000	2,571	385	1,925	2,310	2,695

When melting 30 tons per day with coke at $6 per ton, and you increase your melting ratio from 7 to 1 to 10 to 1, you realize a saving of $2,310 per year, equal to interest at 6 per cent on $38,500. John D. Rockefeller overlooked the foundry business.

MANGANESE AS A SCAVENGER

I knew the value of manganese in steel castings and wanted to use it for semi-steel castings—a higher manganese content than was found in the ordinary pig. I believed it should be melted in the cupola and I succeeded in doing it.

Iron, steel and manganese have a great affinity for sulphur, but as manganese has more of an affinity for oxygen than for iron, it has a tendency to leave the iron and will attract a percentage of sulphur, forming a manganese sulphide, some of which passes off in the slag. The amount of sulphur expelled from the metal will depend on the amount of manganese, the nature of the slag-forming elements, and the temperature at which the metal is melted. If both manganese and sulphur are high in the casting, have no fear of the sulphur, as it will be neutralized by the manganese.

At the time I began experimenting with semi-steel it was generally believed that manganese hardened castings when above 0.85 per cent because of the accepted theory that manganese converts graphitic carbon to combined carbon. But as silicon converts combined carbon to graphitic carbon, it was not mentioned what the percentage of silicon was when manganese hardened iron.

It was impossible to secure any reliable data on the percentage of manganese which should be used, and as our local blast furnace made no pig with more than 0.70 to 1.00 per cent manganese, I purchased a few tons of 80 per cent ferromanganese in lump form to add to the charge going into the cupola. The resultant metal enabled us to make those very same castings that Mr. Christensen desired so much, with only 1 to 3 per cent loss, and our later experiments proved that steel scrap intelligently used was beneficial in all mixtures. Even 10 per cent increases the transverse strength of light castings from 25 to 35 per cent.

30 PER CENT INCREASED STRENGTH WITH 10 PER CENT STEEL

A concern in Michigan wanted stronger castings, but did not care to increase section nor weight, so they began using waste steel clippings with an increase in strength with only 10 per cent steel. The gray iron analyzed as follows: Silicon, 2.30 to 2.50 per cent; sulphur, 0.08 to 0.09 per cent; phosphorus, 0.75 to 0.85 per cent; manganese, 0.30 to 0.50 per cent. With 10 per cent steel the metal contained from 2.10 to 2.30 per cent silicon, 0.07 to 0.09 per cent sulphur, 0.60 to 0.70 per cent phosphorus, and 0.55 to 0.70 per cent manganese. The strength tests were as follows:

	Gray Iron, Lb.	10 Per Cent Steel, Lb.	Percentages in Favor of 10 Per Cent Steel
Average transverse strength..	2,252	2,900	28.7
Minimum transverse strength	2,180	2,760	26.6
Maximum transverse strength.	2,310	3,020	30.7

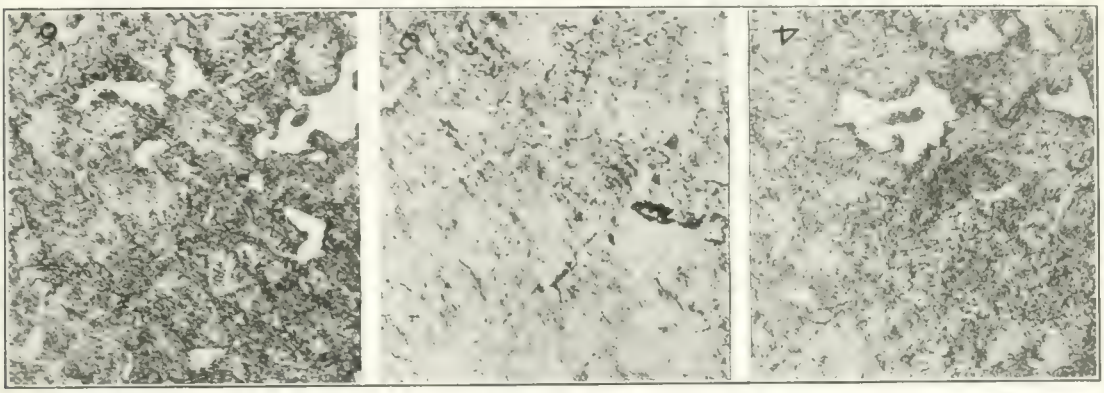


Fig. 4. Photomicrograph of Semi-Steel Containing 30 Per Cent Steel. Fig. 5, Structure of Semi-Steel Test Bar Having a Transverse Strength of 3460 Lb.; Fig. 6, Structure of a Bushing Containing 50 Per Cent Steel

ENDURANCE OF SEMI-STEEL

Semi-steel is believed to be a great heat and acid resisting metal, because the metal is purer than gray-iron. In recent fire tests of gray-iron and semi-steel castings, to learn which is preferable, the gray iron lost 34 per cent by weight, while the semi-steel only lost 9 per cent. Even the despised grate bar is in a higher class than formerly, and railroads are eager for semi-steel grate bars, as tests have demonstrated that one set of semi-steel grate bars stands up better than three sets of gray-iron bars.

Gears and gear blanks made of semi-steel frequently will outwear steel gears. The high graphitic carbon in semi-steel acts as a lubricant, a feature not possible in steel castings. Many concerns who formerly made all their gears of steel are now making them of semi-steel. Acid castings, air, gas, water and steam engine castings, ammonia fittings, crane wheels, cross heads, gears, gear blanks, grate bars, glass house molds, jig castings, lathe beds, locomotive parts, machinery castings, Diesel engine parts and valves, are improved when 30 per cent steel or more is used.

MICROPHOTOGRAPHS AND ANALYSES

Fig. 1 is a micrograph of gray iron. You will note the large black carbon flakes. These flakes break up the structure of the metal, thus making

it brittle and weak. The gray substance is carbon, combined with iron, forming steel, while the white is iron. The analysis is as follows: Graphitic carbon, 3.15 per cent; combined carbon, 0.15 per cent; silicon, 1.85 per cent; sulphur, 0.098 per cent; phosphorus, 0.402 per cent; manganese, 0.50 per cent. Fig. 3 is a specimen from a small gas-engine cylinder made of gray iron, that nearly put the maker out of business. The manager of the foundry did not believe in the use of steel, but when the firm became converted he graciously consented to follow instructions and in a few weeks the loss was reduced to 2 and 3 per cent as against 20 and 30 per cent previously. Fig. 2 is a sample of semi-steel in which you will note the graphic carbon flakes

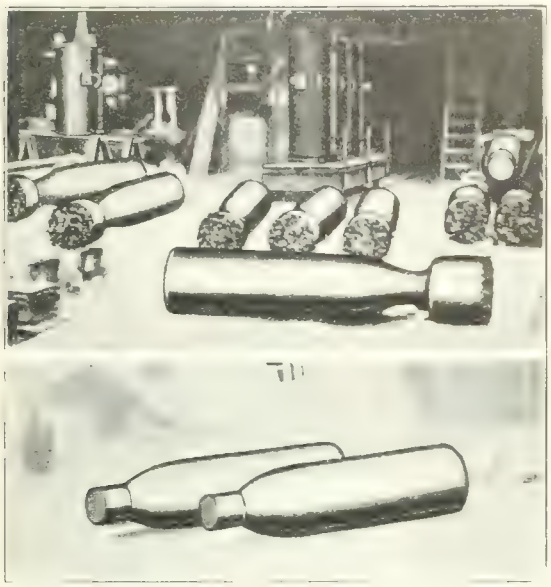


Fig. 7—Finished and Unfinished Semi-Steel Shell Castings

are exceedingly small. The gray constituent is steel and the small white particles are ferrite or iron.

CLASSIFICATION OF SEMI-STEEL

The writer believes the following classifications, with analyses, have proved best by actual test for semi-steel castings:

Automobile cylinders, pistons and other light castings, 3/16-in. to ⅜-in. section with 10 to 20 per cent steel; silicon, 1.90 to 2.25 per cent; sulphur, 0.07 to 0.1 per cent; phosphorus, 0.35 to 0.55 per cent; manganese, 0.65 to 1 per cent. Packing rings, gas engine cylinders and automobile cylinders, ⅜-in. to ⅝-in. sections, with 15 to 25 per cent steel, silicon, 1.65 to 2 per cent; sulphur, 0.07 to 0.1 per cent; phosphorus, 0.35 to 0.55 per cent; manganese, 0.65 to 1 per cent.

Fig. 4 is a photomicrograph of a specimen of semi-steel containing 30 per cent steel; Fig. 5 is a specimen containing 40 per cent steel, and Fig. 6 is a specimen containing 50 per cent steel.

PROJECTILES OF SEMI-STEEL

While both large and small projectiles are being made of semi-steel "somewhere on the continent" and quite a few places in America, still technical men will hardly credit this statement. Fig. 7 shows several 12-in. projectiles which weigh 1200 lb. net and 1600 lb. gross. Thousands of these have been made in America. The illustration also shows the same projectiles with the risers turned off. They are shipped in this form and are finished by the purchaser.

HARDENING SEMI-STEEL

An Easten firm objected to the high cost of the die steel used in its forge shop and someone suggested semi-steel. The foundry superintendent was called on and he agreed to make some semi-steel bars, which he thought could be hardened. They first tried it on a few punches for hot work, but it was either too soft or too hard, until they hit on the right process of hardening. The writer does not claim that semi-steel will replace tool steel. The concern just referred to no longer buys steel for making dies, as semi-steel wears better, is easier to machine and is much cheaper.

A CHEMIST'S OPINION

A letter addressed to the writer by C. J. Atkinson, Milwaukee, a chemist and metallurgist who has handled thousands of semi-steel samples, and dated July 19, 1916, is as follows:

The series of micrographs and chemical analyses I have made for you of semi-steel and ordinary gray cast iron are exceedingly interesting in several ways. The difference between semi-steel and gray cast iron is particularly noticeable in the formation of the graphitic carbon. In cast iron where there is a large mass of metal, the graphitic carbon is always found in large flakes, whereas with the semi-steel the graphitic carbon is in exceedingly small flakes and in small granules.

Another feature is the high sulphur content of these steels. If this had been cast iron with this high sulphur, they would have been exceedingly hard because sulphur has a tendency to promote chill.

Another factor is that in none of the samples have I found any blow-holes or microscopic cavities. The material appears to be exceedingly close.

In nearly all the samples examined, the combined carbon content was high. This, of course, is due largely to the high sulphur; in all cases with the exception of two which showed chill, the material is easy to machine.

The various metallographic elements in the construction of all these irons are as follows:

Pearlite which appears under the microscope or in the photograph as a dark substance, laminated or speckled under high magnification is really iron saturated with carbon, forming steel. Graphitic carbon appears under the microscope as black specks or lines. In most of the photographs, though, these cannot be easily detected, as they are more or less obscured by the pearlite.

The white or light colored areas which contain some slight specks or markings are ferrite, which can be described as iron containing a certain amount of impurities. In one or two of the samples there is another white substance which is absolutely structureless. This is cementite, which is a very hard, brittle substance. It is composed of iron containing a large amount of combined carbon. It is only found in those castings that have been chilled.

Another feature that is extraordinary is the uniformity of this series. Although the castings were of exceedingly varying weights, some having very thick sections and others being exceedingly thin, the metal microscopically was exceedingly uniform, much more so than you would expect to find in gray iron, as we know that where the section of a casting is light there is a tendency for the iron to be exceedingly hard and brittle unless the chemical composition is modified to suit the weight of the casting.

Excellent pig iron is reported to have been recently made at a new plant in New Zealand from large deposits of iron, much of it being found in iron sand at Taranaki, near New Plymouth, on North Island. Pig iron was produced there in commercial quantities as early as 1848, and some of it is said to be of a very high quality as judged by tests made in England. The cost of production is placed at $11.49 per ton, which could probably be reduced by up-to-date equipment. Coal is found in the vicinity. Imports of pig iron into New Zealand in 1914 were 10,805 tons, valued at $225,567, of which the United States supplied 85 tons and the United Kingdom 9284 tons.

STEEL CASTING SPECIFICATIONS

Report of the Committee of the American Foundrymen's Association

On taking up the work of this committee, your chairman, acting in co-operation with your president, R. A. Bull, enlarged the committee by the addition of several members. A copy of the last report of the committee, giving recommendations for changes in the standard specifications for steel castings, published by the American Society for Testing Materials, was sent to each member of the committee, with the request that he give his opinion on the proposed changes, point by point.

With this information in hand, your chairman held a conference with Mr. Thomas, the chairman of the Steel Founders' Society committee on steel castings, who was provided with the views of the members of his committee on the proposed changes. Your chairman and Mr. Thomas then requested committee A-1 of the American Society for Testing Materials to call a meeting of its sub-committee on specifications for steel castings to consider these changes. Your chairman and Mr. Thomas attended this committee meeting, and did their best to secure the adoption of such changes as met the views of the majority of the two committees.

The changes secured were acted upon favorably by the full committee A-1 of the American Society for Testing Materials, and at the recent convention of that society these changes in the specifications were approved and referred to the membership of the society for letter ballot. When the result of the letter ballot is ascertained, these changes will be finally accepted or rejected.

The wording of Section 5-D was changed from its old form to the following form:

Class B castings shall be properly annealed, the treatment depending upon the design and chemical composition of the castings.

The changes proposed in section 6, as embodied in the former report of this committee, were not satisfactory to the majority of the members of the committee as now constituted, nor were they satisfactory to the membership of the Steel Founders' Society committee. After somewhat protracted discussion at the meeting of the sub-committee on steel castings of the American Society for Testing Materials, it was voted to leave this section and Section 23 in their present form.

The change proposed in Section 7, to add silicon to the list of the elements to be analyzed, was not satisfactory to the membership of your committee, nor to that of the Steel Founders' Society committee, and we did not recommend any action on this to the American Society for Testing Materials.

PHYSICAL TESTS AND ANNEALING

The changes proposed in Section 9-A with reference to physical properties and tests of Class B castings were satisfactory to the membership of both committees. Your chairman regrets to state, however, that the American Society for Testing Materials took action on only one-half of these recommendations. Their action was to specify that the elastic limit, or rather the yield point, for all grades of castings should be 45 per cent of the tensile strength. The efforts to have them specify that the percentage of elongation in 2 in. shall equal 1,400,000 divided by the tensile strength per square inch failed, and no action was taken on this recommendation.

Section 11 has been amended to read as follows:

In the case of small or unimportant castings, a test to destruction on three (3) castings from a lot may, upon agreement between the manufacturer and the purchaser, be substituted for the tension and bend tests. This test shall show the material to be ductile, free from injurious defects, and suitable for the purpose intended. Unless otherwise agreed upon between the manufacturer and the purchaser, a lot shall consist of all castings from one melt, in the same annealing charge.

The addition proposed to Section 12 was to read as follows:

When desired by the purchaser suitable test lugs shall be cast on castings which do not have test bars attached, so that the inspector may judge of the annealing.

This proposed addition was not satisfactory to the membership of your committee, nor to that of the Steel Founders' Society. Certain members of the sub-committee on steel castings of the American Society for Testing Materials were anxious that this addition should be made, and the action that was finally taken at the meeting of their committee was the appointing of a sub-committee of their sub-committee on steel castings to report next year on the advisability of this step. At present no action has been taken.

TURNED OR THREADED GRIPS

The change proposed in Section 12-C—"Or have turned grips at the option of the manufacturer" which was desired by the membership of both committees in order to legitimatize the use of test bars with plain turned ends, was taken care of by the action of committee A-1 of the American Society for Testing Materials in changing their specification for test bars to allow either a threaded end test bar or a test bar with plain turned end. This change applies to all their specifications for steel. The full text of their new specification is as follows:

Tension test specimen shall conform to the essential dimensions shown in Fig. 2. They shall have filleted shoulders, or threaded ends, to fit into the holders on the testing machine in such a way that the line of action of the force exerted by the testing machine shall coincide with the axis of the specimen.

A new section, No. 14, has been inserted following Section 13. This section reads as follows:

If the results of the physical tests of any text lot do not conform to the requirements specified, the manufacturer may re-anneal such lot not more than twice, and re-test shall be made as specified in Sections 9 and 10.

A slight change has been made in Section 15-C which now reads as follows:

Castings shall not be offered for inspection if covered with paint, rust, or any other substance to such an extent as to hide defects.

THE QUESTION OF SULPHUR

Your chairman regrets the inability to secure action at this time changing the allowance for sulphur in castings, but feels that this matter will take care of itself in the immediate future, and that within a year or two action upon this point will probably be forced by the pressure of circumstances. He regrets also that the American Society for Testing Materials was unwilling to change its specifications for elongation as requested by this society, but in general he feels that the changes secured are sufficiently satisfactory to warrant him in recommending that the American Foundrymen's Association use the specifications of the American Society for Testing Materials as now amended rather than endeavoring to get up specifications of its own.

The report was signed by John Howe Hall, chairman; W. C. Hamilton, A. H. Jameson and Arthur Simonson.

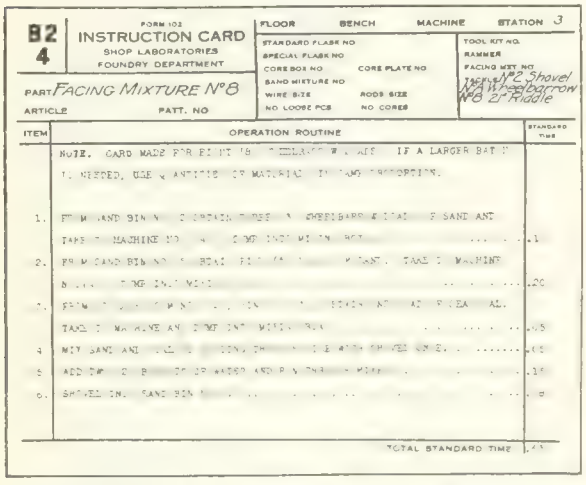
The Louisville Industrial Foundation, Louisville, Ky., which will administer the factory fund of $1,000,000 recently subscribed, has organized with Lewis R. Atwood, president; Donald McDonald and William Heyburn, vice-presidents; William E. Morrow, secretary, and Victor H. Englehard, treasurer. The first payment on subscriptions, 10 per cent, has been called for Oct. 1, and the organization will at once begin negotiations with manufacturers wishing to locate at Louisville. W. E. Caldwell, president W. E. Caldwell Company, and Charles F. Huhlein, president B. F. Avery & Sons, are on the committee to investigate applications.

Technological paper No. 78 of the U. S. Bureau of Standards offers the results of an investigation to show what part the three principal constituents of Portland cement—tricalcium silicate, dicalcium silicate and tricalcium aluminate—play in developing the physical properties of this material.

Improving Methods in the Foundry

An Analysis of Conditions of Labor, Material and Equipment Accompanied by Time and Motion Studies Will Effect Large Economies

R. E. KENNEDY, of the University of Illinois, in a paper read at the Cleveland meeting of the American Foundrymen's Association, Sept. 11-15, 1916, advocated the analysis of foundry operations as the basis for improving shop conditions and methods. When a foundry is in difficulty from the manufacturing end, the solution can nearly always be found from a study of the three factors of labor, material and equipment. These factors having been analyzed



FORM 102
INSTRUCTION CARD
SHOP LABORATORIES
FOUNDRY DEPARTMENT

B2 4

FLOOR | BENCH | MACHINE | STATION 3

STANDARD FLASK NO
SPECIAL FLASK NO
CORE BOX NO | CORE PLATE NO
SAND MIXTURE NO
WIRE SIZE | RODS SIZE
NO. LOOSE PCS | NO. CORES

TOOL KIT NO.
RAMMER
FACING MIX NO
NEEDED: No 2 Shovel, No 4 Wheelbarrow, No 8 2" Riddle

PART FACING MIXTURE N°8
ARTICLE | PATT. NO

ITEM	OPERATION ROUTINE	STANDARD TIME
	NOTE. CARD MADE FOR BENCH MOLDING. IF A LARGER BATCH IS NEEDED, USE A MULTIPLE OF MATERIALS IN SAME PROPORTION.	
1.	FROM SAND BIN NO. OBTAIN THREE WHEELBARROW LOADS OF SAND AND	
	TAKE TO MACHINE NO. AND COMPLETE MIXTURE.	.11
2.	FROM SAND BIN NO. OBTAIN FIVE SHOVELFULS OF PLANT. TAKE TO MACHINE	
	AND COMPLETE MIXTURE.	.20
3.	FROM PLANT OBTAIN AND ADD TO MIXTURE AT MACHINE ALL	
	TAKE TO MACHINE AND COMPLETE MIXTURE.	.05
4	MIX SAND AND [illegible] WITH SHOVEL ONCE.	.05
5	ADD ONE QUART OF WATER AND MIX.	.15
6.	SHOVEL IN SAND BIN	.0
	TOTAL STANDARD TIME	[illegible]

Fig. 1. To Avoid the Necessity of Verbal Directions the Instruction Card Is Used for Giving Directions. Labor, Core Sand Mixtures, Facing Mixtures Can Be Standardized and Instruction [illegible] Provided for the Mixing

in the light of the best in the foundry world, the causes of poor results should be ascertained. Knowing where the trouble lies, it is generally a comparatively easy matter to remedy the cause, but the remedy cannot be applied before the cause of the trouble is located. It is necessary, to get the best results, to take action along the following lines:

1. Study the methods in vogue in the shop in question.
2. Study the methods in vogue in the best practice in this line of work, [illegible] study.
3. Clean up the shop and arrange it for the best work, providing storage places for equipment and materials.
4. Standardize materials, mechanical equipments, methods, and [illegible]

Route [illegible] improved conditions

By standardization we do not mean that one certain method or piece of equipment should be selected from the many and then adhered to religiously forever, but we do mean that the best known way should be found and then used as a standard, while a constant search is being carried on for a better standard.

TIME AND MOTION STUDY IN HASTENING CHANGES

The changing of methods is, as a general rule, a slow process of evolution, the changes being suggested from time to time by certain circumstances brought to light mostly by chance. During recent years, due to the change of work and competition, it has been necessary for many shops to make thorough analyses of their operations to hasten improvements in methods and equipment. For these analyses, time and motion studies of the different classes of work have been made and it has been found that such a study, scientifically conducted, shows up the following factors:

1. The [illegible] in the conduct of [illegible]

the operator improve the quality and increase the output of his work.

2. The work done by the operator which is unnecessary and by eliminating which the operator can turn out more product of as good a quality in the given time, without any more exertion.

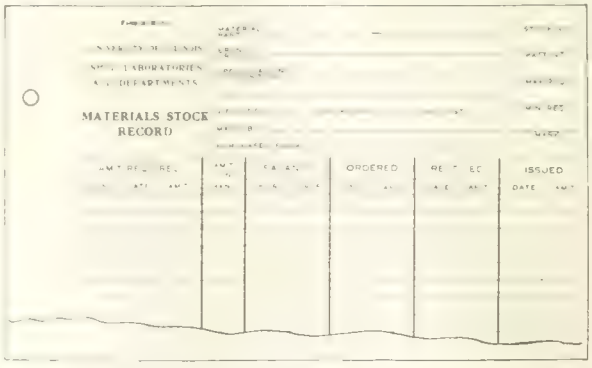
Time study, when rightly applied, means the hastening of these changes because of the facts brought to light by scientific study of the conditions. These studies should be made by some one familiar with the best practices in this line of work in other shops and one who will not let himself be held to the traditional shop method just because it had been customary to do the work in one certain way in the past.

MATERIAL RECORDS

Some form, such as the material record shown in Fig. 2, can be used not only for keeping track of the amount of material on hand, but has a place for the entry of a specification for the buying. With this specification, made out according to the best information obtainable, the materials should give satisfaction. The writer has found it to be common foundry practice to order minor foundry materials without any specification as to quality, which is as bad as a similar practice of ordering pig iron without specifying the chemical content.

Molding sand is another material to which thought should be given. Many foundries are purchasing the same sand from year to year without really knowing whether it is the best and cheaper when everything is considered. It is desirable that foundrymen keep a record of the weight of castings produced for each ton of sand used. Are many castings being lost by scabbing which would not occur with a different sand? Changing the molding sand has often reduced the loss of scabbed castings, turned out by semi-skilled molders, to a minimum.

The necessity for giving strict attention to the purchase of materials cannot be given too much emphasis,



[illegible] A Record Is Kept [illegible] Together With [illegible]

for materials that require extreme care in handling will require highly skilled men in their manipulation and skilled labor costs more than unskilled.

EQUIPMENT

Foundry conditions have been much improved by the introduction of labor saving equipment such as molding machines, sand cutting and mixing machinery and conveying apparatus. Inasmuch as such equipment requires a considerable money investment, a careful analysis of the conditions should be made before the expenditure is made. The selection of the molding machine best adapted to the particular case will, in most

cases, be governed by the number of castings to be made from different patterns.

Those machines which are simple and permit of easily changed patterns offer more value to ordinary shops. Among such machines are the ordinary hand or air squeezer, the simple roll-over drop plate, and the straight stripping plate machine. Very few foundries are doing work of such a nature but that it will pay them to investigate the possibilities of installing some of the simpler molding machines. In foundries having exceedingly large orders, the more complicated machines that combine several operations and the installation of elaborate sand handling plants are important factors.

Nearly every shop will find that it pays to have simple electric riddlers and sand mixers in labor. The use of these mixers will assist the foundryman in standardizing his methods of mixing.

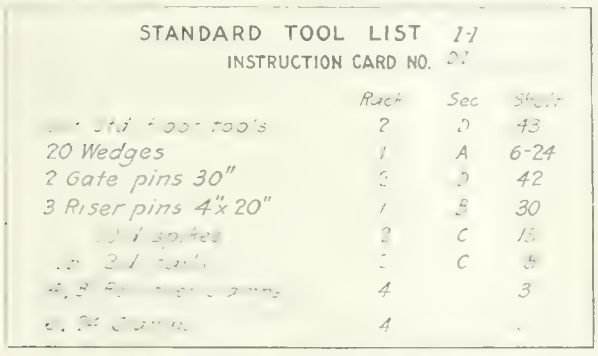
UNIFORMITY DESIRABLE

Where possible, the make of machines should be kept as uniform as possible, for this means fewer kinds of pattern fixtures, greater interchangeability of work and all machines in use all the time.

Another important item to consider in foundry equipment is that of flasks. In only a few cases do the old wooden flasks pay, for their weakness and short life make them the most expensive in common use. The foundry management must decide whether it wants steel, iron or wood flasks, and careful consideration should be given to finding out what is best for any particular shop. The question of investment, absolute accuracy of flasks, ease in handling, standardization of pins, and length of service are some of the things to be considered.

MAINTENANCE

Upkeep of equipment is just as important as its proper selection. One man should be put in charge of


STANDARD TOOL LIST 1-1
INSTRUCTION CARD NO. 01

	Rack	Sec	Shelf
[illegible] floor tools	2	D	43
20 Wedges	1	A	6-24
2 Gate pins 30"	2	D	42
3 Riser pins 4"x 20"	1	B	30
[illegible] floor tools	2	C	15
[illegible] tools	2	C	5
[illegible]	4		3
[illegible]	4		

Fig. 3 The Tools Required for a Given Job

this work, and should be held responsible for results. A tool room will form a valuable adjunct to every foundry and will eliminate the constant hunting for such tools as levels, hatchets, trammel points, special clamps, gaggers and many times for decent riddles, rammers, shovels and many of the most commonly used tools.

With a central storage place, tools and equipment can be kept in repair and on hand in sufficient quantity for the needs of the shop. When a workman is through with special equipment, such as gaggers, clamps, riser pins, blocks, etc., it should be returned by someone whose duty is to collect such things. Other tools, such as the more valuable special lifters, wrenches, levels, hammers, etc., could be checked out on the ordinary checking system.

Even in highly specialized shops there is need of this central tool room together with supervision over the tools used, for very few molders really analyze their needs to the best advantage. Much time could be saved if all the workmen were supplied with the best small tools for their class of work, for there are few foundries in the country where there is not seen a great variety of swab pots, lifters, slicks, vent wires, gate cutters, draw screws, etc. In this large variety of tools there are many which are inefficient and should be discarded.

It is becoming more and more impressed on foundrymen that before a piece of work is turned over to the workmen, it should be carefully considered by a planning department to see that the proper flasks, boards, rods, gate and riser pins, facing sands and methods of making are placed in the hands of the molder before he starts to work. This idea may be carried out further by having this information placed on a form and filed

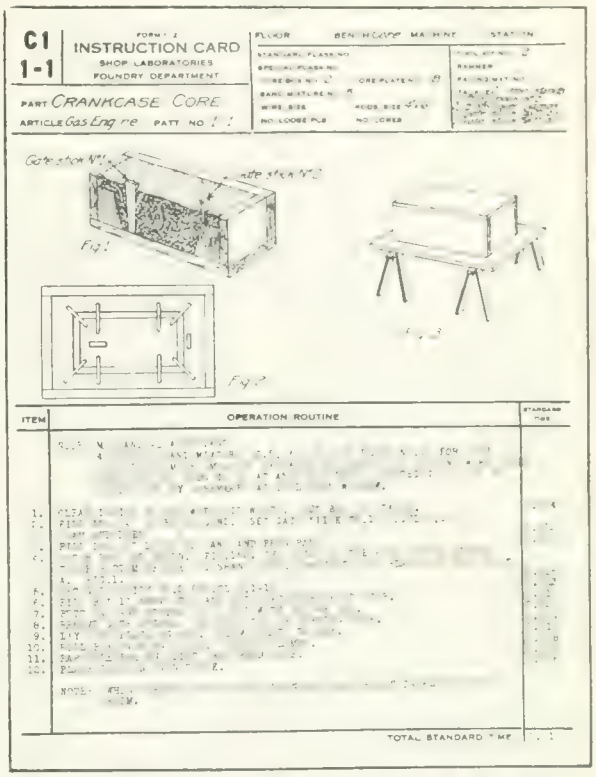

C1 1-1 INSTRUCTION CARD
SHOP LABORATORIES
FOUNDRY DEPARTMENT
PART CRANKCASE CORE
ARTICLE Gas Engine PATT NO. 1 1
FLOOR BENCH CORE MACHINE STATION
Fig. 1
Fig. 2
Fig. 3
ITEM OPERATION ROUTINE STANDARD TIME
TOTAL STANDARD TIME

Fig. 4 Special Information Is Detailed by the Written Routine, with Sketches Such as Instruction Card for Core Shop Should Have

away for future use. This record will be of invaluable assistance to those having charge of the planning in the shop. Fig. 3 illustrates such a tool card as can be used to advantage by any foundry. Fig. 6 shows an illustration of an instruction card for use in core-making and core-molding.

Safety Devices Must Be Approved by Pennsylvania Board

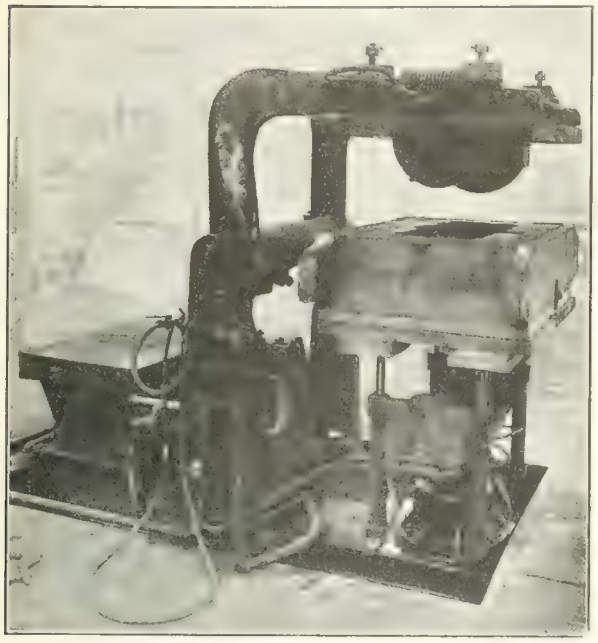
A list of safety devices that meet every requirement of State laws and safety standards is being established by the Industrial Board of the Department of Labor and Industry, Harrisburg, Pa. For the purpose of passing on such devices that may be submitted for approval, the Industrial Board has created an approvals committee consisting of two members of the board, the engineers and physicians of the division of hygiene, the safety engineer of the department and the chief of the bureau of inspection. Manufacturers of safety equipment who desire to receive the approval of the State may submit their devices at the regular meeting of the approvals committee on the last Wednesday of each month. Every device must be submitted separately and the application must be accompanied by the device itself or a working model of it and an 8 x 10 in. unmounted photograph and a copy of the Underwriters' Laboratories approval if it has been presented to those laboratories.

The Gulf States Steel Company's net earnings for August, after allowing for depreciation and heavy reserves, were $237,483, the largest in the history of the company, being an increase of $186,914 over Aug. 1915, and $35,441 over July of this year. For the eight months to Sept. 1 net earnings amounted to $1,380,916, as against $318,719 for the same period in 1915.

NEW MUMFORD MACHINE

Jolt Roll-Over Draw Molding Machine Shown at the Cleveland Exposition

One of the interesting working exhibits at the show in connection with the recent convention of the American Foundrymen's Association in Cleveland, Ohio, was a new jolt roll-over draw molding machine built by the E. H. Mumford Company, Elizabeth, N. J. This machine is designed for a large range of work, taking a



Jolt Roll-Over Draw Molding Machine Taking a 37 x 48-In. Flask

37 x 48 in. flask and having a 16-in. draw. The operation of the machine is as follows:

The pattern board is placed directly on the jolt rammer table by means of a positive spring locking device, thus doing away with the usual floating plate arrangement. The filled flask is rammed by means of a Mumford standard jolt rammer having a 10-in. cylinder and a capacity of ramming at 80 lb. pressure half molds weighing 3700 lb. The mold is then clamped to the pattern board, and the rock-over valve is opened. As soon as the roll-over arms start upward in the rolling over operation, they are automatically locked to the pattern board by means of sliding pins. This locking takes place as soon as the arms move upward ¼ in., so that all danger of the pattern board slipping, it is claimed, is eliminated. The rolling over operation is effected by means of a 16-in. air cylinder acting on a crank.

When the mold is rolled over it hangs suspended by the arms over the levelling and pattern drawing device, this device being a Mumford fluid pressure plunger similar to that used on the Mumford split pattern machine for drawing the patterns. In operation the draw plunger raises the levelling device to a height of 16 in., the maximum draft, when a stud opens a pop valve, releasing four levelling pins which raise until they strike the bottom of the flask. As the levelling pins operate independently of each other any inequality in the surface of the board is automatically taken up. The pins are 22 in. in length, so that no adjustment is necessary for shallow or deep flasks and a saving in time is effected when molds of various depths are being made. When the pins have come to rest under the bottom board they are locked by means of an air clamp. This clamp exerts a pressure of 3 tons on each separate pin, thus assuring a rigid rest for the flask. It may be seen from the above that hand levers for locking the pattern board to the arms and also for locking the levelling devices have been entirely done away with.

When the flask has been levelled the pattern is drawn by means of a fluid pressure plunger. The oil in the cylinder passes through a small outlet to let the plunger down and the plunger is claimed to insure an even draft under all conditions. The machine is operated by means of five valves, and these are placed in consecutive order so that passing from an operation to the next is easily indicated by their location and it is not necessary for the operator to move from one position to complete every operation.

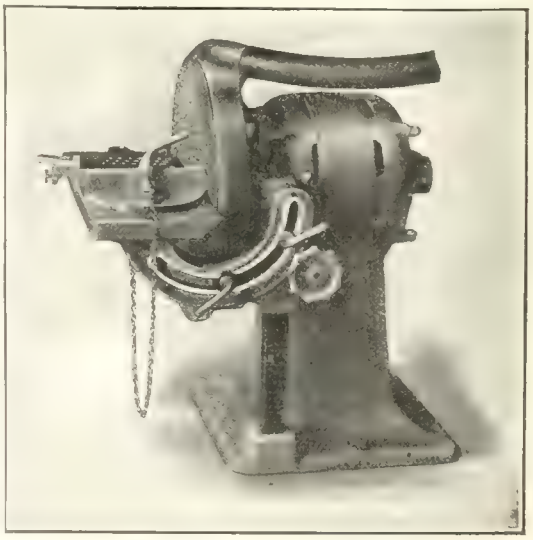
Vacuum-Cleaner Disk Grinding Machine

A motor-driven bench type disk grinding machine equipped with a self-contained vacuum dust removing system has been placed on the market by the Pioneer Dustless Disc Company, Syracuse, N. Y. The machine, which is readily portable, was designed especially for use in metal or wood pattern shops, but can also be used for any small parts that can be handled on this type of machine.

The grinding disk is 9 in. in diameter and is readily removable from the shaft, so that new paper or cloth abrasive disks may be glued in place. Aluminum is employed for the disk and the small diameter, it is pointed out, permits standard sized sheets of garnet paper to be used. The back of this disk is fan-shaped and the guard which incloses the entire back and the lower portion of the front, it is explained, forms a complete exhaust fan which is relied upon to prevent accumulations of dust on the work. The exhaust pipe connected with the dust removal system discharges into a sack or else out of doors. A 1/16-hp. motor arranged to take its supply of current from a lamp socket drives the disk and a ball thrust bearing is provided to guard against end thrust.

The table, which measures 4½ x 11½ in., will tilt to any angle between 20 deg. above the horizontal and 45 deg. below. This adjustment is controlled by a circular rack and pinion operated by a handwheel, and a graduated gage enables the table to be set to any desired angle and then locked in position by thumb screws. A vertical adjustment is provided to enable the disks to be removed when the table is lowered. Angle and centering gages arranged to slide in a slot in the table are provided. The former is of the protractor type and has an adjustment for grinding the ends of segments or any other angular face. The centering gage is provided with holes to receive small steel centers and an adjusting screw is also supplied for use where core prints, bosses, etc., ranging from ¾ to 8 in. in diameter are to be ground.

The weight of the entire machine is 55 lb. which renders it readily portable. The base of the machine is 9 in. square and the over-all height is 15 in.

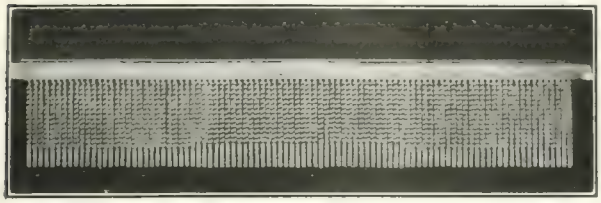


In this Bench Type of Disk Grinding Machine a Self-Contained Vacuum System Is Employed to Remove the Dust

Special Chain Screen Door for Furnaces

An interesting type of chain screen door for furnaces has been added to its line by the E. J. Codd Company, 700 South Caroline Street, Baltimore, Md. For some time this company has been manufacturing a line of chain screen doors for oven, furnace and boiler openings, and the new one is intended for furnaces that are charged and discharged with tongs.

The chain screen door as generally installed consists of a number of freely hanging individual strands of steel chain suspended from a steel bar to form a continuous sheet or curtain of chain that is very similar to the bamboo Japanese screen. It is explained that this curtain hanging before the uncovered opening to a furnace prevents the heat, glare, gases and sparks from leaving the furnace and the cold air from entering,



A Chain Screen Door for Furnaces That Are Charged and Discharged by Tongs and Having the Lower Ends of the Chain Terminating in Short Tubes to Guard Against Catching in the Crotch of the Tongs

while the loosely hanging strands of light chain can be parted readily by tools or other objects projecting into the furnace and fall together again when entrance has been effected. The holes in the links of the chain, it is pointed out, do not interfere with the view of the interior and in fact the glare is toned down, giving an effect somewhat similar to looking into the furnace through a piece of wire gauze. The use of this screen also enables the workman to have both hands available for work instead of using a shield in one hand while the tools are manipulated with the other. Among the uses to which these screens are put are on furnaces for treating glass, steel, iron, copper, zinc and chemicals, billet and shrapnel furnaces, steel soaking pits, roasters for pyrites and in cement works.

This new form of screen was developed for use in plants where the furnaces are charged and discharged by tongs and was designed to overcome the catching of the chains in the crotch of the tongs. The screen consists of a standard chain type with short pieces of light tubing attached to the bottom of each strand, the length of the tubes being approximately one-half the height of the opening of the furnace. It will be noticed that the tubes are of two different lengths which is due to the arch of the furnace being higher in the middle than at the ends. This screen is of the non-automatic type in which a hand chain running through an overhead pulley is employed to lift it out of the way.

In addition to this type of screen for oven and furnace openings, an automatic screen door is made for use on boilers where the opening of the firedoor causes the screen to unroll from a cylinder hung above the opening.

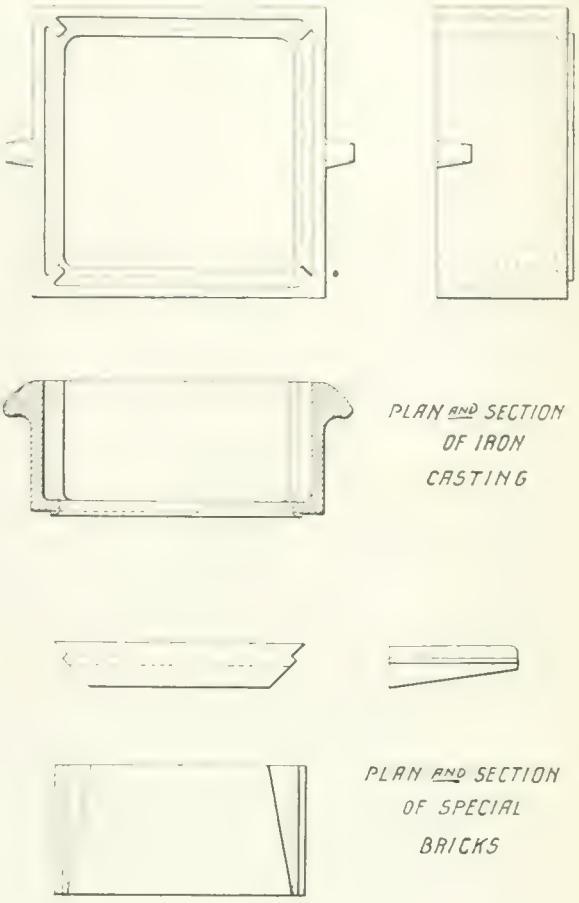
An 18-In. Hollingworth Engine Lathe

A large-diameter hole through the spindle and a heavy bed are the distinguishing features of a new 18-in. engine lathe that has been brought out by the Hollingworth Machine Tool Company, Covington, Ky. The spindle has a hole 1 7/16 in. in diameter, extending entirely through it, and the speeds range from 9 to 468 r.p.m. The bed weighs 2550 lb. and in spite of this unusual weight the design is symmetrical.

Within 90 days the new Sun Shipbuilding Company, Chester, Pa., will be ready to begin the construction of vessels. The finishing touches are being put on the main building, 506 x 880 ft., which will contain a mold loft and laying-out department. Concrete piles for four of the five 600-ft. shipways have been placed and the concrete foundations are being laid for the large cranes.

A Hot Top for Ingots

A hot top for ingots, which has been in actual service at the Cambria Steel Company, Johnstown, Pa., for over three years, is an invention of D. D. Buchanan of the open-hearth department of that company, covered by U. S. Patent No. 1,181,209. The one iron casting required is made with lifting



lugs for convenience in crane handling, as shown. Four firebricks with beveled ends are used to line the casting and unskilled labor is employed in fitting up. The special bricks used are also shown in the illustration. The life of the iron casting averages over 100 heats, while one lining of bricks is reported good for a minimum of 15 heats.

This form of top overcomes the disadvantage of having a projection extending down into the mold and eliminates all tendency of the ingot to hang. It is not necessary to allow the hot top to cool down, as it can be transferred to another mold and is ready for immediate use.

Lubrication Record of a Poppet Valve Engine

Lubricating 512,840 sq. ft. at a cost of 1c. was the record established for a 20 x 32-in. Norberg poppet valve engine installed in the plant of the Rockwell Mfg. Company, Milwaukee, Wis. This figure was made in July of this year when the engine ran 224½ hr. at a speed of 150 r.p.m. In this period 2 gal. of cylinder oil was used and the total cost of lubrication was $1.10. The area of the cylinder swept by the piston rings at each revolution was 27.92 sq. ft. and the total surface swept in the month was 56,412,360 sq. ft. The engine used superheated steam at a gage pressure of 150 lb. and a superheat of 120 deg.

A standard 48-in. engine lathe is being placed on the market by R. H. Kiddle, Kinsman, Ohio. This lathe is equipped with a duplex feed, but otherwise has the usual features of construction and standard adjustments.

FOUNDRY SANITATION

American Foundrymen's Association Code Recommended at Recent Convention

At the meeting of the American Foundrymen's Association held in Cleveland, Sept. 11 to 15, the committee on safety and sanitation, of which Victor T. Noonan, of the Industrial Commission of Ohio, is chairman, submitted a safety code for foundries. The code covers the subjects of entrances, gangways and aisles, ventilation, lighting, heating, sanitation, core rooms, cleaning and finishing operations, equipment, inspection and employment of females.

The code provides that all entrances to foundries, except those for locomotives, cranes or horse-drawn or motor vehicles shall be vestibuled. The regulations governing gangways and aisles are chiefly concerned with the width necessary to provide clearance for the passage of ladles. In main gangways a side clearance of 6 in. on each side is required for two hand or buggy ladles passing in opposite directions. Crane ladles are given a clearance of 18 in. on each side. The code also calls for the keeping of aisles free from pools of water and all obstructions during pouring time.

VENTILATION, LIGHTING AND HEATING

The rules for ventilating and lighting are less specific. They call for sufficient natural or forced circulation of air to render harmless the smoke, gases and fumes. No standard is given to show what dilution of fumes may be considered harmless. The ventilation rules also provide for the drying of ladles under hoods, and also for the provision of hoods over all ovens and furnaces.

In regard to lighting, the rules are equally vague. They simply call for sufficient natural and artificial light to provide safe entrance and exit, and to enable the work to be carried on safely during working hours. As no standard of what may be considered good illumination is given, each foundry man must be the judge of what constitutes "sufficient light."

The code is definite in regard to heating. It calls for the maintenance of a minimum temperature of 50 deg. F., and prohibits the use of open salamander stoves.

SANITATION

The question of sanitation has been carefully considered and the sanitary provision necessary in foundries of different sizes are shown in the following table:

Water Closets

Number of Persons	Number of Closets	Ratio
1 to 10	1	1 for 10
11 to 25	2	1 for 12½
26 to 50	3	1 for 16⅔
51 to 80	4	1 for 20
81 to 125	5	1 for 25

Urinals

Number of Persons	Number of Urinals	Ratio
1 to 30	1	1 to 30
31 to 80	2	1 to 40
81 to 160	3	1 to 53⅓

Washrooms

Number of Persons	Number of Wash Basins	Ratio
1 to 8	1	1 for 8
9 to 16	2	1 for 8
17 to 30	3	1 for 10
31 to 45	4	1 for 11¼
46 to 65	5	1 for 13

Shower Baths

Number of Persons	Number of Showers	Ratio
1 to 50	1	1 for 50
51 to 100	2	1 for 50
100 to 200	3	1 for 66⅔
200 to 400	4	1 for 100

The sanitary code also calls for individual metal lockers, and for provision for drying the workers' clothes. Common drinking cups are prohibited, drinking fountains being substituted.

CORE AND CLEANING ROOMS

The provisions of the code relating to core rooms repeat the sanitary requirements for the foundry proper, and also limit the temperature of the room in which cores can be made when the core ovens are in the cores handled by them to 110 deg. Fahr.

The code also provides separate working spaces for female core makers, and limits the temperature of same room as the core makers to 100 deg. Fahr.

Exhaust apparatus is required around dry tumbling mills, grinding, buffing and polishing wheels. Screens and guards to protect both the operator and adjacent workmen are to be provided at abrasive wheels, and swing frame and portable grinders. Sand blasting is to be carried on in sand blast rooms and helmets or masks, respirators, goggles, etc., are required for the workers. Similar equipment is called for other workers whose duties are such as to make it desirable. Other provisions of this portion of the code relate to the screening and guarding of chipping places and benches, the guarding of casting-breaking drops, the enclosing of arc-welding apparatus and the provision of suitable tools.

GENERAL EQUIPMENT

In the section devoted to equipment, the code requires the guarding of pits and openings in the foundry floor. It also specifies worm geared tilting devices for ladles of 2000 lb. capacity or over, and provides that crane, truck and trolley ladles shall have their center of gravity below the trunnions and have clips to prevent them overturning. Sheet metal guards must be provided on single shank hand ladles.

Specifications are also given for the construction and guarding of platforms around upright crucible furnaces which project over 12 in. above the surrounding floor.

New Line of Motor-Driven Grinding Machines

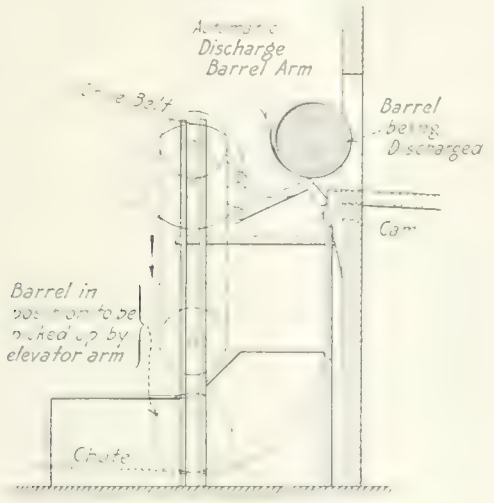
Larger sizes of bench and floor electric grinding machines have been developed by the Hisey-Wolf Machine Company, Cincinnati, Ohio. They are driven by motors ranging from ½ to 5 hp. that are wound for use on direct or alternating current circuits. Quick-acting switches are provided for all machines and the larger sizes have automatic starting equipment. The operating handle is conveniently located in front of the motor and the switch is entirely inclosed in the base, an arrangement which provides protection and at the same time renders the mechanism readily accessible. Ball bearings mounted in the motor end caps close to the grinding wheels are provided for all the machines and felt protection washers placed on each side of the bearing housings are relied upon to exclude dust and grit. Guards covering three-fourths of the circumference of the wheels are supplied and connections for a blower system are provided. Baffle plates are furnished to prevent broken wheel parts and sparks from escaping and a hinged door with a lock is supplied to facilitate the renewal of the wheel without removing the guard. A sliding door enables the particles produced in grinding to be removed where some sort of dust removal system is not employed.

Cash prizes for papers on one of three subjects have been announced by the Engineers' Subdivision of the Chicago Association of Commerce, 10 South La Salle Street, Chicago. The contest is open to undergraduates, and 1915 and 1916 graduates of engineering schools in the United States. The papers are not to exceed 3000 words in length, and the subjects suggested are as follows: "Engineering and Civic Progress," 'The Engineer of the Future," and "The Business Relation of the Engineer to the Commercial World." Three prizes, $50, $30 and $20 respectively, are offered, and the papers are to be mailed to the Engineers' Subdivision Contest, at the address stated, not later than Nov. 1.

The American Uniform Boiler-Law Society, through its chairman, Thomas E. Durban, reports that the legislature of Louisiana passed a bill authorizing the Governor to appoint a commission of five experts to examine the code of the American Society of Mechanical Engineers and to report whether or not it should be adopted as a state law. It also reports that the purchasing department of the Panama Canal Commission specifies that steam boilers shall be constructed according to the A. S. M. E. code.

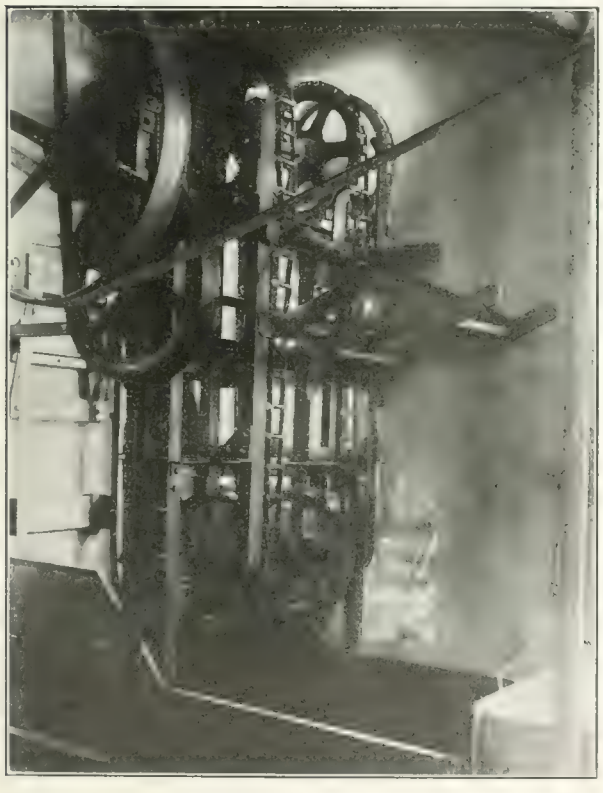
A Barrel Elevator Loaded and Unloaded Automatically

An interesting method of handling oil barrels, suggestive of what may be done in the transport of materials and products in the modern industrial establishment, has been adopted by the Standard Oil Company at its Milwaukee works. The machine is required to elevate empty barrels from the wash house and deliver them to an inclined skid on which they roll by gravity a distance of 100 ft. to the filling room. The barrel elevator has the feature of being capable of picking up barrels from a curved chute underneath the foot sprocket. One end of the chute is just above the level of the floor of the wash room, allowing the barrels to be rolled in by hand and carried up by the curved barrel arm which discharges automatically to the skids.



Elevator Picks Up Package Delivered to It and Dumps It at the Higher Level

The accompanying drawing shows the barrel arm in the discharging position, while the reproduction of the photograph shows the elevator frame with the curved receiving chute at the bottom. The barrel arm is attached to two strands of Griplock chain belt which carry it around the head and foot sprockets. The arm is tripped in the top position by means of a pair of cams engaging the ends of the curved lever arms which carry the barrels. No deep pit was found necessary under the foot sprockets and the equipment is obviously adapted to conditions where it would not be possible to have any part of the machine extend below the floor line.

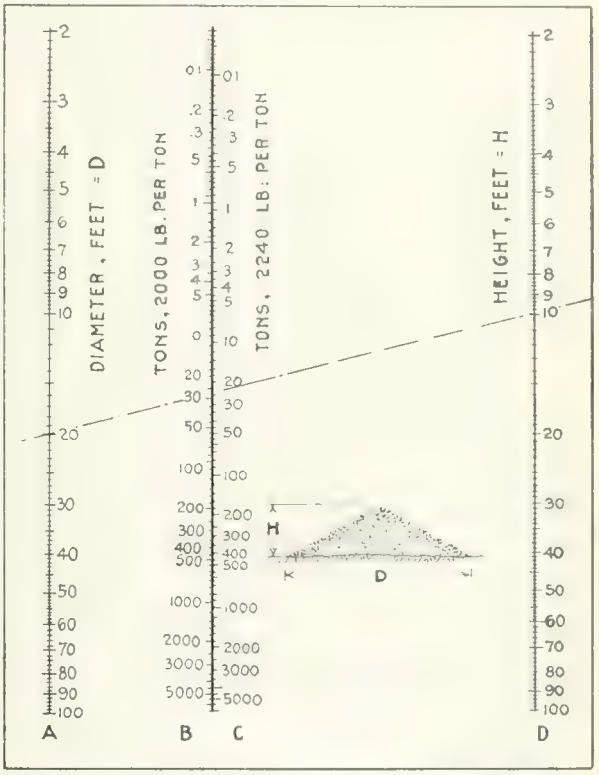


The Elevator with Receiving Space Below the Foot Sprockets for the Barrel Rolled to It

About 1 hp. is required for driving the elevator and the power is taken from a lineshaft in the building by means of a belt coupled up to the elevator countershaft. The capacity of the machine is 120 bbl. per hour. It was designed and built by the Chain Belt Company, Milwaukee, Wis.

The Capacity of a Coal Pile

The accompanying chart has been prepared by W. F. Schaphorst, mechanical engineer, Woolworth Building, New York, as a ready and quick means for ascertaining the number of tons of coal in a given pile of the usual conical section of the outdoor storage yard. Column B gives the number of tons, figuring 2000 lb. to the ton. Column C gives the number of gross tons.



Given Diameter and Height, a Straight Edge Shows the Tonnage of the Coal Pile, or for a Given Tonnage, One May Ascertain the Diameter Necessary with a Given Height

The dotted line drawn across the chart, for example, shows that where the diamater D is 20 ft. (column A), and the height is 10 ft. (column D), the pile contains 27.5 tons (column B), or nearly 25 tons (column C), depending on whether net or gross tons are considered.

A pile of coal 20 ft. in diameter and 10 ft. high is very unusual, however, because the angle of repose is seldom that great. For anthracite the angle of repose is about 27 deg.; coke, 40 deg.; bituminous coal, 36 deg. To find the height to which any of these materials can be piled on a plot of a given diameter, multiply the diameter by 0.25 for anthracite; 0.36 for bituminous coal; 0.42 for coke. The chart will therefore tell just how much coal can be piled on a given level plot.

The Concrete Steel Company, of which William Pietz is Southern manager, will establish a shaping factory and warehouse for general Southern distribution in Birmingham, Ala. A site has been obtained.

FOUNDRY COLLEGE COURSE

Instruction to Students at University of Nebraska on Foundry Engineering

In a paper presented at the Cleveland meeting of the American Foundrymen's Association, Sept. 11-15, John Grennan describes the course in foundry work given to the students at the University of Nebraska. Although the course is comprehensive, it does not attempt to make foundrymen of the students. This would be impossible in the time allotted to the course, but the students do learn considerable about the procedure of getting a pattern into the sand and out again, and they also learn the reasons for simplicity in the design of castings.

The students spend in the course nine hours a week for eight weeks. The first four hours in the foundry are spent in the core-room. A mold is rammed up by the instructor, in which the cores to be made are set. After the nature of the different sands and binders is explained, a batch of sand is mixed and the making of cores is demonstrated. The cores consist of two straight round cores and a stop-off core. One of the straight cores is made in halves and pasted; the other is made whole and rolled out on a plate.

The second period is spent in the foundry. The first mold made consists of a flat back with four patterns in the flask. The patterns show the use of four different cores. One is a green sand core and the other three show methods of coring vertical and horizontal holes, one being below the parting, where a stop-off is used. Nearly all the molding is floor work.

The first exercise is the only one on which all the students work at the same time, and is the only one demonstrated completely. A text book is used and individual instruction given when necessary on the other exercises.

The second exercise may be one of several, the choice usually favoring a 12-in., three-blade propeller, which teaches the making of irregular parting lines. As most of the small flasks used in the shop are made of cast iron several sizes and depths of flask patterns are used. These teach the ramming of deeper molds and the ramming of cores in a mold to make the handles. Lugs also are cast on the flask by the use of a loose piece and cover-core. A core pulley with the inside coped out is used to teach the use of soldiers in securing the sand in the mold. This pulley has a flange on the bottom that makes a three-part flask necessary. A 3-in. and a 5-in. elbow are used to teach the setting of chaplets.

There is considerable demand for castings for exercises in the machine shop. Among these exercises is a 2-hp. gasoline engine. The machine shop exercises, with the other work wanted in other departments, create a demand for castings that have to stand the test of being used. This work makes it possible to run the foundry like a jobbing shop for two or three weeks. Very few can learn to make jacket cores that stand the test of being used in a mold. In the heavier work a wheel is made with cored arms and hub and a segment of the rim. This wheel is usually made in the floor. A cylinder head is swept up to show the use of sweeps. This cylinder head is made in dry sand, as are heavy pieces for the machine shop.

Since all the work in the foundry is done by the students, heats are usually run off about once a week, the weight running from one to two tons. All the molds that are passed by the instructor are cast. The students clean out and daub-up the cupola, put in the bottom, weigh out the coke and iron and do the charging. There is no difficulty in running the cupola with students. The only work not done by students is the tapping.

Besides the work done in cast iron, some copper and aluminum alloys are cast. On account of the lack of time and the cost of material only a few of the better students are put on this work, but every class has it explained and sees the crucibles pulled from the furnace and the molds poured.

In the lectures, the time is taken up mostly by descriptions of the cupola and other furnaces for melting brass and iron, and the metallurgy of metals used in the foundry. Dry sand and loam molding as well as molding machines are taken up.

Foundrymen can expect little from universities in the development of skilled foundrymen until the universities recognize the difficulties encountered. Agricultural, architectural, highway, sanitary, municipal and a great many other engineering subjects are presented in engineering schools. Why not foundry engineering? The Wentworth Institute of Boston gives a course described in THE IRON AGE, Jan. 6, 1916. This course is the kind that will produce results that will be of use to foundrymen.

Effect of Single-Operation Machines on Manufacturing

One of the most notable impressions made on the machine tool industry by the war is the development of the single-operation machine. The effect of this development on manufacturing after the war is discussed editorially in the *Engineer*, of London, Aug. 18, 1916. The single-operation machine was brought about by the necessity of utilizing a vast amount of unskilled labor, who had not the ability nor the time to learn to operate the more complicated usual types of machinery, but who could be taught to perform one operation with accuracy and celerity. The question now arises as to whether or not the single-operation method of manufacture will prevail after the conditions which brought it into being no longer exist.

To answer this question a study must be made of each individual case. In general, the answer will depend on the output desired, the capital expenditure involved in equipment for single-operation or automatic machines, the saving in labor due to the use of the latter, and other similar considerations. Take, for example, a job comprising six distinct lathe operations, each of which requires 10 min. for its completion, in either an automatic or a single-operation machine. A single automatic machine can be employed to do the six operations in succession, while for the same job six of the single-operation machines will be necessary. The gross output of the latter will, however, be six times that of the former.

This general principle, the *Engineer* goes on, will be modified in certain cases by the fact that the automatic and sometimes the single-operation machine may perform more than one operation at one time. Nevertheless, the principle may be established that for equal output, equal numbers of each type of machine must be employed. This immediately involves a larger capital expenditure for the automatic equipment than for the single-operation type, and also greater maintenance and running charges. On the other hand, each single-operation machine requires an operator, while one operator can attend to two, three or even more of the automatic type. Consequently, the operating labor charge is distinctly in favor of the automatic machine. Against this, again, must be balanced the fact that the automatic machines require the services of high-priced tool setters, while most of the tool setting on the single-operation machines can be done by comparatively low-priced operators themselves. While, therefore, the labor cost of the automatic machine in general is lower, this fact must be modified by the conditions attached to each particular case.

In regard to the influence of output, the capital expenditure in idle machinery will be of moment if the single-operation machines are not worked to capacity. Consider again the example cited above. Six single-operation machines will be necessary for the completion of a single piece. If the desired output is six per hour, the single-operation equipment will involve less capital outlay than the corresponding automatic equipment. If, however, the desired output is only two per hour, then each of the single-operation machines will be idle two-thirds of the time. This output could be obtained with but two automatic machines, and it is easily conceivable that the capital tied up in these would be much less than in the six single-opera-

tion machines, and the labor charges would be correspondingly lower.

The influence of the supply of labor on the question also cannot be neglected. In European countries a great number of women and others who would not naturally go into machine shops are being trained in the operation of these single-operation machines. These may not desire to return to their usual occupation after the war, and will form a large reservoir upon which manufacturers can draw for a cheap labor supply. This, with the probable dearth of skilled labor, will put the continuation of single-operation machines on a more favorable basis than it otherwise would have. The whole question bristles with possibilities and its solution cannot be foreseen.

Canadian Industrial Notes

TORONTO, Sept. 25, 1916.—Canadian steel manufacturers are making a vigorous protest against the new freight rates on iron and steel from interior points to the seaboard for export. They have asked the Board of Railway Commissioners for a suspension of the tariff to become effective Oct. 1, carrying proposed increases from Canadian producing points to both Canadian and United States Atlantic ports. The railroads say that the new tariff is justified by the proposed cancellation of export rates from United States producing points to seaboard and the substitution of the ordinary rates, which latter, however, are much lower than the rates proposed from Canadian producing points to the seaboard. As an illustration, the proposed new rate in the United States from Buffalo to New York City is 16.9c. for 100 lb. and the corresponding rate from Hamilton, Ont., to Montreal is 20c. Canadian manufacturers are at present in the position of having to import unusual quantities of raw material from the United States, from which the railroads derive considerable revenue as a result of the increase in the rates. Thus the domestic producers are placed under the double handicap of paying higher rates on raw material and higher rates to the seaboard on manufactured products. Their claim is that they should have the same rates to Atlantic seaboard ports from Canadian producing points as the United States manufacturers have from their producing points to Atlantic ports.

Canada is stated to be experiencing something like a famine in steel rails. Not only is there a scarcity of rails for the little construction work that is in progress, but rails are needed for the maintenance of established lines. The shortage is due to the war, as the steel mills which, under normal conditions, are large producers of steel rails, are now engaged in the manufacture of shells and other munitions. The situation is being considered by the Canadian Government, with a view to such action as will at least provide a supply of rails sufficient for the maintenance of existing lines. It is expected that there will be a remission of tariff duties on enough rails from the United States to meet immediate requirements.

It is announced that the National Steel Car Company, with head office at Montreal and plant at Hamilton, Ont., has orders on its books and contracts in prospect which should carry the company well into 1918. It has an order from the French Government, placed three months ago, for 3000 artillery trucks on which the company is in a position to start delivery. This business alone is said to be worth $1,500,000 to $2,000,000.

The first ferromolybdenum to be produced commercially in Canada was made Sept. 20 at the plant of the International Molybdenum Company at Orillia, Ont. Three electric furnaces are stated to be in operation at this plant.

At the annual meeting of the Canadian Locomotive Company, held at Kingston Sept. 20, all the directors were re-elected and they re-elected officers as follows: Aemilius Jarvis, Toronto, president; J. H. Harty, Kingston, vice-president; Frank G. Wallace, Kingston, general manager; William Casey, manager; J. H. Harty, sales manager; J. H. Birkett, secretary-treasurer. The directors reported plenty of orders on hand and prospects bright. The order from Russia for 50 locomotives has been completed and negotiations are being conducted with foreign governments for more orders.

The report of the Cockshut Plow Company, Brantford, Ont., for the year ended June 30, 1916, shows a material betterment in the financial position of the company: Liabilities were $1,264,000 smaller, chiefly due to a reduction in bank and other loans, which stand at $3,284,407 against $4,620,473 in the previous year. Profits show an increase of about $109,000 over the previous year, being $500,176 against $391,363. Earnings were at the rate of 7.07 per cent on the preferred stock against 6.05 per cent in the previous year. No dividends have been paid since 1914, when the dividend for the September quarter was deferred, and the directors say that under the circumstances they believe it best that dividends should continue to be deferred until such time as business and commerce are more settled.

The total of Canadian foreign trade in the five months of the fiscal year ended Aug. 31 aggregates $987,091,361 and for the corresponding period last year $467,045,501, an increase of $520,045,860. Trade in August more than doubled. In the five months exports rose from $200,262,413 to $446,436,333.

Steel Conditions in Japan

A great increase in Japan's production of iron is anticipated, according to a report from U. S. Consul George H. Scidmore, Yokohoma, Japan. The iron output of the Naichi Steel Tube Mfg. Company, Kamaishi Iron Works, Kanasaki Shipbuilding Yard, Kobe Steel Works, Kishimoto Iron Mfg. Company and the Osaka Iron Mfg. Company, was expected (July 30) soon to be on the market and the output of the Imperial Iron Works will be increased by 6000 to 7000 tons per month when extensions are completed.

The Japan *Times* states that since the restriction of iron and steel exports from the west, more strenuous efforts have been put forth to obtain iron ores in Japan. These have been successful and the total output for May showed an increase of 67 per cent over last year and that for the five months of the year an increase of 42 per cent. The expectation is that in a few years the country's iron and steel output will be increased 300 to 500 per cent.

Handbook of Carnegie Bulb Sections

The Carnegie Steel Company, Pittsburgh, Pa., has published the third edition of its pamphlet giving tables and data on the various bulb sections which it is prepared to roll. These sections are not carried in stock regularly because of the limited quantities required in the building of ships and cars, and orders for them are executed as promptly as rolling-mill conditions warrant. The different sections conform to the standards adopted by the British Standards Committee and profile drawings are given, together with tables of dimensions and weights. The tables of elements of the several sizes of the various sections which formed a part of the pamphlet issued last year are also included.

The steel market in China was much depressed just previous to the war and tended to decline even after that. Continental steel bars were selling in the latter part of 1914 as low as $24 per ton, delivered Shanghai. It was not long before dealers in China realized market necessities and serious buying commenced. Structural steel, ship plates, galvanized sheets, wire nails and tin plates were in great demand. The market advanced by leaps and bounds and by the end of 1915, steel bars sold for more than $125 per ton.

Newfoundland has copper ores, some running from 4 to 30 per cent copper, with which little was done until after the war broke out. The production in 1915 was about 15,000 tons, of which 12,150 tons, worth $151,372, went to the United States and the remainder to England, as against about 2000 tons as the 1914 output, valued at $15,000 and all taken by the United States.

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August Exports Exceed Half Billion

The exports of merchandise from the United States have been so steadily increasing in the past two years, making fresh records almost every month, that the announcement of another great gain has become an old story. Nevertheless, the achievement of August in this respect is so wonderful that it is worthy of more than passing mention. For the first time the value of our exports of merchandise in a single month has exceeded half a billion dollars. The figures in fact were $510,000,000, which was $35,000,000 more than the previous high record, attained in May of this year. This is stated to be not only a record for the United States but for all countries, as it surpasses anything previously realized in the history of the world.

Imports of merchandise in August decreased, instead of increasing, thus swelling the balance of trade in favor of this country. The imports were a trifle less than $200,000,000, which was $47,000,000 below the imports of June, the record month. The August balance of trade in favor of the United States was close to $311,000,000, being greater than shown in numerous entire years in the past. For the twelve months ended with August the export balance was $2,465,000,000, against $1,363,000,000 in the preceding year and $374,000,000 two years ago.

In view of the very important part which our balance of trade has taken in paying off our foreign indebtedness, it is interesting in this connection to note figures which have recently been made public by L. F. Loree, president Delaware & Hudson Company. Last year Mr. Loree undertook the work of compiling an authentic record of foreign holdings of securities and has completed the work since then of supplying the country with more accurate data than it ever before had concerning the extent of its debt on capital account to other countries. He reports that, whereas on Jan. 31, 1915, the railroad securities of all kinds held abroad had a market value of $2,704,402,364, on July 31, 1916, the market value of such securities held abroad had been reduced to $1,110,099,090. The New York *Annalist*, in commenting on this statement, says that it would take but another eighteen months of the continuance by Europe of selling back our securities to us to practically wipe out our indebtedness on account of railroad stocks, bonds and notes representing previous investments of foreign capital in this country's transportation system. It adds that long before then, however, we shall have ceased to owe anything to Europe on account of imported capital. Since the outbreak of the war we have extended credit to foreign countries to a net amount of something like $1,300,000,000, which is in excess of the market value on July 31 of the American railroad securities still held beyond our borders. The amount of industrial and miscellaneous American securities held at that date is stated to be relatively unimportant, so far as available records show, and would be offset by a few more credits on the scale of the recent loans to Great Britain and France. It would not take many months like August to wipe the slate clean of every vestige of American indebtedness to foreign investors.

Steel Contracts and Deliveries

Recently the purchasing agent of a large consumer of iron and steel products visited the selling offices of a steel works in the Central West that owed his company a good deal of material on contracts made at prices very favorable to the buyer, in comparison with those ruling to-day. The mill was far back in deliveries, and the mission of the purchasing agent was to find out why shipments were not being made more promptly and to hurry them forward. Referring afterward to his reception, he said, with some effort at humor, that it was more like that given a canvasser than what a customer would expect. His intimation that his orders would be canceled unless better deliveries were made met the response that the mill was doing the best it could for him under very trying conditions, and that if he chose to cancel the order there would be no pangs of regret but quite the contrary. Needless to say, the order was not canceled, but the situation as his visit revealed it impressed the buyer with its complete reversal of what has been the rule in the relations of buyers and sellers of steel.

Foreign buyers of American steel had a good deal to say last year in complaint of the way in which some of their contracts placed here had turned out. Also the warring governments which found themselves to an unexpected degree dependent on American steel to make their artillery effective have not

relished some of the prices they have had to pay. If they could know all that has gone on in the domestic trade they would appreciate that the war has also imposed high prices and in many directions unprecedented harassment upon the American manufacturing consumer of steel.

We have alluded from time to time to various phases of contract and delivery problems growing out of the present unparalleled situation. Not much is to be gained by discussing their bearing on the contractual relations of steel companies and their customers. It is fair to say that if some of the contracts for steel products entered into last year had been made legally binding in the new sense which some manufacturers have sought to make effective there would have accumulated by this time grounds for no small penalties upon sellers.

It is a question, therefore, whether a complete command of the situation by the mills, in a way never known and not likely to be seen again after the ending of the war, furnishes as perfect a transition to a regime of binding contracts as some published views have intimated. Mutuality is a prime essential of a valid contract. What the manufacturers of steel on the one hand and the manufacturing users and the jobbers on the other hand decide after full consideration to be desirable changes in contract forms are far more likely to stand the test of time and of the buyer's market that is sure to come at length than anything imposed by one side of the market upon the other because conditions have given one side the power. It is much to be doubted that the Federal Trade Commission will say, as it has been asked to say, that a particular contract form has its approval. The problem is one which buyers and sellers must work out together. Something has been gained, much of it by force of circumstances, in a shortening of contract periods and in making the relative needs of buyers the deciding factor, as far as possible, in apportioning shipments. But the bad practices are of too long standing and involve both sides of the market to too great an extent, to expect that they will be permanently reformed by any new contract form, particularly an *ex parte* one. It is not ironclad contract stipulations that are wanted so much as a rule of reasonableness. Meantime much can be done in an educational way if buyers' and sellers' organizations will indicate in a definite way what the binding contract of the future should contain and take a stand in favor of the enforcement of contract obligations.

Future Home Demand for Steel

There is a growing feeling in the steel trade that the domestic demand after the war will be good. One argument is that capital is accumulating in the United States and is not being put into permanent investments, on account of high construction costs, as it will be when the readjustments after the war have been made. In this connection it is well to recall a reference made shortly before the war to the relations between the steel industry and prospective consumptive demand. In THE IRON AGE of March 26, 1914, under the caption "Future Steel Price Fluctuations," several arguments against the probability of wide price fluctuations in future were taken up and an effort made to dismiss them. There was, of course, no prescience in that attempt that may be held to be justified by the remarkable course prices have followed in the past twelvemonth, reaching levels that had never been dreamed of; but of particular point at this time was the reference to the fact that with no large construction work on hand "and with the everyday requirements expressed only in terms of a very moderate degree of general business prosperity" the steel industry still found itself then engaged in operating at about two-thirds of its capacity. With everyday requirements greatly increased, on account of general prosperity, and with large construction work on the boards, as may perhaps be expected after the war, the demand for steel may easily be in keeping with the capacity as now being increased. When a period of dullness succeeds one of activity the marvel is where the steel is going, for it appears that hardly any steel at all would be required, and thus the demand always has a substantial basis upon which to build up. If the steel industry could operate at about two-thirds of capacity during the eight months preceding the war, when its condition was by the ordinary standards extremely bad, it may well have large hopes for a period of years after the war.

Coke and Ore Consumption

Some interesting information as to the ore and coke consumption at blast furnaces is given in the annual statistical report of the American Iron and Steel Institute, just issued. Beginning with 1909 fairly complete reports have been obtained from blast furnaces as to their use of iron ore and of mill cinder, scale, etc. Prior to 1909 the information was not gathered in as much detail. The consumption per ton of pig iron produced has been as follows in gross tons:

	Ore	Cinder, etc.	Total
1909	1.886	0.098	1.984
1910	1.895	0.102	1.997
1911	1.859	0.159	2.018
1912	1.872	0.145	2.017
1913	1.882	0.099	1.981
1914	1.842	0.145	1.987
1915	1.843	0.149	1.992

Carefully compiled statistics based upon cargo analyses of Lake Superior ores from season to season have shown conclusively that the average iron content of Lake Superior ores as shipped has been decreasing, at the average rate of a considerable fraction of a unit per year. One would hardly be prepared, therefore, for the remarkable uniformity shown by the above comparison over a six-year interval. A change of one unit in the iron content of an ore running about 50 per cent would involve a change of about 4-100 ton in the ore consumption; yet the total change in six years, shown above, is only 8-1000, or one-fifth as much. If one were endeavoring to calculate the change in the composition of iron ore from the showing, therefore, he would conclude that the change in six years was by only one-fifth of a unit.

There is evidently another explanation altogether. A slight allowance may perhaps be made for improvements in furnace practice; but the chief point is that there is an increasing employment of the richer Lake Superior ores and a decrease in the relative proportion of the leaner ores mined locally,

as in the South. From 1909 to 1913, both record years, the shipments of Lake Superior ore increased by 17 per cent, while the production of all other ore increased only 3 per cent. For many years, indeed, the production of iron ore outside the Lake Superior region has been about 10,000,000 tons in good years and less in poor years, while the Lake Superior production has increased rapidly in the good years.

Among those who endeavor to keep track of the pig-iron producing capacity of the United States there was great surprise early this year, when a production rate of almost 40,000,000 tons a year was attained. Estimates based upon previous performance, with allowance for additional furnaces completed, fell short of that figure by several millions of tons. A discussion of the divergence led to the suggestion that a large part of it at least was due to improvements in practice, due in considerable measure to changes in furnace lines, as by widening the hearth, whereby outputs per stack were increased. It was noted that there was not a corresponding increase in the coke consumption, a furnace using somewhat more coke, perhaps, but making considerably more pig iron. The statistics of coke consumption now presented bear out this theory. The consumption of coke and bituminous coal, the latter being a very small item, per ton of pig iron produced, has been as follows:

	Pounds		Pounds
1912	2,436.5	1914	2,354.4
1913	2,433.3	1915	2,252.0

The decrease in coke consumption, from the average of 1912 and 1913 to 1915 was no less than 183 lb., or 7.5 per cent, certainly representing a very decided change. Production in these years was substantially the same, so that approximately the same furnaces were in blast. As there was no material change in the average analysis of the total body of ore used the change in coke consumption may reasonably be attributed chiefly to changes in furnace practice. As the change occurred suddenly it may be assumed that all the furnaces did not contribute to it, but that in future there will be other furnaces able to reduce their coke consumption, so that in relation to the iron content of the ore the coke consumption of the industry as a whole may be reduced further. The average coke consumption at present is of course much higher than the records made years ago at certain furnaces using the particularly pure Lake Superior ores, now practically exhausted. Many furnaces then had runs averaging much less than 2000 lb. of coke per ton of pig iron.

The average limestone consumption last year was 1107.4 lb. per ton of pig iron. This factor has not changed materially for many years. In the past dozen years it has been decreasing rather than increasing.

Canadian Rail Supply Short

The steel-rail situation with respect to Canada has undergone a decided change in the past eighteen months. It will be recalled that early in 1915 great interest developed in the steel trade, with some excitement outside of the trade, when announcement was made of sales of steel rails to railroads in this country by Canadian rail manufacturers. These transactions were discussed by Government officials, and an attempt was made to throw discredit on American rail manufacturers because they would not reduce their prices to meet the competition in our markets from our Northern neighbors. The sale of Canadian rails in this country was of course facilitated by the removal of all duties on rails through the passage of the Underwood tariff act. Since then a great change has taken place in the condition of the steel trade throughout the world. Our Canadian correspondent points out, as will be noted in another part of this issue, that the Canadian steel mills are now so overwhelmed with orders for steel for war purposes that they are not producing a sufficient quantity of rails for the country's needs and the government is seriously considering the temporary remission of duties on rails imported from the United States for the purpose of meeting the rail requirements of Canadian railroads.

CORRESPONDENCE

United States Standard Gage and Hot Rolled Steel Sheets

To the Editor: United States standard gage is a weight gage; it was established by Congressional enactment before hot rolled steel sheets came into general use and consequently was based upon the weight per square foot in ounces of wrought iron, which was found to weigh 0.2778 lb. per cubic inch or 480 lb. per cubic foot. Hot rolled steel has been determined to weigh 0.2833 lb. per cubic inch or 489.6 lb. per cubic foot, just 2 per cent heavier than wrought iron. The decimal thicknesses as shown by the United States standard gage table are approximately equivalents of the several weights established.

For convenience each weight and its approximate decimal thickness has been given a number, and plates weighing 11.25 lb. per square foot (approximately 0.28125 in. thick), otherwise known as No. 1 gage, up to sheets (sometimes called taggers) 0.1875 lb. per square foot (approximately 0.0046875 in. thick) and numbered 44 gage, are generally spoken of in the trade by their respective gage numbers.

The gage numbers, the weights per square foot and the approximate decimal thicknesses more commonly used by the sheet trade are No. 10 gage to No. 28 gage, and the following table is compiled to show the relative thickness of wrought iron, upon which the United States standard weight gages are based, and of hot rolled steel of the same weight:

Gage	Weight, Oz.	Thickness, Wrought Iron, In.	Thickness, Hot Rolled Steel, In.
10	90	0.140625	0.1379
11	80	0.125	0.1225
12	70	0.109375	0.1072
13	60	0.09375	0.0919
14	50	0.078125	0.0766
15	45	0.0703125	0.0689
16	40	0.062	0.0613
17	36	0.05625	0.0551
18	32	0.05	0.0490
19	28	0.04375	0.0429
20	24	0.0375	0.0368
21	22	0.034375	0.0337
22	20	0.03125	0.0306
23	18	0.028125	0.0276
24	16	0.025	0.0245
25	14	0.021875	0.0214
26	12	0.01875	0.0184
27	11	0.0171875	0.0168
28	10	0.015625	0.0153

A glance at the above table will reveal the fact that hot rolled steel of the same weight per square foot as wrought iron is from approximately 0.003 in. to 0.0003 in. thinner than wrought iron. It is also a well-known fact that hot rolled steel of the same decimal thickness as wrought iron is, as stated in the first paragraph of this article, 2 per cent heavier than wrought iron.

The American Society for Testing Materials has

determined permissible variations in weight and gage above or below which rolled sheared plates may be rejected, having based its allowances on rolled steel weighing 0.2833 lb. per cubic inch, notwithstanding which manufacturers of hot rolled steel have allowed these tolerances to be applied to the entire range of gages and sizes possible to manufacture and on the basis of the United States standard weight gages—i. e., 1 cu. in. of hot rolled steel to weigh 0.2778 lb., which it does not.

Thousands of dollars in claims have been allowed consumers by giving credit for the difference between the theoretical weight as per United States standard weight table plus the allowable variation and the actual weight of the material, whereas if the United States standard weight table were based on the weight of hot rolled steel the actual weight of material would come within the allowable variation.

Many manufacturers of steel roofing and siding buy the flat sheets by the hundred pounds, form them into V-crimped, pressed standing seam, roll roofing, etc., which they then sell by the square (100 sq. ft.); and if the sheets are heavier than the United States standard gage weights, which standard is to-day used almost exclusively in this country, they will not get from the weight bought the number of squares of roofing material they expected; consequently they are in a measure justified in making a claim, as the United States standard is the guide now in effect.

On the other hand, if the sheet manufacturer rolls steel sheets to the weights given in the United States standard weight table they will be thinner than the consumer supposes they should be, which in some instances is a serious fault. For example, if a No. 10 gage steel sheet is hot rolled to weigh 90 oz. per square foot and it finishes 5 per cent light, which variation is allowable, it will be 0.00962 in. thinner than the approximate thickness as given in the United States standard table.

Sheets are usually ordered by the gage number, thus making it impossible for the manufacturer to determine which is the more important of the two, weight or decimal thickness. The result is an injustice to both the manufacturer and consumer, in that the one may be considering the weight of the material while the other is rolling to thickness.

While all manufacturers agree that the United States standard weight table is not correctly applicable to present day practice and product, each hesitates to be the first to publicly advocate a change, perhaps fearing the process of educating the trade would be slow and difficult. However, only the weights as shown in the United States standard table would require to be changed inasmuch as they are generally used more infrequently than either the gage numbers or the thicknesses.

If the matter were taken up vigorously by the Sheet Manufacturers' Association, Congressional enactment of the proper weights, for the decimal thicknesses shown, based on hot rolled steel, weighing 0.2833 lb. per cubic inch, could no doubt be secured and the trade might then be circularized with the corrected table. The consumer would know what sheets of a given thickness should weigh; he would be getting exactly what he ordered and the manufacturers' dilemma would be ended. SHEET MILL.

British Advance on Manganese Ore

Manganese ore quotations in England were advanced in the first week of September from 2s. 6d. to 2s. 8d. per unit for 50 per cent Indian ore, shipment this year, and from 2s. 5½d. to 2s. 8d. per unit for next year's shipment, both c.i.f. West Coast, United Kingdom. Brazilian ore is still quoted at 4s. per unit for 50 per cent ore.

Tungsten deposits are now being worked experimentally near the banks of the Miramichi River in New Brunswick. Three veins of ore are reported, one of them 26 in. thick. A concentrating plant of 20 tons daily capacity and a crusher have been installed.

Copper Contract for 200,000 Tons

Great Britain and her allies, through the agency of J. P. Morgan & Co., and the principal copper producers late last week closed the largest individual contract for copper ever recorded. It calls for 200,000 gross tons, or 448,000,000 lb., of electrolytic copper, to be delivered over the first six months of 1917. Precise information as to price or prices involved is not available, although it is understood that the copper brought between 26c. and 27c. per pound. The total contract price is stated to have been about $120,000,000, which would indicate that the average price was about 26c. Reports are insistent, however, that 26.75c. to 27c. was paid, seaboard delivery.

The transaction means that the allied governments have agreed to take about one-third of our total production for six months, also that monthly exports probably will establish new records. If evenly distributed over the six months, the contract of itself would mean exporting at the rate of upward of 33,000 tons per month, to which must be added exports to neutral countries. The monthly exports averaged 22,559 tons in 1915; 30,019 in 1914; 31,901 tons in 1913 (the record year). In the first six months of 1916 the exports totaled 147,943 tons, of which the entente allies took 136,635 tons, and in the same period of 1915 the exports totaled 136,527 tons, of which the entente powers took 123,373 tons.

The negotiations were managed in behalf of the producers by John D. Ryan, of the Anaconda Copper Company, and Joseph Clendenin, of the American Smelting & Refining Company. The deal required several weeks for consummation, and knowledge of its progress caused many domestic consumers to cover for their future requirements, with the result that the aggregate of unfilled orders on the books of the producing companies is estimated at 800,000,000 lb.

The Benzol and Toluol Market

The benzol and toluol market is generally quiet. The quantity of pure benzol available for the balance of 1917 is generally covered by contract. Covering for next year has not yet been extensive. Prices for both spot and contract are 60c. to 70c. per gal., f.o.b. producers. Very little toluol is available for spot or near-by delivery at $3 to $3.50 per gal., f.o.b. producer. Contracts are being held up pending the settlement of deals for the manufacture of trinitrotoluol for the allies by large powder companies. Some contract offerings, however, are being made at $2 to $3 per gal. The market for solvent naphtha is easier. Supplies which have been scarce are now plentiful, and quotations are from 30c. to 35c. per gal., producer's plant, for both spot and contract.

Manganese-Ore Shipments from India

Manganese-ore shipments from India for the three months ended June 30, 1916, were 153,209 gross tons, valued at $988,815, as against 56,072 tons, valued at $331,938, for the same quarter of 1915. Of the 1916 shipments, 121,013 tons went to the United Kingdom (47,122 tons in April to June, 1915); 12,300 tons to France (against 4000); 7300 tons to Italy (against 4950) and 12,326 tons to the United States, with none a year ago.

The machine tool trade of Germany had the most prosperous year in its history in 1915, according to U. S. Consul John J. Wood of Chemnitz, Germany, where the trade is centered. The largest plant in the industry paid a dividend of 16 per cent, paying off all its indebtedness and setting aside $60,000 as a fund for the care of families of its workmen serving in the army. Various other machinery firms declared dividends of from 8 to 20 per cent in 1915.

FOREIGN TRADE COUNCIL

Action on European Economic Alliances — January Convention in Pittsburgh

The National Foreign Trade Council, which has as a large part of its work the investigation of important questions connected with the export trade of the United States, held an all-day meeting at the Biltmore Hotel, New York, Sept. 21, to take action on the recommendations of its various committees. It was decided to hold the next National Foreign Trade convention in Pittsburgh in the latter part of January, 1917, for further consideration of the policies necessary to safeguard American commerce and, as the slogan of the council has it, to promote "greater prosperity through greater foreign trade." Twenty-two out of the 48 members of the council were present and all sections of the country were represented.

PRESIDENT FARRELL'S VIEW

The chairman of the council, President James A. Farrell of the Steel Corporation, gave the annual address in which he said in part:

"The European economic alliances foreseen and discussed at the council's last meeting have, on the part of the Entente Powers, been concluded, and the present prospect is that when peace settles upon Europe there will remain two commercial groups, the members of each undertaking a system of mutual trade preferences, which may automatically create discriminations against neutrals. It would be unwise to assume, as many do, that the highly artificial programme of commercial preferences after the war will break of its own weight. Whether a reversion to mercantile restrictions which, from the end of the Napoleonic wars until the beginning of the present war, had steadily been discarded is a practical method of recovery, remains to be seen. At the end of the conflict the United States will have the greatest gold accumulation ever possessed by a single nation. American foreign trade will surpass all records. The United States will be both the largest customer and the most formidable competitor of Europe, a powerful position, if safeguarded by a sagacious policy.

"Since the total foreign trade of the United States normally is about one-twelfth of that of the entire world, and since both exports and imports serve the interest of our international neighbors and ourselves, it would seem that some method should be devised of arriving at a friendly adjustment of commercial relations without resort to extreme discrimination, possibly leading to trade wars."

THE FUTURE OF AMERICAN TARIFFS

Resolutions were passed in which the council, which is non-partisan and non-political, expressed its views upon issues now of outstanding importance to the trade of the country. A summary of the action taken as represented in the various resolutions is as follows:

"1. Called attention to the possibility that the European economic alliances among both the Entente and Central powers, by creating preferences between the nations now allied in arms, may impose discriminations upon the foreign trade of the United States.

"2. Called to the attention of the President of the United States, the Congress and the Tariff Commission, when organized, the necessity 'that the American tariff system, whatever be its underlying principle, shall possess adequate resources for the encouragement of the foreign trade by commercial treaties or agreements or executive concessions within defined limits, and its protection from undue discrimination in the markets of the world.'

"3. Declared that the prospect of keener competition as well as foreign economic alliances after the war makes doubly necessary legislation permitting American exporters to combine, exclusively for foreign trade, as do their foreign rivals. This is an endorsement of the principle of the Webb bill, which passed the House, but will not come before the Senate until the session beginning December.

"4. Enunciated the council's belief in the importance to American trade of the 'open door' policy in China, and expressed its hope that the President and the Department of State will take steps 'jealously to safeguard this principle.'

"5. Laid plans for expert business men's investigation of the further development of European economic alliances, changes in foreign trade and commercial treaty policies likely to affect the United States.

"6. Planned to co-operate by placing all possible information before the new Government agencies for development of sound foreign trade policies, the Federal Trade Commission, United States Shipping Board, Tariff Commission and Federal Reserve Board.

"7. Continued the council's policy of offering prizes to colleges and universities for student essays on topics related to the merchant marine."

Effect of European Alliances on the Trade of the United States

A report has just been made public by the National Foreign Trade Council on European economic alliances. A careful investigation has been made under the auspices of the Council and the result is a 117-page pamphlet issued from the Council's office at India House, New York. The object of the report is to give information rather than to argue for a theory, but possible effects upon the United States of any system of preference and discrimination among the nations now at war are pointed out. The pamphlet gives an analysis of European commercial treaty relations and of tariff relations of the United States with European belligerents and neutrals. In general it is shown that the position of the United States with regard to commercial relations with European powers is not much different from that of the European powers among themselves, American products being accorded most-favored nation treatment. The United States, however, gets only such concessions as are provided for by treaties with other countries, mostly European, but there are no concessions granted to others on products in which the United States is largely interested, unless the contracting country also happens to have a strong interest in the particular concession. It is a question how far this condition could continue if the United States became more formidable in export to Europe of manufactured merchandise. Practically all our favored nation treaties are terminable on 12 months' notice. The pamphlet is of great value to every American export interest in giving the largest amount of information brought together in one publication concerning changes in European commercial policy brought about by the war and their possible effects upon the foreign trade of the United States.

Railroad Car Business

Signs of a growing buying movement for railroad equipment continue. Early decisions are expected in the case of 2000 hopper cars for the Western Maryland, 1500 cars for the Wheeling & Lake Erie, 3000 to 5000 cars for France, and 1000 hopper cars have quietly been bought for the Chesapeake & Ohio. Other active inquiries which may be added to those mentioned last week include 1000 box cars for the Pere Marquette, 500 automobile cars for the Nickel Plate and 70 passenger cars for the Long Island. The Elgin, Joliet & Eastern wants 300 hopper car bodies; the Spanish-American Iron Company is in the market for 150 ore cars; Armour & Co. are considering 500 center constructions, and the Utah Copper Company, following the purchase of 25 concentrate cars of the Pressed Steel Car Company, now will buy 100 to 150 ore cars.

Tungsten Prices in Great Britain

Ferrotungsten prices in Great Britain have just been revised by the Minister of Munitions. A cablegram to *Commerce Reports* says the new basis is 5s. 6d. per pound of contained tungsten, with powdered tungsten at 6s. 3d. per pound based on 60s. per unit, the price of products on a sliding scale rising or falling 1d. per pound with each variation of 1s. per unit of ore.

NATIONAL SAFETY COUNCIL

Iron and Steel and Foundry Sections Among Features of Next Congress

Iron and steel and foundry sectional meetings will be features of the fifth annual safety congress of the National Safety Council to be held at the Hotel Statler, Detroit, Oct. 17 to 20, inclusive. The foundry sectional meeting will occur on Wednesday morning, Oct. 18, and simultaneous with it will be the first iron and steel sectional meeting, which will also hold sessions on Thursday and Friday mornings. Among the other sectional meetings, some thirty in all, may be mentioned the health service section, on Wednesday, Thursday and Friday afternoons of the week of the congress. In connection with the congress there will be a commercial safety device exhibit held at the Detroit armory.

The program of the foundry sectional meeting includes the following addresses:

"Strains, Sprains and Burns," by S. W. Ashe, educational and welfare department, General Electric Company, Pittsfield, Mass.

"Crane and Chain Practices," by F. H. Elam, manager casualty department, American Steel Foundries, Chicago.

"Eye Protection," by F. W. Shepard, safety inspector, American Cast Iron Pipe Company, Birmingham, Ala.

"Alcohol vs. Safety," by Dr. H. P. Hourigan, surgeon, Larkin Company, Buffalo, N. Y.

"Foundry Sanitation," by J. F. Alexander, secretary, Metal Trades Safety Association, Toronto, Can.

The officers of the foundry section are O. J. Fehling, manager National Malleable Castings Company, Chicago; vice chairman, F. G. Bennett, safety department Buckeye Steel Castings Company, Columbus, Ohio; secretary, Earl B. Morgan, safety engineer Norton Company, Worcester, Mass.

The program of the iron and steel section, as stated, requires three different sessions. The officers of the section are as follows and the addresses except those for the Thursday and Friday sections, which were given in last week's issue, are given below:

Chairman, J. M. Woltz, safety director, Youngstown Sheet & Tube Company, Youngstown, Ohio; vice-chairman, George T. Fonda, safety engineer, Bethlehem Steel Company, South Bethlehem, Pa.; secretary, Earl B. Morgan, safety engineer, Norton Company, Worcester, Mass.

"Progress of Safety in Iron and Steel Industry" (illustrated with lantern slides), by Dr. Lucian W. Chaney, U. S. Department of Labor, Washington, D. C.

"Safety in Blast Furnace Operation," by F. H. Wilcox, engineer, U .S. Bureau of Mines, Pittsburgh.

"Safety in Bessemer Operations," by J. H. Ayres, superintendent of safety, sanitation and welfare, National Tube Company, National Works, McKeesport, Pa.

"Safety in Open-Hearth Operations," by Walter Greenwood, safety inspector, Carnegie Steel Company, Youngstown, Ohio.

The health service sectional meetings announce addresses at the Wednesday afternoon session by Dr. L. G. Shoudy, chief surgeon, Bethlehem Steel Company, on "Health Education"; by Dr. Wilbur E. Post, chief medical adviser Peoples Gas, Light & Coke Company, Chicago, on "Physical Examination of Employees," and by Dr. J. C. Bloodgood, medical department Johns Hopkins University, Baltimore, on "First Aid." The Thursday afternoon session includes the following addresses: "The Company Doctor," by Dean S. S. Marquis, department of education, Ford Motor Company, Detroit; "Employment, Medical Supervision and Safety," by L. A. Phelps, superintendent, insurance and maintenance, Avery Company, Peoria, Ill., and by J. H. Weller, supervisor of labor, Packard Motor Car Company, Detroit; "Industrial Hospital and Dispensaries," by Dr. T. R. Crowder, chief surgeon, Pullman Company, Chicago; "Hernia," by Dr. James Burry, chief surgeon, Illinois Steel Company, Chicago, and "Dental Work in the Industries," by Dr. C. E. Smith, dental clinician, B. F. Goodrich Company, Akron, Ohio. The Friday morning session includes addresses on the relation of health to industry, the medical supervision of workmen, the reduction of health hazards and standards of industrial hygiene. The chairman of the Health Service Section is Dr. Otto P. Geier, director of the employees service department Cincinnati Milling Machine Company, Cincinnati, and the secretary is G. L. Avery, secretary Avery Company, Peoria.

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OBITUARY

J. H. Sheadle

Jasper H. Sheadle, vice-president of the Cleveland-Cliffs Iron Company, Cleveland, and vice-president of the Lake Carriers' Association, died at a hospital in Syracuse, N. Y., Sept. 22, aged 57 years. He was taken ill with abdominal trouble while on his way to the White Mountains with Mrs. Sheadle and was taken to the hospital where he was operated on the Sunday before his death, being ill less than a week. He had been identified with the Lake Superior iron ore industry over 25 years and was very widely known in the iron trade. He was born in New Bedford, Pa., which is near Youngstown, Ohio, and received his training in the common schools and at Hiram College, Hiram, Ohio. His first employment was with his father as teller of the Girard Savings Bank, Girard, Ohio. Two years later he became connected with the Second National Bank at Youngstown and at twenty-four was made assistant cashier. His connection with iron and steel dates from 1888 when he was made secretary and manager of the Mahoning Valley Iron Manufacturers' Association, which was formed in that year. In 1890 he went to Cleveland as secretary of the Cleveland-Cliffs Iron Company, successor to the Cleveland Iron Mining Company, which was the first to make shipments from the Lake Superior country. About three years ago he was elected vice-president of that company, of which William G. Mather is president. In addition to his duties as vice-president he had charge of the ore sales and Lake transportation. Since the reorganization of the Lake Carriers' Association he has been its vice-president and since 1909 he has been chairman of the welfare plan committee of that organization. He took a deep interest in the welfare work in behalf of the Lake seamen, developing the plan which has brought remarkable results in improving the condition of sailors. A feature of the work in which he was particularly interested was that designed to aid seamen in the saving of their wages. He was a director of several Cleveland banks and Lake transportation companies and a member of a number of Cleveland clubs. His scrupulous integrity, his native kindliness and his deep interest in human betterment were outstanding qualities, combined in an unusual way with business talent of a high order.



J. H. SHEADLE

The following tribute to Mr. Sheadle was paid by Harry Coulby, president of the Pittsburgh Steamship Company: "In the death of Mr. Sheadle, the navigation interests of the Great Lakes have lost one of their ablest men. He has been one of the leaders in the business for nearly thirty years. The work, however, which seemed particularly to appeal to him, and which he loved, was the welfare of the sailors. When the welfare committee was appointed a number of years ago, he was selected as its chairman, a position he filled to the day of his death. He was the father of the savings plan, which was eminently successful from the day of its adoption, and under which the sailors of the Great Lakes now have on deposit out of their earnings more than $400,000. He was also vitally interested in sanitation, proper quarters and clean, wholesome living on board ship. In his passing, the sailors of the Great Lakes have lost a friend who gave his time and his energies cheerfully for their betterment."

Cromwell Steel Company Will Build Plant

The Cromwell Steel Company, Cleveland, has been incorporated with a capital stock of $2,000,000 to build a new steel plant in Lorain, Ohio, preliminary mention of which was made in THE IRON AGE of Sept. 21. This plant will be modeled after European steel works, in that ultimately no raw steel but only the finished product will be placed on the market. The bulk of its products will be in light and heavy forgings, largely for the automobile trade. The plant to be built at present will consist of four 75-ton open-hearth furnaces and the necessary finishing mills. Contracts are now being placed and construction work will be started at once with a view of getting in productive operation at the earliest possible moment. The plant will be located on a site of 252 acres adjoining the works of the National Tube Company.

The officers of the company will be as follows: President, J. C. Cromwell, Cleveland; vice-president, W. D. Batsholts, Paris, France; general manager, Allen C. Ryan, formerly superintendent of the rail mill of the Tennessee Coal, Iron & Railroad Company, and later superintendent of the rail mill of the Bethlehem Steel Company; secretary, E. S. Griffiths, president of the Cleveland Machine & Mfg. Company, Bishop-Babcock-Becker Company, Cleveland, and Buckeye Engine Company, Salem, Ohio; treasurer, G. L. Jones. The offices are in the Guardian Building, Cleveland.

Scrap Iron and Steel Exports

Exports of scrap iron and steel from the United States are now very large, having been 286,728 gross tons for the fiscal year ended June 30, 1916, or at the rate of 23,894 tons per month. The contrast with previous records is shown by the following table from Government data:

	Gross Tons Per Month
Fiscal year ended June 30, 1916	23,894
Year 1915	6,613
Year 1914	2,761
Year 1913	8,119

The exports in May were 24,889 tons; in June they were 15,867 tons, falling to 4788 tons in July.

Old Material Prices in Germany

The Royal Prussian Ordnance Works at Spandau, Germany, recently conducted a sale of scrap at which the following prices are reported, the prices at the last previous sales also being given:

Material	Price, Marks	Last Sale, Marks
300 tons steel turnings	55.8	37.6
50 tons mild steel scrap	58.1	50.3
50 tons hammer scale	50.6	34.2
150 tons crucible-cast steel turnings	48.5	37.2

The quotations were for material delivered on cars at the works.

PERSONAL

John A. Topping, chairman of the Republic Iron & Steel Company, has largely recovered from an illness of the past few weeks and has gone to Canada for a short stay.

Prof. Henry C. Emery, formerly chairman of the United States Tariff Board, and for nine years professor of political economy at Yale, sailed Sept. 23 on the St. Paul for Petrograd, where he is to represent the Guaranty Trust Company of New York in special work, preliminary to an extension of its interests in Russia. He will make a thorough study of industrial and financial conditions. While making his headquarters at Petrograd, Professor Emery will visit all sections of the empire in the course of his investigations.

J. Edward Dailey, formerly with the Algoma Steel Company, Sault Ste. Marie, has been appointed general superintendent of the open-hearth steel plant of the Youngstown Iron & Steel Company, Youngstown, Ohio, succeeding Archie G. Smith, who resigned to go with the Trumbull Steel Company.

Guy Hutchinson, secretary and treasurer Hart & Hutchinson Company, New Britain, Conn., will shortly sever his connection with that company to engage in business in New York.

William Whitely, for 20 years foreman of the pattern and plate department of the North & Judd Mfg. Company, New Britain, Conn., has resigned to become foundry superintendent of the M. B. Schenck Company, Meriden, Conn.

William H. Cummings, formerly of Providence, R. I., who has had much experience in sheet metal and skylight work, has become associated with the Waugh glazing department of the Asbestos Protected Metal Company, Pittsburgh. Many of the prominent industrial structures now being erected include in their construction details either Waugh skylights or Waugh monitor sash.

D. J. Murphy, formerly in the flat steel sales department of the American Steel & Wire Company, has joined the Twisted Wire & Steel Company, 437 Eleventh Avenue, New York City.

Harry L. Bill has resigned as general manager of the Hayes Mfg. Company, Detroit, to devote his entire time to the business of the Springfield Body Company. He has been in charge of the work of both companies for some time. but the increased business of the Springfield Company, of which he is vice-president and general manager, compelled him to take this action.

Irving P. Miller, formerly engineer and superintendent of production for the Toledo Carriage & Woodwork Company, has been engaged as chief engineer and production manager for the Universal Valveless Four-Cycle Motor Company, Grand Rapids, Mich., which is at present seeking a location for its plant.

W. H. Bischoff, superintendent of open-hearth department No. 2 of the Saucon plant of the Bethlehem Steel Company, has resigned to become superintendent of coke ovens, blast furnaces and open hearths for the Dominion Iron & Steel Company, Sydney, Nova Scotia. Mr. Bischoff had been with the Bethlehem company for 24 years.

C. F. Kettering, general manager Dayton Engineering Laboratories Company, addressed the Engineers' Club of Cincinnati at its first fall meeting on the evening of Sept. 21. His subject was, "Some Present and Future Carburetion Problems."

Sven Winquist of Gothenburg, Sweden, inventor of the S. K. F. ball bearing, on Sept. 23 visited the new American factory of the S. K. F. Ball Bearing Company at Hartford, Conn. Mr. Winquist, who is president of the Swedish company and a trustee of the Connecticut company, expressed himself as much pleased with the splendid start made by the American factory, which is already producing more bearings than its rated capacity, and stated that large additions to the present buildings would soon be necessary. After completion of the inspection Mr. Winquist posted a notice stating that in appreciation of the excellent work done by the Hartford factory, Saturday, Sept. 30, would be a holiday with full pay.

Joseph P. Pinney, purchasing agent Kilbourne & Jacobs Mfg. Company, Columbus, Ohio, has resigned, effective Oct. 1, to accept a position with the Joseph Schonthal Iron Company, Columbus.

Scott A. Rogers has been appointed a salesman for the United Steel Company, Canton, Ohio, in the Cleveland territory.

W. I. Ballentine, formerly general superintendent of the Indianapolis works of the Link-Belt Company, has been appointed works manager of the Chain Belt Company, Milwaukee, effective Oct. 1.

Pig-Iron Manufacturers Entertained at Detroit

The American Pig Iron Association was entertained at Detroit, Sept. 22 and 23, by the Charcoal Iron Company of America. A large number were present from the Cleveland and other districts. F. W. Hutchings, treasurer of the company, met the guests at the Pontchartrain Hotel with automobiles and they were taken to the Bloomfield Hills Country Club, where they spent the two days.

A formal meeting of the association was held Friday morning, after which luncheon was served. The members then went over the golf course preliminary to the golf match to be held the following day. Friday evening members were much surprised at a banquet prepared for them. A large table had been arranged to form a charcoal-iron blast furnace and chemical plant, with miniature lakes and steamboats, roads and lawns, and a miniature railroad with locomotive and cars, all electrically operated, making trips in and about the plant. Mr. Hutchings acted most acceptably as toastmaster, and William McLauchlan of Pickands, Mather & Co. was in his best form as an after-dinner speaker. A number of others responded to toasts.

During the golf tournament on Saturday, T. E. Friend of Pittsburgh won the cup presented by Leonard C. Hanna; Francis B. Richards of Cleveland, the one presented by the Charcoal Iron Company of America, and Mr. Hine of Girard, the trophy presented by William McLauchlan.

Iron and Steel Electrical Engineers

At the annual meeting of the Association of Iron and Steel Electrical Engineers at the Hotel La Salle, Chicago, Sept. 18 to 22, officers were elected as follows:

President, F. D. Egan, Pittsburgh Crucible Steel Company, Midland, Pa.

First vice-president, C. A. Menk, Carnegie Steel Company, Homestead Works, Munhall, Pa.

Second vice-president, S. C. Coey, Youngstown Sheet & Tube Co., Youngstown, Ohio.

Secretary, John F. Kelly, McKeesport, Pa.

Treasurer, James Farrington, La Belle Iron Works, Steubenville, Ohio.

The dues for associate membership were raised from $5 to $7.50 per year and companies producing iron and steel are now admitted to membership, these concerns to be admitted at dues ranging from $25 to $100, according to the number of employees on their payrolls.

The Associated Business Papers, formerly the Federation of Trade Press Associations, will hold its annual convention at the Hotel Astor, New York, Oct. 26, 27 and 28. There will be open forum sessions for the discussion of questions relating to every phase of the making of business newspapers. For advertisers an exhibit has been arranged of all the steps in the conduct of successful advertising campaigns.

The New Britain Machine Company, New Britain, Conn., gave its employees a seashore outing at Cosey Beach on Sept. 19. An attractive program was issued, detailing the music, sports, entertainment and shore dinner that were provided.

Iron and Steel Markets

EXPORT BUYING RENEWED

Basic and Bessemer Pig Iron Advance

Railroad Equipment Orders Broadening—Car Shortage at Pittsburgh

The first real pinch of car shortage cut down shipments at some Pittsburgh district steel works in the past week, and here and there more has been heard of labor shortage. Deliveries are not improving and all indications are that the tension will increase rather than relax.

Domestic buying of finished steel for delivery after Jan. 1 is not heavy. Following various sellers' refusals to consider forward contracts a good many consumers are now disposed to take the market as they find it. Now and then surprisingly early deliveries seem to be available, but such cases are only eddies in a generally strong current.

There are signs of fresh export buying for everyday rather than war purposes. It is now several months since the last considerable demand of this sort. Italy is a large general buyer, all apart from the Italian inquiry for 45,000 tons of billets for shells, on which delivery is asked as soon as it can be made. Wire, plates, sheets and tin plates are wanted in large quantities for various foreign markets.

In prices the most significant change is an advance of 50 to 75 cents in basic iron in the Middle West, or to $19 at Valley furnace, and a corresponding rise in Bessemer iron. In semi-finished steel the situation is indicated by an advance of $5 by a large producer in the contract price of sheet bars. Sheet prices are notably stronger; another advance in wire products is looked for but has not come, and for bars and structural shapes mill prices for early delivery have been raised by some producers. In one case an offer of 3.75c. on 48,000 tons of plates for 1917 was refused, the mill holding for 4c.

All the calculations of the large producers of steel look to the full operation of an increased capacity far into next year. One Eastern company has reserved a large amount of Lake Superior ore for 1917 and may take as much more, and another Pennsylvania steel interest has taken up several hundred thousand tons of high grade ore, at the 1917 price when determined.

Car business is growing, the railroads having become adjusted to the high prices, and car works could make good deliveries if they could get plates. In 60,000 tons of car steel just sold at Chicago some of the plates cannot be had until after the middle of 1917. France is about to place 3000 to 5000 freight cars here and for domestic railroads more than 11,000 cars are under inquiry. Indications are that the railroads have only started on their equipment buying.

Exporters are still scouring the country for shell steel for shipment this year, but get little. Everything is under requisition, a large steel casting company shipping 20,000 tons of ingots a month to companies having contracts for shells or shell forgings.

In the lighter finished lines wire products and sheets have developed an unexpected demand. At Chicago two railroads have tried without success to place wire fence contracts. In sheets the buying has been heavier than in weeks.

The difficulty of getting structural steel has caused an increase in concrete work and good sales of rail carbon bars for reinforcing.

Foundry iron has not kept pace in all districts with the advance in basic and Bessemer. At Chicago the competition of Southern and Northern high phosphorus irons has been a feature, but in northern Ohio foundry irons are 50c. higher. In Southern iron September sales have been large, and one producer has withdrawn from the market for this year. The leading pipe interest has been a buyer of 10,000 to 15,000 tons for this year's delivery. While the Alabama iron market is stronger, there is still out a very considerable volume of warrants.

An interesting basic inquiry in Ohio is for 36,000 tons to be shipped in the first half of 1917 to an open-hearth plant which cannot be finished until late next year. A Cleveland furnace has sold 16,000 tons of basic iron and at Pittsburgh 12,000 tons was sold for the first half, settlements to be made at the market price. An eastern Pennsylvania steel company has bought 56,000 tons of basic iron for the first half of 1917 at $20 and under, delivered.

The coke market shows continued strength. A furnace contract for 10,000 tons a month in the first half of next year has been closed on a $3 basis.

Pittsburgh

PITTSBURGH, PA., Sept. 26, 1916.

A decided car shortage is now confronting the local steel trade, and it may grow worse when the bad weather comes. The loading crew at one large steel plant was recently laid off for one turn because it had no cars to load, and none was received for nearly 24 hours. The shortage of labor is also being felt, holding down the output on nearly everything. There is still an acute shortage in the supply of steel, but this may be relieved to some extent within the next 60 days by new capacity coming in. There is every indication that an upward movement in pig iron, semi-finished steel and on most lines of finished material is under way. The long-expected rise in prices of Bessemer and basic pig iron has come, the market on both grades having gone up in the past week from 75c. to $1 per ton. Consumers are now trying to cover, and find they have to pay considerably more than they could have bought for a month ago. The leading interest and nearly all the outside mills have advanced black and galvanized sheets, Bessemer and open-hearth stock, $2 a ton. An advance in wire products is looked for any day, and there is a famine in the supply of wire nails. Mill prices on steel bars and shapes are practically

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Sept. 27, 1916.	Sept. 20, 1916.	Aug. 30, 1916.	Sept. 29, 1915.
No. 2 X, Philadelphia	$19.50	$19.50	$19.50	$16.25
No. 2, Valley furnace	18.50	18.50	18.25	14.75
No. 2 Southern, Cin'ti	17.40	17.40	16.90	14.40
No. 2, Birmingham, Ala.	14.50	14.50	14.00	11.50
No. 2, furnace, Chicago*	18.00	18.00	18.00	14.25
Basic, del'd, eastern Pa.	19.75	19.75	19.75	17.00
Basic, Valley furnace	**19.00**	18.25	18.00	15.00
Bessemer, Pittsburgh	**22.95**	22.80	21.95	16.95
Malleable Bess., Ch'go*	19.00	19.00	19.00	15.00
Gray forge, Pittsburgh	**19.20**	18.95	18.70	14.70
L. S. charcoal, Chicago	19.75	19.75	19.75	15.75
Billets, etc., Per Gross Ton				
Bess. billets, Pittsburgh	45.00	45.00	45.00	24.50
O.-h. billets, Pittsburgh	45.00	45.00	45.00	25.00
O.-h. sheet bars, P'gh	45.00	45.00	45.00	25.50
Forging billets, base, P'gh	69.00	69.00	69.00	33.00
O.-h. billets, Phila.	48.00	48.00	48.00	30.00
Wire rods, Pittsburgh	55.00	55.00	55.00	30.00
Finished Iron and Steel,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.47½	1.47½	1.47½	1.25
O.-h. rails, heavy, at mill	1.56½	1.56½	1.56½	1.34
Iron bars, Philadelphia	2.659	2.659	2.659	1.509
Iron bars, Pittsburgh	2.60	2.60	2.60	1.35
Iron bars, Chicago	2.35	2.35	2.35	1.35
Steel bars, Pittsburgh	2.60	2.60	2.60	1.35
Steel bars, New York	2.769	2.769	2.769	1.569
Tank plates, Pittsburgh	4.00	4.00	4.00	1.35
Tank plates, New York	4.169	4.169	4.169	1.569
Beams, etc., Pittsburgh	**2.75**	2.60	2.60	1.35
Beams, etc., New York	2.769	2.769	2.769	1.569
Skelp, grooved steel, P'gh	2.35	2.35	2.35	1.35
Skelp, sheared steel, P'gh	2.45	2.45	2.45	1.40
Steel hoops, Pittsburgh	3.00	3.00	3.00	1.40

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire,	Sept. 27, 1916	Sept. 20, 1916.	Aug. 30, 1916.	Sept. 29, 1915
Per Lb. to Large Buyers	Cents	Cents	Cents	Cents.
Sheets, black, No. 28, P'gh	**3.00**	2.90	2.90	1.90
Galv. sheets, No. 28, P'gh	*4.25*	4.15	4.15	2.50
Wire nails, Pittsburgh	2.60	2.60	2.60	1.75
Cut nails, Pittsburgh	2.60	2.60	2.60	1.60
Fence wire, base, P'gh	2.55	2.55	2.55	1.60
Barb wire, galv., P'gh	3.45	3.45	3.45	2.60
Old Material, Per Gross Ton				
Iron rails, Chicago	19.25	19.25	18.75	13.50
Iron rails, Philadelphia	20.00	20.00	20.00	18.50
Carwheels, Chicago	11.75	11.75	11.50	12.00
Carwheels, Philadelphia	15.50	15.50	15.50	14.00
Heavy steel scrap, P'gh	**16.50**	16.25	16.00	14.25
Heavy steel scrap, Phila.	14.75	14.75	14.75	15.00
Heavy steel scrap, Ch'go.	16.25	16.25	15.25	11.75
No. 1 cast, Pittsburgh	**15.00**	14.50	14.50	13.00
No. 1 cast, Philadelphia	16.00	16.00	16.00	14.00
No. 1 cast, Ch'go (net ton)	12.25	12.25	11.50	10.50
No. 1 RR. wrot, Phila.	20.00	20.00	20.00	16.50
No. 1 RR. wrot, Ch'go (net ton)	16.50	16.50	15.50	11.00
Coke, Connellsville, Per Net Ton at Oven				
Furnace coke, prompt	**$3.00**	$2.85	$2.90	$1.70
Furnace coke, future	**2.85**	2.75	2.50	2.25
Foundry coke, prompt	3.25	3.25	3.50	2.15
Foundry coke, future	3.50	3.50	3.50	2.40
Metals,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	*28.00*	28.25	27.50	18.00
Electrolytic copper, N. Y.	**28.75**	28.50	27.25	18.00
Spelter, St. Louis	*8.75*	9.50	8.75	14.25
Spelter, New York	*9.00*	9.75	9.00	14.50
Lead, St. Louis	6.85	6.85	6.50	4.42½
Lead, New York	7.00	7.00	6.50	4.50
Tin, New York	**38.62½**	38.50	39.25	33.25
Antimony, Asiatic, N. Y.	11.00	11.00	13.50	28.00
Tin plate, 100-lb. box, P'gh	$5.75	$5.75	$5.75	$3.15

certain to be advanced within a short time. Scrap is in better demand, and prices are advancing.

Pig Iron.—There is a heavy demand for Bessemer and basic iron with large sales, and a good movement in foundry iron. One fairly large block of basic iron for last quarter and first quarter shipment has been sold at $19 or better, Valley furnace, and there has also been a fairly large sale of Bessemer iron at $22 or better. A Cleveland furnace interest has sold 16,000 tons of basic to the American Steel Foundries at Sharon, Pa., and another interest has sold 12,000 tons of basic, 2000 tons per month for first half of 1917, at the average monthly market price. We also note a sale of 2000 tons of Bessemer for fairly prompt shipment at $22.50, Valley furnace. The Trumbull Steel Company, which is to build an open-hearth steel plant at Warren, Ohio, as noted in these columns, has an inquiry out for 6000 tons of basic iron per month for the first half of next year. While its steel plant will not be ready for operation before the latter part of next year, it is said that if the company buys this iron it will pile it, and the object in trying to get iron now is to have it ready for the steel plant when it is finished. We note a sale of 15,000 tons of basic to a Youngstown interest at $19, Valley furnace, to be delivered as soon as the seller can ship it. Quotations have been advanced and are now as follows: Basic, $19 to $19.25; standard Bessemer, $22 to $22.50; No. 2 foundry, $18.50 to $19; malleable Bessemer, $19 to $19.25; and gray forge, $18.25 to $18.50, all at Valley furnace, the freight to Pittsburgh and Cleveland districts being 95c. per ton.

Billets and Sheet Bars.—It is confirmed that prices on contracts for sheet bars for fourth quarter will be about $5 per ton higher than for third quarter. A leading sheet mill shopped around last week for 1000 tons of open-hearth bars, which it could not find for prompt shipment, and finally bought 1000 tons of Bessemer bars at $45 at maker's mill. It is not believed bars could be found at less than $45 at mill. We quote soft Bessemer and open-hearth steel billets and sheet bars at $45 to $50 at mill, Youngstown or Pittsburgh. We quote forging billets at $69 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take $1 extra.

Ferroalloys.—Ferromanganese for sale in the open market is now being manufactured in this country by four establishments as follows: The Miami Products Company, Chicago, operating one blast furnace; American Manganese Mfg. Company, Dunbar, Pa., one furnace; E. J. Lavino & Co., Philadelphia, one furnace at Sheridan and one at Lebanon, Pa.; Bethlehem Steel Company, Sparrows Point, Md. The Bethlehem Steel Company is stated to be offering ferromanganese quite freely in the Pittsburgh market. The Carnegie Steel Company is manufacturing ferromanganese for its own steel plants and for other plants of the United States Steel Corporation, but has also been a seller to some extent in the open market, mainly, however, to steel makers particularly in need of ferromanganese and in such a position that it seemed to be necessary to help them out. Another subsidiary of the Steel Corporation, the Tennessee Coal, Iron & Railroad Company, Birmingham, Ala., is producing ferromanganese. The lowering of the price to $164 per ton, seaboard, for either foreign or domestic 80 per cent ferromanganese does not seem to have stimulated the demand, which is quiet. It is said that one or two makers of domestic have recently quoted $160 per ton at furnace, or slightly less. There seems to be more ferromanganese offering than is wanted. We quote foreign and domestic 80 per cent ferromanganese at $160 to $164, seaboard. We quote 18 to 22 per cent spiegeleisen at $40 to $45, and 25 to 30 per cent $55 to $65, at furnace. On 50 per cent ferrosilicon we quote $88 to $89 in lots up to 100 tons; over 100 tons, $87 to $88, and over 600 tons, $86 to $87, all per gross ton, f.o.b. Pittsburgh. We quote Bessemer ferrosilicon as follows: 9 per cent, $30; 10 per cent, $31; 11 per cent, $32; 12 per cent, $33; 13 per cent, $34.50; 14 per cent, $36.50;

15 per cent, $38.50, and 16 per cent, $41. Seven per cent silvery is $28.50; 8 per cent, $29; 9 per cent, $29.50; 10 per cent, $30; 11 per cent, $31, and 12 per cent, $32. These prices are f.o.b. furnace, Jackson or New Straitsville, Ohio, or Ashland, Ky., all having a freight rate of $2 per gross ton to Pittsburgh.

Steel Rails.—Three or four leading railroads that thought they had fully covered their needs of rails for all of 1917 now find they have not bought enough and have active inquiries out, desiring to get the same deliveries on these new orders that are called for in their contracts placed some time ago, but this is impossible. The Pennsylvania Lines West are in the market for 5000 tons of rails, the Ann Arbor for 4000 tons, and the Chicago Northern for 3000 tons. It is also stated that the New York Central and the Baltimore & Ohio are figuring on buying more rails. The new demand for light rails is only fair, the lumber interests and the traction lines buying very few, most of the business being placed in light rails coming from the coal-mining companies. We quote 25 to 45 lb. sections at $47; 16 and 20 lb., $48; 12 and 14 lb., $49, and 8 and 10 lb., $50, in carload lots, f.o.b. at mill, the usual extras being charged for less than carload lots. We quote standard section rails of Bessemer stock at $33 and of open-hearth $35, per gross ton, Pittsburgh.

Plates.—It seems the railroads have finally decided that it is useless to hold off from placing orders for steel cars and have decided to pay the high prices now being quoted by the carbuilders. Active inquiries are now in the market for 18,000 cars for fairly prompt shipment, but while the car companies could probably make good deliveries on these cars if they could get the plates and shapes it is doubtful whether these materials could be furnished by the mills under six to nine months. The Illinois Central has placed 500 refrigerator cars with the Haskell & Barker Car Company, the Utah Copper Company has placed 24 mine cars and the New York Central 10 passenger coaches with the Pressed Steel Car Company. Active inquiries include 1000 steel hoppers for the Western Maryland, 1000 box cars for the Pere Marquette, 500 automobile cars for the Nickel Plate, 500 general service cars for the Missouri Pacific and numerous smaller orders. The mill price on plates remains at 3c. for delivery some time during 1917, while for delivery in two to four months prices range from 3.25c. to 4c. at mill. One leading plate mill states it has sold readily ¼-in. and heavier sheared plates for delivery in four to six months at 3.25c. to 3.50c. at mill.

Structural Material.—New inquiry is fairly active, but there is no doubt that a good deal of work is being held up. The McClintic-Marshall Company has taken 1500 tons for a bridge for the Southern Railway, and the Massillon Bridge & Structural Company has taken about 500 tons for extensions for the plant of the Mansfield Sheet & Tin Plate Company, Mansfield, Ohio. Revised bids are to be taken Sept. 30 for 4500 tons for the shops at the Norfolk navy yard. Mill prices on beams and channels up to 15 in. remain at 2.60c. to 2.75c. at mill for such deliveries as the mills can make, which would not be before next year, while small lots from stock for fairly prompt shipment bring 3c. to 3.25c., Pittsburgh.

Sheets.—For the first time in some months we can report a fairly heavy demand for black and galvanized sheets for delivery over the remainder of this year. Prices are firm, and with most mills slightly higher. Several galvanizing plants that have not been active in the sheet market for some time now find they have a demand for galvanized sheets, and have lately placed orders for black sheets for fairly prompt delivery, which they will galvanize. The higher prices for sheet bars in fourth quarter and the better demand are the reasons for the higher market on Bessemer black and galvanized sheets. The export demand is good and sheet mills are now entering more new orders than for some time. Higher prices are looked for soon on galvanized sheets and also on blue annealed. It is stated that so far none of the mills is selling sheets for delivery beyond this year, but will likely start to do so in a short time. We now quote Nos. 9 and 10 blue annealed sheets at 2.90c. to 3c.; No. 28 Bessemer black, 3c., and open-hearth, 3.10c.; Nos. 28 galvanized, either Bessemer or open-hearth, 4.25c.; Nos. 22 and 24 black plate, tin-mill sizes, H. R. & A., 2.90c.; Nos. 25, 26 and 27, 3c. to 3.10c.; No. 28, 3.10c. to 3.15c., and No. 29, 3.20c. to 3.25c. These prices are for carloads and larger lots, f.o.b. mill, Pittsburgh.

Tin Plate.—The leading interest has fixed its price on any tin plate from stock for this year's delivery at $5.50 per base box, and has no production tin plate to sell for shipment before next year. A good part of the Pacific coast salmon packing trade in tin plate for the first quarter has been placed and in a few cases a flat price has been named, but on most contracts the price was left open to be fixed later. All the mills will carry over into 1917 a large amount of tin plate that should have been delivered in the last quarter of this year. For this reason the price to be fixed in October on tin plate for 1917 will likely apply only on a small part of the shipments consumers will receive in the first quarter. The fact that the base price is expected to be about $5.50 per box for 1917 will likely operate against the desire of the mills to name prices only for the first half of the year. This price leaves a large margin of profit, and it is not improbable some mills will be perfectly willing when the time comes to sell all the tin plate they can at $5.50 per base box. Fairly heavy orders are still being placed for first quarter shipment, but none of the mills has as yet opened its books regularly for next year, but all are expected to do so early in October. The output of tin plate this month will be much heavier than in August, as the weather has been much cooler and deliveries of sheet bars from the mills are good. To regular customers mills are quoting tin plate from stock at $5.50, while production tin plate is quoted at $5.75 and up to $6 to the domestic trade. For export, $6 to $6.25 per base box is quoted. We quote 8-lb. coated ternes at $8.50 to $8.75 for 200 lb., and $8.75 to $9 for 214 lb., Pittsburgh.

Rivets.—Makers report the new demand fair. Most consumers are covered over the remainder of the year, and some orders have been taken for delivery in the first quarter of 1917. There is some cutting in prices by jobbers who have stocks of rivets bought at lower prices than are ruling now. The export demand is good. One local maker recently shipped three carloads to India and Japan. Makers' quotations are as follows: Buttonhead structural rivets, ½ in. in diameter and larger, $4 per 100 lb., base, and conehead boiler rivets, same sizes, $4.10 per 100 lb., base, f.o.b. Pittsburgh. Terms are 30 days net, or one-half of 1 per cent for cash in 10 days.

Railroad Spikes and Track Bolts.—We note a better demand for railroad spikes, specifications in the past week having come in more freely than for a good many months. Two local makers who recently stated they were not running to more than 50 per cent of capacity are now operating practically full. Railroad spikes at 2.65c. are referred to as being low in view of the fact that steel bars are firm at 2.60c. and higher. The new demand for track bolts is reported active, and prices are firm. We quote track bolts with square nuts at 4.50c. to 4.75c. to railroads and 5c. to 5.25c. in small lots to jobbers, base. Track bolts with hexagon nuts take the usual advance of 15c. per 100 lb. Prices on ¼-in. and heavier plates are quoted from 3.75c. to 4c. and higher at mill.

Cold-Rolled Strip Steel.—As yet none of the makers has opened books for contracts for cold-rolled strip steel for delivery in 1917, but will likely do so early in October. In the past week contracts for delivery over the remainder of this year were placed in quantities ranging from 100 to 300 tons at $6 to $6.50 and higher. Makers report the demand good and say the greater part of their output for this year is under contract. We quote cold-rolled strip steel at $6 base on contracts for delivery over the remainder of the year, and $6.50 to $6.75 in small lots for fairly prompt shipment. Terms are 30 days net, less 2 per cent off for cash in 10 days, delivered in quantities of 300 lb. or more when specified for at one time.

Wire Rods.—The new demand is heavier than the mills are able to supply promptly, and there is a scarcity

of rods for delivery over the last quarter. Some leading consumers are covered through the first quarter and first half of 1917, and only a limited amount of rods is available to meet the general demand. We quote soft Bessemer, open-hearth and chain rods at $55 to $60 per ton, f.o.b. Pittsburgh.

Nuts and Bolts.—Makers report the new demand good, and some contracts have been placed for delivery in first quarter and first half of next year. All the makers are more or less back in shipments, and state that deliveries of steel bars by the mills are still unsatisfactory. The discounts are as follows, delivered in lots of 300 lb. or more, where the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days:

Carriage bolts, small, rolled thread, 50 and 5 per cent; small, cut thread, 40, 10 and 5 per cent; large, 35 and 5 per cent.

Machine bolts, h. p. nuts, small, rolled thread, 50 and 10 per cent; small, cut thread, 50 per cent; large, 40 and 5 per cent.

Machine bolts, c. p. c. and t. nuts, small, 40 and 10 per cent; large, 35 per cent. Blank bolts, 40 and 5 per cent. Bolt ends, h. p. nuts, 40 and 5 per cent; with c. p. nuts, 35 per cent. Rough stud bolts, 15 per cent. Lag screws (cone or gimlet point), 50 and 5 per cent.

Forged set screws and tap bolts, 10 per cent. Cup and round point set screws, case-hardened, 60 per cent. Square or hexagon head cap screws, 55 per cent. Flat, button, round or fillister head cap screws, 30 per cent.

Nuts, h. p. sq., tapped or blank, $2.70 off list; hex., $2.70 off. Nuts, c. p. c. and t. sq., tapped or blank, $2.40 off; hex., $2.80 off. Semi-finished hex. nuts, 60 and 5 per cent. Finished and case-hardened nuts, 60 and 5 per cent.

Rivets, 7/16 in. in diameter and smaller, 45, 10 and 5 per cent.

Iron and Steel Bars.—The minimum price on steel bars remains at 2.60c. at mill for such deliveries as the mills can make, which would not be before next year, but it is believed that within a short time the price will be put at 2.75c. On a recent inquiry for bars, plates and shapes for some car work, a Chicago mill quoted 2.60c., Pittsburgh, on the bars, the same on the shapes, and 3c. on the plates, and got the order, about 3500 tons, the freight from Pitttsburgh to Chicago, 18.9c. per 100 lb., being added to these prices. It is said that on the large car orders being placed none of the steel carbuilders is getting steel bars under 2.50c., and this price is on options given some time ago. Prices on steel bars from warehouses have been advanced about $3 per ton, now being held at 3.25c., effective from Sept. 21. The demand for iron bars is active, mills being sold up several months ahead. We quote merchant steel bars at 2.60c. at mill, for delivery in first quarter and first half of 1917, while for prompt shipment from warehouse 3.25c. is now quoted. We quote refined iron bars at 2.75c. to 2.85c., and railroad test bars at 2.85c. to 2.90c., f.o.b. Pittsburgh.

Wire Products.—An advance of $2 or $3 per ton on wire or wire nails may come at any time. The domestic demand for wire nails is very heavy, and there is an insistent export demand which would quickly take up any surplus nails that might exist. Two local makers say they are not quoting on the export inquiries, having obligations on their books now from domestic consumers for all the nails they will be able to make the remainder of this year. Specifications against contracts for plain and barb wire and wire nails are very heavy, but fence wire is quiet. Prices to the large trade are as follows: Wire nails, $2.60, base, per keg; galvanized, 1 in. and longer, including large head barbed roofing nails, taking an advance over this price of $2, and shorter than 1 in., $2.50. Bright basic wire is $2.65 per 100 lb.; annealed fence wire, Nos. 6 to 9, $2.55; galvanized wire, $3.25; galvanized barb wire and fence staples, $3.45; painted barb wire, $2.75; polished fence staples, $2.75; cement-coated nails, $2.50, base, these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing remain at 60 per cent off list for carload lots, 59 per cent for 1000-rod lots, and 58 per cent for small lots, f.o.b. Pittsburgh.

Shafting.—Some desirable contracts for the large trade have been placed for delivery in the first quarter and first half of next year on the basis of 20 per cent off list, while other contracts running into first quarter have been taken at 15 per cent off. For shipment over the remainder of this year shafting is hard to find, and it is readily sold at 10 per cent off list, and in a few cases at list. It is expected that in October a heavy business will be placed by large consumers for first half of 1917 delivery. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots for delivery in last quarter of this year and first quarter of 1917, and 10 per cent off in less than carload lots, f.o.b. Pittsburgh, freight added to point of delivery.

Merchant Steel.—Mills report the new demand heavy. Some consumers are trying to cover their needs for the first quarter and first half of 1917, but the mills ask stiff advances for such contracts. Output and shipments are heavy, and all the mills are back in deliveries. We quote: Iron-finished tire, ½ x 1½ in. and larger, 2.60c., base; under ½ x 1½ in., 2.75c.; planished tire, 2.75c.; smooth channel tire, ¾ to ⅞ and 1 in., 2.85c. to 2.90c.; 1⅛ in. and larger, 3.10c.; toe calk, 3.10c. to 3.15c., base; flat sleigh shoe, 2.75c.; concave and convex, 2.85c.; cutter shoes, tapered or bent, 3.25c. to 3.35c.; spring steel, 3.25c. to 3.50c.; machinery steel, smooth finished, 2.90c. to 3c., all f.o.b. at mill

Hoops and Bands—The new demand is active, but most consumers are covered over the remainder of this year. Specifications are heavy. The leading maker states it is not taking any business in either hoops or bands as yet for 1917 delivery. Steel hoops are firm at 3c., and bands at 2.60c., with extras on the latter as per the steel bar card.

Wrought Pipe.—Reports that the Standard Oil Company had placed an order for 500 miles of line pipe with an Eastern mill are not confirmed here. However, John G. Pew, president of the local Peoples Natural Gas Company, which is a Standard Oil interest, was recently in California looking into a very large oil project, and it is possible the reported order was in connection with that proposition. The Peoples Natural Gas Company is in the market for 20 miles of 20-in. steel pipe, and a further inquiry is reported for 100 miles of 6-in. for an oil line running from the Oklahoma fields. The new demand for pipe is fairly heavy, but most consumers are covered ahead for some time. The mills are sold up on lap-weld pipe and oil-country goods for five to six months, but on butt-weld sizes of iron and steel pipe they can make fairly prompt shipments. The higher prices recently adopted by the mills on black iron and steel pipe are firmly held.

Boiler Tubes.—The new demand is heavy, but mills are filled up so far ahead that they cannot promise deliveries inside of eight to ten months on either locomotive or merchant tubes. On seamless steel tubing the two local makers are filled up until late next year. It seems that the present capacity for making seamless steel tubes is inadequate to meet the demand, but the situation will be relieved to some extent when the additions now under way at the plant of the Shelby Steel Tube Company, Ellwood City, Pa., have been completed.

Coke.—Inquiries are in the market for blast-furnace coke for the first half of next year and one contract for about 10,000 tons per month of high grade coke has been closed for that delivery at $3 per net ton at oven. It is expected that other contracts will be closed early in October. Indications favor higher prices for furnace coke for the first half of next year than ruled in the second half of this year. The demand for prompt furnace coke is active, and high grades readily bring $3 and in some cases $3.10 and in a few instances $3.25 per net ton at oven. We note sales of 10 carloads at $3.10 and about 35 carloads at $3.25, the latter for shipment to Youngstown. We quote prompt furnace coke at $3 to $3.10 and contract at $2.85; best grades of 72-hr. foundry, $3.25 to $3.50 for prompt and $3.50 to $3.75 on contracts.

Old Material.—The local scrap market has improved. The demand is slightly better and prices on some grades are higher. The scarcity in supply of basic pig iron and the higher prices ruling for it, also the scarcity in the available supply of steel-making scrap and of common labor in scrap yards, are given as the main rea-

sons for the better condition of the market. Large consumers are not yet in as active buyers, nor are dealers trying to force sales, as they believe prices on nearly all grades of scrap will be higher in the very near future. Part of the Pennsylvania Railroad heavy steel scrap was sold at $16, Altoona, and $16.50, Pitcairn, Pa. Prices on turnings are a little better, also on low phosphorus melting scrap. We note sales of 500 tons of heavy steel scrap at $16.50; 100 tons at $17; 500 tons of turnings at $7.50; 1000 tons of borings at $8.50; 1000 to 1500 tons of low phosphorus melting stock at $20.50, and 2000 to 2500 tons at $21, all per gross ton, delivered to buyers' mills. Prices now being quoted by dealers for delivery in Pittsburgh and points that take the same rates of freight, per gross ton, are as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Breckenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	$16.50 to $17.00
No. 1 foundry cast	15.00 to 15.50
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	18.00 to 18.50
Hydraulic compressed sheet scrap	13.50 to 14.00
Bundled sheet scrap, sides and ends f.o.b. consumers' mills, Pittsburgh district	11.00 to 11.25
Bundled sheet stamping scrap	10.50 to 10.75
No. 1 railroad malleable stock	15.00 to 15.25
Railroad grate bars	11.00 to 11.25
Low phosphorus melting stock	20.50 to 21.00
Iron car axles	24.00 to 27.00
Steel car axles	15.00 to 16.00
Locomotive axles, steel	38.00 to 40.00
No. 1 busheling scrap	13.50 to 13.75
Machine-shop turnings	7.25 to 7.50
Old carwheels	14.00 to 14.25
Cast-iron borings	8.50 to 9.00
*Sheet bar crop ends	18.50 to 19.00
No. 1 railroad wrought scrap	18.50 to 18.75
Heavy steel axle turnings	10.00 to 10.25
Heavy breakable cast scrap	12.50 to 12.75

*Shipping point.

Chicago

CHICAGO, ILL., Sept. 26, 1916.

Car buying that will call for nearly 60,000 tons of steel, delivery of which is more than likely to run into the second half of 1917, contributed to another week of great activity. Building contractors also were eager to close for the structural and reinforcing steel that would go into work which must be completed before the winter season sets in, and sales of rail-carbon bars and of fabricated steel, in large number, were the result. New inquiry for rails for export has also appeared, including 20,000 tons for France. The demand for sheets, both black and galvanized, from foreign and domestic users alike, was much heavier than it has been and is increasing. In nearly all directions the desire to buy is urgent and seemingly unrestrained. The problem of accommodating customers is correspondingly more complex. Pig iron continues to sell freely and, though actual advances in price appear to be realized with difficulty, producers are finding themselves able much more easily to secure the full market price for their product. Heavier buying of malleable iron made its appearance last week to augment the sustained activity in foundry and charcoal irons. With respect to rolling-mill and foundry grades of scrap, the market last week was even more quiet than it has been, but the long anticipated buying assumed a measure of reality in the sales of steel scrap and re-rolling rails. Prices of old car axles are again soaring.

Pig Iron.—The buying movement in pig iron continues in full swing, extending itself over a wider market and without apparent lessening of momentum. Melters of malleable iron began to participate more freely last week, and a number of sales of lots of 1000, 2000 and more tons are reported. There appears to have been little difficulty in securing the full price of $19 at furnace. A sale of 2500 tons of basic was also made at the same figure. For business in southern Illinois, local furnaces found strong competition from producers in the Ironton district, competition which, in some instances, was successful in securing business at prices equivalent to concessions of from 25c. to 40c. per ton below the Chicago furnace price of $19. Southern iron is still the important factor in determining the price of foundry iron. High phosphorus Southern iron, of No. 2 grading in the matter of silicon, sold as low as $17.75, Chicago, and Northern high phosphorus iron as low as $18, delivery being for the remainder of this year and first quarter of 1917. While it is possible that prices as low as these might be duplicated, the quotations of the larger Southern producers are distinctly higher. Some of the higher phosphorus Southern irons can be had for fourth quarter delivery on the basis of $18.25, Chicago, where advantage is taken of barge delivery, but for all-rail shipment these interests are asking a minimum of $14.50 at furnace. This latter price can doubtless be done on some Southern irons for first half shipment, though $15 is more commonly asked. Buying of foundry iron has continued freely, transactions in northern Indiana, southern Illinois and southern Wisconsin including a number of purchases of 1000 to 2000 tons, as well as many other smaller lots. Charcoal iron sales in the past few weeks have been at a rate equaling the activity of the early summer. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of $1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5	$19.75
Lake Superior charcoal, No. 1	20.25
Lake Superior charcoal, No. 6 and Scotch	20.75
Northern coke foundry, No. 1	$19.00 to 19.50
Northern coke foundry, No. 2	18.00 to 19.00
Northern coke foundry, No. 3	18.00 to 18.50
Southern coke, No. 1 fdry and 1 soft	18.50 to 19.00
Southern coke, No. 2 fdry and 2 soft	18.00 to 18.50
Malleable Bessemer	19.00
Basic	19.00
Low phosphorus	34.00
Silvery, 8 per cent	29.50
Bessemer ferrosilicon, 10 per cent	32.50

Rails and Track Supplies.—A renewal of rail inquiry from abroad includes a new lot of 20 000 tons for France. The accommodation of this business is still unsolved so far as local mills are concerned. An Ohio railroad also is in the market for 5000 tons. Quotations are as follows: Standard railroad spikes, 2.75c., base; track bolts with square nuts, 3.25c. to 3.50c., base, all in carload lots, Chicago; tie-plates, $50, f.o.b. mill net ton; standard section Bessemer rails, Chicago, $33, base; open-hearth, $35; light rails, 25 to 45 lb., $40; 16 to 20 lb., $41; 12 lb., $42; 8 lb., $43; angle bars, 2c., Chicago.

Structural Material.—Negotiations for cars were completed in several instances last week, a total exceeding 5000 being bought. For this equipment orders have been placed covering nearly 60 000 tons of steel, delivery of which will extend, at least in part, into the second half of 1917. Among the orders placed was one for 4000 gondolas and box cars, taken by the American Car & Foundry Company for the New York Central. The Nickel Plate also ordered 500 underframes. New proposals include 1000 to 2000 gondolas for the Western Maryland, 1000 automobile cars for the Missouri Pacific and 500 underframes for Armour & Co. In addition several smaller lots are under consideration. The limited season of weather favorable for building now remaining is putting pressure upon buyers of structural steel, evidence of which appears in the closing of an unusually large number of small contracts with fabricating shops. An aggregate of 3100 tons is reported, covering some 11 contracts, among which are included 800 tons of bridge steel for the Vandalia Railroad Company, 500 tons for an extension to the Soo Line ore dock at Superior, Wis., taken by the American Bridge Company, 400 tons for a Chicago Dock & Canal Company building taken by the Hansell-Elcock Company, and 360 tons for the Anaconda Copper Mining Company at Butte, Mont. The Kansas City Structural Steel Company took a contract for 225 tons, while the other contracts ranged in size from 100 to 200 tons. We quote for Chicago delivery of structural steel from mill 2.789c.

We quote for Chicago delivery of structural steel out of jobbers' stock 3.2c.

Plates.—The prices of plates and the conditions attending their delivery grow more extreme. Reports in-

dicate that wide plates for prompt shipment have been sold at prices in excess of 4c., Pittsburgh, and there seems to be no difficulty in securing 4c. for any delivery the mills are willing to quote. The opportunities of securing narrow plates, both for prompt and future delivery, are not so limited nor are prices so high. Sales at 3.25c., Pittsburgh, for prompt shipment and at 3c. for first half are noted. Where widths exceed 72 in., however, the market narrows rapidly. There is little diminution in demand. We quote for Chicago delivery of plates from mill, at its convenience, 3.189c. For prompt shipment we quote 3.439c. to 3.689c. in widths up to 72 in., and for wide plates 4.189c.

We quote for Chicago delivery of plates from jobbers' stocks, 3.75c.

Sheets.—Demand for both black and galvanized sheets has markedly increased in the past week, both from foreign and domestic sources. Inquiry from abroad for lots of 500 to 5000 tons involves a large aggregate quantity, but in this market little consideration is given to business other than that calling for shipment via Pacific coast ports. The improvement in domestic demand is equally impressive. While one large order was taken last week on the basis of 2.85c. for one-pass sheets, the majority of sales were made at a minimum of 2.90c., other prices ranging upward to 3.10c. Galvanized sheets have been selling more freely. One inquiry for export calls for 5000 tons of galvanized sheets. We quote for Chicago delivery, blue annealed, No. 16 and heavier, 3.189c. to 3.339c.; box annealed, No. 17 and lighter, 3.039c. to 3.189c.; No. 28 galvanized, 4.389c. to 4.439c.

We quote for Chicago delivery of sheets out of stock, minimum prices applying on bundles of 25 or more, as follows: No. 10 blue annealed, 3.40c.; No. 28 black, 3.25c.; No. 28 galvanized, 4.50c. to 4.75c.

Bars.—Sales of rail-carbon steel for reinforcing purposes have been much heavier in the last fortnight, the crowding of concrete construction being largely responsible. The rerolling mills have at this time a larger tonnage on their books than at any other period in the year. An increase is also noted in the sales of bar iron, and the disposition to ask an advance of $1 per ton is more general. At the Inland mill of the Republic Iron & Steel Company a labor strike is curtailing production. We quote mill shipment, Chicago, as follows: Bar iron, 2.35c.; soft steel bars, 2.789c.; hard steel bars, 2.50c.; shafting, in carloads, 20 per cent off; less than carloads, 15 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 3.25c.; bar iron, 3.25c.; reinforcing bars, 3.25c. base with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting net list.

Rivets and Bolts.—Several of the mills still have a small quantity of bolts and nuts to sell, but they are picking their customers, as their position warrants them in doing. In rivets, ½ in. and larger, there is little activity, most of the users being under contract, but for small rivets the demand exceeds the supply as a result of the scarcity of wire rods. We quote as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 50-5; cut thread, 40-10-2½; larger sizes, 35-2½; machine bolts up to ⅜ x 4 in., rolled thread, with hot pressed square nuts, 50-10; cut thread, 50; large size, 40-5; gimlet-point coach screws, 50-5; hot pressed nuts, square, $2.70 off per 100 lb.; hexagon, $2.70 off. Structural rivets, ¾ to 1¼ in., 4c. to 4.15c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

We quote out of store: Structural rivets, 4c.; boiler rivets, 4.10c.; machine bolts up to ⅜ x 4 in., 50-10; larger sizes, 40-10; carriage bolts up to ⅜ x 6 in., 50-5; larger sizes, 40-5; hot pressed nuts, square, $3.25, and hexagon, $3.25 off per 100 lb.; lag screws, 55.

Wire Products.—Inquiry for wire products in large amounts is being turned aside by the mills. Two of the important Western railroads have been seeking to place contracts, as yet, it is understood, without success. There is also an inquiry for 5000 tons of rods in this market, which has already brought refusals to quote from at least two mills. The retail and jobbing trades continue persistent in their demand for nails and barb wire. We quote as follows per 100 lb.: Plain wire, Nos. 6 to 9, base, $2.839; wire nails, $2.789; painted barb wire, $2.939; galvanized barb wire, $3.639; polished staples, $2.939; galvanized staples, $3.639; all Chicago.

Cast-Iron Pipe.—Lettings of pipe in the last week have been, with one exception, very small. At Chicago, award has been made to contractors of 700 tons of special pipe. We quote as follows, per net ton, Chicago: Water pipe, 4 in., $34.50; 6 in. and larger, $31.50, with $1 extra for Class A water pipe and gas pipe.

Old Material.—Buying of heavy melting and of shoveling steel by one of the largest local consumers was the only activity of consequence on the part of melters, and prices have shown little added strength as compared with the quotations of a week ago. In fact, shoveling-steel prices are somewhat easier. Car axles again provide the spectacular feature of the market, recent purchases by dealers having been made at prices ranging from $32 to $34 per ton. At this level, local users of axles cannot be interested, as they are able to buy so-called discard billets at $25 to $30, finding them of approximately similar analysis, and preferable in some respects to axles. The axles obviously are being gathered in for shipment elsewhere. Some betterment in the price of pipes and flues is also noted, and rails, both short and rerolling, are higher. Aside from the buying of steel scrap, including some 3000 tons of rerollers, the situation was even quieter last week than it has been. Offerings of railroad scrap embrace a larger quantity than has recently been listed, and include 6000 tons from the Great Northern, of which 2000 tons is steel rail, 3000 tons from the Burlington, and 3500 tons from the Rock Island. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	$19.25 to $19.75
Relaying rails	19.50 to 20.50
Old carwheels	11.75 to 12.25
Old steel rails, rerolling	17.75 to 18.25
Old steel rails, less than 3 ft.	18.25 to 18.50
Heavy melting steel scrap	16.25 to 16.75
Frogs, switches and guards, cut apart	16.25 to 16.75
Shoveling steel	15.50 to 16.00
Steel axle turnings	8.75 to 9.25

Per Net Ton

Iron angles and splice bars	$18.75 to $19.00
Iron arch bars and transoms	20.50 to 21.00
Steel angle bars	15.25 to 15.75
Iron car axles	30.00 to 30.50
Steel car axles	32.50 to 33.50
No. 1 railroad wrought	16.50 to 17.00
No. 2 railroad wrought	15.50 to 16.00
Cut forge	15.50 to 16.00
Pipes and flues	12.25 to 12.75
No. 1 busheling	14.00 to 14.50
No. 2 busheling	9.50 to 10.00
Steel knuckles and couplers	14.75 to 15.00
Steel springs	15.25 to 15.50
No. 1 boilers, cut to sheets and rings	10.25 to 10.75
Boiler punchings	14.00 to 14.50
Locomotive tires, smooth	21.50 to 22.00
Machine-shop turnings	5.50 to 6.00
Cast-borings	6.50 to 7.00
No. 1 cast scrap	12.25 to 12.75
Stove plate and light cast scrap	9.75 to 10.25
Grate bars	10.00 to 10.25
Brake shoes	9.75 to 10.25
Railroad malleable	11.50 to 12.00
Agricultural malleable	11.00 to 11.50

Philadelphia

PHILADELPHIA, PA., Sept. 26, 1916.

The largest Eastern buyer of basic pig iron has purchased 56,000 tons, while other consumers have taken at least 5000 tons, making the total of known transactions 61,000 tons, at prices ranging from a little less than $20 to $20.25, delivered, first half delivery. Low phosphorus has been active also, and in the past two weeks probably 30,000 tons has been taken under contract for first half delivery. Foundry iron shows little change, but several of the furnaces are well sold ahead and the trade is optimistic. In steel products the situation is stronger and a shortage of semi-finished steel is evident. The tremendous demand for plates continues to tax the mills and their sales forces, and large quantities are being booked at 4c., Pittsburgh base, though proffers of business are frequently declined. Some plate inquiries have been withdrawn, either because of price or unsatisfactory delivery. Shipyards are still seeking assurances from the mills, but at least one of the latter will not quote until it knows what tonnage it will be expected to furnish for Government work. Structural material is in lively de-

mand despite the lack of new building enterprises. Export agents continue to look for billets, but with little success so far as the larger mills are concerned. Old material still drags, although the feeling is a little better.

Pig Iron.—Orders for 56,000 tons of basic have been placed by the Lukens Iron & Steel Company, Coatesville, Pa., delivery to be in the first half. The iron was apportioned among four or five furnaces, and for the bulk of it $20, delivered, will be paid, although for a part less than $20 was accepted. At least 10,000 tons will come from the South. Another interest bought 3000 tons of basic at a little under $20, delivered, while another lot of 2000 tons was taken at $20.25. Low phosphorus continues active. In the past two weeks 25,000 to 30,000 tons has been purchased, mostly for 1917 delivery, half of the quantity taken having been contracted for in the past week. Most of the buying has been at $35, delivered, and up to $36 is now asked, the exact figure depending on terms, deliveries and specifications. Foundry iron does not show strength proportionate to that of steel-making grades, but its producers are optimistic as to the future. Eastern Pennsylvania No. 2 X is quoted at $19.50 to $20, delivered, with $20 near the general market, although some sellers ask around $20.25, delivered, and are unwilling to sell under this figure, a stand supported by their well-sold-up condition. The representative of a Southern producer on Saturday last had inquiries before him amounting to 9000 tons, and since has sold about 5000 tons. For No. 2 Southern this maker quotes $14.50, furnace, for this year, but will not consider under $15 for first quarter. The quotations for Virginia iron are now uniform at $20.50 for No. 1, $20.25 for No. 2 X and $20 for No. 2 plain, all delivered. Fewer restrictions are imposed on deliveries, although the producers would like to make contracts which would equalize their deliveries. Orders for 3600 tons were booked by one producer in the week. In foundry iron the largest inquiry comes from the Baldwin Locomotive Works, which is in the market for 6000 tons of No. 2 X and other grades. The Pennsylvania Railroad is inquiring for 300 tons. Most of the inquiries are for small or moderate-sized quantities, mainly for first quarter. Quotations for standard brands, delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa. No. 2 X foundry	$19.50 to $20.00
Eastern Pa. No. 2 plain	19.25 to 19.75
Virginia No. 2 X foundry	20.25
Virginia No. 2 plain	20.00
Gray forge	18.50 to 19.00
Basic	19.75 to 20.25
Standard low phosphorus	35.00

Iron Ore.—The only arrival of foreign ore reported in the week ended Sept. 23 consisted of 6742 tons from Sweden. An eastern Pennsylvania furnace has contracted for 15,000 tons of non-Bessemer Lake Superior ore at 40c. over the recent market.

Fluorspar.—Consumers have been active for 1917 delivery, and contracts for several thousand tons have been closed at about $7 at the mines.

Plates.—The situation continues to grow more acute, but still there exists the puzzling disparity of prices. Most of the mills quote 4c., Pittsburgh, or 4.159c., Philadelphia, delivery at their convenience, yet one interest continues to quote 3c., Pittsburgh, or 3.159c., Philadelphia, as its minimum. An Eastern mill took an order for 1000 tons, for first quarter shipment to Canada, at 3.75c., Pittsburgh, while the best that could be done for a similar quantity of ship plates, also for Canada, was 4c., Pittsburgh. One mill would not consider an inquiry for 7500 tons, for delivery in the last half, at any price, but made a contract for 12,000 tons, running into the first quarter, at 4c., Pittsburgh, or 4.159c., Philadelphia. A lot of 2500 tons was booked at the same price and delivery. Another maker took a lot of 6000 tons of ship plates at 4.159c., Philadelphia, first quarter. A large aggregate of inquiry is outstanding, although some that was in hand a week ago has been withdrawn because of deliveries or prices. The private yards which are to build war vessels continue to seek data as to prices and available supply, having until Oct. 25 to submit their estimates to the Government. Some of the mills are unwilling to give blanket quotations, inasmuch as they desire to know just what tonnage they will be called on to supply. Business from railroad carbuilders has appeared in the week.

Ferroalloys.—Eighty per cent ferromanganese is nominally around $164 for first half, and in limited quantities for prompt shipment, although by some $165 is quoted. Blast-furnace ferrosilicon is quoted at $34.44, Philadelphia, for 11 per cent, and standard 50 per cent at $86 to $88, Pittsburgh. The arrival last week of 50 tons of English ferromanganese is reported.

Bars.—The nominal quotation on steel bars is unchanged at 2.759c., Philadelphia, but premiums are easily obtainable. The mills could dispose of a large tonnage if they had it to offer. They are not seeking to make contracts. Iron bars are strong at 2.659c., Philadelphia.

Structural Material.—New building projects, and action on those before the trade, are wanting, but material continues to be demanded from many sources, and it is scarce. The minimum quotation for structural shapes is 2.759c., Philadelphia, from which the price ranges up to 3.159c. One mill asks 3.659c. for ship shapes.

Billets.—Quotations for open-hearth rerolling billets range from $48 to $55, Eastern mill, the latter price having been paid. Forging billets are unchanged at $65. Representatives of foreign consumers are actively looking for large tonnages of billets, especially for forging. Large makers are not quoting.

Sheets.—The market is easier. No premiums are asked, and eastern Pennsylvania makers will accept business at 3.159c. to 3.409c., Philadelphia. Recent large export inquiries did not come to fruition, while domestic inquiry is lighter.

Coke.—For prompt foundry coke some makers will not consider under $3.50 per net ton at oven. Prompt furnace is quoted at $2.80 to $3 per net ton at oven, and contract at $2.50 to $2.60. Prompt foundry ranges from $3.25 to $3.50 per net ton at oven and contract at $3.15 to $3.40. Freight rates from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Old Material.—Heavy melting steel continues quiet, though a better undertone is caused by buying in other districts. Wrought-iron pipe is stronger at $15.50 to $16. Cast borings are becoming scarce. Railroad wrought is in fair demand. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$14.75 to $15.25
Old steel rails, rerolling	18.00 to 18.50
Low phos. heavy melting steel scrap	21.25 to 23.50
Old steel axles (for export)	35.00 to 36.00
Old iron axles (for export)	35.00 to 36.00
Old iron rails	20.00 to 20.50
Old carwheels	15.50 to 16.00
No. 1 railroad wrought	21.00 to 22.00
Wrought iron pipe	15.50 to 16.00
No. 1 forge fire	12.00 to 12.50
Bundled sheets	12.00 to 12.50
No. 1 busheling	10.50 to 11.00
Machine-shop turnings	7.50 to 8.00
Cast borings	9.50 to 10.00
No. 1 cast	16.00 to 16.50
Grate bars, railroad	11.75 to 12.25
Stove plate	11.75 to 12.25
Railroad malleable	13.50 to 14.00

Steel merchant vessels building or under contract to be built in private American shipyards, on Sept. 1, 1916, according to builders' returns to the U. S. Bureau of Navigation, were 397 of 1,292,310 gross tons. In August, 20 new vessels of 75,060 gross tons were contracted for and 12 vessels of 35,166 gross tons were completed. In the 7 months from Feb. 1 to Sept. 1, 1916, American yards contracted to build 229 steel vessels of 576,857 gross tons and completed 55 such vessels of 206,545 gross tons.

The Bethlehem Steel Company is reported as having an excellent chance of receiving a contract for the construction of 10 vessels for the government of Argentina, to cost about $25,000,000.

Cincinnati

CINCINNATI, OHIO, Sept. 27, 1916.—(*By Wire.*)

Pig Iron.—Virginia irons have again appeared in this market and a sale of 1000 tons was made to an Indiana melter for shipment commencing Oct. 1 and extending to March 1. Other smaller sales are also reported for delivery this year. Northern foundry iron has again been advanced by a large producer in the Hanging Rock district, and $19, Ironton, is minimum for shipment in the last half of this year, orders for first half movement being accepted at the same figure. Southern iron is a little stronger, and while $14, Birmingham basis, can be done on resale iron for prompt shipment, it is questionable whether any of the furnaces would book good-sized orders at this price. A number of Southern furnaces are quoting $15 for first half shipment and are not disposed to take any business below this. A sale of 3000 tons of Southern foundry iron for first half delivery was made in Pittsburgh territory last week. Other Southern iron sales include one 600-ton lot in central Ohio, and Indiana melters also bought quite freely but no large tonnages are involved. Lake Superior charcoal has been especially active. Two consumers in central Ohio contracted for 500 and 1000 tons respectively for first half shipment. Ohio silvery irons are also showing considerable activity, and a sale of 1200 tons to a Michigan melter was made last week. Ohio high silicon irons, on the basis of 8 per cent, are quoted at $27 to $29 at furnace. Reports received from branch offices in St. Louis territory indicate heavy buying of foundry iron in that district. It is reported, but not definitely confirmed, that a nearby melter has contracted for 15,000 tons of basic iron for first half delivery. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	$17.90 to $18.40
Southern coke, No. 2 f'dry and 2 soft	17.40 to 17.90
Southern coke, No. 3 foundry	16.90 to 17.40
Southern coke, No. 4 foundry	16.40 to 16.90
Southern gray forge	15.90 to 16.40
Ohio silvery, 8 per cent silicon	28.26 to 28.76
Southern Ohio coke, No. 1	21.26 to 21.76
Southern Ohio coke, No. 2	20.26 to 20.76
Southern Ohio coke, No. 3	19.76 to 20.26
Southern Ohio malleable Bessemer	20.26 to 20.76
Basic Northern	20.26 to 20.76
Lake Superior charcoal	21.20 to 22.20
Standard Southern carwheel	24.90 to 25.40

(By Mail)

Finished Material.—Warehouse quotations on structural shapes, steel bars and plates have been advanced. Steel bars from stock are now quoted at 3.35c. base; twisted steel bars, 3.50c., the 2-in. and larger sizes being held at 3.90c.; No. 28 galvanized sheets, strong at 4.65c., Cincinnati or Newport, Ky.; No. 28 black sheets, 3.15c. to 3.25c.; No. 10 blue annealed sheets, 3.15c. to 3.25c.; wire nails, $2.85 per keg base; barb wire, $3.70 per 100 lb. The sheet mills report a heavy demand for both black and galvanized and are now more interested in taking care of old customers than in obtaining new business. The warehouse deliveries on some classes of material are a little easier, although mill shipments are still delayed. Cold rolled shafting is hard to obtain even for shipment in the first half of next year.

Coke.—Prices are firm, although there is little new contracting except for scattered lots of foundry coke that are needed for filling in. Shipments are going forward at a more satisfactory rate. The car shortage has not been serious enough to cause any great inconvenience. Connellsville furnace coke remains around $2.70 to $2.85 per net ton at oven for nearby shipment and $2.50 to $2.85 for yearly contracts. Wise County and Pocahontas brands are quoted about 15c. a ton higher. Foundry coke is selling around $3.50 to $3.60 per net ton at oven for either prompt or future shipment, except New River, which is quoted at $3.90 to $4 at oven.

Old Material.—An advance of approximately 25c. per ton has been made on all grades of scrap except borings and turnings. The rolling mills are taking a larger quantity of scrap iron than they have for some time, and the foundry consumption is also on the increase. The following are dealers' prices f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton

Bundled sheet scrap	$11.00 to $12.00
Old steel rails	16.00 to 17.00
Relaying rails, 60 lb. and up	21.00 to 22.25
Relaying steel rails	15.00 to 16.00
Heavy melting steel scrap	14.00 to 14.50
Steel rails for melting	13.00 to 14.00

Per Net Ton

No. 1 railroad wrought	$13.00 to $13.50
Cast borings	8.00 to 8.50
Steel turnings	8.00 to 8.50
Railroad cast	12.00 to 12.50
No. 1 machinery cast	13.00 to 13.50
Burnt scrap	9.00 to 9.50
Iron axles	25.00 to 25.50
Locomotive tires (smooth inside)	21.00 to 22.25
Pipes and flues	10.00 to 10.50
Malleable and steel	11.75 to 12.25
Railroad tank and sheet	9.00 to 9.50

Buffalo

BUFFALO, N. Y., Sept. 26, 1916.

Pig Iron.—Inquiry in the last two days has been for a total of upward of 25,000 tons for foundry, malleable and special irons, and mostly for first quarter needs. Prices remain rigidly at $19 to $20, and one or two producers have announced that they have to-day advanced their minimum for any grade to $19.50 at furnace. Foundry and malleable grades appear to be in somewhat more active demand than basic. Out of a total of 12,000 tons reported as placed for the week, about two-thirds was for foundry and malleable grades and one-third for basic. One purchasing interest came into the market with urgent demand for 250 or 300 tons of foundry iron, but only a single carload could be obtained for the delivery required. We quote as follows, f.o.b. furnace, Buffalo, for delivery to and including the first half of 1917:

No. 1 foundry	$19.50 to $20.00
No. 2 X foundry	19.00 to 19.50
No. 2 plain	19.00 to 19.25
No. 3 foundry	19.00
Gray forge	19.00
Malleable	19.25 to 19.50
Basic	19.50 to 20.00
Bessemer	22.00
Charcoal, regular brands and analysis	21.00 to 22.00

Old Material.—Prices for some commodities have been advanced. Heavy melting steel is now held at $16 to $16.50, and some sales have been made on a basis of $17. No large amounts are available at these figures at this time. Indications point to a steady rise. A scarcity of labor prevents scrap yards from putting scrap in shape for charging-box size. Strong demand for low phosphorus steel has developed, and the price has advanced $1 per ton. Railroad and machinery cast scrap is also in good demand, with a price advance of 50c. per ton. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	$16.00 to $16.50
Low phosphorus steel	21.00 to 21.50
No. 1 railroad wrought scrap	17.50 to 18.00
No. 1 railroad and machinery cast scrap	16.00 to 16.50
Steel axles	32.00
Iron axles	32.00
Carwheels	13.00 to 13.50
Railroad malleable	15.50 to 16.00
Machine shop turnings	6.00 to 6.50
Heavy axle turnings	12.00
Clean cast borings	7.50 to 7.75
Iron rails	18.00 to 18.50
Locomotive grate bars	11.50 to 12.00
Stove plate (net ton)	11.50 to 12.00
Wrought pipe	12.00 to 12.50
Bundled sheet scrap	11.50 to 12.00
No. 1 busheling	13.00 to 13.50
No. 2 busheling	11.00 to 11.50
Bundled tin scrap	14.00 to 14.50

Finished Iron and Steel.—Mills are compelled to choose the business they are accepting. Several agencies report they are sold up on bars and small shapes for 10 to 12 months ahead. Demand has been heavy for structural material, and much that has been placed will be shipped in April or May in time for the spring demand. There is a great scarcity of wire rods; on a recent inquiry for a 1000-ton lot, a price of $62.75 per gross ton was quoted with considerable reluctance by the mill offering it. Washers are strong at $6 to $6.10 off, at mill. On pipe, jobbers' stocks are in fairly

good condition so far as butt-weld pipe is concerned, but it is very difficult to keep stocks up on lap weld sizes. Prices for fabricated structural steel are strong. Architect G. Morton Wolffe, Buffalo, is taking bids for 317 tons for the Rice & Adams Dairy Machinery Company, Buffalo; architects Colson & Hudson, for 100 tons for the Peerless Laundry, Buffalo; and Manion Brothers, Rochester, for 100 tons for a New York Central freight house at Lockport. Bids for an 800 to 900-ton bascule bridge to be erected over the Buffalo River, at Abbott Road, will not yet be opened, as new bids are to be called for permitting competitive designs.

Cleveland

CLEVELAND, OHIO, Sept. 26, 1916.

Iron Ore.—Two Eastern steel companies have made reservations for a large tonnage of Lake Superior non-Bessemer ore for next season delivery, agreeing to pay the regular market price to be established later, and other inquiries from the East are pending. With the present condition of the steel market the securing of a sufficient supply of ore of a high grade to permit the maximum blast furnace output appears to take precedence over the question of prices with the Eastern as well as the Western consumers, and this accounts for some of the early heavy reservations of the better grades of ores. Iron ore firms report sales of some small lots of ore for this season's delivery at regular prices, the buyer paying the additional wild carrying charges. We also note the sale for shipment this season of 50,000 tons of Mesaba ore that was made direct by one of the mining companies. According to an unconfirmed report this sale was made at an advance over this season's prices. We quote prices as follows, delivered lower Lake ports: Old range Bessemer, $4.45; Mesaba Bessemer, $4.20; old range non-Bessemer, $3.75; Mesaba non-Bessemer, $3.55.

Pig Iron.—The market has been very active and prices are higher on all grades. Cleveland furnaces have advanced quotations on foundry and malleable iron 50c. a ton to $19, and one Cleveland interest has withdrawn from the market except for Cleveland delivery. Most Valley producers are now asking $19 for foundry, malleable and basic iron and $22 for Bessemer. A heavy tonnage of foundry and malleable iron was sold in this territory during the past few days, before the price advance, in lots of 1000 tons and over. A Bedford, Ohio, stove foundry has taken about 5000 tons of Northern foundry iron for first half from Cleveland furnaces at $18.50 and is in the market for 1500 tons of 8 per cent silvery iron. Southern iron is also quite active and some additions have been made to the producers who are holding Southern iron at $15, Birmingham, for first half. One sale of 1150 tons to a nearby consumer is reported at the $15 price. Tennessee silvery iron is being offered at $22, Birmingham, which makes the delivered price in this territory from $2 to $3 below Ohio silvery. We quote, delivered Cleveland, as follows:

Bessemer	$22.50 to $22.97
Basic	19.50
Northern No. 2 foundry	19.50
Southern No. 2 foundry	18.50 to 19.00
Gray forge	19.00
Jackson Co., silvery, 8 per cent Si.	28.62
Standard low phos., Valley furnace	33.00

Coke.—A Cleveland interest has purchased 13,500 tons of blast furnace coke, being half of its requirements for one stack for fourth quarter and is in the market for the remainder. The market is very firm and as high as $3.25 per net ton at oven is being asked for furnace coke for prompt shipment and contract. Foundry coke is not active. Standard Connellsville brands are quoted at $3.25 to $3.50 for prompt shipment and contract.

Finished Iron and Steel.—There is considerable inquiry for small lots of steel both for prompt shipment and for such deliveries as the mills are able to make, the steel bar market being particularly active. Some fourth quarter contracts for Bessemer steel are being placed at 2.60c. for steel bars, these contracts including structural material at 2.85c. and plates at 4c. Some additional first half contracts for steel bars have been taken from the implement trade at 2.50c., Pittsburgh. Steel bars for early shipment are quoted at 2.75c. to 3c. While 4c., Pittsburgh, is the minimum ruling price on plates for early shipment, plates in narrow sizes are being sold for early delivery as low as 3.10c. A Cleveland mill has sold to a local consumer over 10,000 tons of slabs for fourth quarter delivery at $46, Cleveland. Considerable new inquiry is coming out for steel for railroad cars and locomotives. The Wheeling & Lake Erie is in the market for 2000 freight cars and the Nickel Plate is in the market for 1000 cars and 10 locomotives. Small lot sales of rails for prompt shipment aggregating 325 tons are reported at $45. Considerable new demand is coming from fabricators for small lots of steel. The structural material for the new steel plant of the Cromwell Steel Company at Lorain, Ohio, requiring 2500 tons, will be furnished by the Eastern Steel Company. Delayed deliveries and high prices for structural material have caused considerable increase in the demand for reinforcing bars. Hard steel bars are weak, due to the plentiful supply rolled from shell discard and have sold as low as 2.30c., delivered Cleveland. Iron bars are firmer, now being quoted at 2.50c. to 2.60c., Cleveland. There is a good demand for charcoal iron boiler tubes due to the fact that consumers cannot get deliveries on steel tubes. The sheet market is fairly active and while most mills are quoting a minimum of 3c. for black sheets the 2.90c. price has not disappeared. We quote sheets at 2.90c. to 3.10c., Ohio mill, for No. 28 black; 2.90c. to 3c. for No. 10 blue annealed; and 4.15c. to 4.30c. for No. 28 galvanized. Local warehouse prices have been advanced $3 a ton on steel bars, structural material and hoops and $2 a ton on plates. New warehouse prices are 3.40c. for steel bars; 3.90c. for large rounds; 3.40c. for structural material; 3.75c. for plates; 3.90c. for hoops, and 3.25c. for iron bars.

Bolts, Nuts and Rivets.—Specifications which have been quiet for some time have increased and are now heavy in volume, and there is considerable inquiry for bolts for prompt shipment. Quite a demand has sprung up from the implement trade. Rivet prices are unchanged at 4c., Pittsburgh, for structural and 4.10c. for boiler rivets. Bolt and nut discounts are as follows:

Coach or carriage bolts, ⅜ x 6 in., smaller or shorter, rolled thread, 50 and 5 cut thread, 40, 10 and 2½, larger or longer, 40 and 2½. Machine bolts within h. p. nuts, ⅜ x 4 in. smaller and shorter, rolled thread, 50 and 10 cut thread, 50; larger and longer, 40 and 5; lag bolts, gimlet or cone point, 50 and 5. Square h. p. nuts, blank or tapped, $2.70 off the list. Hexagon h. p. nuts, blank or tapped $2.70 off, c. p. c. and t. sq. nuts, blank or tapped, $2.40; hexagon nuts, all sizes, $2.80 off. Cold pressed semi-finished hexagon nuts, all sizes, 60 and 5.

Old Material.—The market is dull but fairly firm. Local mills are well supplied with material and are not actively in the market. Sellers are asking higher prices than the mills are willing to pay and are making but little effort to move the material. A sale of heavy melting steel on track in Youngstown is reported at $16.50. Busheling which was reported sold as high as $13 has sagged back and mills are offering only $12 for this grade. Borings and turnings are also weak. Heavy melting steel is strong and quotations on this grade are 25c. to 50c. a ton higher. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton

Steel rails	$15.25 to $15.75
Iron rails	18.50 to 19.00
Steel car axles	32.00 to 33.00
Heavy melting steel	16.25 to 16.75
Carwheels	12.75 to 13.00
Relaying rails, 70 lb. and over	25.00
Agricultural malleable	12.50 to 12.75
Railroad malleable	14.00 to 14.25
Steel axle turnings	12.00 to 12.50
Light bundled sheet scrap	12.00 to 12.25

Per Net Ton

Iron car axles	$24.00 to $25.00
Cast borings	6.00 to 6.25
Iron and steel turnings and drillings	5.50 to 5.75
No. 1 busheling	12.00 to 12.25
No. 1 railroad wrought	15.50 to 16.00
No. 1 cast	13.00 to 13.50
Railroad grate bars	10.00 to 10.50
Stove plate	10.00 to 10.25

Birmingham

BIRMINGHAM, ALA., Sept. 25, 1916.

Pig Iron.—Sales of pig iron this month have equaled the make in this district, over 30,000 tons having been placed during the third week alone. One of the smaller producers is sold practically to capacity for the remainder of the year and well into 1917. Bookings for the first half of 1917 were made for the larger part at $14.50. The market has apparently hardened to this price as a minimum. A recent sale for Southern delivery embraced 1000 tons of No. 3 for last quarter and first quarter of 1917 each at $14. Another maker sold 1000 tons of No. 2 soft for Western delivery in last and first quarters at $15 and 1000 tons for first half, Southern delivery, at $15. Two iron companies have advanced to $15 on 1917 business, and the largest foundry-iron producer, after making heavy bookings, is on that basis, with indications of advancing still further in the near future. The leading maker has been selling at $14.50 and $15, according to quantity and other conditions of specifications, both for spot and forward, not declining 1917 business at the lower figure. Interest in export iron has declined, owing to the difficulty in securing ships. It is not now probable that any more furnaces will go on basic. The car shortage remains acute; in fact, it is responsible to a degree for the increase in free foundry iron on yards Sept. 1. Several export shipments have been made in the past two weeks and others are due in the near future. As low as $15 ocean freight has been recently offered. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	$15.00 to $15.50
No. 2 foundry and soft	14.50 to 15.00
No. 3 foundry	14.00 to 14.50
No. 4 foundry	13.75 to 14.25
Gray forge	13.50 to 14.00
Basic	14.50 to 15.00
Charcoal	22.00 to 22.50

Cast-Iron Pipe.—The most notable order received recently was for 1200 tons of 4-in. pipe for El Paso, taken by the leading interest. The movement of oil pipe from North Birmingham is proceeding regularly. Prices have advanced, and shipments are keeping pace with the production. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., $29; 6-in. and upward, $26, with $1 added for gas pipe and 16-ft. lengths.

Coal and Coke.—Increasing activity of railroads and coal-using plants has stimulated the demand to such an extent that the output is regulated by the car supply. The demand for blacksmithing coal is strong, with prices at $2.25 per ton for foundries and $2 for railroads. Coke could hardly be more active. An order for 10,000 tons for Italy was declined on account of inability to fill it. Spot foundry coke brings as high as $5 to $5.25 per net ton at oven. On regular contracts prices for standard beehive, f.o.b. oven, remain at $4 to $4.25 and $4.50. Furnace coke brings $3.25.

Old Material.—A sale of 500 tons of cast scrap was made at $11.50 the past week. Steel and wrought are fairly active and yards have little left. The Anniston steel works are taking a lot of Birmingham scrap. Prices are firmer. Steel axles, while not plentiful, frequently go under real value in mixed steel sales. The scrap market is much more promising. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old steel axles	$25.00 to $30.00
Old steel rails	11.50 to 12.00
No. 1 steel scrap	10.50 to 11.00
No. 1 wrought	12.50 to 13.00
No. 1 cast	11.00 to 11.50
Stove plate and light	8.75 to 9.25
Carwheels	11.50 to 12.00
Tram carwheels	11.00 to 11.50

A social club, started several months ago by a few employees of the Minneapolis Steel & Machinery Company, Minneapolis, Minn., and without suggestion from the management, has purchased a house and lot for its headquarters, according to the September issue of the company's *Bulletin*, which is an attractive thirty-page monthly magazine, setting forth the products of the company and the activity of its force.

St. Louis

ST. LOUIS, MO., Sept. 25, 1916.

Pig Iron.—Purchases have been heavy, largely by the stove manufacturers. The aggregate of purchases made by local interests, Belleville and Quincy, Ill., and other points has reached 20,000 to 25,000 tons, chiefly of No. 2, with some No. 3 Southern and a little special analysis iron. Two were for 1000 tons each of No. 2 Southern and one of 1000 tons of Southern special analysis. At Belleville and at Quincy the purchases ran to probably 5000 tons in each instance. Transactions have been largely for first-half delivery. It is pretty well established that $14.50 was the prevailing price.

Coke.—Very little business is reported in coke. The prices quoted here are stiffly held at present with the by-product coke of local plants on a parity with the Connellsville product.

Finished Iron and Steel.—The market has developed no new large tonnage contracts. Specifications are held up closely to contracts. Consumers appear willing to pay prices asked, whether from mills on late delivery or from the warehouses at retail quotations. For stock out of warehouse we quote higher prices as a result of the higher base figures at Pittsburgh. For warehouse stock we quote as follows: Soft steel bars, 3.30c.; iron bars, 3.20c. to 3.25c.; structural material, 3.30c.; tank plates, 3.80c.; No. 10 blue annealed sheets, 3.45c.; No. 28 black sheets, cold rolled, one pass, 3.40c.; No. 28 galvanized sheets, black sheet gage, 4.80c.

Old Material.—Quotations are well held as a result of the entry of consuming interests into the market coupled with the anxiety of dealers to cover shortage and also to provide against the future which they expect to bring higher prices. Mills are paying the higher prices asked for small lots rather unwillingly and are disinclined to take large lots. They regard prices as out of line with the figures of other markets. Railroad material is not coming out in sufficient quantity to weaken dealers' positions materially. Steel scrap is stronger than rolling mill grades, but the latter are well held. The approach of winter is also looked upon as likely to reduce offerings still farther. Lists out during the week included 4300 tons from the Great Northern, 300 tons from the Chicago & Alton, 2000 tons from the Nashville, Chattanooga & St. Louis, 300 tons from the Kansas City Terminal, 600 tons from the Vandalia, 3000 tons from the Burlington and 150 tons from a local industry. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton

Old iron rails	$17.50 to $18.00
Old steel rails, rerolling	17.00 to 17.50
Old steel rails, less than 3 ft.	17.00 to 17.50
Relaying rails standard section, subject to inspection	23.00 to 24.00
Old carwheels	12.50 to 13.00
No. 1 railroad heavy melting steel scrap	16.00 to 16.50
Heavy shoveling steel	15.00 to 15.50
Frogs, switches and guards cut apart	15.75 to 16.25
Bundled sheet scrap	8.25 to 8.75

Per Net Ton

Iron angle bars	$17.25 to $17.75
Steel angle bars	15.00 to 15.50
Iron car axles	27.50 to 28.00
Steel car axles	28.50 to 29.00
Wrought arch bars and transoms	22.00 to 22.50
No. 1 railroad wrought	16.50 to 17.00
No. 2 railroad wrought	14.00 to 16.50
Railroad springs	16.00 to 16.50
Steel couplers and knuckles	16.00 to 16.50
Locomotive tires, 42 in. and over, smooth inside	21.50 to 22.00
No. 1 dealers' forge	13.25 to 13.75
Cast-iron borings	7.25 to 7.75
No. 1 busheling	14.50 to 15.00
No. 1 boilers, cut to sheets and rings	10.50 to 11.00
No. 1 railroad cast scrap	12.50 to 13.00
Stove plate and light cast scrap	9.00 to 9.50
Railroad malleable	11.00 to 11.50
Agricultural malleable	10.00 to 10.50
Pipes and flues	11.00 to 11.50
Heavy railroad sheet and tank scrap	11.00 to 11.50
Railroad grate bars	10.00 to 10.50
Machine shop turnings	7.50 to 8.00

Helen furnace of the Red River Iron Works, Clarksville, Tenn., which has been producing ferrosilicon for the past five months, was blown out for relining Sept. 25. It will probably be in again late in October.

New York

NEW YORK, Sept. 27, 1916.

Pig Iron.—There are some inquiries for foundry iron in New Jersey in lots of 500 to 1000 tons, but the foundry market is generally quiet. In New England, labor troubles have been a great handicap and foundries there seem to be pretty well supplied with iron. A New Jersey steel company bought 4000 tons of basic in the past week for first quarter, mostly high manganese iron. A pipe foundry has been a buyer for 1917 to the extent of 2000 or 3000 tons of No. 3 and No. 2 plain. Some low prices were made in this connection, which ordinarily would correspond to less than $19 delivered for No. 2 X, with a 35 to 40 cent freight. However, furnaces are not naming as low a price on No. 2 X. One eastern Pennsylvania interest has advanced prices lately to $20, furnace, for No. 2 X, but sales are not reported at that figure. Export iron still leads in interest. A sale of 3000 tons of low phosphorus for England was closed in the past week. There is also pending some low phosphorus for France and some Southern foundry iron for the Continent. Buffalo irons have not been particularly active. In view of their large sales in August and early September, furnaces in that district are disposed to ask $19 for No. 2 X for the first half of next year. We quote at tidewater for early delivery: No. 1 foundry, $20 to $20.50; No. 2 X, $19.50 to $20; No. 2 plain, $19.25 to $19.50; Southern iron at tidewater, $19.75 to $20.25 for No. 1 and $19.50 to $19.75 for No. 2 foundry and No. 2 soft.

Ferroalloys.—Sales of about 5000 tons of domestic ferromanganese are reported for the past week, most of it going at $165, delivered, or slightly less. About 300 tons of the British alloy was sold at $164, seaboard. Some dealers report more active inquiry. Quotations generally are $164, seaboard, to $165, delivered, depending on whether domestic or foreign alloy is involved. Spiegeleisen is quiet at about $45, furnace. A 300-ton sale of 16 to 19 per cent material was made this week. Bessemer ferrosilicon is in strong demand and quotations on the lower grades, 10 to 13 per cent, have been advanced $1 per ton. The 10 to 11 per cent grade is quoted at $31, furnace, the 11 to 12 per cent at $32, and the 12 to 13 per cent at $33. The 14 to 15 per cent alloy is selling at $45 per ton, furnace. High-grade ferrosilicon is active with considerable new inquiry.

Structural Material.—The interesting view is expressed that we are on the eve of as big a buying movement by railroads, for bridge work at least, as has ever been known. Besides need for such work, the belief is that large expenditures can now be made and that such will minimize the forcing of wage advances, besides securing a measurable return for the money. General building work of large size is quiet at the moment, but demand for industrial plant additions is still a factor with all its urgency for prompt shipment. The fresh railroad offerings include 300 tons for the Philadelphia & Reading, covering 200 tons at Pottsville, Pa., placed with the Phoenix Bridge Company and the remainder with the McClintic-Marshall Company; 300 tons for two bridges for the Boston & Maine; and about 500 to 600 tons additional work for the Baltimore & Ohio. The Pennsylvania has closed in the last week or two on 2900 tons and has placed a freight house at Harrisburg, 200 tons, with the Phoenix Bridge Company. The Maine Central is expected to be in the market for 2000 to 3000 tons, and the Boston & Maine, it is believed, will ask for as much. Among industrial plants the closures embrace 1100 tons for the Whitney Glass Works, Glassboro, N. J., to the McClintic-Marshall Company; 700 tons for the E. C. Budd Mfg. Company, Philadelphia, to the Eastern Steel Company; 700 tons for two buildings for the General Electric Company, Lynn, Mass., to the Hedden Iron Construction Company; 240 tons for the Cramps shipyard to the Belmont Iron Company, and 200 tons for the Snellenberg department store, Philadelphia. Milliken Brothers has taken 300 tons for W. R. Grace & Co., Lima, Peru, and the Dominion Bridge Company 2500 to 3000 tons for the International Nickel Company, at Port Calborne. It is stated that the Chester, Pa., power house is about closed. Awards in general building lines include 1500 tons for the Racquet & Tennis Club to the American Bridge Company and 3500 tons for the sub-structure to the Paterno apartment building, probably awarded to the Jones & Laughlin Steel Company. A high school in Philadelphia taking 200 tons has been closed and a cathedral, involving 600 tons, for Newark, is up for figures. That city is also to take 500 tons for a bridge at Port Street. We quote mill shipments of plain structural material at 2.769c. to 3.019c., New York, and warehouse shipments, which have advanced $2 per ton, at 3.35c., New York.

Steel Plates.—A buyer of ship material offered to pay 3.75c., Pittsburgh, for 48,000 tons of ship plates to be delivered in 1917, but the mill would not budge from 4c. At this writing the purchase has not been effected, though it is likely that the material will be used in large part at a Staten Island, N. Y., shipyard which has been acquired in this connection. One large domestic manufacturing consumer has bought 10,000 tons for the first quarter at 4c., Pittsburgh, and a boiler maker has closed for at least 1000 tons for the same delivery and price, though the tonnage was less than half what was desired. One live inquiry from Italy is for 15,000 tons. Small lots for immediate delivery are commonly done at 5c., Pittsburgh. Wide plates are practically not obtainable prior to the second quarter, and the market is minimum at 4c., Pittsburgh. Plates up to 7 ft. in width likewise take 4c., but deliveries may be made in 6 to 8 weeks, while universal plates are not in good demand and may be obtained in a few weeks and at 3.50c., Pittsburgh. Warehouse prices range from 4c. to 4.50c., New York.

Iron and Steel Bars.—Domestic buying is for the moment quiet, but export business appears to be on a decided upward trend, with opinions expressed that another buying movement is under way, the necessary interval having transpired since the last general export purchasing. On top of the earlier refusal of mills to consider contracts, buyers are now indifferent. In the face of possible higher prices they show every indication of planning to buy merely definite needs. Italy is prominent in the new export offerings and among other things is inquiring for 50,000 tons of billets for shell making. One export sale for 400 tons of flat and round bars is noted and 100 tons of nail wire sold 3.35c. f.a.s., New York. A limited amount of steel bars can apparently be obtained in the fourth quarter at 2.769c. minimum, New York, while the store price is now higher, or 3.35c., New York. Iron bars remain at 2.669c. and 3.25c., New York, respectively, for mill and warehouse shipments.

Old Material.—A better feeling prevails, which is partly due to the reappearance of a demand from western Pennsylvania and partly to increased buying by iron rolling mills. Eastern Pennsylvania consumers of steel scrap are either well stocked or are still prevented by embargoes from taking in shipments. Heavy melting steel scrap for Pittsburgh is now bringing $14 to $14.25, New York, but steel scrap intended for eastern Pennsylvania shows no advance from the figures of the past few weeks. Prices are higher on all kinds of rolling-mill stock, while borings and turnings at last show some tendency toward a higher level, due to a better demand from eastern Pennsylvania consumers. Brokers quote buying prices for the Eastern trade about as follows to local dealers and producers, per gross ton, New York:

Heavy melting steel scrap (eastern Pennsylvania specifications)	$11.75 to $12.00
Old steel rails (short lengths) or equivalent	12.50 to 12.75
Relaying rails	28.50 to 29.00
Rerolling rails	17.50 to 18.00
Poni and steel car axles (for export)	28.50 to 29.00
No. 1 railroad wrought	19.75 to 20.00
Wrought-iron track scrap	16.75 to 17.00
No. 1 yard wrought, long	14.50 to 15.00
No. 1 yard wrought, short	11.75 to 12.00
Light iron (nominal)	3.50 to 4.00
Cast borings (clean)	7.00 to 7.50
Machine-shop turnings (nominal)	5.00 to 5.25
Mixed borings and turnings (nominal)	5.00 to 5.25
Wrought pipe	13.00 to 13.50

Foundries are buying steadily, but not in large

quantities. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

No. 1 cast (machinery)	$15.50 to $16.00
No. 2 cast (heavy)	14.00 to 14.50
Stove plate	11.50 to 12.00
Locomotive grate bars	10.00 to 10.50
Cast car wheels (chilled)	14.00 to 14.50
Malleable cast (railroad)	12.00 to 12.50

Cast-Iron Pipe.—General business is of moderate volume, marked by no heavy purchases, while municipal lettings are almost completely absent. Some of the largest private buyers of pipe are sounding the market for prices for delivery next year. Manufacturers are more willing to sell for delivery this fall than to take contracts for 1917, being quite confident that prices will attain a higher level in the not distant future. Carload lots of 6-in., class B and heavier, are firmly held at $31.50 per net ton, tidewater, with $1 per ton extra on class A and gas pipe.

British Steel Market

Hematite Iron in Strong Demand — Billets Sparingly Offered

LONDON, ENGLAND, Sept. 27, 1916.—(*By Cable*)

The Cleveland pig-iron market is firm with heavy bookings for France. Prompt iron is scarce and an increased output of hematite iron is urgently needed. Restrictions are unrelaxed. American billets are sparingly offered for fourth quarter, with buyers reticent. Two-inch billets for January to March delivery are quoted at £15, c.i.f. Liverpool, and wire rods for October delivery at £19 10s. Prices of tin plate are still quite irregular. Stock plates are quoted at 36s. We quote as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 33s. to 36s.
Steel black sheets, No. 28, export, f.o.b. Liverpool, £20 5s.
Steel ship plates, Scotch, delivered local yards, £13 17s. 6d.
Steel rails, export, f.o.b. works, £10 17s. 6d.
Hematite pig iron, f.o.b. Tees, about 140s.
Sheet bars (Welsh) delivered at works in Swansea Valley, £10 7s. 6d.
Steel bars, export, f.o.b. Clyde, £18.
Ferromanganese (nominal), £35.
Ferrosilicon, 50 per cent, c.i.f., £27.

Hematite Pig Iron Very Scarce—American Steel Scarce and High

LONDON, ENGLAND, Sept. 12, 1916.—(*By Mail.*)—The congestion of orders in the British steel industry is as great as ever, and the labor position is certainly far from satisfactory, in spite of all efforts made to organize the available forces and the introduction of female labor, where this can be done. There is no prospect of the scarcity being remedied until the war is over.

The most striking feature in pig iron is the extraordinary tightness of hematite, where the output is still considerably short of requirements, though urgent needs are being coped with. Export licenses have had to be suspended for a time in order to make up for some of the arrears on home account, while steel works running on munitions use up the greater part of the current output. In other brands the situation is well in hand. It is suggested that French consumers are now asking to have part of their specifications postponed against outstanding contracts, while the tonnage shipped last month showed a new high record. This, coupled with the fact that Italy is now drawing supplies from America, has afforded more facilities in other directions, and enabled a few cargoes to be shipped to Russia via Norway. The outlook causes less anxiety while the production is being slowly further increased.

Conditions in semi-finished steel on the other hand have grown more stringent, nothing being obtainable from home producers outside munition work or for special purposes, for which permits have to be secured from the Ministry of Munitions. American material has tightened further with France and Italy still inquiring for this year's shipments, but offers for anything earlier than the closing months of the year have become very scarce, and the much stiffer terms quoted render business difficult. For 4-in. billets, up to $68 and more is now being asked for the first quarter of next year, while wire rods are quoted £19 10s., c.i.f. Liverpool. Very high prices, too, are demanded for American finished material, small lots of steel bars being offered at £17, c.i.f. Liverpool for September-October.

There has been no important change in finished iron and steel, export business being paralyzed by the severe restrictions of war work although there is still a steady demand for various classes of material. The River Plate is now inquiring for cast-iron pipe, while similar business could be secured for South Africa. Black steel sheets are hard to get, due to the commandeering of steel by the government and the shortage of American sheet bars. Quotations are thus strongly maintained, while operations have to be restricted.

The demand for tin plate has slackened but the premium on stock plate is as stiff as ever, with the supply steadily diminishing. Fundamental conditions are critical, all indications pointing to a further weakening of the output. Prices continue extremely wide. While the price for stock plate ranges up to about 36s. basis 20 x 14, orders for plates to be made could probably be easily placed at about 28s. per box basis f.o.b.

Germany's Steel Output for July

Germany's steel output for July, 1916, was 1,366,107 metric tons, or at the rate of 52,543 tons per day. This is next to the war record of 54,990 tons per day, or 1,319,762 tons in June. The largest war total for a month was 1,412,137 tons in May. The July output was made up of 655,675 tons of Bessemer steel, 579,083 tons of open-hearth steel, 107,277 tons of steel castings, 9620 tons of crucible steel and 14,452 tons of electric steel. More than half of this output, or 772,340 tons, came from the Rhineland-Westphalia district, with 124,584 tons coming from Alsace-Lorraine. The steel casting and electric steel outputs continue at record proportions with the July production of crucible steel the largest of the war.

Pig-Iron Exports Make a Record

Pig-iron exports from the United States are now at a greater rate than ever before. For the first six months of 1916 they were 184,471 gross tons, or 24,745 tons per month, and for the fiscal year ended June 30, 1916, they were 286,728 tons or 23,994 tons per month. July exports this year were 28,718 tons. In 1913 the total exports were 277,648 tons, or 23,137 tons per month. These figures contrast with only 18,708 tons per month in 1915 and 9535 tons per month in 1914.

British Iron and Steel Exports

Advance information regarding British exports of iron and steel and manufactures thereof is that the total for August, 1916, was £5,986,292, which exceeds the value for August, 1915, by £2,452,568 and that for August, 1914, by £3,690,941. Imports of iron ore, scrap iron and steel increased noticeably, the total value being £1,266,585, or an increase of £597,240 over August, 1915.

The Lebanon Valley Iron & Steel Company, Lebanon, Pa., plans to install a new 9 and 12 in. tandem rolling mill. Work has been started on the foundations. Equipment for which orders have been placed includes a 200-hp. Wickes and a 200-hp. Hyde boiler and a 450-hp. Murray engine. Part of the new mill building, which will be 66.5 x 200 ft., will be given over to the manufacture of nuts. When the new addition is completed the company will have 12, 10, 9 and 8 in. finishing mills and a puddling mill.

The Brown Hoisting Machinery Company, Cleveland, has taken an order for 22 locomotive cranes for shipment to the French Government.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, effective from April 10, 1916, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c.; Pacific coast (by rail only), 65c.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 2.60c. to 2.75c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs	.10
Angles, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Plates.—Tank plates, ¼ in. thick, 6 in. up to 100 in. wide, 3c. to 4c., base, net cash, 30 days, or ½ of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras

	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers)	.10
Boiler and flange steel plates	.15
"A. B. M. A." and ordinary firebox steel plates	.20
Still bottom steel	.30
Locomotive firebox steel	.50

Marine steel, special extras and prices on application.

Gage Extras

	Cents per lb.
Rectangular, 1¼ in. thick, over 6 in. wide to 100 in. wide	Base
Lighter than ¼ in., to 3/16 in., up to 72 in. wide	.10
*Lighter than ¼ in., including 3/16 in., over 72 in. to 84	.20
*Lighter than ¼ in., including 3/16 in., over 84 in. to 96	.30
*Lighter than ¼ in., including 3/16 in., over 96 in. to 100	.40
*Lighter than ¼ in., including 3/16 in., over 100 in. to 102	.45
Lighter than 3/16 in., including No. 8, up to 72 in. wide	.15
*Lighter than 3/16 in., including No. 8, over 72 in. to 84	.25
*Lighter than 3/16 in., including No. 8, over 84 in. to 96	.35
Lighter than No. 8, including No. 10, up to 60 in. wide	.30
Lighter than No. 8, including No. 10, over 60 in. to 64	.35

Up to 72 in. and not less than 10.2 lb. per sq. ft. will be considered ¼ in.
Over 72 in. must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.
Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.
Over 72 in., ordered weight 3/16 in., take No. 8 price.
Over 72 in., ordered weight No. 8, take No. 10 price.

Width Extras

Over 100 in. to 110 in. inclusive	.05
Over 110 in. to 115 in. inclusive	.10
Over 115 in. to 120 in. inclusive	.15
Over 120 in. to 125 in. inclusive	.25
Over 125 in. to 130 in. inclusive	.50
Over 130 in.	1.00

Length Extras

Universal plates 80 ft. long up to 90 ft. long	.05
Universal plates 90 ft. long up to 100 ft. long	.10
Universal plates 100 ft. long up to 110 ft. long	.20

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over.

Lengths under 3 ft. to 2 ft. inclusive	.25
Lengths under 2 ft. to 1 ft. inclusive	.50
Lengths under 1 ft.	1.55
Circles 3 ft. in diameter to 100 in.	.30
Circles over 100 to 110 in. (width extra)	.35
Circles over 110 to 115 in. (width extra)	.40
Circles over 115 to 120 in. (width extra)	.45
Circles over 120 to 125 in. (width extra)	.55
Circles over 125 to 130 in. (width extra)	.80
Circles over 130 in. (width extra)	1.30
Circles under 3 ft., to 2 ft., inclusive	.55
Circles under 2 ft., to 1 ft., inclusive	.80
Circles under 1 ft.	1.85

Half circles take circle extras.

Sketches not over four straight cuts, inc. straight taper	.10
Sketches having more than four straight cuts	.20

Plates sheared to a radius take complete circle extras.

*Including extra for width.

Wire Rods.—Including chain rods, $55 to $60.

Wire Products.—Prices to jobbers effective Aug. 5: Fence wire, Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, $2.55; galvanized, $3.25. Galvanized barb wire and staples, $3.45; painted, $2.75. Wire nails, $2.60. Galvanized nails, 1 in. and longer, $2 advance over base price; shorter than 1 in., $2.50 advance over base price. Cement-coated nails, $2.50. Woven wire fencing, 60 per cent off list for carloads, 59 off for 1000-rod lots, 58 off for less than 1000-rod lots.

The following table gives the price per 100 lb. to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	6 to 9	10	11	12&12½	13	14	15	16
Annealed	$2.60	$2.65	$2.70	$2.75	$2.85	$2.95	$3.05	$3.15
Galvanized	3.30	3.35	3.40	3.45	3.55	3.65	4.10	4.20

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect on black pipe from Sept. 7, 1916, and on galvanized pipe from July 24, 1916, all full weight:

Butt Weld

Steel: Inches	Black	Galv.	Iron: Inches	Black	Galv.
⅛, ¼ and ⅜	62	35½	⅛ and ¼	51	24
½	66	51½	⅜	52	25
¾ to 3	69	55½	½	56	38
			¾ to 1½	59	43

Lap Weld

2	63	50½	1¼	46	31
2½ to 6	66	53½	1½	52	38
7 to 12	63	49½	2	53	39
13 and 14	63½	..	2½ to 4	55	42
15	51	..	4½ to 6	55	42
			7 to 12	54	41

Reamed and Drifted

1 to 3, butt	67	53½	¾ to 1½, butt	54	37
2, lap	61	48½	1¼, lap	41	25
2½ to 6, lap	64	51½	1½, lap	47	32
			2, lap	48	33
			2½ to 4, lap	51	36

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	58	40½	⅛, ¼ and ⅜	51	34
½	63	50½	½	56	43
¾ to 1½	67	54½	¾ to 1½	60	45
2 to 3	68	55½			

Lap Weld, extra strong, plain ends

2	61	49½	1¼	48	33
2½ to 4	64	52½	1½	53	39
4½ to 6	63	51½	2	55	42
7 to 8	59	45½	2½ to 4	57	45
9 to 12	54	40½	4½ to 6	56	44
			7 to 8	50	38
			9 to 12	45	33

Butt Weld, double extra strong, plain ends

½	54	43½	½	43	31
¾ to 1½	57	46½	¾ to 1½	46	34
2 to 2½	59	48½			

Lap Weld, double extra strong, plain ends

2	53	43½	1½	42	30
2½ to 4	55	45½	2	42	30
4½ to 6	54	44½	2½ to 4	44	35
7 to 8	49	39½	4½ to 6	43	34

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts on less than carloads, freight to destination added, effective from Sept. 7, 1916, are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1½ in.	33	1½ in.	25
1¾ and 2 in.	45	1¾ and 2 in.	37
2¼ in.	42	2¼ in.	34
2½ and 2¾ in.	48	2½ and 2¾ in.	40
3 and 3¼ in.	53	3 and 3¼ in.	45
3½ to 4½ in.	54	3½ to 4½ in.	46
5 and 6 in.	47	5 and 6 in.	39
7 to 13 in.	44	7 to 13 in.	36

Locomotive and steamship special charcoal grades bring higher prices.

1¾ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Sheets.—Makers' prices for mill shipments on sheets of U. S. standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Blue Annealed Sheets

	Cents per lb.
Nos. 3 to 8	2.85 to 2.95
Nos. 9 and 10	2.90 to 3.00
Nos. 11 and 12	2.95 to 3.05
Nos. 13 and 14	3.00 to 3.10
Nos. 15 and 16	3.10 to 3.20

Box Annealed Sheets, Cold Rolled

Nos. 17 to 21	2.80 to 2.90
Nos. 22 and 24	2.85 to 2.95
Nos. 25 and 26	2.90 to 3.00
No. 27	2.95 to 3.05
No. 28	3.00 to 3.10
No. 29	3.05 to 3.15
No. 30	3.25 to 3.35

Galvanized Sheets of Black Sheet Gage

Nos. 10 and 11	3.25
No. 12	3.35
Nos. 13 and 14	3.35
Nos. 15 and 16	3.50
Nos. 17 to 21	3.65
Nos. 22 and 24	3.80
Nos. 25 and 26	3.95
No. 27	4.10
No. 28	4.25
No. 29	4.40
No. 30	4.65

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin,	Lead		Spelter	
		Electro-	New	New	St	New	St
Sept	Lake	lytic	York	York	Louis	York	Louis
20	28.25	28.37½	38.62½	7.00	6.85	9.50	9.25
21	28.00	28.25	38.87½	7.00	6.85	9.37½	9.12½
22	28.00	28.25	38.50	7.00	6.85	9.25	9.00
23	28.00	28.50	...	7.00	6.85	9.25	9.00
25	28.00	28.75	38.62½	7.00	6.85	9.00	8.87½
26	28.00	28.75	38.62½	7.00	6.85	9.00	8.75

NEW YORK, Sept. 27, 1916.

Copper is strong and active following the record export transaction. Tin is a little higher but consumers continue conservative. Lead is quiet but steady. Spelter is again inactive and lower. No interest is shown in antimony.

New York

Copper.—Interest to a very large extent has been centered in the contract for 448,000,000 lb. of copper which was closed late last week between representatives of the entente allies and the principal copper producing companies. A brief account of the purchase appears in another part of this issue. In the opinion of the trade, the best thing about the big sale is that it will assure a steady market for probably a year and thereby enable consumers to buy with easier minds. The transaction will take the allied governments out of the market for at least six months, leaving it strong, but quiet, unless there should be a great increase in domestic industrial demand. With prices where they are, however, it is considered doubtful if purely domestic business will become much heavier, inasmuch as the tendency already is to find substitutes for copper. Domestic consumers have bought freely since they first heard that the closing of the big contract was imminent. Prompt electrolytic was quoted yesterday at 28.75c. to 29c.; October at about 28.50c.; and November and December at about 28c. Sales for the first quarter have been made at 27.25c. to 27.75c. Lake copper is extremely scarce this side of December, for which position it is quoted at 28c. The exports this month, including yesterday, total 21,851 tons. The London market for electrolytic, quoted a week ago at £130 10s., stood yesterday at £138.

Tin.—In a quiet way there has been a little more activity but, while the undertone is good, sellers are disappointed with the failure of consumers to come strongly into the market. Two reasons are advanced to account for the situation, one being that the tin-plate price for next year has not been fixed and that manufacturers do not want to buy pending its adjustment. The other reason is that consumers some time ago accumulated reserve stocks which they are now using. It is believed that when buying does start it will come with a rush and that a runaway market is not improbable. On Sept. 21 about 100 tons was taken, future deliveries being specified for the most part, some of them as far ahead as next June. On the following day probably 300 tons changed hands and the nearby positions again were neglected. From day to day there has been a steady business in Banca at recessions from the price of Straits. The latter, spot delivery, was quoted yesterday at 38.62½c. The arrivals this month total 3750 tons and there is afloat 2960 tons.

Lead.—The market has become much quieter and is steady at 7c., New York, and 6.85c., St. Louis. Domestic consumers bought freely on the rise but seem now content to simply watch the market. For prompt metal independent producers last week asked up to 7.15c., New York, but they are now offering at the 7c. level. A feature of the situation is a heavy demand from Canadian interests which are still in the market. The production and consumption of lead are pretty evenly matched, and it therefore takes but little to change the course of the market. The exports this month, including yesterday, total 4416 tons.

Spelter.—Some interests reported more inquiry yesterday than had existed for some days, but the market was nevertheless spotty and prices were a shade lower than on the preceding day. Spot was quoted yesterday at about 9c., New York, and 8.75c., St. Louis, with last quarter at 8.50c. to 8.62½c., St. Louis. Business tapered off early last week. A round sized lot was taken early last week by Canadian consumers. The big purchase of copper by Great Britain and her allies is expected to eventually bring about a good movement in spelter, but it is realized that this may not come for several weeks or even months. The exports are heavy, amounting this month, including yesterday, to 10,591 tons.

Antimony.—The dullness of recent weeks is unbroken, so far as prompt deliveries are concerned. Some sales of near future metal have been made at 9.50c., in bond. Certain producers say they are holding for 13c. in bond, but from dealers spot metal can be obtained around 11c., duty paid.

Aluminum.—No. 1 virgin aluminum, 98 to 99 per cent pure, is quoted at 62c. to 63c. per lb.

Old Metals.—The market is firm. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible	26.00 to 27.00
Copper, heavy and wire	24.50 to 25.50
Copper, light and bottoms	21.50 to 22.50
Brass, heavy	14.00 to 15.00
Brass, light	11.50 to 12.00
Heavy machine composition	20.00 to 20.50
No. 1 yellow rod brass turnings	14.75 to 15.50
No. 1 red brass or composition turnings	16.00 to 17.00
Lead, heavy	6.25
Lead, tea	5.75
Zinc	7.00 to 7.50

Chicago

SEPT. 25.—Recent selling of copper has evidenced the same spectacular demand that has been absorbing ferrous metal production. Lead also has been active, but spelter is again quotably lower. We quote: Casting copper, 26.50c. to 27c.; Lake copper, 28.50c. to 29c.; tin, carloads, 39.50c., and small lots, 41c.; lead, 6.90c. to 6.95c.; spelter, 9c.; sheet zinc, 15c.; Cookson's antimony, 50c.; other grades, 13c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 22c.; copper bottoms, 20c.; copper clips, 21c.; red brass, 18.50c.; yellow brass, 14c.; lead pipe, 5.50c.; zinc, 6c.; pewter, No. 1, 25c.; tinfoil, 27c.; block tin pipe, 32c.

St. Louis

SEPT. 25.—Lead has shown the greater activity among the metals, and has moved up somewhat. The closing quotations today were: Lead, 6.95c. to 7c.; spelter, 9c. to 9.25c., according to delivery; tin, 41c.; Lake copper, 29c.; electrolytic copper, 28.75c. to 29c.; antimony, 14.50c. to 15c. In the Joplin ore district lead ore also took an upward shoot and sold up to $75 per ton, with the average for the district at $70. Zinc blende sold at $45 to $65, with the average for the district $56. Calamine sold at $35 to $45, with the average for the week at $42. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 9c.; heavy yellow brass, 12c.; heavy red brass and light copper, 17c.; heavy copper and copper wire, 19c.; zinc, 6c.; lead, 5c.; tea lead, 3.50c.; pewter, 25c.; tinfoil, 31c.

At the fire at the plant of the Delaney Forge & Iron Company, Buffalo, N. Y., on Sept. 15, only one of the five buildings was destroyed, with a total loss of not over $25,000, instead of $200,000, as previously reported. One motor generator set was the only equipment ruined and only three days' time was lost.

The J. M. Schoonmaker, one of the ore boats belonging to the Shenango Steamship & Transportation Company, recently took to upper Lake ports on one trip 14,473.95 tons of coal, which was the largest cargo of coal ever hauled on any Lake boat in one trip.

On Oct. 6 the city of Alliance, Ohio, will receive bids for one 6,000,000-gal. cross compound pumping engine and one motor-driven triplex booster pump. Bids will be received Oct. 5 for 1000 disc meters, ranging in size from ⅝ in. to 1 in.

Iron and Industrial Stocks

NEW YORK, Sept. 27, 1916.

The stock market has been boiling the past week. Transactions have attained a larger volume daily than for a considerable number of years, and several industrial stocks have made new high records. United States Steel Corporation common sold up to 120 and the preferred to 121¾. Republic common reached 72½. Various other stocks made new high records. Profit taking caused recessions the early part of this week, but apparently the break in prices was not due to a collapse of the upward movement. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com..	24½- 26⅞	Pitts. Steel, pref.	100 -103
Allis-Chal., pref..	79 - 80¾	Pressed Stl. com.	58½- 61½
Am. Can, com...	63⅞- 67⅞	Pressed Stl. pref.	103 -106⅞
Am. Can, pref...	112½-113⅞	Ry. Steel Springs, com	70 - 74½
Am. Car & Fdy., com	65¼- 68⅝	Ry. Steel Spring, pref	101
Am. Car & Fdy., pref	117⅛	Republic, com ..	64⅛- 72½
Am. Loco., com..	77½- 81	Republic, pref...	110⅝-112
Am. Loco., pref..	107¾-10	Sloss, com.....	57½- 60½
Am. Stl. Fdries..	56¼- 59½	Sloss, pref.....	97
Bald. Loco., com	84½ 90½	Pipe, com.....	22⅜- 23¼
Bald. Loco., pref.	106	Pipe pref	53⅜- 55
Beth. Steel, com.	554 - 575	U. S. Steel, com..	107 -120
Case (J. I.), pref..	84½	U. S. Steel, pref..	120½-122
Colo. Fuel.....	527⅛- 59½	Va. I. C. & Coke	49¾ 54½
Deere & Co., pref.	92 - 93½	Westing. Elec...	63½- 67⅞
Gen. Electric....	173¾-175½	Am. Rad., com.....	397
Gt. No. Ore Cert.	42 - 45⅜	Am. Ship, com .	49 - 49¾
Int. Harv. of N. J com.	115¾-118	Am. Ship, pref.....	94
Int. Harv. of N. J. pref	120	Cin. Iron Tool	73 - 76
Int. Harv. Corp., com.	77½- 78	Cambria Steel...	81¼- 82
Int. Harv. Corp., pref	109	Lake Sup. Corp..	13⅜- 14⅞
Lacka. Steel	82¾- 87	Warwick	95⅜- 98¾
Nat. En. & Stm., com.	28¼- 31½	Cruc. Steel, com.	89 - 97¼
Nat. En. & Stm., pref	95½- 96	Cruc. Steel, pref.	119½-121¾
N. Y. Air Brake..	140 -144	La Belle Iron, com	61 - 67
		Carbon Stl., com.	88 - 89
		Central Fdy., pref....	28½
		Driggs-Seabury .	94½-108
		Midvale Steel...	72¾- 76¼

Dividends

The Yale & Towne Mfg. Company, regular quarterly, 1¾ per cent and special 5 per cent, both payable Oct. 2.

Manning, Maxwell & Moore, Inc., regular quarterly, 1½ per cent, payable Sept. 30.

The Boston Belting Company, regular quarterly, $2 a share, payable Sept. 30.

The Eastern Car Company, Halifax, N. S., regular quarterly, 1½ per cent, payable Oct. 14.

The Nova Scotia Steel & Coal Company, regular quarterly, 2 per cent on the preferred stock, payable Oct. 14. No action was taken on the common stock dividend.

The Colt's Patent Fire Arms Mfg. Company, regular quarterly, 4 per cent, and extra 2½ per cent, payable Oct. 2.

The International Harvester Company of New Jersey, regular quarterly, 1¼ per cent on the common stock, payable Oct. 16.

The Torrington Company, regular quarterly, 75c. per share on the common stock, payable Oct. 1.

The Willys-Overland Company, regular quarterly, 1¾ per cent on the preferred stock, payable Oct. 2.

The American Screw Company, regular quarterly, 1¼ per cent payable Sept. 30.

The American Seeding Machine Company, regular quarterly, 1 per cent on the common stock and 1½ per cent on the preferred stock, payable Oct. 15.

The Canadian Crocker-Wheeler Company, regular quarterly, 1¾ per cent on both common and preferred stocks, payable Sept. 30.

The Canadian Locomotive Company, regular quarterly, 1¾ per cent on the preferred stock, payable Oct. 1.

The General Railway Signal Company, regular quarterly, 1½ per cent on both common and preferred stocks, payable Sept. 30.

The Hupp Motor Car Corporation, regular quarterly, 1¾ per cent on the preferred stock, payable Oct. 2.

The Otis Elevator Company, regular quarterly, 1¼ per cent on the common stock and 1½ per cent on the preferred stock, payable Oct. 16.

The Saxon Motor Car Corporation, regular quarterly, 1¾ per cent, payable Oct. 2.

The Youngstown Sheet & Tube Company, regular quarterly, 2 per cent on the common stock and 1¾ per cent on the preferred stock, payable Oct. 1.

The E. W. Bliss Company, regular quarterly, 1¼ per cent on the common stock and extra of 100 per cent, payable Oct. 2. An extra of 100 per cent was paid July 1 of this year.

The Lebanon Chain & Iron Company, Lebanon, Pa., is taking bids on a new building, 60 x 120 ft., of steel construction, as an addition to its plant. This will double the present capacity. Edgar A. Weimer is president and Frank E. Krause is manager.

Judicial Decisions

ABSTRACTED BY A. L. H. STREET

PRIORITY OF MORTGAGES ON MACHINERY.—One who lent money to be used by the borrower in purchasing additional machinery to be installed in an industrial plant, under a mortgage covering the plant and "all machinery that may hereafter be added to said premises," has a lien on newly acquired machinery superior to that of the selling manufacturer under a chattel mortgage given back by the owner of the plant to cover the purchase price of such new machinery; the first-mentioned mortgagee having recorded his mortgage several weeks before the manufacturing company recorded its lien. A mortgage may validly provide that it shall cover property to be acquired by the mortgagor in the future. (Arkansas Supreme Court, Murray Company vs. Satterfield, 187 Southwestern Reporter, 927.)

INJURY CAUSED BY CLOGGED MACHINE.—An operator of a punching machine is not to be prevented from recovering for injury due to negligent starting of the machine by his superior employee while he was unclogging it, because he had been instructed to call the machinist when necessary; it appearing that the services of the machinist were not reasonably necessary in this instance. (New York Supreme Court, Appellate Division, Cocchia vs. Rapid Addressing Machine Company, 160 New York Supplement, 474.)

WITHDRAWAL OF OFFER OF SALE.—An offer to sell goods on condition that an acceptance of the offer be accompanied by certified check was subject to withdrawal any time before the check was mailed. (New York Supreme Court, Appellate Division, Hayman vs. Canton Art Metal Company, 160 New York Supplement, 42.)

PAYMENT OF ACCOUNTS.—Receipt of a payment in full discharge of an unliquidated or disputed claim will bar any further demand on the same indebtedness. But when a debt is definitely ascertained as to amount, the receipt of part, although acknowledged as full satisfaction, does not discharge the debtor's liability for the balance actually remaining due, unless the release be given on some new consideration. (Oklahoma Supreme Court, Sherman vs. Pacific Coast Pipe Company, 159 Pacific Reporter, 333.)

BUYER'S WAIVER OF RIGHTS CONCERNING MISREPRESENTATIONS.—When a contract for sale of machinery is modified under the buyer's claim that the original contract was induced by misrepresentations made to him, he thereby waives any right of action on account of any such misrepresentations. And a buyer's inexcusable delay for a year in attempting to rescind a purchase on the ground of fraud bars a rescission at his instance. (California Supreme Court, Brown vs. Domestic Utilities Mfg. Company, 159 Pacific Reporter, 163.)

WAIVER OF DEFECTIVE CONDITION OF WIRE.—Where a quantity of wire was sold without any representation on the part of the seller as to its condition, the buyer's acceptance and use of it after inspecting it will waive any right to claim damages afterward on account of any obviously defective condition. (Oklahoma Supreme Court, Talley vs. Harrison, 159 Pacific Reporter, 366.)

Book Review

Poor's Manual of Industrials for 1916. Pages, 3112; 5¾ x 8¾ in. Published by Poor's Manual Company, New York. Price, $10.

With 3112 pages of text, the manual for 1916 is nearly 10 per cent larger than the previous one. It contains the latest income accounts and balance sheets of industrial companies. These tables are in most cases presented in comparative form, showing at a glance the growth of the business. The general information in the book is revised to Aug. 15. There is also an appendix giving recent information on the steam railroads and the public utilities. Since nearly all manufacturing companies have had a phenomenal volume of business in the past year and profits have broken all records, Poor's Manual of Industrials is of particular value at this time. Its exhibits, while in prosaic setting, represent a veritable romance in American industrial development.

STRIKES AND SETTLEMENTS

Some New England Troubles Subsiding

Conferences are in progress which it is believed will settle the trouble at the Pittsfield, Mass., plant of the General Electric Company. Members of the State board of conciliation and arbitration are conducting the negotiations and are hopeful of bringing about an agreement. It has been stated by the union leaders that unless a settlement is effected by Thursday, Sept. 28, the employees of the Schenectady plant of the company will go out in sympathy.

The strike in Greenfield, Mass., among the toolmakers is a thing of the past, as the men have voted unanimously to return to work.

The trouble among the foundries in Bridgeport, Conn., has taken a new turn. Suits aggregating $200,000 have been brought against the Monumental Bronze Company, E. N. Sperry, its president; John Thompson, the latter's chauffeur; Richard F. Claney, superintendent, and Charles Robinson, a foreman. There are three complainants who in two cases assert that the defendants instigated attacks upon them which resulted in personal and property injuries, and all three claim that they were fraudulently arrested and tried on the charge of breach of the peace. In these trials the complainants were acquitted. Real estate and money belonging to the defendants have been attached. There are now suits pending against some of the strikers, and it is probable that the series of suits will go to the Supreme Court. Conspiracy is charged against both parties to the controversy.

Milwaukee Machinists' Strike About Ended

Milwaukee employers have won in the strike trouble with the machinists' unions, which culminated in walkouts on July 18 to enforce the demand for an 8-hr. day without reduction in pay. All last week a throng of striking machinists went back to work, and with the decision on Sunday, Sept. 24, of the strikers from the Allis-Chalmers shops to return, the trouble is practically at an end. The Milwaukee Metal Trades and Founders' Association is considered an unequivocal victor, not having been obliged to make any concessions or to accede to any demand of the unions, or to offer any inducements for the men to return to work. In fact, the employers were placed in the position of selecting the men they wanted from those of the strikers who applied for their former positions.

Female Labor in French Munition Plants

No more men are to be employed in French munition plants where the work can be equally well done by women, according to an order by the French Minister of Munitions. A list of operations which can be as well performed by women includes, in the manufacture of steel, shells between 75 and 120 mm.; the preliminary examination of the bars and materials, including manipulation of the testing laboratory; all cutting-off operations excepting the setting of the machine tools and the hardening and tempering of the shell, including subsequent verifications and the measurement of temperatures. In the machining stages half the operations are to be performed by women who will make the subsequent examinations preparatory to the fixing of the copper bands in the hydraulic press, which they will also undertake, together with the turning and gaging. In the production of gaines the manufacture of the head will be done by men, but all the other operations, greasing and casing, will be done by women, who will also perform certain work connected with the manufacture of the body. In making plugs for the gaine relays certain manipulations on the big power presses are to be reserved for men, but all the work at the drills, lathes and grinders is to be done by women, who will also gage the finished parts. In the manufacture of the case of the 75 mm. shell practically every operation up to the final painting and varnishing is scheduled as woman's work. About half the work on the priming tubes of the 75's will remain in the hands of men, and the same applies to the manufacture of brass fuses up to the machine stages, but the screwing, finishing and final gaging are to be done by female labor.

Record-Breaking Tin-Plate Exports

Tin-plate exports from the United States now exceed anything ever recorded. For the first six months of 1916 the total was 122,839 gross tons or at the rate of 20,473 tons per month. The increase since January has been progressive, starting with 12,177 tons and increasing to 29,750 tons for the month of June. The largest previous exports before the war were 4817 tons per month in 1913. The following table from Government data gives the comparison of exports in gross tons:

	Total	Tons Per Month
First half of 1916	[illegible]	[illegible]
Fiscal year ended June 30, 1916	[illegible]	19,206
Fiscal year ended June 30, 1915	[illegible]	6,067
Fiscal year ended June 30, 1914	[illegible]	4,939

It will thus be seen that the average for the first half of 1916 exceeds the previous war record of 19,206 tons for the last fiscal year. The July exports were 18,742 tons.

As indicating the breadth of the distribution of export tin plate, the table below gives the Government data showing the destination of most of the exports for the fiscal years ended June 30, 1914 and 1916, in gross tons:

	1914	1916
Great Britain	None	24,783
Canada	2,210	12,394
Argentina	1,282	18,717
Brazil	800	11,848
China	4,012	15,807
British India	9	20,334
Japan	191	24,647
Other countries	3,685	33,250

The great increase in exports to Great Britain and Canada is noteworthy, as well as to China and Japan.

Tin-plate exports for Great Britain for the first six months of 1916 were 198,335 gross tons or 33,056 tons per month. In 1914 they were 435,392 tons or 36,282 tons per month.

New Rennerfelt Electric Furnaces

Four more Rennerfelt electric steel furnaces for installation in the United States have been sold by Hamilton & Hansell, 17 Battery Place, New York, as follows:

Ducas & Co., New York, a 3-ton furnace, 600 kw., for making steel castings and ingots

Maynard Steel Casting Company, Milwaukee, Wis., a ¾-ton furnace, 300 kw., for making steel castings.

The Acieral Company of America, Newark, N. J., a 300-lb. furnace, 50 kw., for making special alloys

J. Leslie Rodgers, Philadelphia, a ¾-ton furnace, 200 kw., for making tool steel. This company will also install 10 small furnaces of special size for making ferrotungsten.

Besides these American installations, six Rennerfelt furnaces have been sold abroad in the last few weeks, all to be used for making steel. The total number of Rennerfelt furnaces installed or contracted for is now 76, of which 18 are in the United States, not including the 10 small ones, mentioned above, for making ferrotungsten.

Central Station Power for Steel Mills

Central station power for steel mills was discussed at the recent annual meeting of the Association of Iron and Steel Electrical Engineers at Chicago. The larger mills, it was asserted, can produce power as cheaply and as reliably as central stations, but with the smaller mills, where the process begins with billets and is carried through to a finished product, central station power is in favor. One suggestion was that central stations might very well purchase the surplus gas of the steel plant for fuel purposes and the steel mill in turn purchase the electrical energy. The point is that in plants where fuel gas is available the peak supply does not always coincide with the peak power demand. It was also contended that the utilization of waste heat involves so much money in the matter of first cost of the power installation that the unit cost of the power is very nearly as great as power generated from a coal-burning plant.

Pittsburgh and Nearby Districts

The Wheeling Mold & Foundry Company, Wheeling, W. Va., was incorrectly reported in THE IRON AGE of Sept. 21, page 652, as having closed its plant on account of labor troubles. The company states that only a portion of the men in one of its departments stopped work for two days last week while certain details as to shop practice were discussed. An agreement which was satisfactory to both the employees and the management was reached and the interruption was so slight as to be hardly remarked. The company further states that the entire plant is working to its utmost capacity without any element to retard its production.

The Allegheny Steel Company, Pittsburgh, which has an open-hearth steel plant and sheet and plate mills at Brackenridge, Pa., is adding another 100-ton open-hearth furnace, which will be ready about Dec. 1, and is also adding more soaking pits. The present plant has six basic open-hearth furnaces and two 4-hole soaking pits. Several years ago the company bought a 36-in. blooming mill of the Mackintosh-Hemphill type that was built for another concern, and stored it at Brackenridge. It is now being prepared for use and will be ready for operation about Dec. 1. This mill will greatly increase the output of sheet bars, which will relieve the company, as it has been a buyer of sheet bars in the open market to a considerable extent. With the new open-hearth furnace finished, the plant will have a monthly output of 20,000 tons or more of steel ingots.

The net profits of the Pittsburgh Steel Company, Pittsburgh, operating blast furnaces, steel plant, rod, wire and wire nail mills at Monessen, Pa., and hoop and band mills at Glassport, Pa., for the year ended June 30, were $4,564,067, which is stated to be equivalent to 54.7 per cent on the $7,000,000 common stock after allowing the full 7 per cent on the $10,500,000 preferred stock.

The Pannier Bros. Stamp Company, manufacturer of steel stamps and dies, Pittsburgh, has completed plans for the erection of a four-story building, 24 x 100 ft., at Sandusky and Cajou streets, North Side, Pittsburgh. It will occupy the entire building.

In furtherance of its safety-first campaign, the H. C. Frick Coke Company, Pittsburgh, is giving moving pictures at different points throughout the Connellsville coke region. These reproduce in a realistic way various accidents occurring in and about the mines within the past year or two, with demonstrations as to the manner by which the accidents might have been avoided. The pictures were prepared specially for the company. C. L. Albright, manager of the safety-first work of the company, is in charge of the demonstrations.

Stockholders of the Mahoning Valley Steel Company, organized some months ago to erect a sheet-mill plant at Niles, Ohio, have organized by electing Jacob D. Waddell, president; Thomas E. Thomas, vice-president and treasurer, and W. Aubrey Thomas, secretary. The company some time ago bought the sheet mills and other equipment of the Atlanta Sheet & Tin Plate Company at Atlanta, Ind., removed them to Niles, and expects to have the plant in operation before the close of this year.

It is stated that about 50 per cent of the larger nut and bolt manufacturers have notified A. H. Chamberlain, secretary of the American Iron, Steel and Heavy Hardware Association, New York City, that they will continue to allow a 2 per cent discount for bills paid within 10 days after presentment. Some makers of nuts and bolts had proposed to reduce the discount from 2 per cent to 1 per cent.

The American Pattern Mfg. Company, Youngstown, Ohio, recently turned out what is said to be the largest pattern ever made in that district. It is for a pinion housing for a large bar mill being built by the William Tod Company for the Imperial Steel Company of Kobe, Japan. The pattern, when assembled, stood 12 ft. high, 16 ft. wide and 18 ft. long. The diameter of the pinion is 6 ft. 2 in., while the face is 5 ft. 3 in. wide. It took 8000 ft. of lumber.

The Standard Underground Cable Company has purchased property adjacent to its works at Seventh and Pike streets, Pittsburgh, on which it proposes to build an extension.

Contracts are soon to be awarded for the erection of a large addition to the School of Applied Science of the Carnegie Institute of Technology at Pittsburgh, to cost about $300,000. Edward Stotz, Monongahela Bank Building, is preparing the plans.

The Sterling Machine & Stamping Company expects to complete its new foundry at Wellington, Ohio, in October, and is now booking orders for light gray-iron castings. The main foundry building is of concrete construction, 80 x 120 ft. It will have a capacity of six to eight tons of finished castings daily. The company also has an aluminum foundry, which is making kitchen ware and other castings.

Reports are untrue that the Follansbee Brothers Company, Pittsburgh, operating an open-hearth steel plant and sheet and tin plate mills at Follansbee, W. Va., had decided to erect an additional plant at that place to cost $1,500,000. It has merely been considering the erection of another sheet-mill plant, but has done nothing definite.

The Keystone Seamless Tube Company, Pittsburgh, with a capital stock of $20,000, has been incorporated by A. M. Thompson, Gibsonia, Pa.; H. Stewart Dunn, 4111 Alliquippa Street, Pittsburgh, and Roy Rose, Sewickley, Pa.

The Bailey Reflector Company, Pittsburgh, with a capital stock of $30,000, has been incorporated by J. Chalmers Stehley; O. R. Degelman, 617 Second Avenue, Pittsburgh, and J. E. McCalmonte, to manufacture sheet metals, lighting fixtures, etc.

The Vesuvius Crucible Company, Swissvale, Pa., with a capital stock of $5,000, has been incorporated by James R. Dunn, 801 Aiken Avenue, Pittsburgh; James R. Miller, Glen Osborn, Pa., and John Heron, Pittsburgh, to manufacture articles of graphite and other refractory materials.

The Acme Stove & Range Company, Carnegie, Pa., with a capital stock of $150,000, has been incorporated by William Ralph Jones, Andrew C. Weisberg, Thomas A. Havican, William A. Kleeb and H. Fred Mercer, Pittsburgh, to manufacture stoves, ranges and stove accessories.

The Amend Coal Company, Greensburg, Pa., with a capital stock of $100,000, has been organized by J. S. Amend, J. R. Eisaman, C. E. Cowan and Paul Johnson, of Greensburg, and R. W. Playford, Uniontown, to mine coal and to manufacture coke and by-products.

The Baldwin Cutlery Company, Tidioute, Pa., with a capital stock of $15,000, has been incorporated by Henry D. Baldwin, H. S. Keck and Ellis S. Kennedy to manufacture tools.

The Standard Screw Company, Corry, Pa., with a capital stock of $25,000, has been incorporated by S. V. Stewart, F. N. Ames, L. R. Bliss, C. F. Bliss and L. T. McElroy.

Guards Employees' Health and Insures Them.

The Tuthill Spring Company, Chicago, has inaugurated a plan for supplying its employees with medical attendance free of charge and with insurance. It has employed a physician by the year. Employees of five years' standing are insured for $1,000; four years, $900; three years, $800; two years, $700; one year, $600, and six months, $500. A man is not insured until he has been with the company six months, but at the end of that time he is automatically placed on the list of insured. Aside from reasons of philanthropy it is hoped that the plan will lead men to stay longer with the company, endeavoring to keep their positions by faithful service.

Considerable tungsten is coming from Peru. Prior to 1910 none was exported from that country, but in that year 12 tons was shipped. At present about 345 tons per year are exported, mostly to the United States and England. Peru's production of copper bars in 1915 was 30,204 gross tons, against 23,134 and 20,039 tons in 1914 and 1913.

Machinery Markets and News of the Works

LABOR SUPPLY SHORT

Some Cities Lack Housing Facilities

Business Brisk, Though Consisting Mainly of Single-Tool Buying—Pacific Coast Is Prosperous

The shortage of labor threatens to reach an acute stage in some cities. In New Jersey and other Eastern States there not only is an insufficient supply of mechanics, but housing those available is a problem. The worst situation in this respect probably exists in Detroit, where men have been drifting away because of the high rentals they are asked to pay. Skilled men are almost impossible to obtain in that city and production has been curtailed. The labor situation has been relieved somewhat in Milwaukee by the return to work of machinists who walked out July 25, but many more men could be used.

Business is generally brisk, although the absence of round-lot buying is notable. Industrial concerns throughout the country are actually placing orders for one or a few machines, despite the extended time they must wait for the delivery of standard machines.

The automobile truck builders in Cincinnati and elsewhere are working to capacity. The machine tool trade in that city notes a betterment in the domestic demand.

In Cleveland the labor situation in the jobbing foundries shows some improvement. Strike troubles and the shortage of molders have been a great influence in delaying deliveries with those tool builders who do not operate their own foundries.

Good reports come from San Francisco and the Pacific Northwest, where the shipbuilding industry is booming as never before.

Canada is being educated to manufacture products formerly made in Germany. The Department of Trade and Commerce of the Dominion is exhibiting about 8000 samples of goods made in German and Austrian shops and factories. The exhibit was gathered in various parts of the world by the British Board of Trade, and will be shown for two weeks in Montreal and two in Toronto.

New York

NEW YORK, Sept. 27, 1916.

From all directions come reports of a good scattered demand from industrial companies who want from one to three or four machines for the nearest shipment possible. In some cases they have bought second-hand equipment for the reason that it can be shipped immediately from warehouse floors. A dealer who bought seventeen used automatic screw machines re-shipped them without delay to a purchaser.

Not only is present business of a good normal sort, but there is promise of increased activity when the labor situation becomes easier. In parts of New Jersey, Pennsylvania, Maryland and Delaware there is such a dearth of mechanics that several shops are only working 60 to 70 per cent, although they have enough orders in hand to justify operation at full capacity. The housing problem also is a serious one in some localities. In Elizabeth, N. J., where the Samuel L. Moore & Sons Corporation is making large additions to its plant preliminary to the building of small ships and submarines, there are not enough houses, and the high cost of building materials halts the construction of small homes. The Samuel L. Moore & Sons Corporation has erected several new buildings and has just obtained a city permit to run a railroad siding into the shipbuilding plant.

Manufacturers of brass goods are exceedingly busy, and have been active purchasers of hand screw machines. The backwardness of deliveries is evidenced by the fact that machines are being shipped for which the contracts were signed last year, this being the case with a lot of tools for the Jersey City Technical High School. Other machines which were ordered a year ago are just going abroad. Deliveries by tool builders who do not operate their own foundries have been greatly hampered by strike troubles in jobbing foundries, and by the lack of molders where there is no labor trouble.

The Roumanian Purchasing Commission, Hotel Biltmore, New York, was recently in the market for about thirty hand screw machines.

Dealers who have made sales of tools for shipment to Holland say that their forwarding agents are encountering no trouble despite the statement cabled from London a week ago that London would restrict shipments to the Netherlands Oversea Trust. In the week such shipments have been made.

The Joseph Dixon Crucible Company, Jersey City, N. J., has purchased the plant of the Pacific Borax Company on West Side Avenue, Jersey City, comprising about 18 acres with buildings, along the line of the Central Railroad of New Jersey, and will use the property to enlarge its manufacturing facilities.

The Seeley Electric Company, Spencer, N. Y., has increased its capital stock from $15,000 to $30,000.

The Rochester Folding Box Company, 10 Commercial Street, Rochester, N. Y., on account of increasing business, has constructed a new factory on Elizabeth Avenue, Greece, N. Y., 200 x 225 ft., with separate power plants, on a site covering 12 acres.

The Condor Aero Company, Buffalo, recently incorporated with a capital stock of $5,000,000, has purchased a site of 28 acres on Walck Road, North Tonawanda, N. Y., on which it will build, from plans now being prepared, a plant for the manufacture of aeroplanes designed by Max Near and Valentine Buettner, respectively vice-president and secretary of the company. William J. Hines is president.

The Linde Air Products Company, Forty-second Street Building, New York, has awarded contracts for a group of factory buildings to be erected at Stinson Boulevard and East Hennepin Avenue, Minneapolis, Minn., and for two factory buildings, one and two stories, at 155 Chandler Street, Buffalo, N. Y. W. F. Barrett is works manager.

The Mohawk Veneer Company, Salisbury Center, N. Y., has been incorporated with a capital stock of $50,000 to manufacture veneer, etc. The incorporators are T. McCabe, Salamanca, N. Y.; E. R. Morrison, Jamestown, N. Y., and R. Z. Morrison, Warren, Pa.

The Troy Engine & Machine Company, Troy, N. Y., has plans in preparation for a foundry building, one and two stories, which it will erect at an approximate cost of $50,000. John Parsons is president.

The Eclipse Machine Company, Elmira, N. Y., Edw. J. Dunn, president, is taking bids for the erection of a machine shop and tool room addition, 40 x 72 ft., and 40 x 100 ft., respectively, two stories

The Clay Cutlery Company, Andover, N. Y., is taking bids for a factory, 50 x 100 ft., one story, to cost approximately $10,000.

Incorporation papers have been issued to the E. V. Stratton Motors Company, Albany, to manufacture motors, trucks, etc. E. V. Stratton, G. D. Hills and J. S. Pettit, 81 Chapel Street, Albany, are incorporators. The capital stock is $51,000.

The American LaFrance Fire Engine Company, Elmira, N. Y., has let contract for the erection of a machine shop and toolhouse addition, 40 x 100 ft. James R. Clarke is president and general manager.

The Schaffer Loom Company, Buffalo, N. Y., capitalized at

$100,000, has been incorporated to manufacture devices for weaving fabrics, carpets, etc. W. A. Schaffer, Detroit, Mich., and E. H. Patterson, 31 Woodward Avenue, Buffalo, are the directors.

The Catchpole Boiler, Foundry & Machine Works, 27 Jackson Street, Geneva, N. Y., has let contract for the erection of a core building, 50 x 60 ft. Walter Howard is manager.

The Eastman Kodak Company, Rochester, N. Y., has awarded contract for a factory addition, 65 x 125 ft., four stories and basement. J. A. Robertson is manager.

The board of managers of the New York State Training School for Girls, Hudson, N. Y., Annie Windsor Allen, president, is receiving sealed proposals for a heating plant, stokers for boilers, etc.

The National Carbon Company, Cleveland, Ohio, has completed plans for a factory addition, 135 x 300 ft., one story, to its plant at Niagara Falls, N. Y., to cost about $50,000. James Parmalee, West 117th Street and Madison Avenue, Cleveland, Ohio, is president.

M. L. Oberderfer, 804 East Water Street, Syracuse, N. Y., has had plans completed for a core building, 50 x 101 ft., one story and basement, which he will erect at once.

The Titanium Alloy Mfg. Company, Niagara Falls, N. Y., is ready for bids on a boiler house, 46 x 53 ft., one and two stories.

The Hamburg Planing Mill Company, Hamburg, N. Y., is having plans prepared for a two-story mill, 50 x 100 ft., to cost $20,000.

The Buffalo Copper & Brass Rolling Mill, Military Road, Denver Street and New York Central Railroad, Buffalo, F. M. Mills, superintendent, is rebuilding its factory, 100 x 300 ft., one story.

The New York Central Realty & Terminal Company, a holding company of the New York Central Railroad, has purchased the block bounded by Perry, Chicago and Scott streets and the New York Central tracks, in the wholesale produce district of Buffalo, and containing about 3½ acres, on which it will erect a cold storage warehouse.

The Duratex Company, 768 Frelinghuysen Avenue, Newark, manufacturer of leather goods, will build a one and two-story addition, at a cost of about $15,000.

The White Tar Company, Cliff and John streets, New York, will build a refining plant on the Hackensack River, Kearny district, to cost about $30,000.

The Positive Lock Washer Company, Vanderpool Street and Avenue A, Newark, manufacturer of steel lock washers, has had plans prepared for a two-story addition, 60 x 74 ft., to cost about $10,000.

The board of education, Newark, N. J., is taking bids for machine tools and other equipment for its manual training department. R. D. Argue is secretary.

The Central Dyestuff & Chemical Company, Newark, manufacturer of aniline dyes, has filed plans for additions to its plant on Plum Point Lane to be used as a pipe shop, carpenter shop and laboratory.

The Newark Tube & Metal Works, 560 Ferry Street, Newark, specializing in the manufacture of steel tubing, will make alterations and extensions in its plant.

Directors of the German Hospital, 340 Bank Street, Newark, have filed plans for the erection of a mechanical laundry plant and power station, about 40 x 60 ft., to cost $34,450.

The Universal Electric Company, Oliver and Mulberry streets, Kearny, N. J., has been incorporated with a capital of $25,000 to manufacture electrical machinery. Carl T. and Gustave O. Westlin and Frank Koch, Arlington, N. J., are the directors.

The New York Central Railroad has awarded a contract to the Webster Mfg. Company, Chicago, for the installation of ship shovels and conveying machinery at its No. 7 grain elevator, West New York, at a cost of $18,500.

Steel & Skirm, Trenton, have awarded a contract for the erection of an automobile garage and machine shop on Montgomery Street, at a cost of about $15,000.

Rice & Adams, Buffalo, manufacturers of dairy machinery, are taking bids on a three-story concrete addition to its plant, 60 x 175 ft., at Chandler Street and the New York Central Railroad Belt Line. The estimated cost is $75,000.

The Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa., has leased from the Crystal Spring Water Company the four-story building at Tenth Avenue and Thirty-sixth Street, New York, at an aggregate rental of about $150,000. It is reported the building will be used as a service station and factory.

New England

BOSTON, MASS., Sept. 26, 1916.

Control of the Howe Scale Company, Rutland, Vt., has been secured by capitalists whose names have not been divulged. It is reported that the new owners are closely allied with the Du Pont interests. Ex-Governor John A. Mead will become president, Carl B. Hinsman will be vice-president, Edward V. Ross treasurer, and L. G. Bagley general agent. Present plans for enlarging the plant will be carried out.

The Standard Tire Valve Company, Boston, Mass., has been incorporated with capital stock of $100,000. The directors are John W. McCormack, president; Michael F. Clarke, 40 Central Street, treasurer, and J. F. Luther.

The North & Judd Mfg. Company, New Britain, Conn., will build an addition, 57 x 87 ft.

The Hold-No-Fone Company, Boston, Mass., has been incorporated with capital stock of $50,000 to manufacture mechanical instruments. The directors are F. M. Lambert, president; Ellen M. Martin, 600 Massachusetts Avenue, Cambridge, treasurer; and J. O'Brien.

The H. E. Harris Engineering Company, Bridgeport, Conn., has increased its capital stock from $50,000 to $100,000.

The Bridgeport Brass Company, Bridgeport, Conn., has secured a permit to build a casting shop, 40 x 60 ft., one story, on Pembroke Street.

The Clark Brothers Bolt Company, Milldale, Conn., has issued 1000 additional shares of stock, bringing its capital stock to $250,000.

The Bristol Brass Company, Bristol, Conn., has announced that it will build 20 more houses for employees in addition to the 37 now being erected.

The B. & K. Company, New Britain, Conn., has had plans drawn for an addition, 60 x 200 ft., one story, to be used as a forge and galvanizing shop.

The General Electric Company, Windsor, Conn., has awarded a contract for an addition, 30 x 30 ft., three stories.

It is reported that the Chase Rolling Mill Company and the Chase Metal Works, Waterbury, Conn., will erect, on Grand Street, opposite the City Hall, a building to be used as executive offices. It is understood that the building will be a large and imposing structure.

Philadelphia

PHILADELPHIA, PA., Sept. 25, 1915.

Henry Disston & Sons, Inc., Tacony, Philadelphia, have awarded contract to the Austin Company, 53 Transportation Building, Philadelphia, for the erection of a one-story concrete and steel machine shop, 73 x 150 ft., at Unruh Street, east of State Road, at an estimated cost of $29,000.

The Edward G. Budd Mfg. Company, Twenty-fifth Street and Hunting Park Avenue, Philadelphia, manufacturer of steel automobile bodies, etc., has awarded contract to Joseph S. Miller & Co., for electrical equipment for its recent plant additions, at an estimated cost of $20,000.

The Lancaster Steel Products Company, Lancaster, Pa., has started the erection of another addition to its plant in North Lancaster, and will push it through quickly to completion.

The L. & H Clutch Company, Philadelphia, has been incorporated with a capital stock of $25,000, by David Lake, Norristown; Samuel L. Hunter, 149 North Twenty-first Street and Walter W. Hess, 4914 Cedar Avenue, Philadelphia, to manufacture clutches and power transmissions. Milton W. Heiberger, 3807 Chestnut Street, is treasurer.

The American Insulator Company, New Freedom, Pa., has been incorporated with a capital stock of $150,000 by H. C. Hendrix, H. C. Kugler, Maurice Spector, Ira S. Painter, S. C. Bowers, C. N. Neunamaker and Emill Hemming, all of New Freedom; William Ottemiller, G. C. Krone and C. F. Obermaire, York, to manufacture electric insulating materials, etc.

The Anderson Mfg. Company, Philadelphia, has been formed, with a capital stock of $10,000 to manufacture heat-regulating devices and other patented devices. Walter M. Fowler, Sixty-fifth Avenue and Thirteenth Street; James S. Fellows, 3203 Summer Street, and J. Scott Fowler, 39 Laurel Street, Philadelphia, are the incorporators.

Duff C. Law, Inc., Philadelphia, has been incorporated with a capital stock of $20,000, by Duff C. Law, Arthur H. Butler and William H. Thomas, to manufacture motion picture machines and supplies. W. S. Furst, 6375 Lancaster Avenue, Philadelphia, is treasurer.

The West Virginia & Pennsylvania Coal Company, 21 South Twelfth Street, Philadelphia, has been incorporated with a capital stock of $50,000 by Ernest Leigh Clark, 2018

Venango Street, and Dudley Miller, 295 Clairmont Avenue, Philadelphia, and Ernest L. English, Bala, Pa., to mine coal and to manufacture coke and by-products.

Harry Davis and Jefferson Hargest will erect a one-story brick garage and automobile repair shop, 60 x 63 ft., at 302-04-06 Muench Street, Harrisburg, Pa., at a cost of about $8,000.

The Reading Toy Mfg. Company, Reading, Pa., has been incorporated with a capital stock of $12,000 by J. Guy Brinton, Wyomissing, Pa., W. Storm Mahler and J. Earl Heckman of Reading, Pa., to manufacture toys and novelties.

The Benzol Products Company, Marcus Hook, Pa., has awarded contracts to F. W. Van Loon for the erection of a two-story brick and steel factory building, to cost $35,000.

Baltimore

BALTIMORE, MD., Sept. 25, 1916.

The Jones & McComas Box Company, 1818 Lancaster Street, Baltimore, has been incorporated with $25,000 capital stock by Hugh H. Jones, Jr., Dennison Street near Edmondson Avenue; Walter P. McComas and William H. Hudgins.

With $45,000 capital stock, the Standard Welding & Cutting Company, Baltimore, has been incorporated to engage in welding and cutting metals. The incorporators are Benjamin H. Cram, president of the Cram Engineering Company, 501 Maryland Casualty Tower Building, Evan Rinehardt and Leander Dorsey.

The Pyrites Company, Ltd., South Wilmington, Del., will construct a four-story chloriding building, 73 x 94 ft., of steel and concrete construction to cost $20,000; a precipitating tank, and two storage bins. The total cost will be about $30,000.

With $20,000 capital stock the Vesuvius Manganese Company, Vesuvius, Va., has been incorporated. Edward C. Martz, Harrisonburg, Va., is secretary.

The Peach Bottom Slate Corporation, Cardiff, Md., has been organized and plans are being made to enlarge its present plant. Carl R. Gray, president of the Western Maryland Railway Company, Baltimore, is president.

A tank shop will be built at Seventh and Hospital streets, Richmond, Va., by the American Locomotive Company.

With $25,000 capital stock the Pulaski Foundry & Mfg. Company, Pulaski, Va., has been incorporated. O. C. Brewer is secretary.

The Board of Awards, City Hall, Baltimore, will receive bids until Oct. 4 for installing refrigerating machinery in Broadway Market.

The Speakman Supply & Pipe Company, Wilmington, Del., will build a new addition which will cost about $18,000.

A 150-ton crane has been installed at the plant of the Harlan & Hollingsworth Corporation, Wilmington, Del., by the McMyler Interstate Company, Cleveland, Ohio.

Chicago

CHICAGO, ILL., Sept. 26, 1916.

In the standard lines of tools, recent sales have included a considerable number of lathes, largely for domestic shops. Makers of ammunition appear still to be in need of equipment. There is also inquiry from Canadian sources for a variety of machines. In the export trade, some of the local dealers have done an especially satisfactory business in fabricating tools for shipyard work. The selling of new tools of standard pattern is largely possible by reason of deliveries now being made against old orders, but the availability of standard tools in general is still so limited as to make the disposition of second-hand machinery decidedly active. Inquiry from the railroads is scattering, and the only group of tools for which prices are being asked is a lot of wood-working machinery for the International & Great Northern Railroad. The Illinois Central, which issued some months ago a tentative list, is expected shortly to purchase some of the tools quoted upon at that time.

The Chicago Coated Board Company, Chicago, will erect a one-story brick factory at 432 East North Water Street, to cost $10,000. Davidson & Weiss are the architects.

J. F. Cansfield will erect a one-story brick foundry at 1725 Walnut Street, Chicago, at a cost of $8,700.

Lawder Brothers, Chicago, will build a three-story service station, 79 x 163 ft., at 6918-22 Lafayette Avenue, to cost $60,000. William Gauger, 36 West Randolph Street, is the architect.

Frank McNellis, 512 South Racine Avenue, Chicago, will build a one-story factory, 50 x 125 ft., to cost $8,000.

The Illinois Watch Company, Springfield, Ill., will erect a two-story addition to its factory, to cost $8,000.

The Rock Island Mfg. Company, Rock Island, Ill., has taken out a permit for the erection of a foundry to cost $3,000.

The Northern Pacific Railroad has announced plans for the erection of a plant at West Allis, Wis., for the manufacture and repair of [illegible] J. M. Hammond, St. Paul, Minn., is the agent.

The Federal Cartridge & Machinery Company, Minneapolis, Minn., has been incorporated with a capital of $500,000 by Paul R. Seidel, Alvord C. Egelston and G. A. Austin. It will build a plant at Anoka and will manufacture small arms and ammunition.

The Minneapolis Steel & Machinery Company, Minnehaha Avenue and Twenty-ninth Street, Minneapolis, Minn., is building a new tool house parallel with its shell shop, 50 x 130 ft., two stories, of concrete and brick. It will be devoted to the manufacture, repair and storage of tools, jigs and fixtures for its shop. It is also erecting a building, 40 x 80 ft., one story, to house two new forging hammers and furnaces required for forging the tapered end of shells.

The additional manufacturing space to be added to the plant of the Imperial Brass Mfg. Company, 1200 West Harrison Street, Chicago, Ill., will give it a total of 150,000 sq. ft. of floor space, not 50,000 sq. ft., as has been stated

The Denver Rock Drill Mfg. Company, Eighteenth and Blake streets, Denver, Colo., manufacturer of rock drills, drill sharpeners, stopers, drifting machines, etc. is making plans for an additional building, 100 x 125 ft., one story, of brick and steel, to be used for manufacturing. Equipment orders have been placed. The cost of the addition will be about $15,000, and has been ordered on account of an increase of over 50 per cent in its business in the last few months.

Milwaukee

MILWAUKEE, WIS., Sept. 25, 1916.

The production of machine tools has started to show a considerable increase, due to the return to work of a large percentage of the machinists who walked out July 18. It is expected that by a week from to-day the last vestige of the trouble will have been wiped out. The 52½-hr. week, voluntarily instituted by the employers July 1, is being accepted by the strikers, who were at first firm in their position that nothing but a 48-hr. week without reduction in pay would induce them to come back. Considerably more men could be used, however, and the general shortage of labor continues to have the effect of restricting extension work required to handle orders. Orders are coming in in considerably greater volume since the beginning of last week, since word went forth that the machinists' strike is over and that labor costs will not be higher because of any reduction in the weekly working schedule.

The Organ Blowing Engineering Company, 13 West Second Street, Fond du Lac, Wis., is erecting a factory on McWilliam Street and expects to take occupancy about Nov. 1. It manufactures electrical appliances for operating pipe organs. W. H. Fagan is secretary and manager.

The Harris Brothers Company, Chicago and St. Paul, has purchased the property of the Tiger Drill Company, maker of farm implements, Beaver Dam, Wis., from the Union Investment Company. It is expected that the plant will resume operations under the new ownership.

The Esterline-Angus Company, Indianapolis, Ind., is negotiating with the Business Men's Association of Beloit, Wis., for relocating its electrical appliance works. An investment of $50,000 is proposed.

The A. J. Lindemann & Hoverson Company, Milwaukee, manufacturing ranges, stoves and sheet-metal ware, is undertaking an extensive new construction program. Contracts have been awarded for a new enameling building, 60 x 90 ft., costing $7,500, and tentative plans are being prepared for an addition to the six-story manufacturing plant, 100 x 120 ft. The work is in charge of Klug & Smith, consulting engineers, Mack Block.

The Cedarburg Foundry Company, Cedarburg, Wis., is now working overtime shifts and its capacity is well taken up to the end of the year. The foundry was placed in operation after a year of idleness a month ago under the new management of Frank E. Walsh and Ernest Heid, West Allis, Wis.

Articles of incorporation have been filed by the Wellington Electric Company, Milwaukee. The capital stock is $25,000 and incorporators are Henry F. Wellington, Lucas Kropfel and C. H. Juergens. It will do a manufacturing and repair business.

The Dupont Powder Company, Barksdale, near Washburn, Wis., is planning to add a box and crate manufacturing unit, costing about $20,000. F. T. Beers is general superintendent.

The plant of the Lyons Boiler Works, DePere, Wis., is being thoroughly overhauled and the entire drive changed to electricity, in preparation for the reopening of the shops about Oct. 1 under the direction of interests owning the Joliet Bridge & Iron Company, Joliet, Ill. It is said that a new corporation is being organized to have charge, with Andrew A. Woodman as president and general manager.

The Jefferson Auto Company, Jefferson, Wis., will double the size of its garage and repair shop, making it 123 x 123 ft., one-story and basement.

The Luck Garage Company, Luck, Wis., has been organized by Edwin Tretsven, Albin Bergstrom and Robert Forsberg and will erect a garage and repair shop, 50 x 80 ft.

The Common Council, Milwaukee, is taking initial steps to obtain a site near the city hall for the proposed new light and power plant, now occupying the basement of the building. F. G. Simmons, commissioner of public works, is in charge.

Frank Hamacheck, Kewaunee, Wis., manufacturer of pea viners, canning equipment and light implements, has broken ground for his new factory and machine shop, 71 x 121 ft., one-story and basement, of reinforced concrete.

The Cornell Wood Products Company, Cornell, Wis., has started work on an addition to its plant at a cost of about $350,000 equipped.

Detroit

DETROIT, MICH., Sept. 25, 1916.

Conditions in the local machinery market have not changed, the demand being brisk, especially for single tools and lathes. From four to seven months is required for delivery of standard high-grade machines. Manufacturing companies are constantly increasing the size of their plants and the unusual building activity promises continued machinery business.

The labor situation in this section is becoming more acute. Skilled men are almost impossible to obtain, due to the excessive prices charged for housing and food, and several large factories have been forced to curtail their production on this account. Plans are being considered to form cooperative companies for the erection of houses, while several Detroit factories are putting up residences for their own workmen.

The W. J. Burton Company, Detroit, manufacturer of galvanized sheets, corrugated roofing, metal ceiling, etc., has moved into its new plant which covers three acres.

Work has been started on a new factory for the Parker Rust Proof Company of America, Detroit, which will employ 700 men.

The Wolverine Machinery & Supply Company, Detroit, has been incorporated with $10,000 by Oliver D. Henry, 292 Atkinson Avenue, Detroit; George C. Whitney and William C. Ketterring.

The Fuller & Sons Mfg. Company, Kalamazoo, Mich., maker of automobile parts, will expand its plant. Frank D. Fuller is president.

The Brunswick-Balke-Collender Company is erecting a tire plant at Muskegon, Mich., to be completed in 60 days. F. J. Loewe will be general manager.

The Clay Brick Company, Grand Rapids, which was recently reorganized and capitalized at $100,000, has been sold to Chicago capitalists who will make improvements and additions to the plant. John J. Moroney, president, and other officers will remain.

H. E. Barclay, Grand Rapids, is having plans drawn by H. H. Weemhoff, architect, for a two-story brick and steel carriage and wagon factory, 30 x 80 ft.

The capital of the Kelsey Wheel Company, Detroit, has been decreased from $1,500,000 to $1,000,000.

The Standard Machine Company, Owosso, Mich., which recently moved from Bay City and purchased the Castree Company, in Owosso, has purchased several additional buildings, and next spring will build a two-story structure, 66 x 120 ft., to cost $15,000. J. C. Fetter is president.

The F. G. Ruddiman Company, Muskegon, Mich., manufacturer of steel spring clip fiber mats, has increased its capital stock from $10,000 to $50,000 as a preliminary step toward enlarging its plant and output.

Officials of the Fay-Kultgen Foundry Company, St. Joseph, Mich., announce that a large addition to their plant will be built. Recent orders for the manufacture of automobile parts are crowding the works to capacity.

The Four Drive Tractor Company, Big Rapids, Mich., will increase its capital stock and add the manufacture of auto trucks to its products.

The Loveland Company, Detroit, through H. B. Loveland, president, has taken a lease on the plant of the Signal Motor Truck Company and will convert the entire building into a repair shop for automobiles.

The Walcott Lathe Company, Jackson, Mich., will erect a steel building, 132 x 132 ft., on the site of the old Dennis machine shop.

The Wise Electro Sherardizing Company, Detroit, has been incorporated with $15,000 stock by Charles L. Backus, Maxwell M. Wise, 54 Avalon Avenue, and Richard E. Bans.

J. Knape, North and Davis streets, Grand Rapids, Mich., will build an addition to his machine shop, to cost $5,200.

Indianapolis

INDIANAPOLIS, IND., Sept. 25, 1916.

The addition which is being erected to the plant of the Lexington-Howard Company, manufacturer of motor cars, Connersville, Ind., will be 50 x 500 ft., one story, not 125 x 200 ft., as has been stated.

The B & B Mfg. Company, Indianapolis, Ind., maker of foundry and turning machines, has increased its capital stock from $5,000 to $10,000.

Fire at the Sullivan-Geiger Company's plant at Indianapolis, Sept. 20, caused a loss of several thousand dollars, both to stock and machinery. The company manufactures galvanized iron and tin products.

The Chard Lathe Company, Newcastle, Ind., has shipped three carloads of lathes to Coventry, England.

The Commercial Club, Fairmount, Ind., has made an appropriation toward the purchase of an electric sewage pump of capacity of 30,000 gal. per hr.

The Troy Chair Company, Troy, Ind., has increased its capital stock from $12,000 to $24,000.

The Indiana Truck Company, Marion, Ind., has increased its capital stock from $200,000 to $250,000.

The Hoosier Machine Company, Lebanon, Ind., has been incorporated with $60,000 capital stock to manufacture machinery. The directors are M. Oedikirk, W. R. Callane and M. E. Callane.

The Whiteland Tile Company, Whiteland, Ind., has been incorporated with $25,000 capital stock to manufacture tile products. William J. Wright, R. T. Ditmers and J. S. Wright are the directors.

The National Dairy Machine Company, Goshen, Ind., will build a one-story addition to its plant, 50 x 100 ft.

The Fehring Carriage Company, Columbus, Ind., has begun construction on two additions to its plant, one to be 27 x 100 ft., and the other 50 x 50 ft.

The Mowers Mfg. Company, Indianapolis, has been incorporated with $10,000 capital stock to manufacture automobile lamps, brackets, etc. The directors are A. D., B. H. and A. Mowers.

The Standard Electric Mfg. Company, Indianapolis, has been incorporated with $100,000 capital stock to manufacture electrical devices. Earl G. Applegate, David A. Frew and B. Frank Hall are the directors.

The O. A. Klamer Furniture Company, Evansville, Ind., has been incorporated with $77,500 capital stock to manufacture furniture. The directors are Claude Maley, Carl G. Viehe and Daniel Wertz.

Cleveland

CLEVELAND, OHIO, Sept. 25, 1916.

In spite of the absence of round-lot buying the machine tool market continues quite active, dealers reporting a good volume of business in orders from one to three machines, with a fair portion in the heavier types of machine tools. Deliveries on most lines of standard machines show no improvement and are holding up some sales. In other cases sales are being made for shipment up to next summer. The demand for cranes and hoists is very good, but some builders are handicapped because they are unable to secure mill motors within six months or longer. A heavy demand exists for locomotive cranes. The labor situation in local foundries shows some improvement. The American Range & Foundry Company has started up its foundry, which has been shut down for two months on account of a strike, and the Ohio Foundry Company has resumed operation in one of its plants which has been shut down for some time.

The Aluminum Castings Company, Cleveland, has acquired a site south of the city near the Harvard-Dennison car barns, on which a new plant will be erected. It will comprise a two-story main building of steel frame and reinforced concrete, 40 x 220 ft., three one-story steel frame buildings, 40 x 100 ft., 20 x 50 ft., and 20 x 100 ft., respectively, and a one-story office building. The contract has been awarded to the Austin Company, Cleveland.

The Union Chain & Mfg. Company, manufacturer of chain belting, driving chains, etc., Seville, Ohio, has increased its capital stock from $20,000 to $40,000 in order to take care of its rapidly growing business. Additional machinery will be purchased, including turret lathes for boring and turning sprocket wheel blanks, a multiple-spindle drill of the circular type, an automatic gear cutter suitable for series cutting, a key-seating machine, a rolling mill for reducing steel strips up to 8 in., automatic screw machines, etc. A New York office has been opened at 47 West Thirty-fourth Street, in charge of J. R. Shays, Jr.

The Peerless Drawn Steel Company, Massillon, Ohio, maker of cold drawn steel, will enlarge its plant by the erection of three brick and steel saw-tooth-roof buildings, 49 x 326 ft., 14 x 120 ft., and 40 x 120 ft., respectively. The Austin Company, Cleveland, has received the contract.

The extensions to the plant of the Canton Steel Foundry Company, Canton, Ohio, will include additions, 65 x 100 ft. and 65 x 325 ft., to the old open hearth building.

The Osgood Company, Marion, Ohio, will build a 100-ft. extension to its machine shop and structural buildings. A larger capacity has been made necessary by the recent purchas of the machinery equipment of the Ohio Tractor Company, Marion, Ohio. The contract has been awarded to the Bellefontaine Bridge & Iron Company, Bellefontaine, Ohio.

It is announced that the extensions to be made to the plant of the Alliance Machine Company, Alliance, Ohio, will include an erecting shop, 120 x 380 ft.; a two-story pattern shop, 50 x 160 ft.; two three-story pattern storage houses, each 50 x 250 ft., and a blacksmith shop 50 x 150 ft.

The Buckeye Machine Company, Lima, Ohio, will shortly begin the erection of a machine shop and foundry, approximately 400 ft. long, of steel and concrete. Expanding business has necessitated larger quarters and a new site has been acquired on which the new plant will be built.

The Gramm-Bernstein Motor Truck Company, Lima, Ohio, will build large extensions to its plant.

The Adamson Mfg. Company, Akron, Ohio, has increased its capital stock from $150,000 to $300,000.

The Findlay Steel Casting Company, Findlay, Ohio, has been incorporated with a capital stock of $200,000 by E. F. Pelton, C. J. Edwards, W. B. Hale, Harry Tilden and Thomas W. Lane.

Cincinnati

CINCINNATI, OHIO, Sept. 25, 1916.

Local demand for oxy-acetylene outfits and for oxygen is expanding rapidly, and it is reported that all three nearby plants are working to capacity and that outside firms are shipping in large quantities of the gas. Reports from various sources on the machine-tool situation differ very little, and it is generally stated that the domestic business is showing some improvement and foreign orders are still coming in. Most of the foreign business is from Europe, Canadian buying now being confined to machines that are urgently needed but that can be shipped promptly. Second-hand machinery dealers are able to dispose of all the standard sized lathes they can find.

Manufacturers of auto-trucks are working their plants to full capacity on both domestic and foreign orders. The United States Motor Truck Company, Covington, Ky., reports the receipt of an order for 25 large trucks to be shipped to Norway. It has recently filled orders from both England and France.

It is currently reported that a large addition to the Shuey Factories Building, Springfield, Ohio, is under consideration and that construction will begin as soon as the architect's plans are completed.

Contractor W. W. Kolb, 144 East Fulton Street, Columbus, Ohio, has been awarded contract for an addition to the foundry of the Herterstein Company, Columbus.

The Standard Degreasing Company, Columbus, Ohio, incorporated by Charles F. Ritter and others, will build a refining plant for extracting oils from vegetables.

The Acme Mfg. Company, Columbus, Ohio, has been incorporated with $10,000 capital stock by A. E. Beechel and others to manufacture a patented gas sad iron.

The Sweet Laboratory Company, Columbus, Ohio, has awarded contract for a four-story building to be erected at Tompkins and High streets.

The Industrial Securities Company, Columbus, Ohio, closely allied with the Columbus Chamber of Commerce, contemplates the erection of a power and manufacturing building.

The Leidecker Tool Company, Marietta, Ohio, maker of oil-well machinery, will construct a branch plant at Basin, Wyo.

The Anderson Steam Vulcanizer Company, Cincinnati, has been incorporated with $100,000 capital stock by Newton M. Anderson, and others. Its manufacturing plans have not yet been given out.

The Stevens Mfg. Company, Dayton, Ohio, manufacturer of automobile parts, die and tool work, is moving into the former New Era Gas Engine plant at Second Street and the Pennsylvania Railroad. It intends to install a number of automatic screw machines.

Work on the new plant of the Domestic Engineering Company, Dayton, Ohio, in Moraine City suburb, is progressing rapidly. The new building, which will be used for the manufacture of farm-lighting outfits, will be one of the largest structures of its kind in the country. It will be 270 x 1000 ft., two stories, of reinforced concrete construction.

The Urbana Tool & Die Company, Urbana, Ohio, is moving into the building formerly occupied by the Urbana Woolen Mills Company. Equipment will be added.

The Central South

LOUISVILLE, KY., Sept. 25, 1916.

The situation with regard to plant improvements here is illustrated by the fact that one of the largest surety bond writers in this section will not write construction bonds for contractors, when structural steel is involved, unless the steel is actually in the contractor's possession. Local concerns handling steel for building are taking orders only for immediate delivery when they can fill them and several local building projects are reported waiting on easier conditions in the structural steel market. Inquiries for ice-making machinery are becoming more frequent, while shops handling heavy plate work are unable to keep anywhere near orders. Several electrification projects contracted for months ago are just now being carried out.

The Louisville Water Company, Louisville, Ky., is advertising for bids until Oct. 15 for the construction and equipment of the authorized pump house to cost $300,000. W. O. Head is president.

The Louisville Veneer Company, Louisville, Ky., is installing fifteen 440-volt alternating current motors 5 to 75 hp., direct-connected and belt driven, to replace a steam power plant. It will also install a sawmill on a timber tract purchased on Elk Creek, near Indianbottom, Ky.

The Louisville Lead & Color Company, Louisville, Ky., is putting in 14 motors and a motor generator set to supply 220-volt direct current for its 12 freight elevators.

The Kentucky Utilities Company, Lexington, Ky., was the purchaser of the electric light plants at Uniontown and Morganfield, Ky., recently reported sold. Harry Reid, president, states that the company will shortly take over other small Kentucky light and power plants.

The Roy C. Whayne Company, Louisville, Ky., is in the market for a second-hand 40 to 50-hp. single-drum electric hoist, to operate on a three-phase, 60-cycle, 220-volt circuit.

The Rutherford Auto Company, Nashville, Tenn., has applied for a charter with capital stock of $10,000. The incorporators are A. G., D. E., J. W., C. H., and E. R. Rutherford.

The Southern Lumber Company, Johnson City, Tenn., has been incorporated with capital stock of $10,000. E. C. Wallin, E. F. Atell, Will E. Lewis, and others, are incorporators.

William S. Whiting, Elizabethton, Tenn., is in the market for a 12-in. lathe, 20-in. lathe, 12-in. shaping machine, a power hack saw and 30-in. radial drill, all second-hand.

Birmingham

BIRMINGHAM, ALA., Sept. 25, 1916.

Extreme activity in all industrial plants, together with high prices for this year's cotton and that held over from one and two years ago, has stimulated the machinery trade. Deliveries are the real hindrance to a greater activity. The volume of trade is expanding week by week and the expansion is in almost all lines.

The Talladega Pipe & Foundry Company, Talladega, Ala., has been incorporated with a capital stock of $20,000 by S. C. Oliver, R. T. Hicks, H. L. McElderry, and others. It has leased the shops of the Birmingham & Atlantic Railroad and will install a sanitary pipe shop.

The Lindsey Lumber & Export Company, Mobile, Ala., is building a mill to cut 18,000,000 ft. of long leaf yellow pine, reported purchased for about $75,000.

The Wake County Cottonseed Oil Company, Raleigh, N. C., has been incorporated with a capital stock of $50,000 by W. A. Simpkins, J. R. Chamberlain, and others.

Texas

AUSTIN, TEX., Sept. 23, 1916.

An unusually large number of manufacturing and other industrial projects requiring the use of machinery are under way or in prospect in Texas at this time. Money is plentiful and the machinery and tool trade is enjoying its full share of state-wide prosperity.

The Wichita Falls Electric Company, Wichita Falls, which has increased its capital stock from $700,000 to $775,000, will enlarge its electric light and power plant.

The West Texas Electric Company, Sweetwater, has increased its capital stock from $300,000 to $500,000 and will enlarge its electric light and power plant.

The Texas Company, Houston, plans to increase its capital stock from $37,000.000 to $44,400,000, the additional funds to be used to enlarge its oil-refining and marketing facilities.

The building which the Walker Properties Association, Austin, is erecting, will be equipped with canning machinery to turn out 75,000 cans per day. W. F. Gohlke is manager.

The Chevrolet Motor Company of Texas has been incorporated at Fort Worth for the purpose of constructing an automobile assembling plant in that city, to cost about $600.000.

The plant of the Texas Glass Company, Texarkana, is to be enlarged in capacity about 75 per cent and machines installed to take the place of hand work. The improved plant will give employment to about 250 men.

The Texas Land & Development Company, Plainview, which has been reorganized by the election of C. J. Hubbard, Boston, Mass., as president, succeeding H. I. Miller of New York, resigned, will install more than 100 irrigation pumping plants upon shallow wells in that section for the purpose of irrigating about 60.000 acres of land.

The Texas Lockjoint Cement Silo Company, Niles City, will rebuild its silo manufacturing plant, which was recently burned.

The Cameron County Irrigation District No. 2, San Benito, which has been organized to take over the irrigation canal and ditch system of the San Benito Land & Water Company, plans to spend about $250,000 for new pumping machinery and in the construction of canal extensions.

St. Louis

ST. LOUIS, MO., Sept. 25, 1916.

The machine-tool business has continued very good in the local and outlying territories. Export inquiries have been received by companies having completed contracts for certain equipment and who have been asked for delivery dates and prices on repeat orders. One instance was for 40 lathes of certain sizes, while other equipment has also been sought. Prices and deliveries have been given, but orders have not yet been placed. Domestic business is holding up in good volume and while no large lots have come out, a steady demand for all classes of equipment is noted.

The Booth Cold Storage Company, St. Louis, Mo., will begin work at once on an eight-story cold-storage building, 65 x 218 ft., which, with equipment, will cost about $2,500,000.

The Robert Breil Machine & Tool Company, St. Louis, has been incorporated with a capital stock of $12,000 by Robert Breil and others to manufacture tools, machinery, etc.

The George V. Steffens Paper Box Company, St. Louis, has been incorporated with a capital stock of $15,000 by George V. Steffens, Lewis R. Milliken and J. B. Reinhardt, and will equip to manufacture paper boxes and other containers.

The Lafayette Motor Car Company, St. Louis, has been incorporated with a capital stock of $15,000 by Milton B. Strauss, Wilson H. Anderson and James A. Wolfort.

The Bussmann Mfg. Company, St. Louis, maker of fuses, has removed to 3819 North Twenty-third Street, and will increase its capacity about six times.

The Sunkel Engineering Company, St. Louis, has been incorporated with a capital stock of $13,000 by Emil C. Sunkel, and others, and will manufacture heating, cooling, ventilating and lighting apparatus.

The Board of Public Service, St. Louis, Mo., is preparing to receive bids for heavy apparatus for handling freight on the municipal docks, to cost $200,000.

The Liberal Impervious Face Brick Company, Liberal, Mo., has been incorporated with a capital stock of $60,000 by C. W. Hurtgen, L. G. Morgan and Roy Todd and will equip a plant.

The E. A. Martin Machinery Company, Joplin, Mo., has been incorporated with a capital stock of $10,000 by E. A. and L. M. Martin and Grover C. Jones, to manufacture machinery and mining equipment.

The Mosaic Asphalt Shingle Company, Edwardsville, Mo., has been organized with a capital of $18,000 by B. B. Clawson, H. P. Hotz and C. F. Ballweg. The company has acquired a factory and work will be commenced as soon as the machinery is installed.

The Batesville Iron Works, Batesville, Ark., which has been closed for several months, will be reopened at once. John C. Evans will be manager.

The Current River Furnace & Chemical Company, Kansas City, Mo., has been incorporated with a capital stock of $50,000 by William A. Thompson, W. H. Langford and William A. Rule, and will equip a plant for the treatment and reduction of ores and the manufacture of chemicals.

The Perfect Smoke Consumer & Fuel Economizer Company, Springfield, Mo., has been incorporated with a capital stock of $13,000 by Thomas M. Brown, Frank W. Adams and Otis Moser, to manufacture smoke consumers.

The Robidoux Automobile Company, St. Joseph, Mo., has been incorporated with a capital stock of $15,000 by L. T., E. O. and Dale Harvey.

The Carthage Foundry & Machine Works, Carthage, Mo., will erect and equip a plant, 74 x 143 ft., two stories.

The Columbian Steel Tank Company, Kansas City, Mo., will erect and equip a four-story manufacturing building. A five-story building will be built in 1917.

A filter plant will be built in connection with the waterworks at Galena, Mo. The mayor can be addressed.

C. H. Reed, Brays, Mo., is reported in the market for one 25-hp. steam engine, etc., for road work.

The Dayton Dick Company, Quincy, Ill., is in the market for a 100 to 125-hp., 440-volt, three-phase electric motor and other equipment.

R. A. Dowdy, and others, will equip a broom factory at Batesville, Ark., and are in the market for machinery.

The Little Rock Marble & Granite Company, Little Rock, Ark., has been incorporated with a capital stock of $10,000 by S. E. Matthews, C. Q. Kelley, and others, and will install stone working equipment.

The St. Louis Southwestern Railway, C. D. Purdon, chief engineer, St. Louis, Mo., will equip a 24-stall round house and a machine shop at Pine Bluff, Ark.

Waterworks plants are being planned by Arkansas City, Ashdown, Beebe, Benton, Bentonville, Conway, Corning, Enders, Hartford, Hatfield, Heber Springs, Junction City, Marianna, McCrory, Piggott, Pocahontas, Portland, Rector, Springdale, Star City, Wilmot, all in Arkansas, and in each case the city clerk and the mayor may be addressed for information.

The Chess & Wymond Company, Louisville, Ky., will equip a cooperage plant at Pine Bluff, Ark., requiring about $30,000 worth of machinery.

The Pocahontas Waterworks Improvement District, No. 1, Pocahontas, Ark., B. A. Brown, secretary, will receive bids for a complete plant including oil engine, motors, pumps, etc., filter and allied equipment.

Waynoka, Okla., will improve its electric light plant equipment at a cost of about $25,000. Alva B. Simonds is clerk.

The Pippin Mfg. Company, Oklahoma City, Okla., has been organized by R. C. Hawley, and others, and will equip a plant for which lathes, milling, shaping, drilling and planing machines will be required.

The Oil & Gas Producers Company, Bartlesville, Okla., has been incorporated with a capital stock of $250,000 by W. H. Byron, and others, and will be in the market for equipment.

The Western Flint Glass Company, Checotah, Okla., A. C. Dodd, manager, will install about $15,000 worth of equipment.

The S. & S. Motor Company, Commerce, Okla., has been incorporated with a capital stock of $15,000 by C. V. Sturat, and others, and will buy machine shop and garage equipment.

The Dupont Lumber Company, Poplarville, Miss., will remodel and enlarge its present mill, installing additional machinery.

Tchula, Miss., will equip a waterworks plant at a cost of about $13.500. W. W. Gwin, mayor, is in charge.

The Beaumont Veneer Works, Beaumont, Miss., will add about $4,000 worth of equipment to its plant. J. H. Overstreet is owner.

The Oak Lawn Sugar Company, Franklin, La., is in the market for engines, pumps, etc., for irrigation.

The school board, Lake Charles, La., is in the market for manual training equipment for the schools, including wood-working and iron and steel working machinery.

Shreveport, La., will install waterworks pumping station equipment to cost about $200,000. J. B. Hawley is consulting engineer.

The Pacific Northwest

SEATTLE, WASH., Sept. 22, 1916.

At no time for years have the iron working plants and boiler manufacturers in the Northwest experienced such a period of unusual prosperity as now. This is largely due to the unprecedented expansion of shipbuilding which extends over the entire Pacific coast. Many tentative offers of contracts for boiler and similar work have been refused, owing to pressure of work on hand. An instance of this is a tentative contract offered by the Union Iron Works, San Francisco, to the Commercial Boiler Works, Seattle, for the construction of eighteen 1000-hp boilers, the contract amounting to $[illegible],000. The Commercial Works was forced to refuse the contract, as it has orders that will keep its plant running to capacity until the spring of 1918. Prices are good, and with apparently increased activity in shipbuilding a busy winter and spring are promised for the iron works here. Similar conditions prevail in Tacoma and Portland, where every plant equipped for building marine machinery is running to capacity. Similar busy conditions prevail at the sheet-metal shops throughout Seattle. They report business in better condition than for a decade.

The J. F. Duthie Shipbuilding Company, Seattle, has been forced to refuse several tentative contracts for ships, due to pressure of work already contracted for. Although very young in the field, this company will shortly have 2000 men at work.

According to reports of the port warden, Seattle's overseas, coastwise and Alaska commerce for August has again passed the $42,000,000 mark for a period of one month. Of this amount $11,000,000 constituted shipments to Alaska for the month.

The Robbins Lumber Company, Spokane, Wash., plans a four-story addition to its plant at 1218 Railroad Avenue, where it manufactures bodies for automobiles, dairy wagons, etc. It will be 16 x 30 ft., of concrete and brick, and is to be equipped.

The Chamber of Commerce, Portland, Ore., is back of a project to establish a car-building plant in Portland. It is suggested that the Twohy Brothers plant, which is partially equipped for this purpose, be improved and extended.

The Port of Astoria, Ore., is installing coal-handling equipment at an expenditure of $18,000.

The first unit of the Anaconda Copper Mining Company, Great Falls, Mont., on which work started last December, has been completed and is in operation.

The Williams Flume Patents Holding Company, Boise, Idaho, has been incorporated for $20,000, and will construct a plant nearby for the manufacture of a metal water flume. H. S. Williams, Edwin Snow and J. L. Savage are stockholders in the company.

The Roache Timber Company, Sutherlin, Ore., is having plans prepared for an electrically operated sawmill to be built in Sutherlin. It will have capacity of 200,000 ft. daily. The company also plans the construction of 15 miles of railroad to tap its timber reserves. The combined improvements will cost $1,500,000.

The Heath Shipbuilding Company, Portland, Ore., has recently secured a site for its proposed shipbuilding plant to be erected by George E. Hardy and E. W. Heath, the incorporators. Work on two sets of ways will begin at once, and the company expects to have two vessels under way within 30 days.

Articles of incorporation of the Three Forks Portland Cement Company, Lewiston, Mont., have been filed, with capital stock of $2,400,000. The company has recently taken over the Hanover Gypsum Company holdings, and will construct a cement plant.

The Chicago, Milwaukee & St. Paul Railway is in the market for 10,000,000 ft. of lumber for grain doors for box cars used in the hauling of wheat.

The Kilbourne & Clark Company, Seattle, manufacturer of wireless equipment, has increased its capital stock from $100,000 to $1,000,000 and plans the enlargement of its plant in Seattle, and the establishment of an assembling plant in New York. The new capital will be put into improvements and extensions of its plant in Seattle.

The Minneapolis Steel & Machinery Company, Minneapolis, Minn., plans the establishment of a branch house in Great Falls, according to George M. Gillette, general manager, and N. G. Nelson, sales manager, who recently made an inspection of sites. It will construct its own building in the city, and will feature its farm tractors.

The Union Meat Company, Portland, has awarded contract for another six-story reinforced concrete and brick building to be erected at its plant at Kenton. The new structure will cost complete $75,000.

San Francisco

SAN FRANCISCO, Sept. 19, 1916.

The number of inquiries for metal-working tools is apparently on the increase. They are mostly small propositions, involving only a few tools, but several deals of considerable importance are under way. Especial interest is taken in the prospective navy yard requirements. Local shipbuilders have been among the largest buyers, and continue to place scattering orders as additional needs appear. The garage and small-shop business is picking up, as needs [illegible] but [illegible] prospects of an easier market seem remote. Wood-working machinery is still rather quiet, but the outlook is improving somewhat. Milling and grain-handling equipment is in good demand. A number of large irrigation projects are under way, requiring much heavy construction work as well as pumps, etc. Inquiries are still coming fairly well from the mining districts, and some orders are appearing for gold dredging equipment, while the oil tool business is quite active. The gas engine manufacturers are very busy, and are carrying out a number of changes, most of them intending to make Diesel engines.

The Dividend Mfg. Company, Modesto, Cal., has been organized to manufacture machinery. It will specialize on a concentrator, patent for which is controlled by S. P. Coffer.

Construction has been started by the Holton Power Company, Holton, Cal., on an ice plant, which will cost about $400,000.

It is announced that the Great Western Power Company will start work within the next year on another hydroelectric plant above Oroville, Cal., to develop about $100,000 hp.

The Riverside Specialty Works, Riverside, Cal., capitalized at $50,000, will build a plant for the manufacture of automobile parts.

Canada

TORONTO, Sept. 23, 1916.

The Department of Trade and Commerce of Canada has secured an exhibit of 8000 samples of goods of German and Austrian manufacture, collected by the British Board of Trade in various parts of the world. These samples will be exhibited for two weeks each in Montreal and Toronto. The samples comprise articles of almost every line of manufacture and will be accompanied by very complete information regarding the markets, terms, prices and analysis. Mr Kershaw, of the commercial intelligence branch of the British Board of Trade, will accompany the exhibit, and Watson Griffin, acting Commissioner of Commerce, will have charge of arrangements in Canada. While this will be only a temporary exhibit, arrangements are under way by the Trade and Commerce Department for the establishment of a permanent sample museum at Ottawa.

Mr. Just, trade commissioner for Russia, states in his report to the Department of Trade and Commerce, Ottawa, that agricultural implements, other than harvesting machinery, are in strong demand. The short supply of implements has been strikingly illustrated in gathering the hay and rye crops this season.

In New Zealand corrugated galvanized sheets are reported by Canadian Trade Commissioner Beddoe to be in substantial demand. The duty on galvanized corrugated sheets in New Zealand is £2 a ton on goods manufactured in the British Empire and £2 8s. a ton on foreign goods, thus providing a preference of 8s. for Canadian goods as compared with foreign goods. Mr. Beddoe also states that difficulty is also experienced in securing mild steel bars and structural iron in New Zealand. Orders have recently been filled for mild steel bars from India at prices below the latest Canadian quotations. This is business that has arisen since the outbreak of war and will be watched with considerable interest.

Canada's exports of nickel for the fiscal year ended June last are set forth in a government report made public recently. It states that in the year mentioned Canada exported $6,180,998 worth of nickel to the United States, while only $1,689,012 worth went to Great Britain. This is an increase of nearly $2,500,000 over the previous fiscal year.

Beatty Brothers, Fergus, Ont., manufacturers of conveyor machinery, door tracks and hangers, etc., have awarded the contract to J. W. Oakes, Guelph, Ont., for the erection of an addition to their plant, of brick and concrete, to cost $50,000.

Harley-Kay, Ltd., Georgetown, Ont., manufacturer of knitting machinery, has taken over the plant of the Georgetown Foundry & Machine Company. New buildings will be erected to accommodate the [illegible] manufacture of new lines. The extensions will cost $15,000.

The Western Drydock & Shipbuilding Company, Port Arthur, Ont., has signed contracts for the construction of [illegible] more freighters.

The Pacific Steel Products Company, Eburne, B. C., is building a plant, including a rolling mill.

The Quaker Oats Company's plant at Saskatoon, Sask., will be enlarged so that it will have a daily capacity of 1200 bbl. of flour per day instead of 600 bbl. The machinery to be installed will cost about $45,000. A part of the plant previously unoccupied will be used to house the new plant.

The Saskatchewan Bridge & Iron Works proposes to establish a plant at Moose Jaw, Sask., and is asking the City Council to grant a special rate for electric current. George Harrison is manager.

The Canadian Northern Railway has let the contract for the erection of a machine shop at Port Arthur, Ont., to J. H. Simmons, Winnipeg, Man.

The Bryant Paper Company, Kalamazoo, Mich., proposes to build a pulp mill at Toronto to cost $1,500,000.

The Electro Steel & Metals, Ltd., Welland, Ont., will build an addition to its foundry at a cost of $10,000.

The Maxwell Motor Car Company will commence work shortly on the erection of a plant at Windsor, Ont., to cost $60,000. A site was purchased some time ago.

Large additions will be made to the plant of the Maple Leaf Harvest Tool Company at Tillsonburg, Ont., and new machinery will be installed. Charles G. Evans is superintendent of the company.

The ratepayers of Niagara Falls, Ont., carried a by-law to grant concessions to the Perfection Motor & Tire Company, Madison, Wis., in return for which it will erect a plant there to cost $35,000.

C. J. Halliday, mayor Chelsey, Ont., is in the market for one 60-cycle, 60-hp., 3-phase motor, connected to centrifugal pump for use in the pumping station.

The Waterworks Committee, Sherbrooke, Que., propose to install a vertical plunger pump with a daily capacity of 4,000,000 gal. E. C. Gatien is secretary.

Plans are being prepared by F. S. Mallory, 65 Adelaide Street East, Toronto, for the erection of a brick and concrete manufacturing plant for the Canada Metal Company, 33 Fraser Avenue, Toronto, estimated to cost $25,000.

The Ottawa Car Company, Slater Street, Ottawa, will commence work on the erection of a brick factory to cost $10,000.

The Adams Brothers Harness Mfg. Company, 204 King Street East, Toronto, has commenced the erection of a brick and concrete factory on King Street West, to cost $75,000. F. Farley is superintendent.

Wilfred H. Pauze, 1822 Cote des Neiges Road, Montreal, is in the market for one wood sticker, small planer, band saw and circular saw.

The Fess Oil Burners of Canada, Ltd., Toronto, has been incorporated with a capital stock of $100,000, by William S. Morlock, 85 Bay Street; Reginald H. Parmenter, 93 Dunvegan Road; Samuel D. Fowler, and others, to manufacture engines, oil burners, etc.

The International Metal Works, Ltd., Brockville, Ont., has been incorporated with a capital stock of $30,000, by Thomas J. Storey, Walter J. Jarman, Ellery L. Wright and others, to manufacture automobiles, aeroplanes, etc.

The Canada Light, Heat & Welding Company, Ltd., Toronto, has been incorporated with a capital stock of $1,000,000 by Willis B. Sturrup, 6, Adelaide Street East; John F. MacGregor, 237 Beech Avenue; James W. Bicknell, and others to make calcium carbide, generators, etc.

An extension is being erected to the machine room of the Garden City Paper Mills Company, St. Catharines, Ont., 40 x 70 ft., one story.

At a meeting of the directors of the Provincial Paper Mills Company, Ltd., held in Toronto, recently, it was decided to have plans prepared for a two-machine mill to be erected at Mille Roches, Ont.

London, Ont., proposes to install a water wheel, electric generator, and a 250-hp. pump in its waterworks plant at a cost of $15,000. E. V. Buchanan is general manager.

The West Kootenay Power & Light Company, Nelson, B. C., will install an 8000-hp. unit at its plant at Upper Bonnington Falls, B. C.

The Provincial Hydro Electric Commission will spend in the neighborhood of $1,000,000 in doubling the equipment at its Toronto station.

St. Mary's, Ont., will call for tenders for a gasoline-driven centrifugal pump. Thomas M. Clark is town clerk.

The Richam Mfg. Company, Ltd., Hamilton, Ont., has been incorporated with a capital stock of $150,000 by George A. Truman, Christopher G. Christopher, both of Hamilton; Edward Truman and Frederick Bell of Burlington, Ont., and others, to manufacture automobile tires and accessories.

The Houpt Paper Mills, Ltd., Camden East, Ont., has been incorporated with a capital stock of $100,000 by Lewis F. and Wilber E. Houpt of Buffalo, N. Y.; Dan J. Albertson, Kalamazoo, Mich., and others.

The Signal Systems, Ltd., Toronto, has been incorporated with a capital stock of $40,000 by Thomas S. Jardine, William H. Irving, 10 Adelaide Street East; Henry H. Davis, 143 Bloor Street West, and others, to manufacture mechanical apparatus.

George W. Whalen has completed financial arrangements with eastern Canadian associates for the opening of pulp plants at Quatsino Sound and Swanson Bay, in addition to the present works of his company at Howe Sound, B. C. The Swanson Bay plant will have a daily capacity of 30 tons and Quatsino Sound 120 tons. The latter will be handled by the Colonial Pulp & Paper Mill, a corporation with a capital stock of $2,500,000.

The cost of the new forge shop which is being erected for MacKinnon, Holmes & Co., Sherbrook, Que., will approximate $25,000, not $5,000, as has been stated.

Government Purchases

WASHINGTON, D. C., Sept. 25, 1916.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, schedule 167, for two motor and turbine-driven centrifugal pumps for Norfolk; schedule 168, for one motor generator set for Pensacola; schedule 169, for one forcing and straightening press for Washington; schedule 170, for one electric spot welder for Pensacola; schedule 171, for one milling, drilling and boring machine, one involute gear-cutting equipment, one heavy grinding machine, miscellaneous bench, engine and turret lathes, one profiling machine, one milling machine, one automatic screw machine, one screw-slotting machine, one boring and turning mill, and two drill presses, all for Portsmouth; schedule 175, for 26 pneumatic trolley hoists for Puget Sound.

The Bureau of Yards and Docks, Navy Department, Washington, will receive sealed proposals until 11 a. m., Oct. 28, for one 20-ton locomotive crane for New York; until 11 a. m., Nov. 11, for one locomotive jib crane of 50-ton capacity for Pearl Harbor, and one 250-ton floating revolving crane for Mare Island.

Sealed proposals will be received until 2 p. m., Oct. 12 by the supervisor of the Yosemite National Park, Yosemite, Cal., for furnishing hydroelectric equipment consisting of water wheels, generators, transformers, switchboard, etc.

The general purchasing officer of the Panama Canal, Washington, will receive sealed proposals until 10.30 a. m., Oct. 14, under circular 1083, for furnishing a motor-driven grinding machine, a plate-bending roll, etc.

Bids were received by the Bureau of Supplies and Accounts, Navy Department, Washington, Sept. 19, for supplies for the naval service as follows:

Schedule 43, Ordnance

Class 71, Puget Sound—One heavy duty engine lathe—Bid 65, $3,390; 140, $3,610; 153, $3,356; 156, $3,440 and $3,465; 163, $3,625.50.

Schedule 64, Yards and Docks

Class 101, Charleston—One locomotive crane and lifting magnet and one clamshell bucket—Bid 16, $11,299; 106, $12,024; 124, $12,855; 139, $11,075; 158, informal.

Schedule 65, Ordnance

Class 111, Philadelphia—One electric truck and crane—Bid 96, $2,500

Schedule 81, Yards and Docks

Class 141, Philadelphia—One hydraulic pump—Bid 116, $2,914; 151, $2,264; 167, $2,074; 200, $2,825; 201, $2,850 and $3,000.

Schedule 82, Navigation

Class 151, Annapolis—One surface condenser—Bid 16, $2,250; 201, $1,850.

Schedule 84, Construction and Repair

Class 171, Philadelphia—Two horizontal centrifugal pumps—Bid 55, $1,000 and $925; 79, $553.69; 126, $772; 148, $1,438; 201, $720.

The names of the bidders and the numbers under which they are designated in the above list, are as follows:

Bid 16, Browning Company; 55, A. S. Cameron Steam Pump Works; 65, Hallidie Machinery Company; 79, Dayton-Dick Company; 96, Galion Dynamic Motor Truck Company; 106, Industrial Works; 116, Kemp Machinery Company; 124, Link-Belt Company; 126, Lea-Courtney Company; 139, McMyler Interstate Company; 140, Manning, Maxwell & Moore, Inc.; 148, Morris Machine Works; 151, National Electrical Supply Company; 153, D. Nast Machinery Company; 156, Niles-Bement-Pond Company; 158, Ohio Locomotive Crane Company; 163, Perine Machinery Company; 167, Rumsey Pump Company, Ltd.; 200, Watson-Stillman Company; 201, Worthington Pump & Machinery Corporation.

THE IRON AGE

New York, October 5, 1916

ESTABLISHED 1855 VOL. 98: No. 14

How a Worcester Plant Controls Production

The Production Department and the Dispatching Division of the Heald Machine Company — Some Details of Its New Machine Shop

BY W. E. FREELAND

THE problem of standardizing repeated operations, centralizing their control and visualizing the actual conditions affecting production in his plant is one of major interest to the modern manufacturer. Just as every business has itself been an evolution, so must every production system be an evolution. Local conditions always prohibit the establishment of a complete standard system adaptable in all its details to any machine shop or metal-working industry. Thus, as in the case of the Heald Machine Company, Worcester, Mass., a production department separate in its functions from the manufacturing department must take storage of materials and directs the work of the engineering department, which in this plant does not include the machine design department. The engineering department plays a part in the routing of the work because upon it rests the burden of tool equipment and upkeep and of much of the work preparatory to actual production. The actual assignment of jobs is delegated to the dispatching division of the manufacturing department.

The routine following the receipt of orders which would bring the stock of assembled machines low is this: The sales manager notifies the management when sales of a particular type of machine

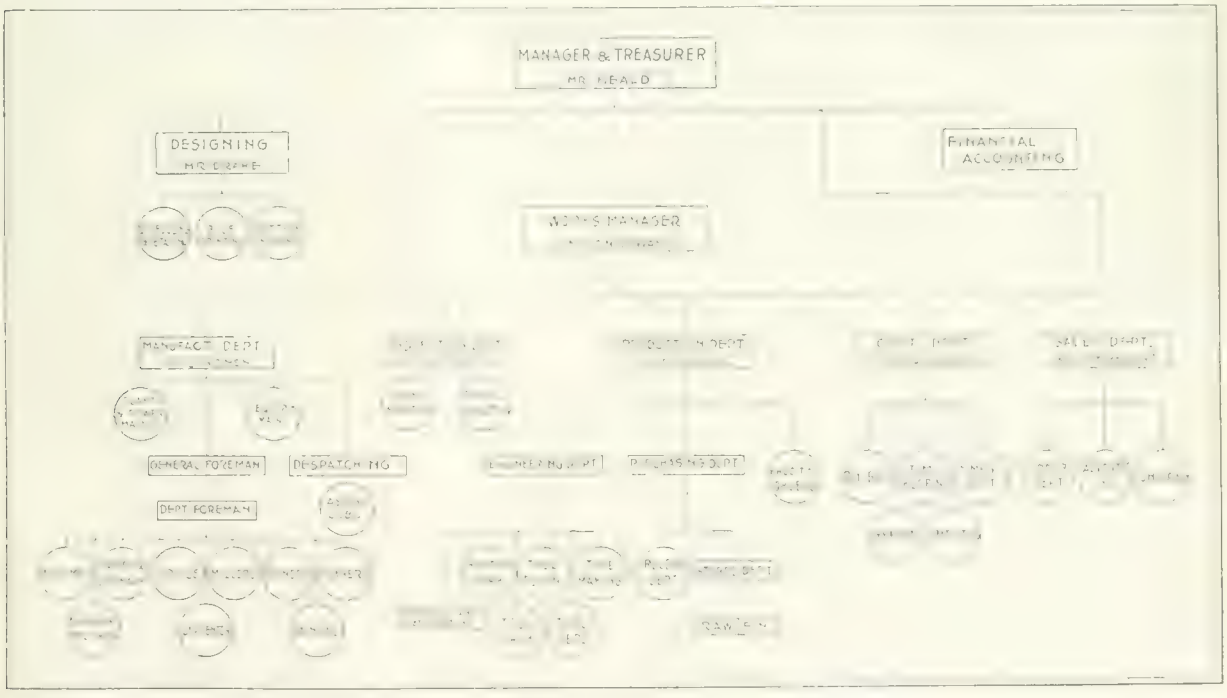


Fig. 1—Organization Chart of the Heald Machine Company

forms and adopt methods distinctive to the plant of which it forms a part.

The organization chart of the Heald Machine Company is interesting because it shows clearly how one concern has divided the executive control of its various activities. The production department has charge of the general planning, issues production orders, supervises the purchasing and are running larger than existing production schedules, and the management decides the number of machines of this type to be made, the works manager setting the date of delivery and issuing his instructions to the production department.

For a concrete example, let us say that these instructions call for the building of 50 K-type machines. The production department first proceeds

to issue a general assembly order for the 50 machines required, notifying the sales and manufacturing departments of the assembly order and date. Its next step is to request from the designing department a complete schedule for 50 machines of K type. This general schedule consists of a considerable number of blueprint sheets (a specimen sheet shown in Fig. 2), bound together on a heavy fiberboard back. The first sheet forms a cover and bears general data regarding the schedule. Below this are several index sheets which give the names and numbers of the parts and units and reference numbers to the succeeding sheets upon which the drawings, units and parts appear. Following these are complete schedules of parts, these sheets having spaces for notations necessary during the progress of actual production.

Upon the receipt of the schedule, the stores department is asked for a report showing the finished parts on hand, parts in process, requirements on all previous schedules, and total of each part or unit available, thereby establishing the balance of each part available for the new schedule. Parts are not made for a specific assembly order, but on parts production orders, as many parts are used upon two or more types of machines.

With this report in hand, the production department issues production orders for the parts not available in stores, and sends a requisition to the purchasing department for needed raw materials. This requisition is made in triplicate on sheets of three colors; a green sheet goes to the purchasing department, a blue sheet to the manufacturing department in the traveler envelope, and a yellow sheet to the cost department. When the stores department receives the raw material, it notifies the production department, giving the quantity, the order number, the assembly number, and the part number if it is a casting. The blue sheet, which goes to the manufacturing department, eventually reaches the cost department through the stores department.

Orders for general assembly, unit assembly or parts production are made out in the same manner on sheets of three different colors. If it is a general assembly or a parts production order, a white sheet is retained by the production department, a pink sheet is sent to the stores department and a yellow sheet to the cost department. For a unit assembly a pink sheet goes to stores, a blue sheet in the traveler envelope goes to manufacturing and a yellow sheet to the cost department. From the pink sheets the stores clerk posts the requirements for each part or unit.

SCHEDULE OF

NO OF MACHS. 50 — #70-71 Internal Grinding Machines — MACH. NOS 850 To 899

DATE June 25, 16 — Main Table Clutch And Pinion — ASSEMBLY NO 22600

K Unit #2A — PAGE 10

PART NUMBER	DR. SIZE	PART NAME	QUAN REQD	ON HAND	MAKE	ORDER NUMBER	DATE STARTED	QUAN	MATERIAL AND DIMENSIONS
K-3[illegible]	D	Pinion Shaft Collar	1	48	300	22532			2-1/2" Diameter Screw Stock x 1-1/16" long
		3/8 x 3/4 Sq. Head Set Screw U. S. S. Cup Pt. (C.H.)	1 1						
K-303	C	Friction Cup	1	32	400	22533			Gray Iron Casting
		#13 Woodruff Key	1						
K-304A	C	Auto Feed Pinion	1	45	250	22534			1-3/4" Diameter 25 Pt. S.S. x 16-3/4" Long
K-381	D	Friction Clutch	1	28	350	22535			Gray Iron Casting. Use Pattern E-321
K-416	D	Friction Finger Cone	1	30	300	22536			2-7/16" Diameter Screw Stock x 2-1/4" long
K-479B	D	Main Table Worm Gear	1	36	200	22537			Bronze Composition Casting #1. Wells Chemical. Use Pattern E-318
PL-38		7/16 Diameter x 1-1/2" Pin (Main Table Worm Gear Pin)	2	675	OK				7/16 Diameter Drill Rod x 1-1/2" long
		THESE PINS ARE ASSEMBLED WITH AND CHARGED TO K-479B							
E-375	D	Friction Clutch Stud	1	49	300	22538			3/4 Diameter Screw Stock x 1-3/16" long
E-376	D	Friction Finger	1	[illegible]	200	22540			Semi Steel Casting
S-65	D	Friction Finger Screw	1	548	OK				5/16 Diameter Screw Stock x 1-1/8" long
		5/16 - 18 x 5/16 Hex. Nut (Case Hardened)	1						
		ASSEMBLY DRAWING C-K UNIT #2A							

Fig. 2. This Schedule Is Typical of the Detail Sheets in the General Schedule Furnished to the Production Department by the Designing Department. The five white columns in the center are for the use of the production department. The first column shows the quantity of each part reported available by the finished stores department. The second column shows quantities for which parts production orders are issued; the third column the parts production order numbers; the other two columns are filled in as the work progresses

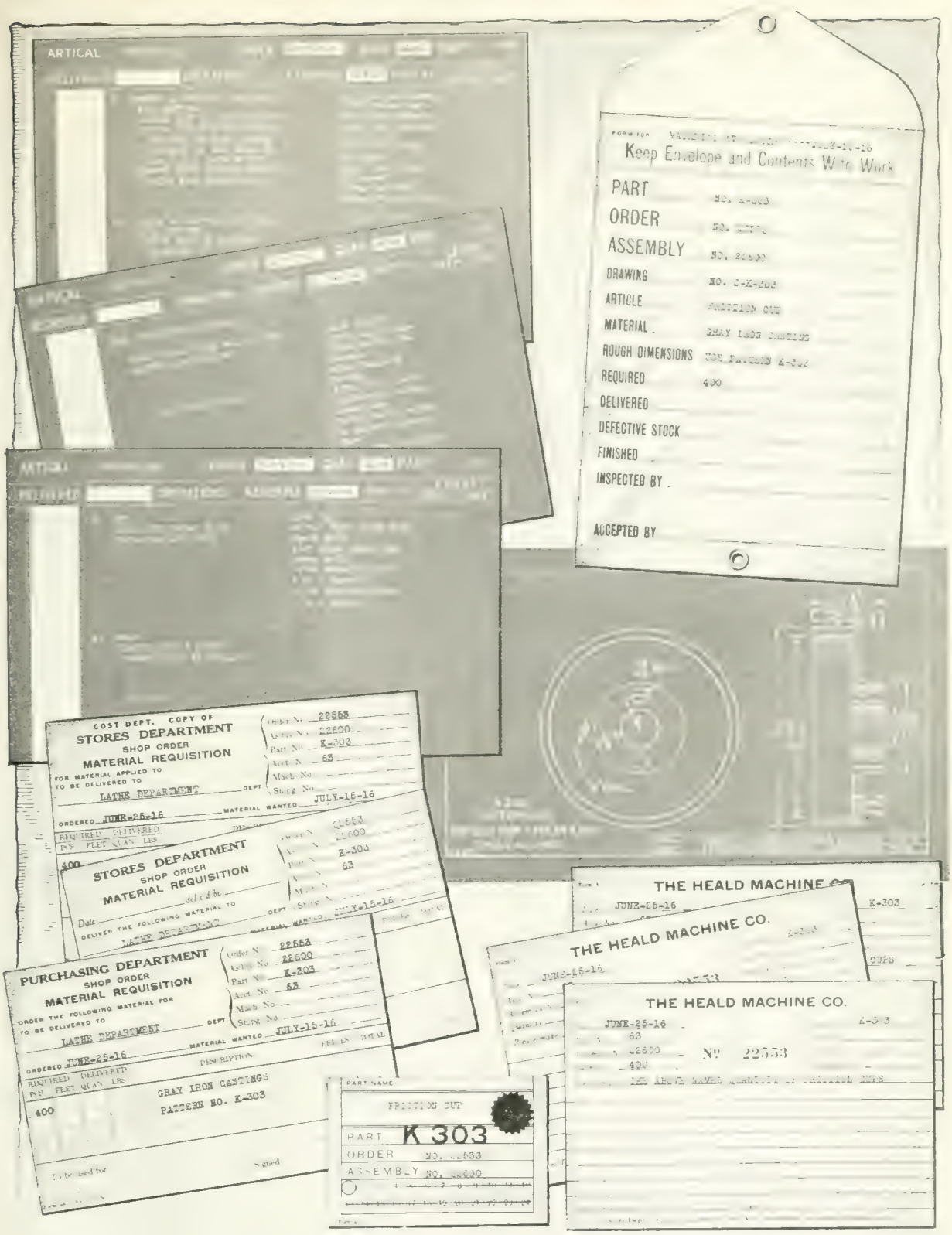


Fig. 3—The Blueprint and Instructions Sheets Belong in the Traveler Envelope. Also included are a triplicate parts production order and a triplicate purchase order for raw mateial. The small card is the job card which is used in the operation of the planning board. The figures ruled off at the bottom of this show that there are four operations on this part. The circle around the figure 1 shows that the tools for this operation have been ordered issued. When this operation is finished a red cross will be drawn through the number 1. The stores requisition is of same form as for unit assembly

The planning board occupies one wall of the superintendent's office. It consists of a series of interchangeable panels to which are attached formed-tin card holders. The job tickets which are placed in these holders come to this office in a traveler envelope from the production department. The traveler is printed upon its face to provide spaces for information concerning the part number, order number, assembly number, drawing number, name of article, material, rough dimensions, number required, material available (date), number delivered, defective stock, finished, etc. The traveler contains a blueprint of drawing of the part and an instruction sheet. If there are several operations to be performed, two or more sheets (measuring 5 x 8 in.) may be required. These instruction sheets give complete details as to the manner in which the operation is to be performed and the tools which are to be employed. It is planned to have at least one job and the necessary tools delivered to each operator before the completion of the job which he has in hand.

It will be noticed that in the illustrations of the job ticket and of the section of the planning board

there are various markings and stickers on the job tickets. In some cases the bottom section of the ticket when in the rack is covered with a strip of colored cardboard. These colored cards help to show the condition of the equipment, tools and work in process. Their use is clearly explained in the following copy of the instructions posted in the dispatching department:

Salmon colored card indicates "Operator out."
Red colored card indicates "Machine broken down."

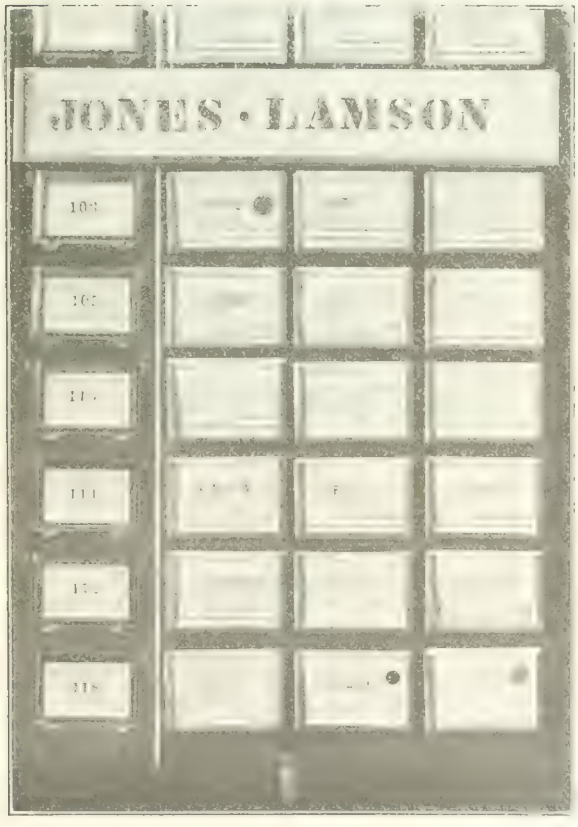
Blue circle around operation on job card indicates "Tools ordered out."

Red cross through operation number on job card indicates "Operation finished."

On the job card the operations not used are crossed off with a straight black line.

By referring to Figs. 4, 5 and 6 it will be seen that each panel of the planning board is held in place in the frame by buttons and can be moved about as desired. The sign cards designating the classes of machines are placed in large holders simi-





changeable panels held in place in a frame by buttons at top and bottom. The larger cards designating classes of machines can be quickly

horizontal row of the smaller holders.

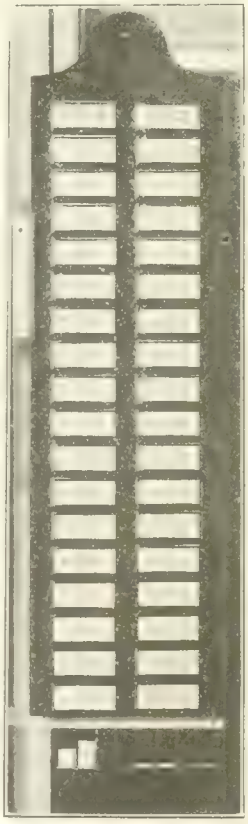
the type and shop number of the individual machines and concise information of their equipment, range

on each machine. The third and

order of precedence. Cards of other jobs ahead of a machine are placed behind the front card in the fourth row

Two special panels give the assembly order number and dates of

chucks. Such a board furnishes a quick reference for officials in charge of the assignment of jobs. The small partitioned space b w the panel holds cards of different colors which play a part in the working of the planning board



Green colored card indicates "Machine without operator but tooled for important work."

White card stamped "Extra" indicates "Machine working on extra or special operation."

Yellow colored card indicates "Machine will be out of work in one hour."

Green sticker on job card indicates "Work of first importance."

Red sticker on job card indicates "Work of second importance."

lar to the job card holders, and are readily attached to any part of the board over the smaller holders. These two features permit of great flexibility in the general scheme of the board to meet changing conditions. The first row of cards on each panel gives the number of each machine and essential details of its range and capacity. The second row shows the job in process, and the next two



Fig. 7

In the plant of the Heald Machine Company, the offices and drawing rooms are inclosed by glass partitions having 4-ft. base portions; the storage, tool, chuck, carpenter and all except the machine divisions have 3-ft. wire grills above 4-ft. partitions; the machine areas are [illegible], not inclosed

rows the jobs ahead as selected by the operating officials. Other jobs ahead of any machine are placed behind the front card in the fourth row. The board receives constant attention, being practically in continuous operation. Two separate panels of different design show the assembly number and the delivery date of each assembly order for machines and magnetic chucks that has reached the manufacturing department.

Traveler envelopes stay with the work. Those that cover jobs not started are kept in specially built boxes in a rack with shelves within easy reach of the clerks in the office. All the travelers of any one assembly order are kept together in a properly labeled box. An extra set of blueprints of the instruction sheets is made and placed in a loose-leaf binder to form a "progress book," in which each operation is checked when completed, and contingent notations are made on these prints. The progress books are checked twice each day.

When a job is assigned, a tool order is issued and sent to the tool crib. Among other items this order gives the hour when tools should reach the designated operator. The tool crib is also notified when a job is finished and promptly sends a collector for the tools.

The traveler is sent with the job when it is assigned for the first operation. A simple form of notification slip is employed by inspectors and foremen to notify the dispatching division when jobs are completed. When the head of the inspection department receives notice that a job is completed he sends a move-man for the work, which is taken to the inspection bench of the department where the work was done. When he sends in his notice that the inspection has been finished, he sends the work and traveler to the department where the next operation will be performed. There is no need to send a notice as to which job ahead of a machine has precedence, as the work of the operator is controlled through the close timing of the tool issue.

The company has recently greatly increased and rearranged its equipment, being enabled to do this by the completion of a large addition. This addition, 160 x 190 ft., increases the total floor space of the plant to about 100,000 sq. ft. The new part,

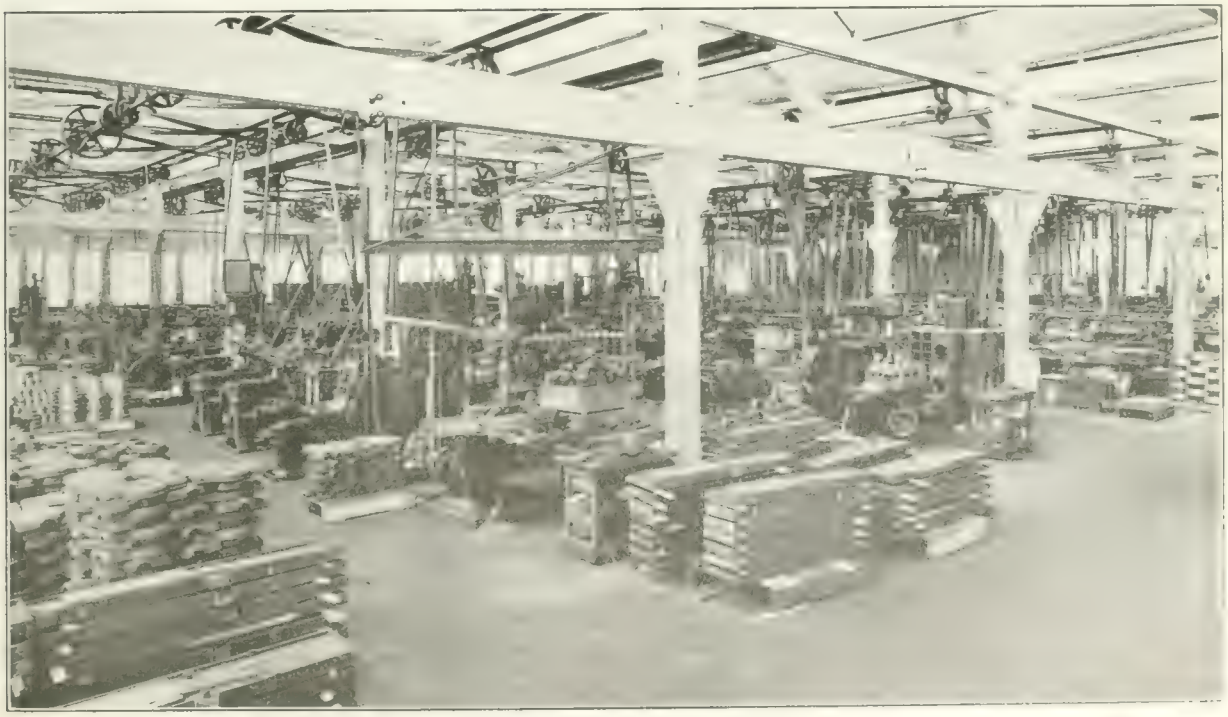


Fig. 8—Wide aisles and generous spacing of machines in the [illegible] large lots



Fig. 9—In planning the machine location special attention was given to providing space for several conveyor platform trucks near all machines which have a large output per day.

like the old, is one story high and has a saw-tooth roof. The longitudinal roof girders are of double steel beams and the transverse girders are heavy I-beams supported by steel columns. As first designed the saw-tooth portions were to have been supported by the usual steel trusses, but a considerable saving in cost was made without loss of strength by making the supporting members of heavy wooden beams. The absence of the steel trusses, with the consequent elimination of the light-obstructing and dust-collecting properties inherent in that type of construction, is one of the pleasing features of the new shop.

The double channel-iron girders permit of flexibility in the hanging of shafting. In some cases the hangers are attached directly to the girders by bolting through the opening in the beams; in other cases parallel wooden beams are suspended below the girders by the same method and the hangers attached to them. An entire line of shafting when attached by either method can be quickly moved about to correspond with changes in machine locations. The various motors are placed on platforms firmly bolted and braced to the vertical steel columns.

A series of experiments has produced an unusually satisfactory and economical artificial lighting installation. As first planned by experts, the artificial illumination was to have been secured wholly from overhead lamps of 100-watt size, located in two rows in each saw-tooth section—one row



Fig. 10—Assembling of machines is done by groups and not by individual machines. Thus all the machines on an assembling order come off the floor practically simultaneously

to be suspended from the peak and the other from points near the bottom of the southern slope of the saw-teeth. These lamps were to be inclosed in reflectors which would throw the light downward in a cone of comparatively small diameter. As finally worked out, the lamps (four to each bay formed by the girders) are of 60-watt size and the reflectors are of the intermediate type forming a cone considerably broader than as first planned. The lights have been lowered so that they hang just below the belts on the countershafts.

An independent feed line, which is kept alive all day, supplies current for individual 25-watt lamps supported by universal arm fixtures, so that any operator who needs light for boring, undercutting and similar operations has it available at any time. It is believed that the present arrangement and sizes of lamps produce a more even and efficient illumination and with less eye strain than any other of the plans tried. Yet this better lighting is secured usually by a combination of two

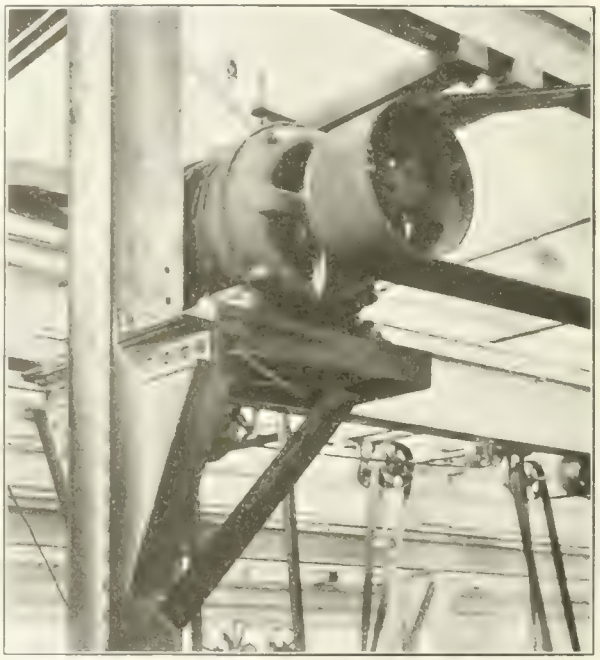


Fig. 11—The type of building construction lends itself admirably to a rigid method of motor suspension

lamps—an overhead and a drop light—with a total of 85 watts in place of one 100-watt lamp overhead.

One of the most quickly noticed features of this plant is the wide aisles and other open spaces about machines. This liberal spacing of machines is a helpful feature in the handling of large jobs and in the use of the numerous conveyor trucks with which the work is transported from place to place. The shop is also liberally supplied with traveling cranes wherever heavy lifting is necessary.

The origin of the Heald Machine Company is found in the business started by Stephen Heald in 1830 in Barre, Mass. Wood-working and agricultural machinery were the first products, and wire-drawing machinery was later added. Along in the 50's an iron foundry was added and coal and iron brought by teams from the railroad 20 miles away. Two sons later entered the business, which continued until the death of Stephen Heald in 1887 The business languished for two or three years while the estate was being settled, and in 1890 was taken over by L. S. Heald & Son, son and grandson of the founder. In 1903 James N. Heald bought out his father's interest, moved the business to Worcester and organized the present company. The man-

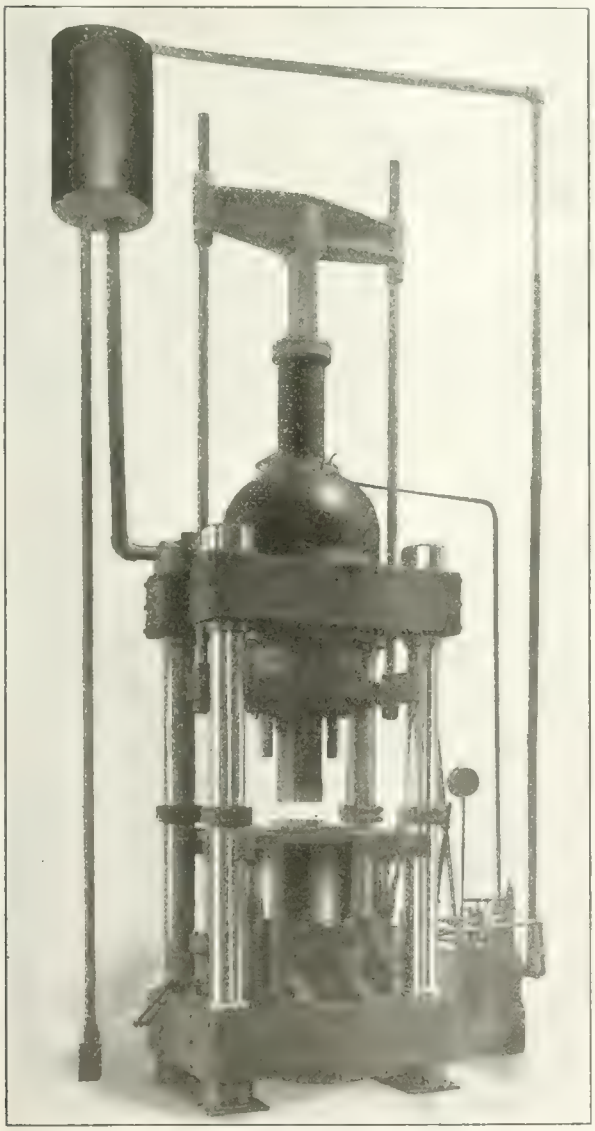
ufacture of grinding machines had become a large factor in the business previous to the removal to Worcester, and since that time a comprehensive line of internal and surface grinding machines, and more recently a successful line of magnetic chucks, have been developed, which have had a large sale, both domestic and foreign.

The first shop in Worcester, built in 1903, contained but 9000 sq. ft. In 1907 additions brought the size of the shop to 23,500 sq. ft. and a boiler house was built. In 1909 an electric power plant of 100-kw. capacity was added. In 1911 an addition, 100 x 220 ft., widely described at the time of its erection because of its new features, was built. In thirteen years the number of hands employed has increased from 22 to 325.

Paul B. Morgan, treasurer Morgan Construction Company, Worcester, is president and James N. Heald is treasurer of the company. Mr. Heald is general manager; Cyrus N. Cowan, works manager, and S. T. Massey, sales manager.

Press for Briquetting Metal Turnings

A line of hydraulic presses for briquetting metal turnings, borings, etc., has been developed by the Hydraulic Press Mfg. Company, Mount Gilead, Ohio. The press is of the four-rod inverted cylinder type and is built in three different sizes and pressure capacities ranging from 300 to 1000 tons, the last being the one illustrated. It enables this class of scrap material to be put in convenient form for handling and to be remelted without loss of valuable ingredients and oxidation is prevented. One of the particularly interesting features of the press is the mechanism for forming a briquet.



In this Hydraulic Press for Briquetting Metal Borings, Turnings, Etc., for Remelting, the Material Is Placed in a Floating Mold Supported by Four Springs and Sliding Over a Stationary Plunger

In operation the material is placed in a floating mold supported by four springs. When pressure is applied from above, the friction of the material on the sides of the mold causes the latter to move down over a stationary plunger projecting into the mold from below. This arrangement, which is somewhat unique in design and operation, causes pressure to be applied on both the top and bottom of the material which, it is emphasized, gives a briquet of uniform density. All of the movements of the press are controlled by levers conveniently located for the operator.

After the briquet has been formed the lower plunger is removed by a lever located near the main operating valve and the briquet is ejected from the mold by pressure applied by the main ram. Hydraulic push cylinders are employed to lift the floating mold while the lower plunger is withdrawn or returned to place on this size of press and also the middle size, which has a capacity of 750 tons. In the 300-ton press a collar surrounding the plunger is held against the mold by a spring. When the briquet is ejected from the mold it falls to the base of the press and is removed by a conveyor.

A surge tank located above the main cylinder is provided for this press. A simple movement of the valve lever brings the plunger to bear on the material in the mold and the suction caused by this action fills the main cylinder with fluid. In this way the first stroke of the pump produces pressure upon the material being handled. When the pressing operation is completed the main ram is returned by an auxiliary one located at the extreme top of the press and the fluid is returned to the surge tank.

A Safety Manual for Blast-Furnace Workers

The precautions to be observed by the foremen and other employees at blast-furnace plants to avoid accidents are described at some length in technical paper No. 136 of the Bureau of Mines. The author, Frederick H. Willcox, first describes the method of attacking the accident problem by using a plant-inspection committee composed of two to four men selected from the sub-foremen and workmen. The duties of this committee, which comprise a study of accidents that have happened and the inspection of the plant for improper physical conditions and unsafe practices, are touched upon and methods of obtaining co-operation on the part of the employees and of putting the recommendations of the plant-inspection committee into effect are outlined. The larger portion of the paper is given over to directions for avoiding accidents, with detailed instructions to the various groups of employees, including the engine room and boiler house forces. These instructions are supplemented by numerous engravings illustrating the unsafe and safe ways of performing various operations. Notes on first aid are included.

British Imports of Manganese Ore

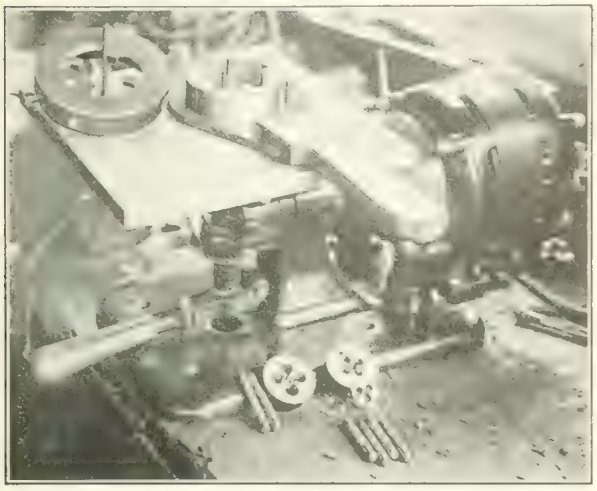
British imports of manganese ore in August were 46,606 gross tons, against 10,611 tons in August, 1915, and 33,817 tons last July. The total for the eight months to Sept. 1, 1916, is 306,005 tons, contrasted with 164,769 tons to Sept. 1, 1915. The receipts thus far this year are at the rate of 38,250 tons per month, as against only 20,596 tons per month for the first eight months of 1915. The manganese ore situation in England is therefore easier now than at any time during the war.

FINISHING EDGES OF DIES

How Threading and Blanking Types Are Made on a Special Machine

The Anderson Die Machine Company, Bridgeport, Conn., has designed and built a die-forming machine. As the name indicates it is intended for finishing blanking and threading the dies and similar work after the core or surplus stock has been drilled out. The machine is driven by a motor receiving power from the nearest lighting socket, and it is emphasized that the machine is more rapid than a filing machine of the reciprocating type, since the cut is constant and change of contour of the surface operated on does not necessitate a corresponding change of cutter.

The machine consists of a main frame containing a vertical work spindle which is driven by a shaft at right angles to it that is connected to the motor by a semi-flexible coupling and to the spindle by a pair of spiral gears. The work table or platen

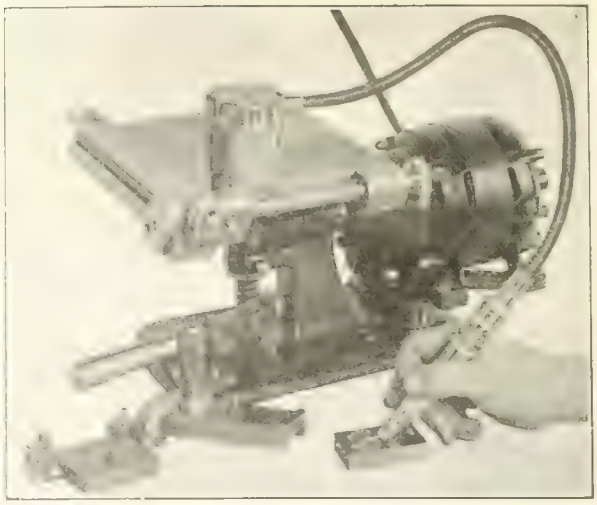


Finishing the Cutting Edges of a Threading Die in a Specially Developed Die Forming Machine

is adjusted to give a surface at right angles to the center line of the spindle.

The cutters, which are mounted in a collet, operate on the principle of a hardened ratchet screw to shear material off the work operated on when rotating at high speed. The pitch of this screw is relied upon to cause the work to be drawn down on the platen and also carry the chips down and leave the line marked out on the blank visible at all times. This arrangement, it is explained, does away with feed screws, slides or vises in which to hold or control the work upon which the machine is operating. The collet is opened for the removal or changing of cutters by a lever conveniently located at the front of the machine. This lever is pivoted on the frame and when raised comes in contact with the lower end of the draw-in spindle, thus compressing the spring and forcing the collet upward and open. The main spindle is hardened and ground and runs in bronze bearings, the upper of which is of the double angle type, while the lower is straight and adjustable for wear. An adjustable thrust collar bearing on the lower face of the upper bearing is provided, and a knurled ring on the end of the spindle is relied upon to prevent chips or dust from entering the bearing.

When threading dies are being finished, the die, which has previously had as many holes drilled in it as there are cutting edges required, is dropped into a central opening in the work holder or lever.



Putting the Finishing Touches on a Blanking Die by Hand with a Cutter Receiving Power from the Spindle of the Machine through a Flexible Shaft Connection

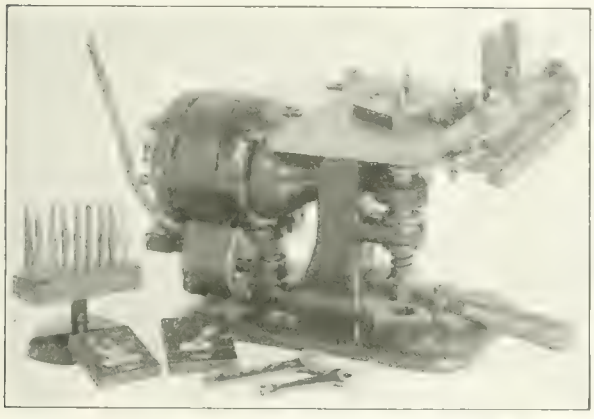
The die fits freely into this opening and a former of machine or tool steel which has been hardened to resist wear is placed over the die. This former has four or more projections, depending on the number of cutting edges on the die, and these are the same width as the portion of the finished die that will produce the thread. A special cutter having a blank portion where it comes in contact with the projections of the former is inserted in the collet. This blank portion is relied upon to limit the amount of material to be removed and also serves to establish a uniform tooth width. The die holder is moved back and forth by a handle and the die is rotated until the cutter comes in contact with the portion of the die to be operated on.

A special type of controlling mechanism is provided where it is desired to finish the sides of a die at an angle with the base. In this mechanism the bar *A* extends across the machine at right angles to the side of the rectangular machine table, this bar being secured to the main slide, which guides it at right angles to the die or the table. A strip or bar *B* extends nearly across the bar *A* and has a series of holes in the top face, while the outer end is threaded. A knurled nut *C* is located



Machine Set Up for Finishing the Sides of the Die That Is Held in Position with Relation to the Cutter Spindle

on the threaded portion of the bar and is secured from side motion by the bracket *D*, which forms a part of the main slide. Turning the knurled nut in either direction causes the bar *B* to be moved correspondingly. The main slide is secured to the table by a dovetail, and together with the bar *A* can be moved by hand in either direction. A plate *E* is fitted to the lower side of the block to give a sliding fit at all times. If desired the main slide can be locked with a screw. A bar *F* passes through the main slide and extends toward the back of the machine, the rear end of the bar being threaded. The block *G* is fastened securely at the rear edge of the table and a knurled nut *H* is secured in the block to prevent movement in either direction. The turning of this nut in either direction causes the bar *F* to move either forward or back. A set screw *I* is mounted in the slide and is designed to engage the bar *F*, thus causing the main slide to move in the same direction as the rod. The slide *J* is mounted on the bar *A* and normally can be moved by hand in either direction throughout the width of the table or locked in any position by the screw *K*. A knurled plug passes through the slide *J* and engages the holes in the bar *B*. If the slide is permitted to move freely, a fine adjustment of it on the bar *A* can be secured by turning the knurled nut *C*. An arm *L* is also mounted on the slide *J* and can be swung at any angle in relation to the bar *A*, the edge being graduated to indicate the degree of angularity. Two holding members *M* and *N* are fastened to the bar *L* and set screws *O* are em-



A Blanking Die Being Finished by Milling Away the Rough Edges Left After the Core Has Been Drilled Out

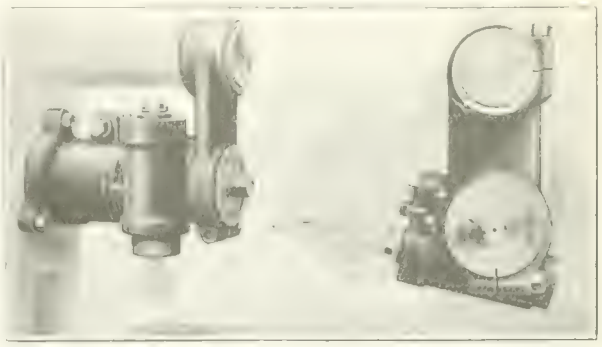
ployed to fasten the die or work being operated on to the holding members, which are locked in their positions on the arm *L* through the screws *P*.

In operation the die is secured in place and the slide *J* is engaged in one of the holes in the bar *B*. After the main slide is unlocked, the amount of material to be removed in one cut is adjusted by manipulating the nut *C*, after which the die is fed by sliding the bar *A* by hand. After this material has been removed the operation is repeated until the desired depth has been secured. To remove material in the opposite direction, the slide *J* is left free and the rod *F* is secured to the main slide by the set screw *I*, so that when the nut *H* is turned the die can be adjusted to have the cutter take off the proper amount of metal. The handles *Q* and *R* serve to assist in feeding the die against the cutter. In this way, it is pointed out, practically any surface can be finished by swinging the arm *L* and the slide *J* to give the various angles required.

Finishing touches can also be put on a blanking die by hand by connecting a flexible shaft to the spindle of the machine by a special fixture and using a rapidly rotating cutter.

A Semi-Universal Milling Attachment

A new design of semi-universal attachment has been developed by the Valley City Machine Works, Grand Rapids, Mich., for use on its No. 1½ milling machine. The particular advantage claimed for the use of this attachment is that the operator can get closer



A Semi-Universal Attachment for Milling Machines Capable of Adjustment to Either a Vertical or Angular Position

to angular cuts without sacrificing rigidity of support Although the attachment was designed primarily for use on the builder's machines, it can also be applied to other makes with slight modifications.

The attachment swings clear under the overarm and if desired may be reversed. When the spindle is in a vertical position the hole through it is readily accessible, a feature that is made possible by offsetting the spindle of the attachment from that of the machine proper.

The attachment spindle rotates in the same direction as the main one, and is fitted with a No. 10 taper. The drive is through a splined arbor, coarse pitch miter gears, an intermediate ball-bearing shaft and a pair of heavy steel spur gears as the final drive.

A clamp base, which is bored to fit the spindle box and is secured to the column with screws, is furnished with the attachment.

Franklin Institute Lectures

The Franklin Institute, Philadelphia, has arranged a program of lectures for the winter of 1916-17, included in which are the following:

Oct. 18, 1916—"Scientific Research in Relation to the Industries," by Charles P. Steinmetz, chief consulting engineer, General Electric Company, Schenectady, N. Y.

Dec. 14, 1916—"The Cooling of Water for Power Plant Purposes," by C. C. Thomas, professor of mechanical engineering, Johns Hopkins University, Baltimore, Md.

Feb. 1, 1917—"The By-Product Coking Industry," by C. J. Ramsburg, vice-president H. Koppers Company and Pittsburgh By-Product Coking Company, Pittsburgh, Pa.

March 1, 1917—"Development and Progress in Aviation Motors," by Henry Souther, consulting engineer, aviation section, U. S. Army, War Department, Washington, D. C.

March 15, 1917—"Design, Construction and Equipment of a Modern Military Aeroplane," by Jerome C. Hunsaker, assistant naval constructor, Navy Department, Washington D. C.

A Steel Plant for Siberia

A new iron and steel plant in Siberia is contemplated. The plan, as a result of a recent meeting between representatives of the Russian Government and of the iron industry, is to raise a capital of 20,000,000 rubles, the interest to be guaranteed to the banks subscribing. The government is to lease the district of Kusnezk, where the works are to be located, to the company for 60 years, the company to supply a fixed tonnage of rails and other railroad material yearly at current prices. This district has coal and iron deposits estimated at 1594 million poods, the ore having an iron content of 58 to 65 per cent. Agricultural implements are also to be made.

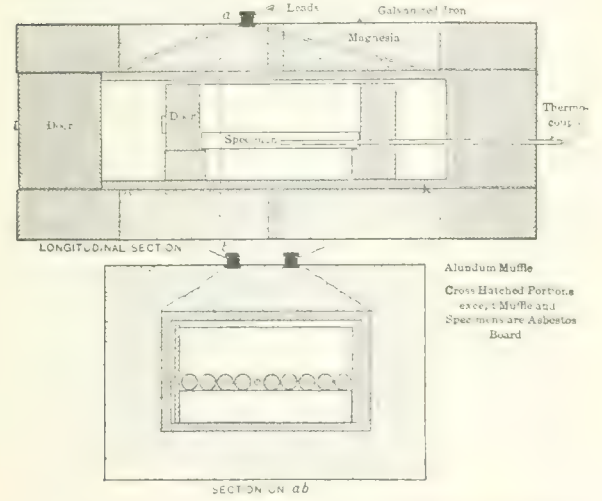
Effect of Sulphur on Low-Carbon Steel*

A Comparison of the Static and Dynamic Properties of High and Low Sulphur Steels Uniformly Heat Treated — Sulphur Detrimental in Shock Tests

BY CARLE R. HAYWARD

SULPHUR has long been one of the banes of the steel manufacturer and often no effort and expense have been spared in order to reduce it to a small per cent in the finished product. This condition is due to a general conviction that in many cases where steels have failed in service, sulphur has been the cause. But there has been a growing feeling in recent years that the verdict against sulphur has been unnecessarily severe. In cases of segregation it was present in augmented amounts along with other impurities, but it had not caused the segregation.

High sulphur in pig iron is caused by poor furnace conditions and the sulphur is merely one indication of an iron that has not been properly reduced. No amount of subsequent treatment under



Sections of the Heat-Treatment Furnace Used in Treating the Low Carbon Steels

oxidizing conditions in the open-hearth furnace can remedy the defects, although the per cent of sulphur may be considerably reduced. In other words, the causes of bad steel can frequently be traced back to bad pig iron, and sulphur is merely one indication that the pig iron is bad. The writer recently visited a steel plant where a mass of evidence had been accumulated which substantiated this fact, and the superintendent was emphatic in stating that high sulphur was not harmful provided the steel was not otherwise poor due to insufficient reduction in the blast furnace.

The presence of a moderate amount of sulphur is desirable from the standpoint of the man who machines the steel. The low-sulphur material drags and the production of a smooth surface is very difficult. A slight increase in sulphur enables the machinist to produce a smooth surface without difficulty. Since, therefore, such large quantities of steel are subjected to machining, it becomes highly important that the sulphur controversy should be settled, and if its presence is proved to be harmless the ban on it should be lifted.

Among the recent papers on the effect of sulphur on steel is one by Dr. J. S. Unger, manager central research bureau, Carnegie Steel Company.† The results of an exhaustive series of tests are given and the conclusion states:

> The author does not advocate paying no attention whatever to sulphur content in steel, but believes firmly that a steel containing less than 0.100 per cent is not necessarily bad, and that it will show little, if any, difference in quality when compared with the same steel of much lower sulphur, other conditions being the same.

The present investigation was undertaken at the suggestion of A. H. Annan of the Rhode Island Tool Company, who co-operated by furnishing the steel and machining the specimens. The results are presented as a contribution to the general knowledge on the subject.

THE STEELS USED

It was planned to use three steels of different sulphur content, but with the other elements the same. The manganese was an exception, however, for with this element part is in the form of MnS existing free in the steel and the remainder is dissolved in the steel. It is evident, therefore, that the manganese should vary, but that the amount in excess of MnS should be constant in the different steels. The steels finally selected were in the form of ¾-in. round bars. Two bars of each grade were required to furnish sufficient specimens. The analyses are shown in Table 1.

Table 1—Analysis of Steels Used in Equipments

Mark	Carbon, Per Cent	Total Manganese, Per Cent	Excess Manganese, Per Cent	Phosphorus, Per Cent	Silicon, Per Cent	Sulphur, Per Cent
1	0.18	0.55	0.48	0.007	0.01	0.038
1A	0.18	0.57	0.50	0.009	0.02	0.041
2	0.17	0.67	0.52	0.008	0.01	0.086
2A	0.18	0.70	0.55	0.010	0.03	0.087
3	0.18	0.80	0.54	0.006	0.02	0.152
3A	0.17	0.80	0.55	0.011	0.03	0.148

THE HEAT TREATMENT

In order to make a comparison of the steels under different conditions it was decided to heat all the specimens to a temperature just above the critical range, quench in water, and reheat different lots to 300, 400, 500 and 600 deg. C. respectively. For this purpose the bars were cut in 7-in. lengths, which was sufficient for tensile specimens and specimens for microscopic examination.

The furnace used is shown in the illustration. The muffle is made of alundum and is 2 in. high, 9 in. wide and 16 in. long. It is wound with No. 15 excello resistance wire. In order to obtain uniform heating of the specimens, they were supported on an asbestos rack, as shown. Asbestos shields were placed on the sides and ends of the rack so that the specimens were practically in a muffle within a muffle. A platinum, platinum-rhodium thermo-

*From a paper to be presented at the meeting of the American Institute of Mining Engineers in New York in February, 1917. The author is assistant professor of mining engineering and metallurgy, Massachusetts Institute of Technology, Cambridge, Mass.

†THE IRON AGE, Jan. 13, 1916.

couple was introduced through the back of the muffle into the center of the heating chamber and connected to a Siemens and Halske recording galvanometer.

The procedure in heat treatment was as follows:

The furnace was heated to 880 deg. C. and nine specimens introduced. This caused the temperature to fall to 550 deg. C. and it took about 40 min. to again reach 880 deg. When the latter temperature was reached it was maintained constant for 15 min., after which the specimens, except as noted below, were quenched in water and a new lot introduced into the furnace. This was continued until about 18 of the specimens had been treated. Nine of these, consisting of three high-, three medium- and three low-sulphur steels, were removed from the furnace and allowed to cool in air. The remaining nine, consisting of three of each sulphur content, were allowed to cool in the furnace.

In drawing the quenched specimens at the various temperatures, the procedure was as follows:

The furnace was heated to 600 deg. C. and nine specimens, three of each sulphur content, were introduced. The temperature fell and it required about 30 min. to come back to 600 deg. It was maintained here for 10 min. and then the specimens were withdrawn and quenched in water. The furnace was cooled to 500 deg. C. and another set of nine specimens was introduced. When the temperature had regained 500 deg. it was maintained constant for 10 min. and then the specimens were withdrawn and quenched. Following a similar procedure, sets of nine specimens were treated at 400 and 300 deg. C. respectively.

THE TENSILE TESTS

After sawing off ¾ in. from each piece for microscopic examination, standard test specimens were prepared with 2-in. gage length, 0.505-in. diameter and threaded ends. These were pulled in an Olsen machine in the testing laboratory of the Massachusetts Institute of Technology. The results obtained are given in a table in the paper. The averages are retabulated in Table 2. The designations *L*, *M* and *H* refer to low, medium and high sulphur content.

Table 2—Average Tensile Results of the Treated Specimens

	Yield Point, Lb. Per Sq. In.	Breaking Load, Lb. Per Sq. In.	Elongation, Per Cent in 2 In.	Reduction of Area, Per Cent
Heated to 860 deg. C. and quenched in ice water:				
L	57,900	85,600	23.5	63.1
M	53,600	77,700	27.7	70.1
H	56,900	86,000	22.0	60.7
Heated to 860 deg. C. and cooled in still air:				
L	43,200	58,100	41.5	67.8
M	46,000	58,000	41.3	68.5
H	42,600	59,400	39.0	63.9
Heated to 860 deg. C. and cooled in furnace:				
L	36,500	52,600	40.5	63.2
M	36,800	53,000	40.3	61.6
H	35,100	55,000	38.0	63.0
Quenched at 860 deg. in ice water. Reheated to 300 deg.:				
L	55,900	75,675	26.5	70.0
M	59,700	77,000	26.7	71.4
H	57,500	87,800	21.5	60.7
Quenched at 860 deg. in ice water. Reheated to 400 deg.:				
L	60,300	76,300	28.8	72.1
M	62,600	76,600	26.3	70.0
H	62,400	83,200	22.3	62.4
Quenched at 860 deg. in ice water. Reheated to 500 deg.:				
L	57,000	72,700	32.0	73.7
M	59,700	73,300	29.0	71.8
H	60,900	78,000	26.0	67.0
Quenched at 860 deg. in ice water. Reheated to 600 deg.:				
L	52,200	68,800	34.2	75.5
M	53,800	71,100	33.0	73.7
H	55,200	74,600	30.5	70.7

There is not sufficient variation in the results to make an effective plot, but Table 3 summarizes the figures by giving the order in which they occur from high to low.

After concluding the tensile tests, it was thought desirable to determine the effect of varying sulphur content on specimens subjected to shock.

SHOCK TESTS

Through the kindness of the testing department of the Watertown Arsenal, their Charpy machine was obtained for this purpose. The remaining ¾-in. stock of bars marked 1, 2 and 3 were sawed into 2-in. lengths and the specimens subjected to heat treatment in sets of three under the same conditions that obtained in the case of the tensile specimens. After heat treatment, the specimens were machined to conform to the following specifications:

Table 3—Summaries of Tensile Tests Showing Relative Rank

	Yield Point			Breaking Load			Elongation			Reduction of Area		
	L	*M*	*H*	*L*	*M*	*H*	*L*	*M*	*H*	*L*	*M*	*H*
Quenched in ice water..	1	3	2	2	3	1	3	1	2	3	1	2
Cooled in still air.....	2	1	3	2	3	1	1	2	3	2	1	3
Cooled in furnace.....	3	1	2	3	2	1	1	2	3	2	1	3
Reheated to 300 deg...	3	1	2	2	3	1	3	1	2	3	1	2
Reheated to 400 deg...	3	1	2	3	2	1	1	2	3	1	2	3
Reheated to 500 deg...	3	2	1	3	2	1	1	2	3	1	2	3
Reheated to 600 deg...	3	2	1	3	2	1	1	2	3	1	2	3
Totals	17	11	14	18	17	7	11	12	19	13	12	17
Order of totals.....	3	1	2	3	2	1	1	2	3	2	1	3

Length 55 mm., cross-section 10 by 10 mm., notch across one side, midway between the ends, 1 mm. wide. Radius of cutter edge, 2/3 mm.

The Charpy machine consists of a heavy pendulum which drops from a fixed height, strikes the specimen supported at each end and breaks it at the notch. The pendulum then continues its swing and the height it reaches is registered. Knowing the weight of the pendulum, the height it falls and the height it rises, a simple calculation gives the energy consumed in breaking the specimen.

(Photomicrographs of some of the specimens are given in the paper.)

CONCLUSIONS

Table 3, which expresses the summary of the tensile tests, shows that the high-sulphur steel has for each treatment the highest breaking load while the yield point ranks first for two treatments, second for three and third for two. From this we may conclude that the sulphur does not lower the tensile strength.

The figures for elongation and reduction of area show that there is little difference in ductility between the low- and medium-sulphur steels, but the ductility of the high-sulphur steel is slightly lower than the other two for most of the treatments.

The average figures for the shock tests, except for the air- and furnace-cooled specimens, are highest for each treatment in the case of the low-sulphur steels, and lowest for each treatment for the high-sulphur steels. The widest difference appears in the steels which have been quenched and reheated.

It is difficult to draw definite conclusions from the results because of the newness of the shock test and the difference of opinion among engineers regarding its value. The tensile tests are not unfavorable to steels with moderate amounts of sulphur, while the shock tests show a decided falling off in strength as the sulphur increases. Until the interpretation of the results from the Charpy machine is more fully understood, it is impossible to say to which set of tests the most importance should be attached.

Further light might be thrown on the subject by making alternate stress or fatigue tests. It

would be important to learn whether the results would confirm the tensile or shock tests. Unfortunately, however, the stock of steels used in the previous work was exhausted, and whatever the results of the fatigue tests there would be an uncertainty in their interpretation because of difference in stock. It was, therefore, decided not to include this series in the present investigation.

Salvaging Rails with a Motor Truck

An interesting use of a motor truck is being made by the Black Hills Transfer Company, Nahant, Mont. This company has the contract for salvaging the rails on an abandoned logging railroad connecting the station at Nahant on the Burlington system with some timber lands 35 miles west of the town. For this work the company is using a 1½-ton White motor truck.

The line from which the rails are being recovered was abandoned several years ago on account of the exhaustion of timber and the enforcement of the forest reserve act. Several obstacles confronted the transfer company when it received the contract. It was not possible to use a locomotive to haul the rails because the forest reserve laws require oil-burning locomotives and only those burning wood were available. The track was not, of course, kept in repair and the cost of putting it in shape to enable a heavy locomotive to run over it was prohibitive. A rank growth of long and tough grass over the rails, in some cases 18 in. high, had woven a network that completely obstructed them from view which was another objection to the use of a locomotive.

When the truck was received from the builder it was fitted with flanged steel wheels and a special rear truck provided. A standard flat car was also used as a trailer and with this equipment it was possible to haul 12 tons of rails into Nahant each trip. The truck made two round trips a day, 140 miles, climbing several grades as steep as 7 per cent. In the first month the truck was in service it covered approximately 3300 miles, or an average of 108 miles per day. In several cases more than 10 miles were run on 1 gal. of gasoline.



Using a 1½-Ton Motor Truck Equipped with Flanged Wheels to Recover the Rails of an Abandoned Lumber Railroad. The Truck Also Hauls a Standard Flat Car as a Trailer, the Capacity of the Two Being 12 Tons

The total number of controlled establishments under the Munitions of War acts in Great Britain is now 4212.

Carriage Builders Hold Annual Meeting

The Carriage Builders' National Association held its forty-fourth annual meeting at the Hotel Gibson, Cincinnati, Ohio, Sept. 26, 27 and 28. The meeting was called to order by President P. E. Ebrenz, St. Louis, and the address of welcome was made by Mayor George Puchta of Cincinnati. Manufacturers from all parts of the country were present and exhibits were held in the banquet hall of the Hotel Gibson.

On Wednesday an interesting address was made by Charles E. Adams, president Cleveland Hardware Company, Cleveland, who spoke in part as follows: "Steel and iron products are selling to-day at a price that will not decrease before 1919. As steel goes, so go the world and its products. The man who sells a commodity at less than current prices because he was fortunate enough a few years ago to lay a large supply in stock is an industrial suicide. He never will again be able to duplicate the prices of 1913. Nor will labor again be as cheap as before the European war. The laboring man of this country has been given a touch of luxury and unprecedented prosperity and will not return to the wage scale of a few years ago. He has already begun to demand an annual vacation. He does not request it. He is America's most independent class. I predict that the highest priced labor in the United States will be the day labor, and this will come before July 1, 1917. The cessation of immigration has caused this condition. The United States to-day has 2,000,000 less foreign laborers than in 1913, and the foreign element that once used the pick and shovel has since graduated to a position where skill is required."

C. P. Heindell, Charlotte, N. C., who made an address on "The Buggy in the South," disputed statements recently made by automobile manufacturers that the horse-drawn vehicle would soon be a matter of the past.

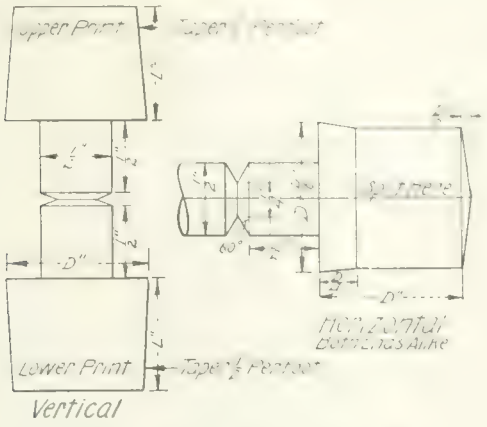
The attendance was larger than at any previous convention and 42 active members were added to the association, while 70 salesmen were enrolled as associate members.

Theodore Luth, Cincinnati, was elected president by acclamation. The next convention will be held in Chicago at a date to be selected by the board of directors.

The American Mining Congress will open its nineteenth annual session at Hotel LaSalle, Chicago, Nov. 13. Secretary J. F. Callbreath states that the convention promises to be the largest gathering of mining men ever assembled in the United States. The occasion is an important one, as it is expected that the next session of Congress will pass a bill revising the mineral land laws. Many important papers are to be presented.

Suggested Standards for Pattern Parts

Certain standards for pattern parts were advocated by W. W. Carlson, Kansas State Agricultural College, Manhattan, Kan., in a paper presented at the meeting of the American Foundrymen's Association, Cleveland, Sept. 14. Among other standards recommended is a system of colors for parts of patterns to show the finish of the various surfaces of the casting. Thus, if a casting is molded with the surfaces that are to be



D	L	S	t
⅜"	⅝	1⅞	
½"	⅞	2"	1½"
⅝	1⅛	2⅛	
¾	1⅜	2¼	
⅞	1⅝	2⅜	
1"	1⅞	2½	1½"
1⅛	2⅛	2⅝	
1¼	2⅜	2¾	
1⅜	2⅝	2⅞	
1½	2⅞	3"	1½"
1⅝	3⅛	3⅛	
1¾	3⅜	3¼	1½"

Suggested Standard for Core Prints

machined at the bottom of the mold, there will be less likelihood of these surfaces being imperfect due to slag, dirt and other impurities, than if they were at the top. Coloring the pattern to indicate which are machined and which are rough surfaces will often enable the molder to so bed his patterns as to bring the machined surface at the bottom. The following schedule of colors is recommended.

Rough casting	Yellow
Machined surfaces	Red
Core prints	Black
Pattern joints	Natural shellac
Pattern boards	Black

These colors, the author says, may not be ideal but they fill the purpose admirably. In a modified form they are already in use by steel manufacturers, and so he feels it would be an easy matter to settle on some one plan that would soon become generally used throughout the country. The objection that is sometimes put forth against color schemes is, he said, that they add to the expense, yet every pattern worthy of the name should be properly coated to protect it. The expense of this coating is, he added, a small percentage of the total cost of the pattern; the additional expense of the added colors is slight and disappears when the advantages gained are considered.

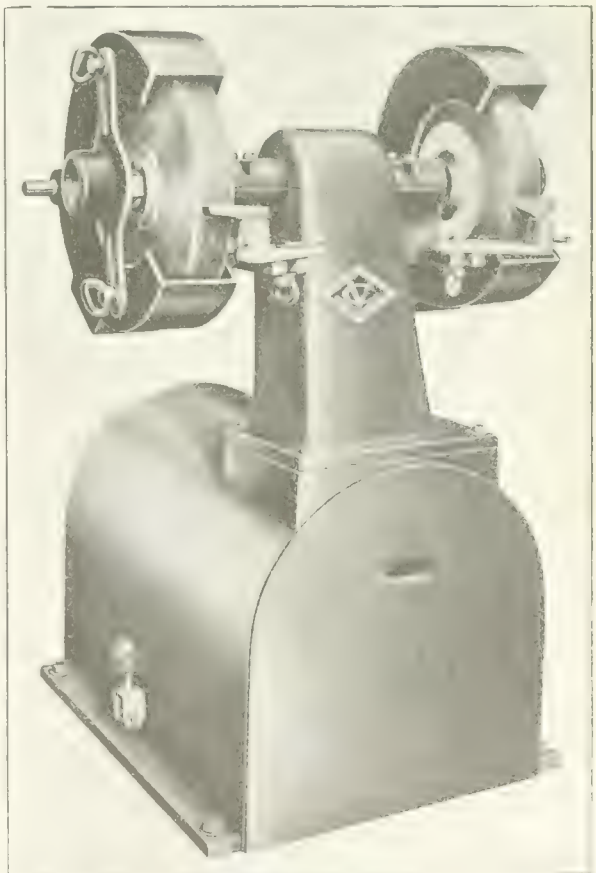
Another suggested system of standards is that of core prints. The accompanying illustration shows the system adopted in the shops of the Kansas State College. As will be noted, the vertical core prints have different tapers for the upper and lower ends. This taper is found to be sufficient but not excessive, and it is believed it will fit all average conditions. The shanks are all turned to the same diameters so that certain prints can be removed and others substituted of whatever size is desired. The author enumerates commendable points of the prints as follows: (1) There is a saving of time in making patterns by having core prints on hand. (2) There is a decrease in expense due to the fact that apprentice boys or low-wage help can be used instead of the more highly paid patternmakers. (3) Ease of changing the size of core prints on a pattern for pulleys and in various places where varying holes are required, is of value. (4) Since the tapers on the vertical prints are the same it is much easier and surer to secure properly fitted cores in the core prints. (5) As will be noted, the horizontal print has an increased diameter next to the pattern to aid in avoiding crushing the sand next to the mold when the core is put in place. (6) There results an increased rate of production and satisfaction to the workman by having definite written instructions for the men to follow.

The accompanying standard lists prints only up to 3¼ in. in diameter with a length of 1½ in. This length prevails up to 4 in., where the length changes to 2 in., which continues to 6 in. diameter. At 6 in. the length becomes 3 in. and at 8 in. the length changes to 4 in.

Grinding Machine with Inclosed Motor

A line of grinding and buffing machines has been brought out by the Valley City Machine Works, Grand Rapids, Mich., with the motor inclosed in the base. They are of the motor-driven, self-contained type, in which the power is transmitted by a belt connection. Thus, it is emphasized, it is possible to use any motor of the proper power, irrespective of its speed or the nature of the current available. The base is designed to carry the various sizes of the company's grinding heads, the wheels in the machine illustrated being 18 in. in diameter, while the base houses a 5-hp. motor.

In the machine the motor is placed on a pivoted base at right angles to the grinding spindle, the connection being made by a quarter-turn belt. It is explained that this arrangement keeps the motor free from dirt and grit and at the same time the shocks are cushioned or absorbed without danger. The tension of the driving belt can be varied from time to time by manipulating the adjustment screw at the base of the machine.



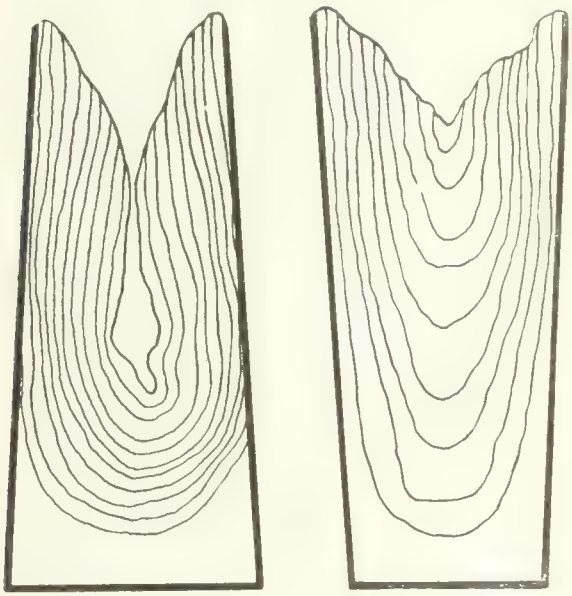
A New Self-Contained Grinding and Buffing Machine with the Driving Motor Inclosed in the Base and Transmits Power Through a Quarter-Turn Belt

The Production of Sound Steel Ingots

Some Results of Modern Practice Using the Large End Up with Hot Tops —Top and Bottom Pouring Discussed

CONTRIBUTED

THE physical properties of wrought steel depend in part on its chemical composition and in part on the mechanical and thermal treatment which it has received. The ingot is the phase in its manufacture in which it is prepared for physical treatment. The casting of sound ingots, simple though it may be imagined to be by those whose work begins with the finished bar or sheet, is a process literally as complex as the microscopic structure of the steel itself. In modern steelworks practice the chemical composition of the metal can be identified and its heat treatment controlled with considerable precision and the effect can be followed closely by microscopical and other methods. The production of the ingot, on the contrary, is subject to many influences to which quantitative determinations cannot be applied in practice, and it remains largely an empirical process.



Figs. 1 and 2 Show the General Outlines of the Successive Layers of Metals in Ingots as Ordinarily Cast in Tapered Molds

The faults which occur in the production of the ingot do not necessarily disappear in its subsequent treatment. On the contrary, many of them may accompany the material throughout the whole of its manufacture and become either the reason for its rejection and consequent waste of labor or the hidden cause of disaster in use.

THE GROWTH OF AN INGOT

What occurs in the solidification of an ingot is generally accepted, but the actual form which the conditions of its growth compel its interior to take is not so generally recognized. The dominant fact is that the layers which set successively are roughly parallel to the walls of the mold, and preserve a similar inclination to each other. They are not accurately parallel, because the rate of cooling varies in different parts of the ingot. The sides of the outer shell which set first, for instance, contract and withdraw themselves from direct contact with the walls of the molds, thus reducing their cooling effects, while the base remains constantly in contact with the bottom of the mold. This differential value of the cooling surfaces is appreciable, but is quite insufficient to prevent the inclination of the walls from controlling that of successive layers. This fact has recently been pointed out by Harry Brearly *Journal* of the West of Scotland Iron and Steel Institute, March, 1916), and is both illustrated by him with reference to ingots which were emptied or bled at various stages of solidification, and confirmed by a series of observations on the solidification of sterine, in which he was able to study the phenomena of setting more closely and continuously than was practicable with metal.

Figs. 1 and 2 show the general outlines of the successive layers by which ingots as ordinarily cast grow in taper molds. As is seen in Fig. 1, an ingot cast in a taper mold with its small end up forms ultimately a closed solid with a liquid in its interior. This liquid metal will shrink on cooling, leaving a pipe or cavity; and the cooling process, being there at its lowest, will favor the segregation or separate crystallization of impurities along the central axis, while the solid closure of the cavity at the top will prevent the segregates from rising into the head of the ingot. A similar cavity is seen in both figures at the upper part of the ingot, and unsoundness through this cavity is avoided in practice by discarding the upper part of the ingot in which it is visible. Fig. 1 shows, however, that no such precaution will remove the unsoundness due to the lower pipe.

In both types of ingots the actual depth of the upper pipe will vary with the size of the ingot, the nature of the steel, and other circumstances. But in those cast with the large end up, drawing the shrinkage of metal from a larger cross-section, the depth of the pipe is less, while the longer time for which the metal remains liquid in the upper part permits a larger part of the segregates to rise into the head.

These facts are the more important because the convenience of stripping the molds without waiting until the ingots are sufficiently set to be handled safely causes a large proportion of ingots to be cast with the small end up.

TOP AND BOTTOM POURING

The conditions of casting ingots differ also according as the metal is brought up into the mold from the top or the bottom. In top casting the mold can be, and usually is, filled more quickly than in bottom casting, where the liquid metal has to rise against its own head. As against this advantage, which is more material to quantity than to quality of output, bottom casting has advantages of its own. If the metal is introduced quite centrally and vertically through the base, it flows more evenly over the surface of the mold than if it cast from the top, giving a cleaner skin and less chance of the premature solidification of splashes. The immediate contact of the metal with the sides and its relatively

slow rise give a quicker setting and a thicker solid crust, reducing in this way the volume of liquid metal and the size of the pipe which its shrinkage will cause.

In a usual form of bottom casting the top of the mold is closed except for a vent hole; and the thick crust which forms through contact with the top serves to seal the ingot from the air and to give a better chance that the cavities which are left will be unoxidized and will weld up under the subsequent treatment.

In some practice the mold in bottom casting is left open at the bottom, and is placed over a hole in a thin runner-brick through which the metal is introduced. If the mold is not placed centrally over the hole, or if the hole is chipped or partly melted, the metal is not delivered symmetrically into the mold, and under the head which is behind it may splash against the sides and otherwise set up lines of weakness in the ingot.

MODERN PRACTICE

Leaving out the methods which have been and are used for closing cavities under pressure, which involves a costly plant and considerable revision of existing arrangement, the best known method of increasing the soundness of ingots and reducing the percentage which has to be scrapped is that of Sir Robert Hadfield. It has long been recognized that if the metal is kept liquid in the top of the mold, the pipe is fed and filled up to within a short distance below the final level of the liquid, while the segregates float up and are found in the head. In making small crucible cast ingots, for instance, the upper part of the mold is lined with a white-hot fire-clay sleeve or nozzle, which stops the piping, though not the contraction cracks.

A more vigorous method has been tried by covering the top of the metal with charcoal and burning it with a blast of air; but while this method gives the necessary heat and keeps the metal extremely liquid, it is apt to carbonize the upper layers of the metal and to introduce serious variations into the composition of the ingot. Krupp has covered the top of the ingot with molten slag. The solution of the problem which Hadfield has introduced is to use the charcoal and blast, but first to cover the metal with molten slag; thus providing whatever extra heat is wanted for keeping the metal liquid, while interposing the slag to prevent carbonization of the metal.

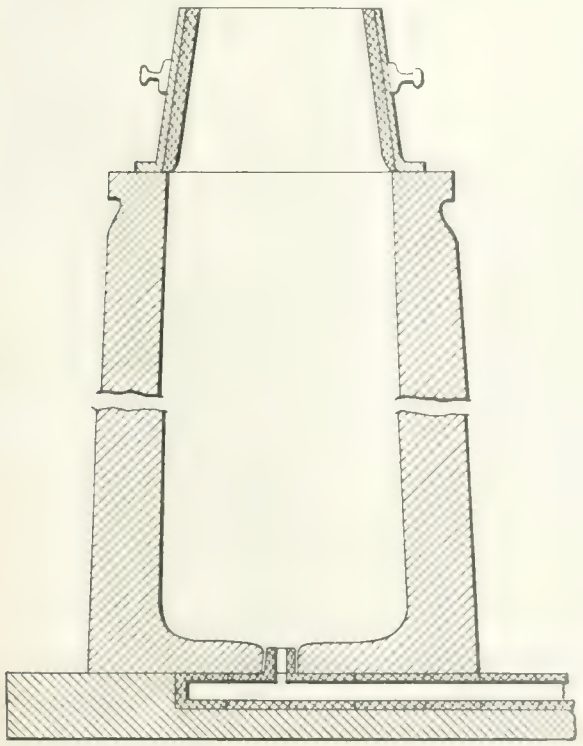


Fig. 3—Cross-Section of Ingot Mold with Hot Top and Large End Up, Showing Method of Introducing Steel in Bottom Pouring. This procedure is more universal now, it is claimed



The Right-Hand Drawing (Fig. 5) Represents a Section of a 12-In. Square Ingot Intended for Conversion Into Shell Billets Poured from the Bottom in a Large End Up Ingot with a Hot Top. Fig. 4 (Left) represents an ingot as usually cast

The use, however, of a separate blast on each mold introduces a complication to which many works would be averse, and obviously the method must require some care to prevent the charcoal from coming in contact with the steel which first solidified around the top of the mold and forming with it a liquid cast iron which would flow down into the ingot, which in the absence of precaution could readily happen when the level of the slag falls through shrinkage of the liquid steel.

Successful though the method has been in the works in which it has been used, an alternative would be preferred by many steelmakers in which no additional material and no extraneous heat is required. Such an alternative is now being worked in the following manner: The molds are used large end up and the metal is cast from the bottom, which is solid (Fig. 3), having a central aperture fitted with a renewable fire-clay lining which stands over the hole in the runner-brick. This arrangement insures the metal being delivered truly up the axis of the ingot and avoids the troubles which ordinarily arise through inevitable defects in the runner-brick hole. By the use of a vacuum cleaner just before casting, any dirt which may have fallen into the mold is removed, and the ingots are obtained with a clean skin from the very bottom.

The top of the mold is covered with a cast-iron head with inclined sides, furnished with internal projections which serve to hold a thin refractory lining and the heat which this head catches and reflects on to the surface of the metal keeps the upper part of the metal liquid for feeding the body of the

ingot as it shrinks until the segregates have passed up into the head and the ingot has set solid.

This process, which is free from patent rights, involves little or no alteration in existing methods of working. It is used in more than one works in Sheffield, England, and has been in constant operation for many years in at least one large steel plant in America, both for small and very large ingots. Sections taken from time to time have invariably shown an ingot sound up to the head, as is seen in Fig. 4, which reproduces the section of a 12-in. square ingot intended for conversion into shell billets, and may be compared with Fig. 5, showing an ingot cast in the ordinary way. For the last eight months the same size billets made by this process have been adopted for rifle-barrel blanks and supplied for this purpose, with the rejection of only the head, which only weighs 10 per cent plus or minus 1 per cent of the whole ingot. The presence of any unsoundness or segregate in any blank is shown up at once on boring and the observations on occasional sections have been confirmed by the fact that no rifle-barrel blank has been found to be unsound.

YIELD OF INGOTS

The improvements in soundness of ingots which these modern processes have now made is therefore shown not merely by their conformity with the requirements of the physical phenomena of casting, but by prolonged and continuous experience. But the proportion of the upper part of the ingot which is scrapped in ordinary practice for many purposes, including shells, remains for the most part unaltered. Under this practice a minimum of 20 per cent is discarded from top-cast ingots and 25 per cent from bottom-cast ingots, and is much more than is required to disclose a sound top in the part which is left for use. But even so, unsoundness may still possibly exist below the solid top. Considering the small control which the usual methods exercise over the inlet of metal in bottom-cast ingots and over the loss of heat and formation of pipes in ingots of both kinds, the practice as applied to them has not been needlessly severe.

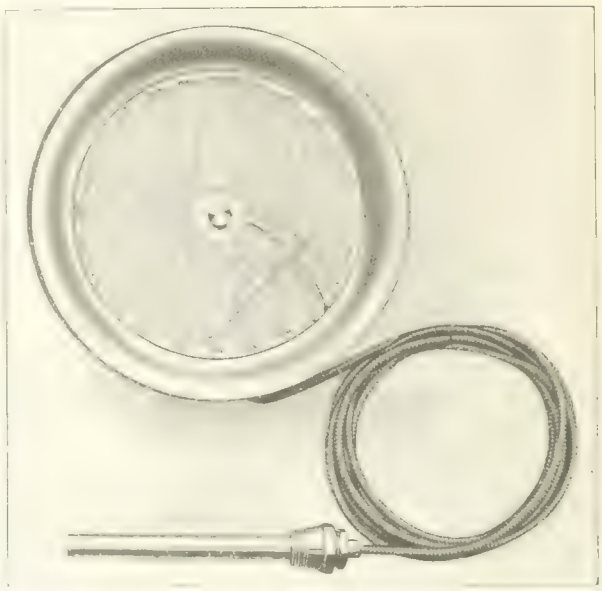
As much, however, cannot be said of the application of this practice to ingots made under the modern processes which have been described. Taking, for instance, the figures of the last process, it is clear that after discarding 15 per cent from the top of such ingots the whole of the suspicious region will have been removed, with an ample margin. No part of the remainder will be more likely to be unsound than any other part of the ingot; no further security will be gained by discarding a larger quantity and the ingot so cropped will be far more likely to be sound than the ingots of ordinary manufacture which have been cropped in accordance with the present ordinary practice. G. S.

Cast-Steel Shells Successfully Made Here

Cast-steel shells are reported as being made in this country successfully and on a large scale by one of the large steel-casting companies of the Central West. The monthly output is said to be 3600 tons. The surprising fact is that after casting they are not forged, but are machined only. They are cast hollow, of basic steel, containing 0.60 to 0.70 per cent carbon. After the excess metal as heads is removed, ¾ in. from each shell is machined from the outside and ½ in. from the inside. They are reported as sound and solid and eminently satisfactory. Considerable money is said to have been spent before it was learned just how to make them. They are all 6 and 8 in. shells, and are sent to a Canadian locomotive works, where they are machined.

A New Distant Recording Thermometer

A thermometer capable of recording temperatures at some distance from the point at which they are measured, has been placed on the market by the Brown Instrument Company, Philadelphia, Pa. The instrument, which is designed for a range of 0 to 800 deg. Fahr. or 0 to 425 deg. C., operates on the principle of the expansion of a gas with changes in temperature.



In This Recently Developed Recording Thermometer the Expansion of Nitrogen Gas in the Cylinder Transmits Pressure Through the Tube to a Helical Spring Which Expands and Actuates the Recording Arm

A number of new features have to do with the revolution and holding of the chart.

A copper cylinder containing nitrogen gas under pressure is employed to measure the temperature. A number of different types of gas containers can be furnished having either threaded connections for insertion in mains and pipes, or coated with lead to withstand the attacks of chemicals and acids. The change in the volume of nitrogen gas in the copper cylinder, due to changes in temperature, is transmitted through a small copper tube protected by flexible steel tubing. This tube can be supplied in lengths of 100 ft. if desired, thus making it possible for the recording gage to be placed as far as that from the point where the temperature is being measured and enabling the instrument to be used in numerous processes where a constant record of the temperature on a chart is desired.

A flat helical spring resembling very closely that used in pressure gages forms the basis of the recording mechanism. It is directly connected to a recording arm which marks on the record chart and expands in proportion to the pressure exerted by the expansion of the gas in the copper cylinder, this pressure being transmitted through the small copper tube.

The chart is revolved by a clock movement mounted directly on the front plate that supports the chart, this arrangement being relied upon to insure alignment of the clock and the chart plate. The chart is held in position by clips attached to the door and swinging away from the chart automatically when the door is opened. In this way the chart can be readily replaced without interference, especially as the opening of the door brings an automatic pen-raising device into play and keeps the pen clear of the chart until the door is closed again, when the pen is automatically released.

An indicating form of instrument for the same ranges of temperature is made where the necessity does not exist for having a permanent record.

A research on cobalt and cobalt alloys, conducted at Queens University, Kingston, Ontario, Canada, for the mines branch of the Canadian Government, has been published under the title "Magnetic Properties of Cobalt and of Fe_2Co, by Herbert T. Kalmus and K. B. Blake.

A QUENCHING MACHINE

Continuous Hardening, Pickling, Cleaning and Drying Apparatus—Used for Shells

A special machine that does the work in a munitions plant for which a gang of eight to ten men was formerly required has been developed by the U. S. Electro Galvanizing Company, 1 Park Avenue, Brooklyn, N. Y. It is an apparatus capable, say, of washing articles in a number of different solutions and then drying them. The machine is operated by one or two men and does the work, it is pointed out, of a battery of tumbling barrels.

The apparatus, which is continuous in operation, consists of a receiving bucket suspended in a tank of water and a number of drums revolving in tanks containing different solutions and a drying drum. These drums revolve at a speed of 10 r.p.m. and are installed on an incline instead of being perfectly horizontal. The material is thus made to advance as the apparatus revolves. A great variety of adjustments and combinations are possible. For example, the speed of travel of the cartridge shells through the machine can be governed by varying the speed of the machine, the inclination or the width of the pick-up pockets or by various combinations of all three.

In operation the shells come from the annealing oven at a red heat and are carried down a slide from the oven in trays that are tilted at the bottom of their travel to empty the shells into the receiving bucket of the washing machine, which is a square perforated receptacle with a chute at one end. This bucket in its receiving position is immersed in a tank of water, and as the shells are emptied from the trays they strike the water, which hardens them first.

One end of the receiving bucket is then raised, the other containing the chute remaining stationary. This causes the shells to run into a cylinder where the water is drained off and they next pass into a perforated drum revolving in a tank containing a pickling solution. Here they remain for about 4 to 5 min., as it takes that period for them to travel from one end of the cylinder to the other where they fall into a pick-up pocket.

This pick-up pocket carries them, a few at a time at each revolution of the machine, from the pickling drum to a perforated cylinder where they are drained. They next advance into a drum revolving in clear water where the pickle is thoroughly rinsed off, approximately 1 min. being required. The shells are again picked up and go to another draining cylinder from where they pass into a perforated drum revolving in a soapy solution where they remain about 4 or 5 min. Pick-up pockets again take the shells into another draining cylinder and into a drum revolving in clear water. From here they pass into another draining cylinder and then into the drying drum, which consists of an inner perforated cylinder that contains the shells and an outer cylinder supported by legs. The latter is a sort of hood or container for the heat and has three openings in its lower part through which the hot air is introduced, while an opening at the top is provided for the air to pass off.

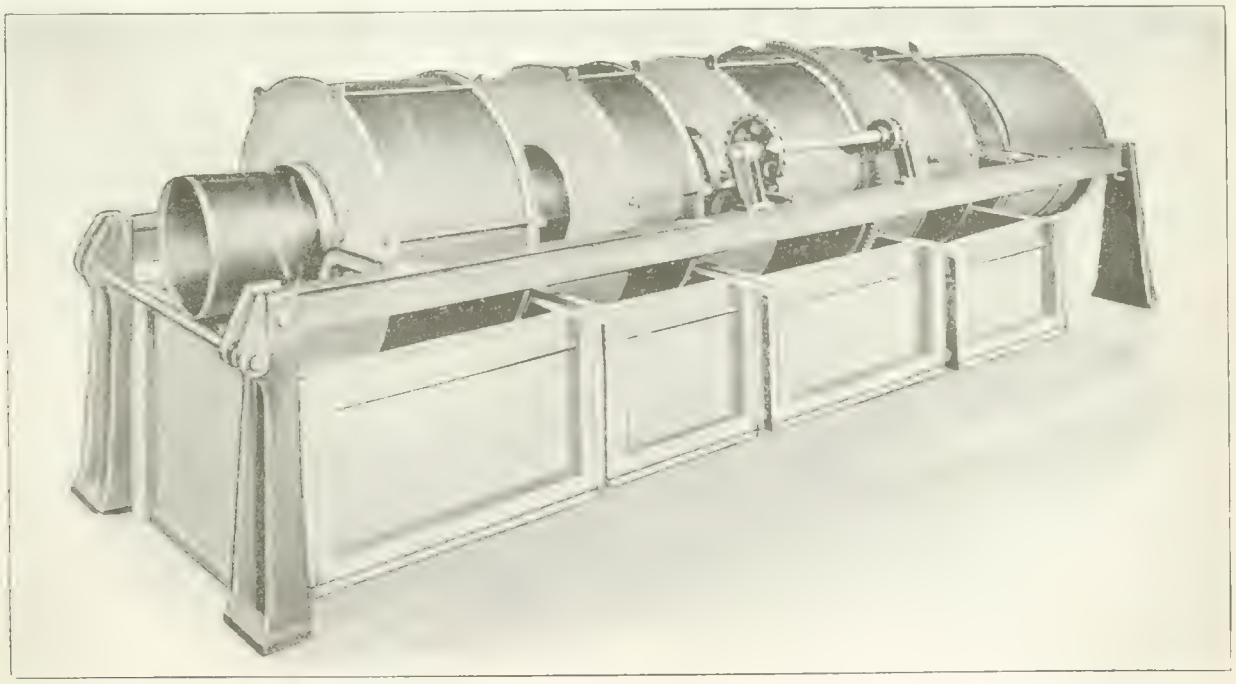
Vanadium and Tungsten from Peru

A partial indication of the growing mineral wealth of Peru was given by the President of Peru in his recent annual message to Congress. Some of the data of the production for 1914 and 1915 in metric tons is as follows:

	1914		1915	
Material	Tons	Value	Tons	Value
Vanadium ore, 15 per cent	14	$7,763	3,145	$682,610
Tungsten ore, 65 per cent	196	96,184	371	350,358
Molybdenum ore, 50 per cent	..	....	274	6,983
Antimony ore, 15 per cent	..	....	406	17,782
Lead	5,018	142,486	2,770	125,555
Copper	27,000	7,447,119	34,319	11,834,373

The large advance in 1915 in vanadium and tungsten production, as well as the inception of molybdenum and antimony mining, are striking.

The marketing of engineering ability is to be the subject of an address by C. Francis Harding, professor of electrical engineering, Purdue University, to be delivered at the City Club, Chicago, Oct. 6, at a booster dinner, so called, to be given by the American Association of Engineers in its campaign for membership. Other speakers on the program are John Ericson, city engineer, Chicago; W. H. Finley, chief engineer Chicago & Northwestern Railroad, and Isham Randolph, consulting hydraulic engineer, Chicago.



A Combination Machine Which Receives Red Hot Cartridge Shells from the Annealing Oven at One End and After Automatically Quenching, Pickling, Cleaning and Drying Them Discharges Them Ready for the Next Operation at the Other End

The Determination of Foundry Costs*

An Efficient Production System and Adequate Cost Accounting Essential to Make the Proper Prices to Insure Profits

BY CLINTON H. SCOVELL

An adequate production scheme is one of the essentials for efficient foundry management. It is also the framework for the cost accounting.

Upon receipt of an order for castings, at least three copies of the production order can be used effectively. One should remain in the production department, filed by customers or manufacturing classification, and two copies should go forward to the foundry foreman, one for his file and one as an order for patterns. A summary of these orders is kept by the production clerk, classified by customers, and if desirable for production purposes, according to weight of castings or grade of metal. A daily analysis of this summary is made by the production clerk and foundry foreman, and the production for succeeding days determined. Postings are made to this record, crediting the good castings made each day and leaving as a balance the number of castings for each pattern yet to be made.

When new patterns are received at the foundry the gross weight of castings to be made from these patterns is calculated. By maintaining the record the production ahead of the plant can be closely estimated.

Production orders as issued to the foundry should be given serial numbers. These order numbers can be so arranged as to indicate a customer, a class of work, a pattern, or, if desirable, all three.

THE DISTRIBUTION OF LABOR CHARGES

The labor cost will be sharply divided between direct and indirect charges. Even if the direct charges are not further subdivided, the total payroll should be separated into cupola labor, molding, core making, cleaning, pattern work and carpenter shop. In most cases there should be a subdivision of molding and core-making labor which will show the time consumed by molders and core makers against individual production orders. On large work there should be a similar division of cleaning also.

All indirect labor (except that connected with the molding, core making and possibly cleaning departments) should be charged to appropriate burden centers and subsequently distributed to job cost cards on the basis of pounds of good castings made. The indirect labor associated with molding and core making will be charged from the labor distribution to the molding or core making burden centers, and applied to costs through the hourly burden rate of these centers.

MATERIAL COSTS

The material charged to the cupola is the principal cost of melted metal, although the total cost of metal is composed of fixed charges on the investment in cupola equipment and raw material inventories, cupola repairs and the labor of the cupola gang.

A perpetual inventory should be maintained for all materials and supplies. This does not necessarily mean that detailed stores cards should be maintained, covering all items of supplies. But separate accounts should be kept (including freight as well as purchase price and unloading costs when kept separate) for such important items as pig iron, scrap, coke, molding sand, etc. General supplies may well be grouped in a storeroom, for which one person should be responsible. The balances on hand may be checked individually as convenient. If various sections of the inventory are checked at regular intervals, an accurate record can be maintained, so that it is possible to prepare a reliable statement of loss and gain at the end of each period without taking a physical inventory.

It is highly advisable that such supplies as nails, gaggers, etc., be kept under stores control. Large savings have been effected by requiring the foremen of the molding and core-making departments to issue requisitions for this class of supplies, which are a charge to burden in the respective departments.

THE DISTRIBUTION OF BURDEN

The first burden charge to each department is for rent. If the plant is rented, the rent chargeable to each department can be determined easily by apportioning the total rental paid according to the relative areas of the different departments. Where the plant is owned, the expense corresponding to rent consists of interest and taxes on the land, and interest, taxes, insurance, depreciation and repairs, and possibly heat and light on the buildings. The sum of these charges determined for each building in the plant, divided by the available floor space in each, gives a square foot factor which can be used to distribute the rent charges to departments.

The burden charges on the equipment in the several departments will vary because of the varying cost of the equipment, affecting interest, tax and insurance charges, and because the nature of the operations performed affects the depreciation. Charges of these various kinds are therefore based on the value and kind of equipment in each department. The sum of the rent and equipment charges are fixed whether any manufacturing operations are carried on or not.

The next charges are for power and for repairs to keep the factory in good operating condition. The power plant should be considered as an individual unit, and the cost of generating steam and power carefully determined. The cost of operating the power plant will include, beside fixed charges, such items as labor, repairs, coal, water and supplies. Having determined the cost of power, each department using power should be charged with its correct proportion of this cost. If it is not feasible to record the power used by each department, the consumption should be estimated as closely as possible. Multiplying the number of horsepower-hours used by the cost per hour the power charges against each department is determined.

In a large plant the repair department should also be treated separately, and its burden known. The original estimates on the cost of repairs in departments may be made from repair department records, or from a knowledge of the repair materials purchased, the payroll in this department and its share of the burden. When work is done for the productive departments such work should be charged to them in the same manner as it would be by an outside company. When the charges are accumulated on the individual repair job they check the estimate in each department.

The labor cost for foremen will be part of the burden of molding and core making, and of the pattern shop and carpenter shop if they are large enough to have charges of this kind. Cleaning labor may all be thrown together and assessed, with other general charges as a cost per hundred pounds on all the work done, but if the foundry is handling large castings which individually take several hours to be cleaned or chipped, these costs should be charged separately just as much as molding or core making labor, and in such cases the labor of foremen will be charged to burden as in other departments.

Some foundry executives may question the importance of dividing overhead or burden as above described. They may believe that average costs for metal, molding, core making, cleaning, etc., are all that is necessary, and where the product is uniform a fairly

*Abstract of a paper read at the meeting of the American Foundrymen's Association, Cleveland, Sept. 11-15, 1916. Adapted from the author's "Cost Accounting and Burden Application," in course of publication by D. Appleton & Co., New York.

good control of foundry operations may be secured in this way. However, labor costs vary widely for molding and core making on castings of different weights and different shapes. It is the difference in labor cost that attracts attention, but it takes only a little analysis to show that there is a burden on molding separate from that on core making. If an accurate distinction between the cost of light and heavy castings is desired it is essential to separate the burden costs as well as the labor costs, and charge these burdens in proportion to the work actually done in the respective departments and not as a flat average over the entire output.

THE ELEMENTS OF COST OF A CASTING

The elements of cost in a casting are the cost of metal at the spout, and the costs of molding, core making and cleaning. There is overhead or burden to be reckoned in connection with all these costs, and there are certain general expenses, as for power, heat and light, and supervision, that must be considered and spread in an appropriate way over the product. These costs will be accumulated on the job cards for individual production orders. It is a question of discretion as to just what a production order should cover. In most foundries it will stand for a class of product, or for an individual customer's requirements, but in some instances, as previously noted, individual castings will be made on separate production orders.

A job card should provide for the hours and amount of core making and molding labor, the number of pounds of good and defective castings made and a memorandum as to the loss through returns and allowances. The hours and amount of core making and molding labor will be posted from daily labor tickets, and the weight of castings, both good and defective, from the daily production reports. A memorandum of loss by returns and allowances will be obtained from the accounting department as credits are issued.

The burden of the core making and molding departments will be applied to the corresponding labor charges, preferably on the basis of the productive hours already charged.

If the work is large, cleaning labor and burden will appear as separate items, on the individual cards. Any charges for patterns, or machine work that may be done strictly as a foundry cost, will be accumulated on a separate cost card, but should be included on the cost-of-casting card under the heading of "Other Charges."

The cost of metal at the spout as accumulated in the account set up for this purpose is to be distributed to the job cards in proportion to castings made. Some managements will desire to have the material cost of metal and the cupola operating or conversion cost separately on the production orders, but if this division is made it seems logical to go a step further and show cupola material, labor and burden all separately. The cost of the metal and the cupola operating costs are separate, of course, on the cupola report.

Just what course is adopted in this respect will depend on the view taken in regard to defective castings, and as it cannot always be known whether castings are defective as soon as they are broken out of the sand, it seems wiser to distribute all of the cupola costs to all of the castings made. Those that prove defective have a scrap value. If this is regarded as equal to the average cost of the cupola charge the cost of the defective castings will be merely the labor and burden (and conversion cost, if stated separately) which has been incurred in their making.

The same result can be secured by distributing the cost of metal on the basis of good castings made, and distributing the cupola labor, burden and fuel on the total weight of castings made, both good and defective. A total will be obtained as to both gross weight and amount, from which the weight only of defective castings will be deducted, if the metal cost is charged on the basis of good castings. If the metal cost is on the basis of gross weight, both the weight and value of scrap will be deducted. According to either plan, this will leave the net weight of good castings, and the total cost of both good and defective, less the scrap value of the defective castings.

To the cost, as above determined, general burden should be applied, representing miscellaneous foundry expenses, at a rate per hundred pounds. The main elements of burden in a foundry are to be recognized and distributed as charges on land and buildings, and for power and repairs, but after the best possible analysis of charges of this character, and their distribution to cupola, and to the departments of molding, core making, cleaning, etc., some general charges will remain for such items as general supervision, clerical labor, shipping, delivery and the costs of defective castings returned from customers (less scrap value). If the product is fairly uniform and rather small, all the costs of cleaning can be conveniently thrown in the general burden on a pound basis.

The expense for flasks and patterns, including repairs as well as fixed charges, is logically part of the molding burden, but this is sometimes thrown into general burden.

ALLOCATING THE COST OF PATTERNS

The policy of different foundries will naturally vary in respect to the cost of new paterns. In a jobbing foundry where the customers own the patterns this factor will not have to be considered, but in a foundry making for its own machine shop it will be considered part of the foundry cost. The general upkeep of patterns may fairly be included in molding burden, but the cost of new patterns should be accumulated on individual pattern orders, even if the final charge is to an expense account.

Patterns are an asset to a certain extent, and if a foundry is rapidly increasing its line it is logical to increase the asset in patterns, but after a line has been fully established an increase in the assets on account of patterns should be made very cautiously, and practically all expense of this kind charged as maintenance.

SUMMARIZING THE RECORDS

To complete an adequate cost and accounting plan for a foundry, provision should be made for summarizing various records. The distribution of labor and materials and also the development of burden has already been explained.

The total cost of the cupola will be distributed to individual production orders or job cards, according to one of the two plans outlined, and the total will be a credit to the cupola account and a charge to individual orders. A summary of the production orders in respect to labor and departmental burden will provide credits to the respective labor and burden accounts, and the total cost of the finished castings will be charged to an account called "Cost of Goods Sold," by individual customers if immediately shipped, or be transferred to a machine shop inventory. The foundry cost cards should provide for a convenient posting of shipments (weight and cost value), and to carry forward the remaining inventory to the operations of the next period. A few foundries maintain a stock of clean castings that have not been machined, but this is almost uniformly for the benefit of the machine shop rather than the foundry, and the value of such raw castings is much better transferred to the raw material inventory in the machine shop, rather than carried as inventory of finished work in the foundry.

On continuous jobs, such as work for a regular customer, or on any special work that is not finished in the month in which it is started, there will be material, labor and burden costs in the succeeding period, in addition to those brought forward from the previous period. The balances, both weights and cost values, determined at the end of each period (month or four weeks) are an inventory of work-in-process, and the total of the balances on the job cards should agree with the controlling account in the general ledger. This bookkeeping agreement should be established as a matter of course every period, and a physical inventory should be taken and compared with the job cards from time to time as may be convenient, so that the management may be sure that the values and the weights are actually on hand.

Upon each cost card there should be provision for such information as the selling price, cost of goods sold, gross profits, loss on returns and allowances, and net profit. These items should be proved, by means of summaries, with the controlling accounts in the ledger.

BRITISH MADE PIPE

American Superiority in Manufacturing, Packing and Delivering Not Admitted

An answer has been made to the article appearing first in the *Ironmonger*, of London, and later in THE IRON AGE, of August 24, giving the palm for excellence of product and method of packing for shipment to American-made pipe over pipe manufactured in Great Britain or Canada. The original communication was made by Percy G. Donald, who was engaged in behalf of the British Government in buying material for a water pipe line in Egypt. Owing to the prominence given Mr. Donald's severe criticism, William Stewart, Stewarts & Lloyds, Ltd., tube manufacturers, Glasgow, Scotland, has sent to THE IRON AGE a copy of that company's reply to the arraignment. Substantially in full it is as follows:

PACKING FOR EXPORT

"The specification issued to British manufacturers called for the threads of the pipes to be protected with old nail bags. This method of protection is illustrated in Mr. Donald's article (Fig. 1), and is described as the 'usual method of packing British water pipe.' That description is altogether misleading. The usual method of protecting the threads of tubes of the sizes dealt with in Mr. Donald's article is by means of a wrought-iron ring screwed on the uncoupled end. This ring may consist of a half-coupling, or a forged ring made specially for the purpose.

"Mr. Donald refers to this protection as an 'alternative' method adopted by British manufacturers, but his statement that it is only supplied at an extra charge is incorrect. Our practice, and we believe the practice of all other British makers, is to include the protection ring in the price per foot of the tube. It is not clear from Mr. Donald's article what proportions of the British tubes were supplied protected respectively with old nail bags and with rings, but the article gives the impression that the majority of the pipes were protected at the ends with old nail bags. This, so far as our supplies were concerned, was not the case.

"As to the illustration of a typical protector found on American pipes, it is not claimed that this is the style of protecting ring found on *all* American pipes. It is not the usual American protection. In this connection we refer to the description given at p. 90 of the National Tube Company's pocket catalogue, which reads: 'Solid tapped rings or split couplings will be provided as thread protectors on all sizes, 4 in. in diameter or larger.'

PIPE COUPLINGS AND LENGTH OF TUBES

"Mr. Donald's references to pipe couplings are contradictory. He states: 'The American socket has the inside slightly bevelled before the thread starts,' and 'in the American pipe the socket is invariably recessed.' If American sockets are invariably recessed the reference to bevelling is meaningless. If they are bevelled the reference to recessing is misleading.

"It is stated that the British pipes were sent out with the threads quite dry both at the socket and the spigot end. Our practice is to oil the threads of the couplers and the tubes before despatch.

"The length of the tubes made by British manufacturers is determined by many factors, including the length of the railway trucks in which the material to make the tubes reaches the tube-maker and in which the tubes are despatched from the tube-maker's works, the head-room in their customer's warehouses, and facilities for handling. We do not think there is much in this point, as, from our own experience, there is not much difference between the lengths of British and American pipes of the sizes in question.

"The greater number of joints per day which it was possible for Mr. Donald to make with American pipe than with British must have been due more to the finer thread on the British pipe than to any difference in the length of the tubes themselves.

SCREW THREADS

"There are many considerations determining the number of threads per inch with which tubes should be screwed, and there are good arguments in support of both the American practice of eight threads per inch and the British practice of eleven threads per inch. The British Engineering Standards Committee went very carefully into this matter, and decided that the balance of advantage for all purposes of pipe threads lay with eleven threads per inch for pipes 1 in. to 6 in. nominal bore.

"At the instigation of American and French engineers an international commission met four or five times in Paris in order to standardize pipe screw threads and form an international standard. At these meetings the advantages of both practices were again gone into thoroughly, and at the last meeting it was decided to recommend the adoption of the British practice, viz., eleven threads per inch, and this was done with the full concurrence of the Americans. Among other reasons, the fact that in screwing eight threads to the inch much of the metal of the pipe was cut away, thereby nullifying any possible advantage of a heavier pipe, had considerable influence.

THE WATER TEST

"More care is required to make a satisfactory joint with pipes screwed eleven threads per inch than with pipes screwed eight threads per inch, and lack of experience in laying the pipes probably accounts for the greater number of British joints found to be leaking when water was pumped through.

"That a perfectly satisfactory joint can be made on pipes screwed eleven threads per inch with tubes screwed taper and sockets screwed parallel is beyond question. Such joints have been in satisfactory use for comparatively high pressures for very many years, and are standard practice for gas and water purposes, and also for moderate steam pressures. For oil-line work or high-pressure steam, British practice is to screw the tubes taper and the sockets a corresponding taper.

THE TERM BRITISH STANDARD

"The term 'British Standard' refers exclusively to British Standard threads, and is not used, either by tube manufacturers or by consumers, in referring to sizes or thicknesses. Mr. Donald has failed to appreciate the difference between British Standard for pipe threads and British Standard sizes and thicknesses.

"There obviously cannot be any variation in screwing standards, and all makers work to standard gauges in screwing their tubes. As the different thicknesses of tubes for gas, water and steam are all screwed to the same standard, it follows that the inside diameter of the tubes can only be nominal and must vary with the thickness.

"Mr. Donald states that the Admiralty, the War Office, the railway companies, and the shipbuilders, although represented on the British Standards Committee on Screw Threads, set up their own special standards when asking for quotations. This is not the case. These bodies may specify different thicknesses according to the various requirements, but they all adhere to British Standard screwing.

"It is alleged that hardly two manufacturers in Great Britain agree on the weight per foot of any size of tube. This is a matter of little consequence. Tube-makers publish their standard thicknesses and weights for the different qualities of tubes they make, and if there is any difference between makers' standards, users can select the thickness that best suits their purpose.

STANDARDIZATION IN THE UNITED STATES

"Mr. Donald alleges that American manufacturers can produce tubes of a higher quality and a greater weight at prices considerably below those of the British manufacturers, but he produces no evidence in support of this assertion; nor in support of his assertion that the British manufacturers get their labor at about half the cost the American makers pay.

"The difference between British and American standard thickness, as shown on the table given in Mr.

Donald's article, is largely due to the difference in the screwing standards of the two countries. Up to 2 in. the difference is very slight and British gas tubes are, if anything, heavier than American standard tubes for gas, water and steam, while British steam tubes are very considerably heavier. For sizes above 2 in. American tubes are heavier than either British gas and steam tubes, but this is entirely due to the greater thickness of metal required to carry the coarser American thread.

"Mr. Donald asks why there should be different pipes for water, gas and steam? This question should be addressed rather to consumers of pipes than to manufacturers. British manufacturers are frequently blamed for their reluctance to comply with the requirements of their customers and for assuming an attitude of 'This is what we make—you can take it or leave it.' That is obviously the attitude of the American manufacturers with regard to standard pipes for gas, water, and steam. It would be a decided advantage to British manufacturers to supply only one quality of tube for different purposes, but there are other considerations than the convenience of manufacturers, and we are inclined to believe that if any change is made American manufacturers will follow British practice, rather than British manufacturers American practice, with regard to the different standards for gas, water and steam tubes.

FITTINGS AND COSTS

"Under this heading Mr. Donald makes the assertion that U. S. pipe is tested to a higher pressure than British steam pipe. This is not the case, and here Mr. Donald produces no evidence in support of his assertion.

"American manufacturers are praised for confining themselves to tubes and refusing to have anything to do with fittings, while British manufacturers are condemned for wasting time on fittings. Were the position reversed we should no doubt have found Mr. Donald reproving British manufacturers for their stupidity in allowing articles so essential to their industry as fittings to be manufactured in separate establishments.

"We have no means of checking the figures given by Mr. Donald. Comparisons based on war conditions are altogether valueless. During normal times British manufacturers have to meet the competition of German, Canadian and American manufacturers, and the fact that they have been able to do so and increase their foreign trade in the past seems to point to there being something in their manufacturing and selling methods which meets the requirements of their customers, and we have no doubt that after the war is over they will be able to regain whatever portion of their trade has been lost to America as a result of the disadvantages they at present labor under owing to the war."

British Standard Specifications in Foreign Tongues

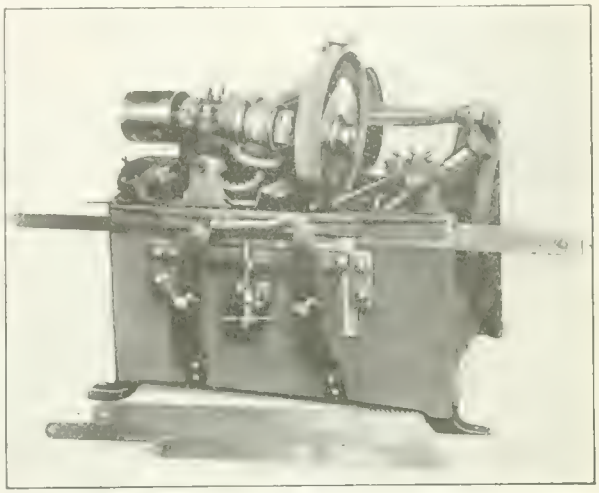
The British standard specifications have been translated into French, according to a paper presented by the secretary of the Engineering Standards Committee before the British Association, at Newcastle, Sept. 7, discussing the work of the committee. It is hoped to translate them also into Spanish and some consideration is being given to the possibility of putting them into Russian. As the author phrased it, every effort must be made to insure that the British standard specifications are readily available to foreign purchasers as well as those in the British Empire. Incidentally he mentioned, as an indication of what may be expected in commercial contests after the war, that the German League of Economic Associations has recently been formed out of the six great associations of German engineers, architects, furnacemen, chemists, electricians and marine engineers, numbering some 60,000 members.

Plans for the shipyard of the new Northern Shipbuilding Company, Tacoma, Wash., have been practically completed by John Martinolich, president of the company, and work will begin shortly. The company will construct wooden vessels, for which several orders have already been taken.

Grinding Machine for Hack-Saw Blades

The Wardwell Mfg. Company, Cleveland, Ohio, has brought out an automatic power hack-saw blade grinding machine which is said to be the first machine of the kind ever placed on the market. It has a one-piece frame, with all wearing parts of steel. A bronzed bushed grinding wheel head is suspended at the end of an arm hung from hardened steel pivots. In this way all slides are eliminated and freedom from all vibration of the grinding wheel head is obtained. The grinding wheel head has both radial and thrust adjustments.

A slotted eccentric provides a quick adjustment of the feed and a double pawl positive feed movement not only provides a continuous feed to the saw but also draws it in and discharges it from the machine, and so permits every tooth to be resharpened. Tension screws on a spring vise are relied upon to regulate the proper grip of the blade, while a screw raises or lowers the



In this Automatic Machine for Resharpening Power Hack Saw Blades a Double Pawl Mechanism is Provided to Control the Movement of the Grinding Wheel and the Blade is Held in a Spring Vise

blade, should it be warped high or low in the middle. Four adjustments control all movements.

It is stated that these movements are so accurate and that the grinding wheel spindle is under such perfect control that as little as 0.0005 in. can be removed from the face or back of the saw blade tooth. The machine is extremely simple, it is said, so that a boy can operate it, and that a continuous stream of blades can be fed through it at the rate of 65 teeth per minute. This means that from 14 to 18 blades 18 in. in length can be resharpened in an hour.

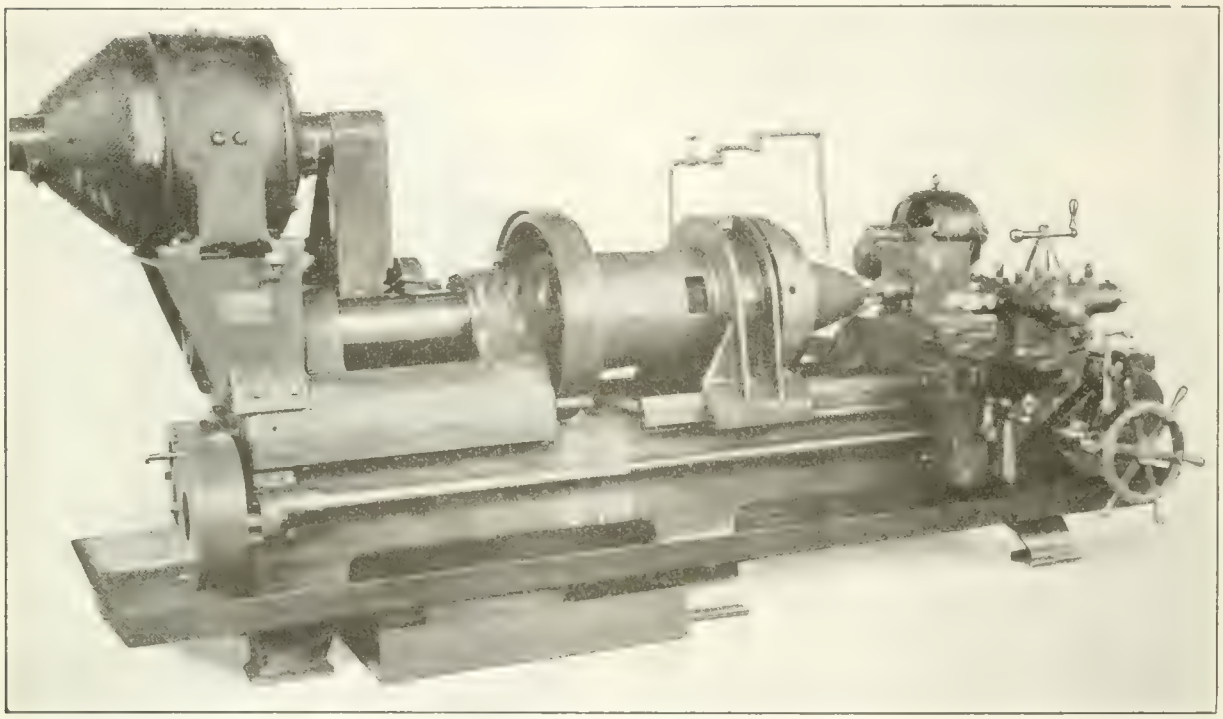
The blades are sorted by the operator, those of the same width and pitch being run through in groups so that it is not necessary to stop the machine. Any width or length of blade with teeth up to as fine as 33 per inch can be resharpened, and it is claimed that as the blades become dull they can be resharpened six or eight times or more, depending on the material being cut. It is stated that the actual cost of resharpening one blade does not exceed 2c., and that the use of a machine will result in a great saving to users of power hack-saw blades who now throw away those blades as soon as they become dull.

At the annual meeting of the Association of German Ironfounders, held recently, Herr Mettler of Berlin stated that under war conditions Germany had succeeded in dispensing with tungsten and in producing an iron which had more than twice the electrochemical properties of copper and that Germany's future lay in the electric furnace.

More natural gas was used in the United States in 1915 than in any other year, according to statistics completed under the supervision of J. D. Northrop of the U. S. Geological Survey. The quantity was 628,578,842,000 cu. ft., which exceeds by 6 per cent the record established in 1914.

A Special Lathe for Projectile Work

A special machine which makes it possible to take the finish boring and facing cuts and also mill threads in either the base or nose end of a shell has been developed by the Gisholt Machine Company, Madison, Wis. With this machine it is possible to perform the boring, facing and threading operations without transferring the shell from one machine to another, which, it is emphasized, eliminates the time required for rechucking and also secures a perfect thread. Two sizes of lathe are built, the one illustrated having a nominal swing of 25 in. with a 10-ft. bed, which enables shells up to 12 in. in diameter to be handled, while the other which will handle shells up to a maximum diameter of 16 in. has a swing of 29 in. and a bed 16 ft. long. The thread milling attachment can be adapted for cutting right or left hand threads, either internally or externally, of either the United States standard or metric pitches.



This Special Projectile Lathe Was Developed to Enable the Finish Boring and Facing Cuts to be Taken in Shell Blanks and Threads to be Milled in the Nose End at One Setting

The collet chuck is supported at the outer end by a heavy steady rest and is driven directly from a spiral pinion on the backgear shaft that meshes with a spiral gear secured to the collet chuck flange which in turn is secured to the end of the spindle nose. The spindle has a bore of 6¼ in. and a ball bearing against the rear housing takes care of the end thrust. The other bearings are large and are provided with bronze bushings. A silent chain transmits the power from the driving motor to the backgear shaft. The tool post, which is a steel casting, is mounted on the front of the cross-slide. Four holes, 2¾ in. in diameter, are provided for mounting boring bars equipped with either single or double end cutters. An index pin on the cross-slide is relied upon to line up the tool post holes with the spindle when the latter type of cutter is used.

The thread milling attachment is mounted on the rear of the cross-slide and has a radial adjustment for aligning its spindle with that of the lathe. The spindle of the attachment is mounted in adjustable bronze taper bearings and has thrust washers and an adjustable collar to prevent backlash of the spindle. The spindle is driven by a worm and wormwheel and spiral gears from the small motor mounted directly on the cross-slide. Special back gearing is provided for reducing the speed of the lathe spindle to the proper one for milling the thread at one revolution. An arbor for a hob is provided on the spindle and an adjustable cam at the front end of the cross feed screw is furnished to feed the hob in to the correct depth of thread before the main spindle starts to revolve.

A lever on the headstock enables either the slow speed for thread milling or the regular rate for boring and turning to be secured, while change gears are provided to vary the relation between the boring and milling speeds to suit conditions. The customary change gears for obtaining the various feeds and threads required for the screw cutting operation are provided and three rates of quick change feed are available at the headstock end. The power feed for boring operates through a rack and pinion and an interlocking mechanism is provided to prevent the engagement of conflicting feeds.

The Excelsior Pulley Company, Cuba, N. Y., has been completely reorganized and is vigorously reaching out for a larger share of the trade in wood-split pulleys. In March of this year M. A. Howell purchased a controlling interest in the company and assumed active management of it. None of the previous officers is now connected with the company. The new owners have installed new power and added new machinery. Among the additions to the equipment are a new two-cylinder 150-hp. gas engine, a planer, a jointer, a cut-off saw, lathes, etc., which will more than double the former capacity of the factory. The new officers are as follows: M. A. Howell, president and general manager; E. Z. Howell, vice-president and treasurer; C. F. Zietlow, secretary.

The Vulcan Fuel Economy Company, maker of the Vulcan soot cleaner for water-tube and tubular boilers, 230 South La Salle Street, Chicago, is now the name of G. L. Simonds & Co. The personnel of the organization remains the same. The only change, in addition to that of the name, is an increase in capital, the better to handle the company's business.

Ferromanganese Alloys by Electricity

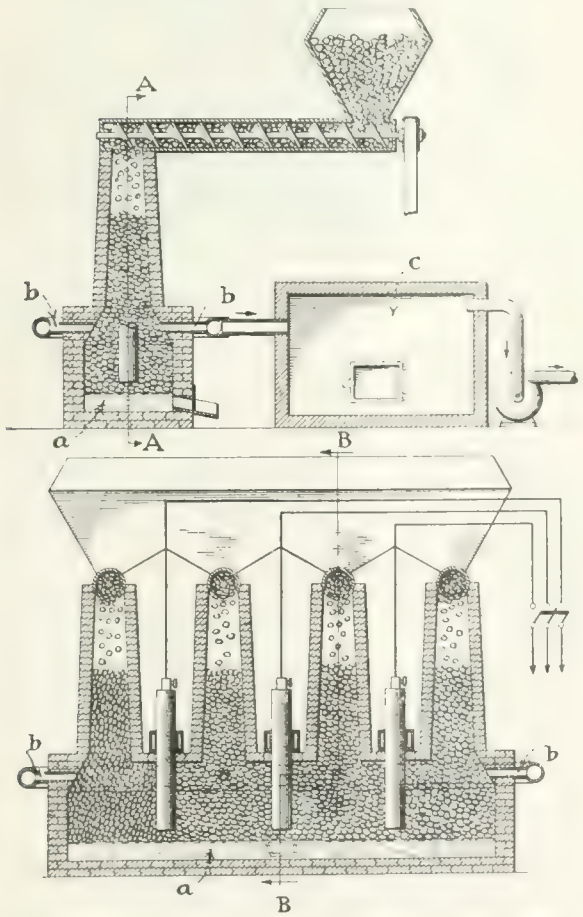
The production of ferromanganese alloys from the waste clinker or cinder from zinc furnaces in an electric furnace, at the same time recovering the zinc, is a recent new process. It has been invented by Harry Schragin, South Bethlehem, Pa., and is covered by U. S. patent 1,190,679—July 11, 1916.

The waste clinker or cinder from zinc smelters, using franklinite or willemite zinc ores, such as the New Jersey Zinc Company smelts in making spiegeleisen, is crushed to a suitable size, mixed with 25 per cent by weight of waste coal dust and a quantity of limestone flux. The cinders referred to contain approximately 15 to 22 per cent MnO. They also mixed with about 28 to 56 per cent FeO, 20 to 30 per cent SiO_2, 8 per cent carbon, 6 per cent Al_2O_3, 10 per cent CaO, about 4 to 5 per cent ZnO, and about 2 per cent MnO.

The charge is placed in a hopper, shown in the illustration of the furnace, and is fed by the screw conveyor to the furnace stack. The current is turned on when a sufficient amount of the charge has accumulated around the electrodes. The temperature is then brought up to 1500 deg. C., the process of charging continuing in the meantime. The charge melts collecting as a pool *a* where the molten iron and manganese settle, the slag rising to the top. An alternating current is preferred rendering the control of the temperature easier.

The zinc is volatilized and drawn off by suction through the openings *b* to the chamber *c*, where it settles. Any zinc passing up beyond the pipes is condensed by the down-coming cool charge and returned to the fusion zone. The atmosphere is reducing and the temperature is not allowed to exceed 1500 deg. C to any extent.

Silicospiegel is claimed as a possible product by using a modification of this process and is covered by a patent, U. S. 1,190,678—July 11, 1916, granted to

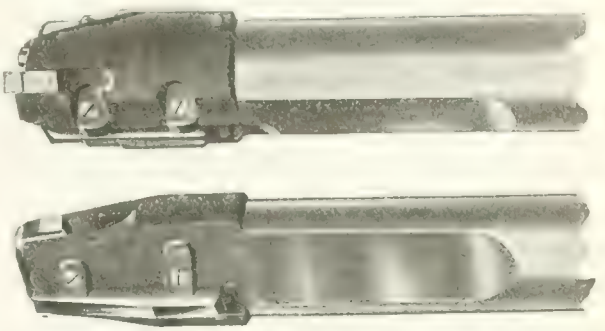


Two Sectional Views of Electric Furnace for Producing Alloys of Iron and Manganese

the same person. The charge is substantially the same but the temperature is raised to 1800 to 2000 deg. C. The volatilized zinc is collected as before, but the silicon is reduced along with the iron and manganese, producing an alloy containing from 10 to 15 per cent silicon, 10 to 30 per cent manganese, 15 per cent aluminum and 60 to 70 per cent iron.

Three-Cutter Boring Head for Shells

An inserted-blade type of boring head for shell work has been placed on the market by the Black & Decker Mfg. Company, Baltimore, Md. Two heads comprise a set, one being used for roughing the side walls and the bottom of the shell, while the other finishes the same



A Boring Head for Machining the Side Walls and Bottom of a Shell Interior Which Has Two Side Wall Cutters Set at an Angle of 180 Deg. and an Overlapping Bottoming or Nosing Cutter Located Midway Between Them at a Right Angle

surfaces. The advantages claimed for the use of this head are an economical use of high-speed steel as the blades are of small cross-section and can be removed and reground a number of times, a system of support for the blades which is relied upon to eliminate chatter and special arrangements for clearing the blade of chips and supplying lubricant to the point at which the cutting is being done.

Each head contains three blades, two side wall cutters at diametrically opposite points on the periphery of the head and a nosing or bottoming cutter which is set in the end of the head midway between the other cutters or at right angles to them. The rear of the latter cutter overlaps the side ones, and in the case of the finishing head all are ground to give the proper contour which, it is explained, eliminates the possibility of a shoulder being left in the shell at the junction of the bottom and side walls. The blades are backed up and supported by the metal of the head and a wedge and a screw system of clamping is employed which, it is pointed out, renders the possibility of a blade becoming loose and chattering when in service rather remote.

The cross-section of the blade is small and it is possible to remove the blades and regrind them several times before they have to be discarded. In this way, it is emphasized, a large source of waste, inherent to the solid blade boring head when working to the close tolerances common in munition work, is done away with and economies are thus effected in the use of high-speed steel. Arrangements have been made to provide an unobstructed path for the chips produced to flow back from the blades. When cutting is being done the blades are flooded with lubricant under pressure through a central lead with an inlet at the turret end of the head. The heads, clamps and screws are case hardened and the shanks are ground to fit the turret with keyways and flats to suit the opening in the turret.

T. A. Willson & Co., Inc., Reading, Pa., manufacturer of eye protectors, has been awarded a large Government contract of an unusual character. It is stated to be the first official order ever issued for eye protection equipment for the exclusive use of the country's armed forces. The company's Albex eye protector has been adopted and standardized by the War Department and will soon be a part of the regular equipment of 50,000 troops. The company had previously received an order for about 25,000 goggles for shipment to El Paso and other Southern points. Within a few months about 75,000 enlisted men will be equipped with Willson eye protectors.

PRODUCER GAS FOR BOILERS

By-Product Producers Held to Effect Large Savings in Steam Plant

Exceptional economic possibilities are offered in the firing of steam boilers in large steam plants by recovery-producer gas, recovering ammonium sulphate a by-product, according to an article by T. Roland Wollaston in the *Engineer*, of London, Aug. 25, 1916. Basing his figures on English practice, the author states that with coal of good producer quality delivered for 6s. per ton, there is obtainable from each ton 90 lb. of ammonium sulphate, valued at 9s. 6d. The difference, 3s. 6d. covers running and capital charges, power thus being obtained at no cost. The demand for ammonium sulphate, he says, is constantly increasing and its price in the past has fallen and risen with that of coal. There is no probability, he holds, that the commercial possibilities of the scheme suggested will ever be less than they are at present.

The operation of a 15,000-kw. (20,000-hp.) central station with a load factor of 25 per cent, is analyzed with reference to the cost with ordinary coal-fired boilers and with recovery-producer gas firing. It is assumed that the coal-fired boilers will operate at 70 per cent efficiency and the gas-fired boilers at 83 per cent. The coal-fired boilers will use 2 lb. of coal per horsepower-hour, including banking and standby. Recovery gas producers will, on common slack, work at 68 per cent cold gas efficiency, and yield sulphate of ammonia equal to 4 per cent of the coal gasified. They will also generate their own blast steam. To secure the above efficiency, the gas plant should be worked at full load, from which it follows that gas firing should be adopted only for the average load factor, 5000 hp., the peaks being carried by the coal-fired boilers.

The additional capital outlay and operative changes required for the gas-fired plant may be taken as follows:

Extra capital outlay	£22,500	($109,125)
Extra labor on plant (per annum)	2,100	(10,185)
Extra stores (per annum)	700	(3,395)

If 5000 hp. be considered as the dead steady load throughout the year the normal annual coal consumption would be 39,107 gross tons. The combined efficiency of the gas plant and gas-fired boilers would be 56.44 per cent, compared with 70 per cent for coal-fired boilers, and the coal consumption would approximate 48,500 tons annually.

Basing the cost of acid for fixing the ammonium sulphate at £2 per ton, and coal at 15s. per ton, with an assumed value of the ammonium sulphate at the works of £15 per ton, the following balance sheet may be made up:

NORMAL PRACTICE

Dr.		
To 39,107 tons coal	£29,330	($142,250)

PROPOSED PRACTICE

Dr.		
To 48,500 tons coal	£36,375	($176,500)
To 1,940 tons acid	3,880	(18,820)
To extra labor at gas plant	2,100	(10,200)
To extra stores at gas plant	700	(3,400)
To handling and bagging sulphate	646	(3,135)
To 14 per cent. interest, depreciation and maintenance on £22,500	3,150	(15,300)
Gross operating cost	£46,851	($227,355)
Cr.		
By 1940 tons of sulphate at £15	$141,135	
By 1940 tons of tar at £1	9,450	
		$150,585
Net operating cost		$76,770

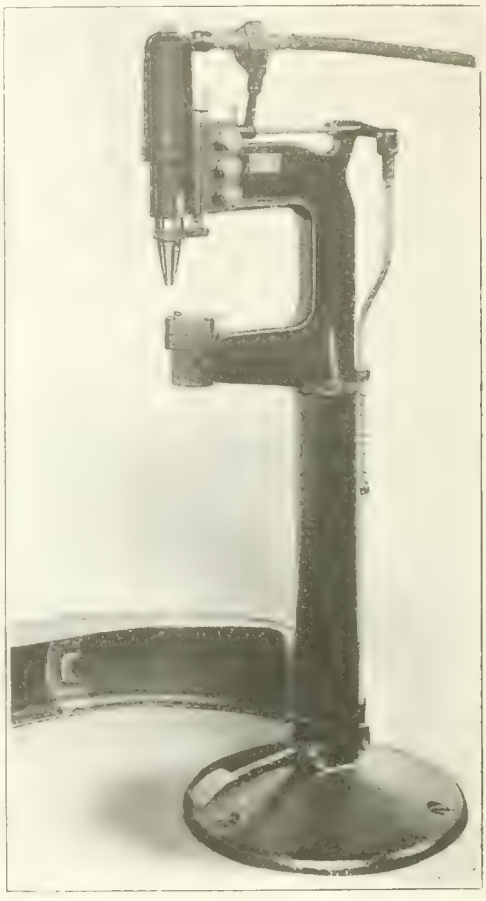
The net saving per annum is thus: $142,250 — $76,815 = $65,435.

Other minor debits and credits which will occur, such as an annual charge on extra land required, will probably balance, leaving a net saving according to the proposed system, based on the charges given above of about £13,000, or a return of 50 per cent on the investment.

A Pneumatic Pedestal Riveting Machine

For riveting small light parts that can be handled to better advantage in a stationary machine, the Chicago Pneumatic Tool Company, Fisher Building, Chicago, Ill., has designed a pneumatic pedestal riveting machine. It is operated by a foot lever which leaves the operator's hands free to handle the work. Although only one size of rivets is handled by the ordinary machine, a special arrangement can be supplied for handling four different sizes.

The machine consists of a pipe column supported on a cast-iron base which is bolted to the floor. At the



A Pedestal Type of Pneumatic Riveting Machine Designed for Small Light Parts

opposite end of the column the yoke, which consists of a crucible steel frame, is fastened. The standard yoke has a gap of 8 in. and a reach of 11 in., but yokes of any desired dimensions to accommodate larger work can be furnished at a slight additional cost. The riveting head is of the builder's standard Boyer type and is furnished in three sizes for 1 1/16-in. rivets from 3 to 5 in. long. It is held in a clamp that can be adjusted to take care of the wear on the dies or any variation in the length of the rivets used. A special dolly may be supplied where it is desired to handle more than one size of rivet. The use of this fixture, it is pointed out, enables four different sizes of rivets to be used. Other advantages claimed for this arrangement are the ability to rivet in close corners and a low cost of replacement when the dolly becomes worn out.

The net weight of the machine when equipped with a head for handling the smallest size of rivets is approximately 173 lb.

Raw gasoline extracted from natural gas and sold in 1915 amounted to 65,364,665 gal., a gain of 53 per cent over the quantity marketed in 1914. The number of plants for manufacturing gasoline from natural gas increased from 386 at the begining of 1915 to 414 at the end of the year. The greater ratio of output increase is partly so because some of them operated only a part in 1914.

FOUNDRY BY-PRODUCT COKE*

Requisite Qualities—Amount of Air to Use—Manganese and Sulphur

BY GEORGE A. T. LONG

The requisites of a good by-product foundry coke are first, high carbon; second, low sulphur; third, good cellular structure, and fourth, that the product shall be uniform. The carbon and sulphur are primarily the result of the quality of coal which is used in the ovens for coking purposes. The structure, however, depends on proper preparation of the coal before coking, as well as upon the arrangement of the ovens in which the coal is coked and upon the temperature of the coking chamber. It, therefore, does not follow that all by-product cokes are suitable for foundry use.

In using coke in the cupola, as little wood as possible should be used, only sufficient to ignite the coke. The height of the bed above the tuyere depends on the metal being melted. For ordinary soft gray iron castings the bed should be brought up to 24 in. above tuyeres, settled and thoroughly burned through before charging any iron. With low carbon iron such as steel mixtures, a higher bed is required, no less than 30 inches above the tuyeres after settling, as low carbon may require more fuel.

How much iron shall we use to a charge? I contend the charge that is put on the bed should be used all through the heat, whether the heat be five charges or 50, as the closer we can work to the melting zone the better will be the results obtained. I also believe in making small charges, as this practice gives a more uniform mixture, keeps the iron hotter and saves fuel. In the ordinary cupola 24 to 36 in. inside, I use 1000-lb. charges; in cupolas from 36 to 54 in. I prefer 2000 lb. In cupolas larger than this, 3000-lb. charges would be the limit I would carry, using 1 lb. of fuel to 10 lb. of iron between charges, unless using steel mixtures.

The larger the percentage of steel, the more fuel is necessary. For instance, with a 25 per cent steel mixture I would use 150 lb. of coke to 1000 lb. of metal, for the secret of all steel mixtures is in bringing the carbons up in order to get fluid metal.

HOW MUCH AIR SHOULD BE USED?

Nothing varies so much in foundry practice as the air going into the cupola. You will seldom find two foundrymen of the same opinion, or using the same air pressure. The pressure will range all the way from 6 to 30 oz. The lower pressure that you melt metal with, the better results you obtain; the oxidation is less, the sulphur is lower, and the metal is softer and truer to mixture. High blast pressure tends to combine the carbon and reduces silicon and manganese, causing hard iron. If the coke does not have a good structure it will not stand up and much the same trouble will result. A number of troubles attributed to coke, such as slag, hard iron, shrinkage, etc., can be all put down to high pressure.

FERROMANGANESE AND SULPHUR

As to sulphur, in one case the sulphur jumped up 0.15 or 0.20 per cent in the castings, and immediately the coke was assumed to be the cause, for it was said no change had occurred in the irons used. This was true, but upon looking into the matter I found they had discontinued the use of ferromanganese, owing to its high price, and this reduced their manganese as charged, about 0.40 per cent.

As to slag, when it starts right at the beginning of the heat it usually comes from too low a bed, which allows the air to reach the iron. With this condition slag will show at once. Very often the daubing used to line the cupola reduces the slag before the blast is put on; this is due to the nature of the clay used.

Some foundrymen think it is necessary to select large coke for the bed. This is a mistake, for all large size coke permits the passage of air too freely. The best results are obtained by straight forking with no attempt to select large pieces for the bed. Large coke leaves too much air space, while a mixture of sizes packs enough to confine the air and keeps the blast from too direct contact with the iron. Trouble with cold iron at the start of a heat is often due to a bed of large size coke, for with such a bed two or three charges must be melted before the coke settles properly.

A great many foundries over the country are using extra coke every few charges. This is an entirely wrong practice. They do this to renew a bed which has been lowered by melting too large charges of iron. As an example, a foundry I visited a short time ago has a cupola 42 in. inside measurement, with 13 in. from the sand bottom to the tuyeres. They were using 4000 lb. of iron to each charge with 450 lb. of coke between charges. Every seventh charge they used 200 lb. of extra coke. Still their iron was not right and they were troubled with slag. The cause of their trouble was too large a charge of iron and too much coke in a body. The charge of 450 lb. of coke would fill up the cupola considerably above the melting zone, and would have to be burned down to the zone before it would do any work. The large charge of iron would then force the melting zone so low that the air would reach the metal. In charging this cupola, I simply cut out the extra coke and charged 2000 lb. of iron to 200 lb. of coke, reduced the air from 16 oz. to 10 oz. and they have had no further trouble since this change was made.

CONTINUOUS MELTING AND THE LINING

In continuous melting where a cupola is run from 10 to 18 hr. a day, the charging is practically the same. It is not a question of how long you can run a cupola; it is a matter of how long the lining will last. The greatest trouble with continuous melting arises from the slag-notch closing up. I have not found anything equal to limestone for fluxing. The trouble with many cupolas built for continuous melting is that the slag-notch is too close to the tuyere. The slag-notch should be at least 10 in. below the bottom of the tuyeres; a slag-notch so placed practically will take care of itself and will not require continual poking.

In using by-product coke manufactured by people who are making a specialty of foundry coke one is sure to get a uniform product both in fixed carbon and sulphur. A uniform fuel is the greatest asset a foundryman can have.

*From a paper presented at the American Foundrymen's Convention in Cleveland, Sept. 15, 1916. The author is with Pickands, Brown & Co., Chicago.

William E. Leary, Jr., who was formerly manager of the Empire Foundry Company, New Brunswick, N. J., has become proprietor of the Brunswick Foundry Company, with plant at New and Neilson streets, New Brunswick, and will manufacture high-grade gray-iron castings. The Empire Company has been absorbed by the Simplex Automobile Company and has discontinued outside work, which has given Mr. Leary the [illegible] rare opportunity of taking care of old [illegible] with the same organization.

Two Conventions of American Chemists

The Chemical and Electrochemical Societies Discuss Electric Steel, Made-in-America Products, Coppered Steel—The Exposition

IN connection with the Second Annual National Exposition of Chemical Industries of the United States in New York during the week of Sept. 25 to 30, 1916, two important technical societies held their regular conventions—the American Chemical Society and the American Electrochemical Society. Both were largely attended and unusually successful.

American Chemical Society

Every department of chemical technology and manufacture was represented, both at the exposition and at the American Chemical Society's technical sessions. Chemical industrial preparedness was emphasized especially at the opening sessions. Brig.-Gen. William Crozier, chief of the Bureau of Ordnance, U. S. Army, at one of the early sessions, speaking on "Chemistry and National Welfare," said that modern warfare has made it necessary to draft a country's national resources in chemical knowledge and that there could be no room for doubt regarding the value of the chemical engineer in war as it is conducted to-day. He urged co-operation between the private chemical industries and the Government in the form of intelligent preparation for sudden emergencies.

President Charles H. Herty of the American Chemical Society, in thanking General Crozier for his address, said:

> The chemists of this country are ready to respond to your call at any time, and in them you have a reserve corps that can be relied upon in time of need.

THE TOLUOL AND NITROGEN QUESTION

Dr. Herty, in his annual address, made this important specific recommendation:

> Provision should be made in the immediate future for the storage of large quantities of Government-owned toluol. With the cessation of the European war orders for explosives and with the rapid increase of by-product retort ovens for coke manufacture, we shall eventually have a large over-production of toluol with consequent lowering of price. The potential value of the hydrocarbon in munitions is too great to allow its sacrifice as a fuel or illuminant, and its storage involves not unusual difficulties. The moral effect alone of its known presence in our midst would in itself fully justify the investment as a preparedness measure.
>
> Another suggestion is this: Modern warfare is largely dependent upon the successful work of chemists, not alone in the direction of munitions but through research in husbanding the resources of the country and in increasing knowledge which in times of stress may be vital to the nation. The military authorities should formulate a definite policy in regard to the chemist whereby in times of war his services may best be applied to the advantage of his country.

Dr. Nicholas Murray Butler, president Columbia University, where many of the technical meetings were held, in an address of welcome, spoke of the chemists' gathering as the mobilization of a very large part of civilization's fighting army.

Horace K. Porter, H. Koppers Company, Pittsburgh, read a paper at one of the meetings on "Coal and Coke By-products as a Source of Fixed Nitrogen," and gave the assurance that this country would not be in danger of a nitrogen famine in case of war, such as Germany faced when she was cut off from outside sources. He said that the available supply of fixed nitrogen from the coal in this country is adequate to meet the nation's military needs in any reasonable contingency. A compilation made by him shows that up to September, 1916, there were in this country the following plants and by-products ovens in the United States:

	No. of Ovens	Annual Capacity in Net Tons—Coal	Coke	Ammonia NH_3
Plants building	2,236	13,867,000	10,126,600	37,810
Plants completed	6,756	29,827,000	22,479,400	75,950
Total	8,992	43,694,000	32,606,000	113,760

	Net Tons
Annual capacity for ammonia at coke plants	113,760
Annual capacity for ammonia at gas works	12,500
Total annual capacity of coal carbonizing plants	126,260
Practical yield of 95 per cent nitric acid from this amount of ammonia (126,260 tons)	404,000
Total consumption of ammonia in United States in 1915	70,000
Ammonia capacity, at close of 1917, in excess of that necessary to make 180,000 tons of 95 per cent nitric acid	70,100

Industrial Conference on Electric Steels

As part of the extensive program of the convention of the American Chemical Society, an informal industrial symposium on "Alloy and Electric Furnace Steels" was scheduled for Wednesday afternoon at the Grand Central Palace. Dr. John A. Mathews, president Halcomb Steel Company, Syracuse, N. Y., presided. No formal papers were presented, but the successful and profitable discussion which resulted was introduced by the presentation on the screen of an interesting set of pictures by Dr. Mathews.

Starting with views reproduced from De La Piro's book on technology, printed in 1540, which discusses the earliest iron and other metallurgical processes, the chairman showed reproductions of the various types of modern electric furnaces, such as the Heroult, the Rennerfelt, the Snyder, the Grönwall-Dixon, the Roechling-Rodenhauser and the earlier types.

In addition, Dr. Mathews showed a view of the first Heroult furnace installed in the United States at his plant about 10 years ago and the furnace as it appears to-day, revealing some of the changes it has undergone. This, as well as the other furnaces at Syracuse, operates on hot metal from the open-hearth department adjacent to which it is located. The old furnace is single-phase and is the only single-phase Heroult furnace operating in this country. It and the others consume electric power from Niagara at a distance of 160 miles. Views of the Snyder and the new 6-ton Heroult furnace at this plant were shown.

ZIRCONIUM AS A REFRACTORY

Prof. Joseph W. Richards, Lehigh University, South Bethlehem, Pa., in introducing the discussion on electric steels deemed the subject an appropriate one before a convention of chemists. While the industry was in a transition stage, it had more than doubled itself in two years. At present the question of refractories was a vexing one because of the war, and he asked for testimony from the many prominent electric steel men present as to whether zirconium oxide was being used in any way, either as brick or as a substitute for magnesite.

The speaker called attention to the fact that one difficulty at present being experienced by electric steel makers was the pouring of the metal, it not being so successful from a large ladle as the more easily and carefully poured crucible steel, and hence not so freely separated from slag, etc. He felt that a solution for this was the use of an electrically heated ladle.

Professor Richards expressed the conviction that an important use for the electric furnace in the future would be as an adjunct to the Bessemer and open-hearth, and that much more would be heard of the tri-

plex process, for superior steel could thus be made at a minimum cost and better in quality than the open-hearth and at the same cost. He believed that the time was coming when all steel would be put through the electric furnace before incorporation in ingots.

TEMPERATURE OF ELECTRIC AND CRUCIBLE STEELS

Prof. Henry M. Howe, New York, called attention to the fact that crucible steel is never as highly heated as electric steel, and believed that the one might be better adapted to certain uses than the other. Dr. Mathews felt that from his experience the metal in the crucible was not materially different from that in the electric furnace, but the small ingot as poured from the crucible probably had its virtues. Dr. Mathews later stated that while the crucible was not adapted to making high-grade low-carbon steels, high-grade carbon and alloy steels could be produced cheaper in the electric furnace, and in response to a question he also said that all alloy steels that had been made in the crucible had also been made in the electric.

As to the relative merits of high-speed steel made in the crucible or in the electric furnace, Dr. Mathews informed the audience that probably 50 per cent of such steel now made in the United States is made in the electric furnace and that it would be impossible to pick one from the other. He felt, however, that the advantage of the electric furnace was not as great for high-speed as for alloy steels.

TRIPLEXING AND THE U. S. STEEL CORPORATION

It was developed during the discussion that the United States Steel Corporation is now using the triplex process at its plant at Joliet, Ill., where two 15-ton Heroult furnaces are operating. When open-hearth metal is available, metal from this is further refined in the electric furnace; but when only Bessemer can be obtained, the extra refining is completed in the electric furnace. It was also stated that chrome brick are being successfully used instead of magnesite.

The question as to the relative quality of electric steel made from cold or hot metal was brought up by Professor Tucker of Columbia University, and a reply by Ernest Humbert testified to the absence of any distinction, the deoxidation in each case being the same.

If there is really any superiority in electric steel over other steels in physical properties, it was asked whether there is any scientific reason for it. Professor Richards stated that the dead melt and the deoxidation obtainable were potent factors, and Dr. Mathews called attention to the striking quietness of electric steel when poured.

A CONSUMER'S TESTIMONY

Important written testimony from a large consumer of electric steel, K. W. Zimmerschied, metallurgist, General Motors Company, Detroit, Mich., was read by the chairman, in which the following striking points in favor of electric steel were emphasized:

1. It is freer from inclusions of any kind than any other steel.
2. It has a wider forging range in that it will stand a higher temperature than other steels.
3. It has a higher range for heating when worked, with less likelihood of the formation of coarse grains.

C. D. Young, engineer of tests, Pennsylvania Railroad, Altoona, Pa., made the statement that he had conducted a large number of static tests on electric steel castings of about 0.25 per cent carbon and had been unable to detect any superiority over good open-hearth steel castings.

Dr. G. B. Waterhouse, metallurgist, Lackawanna Steel Company, Buffalo, N. Y., called attention to the chance for the use of an electric furnace with an acid lining under present conditions if used in connection with the Bessemer and open-hearth, as in the triplex process, for sufficient refining is possible before the electric-furnace stage is reached.

Professor Richards recited the experience of a maker of saws using both the crucible and electric-furnace process. To distinguish the electric from the others in the finished saw, the steel was stamped with a double X. Some time later word came from the forests of the Far West that more saws with the distinguishing mark were wanted, for they seemed superior to any other saws. This point was taken up by Professor Howe, with the suggestion that the reason for this preference might have been psychological. Professor Richards expressed his faith in electric steel by the prediction that when as much experience has been had with electric steel as with crucible, no more crucible steel will be made.

URANIUM IN STEEL

The subject of uranium in steels was discussed by Dr. Charles M. Johnson, chief chemist, Park works, Crucible Steel Company of America, Pittsburgh, Pa. While 0.20 per cent of uranium is considered or claimed generally as conferring the same efficiency on tool steel as 12 per cent of tungsten, Dr. Johnson, in his examination and use of such steels, has not found the uranium steel as efficient. He has also discovered, in trying to produce uranium steel, great difficulty in getting uranium into the steel. It seems to possess a decided affinity for oxygen, so much so that he felt it might be regarded as having the strongest attraction for oxygen than any other element. Uranium steel that he had made, containing about 0.40 per cent carbon, 0.30 to 0.40 per cent manganese and about 0.30 per cent uranium, was very poor and exceedingly red short. While uranium now is about $7 per pound, tungsten has been higher; still he believes that a chromium-tungsten-vanadium steel is better and more efficient by 200 per cent.

The meeting was regarded as a complete success, and the attendance, which was large, included many metallurgists and steelmakers active in the electric steel and steel industry in general.

Professor Howe on Electric Steel

Since the above conference was held Prof. Henry M. Howe sent to THE IRON AGE the following communication on "Remediable or Irremediable Inferiority of Electric Steels," suggested by the foregoing conference, under the chairmanship of Dr. Mathews:

"The question whether the causes of the inferiority of electric steel are remediable or irremediable is evidently of far more than academic interest, for on its answer should depend, for instance, the course of the crucible steelmakers in repairing and extending their plants, to say nothing of the attitude of investors.

"It is natural and human that those directly interested in electric steel should bring themselves to believe that the causes are remediable and to explain the superiority of crucible steel by what may be called the accidental features of the present practice, such as the smaller units, the better conditions of pouring to which this small unit-size naturally leads, and the present greater skill of the crucible melters. But, granted the inferiority, the recognition of such causes as operative does not prove—it, indeed, hardly suggests—that the other and apparently irremediable causes are not operative also. The recognition of one kind of disadvantage of the electric process does not bear on the question whether other and suspected disadvantages are also operative.

THE QUESTION OF QUIETNESS

"For instance, one great cause of superiority of electric over open-hearth steel is held to be its greater quietness in the furnace, which leads to a more complete separation of the suspended matter, or 'sonims,' as Mr. Hibbard aptly calls them. Acid open-hearth steel in turn has a like advantage over basic. But, granted that electric steel has this advantage over open-hearth steel, we naturally ask whether it is not in this respect at a distinct disadvantage when compared with crucible steel. In the induction electric furnace rapid circulation is, I believe, unavoidable. In the arc furnace such circulation is to be suspected. First, those of us who are not electricians may reasonably suspect that the strong current of the arc itself, in the immediate neighborhood of the steel if not passing through it, will cause like circulation.

"Next, we naturally look for thermal convection cur-

rents of far greater activity than those in the crucible, in which the molten steel is heated by heat supplied to the outer walls of the crucible with a fair degree of uniformity. Moreover, this uniformity is increased by the interposition of the crucible walls between the steel and the heat. The electric induction furnace being so greatly at a disadvantage as regards quiet, we may here confine our attention to the arc furnace, in which the heat is supplied locally at an exalted temperature and diffused outwards through the walls of the furnace at a rate so rapid that a constant supply of heat through the arc is needed to make up for it. We naturally suspect that this extremely high local heating of the molten metal in the neighborhood of the arc should lead to thermal convection currents of far higher order of rapidity than those in the crucible.

"The reply that electric steel pours and lies quietly in the mold is beside the mark. If I stir water ever so rapidly in a pitcher and then pour it into a tumbler, it will lie practically as quietly there as if it had been quiet in the pitcher. This quiet in the ladle and molds shows only that the steel does not in itself contain sources of circulation and agitation, but it throws little light on the agitation which may be caused in the furnace by the induced electric currents and by the local heating from the arc.

INTENSE ELECTRIC HEATING

"Beyond this, this intense local heating in the arc furnace may well injure the quality of the steel. The very particles of molten steel through which the arc enters the bath should become very highly heated, and the rapid convection to which this local heating leads should expose a constant succession of fresh particles to this superheating, so that in time a very large fraction of the particles, if not all of them, may thus suffer. We do not know with certainty that this is harmful, but we may suspect it.

"A convincing answer to these important questions is hardly to be had from the mere general observations of even the most experienced and acute observers, but should, I believe, be based on direct experimental evidence."

The Electrochemical Society

The technical sessions of the American Electrochemical Society were held at the Hotel Astor. They occupied the greater part of Thursday and Friday, Sept. 28 and 29.

Symposium on "Made in America"

Only the unusual conditions brought about by the war made possible the success and importance of a symposium on "Made in America" which consumed the attention of the society's session on Thursday morning. With C. A. Lidbury, Oldbury Chemical Company, Niagara Falls, N. Y., in the chair, L. E. Saunders, Norton Company, Worcester, Mass., read a manuscript which was presented as the report of a committee which was responsible for the meeting. The object of the committee's work, the causes leading up to it and the results were in part as follows, as reported by Mr. Saunders:

"Several months ago a manufacturer of articles used in the electrochemical industry learned, by accident, that some of his products, which were being sold through dealers, were being put on the market as of European manufacture. A good deal of indignation was felt, and as a result all articles made by this company have since been marked with the maker's name and the fact that the articles are made in the United States. This incident was the occasion for starting the movement which has resulted in this session.

"The manner of going at the proposition has been to ask, first, the users of all sorts and kinds of articles to give their experience with those things made in the United States which have been purchased in whole or in part from abroad. Second, an endeavor has been made to get the manufacturer to defend himself against possible adverse criticism by furnishing data which he himself has collected, probably in all cases showing the superiority of the articles he manufactures.

"I shall endeavor in an unbiased manner to quote from the extensive correspondence, with the object of introducing personal discussion.

CARBON ELECTRODES

"A proper beginning for such a discussion in the electrochemical industry is the subject of carbon electrodes. Before the European war started, we cannot deny the fact that a large quantity was imported from various European countries. The replies to our inquiries from users have been extremely gratifying. Every user has stated that it is possible to secure, in this country, large electrodes of as good a quality as was purchased abroad two years ago.

"One user states that when the war started there were no carbons of large size to be compared with those of European manufacture. Another user states that some of our carbon manufacturers have been successful in improvement and others are not doing as well as they did when severe competition had to be met. Still another user says that they are unable to furnish any testimony in this respect, as they have used nothing but American-made electrodes.

"Some users have gone into detail in the matter of carbon electrodes, and have stated: First, that the perfection of manufacture is very high in our American-made carbons; second, that the resistivity is even less than the best of European carbons and that annealing has been so perfectly done that breakage almost never occurs. This user is, of course, an enthusiast, for those of us who use carbon electrodes realize the Utopian nature of the last statement.

"One of the complaints that has been made by a user is that the price of European electrodes delivered was about 40 per cent less than the cost of the best American electrodes during the past year, and that there is no such difference in quality as to warrant such a difference in price. It is, perhaps, needless to point out that we do not know what the cost of European electrodes might now be delivered in the United States, but it is safe to say that it would not be the cost at which they were sold two years ago, and there is at least a question whether such a difference in price will occur again when the manufacturers meet in competition. No manufacturer of carbon electrodes has sent us any testimony of his own.

ELECTROLYTIC ELECTRODES

"As to the use of electrodes in the electrolytic field there has been no adverse testimony regarding American made articles; in fact, they have so uniformly favored a single manufacturer that it becomes embarrassing to make any statement. All our other testimony on this subject states that graphite electrodes are used. I dare say the manufacturer has not considered it necessary to make any statement in reply.

AMERICAN PLATINUM

"One of our most prominent professors of electrochemistry has stated that no American-made platinum makes any pretense of being good. Other users state that platinum vessels have been supplied by American manufacturers containing so much iron and iridium that they cannot be used for accurate analytical work and are attacked when used on a large scale in other ways. This is a serious arraignment of American-made articles. We gave to the manufacturers every opportunity to meet objections of this character. We were unsuccessful. The calm and confident statement was made that competition of years had been successfully met by American-made articles.

PURE CHEMICALS

"On the situation with regard to fine chemicals, we have had no criticism in reply to our letters. In conversation, however, I have been told that it has been the experience of several users of potash salts of high purity that they cannot be obtained at the present time. A user has stated that this was so for a considerable period, but is being remedied. It is also stated that sodium salts, in many cases, are being substituted for potash salts formerly used in an analytical way.

FERROALLOYS AND ELECTRIC STEEL

"The quality of the ferroalloys made in this country has always been, almost from the time of the beginning

of the industry, of the highest character, unless we hear something to-day to the contrary from some one with experience.

"As to electric steel, the testimony has not been large, and it may be that something has been escaped in the investigation. I know that special steels have been made abroad which, during the early part of the shortage here, could not be duplicated. This, I believe, is rapidly being overcome and I feel safe in saying, subject to correction at this meeting, that electric steel, of all qualities, made in this country has never been excelled.

CHEMICAL GLASSWARE

"The matter on which we have received the greatest amount of testimony is the chemical glass industry. The users are, to a considerable extent, pessimistic. Quoting from a well-known college professor, the statement is made:

American glassware is very [illegible] ship, in most cases in quality, [illegible] from 2 to 5 times as much.

"Another large user states that we cannot make a suitable glass without potassium and the proper silicates, nor without the proper clay materials for the pots, and these are not obtainable in this country. The same user is extremely pessimistic about remedying this situation. He states that in many cases abroad it is a family affair, the making of fine glassware, and the son follows in the father's footsteps, these men not being willing to leave their country, and when they do, they can command better wages than the industry can afford to pay.

"Another user states that compared with Jena glass, certain American-made glasses are more resistant to the action of both acids and alkalis, especially the latter, for example: When boiled in 10 per cent sodium hydroxide solution, its loss in weight was less than 60 per cent of that sustained by Jena glass under the same conditions. Its resistance to shock and to sudden changes of temperature seems to be somewhat better than certain imported glassware. Another user states that resistance to sulphuric acid was higher in the case of American glass than of the best imported glass. On the other hand, one user states that he is unwilling to publish the data he has obtained on both glass and porcelain for patriotic reasons.

"All manufacturers are agreed that our greatest difficulties at present are with light blown glassware. This kind of ware can be produced in this country and it is simply a question of quantity rather than quality that is troubling the user. The manufacturers of glassware have stated, in one case, that the linear thermal expansion has been reduced in the glass of his manufacture to just about half that of the imported glassware. One manufacturer gives results of tests in regard to breakage on sudden cooling. The beakers are filled with paraffine, and heated to a desired point, then immersed in water at 15 deg. C. The temperature reached before fracture averages 253 deg. C. No data is given with reference to beakers of foreign manufacture. Tests were also conducted in the way of resistance to fracture by dropping. The beakers are dropped from varying heights on to a 2-in. pine plank. The average height which these beakers withstood was 30.7 in. A large number did not break at 36 in., and were not carried further. These are tests which apparently are used to give a favorable comparison of American glassware against that of German make.

"Testimony, both by the user and the manufacturer, seems to be overwhelmingly in favor of the conclusion that American-made glassware can be secured which excels in numerous properties that which has been imported from abroad.

CHEMICAL PORCELAIN

"A subject of great importance is that of chemical porcelain. Here we have again had much testimony, principally from the manufacturer. That there is a prejudice, however, may be seen in the statement of a prominent member of this society, as follows:

I certainly was surprised at the cracking of a small porcelain crucible I was heating. I could not find the crossed swords on the bottom. It probably would have had "Made in America" on it if marked at all.

"By the testimony which follows, it would seem that even so high a recommendation as the crossed swords is not the *ne plus ultra* which this testifier would have us think. One man who states that he has used American-made porcelain in four weeks of summer school says that he has lost all idea of ever being able to secure good American poreclain. Turning from this pessimist for a moment, it is good to find such testimony as the following:

Heating and cooling test, American made porcelain against Royal Berlin, number cracked or crazed: In the case of Royal Berlin one; American make none. The test consisted in heating the sample to 170[illegible] hr. and then removing with a pair of steel tongs and tossing upon a steel plate in a draft. Next test, solubility in 25 per cent sodium hydroxide, boiling for six hr.: American made porcelain, 1.15 per cent; Royal Berlin, 1.8 per [illegible]

"Another user has stated that his bills for both glassware and porcelain have been cut in two by the use of American-made ware as compared to that of foreign make.

"In the case of electrical instruments we believe that the situation has not changed since the war, as American-made instruments, by common consent, are the best in the world. Chemical balances are made with great success in this country; machinery used in the electrochemical industry has been nearly always secured here; microphotographic apparatus made here, it is stated, is far ahead of anything made in Europe. Articles like filter paper have been long made of high quality; microscopes of American manufacture cannot be excelled. Some other instruments which have been made abroad are being worked on now in this country

General Discussion

In the discussion which followed this report A. T. Hinckley, National Carbon Company, Cleveland, Ohio, called attention to the fact that while many large electric furnace electrodes were imported before the war, it was partly because the furnaces were of foreign make and needed foreign electrodes; American electrodes, however, are now superior. He claimed that American electrode makers' trade would expand and he regarded the growth of the industry as noteworthy.

John Wood Beckman, Great Western Power Company, San Francisco, Cal., reported that on the Pacific coast acceptable electrodes were being made from lampblack produced as a by-product in cracking oils.

Dr. Allerton S. Cushman, Washington, D. C., made an effective plea for a service test over a period of years as a measure of quality. He deplored the present tendency to accept at its face value superficial or what he regarded as unsatisfactory tests such as throwing heated porcelain on a steel plate in a draft to determine its quality. In his experience in using American porcelain Gooch crucibles, he had found them unable to withstand tests under a vacuum because the bottoms came out—something which never occurred with foreign wares.

Dr. W. H. Walker, Massachusetts Institute of Technology, Cambridge, Mass., testified that after using a large amount of American-made chemical porcelain and glassware, he understood that the material was promising, but that much tolerance was demanded. Dr. Dorsey A. Lyon's remarks were in favor of the porcelain and glassware, but to the effect that no satisfactory filter paper had been found.

Prof. Joseph W. Richards recited the experience of a large South American copper smelting company which had depended on German fused magnetite electrodes, 60,000 having been ordered and, nearly put out of business by the war, they had finally succeeded in making a better similar one than the one they had thought irreplaceable.

Copper Steel and Corrosion

The familiar question of the value of copper steel as a resistant to corrosion was an important feature of the meeting on Thursday afternoon and elicited a spirited discussion by two prominent advocates of both sides. The conclusions of the investigations of E. A. and L. T. Richardson in their paper on the subject are given in another part of this issue of THE IRON AGE.

The paper was presented only by title in the absence of the authors.

Dr. Allerton S. Cushman, Washington, D. C., was the first to discuss the paper and he characterized it as curiously placed on the program of an electrochemical society. It should rather be before a deliberation of prominent iron and steel metallurgists. He regarded the paper as "one more nail in the Hindenburg statue in favor of coppered steel." The fact that his extensive work on the subject was not referred to was a surprise to him. To be sure he had not lately presented numerical data because he did not want to go off half cocked. He was at present conducting extensive tests on over 1000 pieces of 26-gage material of all kinds, but he felt that a decidedly long stretch of time was necessary in arriving at conclusive or at least valuable data. Some of his specimens had already lasted 1400 days.

Dr. Cushman strongly expressed his feeling that the data that were here presented together with all previous similar information had created the impression that rolled sheet metal is worse than it really is, and he stated that this paper's conclusions were unjustified on any experimental data. They were new, to be sure, and important if true. That copper improves steel and not iron was based on results from small test pieces in semi-rural districts.

BRITISH CORROSION TESTS

The recent work of the Iron and Steel Institute (British) was mentioned by Dr. Cushman as coming from some of the most distinguished scientific men in the world. Doctors Hadfield and Friend had come to the conclusion from their tests that the presence of carbon and manganese were important; they did not mention copper. The speaker cited the ancient irons as wonderfully resistant to corrosion but free from copper. He was still unconvinced that copper was proved as the beneficent element, for he knew there were many factors entering into the problem.

In his tests Dr. Cushman said that Bessemer steels rusted faster than open-hearth as determined by 600 samples over a period of three years. What is the explanation? It is conceded that Bessemer contains more gas than open-hearth steel, but the question of gas content had not been exhaustively studied in its relation to corrosion. "I have," he stated, "a great deal of data containing new discoveries which will come out in the not distant future, whether I live or not. I claim that, based on any evidence compared with other evidence, the acceptance of the conclusions of this paper would be wrong."

D. M. Buck, metallurgist, American Sheet & Tin Plate Company, Pittsburgh, Pa., spoke of the very large number of full sized tests of different brands exposed to different conditions for 5 or 6 years and asserted that he had arrived at the definite conclusion that copper was a benefit, that it improved any good heat of steel, but not a rotten heat. Bessemer and some open-hearth sheets had failed in one year. Copper when added to pure iron he had found was a benefit.

AMERICAN SOCIETY FOR TESTING MATERIALS WORK

Dr. Cushman called attention to the extensive and important tests about to be inaugurated by the American Society for Testing Materials. He regarded it as a great undertaking, at great expense and labor, and believed its results would be far reaching. If they resulted contrary to his contentions he would find comfort in the fact that many others had erred. Mr. Buck expected definite results from this signal undertaking.

James Aupperle, metallurgist, American Rolling Mill Company, Middletown, Ohio, believed the authors drew conclusions from unwarranted data and did not know what kinds of steel they were using. I cannot tell the difference between an 0.03 per cent and 0.30 per cent copper steel in corrosion tests, he claimed, but have detected more gas in rusting material than in that that did not rust. Even high copper steel failed because of the presence of gases such as nitrogen and oxygen.

The fact that there is no standard test for corrosion was regarded as a matter of regret by both Doctor Cushman and Doctor Fink. The necessity in all cases that steel should be as good and pure as possible was contended by the former, who claimed that often this was not the case.

The Chemical Exposition

The Second National Exposition of Chemical Industries, occupying two floors at the Grand Central Palace, New York, was a gratifying success. The combined capital represented by the almost 190 exhibitors reached the stupendous total of $275,000,000,000. A feature was the fact that many of them were new companies or industries owing their existence and success to the war. Many steel, iron and by-product coke plants were represented. Among those exhibiting the following may be mentioned:

Abbe Engineering Company, New York City
American Coal & By-Product Coke Company, Chicago.
American Transformer Company, Newark, N. J. (With Research Corporation.)
Baker & Adamson, New York City.
Baker, J. T., Chemical Company, Phillipsburg, N. J
Barrett Company, The, New York City.
Bausch & Lomb Optical Company, New York City
Benzol Products Company, New York City.
Bethlehem Foundry & Machine Company, South Bethlehem, Pa.
Bristol Company, The, Waterbury, Conn.
Brown Instrument Company, Philadelphia, Pa.
Buffalo Foundry & Machine Company, Buffalo, N. Y.
Carborundum Company, Niagara Falls, N. Y.
Central Foundry Company, The, New York City
Coatesville Boiler Works, New York City.
Detroit Range Boiler Company, Detroit, Mich
Driver-Harris Wire Company, Harrison, N. J
Duriron Castings Company, New York City
Edison, Thos. A., Orange, N. J.
Eimer & Amend, New York City.
Electrolytic Zinc Company, Inc., New York City
Foote Mineral Company, Philadelphia, Pa.
General Chemical Company, New York City.
General Electric Company, Schenectady, N. Y
Holz, Herman A., New York City.
Koppers Company, H., Pittsburgh, Pa.
Laboratory Supply Company, The, Columbus, Ohio.
Lead Lined Iron Pipe Company, Wakefield, Mass.
Leeds & Northrup Company, The, Philadelphia, Pa.
Lehigh Car, Wheel & Axle Works, New York City
Lehigh Foundry Company, Fullerton, Pa
Little, Arthur D., Inc., Boston, Mass.
Mott, J. L., Iron Works, New York City
Norton Company, Worcester, Mass.
Precision Instrument Company, Detroit, Mich
Pittsburgh Testing Laboratory, Pittsburgh, Pa.
Raritan Copper Works, Perth Amboy, N. J.
Research Corporation, New York City.
Roessler & Hasslacher Chem. Company, New York City
Ruggles-Coles Engineering Company, New York City.
Taylor Instruments Companies, New York City.
Tennessee Coal, Iron & Railroad Company, Birmingham, Ala
Thwing Instrument Company, Philadelphia, Pa
Tolhurst Machine Works, Troy, N. Y.
United Lead Company, New York City
United States Smelting Company, New York City.
United States Bureau of Mines, Washington, D. C.
United States Bureau of Standards, Washington, D. C
United Cast Iron Pipe & Foundry Company, Burlington, N. J
Vulcan Iron Works, Appleton, Wis
Westinghouse Elec. & Mfg. Company, East Pittsburgh, Pa.

Besides the Benzol Products Company, Marcus Hook, Pa., and others exhibiting the many intricate products made from benzol, toluol, etc., the H. Koppers Company showed a model of a complete by-product coke oven as well as the products.

The Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa., among other products, displayed the Thury regulator for electric furnaces, which is so extensively used by electric steel furnaces in this country.

The many interesting by-products from the manufacture of copper and its compounds, including tellurium, selenium, electrolytic silver and the slime as made by the Raritan Copper Works, Perth Amboy, N. J., attracted attention. Here also was shown the electrolytic zinc of the Anaconda Copper Company, which will be producing 200 tons per day at its new plant at Great Falls, Mont., by Nov. 1, 1916.

Many samples of the iron-silicon alloys, Duriron and Tantiron, were displayed by the Duriron Castings

Company, 90 West Street, New York, and the Bethlehem Foundry & Machine Company, South Bethlehem, Pa., producers respectively of these two alloys.

Herman A. Holz, 30 Church Street, New York, showed interesting instruments and crucibles made from the new alloy rhotanium, which is claimed to be a satisfactory substitute for platinum. This company also exhibited the Brinell meter for testing the hardness of metals.

The Buffalo Foundry & Machine Company's exhibit occupied the entire side of one floor and was an imposing sight.

At the booth of the American Electrochemical Society the extent to which practically every part of an automobile chassis is dependent on some electrochemical industry was uniquely portrayed.

A very largely attended smoker in the ballroom of the Hotel Astor on Thursday evening and an excursion up the Hudson on Saturday were two important social features of the combined conventions.

Iron and Steel Institute's St. Louis Meeting

The following tentative list of papers and addresses for the eleventh general meeting of the American Iron and Steel Institute, to be held at the Planters' Hotel, St. Louis, Friday and Saturday, Oct. 27 and 28, is announced:

The president's address, by Elbert H. Gary.

"St. Louis and Its Industries," by Clarence H. Howard, president Business Men's League, St. Louis.

"The Duplex Process," by Dr. G. B. Waterhouse, metallographist, Lackawanna Steel Company, Buffalo.

"Pulverized Coal as a Fuel for Metallurgical Furnaces," by James W. Fuller, president Fuller Engineering Company, Allentown, Pa.

"The Iron Ores of the Adirondack Region," by Frank S. Witherbee, president Witherbee, Sherman & Co., New York.

"Progress in Hot Blast Stove Design," by Arthur J. Boynton, superintendent blast furnaces, National Tube Company, Lorain, Ohio.

Friday will be devoted, as usual, to the reading and discussion of papers. The banquet will be held on Friday evening at the club house of the Missouri Athletic Association. The local committee is preparing a program for "Seeing St. Louis" on Saturday.

The general committee on arrangements consists of James A. Farrell, president United States Steel Corporation, chairman; James A. Burden, president Burden Iron Company; E. A. S. Clarke, president Lackawanna Steel Company; John C. Maben, president Sloss-Sheffield Steel & Iron Company; Charles M. Schwab, chairman Bethlehem Steel Corporation; John A. Topping, chairman Republic Iron & Steel Company; Frank S. Witherbee, president Witherbee, Sherman & Co.

The local committee on arrangements consists of Clarence H. Howard, president Commonwealth Steel Company, chairman; Thomas R. Akin, president Laclede Steel Company; Aug. A. Busch, Busch-Diesel Engine Company; B. F. Bush, receiver Missouri Pacific-Iron Mountain railroad systems; George W. Niedringhaus, vice-president National Enameling & Stamping Company; A. L. Shapleigh, president Shapleigh Hardware Company; George W. Simmons, vice-president Simmons Hardware Company.

The Russian Steel Industry

Orders received by the Russian steel trust, or the Prodamet, for the first six months of 1914, 1915 and 1916 were as follows in net tons, according to the British commercial attaché at Petrograd:

Material	First Half, 1914	First Half, 1915	First Half, 1916
Sheet iron	183,169	149,846	117,919
Girders	158,130	106,034	11,529
Sleepers	36,198	33,543	21,759
Hoop iron	71,164	61,346	14,296
Angle, band and section iron	540,637	537,964	632,711
Rails, light	27,900	13,862	51,517
Rails, heavy	209,858	245,341	132,107
Total	1,227,056	1,147,936	979,938

The war periods of 1915 and 1916 are considerably below the figures for the normal period of 1914.

PLATE MILL FOR JAPAN

Youngstown Building Machinery for Kobe—To Roll Plates 168 In. Wide

The William Tod Company, Youngstown, Ohio, builder of rolling mills, engines and rolling mill and steel works equipment, is building for the Imperial Steel Works at Kobe, Japan, a large plate mill which will be used for rolling heavy plates of a thickness up to 2 in., and width of 14 ft. The maximum length to be rolled will be about 60 ft. The mill train will consist of two stands of two-high reversing mills and the pinion housing. The first stand will be used as a roughing mill for the smaller plates and as a roughing and finishing mill for the plates of maximum width and thickness. The main rolls will be 49 in. in diameter by 180 in. in length. The second stand is a smaller mill having rolls 44 in. in diameter and 145 in. in length.

Some idea of the size of the pinion housing may be had from the following: The maximum height of the housing assembled is 18 ft., 3 in., the width of the base is 16 ft. and the length over the ends of the pinions is 24 ft. 6 in. In addition to inclosing the main mill pinions, the pinion housing also contains a 2½ to 1 reduction gearing for increasing the power transmitted from the engine to the mill. The main mill pinions are 68-in. pitch diameter by 60-in. face, while the reduction gears, of which there are two sets in the housing, are 40 in. and 100 in. in pitch diameter and of 30-in. face. The teeth are double helical, planed on special gear-cutting machines. The mills and the pinion housing are placed in line, the second mill being driven through the rolls of the first mill. All the spindles for driving the mill are of the Tod "no backlash" type, with universal couplings.

Connecting to the 40-in. pinions of the reduction gears, and for driving the roll train, the company is furnishing a 44-in. and 76-in. x 60-in. twin tandem-compound reversing engine, similar in construction to the engine it installed some months ago at the plant of the Brier Hill Steel Company for driving its 40-in. blooming mill. The engine is one of the largest of this type installed at present in this country, and for driving these mills is geared down so that the mill rolls make 1 revolution to 2½ revolutions of the engine shaft to produce the rolling torque required for breaking down the ingots, which will weigh about 30,000 lb. The dimension from center to center of the two mill stands is 41 ft. and from the center of the first, or larger mill stand, to the pinion housing, is 40 ft. The distance from center line of the pinion housing to the center line of the engine is 26 ft.

The William Tod Company is furnishing the tables and transfers back of the mill stands which convey the plates and slabs from the first mill to the second mill, and also a large straightening machine to level the plates of maximum width and thickness, the run-out tables, cooling bed and cooling bed transfer, and the delivery tables leading to the shears, and also a device for weighing the thick plates.

Large Sheet Mill for Japan

The William Tod Company has recently received an order to build for the Ayen-Mekki Kabushiki Kaisha Company, of Japan, the first sheet mill, it is believed, to be installed in that country. It will comprise four 28 x 44-in. finishing mills, two 28 x 42-in. roughing mills, and two 26 x 44-in. cold mills, together with a 1000-hp. 8 to 1 reduction gear drive. The gear and pinion are inclosed and are provided with double helical planed teeth. This drive, when completed, will embody several new features not heretofore used in construction of drives of this character.

Koppers Coke Ovens at Steelton

The Bethlehem Steel Company has awarded to the H. Koppers Company a contract for a battery of 60 coke ovens, with by-product plant, for the Steelton, Pa., works. This will provide for 7700 gross tons of additional coke daily. Work starts at once on the contract and will be completed in about a year.

CORROSION OF STEEL SHEETS

Influence of Copper and Manganese—Presence of Copper Beneficial

The corrosion of iron and steel, with the relation of copper thereto, was discussed by E. A. Richardson, Warren, Ohio, and L. T. Richardson, Madison, Wis., in a paper, entitled "Observations Upon the Atmospheric Corrosion of Commercial Sheet Iron," before the regular fall meeting in New York City last week of the American Electrochemical Society. The conclusions resulting from their investigations are as follows:

Taken as a whole, the results indicate that copper-bearing steels are, without doubt, decidedly superior to any of the other materials tested. The remaining materials may be divided roughly into two classes, one class including the ordinary steels (Bessemer and open-hearth) and the other class the commercially pure irons and the copper-bearing irons. Charcoal iron is classed with the pure irons. We have obtained results in another test which would indicate that the resistance of wrought iron to corrosion is due to the purity of its iron and not to slag inclusions. In addition, it was noted during the present test that charcoal iron appeared to corrode in very much the same way as pure iron.

In regard to the steel-iron question, it is noted that the pure irons (including charcoal iron) are superior to steel. It is believed that this superiority is due to the purity of the iron, or to some combined effect of manganese and copper.

The results obtained in regard to the effects of mill scale do not agree with the results obtained by others. They indicate that with steels which rust rapidly mill scale is a stimulator of corrosion. On the other materials tested the mill scale has exerted a protective action. We have no explanation for this.

The important feature of the results, however, is that it substantiates the claim made in several other publications that the addition of copper to steel in amounts of about 0.25 per cent causes a remarkable increase in its ability to resist atmospheric corrosion. In the present test the addition of about 0.25 per cent copper to Bessemer or open-hearth steel has resulted in an increased resistance of 300 or 400 per cent.

The addition of copper to pure iron also results in an increased resistance to corrosion, but to no such an extent as the addition of a similar amount to steel. The addition of about 0.25 per cent copper to a commercially pure iron results in the useful life being increased by about 20 per cent.

INFLUENCE OF COPPER AND MANGANESE

We have been unable to determine the reason for this effect of copper in reducing corrosion. It is believed, in view of the fact that the copper exerts a greater influence in steel than in iron, that it must be due to the combined presence of copper and manganese, since the chief difference in the iron and steels under consideration is in the manganese content. It may be that the copper eliminates a harmful effect of manganese, or it may be that it is some combined effect of these two elements that acts as a protection to iron. The writers are inclined to believe that it is the latter cause.

Tests made by D. M. Buck indicate that copper even up to 0.10 per cent added to low manganese materials increases their resistance to corrosion but little. Ordinary steels containing about 0.40 per cent manganese, but no copper, are very poor as regards resistance to corrosion, but additions of copper to such steels result in a greatly increased resistance. A maximum resistance is reached with about 0.25 per cent copper. These results were also confirmed upon full-sized sheets of the same materials.

The writers believe, in view of these results, that the resistance of pure iron to corrosion could be increased by the addition of both manganese and copper and that additions of manganese to pure iron or steel, even up to 3 or 4 per cent, or more, with a corresponding increase in copper to produce a maximum effect, should give a material more resistant to atmospheric corrosion than the copper steel now on the market.

Also, some interesting results might be obtained by substituting for manganese in copper-bearing steels or irons, chromium, vanadium, tungsten or molybdenum.

SUMMARY

Copper-bearing steels are decidedly superior to pure iron, steel or charcoal iron.

The addition of copper to pure iron increases its resistance to corrosion, but to no such an extent as similar additions to steel.

Charcoal iron and pure iron are superior to steel as regards resistance to atmospheric corrosion.

Charcoal iron is very similar to pure iron in its resistance to corrosion.

Copper is believed to decrease corrosion due to some mutual influence of manganese and copper.

The additions of larger amounts of manganese and copper to pure iron or steel are suggested as well as additions of copper-chromium, copper-vanadium, copper-tungsten or copper-molybdenum.

Mill scale stimulates corrosion in rapidly rusting materials and retards it in slowly rusting materials.

Rhotanium, a Substitute for Platinum

An interesting and important alloy has been produced which is claimed to be an entirely satisfactory substitute for platinum, either as crucibles or as ignition tubes, thermo couples, etc. The new material is called rhotanium. Its composition is not revealed but it is announced to be an alloy of metals of the platinum group. Platinum has increased in value since the war started until its present price is about $96 per oz., or $3.85 per gram. The price of the new alloy is the same, but its actual cost about 50 per cent less since its specific gravity is about half that of platinum.

Some unusual claims are made as to the qualities of the new substitute. Besides its relative lightness, it is perfectly satisfactory for all work where platinum has had to be used, as for crucibles, dishes, boats, cones, tubes, wire, foil, gauze, etc. It is insoluble in hot, concentrated or diluted hydrochloric, nitric or sulphuric acids, and is not affected by alkalis or sulphide solutions. It will not oxidize at any temperature and is practically unaffected by fusion with alkali carbonates and similar fusion salts.

That a reducing flame does not produce the crystalline effect so common to platinum is another important claim. Rhotanium is very malleable and ductile, can be hammered, drawn or spun and its color is indistinguishable from platinum. Its tensile strength is about 20 per cent in excess of that of platinum and its hardness nearly twice.

A thermo-couple of this new allow is reported to develop an electro motive force nearly six times as high as that given by the platinum, platinum-rhodium couple and higher than that of most base metal couples at the same temperature.

The new alloy was discovered by Frank A. Fahrenwald of Cleveland, Ohio, and is being manufactured by the Industrial Research Corporation of the same city. The Eastern agent is Herman A. Holz, 50 Church Street, New York.

An Electric Steel Induction Furnace at Cleveland

The Cleveland City Forge Company, Cleveland, Ohio, W. N. Crafts, president, has bought the 21-ton Roechling-Rodenhauser electric induction furnace which the Eastern Metals Corporation of Bayonne, N. J., installed about 2 years ago but never operated extensively. The installation in Cleveland will soon be producing high-grade carbon and alloy steel ingots.

The project for the construction of a by-product coke-oven plant for the Hamilton By-Products Coke Ovens, Ltd., Sun Life Building, Hamilton, Canada, has been deferred until next year.

Pittsburgh Steel Company's Year

The annual report of the Pittsburgh Steel Company, Frick Building, Pittsburgh, has been issued for the fiscal year ended June 30, 1916. The gross sales were $21,848,035.67, against $11,649,863.97 for the previous year, showing an increase of $10,198,171.70. The net profits, after setting aside $500,000 for depreciation, were $4,564,067.18, against $858,160.02 for the previous year, being an increase of $3,705,907.16.

Shipments of the various products of the company during the year, compared with the preceding fiscal year, were as follows:

	1915-16		1914-15	
	Tons	Amounts	Tons	Amounts
Pig iron, billets and bars	244,118	$5,364,608	62,383	$1,182,439
Hoops, bands and cotton ties	40,530	1,260,842	36,168	1,045,573
Wire rods, plain wire, nails, fencing, etc.	334,113	14,506,902	234,921	8,829,394
	618,761	$21,132,352	333,772	$11,057,406
Miscellaneous products		715,683		592,457
Totals	618,761	$21,848,035	333,772	$11,649,863

The consolidated balance sheet as of June 30, 1916, is as follows:

Assets

Real estate and plant	$19,353,634.70
Cash	1,003,596.94
Accounts receivable	2,363,640.97
Bills receivable	34,871.12
Inventories	3,830,735.65
Investments in companies at cost	12,004.76
Special deposits for redemption of notes, etc	1,049,378.32
Royalties and other payments in advance	259,089.00
Deferred charges	34,356.52
Reacquired securities	10,100.00
Total	$27,951,407.98

Liabilities

Preferred stock	$10,500,000.00
Common stock	7,000,000.00
Coupon gold notes	2,384,000.00
Accounts payable	1,865,372.08
Reserve for depreciation	500,000.00
Reserve for repairs and renewals	321,562.85
Surplus	5,380,473.05
Total	$27,951,407.98

In his accompanying remarks to the stockholders Wallace H. Rowe, president, said: "During the period under review appropriations were made for the construction of 4 additional open-hearth furnaces for the purpose of completing the steel-making unit of 12 open-hearth furnaces and to give the company an increase of 50 per cent in its steel-ingot production. Two of the furnaces were built by contract and were finished and put into operation on Aug. 10, 1916. The other two are in course of construction by the company's own forces and are soon to be completed; they are expected to be put into operation Oct. 1. Of the $5,000,000 notes outstanding June 30, 1915, there have been redeemed during the fiscal year $3,000,000, and of the remaining notes $1,000,000 were called for redemption and paid on July 1, 1916, and the remaining $1,000,000 have been called for redemption Oct. 1, 1916."

Grainger & Co., Inc., Louisville, Ky., has formally extended its charter so as to authorize 50 years' continuance of the company. This is one of the oldest going concerns in the Ohio Valley, conducting a structural iron works, a foundry and machine shops. It was established in 1833, near the present location, 119 to 135 North Tenth Street, by W. H. Grainger, father of Charles F. Grainger, president of the company, and was incorporated under the present name 25 years ago, with $100,000 capital stock. Later the capital was increased to $200,000. W. C. Brohm is vice-president and general manager and John M. Upton secretary and treasurer.

Almost 1000 acres of land has been purchased by the Bethlehem Steel Company in the neighborhood of its plant at Sparrows Point, Md., since May 1.

CO-OPERATION BY ENGINEERS

A New Organization on Foot to Take Part in Civic Affairs

A movement which looks to the formation of a new organization of engineers who are represented in the membership of the large national engineering societies was set on foot at a luncheon given at the India House, New York, on Sept. 28 by William L. Saunders, chairman of the Ingersoll-Rand Company. About 35 persons were present, including officers of the societies. Mr. Saunders in bringing before his guests the object of the gathering said that the complete organization of engineers for civic work—the committee of five in each State — created by the National Consulting Board through its Committee on Industrial Preparedness, had suggested the desirability of a permanent organization of engineers to work in the same and kindred lines. The work done in making an inventory of the country's manufacturing and raw material resources had resulted in the creation by Congress of a Council of National Defense. What was now advisable, in the opinion of Mr. Saunders and others with whom he had consulted, was the formation of the National Association of Engineers, or the National Federation of Engineers, or the Engineers' Civic Association — whatever name might be adopted—to which members of the national societies might belong, its purpose being to bring the engineer forward to a position of influence and service in the affairs of government. There was no thought of connecting the new association with the technical work carried on by the existing societies, but, entirely independent of them, it should be in a position to make the influence of engineers felt when Congress is considering conservation of our natural resources, mining laws, railroad regulation and like questions.

The views of most of those present were expressed, the discussions being participated in by Dr. L. H. Baekeland, Frank J. Sprague, Dr. A. R. Ledoux, Lawrence Addicks, Charles F. Rand, Dr. Charles H. Herty, president of the American Chemical Society; Gano Dunn, J. J. Carty, H. W. Buck, president of the American Institute of Electrical Engineers; Dr. D. S. Jacobus, president of the American Society of Mechanical Engineers, and Calvin W. Rice, secretary of that society; Dr. H. S. Drinker, president of Lehigh University; Charles Whiting Baker and Charles Warren Hunt, secretary of the American Society of Civil Engineers.

The expressions were almost entirely favorable to the proposals as presented by Mr. Saunders. The point was made that the constitutions of most of the existing engineering societies prevent the consideration by those societies of political and other public questions, and therefore engineers had no organization through which they could act in civic affairs. Reference was made by some of the speakers to other movements now under way designed to secure co-operation of important questions among the country's scientists and members of technical societies.

The outcome of the discussion was the unanimous adoption of a resolution providing for the appointment of a committee of five by Mr. Saunders to consider the various proposals made at the meeting and to make a report at another meeting to be called by the chairman. The committee consists of Benjamin B. Thayer, Charles W. Hunt, Thomas Robbins, John J. Carty and Calvin W. Rice.

The Doehler Die-Casting Company, Court and Ninth streets, Brooklyn, N. Y., was incorrectly located at Rochester, N. Y., on page 677 of THE IRON AGE of Sept. 21, in giving an abstract of the paper presented before the American Institute of Metals at Cleveland on "The Evolution of the Die-Casting Process," by Charles Pack of that company. The error was originally made in the official program of the Institute.

Zinc is the leading metal produced in French Indo-China and its exportation in the past five years from Haiphong has averaged nearly 27,000 metric tons per year. In 1913 the total was 27,732 tons; in 1914 it was 19,562 tons, and in 1915 it was 33,335 tons. Of the latter the United States took 7825 tons.

ESTABLISHED 1855

THE IRON AGE

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The Pig-Iron Outlook

What of pig iron? Will the demand from abroad, by which the seemingly impending break in the market was so narrowly averted, be the agency that shall carry pig iron in the wake of other metals to a high level of prices? The factors likely to influence the trend of pig-iron prices are partly speculative and partly capable of analysis.

It was only two months ago that a break in the foundry-iron market seemed imminent. A country-wide demand for castings existed and many foundries had filled their order books in excess of capacity. Then why a weak pig-iron market? Because of labor strikes, labor inefficiency and indifference, and irremediable labor shortage, foundry production had been cut down as much as 25 to 30 per cent. Pig iron had been bought for first half delivery on the basis of full foundry production. When deliveries came due, many buyers could not take in the iron, in some cases finding themselves even without labor to unload the cars in the yard. As a result, furnaces saw their entire schedules disarranged and themselves under the necessity of putting over into the last half large amounts of contract iron, while the foundries were also carrying considerable stocks on their yards. In the last half the effects have been cumulative. At the present time, though the midsummer uncertainty regarding the first half of 1917 has been relieved, not a few merchant furnaces could take orders for last quarter shipment with advantage to themselves. To some extent this gap will be filled by the heavy domestic demand for steel-making iron and by shipments of iron for export.

What is said above of the foundry labor situation as the limiting factor is important in its bearing on the future. In the coming year little improvement in this respect is probable, and, from domestic consumption of pig iron thus hampered, producers of foundry irons are not likely to find support for more than a competitive market. Some compensation is to be expected from foreign demand. Merchant pig iron is being produced approximately at the rate of 10,000,000 tons annually, of which about 6,500,000 tons will be foundry iron. Assuming the enforced curtailment of foundry consumption to be 20 per cent, we have some suggestion of the amount of iron that must be sold abroad to take up all the output at home. Pig iron is being exported most largely to Norway, Sweden, Holland, Russia, France and Italy, and latterly Great Britain has been a buyer. Italy and France are the most likely markets. Italy has been buying at an exceptional rate of both foundry and steel-making irons, but the most liberal allowance on account of abnormal needs suggests no very large figures. Exports of pig iron from this country in 1913, the year of highest record up to that time, amounted to 277,648 tons. While Europe primarily desires steel and her purchases of pig iron are largely supplementary, yet if we assume the same increase in demand for pig iron as has been shown in exports of steel as between like periods in 1913 and 1916, namely, about 150 per cent, we arrive at possible exports of pig iron in 1916 in the neighborhood of 700,000 tons. This is less than one month's production of the merchant stacks and is considerably under the amount by which the expected domestic market of the furnaces has fallen short.

Something may be counted on in the pig iron that will be bought for the open-hearth steel capacity steadily being added by new works and additions. This year, however, in spite of the large amount of new open-hearth plant started up, there was no particular change in the price of steel-making pig iron until the foreign demand set in, nor was foundry iron noticeably affected by the swinging of foundry-iron furnaces to steel-making pig iron.

The extent to which pig-iron prices may advance for reasons related to the supply and cost of raw materials is a matter of some speculation. Under favorable conditions for the Lake movement of ore, the indications are that the supply during the coming winter is likely to be sufficient only by a narrow margin. The loss of a half month's shipment, equivalent to nearly 5,000,000 tons of ore, or 2,500,000 tons of pig iron, would completely dwarf the bearing of export demand upon the situation. A shortage of 100,000 tons of pig iron would be more effective in advancing prices than unsold stocks of 1,000,000 tons in depressing them.

In the matter of costs, expectations of advances are sustained by every indication. Increases in Lake freights of perhaps 20 cents per ton and in the price of ore of 75 cents or more are within the probabilities. Coke operators also are contending against labor conditions for which no relief is in sight, and already production is falling behind

contract obligations, with contracts for 1917 being made at higher prices. If all the expected advances in costs of raw materials become effective, the question still remains whether pig-iron producers will absorb them out of their profit or add them to the selling price. Sales already made for the first half show only a partial addition of expected advances in raw materials to the pig-iron prices of 1916.

The Engineer in the Ascendency

Some big developments are under way looking to giving to the engineer that place in society which he feels should have been his long before this. One of these is growing out of the industrial preparedness movement; another is the crystallization of the industrial service and research idea which took root on the establishment by Ambrose Swasey of the Engineering Foundation; and the third, as yet unannounced, seems to seize on the need of a single organization to secure that broad recognition for science, applied as well as pure, that will gain weight for views of the engineer in matters of public concern, for example.

It is not surprising that such movements should be taking form when a survey is made of the caliber of intellect and kind of personality which have now for years been taking up in numbers the engineering profession. The public, moreover, has been gaining regard for the engineer rapidly. His plentiful works of magnitude, complexity and daring have earned it. As a primary help in legislative or administrative work, at least in a public way, however, he has not come in for much consideration. He has stuck to his last, as a class; without commercial training, he has not studied to establish himself as an oracle or to lift the market price for his services. It has been left to those of the broadest attainments, ranking in their profession, to foresee the tendencies of big import. And results are likely to be realized through their avenues of activity long before they are through the endeavors of the workers for self-interest. In this last class will the world put the no less than three associations started last year, and made up largely of employee-engineers, who, through co-operative effort, hope to get compensation increases apparently through force of numbers. The public, which, after all, pays the bill, needs further education before it will fully appreciate engineering service, and then there should be less complaints of inadequate rewards.

The possibilities of a new association perpetuating the public-spirited work of the nation's industrial census are noted elsewhere in this issue. The working groups in each State of members of the four large national engineering societies and of the American Chemical Society completed their special task, accepted from the Committee on Industrial Preparedness of the Naval Consulting Board, when the facts and figures reached Washington; and they lost their wageless jobs when Congress arranged for a National Council of Safety, this made up of members of the President's Cabinet and of some seven appointed experts in different industries, public utilities, etc. The engineering societies, not having rights under their charters to take action on Government affairs, the opportunity was taken to look into the feasibility of continuing the co-operative movement through the medium of an association to devote itself to public matters involving engineering, as in problems of conservation, railroad regulation, and mining laws. The next step will come after the report of the committee appointed by Mr. Saunders.

A demand for a single strong, influential body is shown in the growing belief that one general engineering society could well serve, and now, it is understood, a plan is on foot to reach beyond applied science and take in the pure scientist. More need not be said of this now, as announcements in this regard are expected within the next few days. Such a step forward, however, pushed by men of authority and position, and shaping itself at the same time with the engineering-civic association, ought to reassure the doubters that the world will not undervalue its engineers.

Finally, as a contemporaneous development, may be mentioned an advanced step which has been taken in connection with the Engineering Foundation. Here it seems that a national research council is under formation to coördinate the research facilities of the Government and commercial and private laboratories. It is made up in part of members of the National Academy of Sciences, and will be provided with the machinery of the Foundation, for which, incidentally, Dr. Cary T. Hutchinson, a noted consulting engineer of New York, has been secured as secretary. If this last is to become the instrument for investigating the unknown for the sake of industry, started by one engineer and continued by others, surely the engineer must feel that he is coming into his own, and fast at that. Through the last institution he is guiding industry in uncharted fields; through membership in the national security council he will put his special knowledge at his country's service; through his new proposed get-together organization he proposes to advise, if not to direct, the Government in matters essentially technical, and through his scientific legion of honor he will be admitted among the immortals.

A Remarkable Coke Market

The Connellsville coke market has run quite counter to expectations. For a year or more the theory in the coke market has been that as additional by-product ovens were completed coke prices should decline. A year ago contracts were made for the present year at an average of between $2.25 and $2.35 per net ton at oven, but at practically all times there were slightly lower prices quoted for the whole year than for the first half, on the principle that increased by-product oven production would make coke more plentiful in the second half than in the first half. When contracts came to be made for the second half of this year, however, the average was in the neighborhood of $2.50, representing an advance rather than a decline, while now the expectation is that contracts for the first half of 1917 will be at $3 or more.

The building of by-product ovens has, in fact, ceased to be the controlling factor. One item is that the by-product ovens are being completed much

more slowly than was expected, as the labor shortage has curtailed building operations, while materials and equipment are secured with difficulty. The more important influences now are the coal market and the shortage of labor at the coke ovens. Such prices are obtainable for coal that it does not pay to make coke at all except at the higher coke prices. The labor supply is so scant that production of coke is restricted; the scarcity is of coke workers rather than of coal miners.

In the tense condition that exists it does seem that the making of coke contracts for the first half of next year, at any price, represents a gamble on both sides. If there were an adequate supply of labor, coke would not be so high as it is; but with labor scarce now and perhaps unobtainable six months hence, the operators may be unable to carry out contracts, no matter what the price.

Our Huge Crude Steel Exports

The extent to which the United States is supplying Europe with steel billets, ingots and blooms is phenomenal, being little appreciated by the average reader. Exports of these steel products from the United States are now at the greatest rate ever recorded and still on the increase. To Aug. 1, 1916, the total this year was 647,566 gross tons or 92,509 tons per month. In January they were only 55,315 tons, growing to 107,696 tons in March, 142,782 tons in May, the maximum thus far. The following table of Government data shows the relative exports in gross tons:

	Total	Per Month
Seven months to Aug. 1, 1916.....	647,566	92,509
Fiscal year ended June 30, 1916..	962,206	80,184
Fiscal year ended June 30, 1915..	220,416	18,334
Fiscal year ended June 30, 1914..	46,926	3,827
Calendar year 1915.....	560,728	46,727
Calendar year 1914.....	50,496	4,208
Calendar year 1913.....	91,847	7,654

The present exports are at the rate of 1,110,108 gross tons per year, and compare with only 91,847 tons in 1913 as the previous pre-war record.

The destination of these exports for the fiscal year ended June 30, 1916, was as follows:

	Gross Tons
France	571,767
United Kingdom	240,802
Canada	92,597
Other countries	57,040
Total	962,206

France took 80,116 tons of the June total of 116,425 tons and is now absorbing the bulk of the exports from this country. Earlier in the war, France received practically no billets, ingots or blooms, the greater part going to the United Kingdom. Out of total exports in 1915 of 560,728 tons, Great Britain took 359,125 tons, Canada 58,486 tons and other countries 143,117 tons, France receiving none. The course of the shipments of this class of material has decidedly changed in six months.

The Tungsten Market

The tungsten market is more active. Large sales of concentrates for next year's delivery have been made at about $17 per unit for 60 per cent ore. At least 200 tons of ferrotungsten has also been sold, part of it for foreign consumption, England being the principal purchaser. The price paid was $2.60 to $2.75 per lb., New York, of contained tungsten. An incident connected with England's purchase is that one lot was taken from an American producer whose name appears on the British supplementary black list.

The Bolt and Nut Cash Discount

Through inadvertence an erroneous statement was printed in last week's issue of THE IRON AGE regarding the cash discount on bills for bolts and nuts. It was stated that "about 50 per cent of the larger bolt and nut manufacturers have notified A. H. Chamberlain, secretary of the American Iron, Steel and Heavy Hardware Association, New York City, that they will continue to allow a 2 per cent discount for bills paid within 10 days after presentment." The correct situation in this respect is as presented below in an extract from the association's journal, the *Heavy Hardware Bulletin* for September:

> All branches of the jobbing trade have made themselves distinctly heard against the proposal of certain manufacturers of bolts and nuts to reduce their cash discount on this line from 2 per cent—10 days to 1 per cent—10 days. The progress that has been made is indicated by the fact that the secretary has expressions from six of the ten or twelve manufacturers who are recognized as largest servers of the jobbing trade, stating that they will allow 2 per cent cash discount as heretofore. With this percentage against it, it is hard to see how the movement to reduce the cash discount on this line can be pushed to ultimate success.

The above statement is of course made from the standpoint of the jobbers and refers specifically to the manufacturers of bolts and nuts who cater especially to the jobbing trade. The greater number of bolt and nut manufacturers, however, sell their product to agricultural implement makers, machinery builders and other consumers, and this class of trade claims to be wholly on the 1 per cent basis, with no disposition to return to the old 2 per cent discount. The 1 per cent discount was put into effect early in the present year. The bolt and nut manufacturers are confident that 90 per cent of the important manufacturers in their line are adhering strictly to the discount of 1 per cent for cash in 10 days from the date of invoice.

Open-Hearth Furnace Record at Harrisburg

The No. 2 basic open-hearth furnace at the works of the Central Iron & Steel Company, Harrisburg, Pa., rated at 50 tons, gave 880.4 gross tons of finished ingots in the week ended Oct. 1. What makes the record all the more noteworthy is that the ingots were bottom poured, as is the entire output of the plant, and the record was made with producer gas and cold stock. William H. Brown is superintendent of the open-hearth department.

The company is proceeding with the construction of a 100-ton furnace. Robert H. Irons, general superintendent, expects that steel will be made in it by June or possibly July. After the completion of this furnace the 50-ton furnaces are to be changed to 100-ton units, making a battery of five 100-ton furnaces in all, which are calculated to give sufficient steel to operate the company's present mills to full capacity.

Locomotive Buying and Inquiry

Locomotive buying and inquiry are both more active. Since the large order for 230 locomotives placed two weeks ago by the New York Central, orders for 34 locomotives have been reported, made up of small orders from numerous sources, of which 10 are for export and 4 for the Bethlehem Steel Company. The American Locomotive Company and the Baldwin Locomotive Works will build 5 each of the foreign locomotives. The Baldwin Locomotive Works will furnish the Bethlehem Steel Company with 4 switching and the Midvale Steel Company with 2 locomotives. Inquiries have appeared for 54 locomotives, the largest being 10 Santa Fes for the Union Pacific, 13 for the Pere Marquette, 10 for the Nashville, Chattanooga and St. Louis and 8 for the Norfolk & Western.

The Dominion Steel Corporation of Canada will call in and pay off all renewal balances of short term obligations, consisting of $3,400,000 five-year 6 per cent notes. The notes do not fall due until Dec. 1, 1918, and thus their maturity is anticipated by two full years.

PERSONAL

E. H. Gary, chairman of the United States Steel Corporation, has returned from an Asiatic tour. In an interview with newspaper representatives, he speaks highly of Japanese manufacturing and commercial enterprise.

H. B. Allen, who has long been connected with the sales department, has been appointed domestic sales agent for the American Iron & Steel Mfg. Company, manufacturer of bar iron, bolts, nuts, rivets, etc., Whitehall Building, New York City. George H. Court has been appointed export sales agent.

Henry J. Klaer has been made general manager of the Penn-Seaboard Steel Corporation of Philadelphia. He was formerly engineer for the Thurlow, Pa., plant of the American Steel Foundries and recently has been treasurer of the Wetherill Company, Chester, Pa., now a part of the Sun Shipbuilding Company.

Effective Oct. 1, T. Burns, general superintendent of the open-hearth steel plant of the Pittsburgh Crucible Steel Company, Midland, Pa., resigned, and that position was abolished. On that date William G. O'Malley assumed the duties of works manager, having charge of all operations and construction at Midland, reporting directly to the president, J. W. Daugherty. Mr. O'Malley has been general master mechanic of the plant for five years. He was for some years connected with the Lackawanna Steel Company, and superintended the construction of the new plant of that company at Buffalo, N. Y.

W. E. Donaldson, who recently resigned as superintendent of the department of transportation and labor at the Ohio works of the Carnegie Steel Company, Youngstown, to become special agent for the United States Steel Corporation, in charge of the slag department, with headquarters at Pittsburgh, was given a dinner by his former associates at Youngstown last week, and was presented with a diamond stick pin and a pair of cuff links. He assumed his new duties in Pittsburgh, Oct. 2.

William Griffin, recently appointed superintendent of the transportation and labor department of the Ohio works of the Carnegie Steel Company, Youngstown, was presented last week with a gold watch, chain and elk tooth charm, by employees of the safety department, from which he resigned recently to accept his new position.

W. R. Pendry, formerly connected with the by-product coke department of the Minnesota Steel Company, Duluth, Minn., has been placed in charge of new by-product coke construction of the American Steel & Wire Company, Cleveland, Ohio.

R. E. Priest, formerly sales manager of the Garland Nut & Rivet Company, Pittsburgh, has resigned to become general manager of sales of the McLain-Heames Company, Detroit, Mich., manufacturer of cap, set and stud bolts, semi-finished nuts and automobile nuts.

Following the resignation of H. A. Flagg, sales manager of the Standard Welding Company, Cleveland, and Charles E. Miller from the management of the Detroit office of the same company, J. C. Manternach, general manager of the company has made public the following appointments and promotions, all effective Oct. 1: P. W. Gilbert, who has been assistant sales manager for nearly five years, takes up the duties of manager of sales. B. A. Quayle, who has had charge of the Chicago office for many years, becomes general representative, with headquarters at the factory. Benton G. L. Dodge, who has had charge of advertising and publicity for more than five years, takes up the larger duties of manager of sales promotion. Walter C. Voss, formerly in charge of the Cleveland district, moves to Detroit, where he will assume charge jointly with Theodore Palmer, long connected with the Michigan office. Willis Stutson, of the Indianapolis district, is placed in charge of the Chicago office, with A. J. Brandt as assistant. Mr. Stutson will also handle the Indianapolis district from Chicago. O. L. Miller, formerly of the order department at the factory, replaces Mr. Voss at Cleveland. T. E. Hauser, formerly head of the order department, becomes assistant to the sales manager, while W. Paxton becomes head of the order department. Neither Mr. Flagg nor Mr. Miller has yet announced his intention regarding a future business connection, but it is generally understood that they will engage in business jointly in Detroit.

L. C. Schultz has become associated with Hamilton & Hansell, 17 Battery Place, New York, as metallurgist on ferrotungsten in the Rennerfelt electric furnace department.

George W. Hughes, general superintendent of the Earlston and Saxton furnaces, is at Iron River, Mich., inspecting the ore properties operated by Joseph E. Thropp, Everett, Pa.

Paul J. Barnard, Minneapoils, Minn., has been appointed sales manager of the Harvey Spring & Forging Company, Racine, Wis., which is extending its business and production. He was formerly connected with the Gas Traction Company, Minneapolis, and later with the Emerson-Brantingham Company, Rockford, Ill. In recent months he was Northwestern distributing agent for Burd piston rings and Harvey springs.

George A. Dechant, Harrisburg, Pa., has been appointed advertising manager of the J. I. Case Threshing Machine Company, Racine, Wis. He has been a member of the Case sales organization for nine years, serving as branch manager at Harrisburg the last six years.

John Strondeck, superintendent of the Joliet plant of the Joliet Bridge & Iron Company, Joliet, Ill., has been transferred to DePere, Wis., to take charge of the former Lyons Boiler Works, recently acquired by the Joliet company as a branch. The Lyons works is now being overhauled.

Samuel P. Goman, formerly superintendent of the Harlan & Hollingsworth Corporation, Wilmington, Del., is now superintendent of the new Sun Shipbuilding Company, Chester, Pa.

R. F. Randolph, who has been general superintendent of the Saucon plant of the Bethlehem Steel Company, has been appointed general superintendent of the Dominion Iron & Steel Company, Sydney, N. S.

G. J. Buckeye has severed his connection with the Buckeye Machine Company, Ltd., manufacturer of agricultural implements and general machinery, Calgary, Alberta, and expects in the near future to be in business for himself.

T. V. Buckwalter, formerly of the engineering department of the Pennsylvania Railroad Company, Altoona, Pa., has been appointed chief engineer of the Timken Roller Bearing Company, Canton, Ohio. His specialty in connection with the Pennsylvania Railroad was in self-propelled vehicle research work in connection with the development of motor car practice.

Will H. Baltzell has been appointed chief engineer of the Canadian Steel Corporation, Ltd., with offices at Ojibway, Ontario, Canada. This is the Canadian branch of the United States Steel Corporation.

W. L. Cooper, London representative of Robert W. Hunt & Co., Chicago, is in the United States visiting the various offices of his principals and acquainting himself with current conditions.

The Hart & Hutchinson Company, New Britain, Conn., has accepted the resignation of Guy Hutchinson as secretary and treasurer. The election of officers resulted as follows: Howard S. Hart, president; Maxwell S. Hart, vice-president; Norman P. Cooley, treasurer; Logan E. Page, secretary. Mr. Hutchinson will continue as a member of the board of directors. He will take up new duties with the Willys-Overland Company in New York City.

C. E. Williams, general manager of the William L Gilbert Clock Company, Winsted, Conn., has also been made secretary of the company, succeeding Harvey L. Slauson, who has resigned to accept a position with

the American Graphophone Company, Bridgeport, Conn.

I. Schoenawa has become associated with the Charleston Steel Company, Charleston, W. Va., as managing director. He was formerly connected with Siemens & Halske and was in charge of the installation and operation of the large 20-ton electric induction steel furnaces at the plant of the American Iron & Steel Mfg. Company, Lebanon, Pa. Mr. Schoenawa is well-known as one of the authors of an important German work on electric steel furnaces. The Charleston company will soon start up an 8-ton Rennerfelt electric furnace.

Charles Lounsbury has been elected president and general manager of the American Railway Supply Company, 134-136 Charles Street, New York, to take the place of the late Walter Chur, who died Aug. 29, 1916, at his home in East Orange, N. J.

S. B. Patterson has resigned as superintendent of the properties of the Robesonia Iron Company, Ltd., Robesonia, Pa., effective Oct. 1, after 12 years of service with the company. It is his intention to retire from active business. Starting as a clerk at the blast furnaces of Cooper, Hewitt & Co., Phillipsburg, N. J., in 1864, Mr. Patterson successively engaged in the manufacture of stoves at Phillipsburg and in the operation of blast furnaces at Ironton, W. Va., Pine Lake, Mich., West Point, N. Y., Quinnemont, W. Va., Wharton, N. J., and Catasauqua, Pa. In 1904 he left the Empire Steel & Iron Company and was appointed superintendent of Robesonia furnace. He will reside at Allentown, Pa. Mr. Patterson's successor is J. W. Gocher, formerly of Johnstown, Pa., who began his career in the iron and steel business in 1889, as a draftsman in the employ of the Cambria Steel Company, becoming successively chief draftsman, assistant chief engineer, and chief engineer of the company, and in 1912 was transferred to the executive department as consulting engineer and assistant to the president. In 1914 he left the Cambria Company to establish an office of his own in Johnstown as consulting engineer in which capacity he became known to the Robesonia Iron Company, and in April of this year was offered and accepted the position of assistant superintendent.

Robert C. Clifford, for the past four years district sales manager for the United States Cast Iron Pipe & Foundry Company, in charge of its St. Louis and Kansas City offices, is now associated with the Walter A. Zelnicker Supply Company, St. Louis, in charge of its rail department.

R. W. Howell, formerly with the Springfield Machine Tool Company, Springfield, Ohio, has been appointed foundry superintendent of the Miller Improved Gas Engine Company in the same city.

W. L. Buck, who has been connected with the Cambria Steel Company, Cincinnati, Ohio, has resigned to accept a position in the sales department of the American Steel Export Company, New York City.

Frank A. Moeschl, general manager of sales of the Newport Rolling Mill and Andrews Steel companies, Newport, Ky., has returned from a five weeks stay on the Pacific coast.

E. J. Cornish, vice-president, has been elected president of the National Lead Company, succeeding W. W. Lawrence, deceased, late of Pittsburgh.

The Vulcan Steel Products Company, 120 Broadway, New York, the new export company established by Otto Kafka, has on its staff the following: William W. Weller, representative in France, whose experience covers years of active work in the steel industry, including several years as sales manager for one of the largest pipe manufacturing concerns in America; F. G. Belsito, representative abroad, especially in Italy, whose experience covers selling in Cuba, Panama and Italy; George W. Blen, representative in England, whose experience has been gained in years of active work in various departments of the steel industry; Fred M. Cole, at the head of the purchasing department, whose experience has especially been in the manufacturing department of the Cambria Steel Company; Warren M. Maule, secretary and active head of the accounting department, who has been assistant in the comptroller's office of the Cambria Steel Company; and H. D. Mills, head of the traffic department, who has had long experience in various railroad and express companies.

J. B. McIntyre, superintendent of the St. Louis warehouse of the Illinois Steel Company, has been appointed assistant to the general superintendent at North works, Illinois Steel Company, Chicago. He is succeeded at St. Louis by W. C. Strand of the sales department of the Illinois Steel Company at Chicago.

Joseph Spring, for the past seven years piece rate inspector, factory lay-out and cost department, for the Aurora Automatic Machinery Company, Aurora, Ill., has been promoted to the position of superintendent of the Chicago plant of the company, effective Oct. 1.

The Trumbull Steel Company, Warren, Ohio, has transferred R. B. Ohl from the general sales department at the mill to the Eastern district sales office, Grand Central Terminal, New York City.

S. R. Willock has been appointed general manager of sales of the William Tod Company, Youngstown, to succeed R. D. Day, who resigned recently to become connected with the Pollak Steel Company, Cincinnati. Mr. Willock for some time has been assistant general manager of sales.

OBITUARY

COL. ROBERT C. MCKINNEY, chairman of the board of directors of the Niles-Bement-Pond Company, 111 Broadway, New York, died at his home at Belle Haven, Conn., Oct. 3, aged 65 years, following an illness of more than two years. It was because of failing health that Colonel McKinney gave up the active work attached to the presidency of the company in February, 1915. He had been connected with the manufacture of machine tools since he was 20 years old. He was born in Troy, N. Y., but went to Hamilton, Ohio, when a young man. He was one of the organizers of the Machinery Club of the City of New York, and at the time of its organization was made vice-president. He was elected president of the club in 1909 and served two years. At the time of his death he was a director. He leaves his widow, a daughter, a brother—J. P. McKinney of Pittsburgh—and two sisters.

SAMUEL POWELL STACKHOUSE ELLIS died at his home in Pittsburgh, Sept. 28, aged 66 years. He was born in Philadelphia and was graduated from the Philadelphia High School. In 1870 he went to Johnstown, Pa., as private secretary to Daniel J. Morrell, general superintendent of the Cambria Iron Company. He was connected with that company for 19 years, when he resigned to accept the position of sales manager for the Pittsburgh district of the Lorain Steel Company, which position he held for 23 years, resigning Feb. 1, 1912. He leaves his widow, one son and three daughters.

CHARLES FORNEY, former superintendent of the blast furnaces of the old Paxton Iron & Steel company, Harrisburg, Pa., died at his home at Craighead Station, near Carlisle, Pa., Oct. 1, aged 60 years. He was graduated from Lafayette College in 1879 and a year later became connected with the Lebanon blast furnace. Later he went to Virginia, then to Everett, Pa., and next to Sheridan, Pa., in charge of blast furnaces. He became superintendent of the furnaces at Harrisburg in 1894, retiring in 1903.

IGNATZ GRIMM, president Grimm Iron Works, Cincinnati, Ohio, died Sept. 30, aged 73 years. He was a native of Germany and came to this country with his parents when very young. He leaves his widow, one son and two daughters.

Big Deal in Brazilian Manganese Ore

A sale is reported of about 200,000 tons, for shipment over 1917, of standard quality Brazilian manganese ore running about 48 per cent, at two shillings, English money, or 48 cents, per unit of manganese, delivered f.o.b. steamers, Rio de Janeiro; buyers to furnish vessels, and entire freight to be for buyers' account. At the present freight rate of $12 per ton the cost would approximate 75 cents per unit f.o.b. cars, Baltimore.

If current freight rates were figured, this transaction would involve an ultimate expenditure of about $6,750,000. It follows that only a very large interest could finance such a deal, and that the buyer must command the necessary steamers to bring the ore to this country. There is indicated a firm belief on the part of the buyer that the European war has many months to run, and that early relief is not to be expected, in the matter of manganese ore, from Russia or India. The Russian supply is bottled up by the closing of the Dardenelles, while the scarcity of ocean bottoms and Great Britain's restrictions make the shipments from India almost negligible. Small lots of Indian ore have arrived here recently, coming as a part of general cargoes, and have brought from 65c. to 70c. per unit.

Bethlehem Sales Agents in Conference

The entire sales force of the Bethlehem Steel Company was last week called to the home offices at South Bethlehem, Pa., for a conference which lasted three days and included a tour of inspection of the Lehigh and Saucon plants and the recently acquired properties at Sparrows Point, Md., and Steelton, Pa.

Following inspection of the home plants, Sept. 27, the salesmen were guests at a banquet given by General Sales Agent E. S. Knisely at the Lehigh Country Club in the evening, where short addresses were made by President E. G. Grace, Vice-President W. F. Roberts, G. H. Blakeley, manager of structural sales, H. E. Lewis, assistant superintendent, and W. S. Rutherford, manager of orders. In the party were:

Edward S. Knisely, general sales agent; Paul Mackall, assistant general sales agent; R. W. Gillispie, assistant general sales agent; H. A. Jackson, sales agent, Boston district; J. M. Ellis, sales agent, New York district; W. B. Kennedy, sales agent, Philadelphia district; J. A. Davis, sales agent, Baltimore district; H. W. Eisenhart, sales agent, Pittsburgh district; H. N. Clarke, sales agent, Cleveland district; John S. Hegeman, sales agent, Detroit district; Robert E. Belpknap, sales agent, Chicago district; J. M. Price, sales agent, St. Louis district; Edward S. Illig, sales agent, San Francisco district; Edward J. Krause, sales agent, forgings; G. J. Costello, sales agent, crucible tool steels; E. F. Shaffer, sales agent, drop forgings; W. C. Cutler, sales agent, mill No. 1 products; H. G. Walton, sales agent, steel, iron and manganese castings; C. E. Ryberg, sales agent, brass and bronze castings; H. E. Stoll, sales agent, rails; P. H. Hampson, sales agent, miscellaneous products; N. E. Salsich, sales agent, track department; Robert Gross, sales agent, pig iron department.

The Ontario & Niagara Connecting Bridge Company will build at Niagara Falls a bridge of steel and concrete over the Niagara River for the use of steam and electric railroads, vehicles and pedestrians. It is expected to cost $1,000,000. The structure will span the river near the point where the transmission line of the Niagara, Lockport & Ontario Power Company crosses the rapids, in the town of Lewiston, and not far from the whirlpool.

A French metal syndicate, similar to the Metallgesellschaft of Frankfurt, Germany, is about to be formed under the auspices of the French branch of the Penarroya Company, according to *L'Usine* of Paris. This company owns the great lead works in Spain and is said to be controlled by the Rothschilds.

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Government Steel Awards for Navy

WASHINGTON, D. C., Oct. 3, 1916.—On the basis of bids opened by the Navy Department, Sept. 19, for steel plates, sheets, bars and shapes, and steel hull rivets for the fuel ship to be built at Boston and the hospital ship to be built at Philadelphia, the following awards have been made:

Carnegie Steel Company, 5,400,000 lb. steel plates, $167,346; 178,000 lb. steel plates, $5,775.22; 1,105,400 lb. angles, steel, $68,317.39; 940,000 lb. steel plates, $29,694.60; 6,180,000 lb. steel plates, $189,046.20; 890,000 lb. steel plates, $28

Alan Wood Iron & Steel Company, 59,000 lb. sheets, steel, $2,065

American Sheet & Tin Plate Company, 51,000 lb steel, $2,029.80.

American Pressed Steel steel, $2,448.

Federal Steel Foundry Company, 146,300 lb. steel c $14,264.2

MORE FURNACES IN BLAST

An Increase in Daily Rate of 3400 Tons

September Output Almost Equals That of August —A Net Gain of Nine Stacks

The September pig-iron production was almost the same as that of August. The total for the month was 3,202,366 tons, or 106,745 tons a day as compared with 3,203,713 tons in August, or 103,346 tons a day. The changes caused by the blowing in and blowing out of furnaces gave a net gain of nine stacks. The number on the active list Oct. 1 was 328, with a daily capacity of 106,578 tons, as compared with 319 furnaces active on Sept. 1 with a daily capacity of 104,502 tons.

DAILY RATE OF PRODUCTION

The daily rate of production of coke and anthracite pig iron by months, from September, 1915, is as follows:

Daily Rate of Pig Iron Production by Months—Gross Tons

	Steel Works	Merchant	Total
September, 1915	70,977	24,108	95,085
October	73,595	27,227	100,822
November	73,282	27,962	101,244
December	73,647	29,686	103,333
January, 1916	72,614	30,132	102,746
February	75,305	31,151	106,456
March	76,274	31,393	107,667
April	77,226	30,366	107,592
May	77,706	30,716	108,422
June	76,526	30,527	107,053
July	74,397	29,620	104,017
August	74,617	28,729	103,346
September	76,990	29,755	106,745

CAPACITY IN BLAST OCTOBER 1 AND SEPTEMBER 1

The following table shows the daily capacity in gross tons of furnaces in blast Oct. 1 and Sept. 1 by districts:

Coke and Anthracite Furnaces in Blast

Location of furnaces	Total number of stacks	Oct. 1 Number in blast	Oct. 1 Capacity per day	Sept. 1 Number in blast	Sept. 1 Capacity per day
New York:					
Buffalo	19	17	5,747	16	5,397
Other New York	5	3	583	3	550
New Jersey	6	1	230	1	230
Pennsylvania					
Lehigh Valley	20	13	3,878	12	3,720
Spiegel	2	1	109	1	266
Schuylkill Val.	12	11	3,049	10	2,855
Lower Susquehanna	6	3	1,322	3	1,370
Lebanon Valley	8	6	742	7	893
Ferro and Spiegel	1	1	86	1	90
Pittsburgh Dist	53	42	23,839	40	22,825
Ferro	3	3	405	3	405
Shenango Val.	19	19	6,176	19	5,944
Western Pa.	24	20	6,044	20	6,841
Ferro and Spiegel	2	2	201	1	100
Maryland	4	4	1,600	3	1,230
Ferro	0	0	0	1	92
Wheeling District	14	14	4,199	13	3,987
Ohio:					
Mahoning Val.	25	25	11,031	24	10,445
Central and Northern	24	21	8,282	22	8,551
Hock. Val. and Hang'g Rock	15	11	1,608	10	1,450
Ill and Ind.	35	32	13,563	31	14,812
Ferro	2	1	84	1	60
Michigan, Wis. & Minn.	12	10	2,834	9	2,378
Colo. and Mo.	6	4	1,325	4	1,273
Ferro	1	1	55	1	126
The South:					
Virginia	18	9	1,131	9	1,163
Kentucky	5	3	425	3	420
Alabama	37	28	7,258	29	7,883
Ferro	1	1	59	0	0
Tennessee	13	10	927	9	877
Total	394	328	106,578	319	104,502

The furnaces blown in between Sept. 1 and Oct. 1 include one Buffalo stack in New York, one Saucon in the Lehigh Valley, Delaware River in the Schuylkill Valley, one Edgar Thomson, one Lucy and one Eliza in the Pittsburgh district, Marshall in western Pennsylvania, one Bellaire in the Wheeling district, Cherry Valley in the Mahoning Valley, Hamilton in the Hanging Rock district, one Gary in the Chicago district, one Zug at Detroit and Standard in Tennessee.

Among the furnaces blown out last month were one Saucon and one Palmerton in the Lehigh Valley, one Lebanon in the Lebanon Valley, Newburgh in Ohio, and Helen in Tennessee.

OUTPUT BY DISTRICTS

The accompanying table gives the production of all coke and anthracite furnaces in September and the three months preceding:

Monthly Pig-Iron Production—Gross Tons

	June (30 days)	July (31 days)	Aug. (31 days)	Sept. (30 days)
New York	190,140	190,319	182,812	185,483
New Jersey	6,379	6,621	7,020	6,907
Lehigh Valley	111,689	104,835	99,650	104,989
Schuylkill Valley	93,552	89,811	88,373	91,483
Lower Susquehanna and Lebanon Valley	75,092	73,440	69,558	64,514
Pittsburgh district	728,071	736,477	721,917	724,183
Shenango Valley	172,259	178,903	179,976	185,276
Western Pennsylvania	157,909	169,979	172,970	183,647
Maryland, Virginia and Kentucky	85,687	87,294	92,540	94,382
Wheeling district	125,889	128,135	123,426	124,034
Mahoning Valley	315,675	314,461	326,413	316,907
Central and Northern Ohio	274,726	261,162	263,587	248,434
Hocking Valley and Hanging Rock	48,640	48,624	50,168	43,948
Chicago district	462,394	465,895	460,836	457,637
Mich., Minn., Mo., Wis. and Col.	123,116	121,285	115,341	121,877
Alabama	204,076	213,973	219,076	219,508
Tennessee	33,494	33,299	30,056	29,157
Total	3,211,588	3,224,513	3,203,713	3,202,366

PRODUCTION OF STEEL COMPANIES

Returns from all furnaces of the United States Steel Corporation and the various independent steel companies show the following totals of steel-making iron month by month, together with ferromanganese and spiegeleisen. These last, while stated separately, are also included in the columns of "total production."

Production of Steel Companies—Gross Tons

	Pig, total production 1914	1915	1916	Spiegeleisen and ferromanganese 1914	1915	1916
Jan.	1,261,430	1,115,944	2,271,035	17,325	18,041	24,866
Feb.	1,329,414	1,237,380	2,183,845	10,524	13,319	23,877
Mar.	1,704,688	1,551,082	2,365,116	20,133	12,274	29,388
Apr.	1,663,276	1,584,111	2,316,768	18,676	12,337	31,862
May	1,447,347	1,694,290	2,408,890	21,504	13,440	35,844
June	1,329,623	1,779,647	2,295,784	16,254	19,200	38,597
July	1,391,851	1,949,750	2,306,303	16,524	17,851	31,353
Aug.	1,401,818	2,313,122	11,577	27,463	33,338
Sept.	1,390,322	2,129,322	2,309,710	13,786	23,139	29,451
Oct.	1,271,820	2,281,456		17,435	23,992	
Nov.	1,059,159	2,198,459		21,977	28,741	
Dec.	1,034,802	2,283,047		20,733	25,004	

THE RECORD OF PRODUCTION

Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1912—Gross Tons

	1912	1913	1914	1915	1916
Jan.	2,057,911	2,795,331	1,885,654	1,601,421	3,185,121
Feb.	2,100,815	2,586,337	1,888,670	1,674,771	3,087,212
Mar.	2,[illegible]18	2,763,563	2,347,867	2,063,834	3,337,691
Apr.	2,[illegible]436	2,752,761	2,269,655	2,116,494	3,227,768
May	2,[illegible]882	2,822,317	2,092,686	2,263,470	3,361,073
June	2,[illegible]745	2,628,[illegible]	1,917,783	2,380,827	3,211,588
July	2,[illegible]889	2,[illegible]446	1,957,645	2,563,420	3,224,513
Aug.	2,512,431	2,54[illegible]763	1,995,261	2,779,647	3,203,713
Sept.	2,46[illegible]829	2,505,927	1,882,[illegible]77	2,852,561	3,202,366
9 mos.	21,[illegible]966	23,961,110	18,237,198	20,296,445	29,041,045
Oct.	2,[illegible]953	2,546,261	1,778,186	3,125,491	.....
Nov.	2,631,[illegible]4	2,233,123	1,518,316	3,037,308	.....
Dec.	2,[illegible]737	1,983,607	1,515,752	3,203,322	.....
Total yr.	29,[illegible]490	30,724,101	23,049,752	29,662,566	

DIAGRAM OF PIG-IRON PRODUCTION AND PRICES

The figures for daily average production, beginning January, 1909, are as follows:

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1909 Gross Tons

	1909	1910	1911	1912	1913	1914	1915	1916
Jan.	57,[illegible]84	84,[illegible]48	58,[illegible]65	69,[illegible]84	90,172	60,808	51,659	102,746
Feb.	60,976	85,616	64,090	72,442	92,369	67,453	59,813	106,456
Mar.	[illegible]4,[illegible]79	[illegible]4,[illegible]79	[illegible]2,[illegible]57	[illegible]2,[illegible]57	89,147	54,738	66,525	107,667
Apr.	57,962	82,792	68,836	79,181	91,759	75,665	70,550	107,592
May	60,[illegible]58	77,[illegible]02	61,[illegible]67	[illegible]4,[illegible]1	91,[illegible]20	67,[illegible]06	73,015	108,422
June	64,656	75,516	59,585	81,358	87,619	63,916	79,361	107,053
July	67,793	69,305	57,841	77,738	82,601	63,150	82,691	104,017
Aug.	7[illegible]4,[illegible]01	7,[illegible]03,[illegible]2	[illegible]4,[illegible]46	[illegible]2,[illegible]57	84,[illegible]03	89,[illegible]66	103,346	
Sept.	79,507	68,476	65,903	82,128	83,531	62,753	95,085	106,745
Oct.	[illegible]6,[illegible]67	[illegible]0,[illegible]11	[illegible]6,[illegible]55	[illegible]2,[illegible]57	77,361	100,822		
Nov.	84,917	63,659	66,648	87,697	74,453	50,611	101,244	.....
Dec.	[illegible]2,[illegible]22	[illegible]7,349	65,[illegible]12	[illegible]0,[illegible]56	65,987	48,896	103,333	

The fluctuations in pig-iron production from January, 1908, to the present time are shown in the accompanying chart. The figures represented by the heavy lines are those of daily average production, by months, of coke and anthracite iron. The two other curves on the chart represent monthly average prices of Southern No. 2 foundry pig iron at Cincinnati and of local

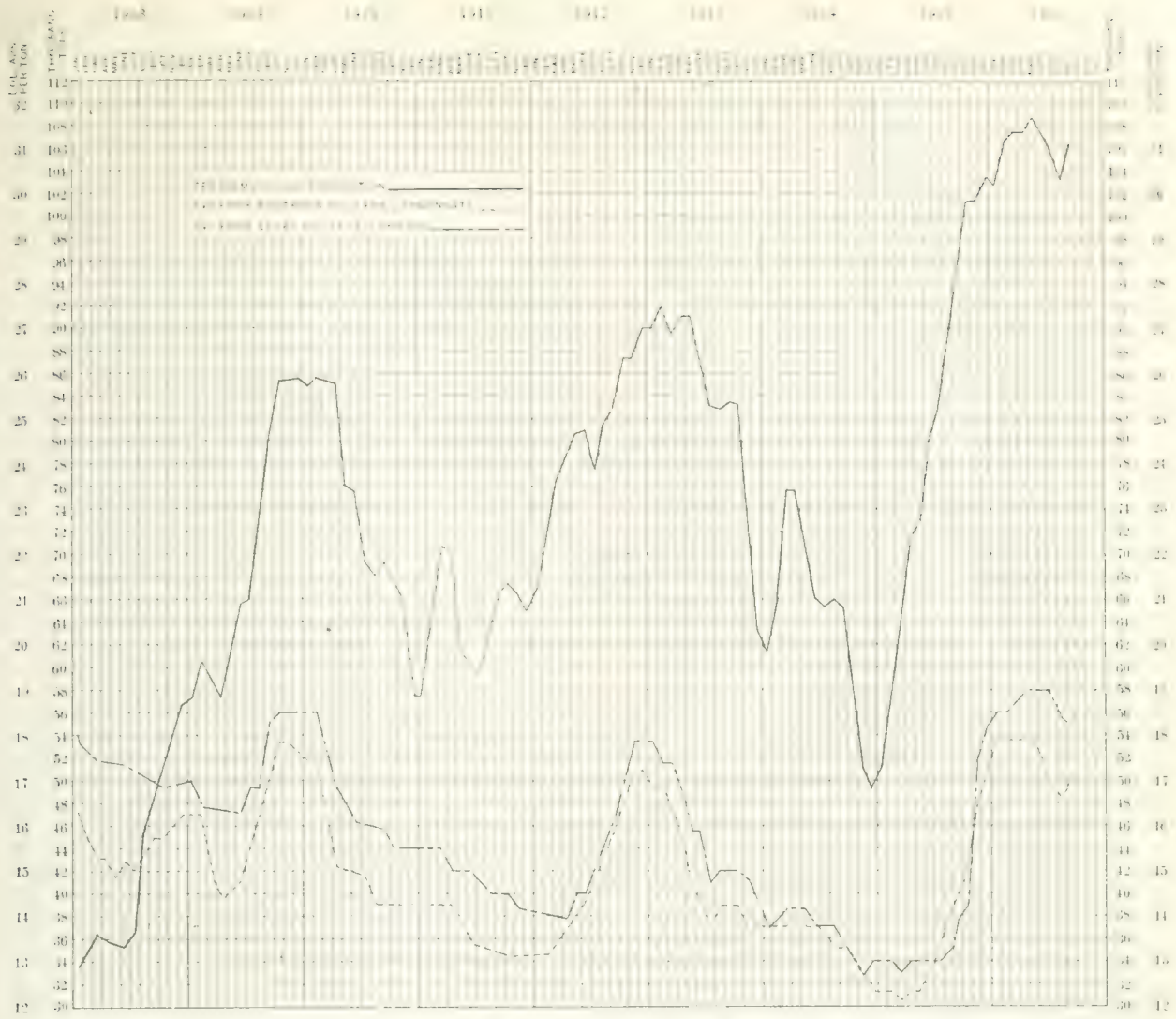


Diagram of Daily Average Production by Months of Coke and Anthracite Pig Iron in the United States from Jan. 1, 1908, to Oct. 1, 1916, Also of Monthly Average Prices of Southern No. 2 Foundry Iron at Cincinnati and Local No. 2 Foundry Iron at Chicago District Furnace

No. 2 foundry iron at furnace at Chicago. They are based on the weekly market quotations of THE IRON AGE.

Blast Furnace Notes

On Oct. 1 the Carnegie Steel Company was operating 57 out of its 59 blast furnaces. Edgar Thomson I, which had been out for relining and repairs, was blown in Sept. 2, and Lucy No. 2, also out for relining and repairs, was blown in Sept. 20. Bellaire No. 2, which has been completely rebuilt and enlarged, was blown in Sept. 20. At present the only idle furnaces are one Isabella, at Pittsburgh, which is being relined and repaired, and the small Zanesville, Ohio, stack, which may not be operated again.

Dover furnace, of M. A. Hanna & Co., Canal Dover, Ohio, will be blown out this week. This stack will be provided with a thin lining and larger hearth, increasing its rated capacity from 400 to 500 tons per day.

All five Eliza blast furnaces of the Jones & Laughlin Steel Company, Pittsburgh, are again in blast, the one stack that was idle for relining and repairs having resumed blast early in September.

No. 2 South Chicago stack of the Illinois Steel Company blew in Oct. 2.

All of the blast furnaces in the Mahoning and Shenango valleys were in blast on Oct. 1, Cherry Valley furnace having been blown in on Sept. 29.

The Donner Steel Company, Buffalo, has leased the entire property of the Tonawanda Iron & Steel Company at North Tonawanda, N. Y., for three years with an option of purchase. The plant includes the two Niagara furnaces which have been idle for approximately two years. It is expected that one of the furnaces will be put in blast shortly to manufacture ferromanganese.

The Bellaire furnace of the Carnegie Steel Company blew in Sept. 20, thus placing all the furnaces in the Wheeling district on the active list.

With the exception of the No. 2 Isabella furnace of the Carnegie Steel Company all the blast furnaces in the Pittsburgh district were active on Oct. 1.

Midvale Stockholders Get Good Report

Stockholders of the Midvale Steel & Ordnance Company held their first annual meeting Oct. 3. They were informed that earnings in excess of 30 per cent on the stock were coming in, exclusive of profits from a contract for 3,000,000 rifles for the British Government. This information was given in the following statement presented in behalf of President William E. Corey, who was absent on a Western trip:

From the standpoint of our company business conditions [illegible] satisfactory. All of our plants are operating to full capacity and orders are being received in excess of shipments. Net earnings, leaving entirely out of consideration the manufacture of rifles by the Remington Arms Company under its contract with the British Government, since the acquisition of the Cambria Steel Company in February, are in excess of $2,500,000 per month. During the past year additions to our plants have been under construction [illegible] will be completed by Jan. 1, 1917, resulting in a total increased [illegible] of [illegible] tons of pig iron and [illegible] tons of open hearth steel [illegible]

Vice-President William B. Dickson presided at the meeting in Mr. Corey's absence. The stockholders elected these directors to serve for three years: Samuel M. Vauclain, A. C. Dinkey, W. P. Barba, Frederic W. Allen and John C. Neale.

Iron and Steel Markets

PIG IRON AGAIN HIGHER

All Grades Lifted by Export Sales

Increased Pig-Iron Production—Implement Makers Need More Steel—An Export Record

Heavy buying of pig iron, accompanied by price advances on top of those of last week, is the outstanding feature of the iron market. It comes while evidence is accumulating of the trend of finished steel to still higher prices. Export demand is partly responsible in iron, as it has been in steel, but, with high levels regarded as certain for months to come, domestic purchases, one after another, are, after repeated postponements, being brought forward. In the face of a shortage of labor for the increased business, the mills have difficulty in adding to production and shortening deliveries, yet buyers could use more material; the result is the growing price strength.

The greatest activity has occurred in Bessemer and basic pig iron, which have risen $1.25 per ton in two weeks. Low phosphorus iron has been conspicuous, some 60,000 tons, and perhaps as much as 100,000 tons, being taken for export at rapidly advancing prices. As high as $35 per ton was paid, and quotations are at present above this figure. The present movement in basic iron for export has taken close to 200,000 tons from one Alabama producer, and another Southern basic producing interest has refused additional offers after selling 100,000 tons. In Pittsburgh 70,000 tons were sold.

Foundry buying has also improved. In Chicago this has resulted in part through the adjustment of labor difficulties in that city and in Milwaukee. Foundry iron is 25c. and 50c. per ton higher, and likely to climb farther if more stacks are put on basic iron. Buffalo furnaces have taken 25,000 tons for the East, and in the last six weeks 400,000 tons have been booked in Birmingham. Detroit will shortly buy 30,430 tons of cast-iron pipe.

Pig-iron production has been bettered, as expected, responding in part to the more favorable weather conditions of September over those of August. Last month's total for the thirty days was 3,202,366 tons, or 106,745 tons a day, against 3,203,713 tons for August, or 103,346 tons a day. The month opens up well with 328 furnaces in blast, with a daily capacity of 106,578 tons, against 9 less furnaces, or 319, which started September, representing a daily producing rate of 104,502 tons.

An illuminating illustration of the diminishing check on buying caused by high-price levels is the quiet inquiry for steel bars being made by the implement manufacturers. It appears that consumers of their machinery are buying heavily, one interest, indeed, in Southern territory, ordering five times more than a year ago. Incidentally, what steel bars are available for relatively early delivery are now $3 per ton higher.

Structural steel is also stiffening. It is believed that as much fabricated work was contracted for in September as in April, or perhaps May of this year. The steel has been placed for the New York Central Hotel, New York, taking 15,000 tons, and for buildings at the Norfolk Navy Yard, requiring 4000 tons. An advance of $2 a ton for plain material on contracts already made by a number of mills is likely to be general in a few days.

About 2500 cars have been bought by the railroads but there is no let up in the demand for plates. Some 60,000 tons are involved in the 560 miles of 8-in. and 220 miles of 6-in. pipe for the Sinclair Oil & Refining Corporation for a line from Tulsa to Chicago. It was necessary to distribute this business among three mills. Some 11,000 tons have been bought for shipbuilding purposes at Staten Island and more is wanted. Japan has paid as high as 4½c. One leading mill has rejected an offer of 3½c., Pittsburgh, for practically its entire output of sheared plates for the last half of 1917.

The August exports of iron and steel broke the record. They totaled 598,192 tons against the high total of 540,000 tons in May. The figures bear out the contention that the smaller amounts for June and July did not mean that the high point of the export movement had been passed, and indeed the showing of the steel works' order books at the time was otherwise.

The signs are that tin-plate prices for next year will be higher, and box annealed sheets, though themselves not in unusual demand, are now quoted at 3.10c., Pittsburgh, as a minimum, due to the higher cost of semi-finished steel.

The inquiries for 35,000 tons of rails for France and for 22,000 tons for a road in western Canada are not yet satisfied, and not much has been placed against the 30,000 tons for a number of American railroads acceptable for 1918 delivery.

Coke is 25c. and 50c. higher per ton, due largely to labor shortages at the coke ovens, and the scrap market has also stiffened in line with the advances in pig iron.

Pittsburgh

PITTSBURGH, PA., Oct. 3, 1916.

The greatest activity the past week was in Bessemer and basic pig iron, both of which have been bought heavily, bringing much higher prices. Bessemer iron is up squarely to $22.50, with reports of sales at $23, Valley furnace, while basic has sold in large lots at $19.50. The tendency in prices on nearly all lines of semi-finished and finished material is toward higher values. The expected advance in prices on wire has not materialized, this probably being held back by reason of the serious illness of the general sales manager of the leading wire interest. Prices on billets and sheet bars are extremely firm, $45 being regarded as minimum, prices ranging from this figure up to $50 at mill. Sheets are also very firm, blue annealed having advanced $2 per ton. Coke and scrap have moved up sharply. The surprise of the market is coke, which has already sold on contracts for first half of next year at $3 per net ton at oven, while spot coke has sold at $3.25, with reports of sales at $3.50. A serious shortage in labor is holding down the output of coke and is also restricting the output in finishing mills, common labor being reported exceedingly scarce at all places where it is employed. There has been no general advance in prices

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton	Oct. 4, 1916	Sept. 27, 1916	Sept. 6, 1916	Oct. 6, 1915
No. 2 X, Philadelphia	$19.75	$19.50	[illegible]	[illegible]
No. 2, Valley furnace	19.00	[illegible]	[illegible]	14.75
No. 2 Southern, Cin'ti	17.40	[illegible]	[illegible]	14.40
No. 2, Birmingham, Ala.	[illegible]	[illegible]	[illegible]	11.50
No. 2, furnace, Chicago*	18.50	[illegible]	[illegible]	14.25
Basic del'd eastern Pa.	20.00	[illegible]	[illegible]	15.00
Basic, Valley furnace	19.50	19.00	[illegible]	[illegible]
Bessemer, Pittsburgh	23.45	[illegible]	[illegible]	16.95
Malleable Bess., Ch'go*	19.00	19.00	19.00	[illegible]
Gray forge, Pittsburgh	19.95	[illegible]	[illegible]	14.70
L. S. charcoal, Chicago	19.75	[illegible]	[illegible]	[illegible]

Billets, etc., Per Gross Ton:				
Bess billets, Pittsburgh	45.00	[illegible]	45.00	[illegible]
O.-h. billets, Pittsburgh	45.00	[illegible]	45.00	25.00
O.-h. sheet bars, P'gh	[illegible]	45.00	45.00	25.50
Forging billets, base, P'gh	69.00	[illegible]	69.00	33.00
O.-h. billets, Phila	[illegible]	[illegible]	[illegible]	30.00
Wire rods, Pittsburgh	[illegible]	55.00	[illegible]	31.00

Finished Iron and Steel, Per Lb. to Large Buyers	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	[illegible]	[illegible]	[illegible]	1.25
O.-h. rails, heavy, at mill	[illegible]	[illegible]	[illegible]	1.34
Iron bars, Philadelphia	2.659	[illegible]	[illegible]	1.509
Iron bars, Pittsburgh	[illegible]	[illegible]	[illegible]	1.40
Iron bars, Chicago	2.35	2.35	[illegible]	1.35
Steel bars, Pittsburgh	2.75	2.60	[illegible]	1.40
Steel bars, New York	2.919	[illegible]	[illegible]	1.569
Tank plates, Pittsburgh	4.00	4.00	4.00	1.40
Tank plates, New York	4.169	4.169	[illegible]	1.569
Beams, etc., Pittsburgh	2.75	2.75	[illegible]	1.40
Beams, etc., New York	2.869	2.769	2.769	1.569
Skelp, grooved steel, P'gh	2.35	[illegible]	2.35	1.40
Skelp, sheared steel, P'gh	2.45	[illegible]	[illegible]	1.45
Steel hoops, Pittsburgh	3.00	3.00	3.00	1.40

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire, Per Lb. to L. [illegible]	Oct. 4, 1916. Cents.	Sept. 27, 1916. Cents.	Sept. 6, 1916. Cents.	Oct. 6, 1915. Cents
Sheets, [illegible] No. 28 [illegible]	3.40	3.00	2.90	2.00
[illegible] No. [illegible] P'gh	[illegible]	[illegible]	4.25	3.50
Wire [illegible]	[illegible]	[illegible]	2.60	1.75
Cut nails, Pittsburgh	[illegible]	2.60	[illegible]	1.70
Fence wire [illegible]	[illegible]	[illegible]	2.55	1.60
Barb wire [illegible]	[illegible]	[illegible]	[illegible]	2.60

Old Material, Per Gross Ton:				
Iron rails, Chicago	[illegible]	[illegible]	[illegible]	[illegible]
Iron rails, Philadelphia	20.00	20.00	[illegible]	18.50
Carwheels, Chicago	[illegible]	[illegible]	11.50	12.00
Carwheels, Philadelphia	[illegible]	[illegible]	15.50	14.00
Heavy [illegible] P'gh	17.50	16.50	16.00	14.00
Heavy [illegible] Chgo	15.00	[illegible]	[illegible]	[illegible]
Heavy [illegible] Chgo	[illegible]	16.25	[illegible]	11.75
No. 1 cast, Pittsburgh	[illegible]	15.00	14.50	12.00
No. 1 cast, Philadelphia	16.00	16.00	16.00	11.00
No. 1 cast, Chicago (net)	12.50	[illegible]	12.00	10.50
No. 1 RR wrot, Phila	20.00	20.00	20.00	16.50
No. 1 RR wrot, Chgo (net)	16.75	16.50	16.00	11.00

Coke, Connellsville, Per Net Ton at Oven				
Furnace coke, prompt	$3.25	[illegible]	$3.00	$1.75
Furnace coke, future	3.00	2.85	[illegible]	2.25
Foundry coke, prompt	[illegible]	[illegible]	3.50	[illegible]
Foundry coke, future	3.75	[illegible]	3.50	2.50

Metals, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	28.25	[illegible]	[illegible]	[illegible]
Electrolytic copper, N. Y.	28.50	28.75	28.00	18.00
Spelter, St. Louis	9.50	8.75	8.50	14.00
Spelter, New York	9.70	[illegible]	[illegible]	[illegible]
Lead, St. Louis	[illegible]	[illegible]	[illegible]	[illegible]
Lead, New York	7.05	[illegible]	[illegible]	[illegible]
Tin, New York	39.25	38.62½	38.87½	32.00
Antimony, Asiatic, N. Y.	10.00	11.00	12.00	28.00
Tin plate, 100-lb. box, P'gh	$5.75	$5.75	$5.75	$3.15

on bars and shapes; while some mills are quoting 2.70c. flat on both bars and shapes, 2.60c. is still being done to regular customers for delivery at convenience of the mill. The whole market is as strong as it could possibly be, with the outlook indicating higher prices all along the line. Consumers are showing more willingness to cover for the first half of the year, and are now paying prices for that delivery which they refused even to consider a month or more ago.

Pig Iron.—W. P. Snyder & Co. report the average price on basic iron in September to have been $18.63, and on Bessemer, $21.93, Valley furnace, an advance over August in basic of 63c. and in Bessemer of 93c. Sales reported were 70,000 tons of basic and 65,000 tons of Bessemer. There have been heavy sales of both Bessemer and basic in the past week and at the highest prices yet reached on this movement. There is every indication that they will go still higher, and $25 for Bessemer and at least $22 for basic are predicted before the first of the year. A large amount of both Bessemer and basic is under negotiation at this writing with chances favoring the closing of some large sales before the week is out. The demand for foundry iron is also quite active and prices on No. 2 have advanced squarely to $19 at Valley furnace, with some sellers asking $19.50. We note sales of 10,000 tons and 5000 tons of basic at $19.50 and 5000 tons of Bessemer, also 2000 tons and 28,000 tons on a sliding scale contract, all at $22.50, Valley furnace. Sales are also reported of 2000 tons and 30,000 tons of Bessemer at $23, Valley furnace. A leading radiator interest is reported to have closed for about 10,000 tons of foundry iron for delivery over the first half of the year, and an Ohio River steel company is reported to have taken 15,000 tons of basic for first half of next year, but none of this iron is to go from Valley furnaces. A local consumer, that had an option on 10,000 tons of Bessemer iron that expired early last week, closed this at a price considerably under the price ruling today. We quote standard Bessemer iron, $22.50; basic, $19.50; No. 2 foundry, $19 to $19.50; malleable Bessemer, $19.50 to $19.75; gray forge, $19, all at Valley furnace, the freight rate for delivery to the Pittsburgh and Cleveland districts being 95c. per ton.

Billets and Sheet Bars.—While the new demand for billets and sheet bars is only fairly active, most consumers being covered by regular contracts, the market is very firm and $45 at mill is minimum price on either Bessemer or open-hearth billets and sheet bars, with some sellers asking up to $50. The foreign inquiry for steel has quieted down, but it is said several of the larger mills are very short of steel and are picking up considerable quantities of small ingots from steel casting plants and other sources, for which they are paying $45 and higher. We quote soft Bessemer and open-hearth steel billets and sheet bars at $45 to $50 at mill, Youngstown or Pittsburgh. We quote forging billets at $69 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take $1 extra.

Ferroalloys.—The new inquiry for ferromanganese is not heavy, consumers evidently believing that prices may be lower. An inquiry is in the market from a large steel company for 1200 tons—200 tons a month for the first half of 1917—which may be closed this week. It is reliably stated that two makers of domestic ferromanganese are offering it at $160 at furnace, or $4 per ton under what is regarded as the official price for English 80 per cent. We quote foreign and domestic 80 per cent ferromanganese at $160 to $164, seaboard. We quote 18 to 22 per cent spiegeleisen at $40 to $45, and 25 to 30 per cent $55 to $65, at furnace. On 50 per cent ferrosilicon we quote $88 to $89 in lots up to 100 tons; over 100 tons, $87 to $88, and over 600 tons, $86 to $87, all per gross ton, f.o.b. Pittsburgh. We quote Bessemer ferrosilicon as follows: 9 per cent, $30; 10 per cent, $31; 11 per cent, [illegible] per cent, $33; 13 per cent, $34.50; 14 per cent, [illegible] 15 per cent, $38.50, and 16 per cent, $41. Seven per cent silvery is $28.50; 8 per cent, $29; 9 per cent, $29.50; 10 per cent, $30; 11 per cent, $31, and 12 per

cent, $32. These prices are f.o.b. furnace, Jackson or New Straitsville, Ohio, or Ashland, Ky., all having a freight rate of $2 per gross ton to Pittsburgh.

Steel Rails.—Inquiries are in the market for considerable quantities of standard section rails from railroads that have already contracted for 1917, but find they will need more than called for in their contracts. The Pennsylvania lines west is said to have closed for 5000 tons, and even larger contracts are also said to have been closed. None of the rail mills is promising deliveries before the second half of 1917, while the Carnegie Steel Company will not quote for delivery before the last quarter of that year. The new demand for light rails is fairly active from the coal-mining concerns, but from the traction and lumber interests is quiet. We quote 25 to 45 lb. sections at $47; 16 and 20 lb., $48; 12 and 14 lb., $49, and 8 and 10 lb., $50, in carload lots, f.o.b. at mill, the usual extras being charged for less than carload lots. We quote standard section rails of Bessemer stock at $33 and of open-hearth $35, per gross ton, Pittsburgh.

Plates.—Orders for steel cars are coming out more freely, and inquiry is heavier than for some time. The Chesapeake & Ohio has ordered 1000 70-ton hopper cars from the Pressed Steel Car Company, and the National Refining Company has ordered 60 40-ton tank cars, and the Illinois Traction Company 60 steel hoppers and 40 steel gondolas from the American Car & Foundry Company. The Wheeling & Lake Erie is in the market for 1500 70-ton steel gondolas and 500 70-ton steel hopper cars. The Western Maryland is in the market, and will likely close this week for 2000 steel hoppers. The Carnegie Steel Company is low bidder on about 20,000 tons of ship plates for two Government colliers. The steel plates for the first lot of ships in the new naval program amount to about 200,000 tons, and bids will be opened on these about Oct. 20. The situation in plates is getting tighter and the absolute minimum mill price on sheared plates is 3.50c. for such deliveries as the mills can make. One leading mill has been offered 3.50c. for practically its entire output of sheared plates for the last half of 1917, and turned the order down, desiring to take care of its regular customers. The mill price on ¼-in. and heavier plates we quote at 3.50c. for delivery in the second half of 1917, while for delivery in two to four months prices now range from 4c. to 4.50c. at mill. Small lots of sheared plates for fairly prompt shipment are reported to have sold as high as 5c. at mill.

Structural Material.—While there has been no general advance on plain material to 2.70c., as reported, local mills are naming 2.70c. in most cases, but are still quoting 2.60c. to some customers for such deliveries as they can make. Inquiry is active in spite of the very high prices. The McClintic-Marshall Company has taken 1500 tons for new steel buildings for the Whitney Glass Company, Glassboro, N. J., and the Jones & Laughlin Steel Company 3500 tons for the Paternal Apartment House substructure at the Grand Central Terminal in New York City. The Philadelphia & Reading has divided 300 tons of bridge work between the Phoenix Bridge Company and McClintic-Marshall Company. The Baltimore & Ohio, the Boston & Maine and the Maine Central are all preparing specifications for bridge work, which are expected to come to the shops for bids within the next 60 days. We now quote beams and channels up to 15 in. at 2.60c. to 2.70c. at mill for such deliveries as the mills can make, which probably would not be before second or third quarters of next year, and small lots from stock for fairly prompt shipment readily bring 3c. to 3.25c., Pittsburgh.

Sheets.—There is continued activity in the new demand for Bessemer black, blue annealed and galvanized sheets, prices being very firm and showing indications of going higher. The leading interest has advanced its prices on black and galvanized sheets $3 per ton and other makers on blue annealed sheets $2 per ton. The export demand for Bessemer black and galvanized sheets is heavy. It is claimed that none of the mills is selling sheets for delivery into next year, but will likely open books for such contracts in a short time. We quote Nos. 9 and 10 blue annealed sheets at 3c. to 3.10c.; No. 28 Bessemer black, 3.10c., and open-hearth, 3.15c.; No. 28 Bessemer galvanized, 4.25c., and open-hearth, 4.40c. Nos. 22 and 24 black plate, tin-mill sizes, H. R. & A., 2.90c.; Nos. 25, 26 and 27, 3c. to 3.10c.; No. 28, 3.10c. to 3.15c., and No. 29, 3.20c. to 3.25c. These prices are for carloads and larger lots, f.o.b. mill, Pittsburgh.

Tin Plate.—It is expected that about Oct. 15 the leading interest will announce its price on tin plate for 1917 delivery. Heretofore the general belief has been that this price would not be higher than $5.50 per base box, and, in fact, it is said that one leading interest favored strongly putting the price at $5. Developments the past week or two have changed the aspect in the tin-plate trade, and it is now said the price for 1917 delivery will possibly be as high as $6 per base box. One reason for this is the mills will carry on an average into next year close to three months' production of tin plate for which they will obtain not over $3.50 per base box. This is a decided advantage to consumers. It is a well-known fact that profits of tin-plate mills for 1916, when the year is figured up, will be very small in comparison with what they should have been when general conditions in the steel trade over all of this year are considered. There is an insistent heavy demand, and it is claimed that $5.50 for wasters and $6 for production tin plate can readily be obtained for delivery this year.

Rivets.—The new demand is stated to be fairly active, but not so heavy as some time ago, most consumers being covered over the remainder of this year and some into the first quarter of next year. There is also a heavy foreign demand, mostly from India, China, Japan and South America. There is still some unevenness in prices among jobbers, who have stocks of rivets bought when prices were lower than they are now. Makers' quotations are as follows: Buttonhead structural rivets, ½ in. in diameter and larger, $4 per 100 lb., base, and conehead boiler rivets, same sizes, $4.10 per 100 lb., base, f.o.b. Pittsburgh. Terms are 30 days net, or one-half of 1 per cent for cash in 10 days.

Railroad Spikes and Track Bolts.—Makers report the demand for spikes better than for some time, two local makers receiving heavy specifications in the past week against contracts placed early this year. The fact is emphasized that spikes at 2.65c. are relatively low, and an advance in the near future is anticipated. The new demand for track bolts is also more active, evidently due to the fact that the railroads are anxious to get as much work finished as possible before bad weather comes. We quote track bolts with square nuts at 4.50c. to 4.75c. to railroads and 5c. to 5.25c. in small lots to jobbers, base. Track bolts with hexagon nuts take the usual advance of 15c. per 100 lb. Prices on spikes are as follows:

Standard railroad spikes, 4½ x 9/16 in. and larger, $2.65 base; 5 x ⅝ in. railroad spikes, ½ and 7/16 in., $2.75 base railroad spikes, ⅜ in. and 5/16 in., $3.05 base; boat spikes, $2.80 base, all per 100 lb. f.o.b. Pittsburgh.

Cold-Rolled Strip Steel.—It is expected that about next week some makers will open their books for orders for the first quarter and first half of 1917. It is believed that prices for such deliveries will be on the present basis of $6 per 100 lb. Nearly all consumers are covered over the remainder of this year and there is very little new buying. We quote cold-rolled strip steel at $6, base, on contracts for delivery over the remainder of the year, and $6.50 to $6.75 in small lots for fairly prompt shipment. Terms are 30 days net, less 2 per cent off for cash in 10 days, delivered in quantities of 300 lb. or more when specified for at one time.

Wire Rods.—There is a very active demand, greater than the mills can supply promptly. There is also some heavy export inquiry. Two local makers are not quoting on export rods, stating they need their entire supply for their own wire mills and for domestic customers. Prices are very firm. We quote soft Bessemer, open-hearth and chain rods at $55 to $60 per ton, f.o.b. Pittsburgh.

Nuts and Bolts.—Makers report the new demand only fairly active, as nearly all consumers are covered over the remainder of this year and some into the first quarter and first half of 1917. Deliveries of steel bars by the mills to the factories are very unsatisfactory

and are restricting the output of nuts and bolts materially. Prices are firm. Discounts are as follows, delivered in lots of 300 lb. or more, where the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days:

Carriage bolts, small, rolled [illegible] per cent; small, cut thread 40, 10 and [illegible] per cent.

Machine bolts, h. p. cuts, [illegible] per cent; small, cut thread, [illegible] per cent.

Machine bolts, c. p. [illegible] per cent, large 10 per cent. [illegible] per cent. Bolt ends, h. p. cuts, [illegible] per cent. Rough stud bolts, 15 per cent. Lag screws [illegible] or gimlet point), 70 and 5 per cent.

Forged set screws and tap bolts, [illegible] round point set screws, case-hardened, [illegible] Square head hexagon head cap screws, 55 per cent. Flat, button, round or fillister head cap screws, 30 per cent.

Nuts, h. p. sq., tapped or blank, $2.70 off list; hex., $2.70 off. Nuts, c. p. cut, sq., tapped or blank, $3.00 off; hex., $2.80 off. Semi-finished hex. nuts, [illegible] per cent. Polished and case-hardened nuts, 60 and [illegible]

Rivets, 7/16 in. and larger, diamond and [illegible] per cent.

Iron and Steel Bars.—While the minimum mill prices on steel bars remain at 2.60c., Pittsburgh, for such deliveries as the mills can make, it is likely this price will shortly be advanced to 2.70c., or possibly 2.75c. On some recent quotations sent out by two local mills in which shapes were involved, a flat price of 2.70c. was quoted on both the shapes and bars, but there are still quotations going out on steel bars at 2.60c. The demand is reported urgent and the two leading local makers are understood to have their output well sold up through the first half of 1917. Some large orders for steel bars have been placed lately by carbuilders, and it is said that none of these orders went at less than 2.50c. at mill. Foreign inquiry for steel rounds has quieted down, but very large quantities of these are still being made at various plants in this city and also at Youngstown. One mill of the Carnegie Steel Company at Bessemer, Pa., has been operating on steel rounds for some months. The demand for iron bars is active and mills report they are sold up for three or four months ahead. We quote steel bars at 2.60c. to 2.70c. at mill for delivery in the first quarter and first half of 1917, while for prompt shipment from warehouse up to 3.25c. is quoted. We quote refined iron bars at 2.75c. to 2.85c., and railroad test bars at 2.85c. to 2.90c., f.o.b. Pittsburgh.

Wire Products.—The expected advance in wire and wire nails has not yet been made, but it may come at any time. Makers report the demand for wire nails as very heavy, and practically the entire output of mills in this district is under contract for the remainder of this year. There is also an insistent demand for wire nails for South America, England, France and other countries, but on many of these inquiries local mills are not quoting, as they cannot make deliveries. Specifications against contracts are very heavy, and it is not believed the supply of barb wire and wire nails will be large enough to meet the demand this fall. Prices to the large trade in effect at this writing are as follows: Wire nails, $2.60, base, per keg; galvanized, 1 in. and longer, including large head barbed roofing nails, taking an advance over this price of $2, and shorter than 1 in., $2.50. Bright basic wire is $2.65 per 100 lb.; annealed fence wire, Nos. 6 to 9, $2.55; galvanized wire, $3.25; galvanized barb wire and fence staples, $3.45; painted barb wire, $2.75; polished fence staples, $2.75; cement-coated nails, $2.50, base, these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing remain at 60 per cent off list for carload lots, 59 per cent for 1000-rod lots, and 58 per cent for small lots, f.o.b. Pittsburgh.

Shafting.—Several makers are now entering contracts for cold-rolled and cold-drawn shafting for delivery in the first quarter and first half of 1917 at 20 per cent and 15 per cent off list, the most desirable contracts going at the greater discount. Makers have their output sold up for the remainder of this year, and on small current orders for delivery in the next two or three months 10 per cent off list is quoted and occasionally the list price. It is expected that some large contracts will be made this month for delivery through the first half of 1917. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots for delivery in last quarter of this year and first quarter of 1917, and 10 per cent off in less than carload lots, f.o.b. Pittsburgh, freight added to point of delivery.

Merchant Steel.—The new demand is heavy. Large consumers are now trying to cover on their needs for the first quarter and first half of next year. The mills are quoting considerably higher prices for these deliveries than are ruling now, and in some cases consumers are holding up placing contracts. For small lots, prices are as follows: Iron-finished tire, ½ x 1½ in. and larger, 2.60c., base; under ½ x 1½ in., 2.75c.; planished tire, 2.75c.; smooth channel tire, ¾ to ⅞ and 1 in., 2.85c. to 2.90c.; 1⅛ in. and larger, 3.10c.; toe calk, 3.10c. to 3.15c., base; flat sleigh shoe, 2.75c.; concave and convex, 2.85c.; cutter shoes, tapered or bent, 3.25c. to 3.35c.; spring steel, 3.25c. to 3.50c.; machinery steel, smooth finished, 2.90c. to 3c., all f.o.b. at mill.

Hoops and Bands.—Mills report the new demand for both hoops and bands as very active and specifications against contracts are heavy. Several leading makers have not as yet opened their books for the sale of either hoops or bands for next year's delivery, but will probably do so this month. Steel hoops remain firm at 3c. and bands at 2.60c., with extras on the latter as per the steel bar card, but it is expected that prices on bands will be higher in the near future.

Wrought Pipe.—The Sinclair Oil & Refining Corporation has contracted for 560 miles of 8-in. and 220 miles of 6-in. line pipe for the laying of an oil line from the Tulsa fields in Oklahoma to Chicago. Spang, Chalfant & Co. will furnish 300 miles of 8 in.; National Tube Company, 260 miles of 8 in.; Wheeling Steel & Iron Company, all the 6 in. The line is to be laid this year, and will take 60,000 tons of plates. The new demand for pipe is heavy. Mills are sold up on lap-weld sizes for five or six months, but on butt-weld sizes can make fairly prompt shipments. Discounts on iron and steel pipe, which are very firm, are given on another page.

Boiler Tubes.—Makers report the demand for locomotive and merchant tubes as very heavy and state their output is practically sold up through the first half of 1917. On seamless steel tubing the two leading makers state they have obligations on the books that practically take their entire output well up to the close of 1917. Prices are very firm, another advance in both iron and steel tubes being looked for in the near future. Discounts are printed on another page.

Coke—Heavy inquiries are in the market for furnace coke for first half and for all of 1917 delivery, but so far as known only one contract has been closed, this being about 10,000 tons per month to go to Alice furnace at Sharpsville, Pa., at $3 per net ton at oven. A Buffalo steel company has an inquiry out for 14,000 tons of furnace coke per month for January-March, and 30,000 tons per month April-December inclusive. The Andrews & Hitchcock Iron Company, owned by the Youngstown Sheet & Tube Company, is inquiring for 24,000 tons per month for the entire year. An eastern Pennsylvania company is asking prices on 8000 tons per month for the first six months of next year. The Midvale Steel Company has tentative inquiries out for about 90,000 tons of coke per month over all next year, of which 35,000 tons are for the Worth furnaces at Coatesville, and 55,000 tons for furnaces of the Cambria Steel Company at Johnstown. This amount of coke will also take care of the third Worth stack being built, which is expected to be ready for operation about February or March. Prices on blast-furnace coke are firmer. One seller is now asking $3.50 per net ton on contracts for first half of 1917. There is a fair demand for prompt furnace coke. We quote best grades of prompt furnace coke at $3.25 to $3.50, and on contracts for first half of next year at $3 per net ton at oven. Best grades of 72-hr. foundry coke are held at $3.25 to $3.50 for prompt shipment, and $3.75

to $4 on contracts. The Connellsville *Courier* gives the output of coke in the upper and lower Connellsville regions for the week ended Sept. 23 as 404,600 net tons, an increase over the previous week of 11,153 tons.

Old Material—The tone of the scrap market is much stronger, due largely to the heavy advances on Bessemer and basic iron. Scrap prices on nearly all grades are higher, with indications favoring further advances. New buying as yet is not heavy, but dealers have changed their views considerably on prices, and are refusing offers that they would have been glad to accept a week or two ago. Sales are reported of several large lots of heavy steel scrap at $17 and higher, and some dealers are now quoting $18 per gross ton. The demand is mostly for heavy steel melting scrap, low phosphorus melting stock and borings. It is claimed the amount of available steel melting scrap is limited. Prices now being quoted by dealers for delivery in Pittsburgh and points that take the same rates of freight, per gross ton, are as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Breckenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	$17.00 to $18.50
No. 1 foundry cast	15.00 to 15.50
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	18.00 to 18.50
Hydraulic compressed sheet scrap	13.50 to 14.00
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	11.00 to 11.25
Bundled sheet stamping scrap	10.50 to 10.75
No. 1 railroad malleable stock	15.00 to 15.25
Railroad grate bars	11.00 to 11.25
Low phosphorus melting stock	20.50 to 21.00
Iron car axles	34.00 to 35.00
Steel car axles	35.00 to 36.00
Locomotive axles, steel	38.00 to 39.00
No. 1 busheling scrap	13.50 to 13.75
Machine-shop turnings	7.50 to 7.75
Old carwheels	14.00 to 14.25
Cast-iron borings	8.50 to 9.00
*Sheet bar crop ends	18.50 to 19.00
No. 1 railroad wrought scrap	18.00 to 18.75
Heavy steel axle turnings	10.00 to 10.25
Heavy breakable cast scrap	12.50 to 12.75

*Shipping point.

Chicago

CHICAGO, ILL., Oct. 3, 1916.

A significant and important change of front has been revealed within the past fortnight in the new attitude taken by the implement interests in the matter of the sales of their product. It is now stated by leading manufacturers of farm machinery that the farmer buyer has accepted the condition of higher prices and purchases are exceeding every expectation. It is reported that orders received by one large interest from Southern territory are five times greater than those of a year ago. The long cherished axiom that high prices militate especially against buying by the farm trade now seems less formidable. A feature of the market is the quiet inquiry of implement manufacturers regarding both mild and rail carbon bars and bolts and nuts. They are also making substantial purchases of pig iron. Rail inquiry now under consideration includes 22,000 tons for Canada and the 20,000 tons for France. There is an increased interest in structural steel. Car purchases last week totaled 2500, of which the most important was the Missouri Pacific order for 1500, placed with the Western Steel Car & Foundry Company. An advance of $2 a ton has been made in the price of plain material. The tremendous demand for plates, particularly those suitable for shipbuilding, and also lighter gages in widths varying from 60 in. to 72 in., largely for export, shows no abatement. The high mark thus far appears to have been reached in connection with plates for Japan, placed at 4.50c., but sales of light gage narrow plates at 3.75c. are also noted. Higher prices for box annealed sheets are announced and 3c., Pittsburgh, is now a minimum for local mills. Continued heavy selling of pig iron has not yet brought any quotable advance in the prices of standard grades of Northern iron but iron from the South is now generally held at $15, Birmingham, with $14.50 the exception. A freer selling of steel scrap and foundry scrap is noted.

Pig Iron.—Buying of pig iron continues on a large scale with sales of malleable noticeably increased. While the larger part of the purchases are for first half delivery, there is also some buying for fourth quarter. From the producer's standpoint, the fourth quarter or prompt shipment period must still be the unsatisfactory phase of the situation, for upon it falls the consequences of reduced consumption and delayed shipments occasioned by the labor shortages and troubles of the year. A noticeable improvement in the Chicago and Milwaukee districts in the matter of labor, however, is reported as having made itself felt in the last thirty days. Purchases of malleable iron were much heavier last week and some sellers have advanced their price to $19.50, but $19 continues to be the price at which business is done. The effect of the heavy selling of iron upon prices is more noticeable in the South, where the principal producers are now uniformly quoting $15 for first half delivery. For fourth quarter, $14.50 can be done, and a number of sales of high silicon iron, considered to be of special analysis, have been made by one producer on the basis of $14.50, Birmingham, for prompt shipment. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of $1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5	$19.75
Lake Superior charcoal, No. 1	20.25
Lake Superior charcoal, No. 6 and Scotch	20.75
Northern coke foundry, No. 1	$19.00 to 19.50
Northern coke foundry, No. 2	18.50 to 19.00
Northern coke foundry, No. 3	18.00 to 18.50
Southern coke, No. 1 f'dry and 1 soft	19.00 to 19.50
Southern coke, No. 2 f'dry and 2 soft	18.50 to 19.00
Malleable Bessemer	19.00
Basic	19.00
Low phosphorus	34.00
Silvery, 8 per cent	29.50
Bessemer ferrosilicon, 10 per cent	33.50

Rails and Track Supplies.—Quotations on the inquiry covering 20,000 tons of rails for France are still outstanding, as is the case also in respect of the 22,000 tons for which the Pacific & Great Eastern Railroad of British Columbia has been in the market. Inquiry for rails for 1918 delivery has not amounted to so much in the West as it seems to have in Eastern markets, an aggregate of 30,000 tons representing all the inquiry that has been received. Quotations are as follows: Standard railroad spikes, 2.75c., base; track bolts with square nuts, 3.25c. to 3.50c., base, all in carload lots, Chicago; tie-plates, $50, f.o.b. mill, net ton; standard section Bessemer rails, Chicago, $33, base; open-hearth, $35; light rails, 25 to 45 lb., $40; 16 to 20 lb., $41; 12 lb., $42; 8 lb., $43; angle bars, 2c., Chicago.

Structural Material.—Orders for 2500 cars were placed last week. this number including 1500 for the Missouri Pacific, 500 for the Nickel Plate, 300 for the Milwaukee Coke & Gas Company and 200 for the Chicago & Alton. Several small lots in addition were closed. As all of this business was protected in the matter of raw material, about 20,000 tons of steel has been added to the mill books. Inquiry for structural shapes has increased and buying is somewhat heavier. While it cannot be said that new business is impossible of being placed for delivery in the first half, yet the mills, generally speaking, have sold up their estimated capacity for that period, and further sales will continue to crowd tonnage over into the second half. If structural mills were being operated only on structural shapes, capacity adequate to the demand would doubtless be easily available. Contracts for fabricated material reported last week were not large with the exception of one for 1000 tons, taken by the Llewellyn Iron Works, covering the material for the Blackstone building at Los Angeles. The Utah Copper Company placed 360 tons for a new leaching plant. The Illinois Steel Company has followed the lead of the Carnegie Steel Company and advanced its quotation on structural steel to the basis of 2.70c., Pittsburgh. We therefore quote for Chicago delivery of structural steel from mill 2.889c.

We quote for Chicago delivery of structural steel out of [illegible] 3.25c.

Plates.—A sale of 2000 tons of plates for shipbuilding is noted for delivery in the first quarter at a

price of 4c., Pittsburgh, the interesting circumstance being that a portion of the plates will be less than 84 in. in width. On a recent sale to Japan, 4.50c., f.o.b. mill, was done. Another mill rolling plates in widths not to exceed 84 in. has been selling the lighter gages, from 3/16 in. to No. 16, at prices ranging from 3.65c. to 3.75c., for first quarter delivery. The demand for plates for shipbuilding and, in the lighter gages, for general manufacturing purposes apparently is without limit. It is to be noted that the mills which are quoting 3.50c. to 4c. on many inquiries are still taking contracts from regular customers, also for delivery in the first half, on the basis of 3c., Pittsburgh. We quote for Chicago delivery of plates from mill, at its convenience, 3.189c. For prompt shipment we quote 3.439c. to 3.689c. in widths up to 72 in., and for wide plates 4.189c.

We quote for Chicago delivery of plates from jobbers' stocks, 3.75c.

Sheets.—Makers of sheets have assumed a decidedly stiffer attitude in the matter of prices and the principal sellers are now quoting on one-pass box annealed a minimum of 3c. to 3.10c., Pittsburgh. This strength is due to the higher costs of semi-finished steel rather than to the demand for sheets except in the heavier gages. For light sheets, both black and galvanized, the demand has not greatly increased. The export demand for black sheets, No. 10 to No. 16 gage, is especially heavy and insistent. We quote for Chicago delivery, blue annealed, No. 16 and heavier, 3.439c.; box annealed, No. 17 and lighter, 3.189c. to 3.289c.; No. 28 galvanized, 4.439c.

We quote for Chicago delivery of sheets out of stock, minimum prices applying on bundles of 25 or more, as follows: No. 10 blue annealed, 3.40c.; No. 28 black, 3.25c.; No. 28 galvanized, 4.65c. to 4.75c.

Bars.—Implement manufacturers have at last given up the stress they have consistently laid upon inability to market their product at higher prices and are now seeking additional material to meet unexpected demands upon them. Endeavor has been made to increase the tonnages provided for under the contracts for mild steel bars placed at 2.50c., and particularly is inquiry being quietly made concerning the covering of their rail-carbon steel requirements. The market for iron bars is unchanged and, in fact, 2.35c., Chicago, has been clearly established as the price for first half contracts. A little business has been taken at 2.40c., but this is not general. We quote mill shipment, Chicago, as follows: Bar iron, 2.35c.; soft steel bars, 2.789c.; hard steel bars, 2.50c.; shafting, in carloads, 20 per cent off; less than carloads, 15 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 3.25c.; bar iron, 3.25c.; reinforcing bars, 3.25c. base with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting net list.

Rivets and Bolts.—The important inquiry now coming in to manufacturers of bolts and nuts is from the implement interests which have long delayed covering for their first half needs. Several inquiries, each of which exceeds a million bolts, are reported as having been quietly made. The rivet situation is without feature. We quote as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 50-5; cut thread, 40-10-2½; larger sizes, 35-2½; machine bolts up to ⅜ x 4 in., rolled thread, with hot pressed square nuts, 50-10; cut thread, 50; large size, 40-5; gimlet-point coach screws, 50-5; hot pressed nuts, square, $2.70 off per 100 lb.; hexagon, $2.70 off. Structural rivets, ¾ to 1¼ in., 4c. to 4.15c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

We quote out of store: Structural rivets 4c.; boiler rivets, 4.10c.; machine bolts up to ⅜ x 4 in., 50-10; larger sizes 40-10; carriage bolts up to ⅜ x 6 in., 50-5; larger sizes, 40-5; hot pressed nuts, square, $3.25, and hexagon, $3.25 off per 100 lb.; lag screws 55.

Wire Products.—Adverse delivery conditions appear ineffective in halting the demand for wire nails, particularly 8d. common and 16d. common. This inquiry is particularly insistent in that it is supported by actual consumer demand. There is also a sustained business in barb wire and some improvement in sales of fencing. We quote as follows per 100 lb.: Plain wire, Nos. 6 to 9, base, $2.839; wire nails, $2.789; painted barb wire, $2.939; galvanized barb wire, $3.639; polished staples, $2.939; galvanized staples, $3.639; all Chicago.

Cast-Iron Pipe.—Public lettings of pipe last week involved only small quantities, including 150 tons each at Chisholm, Minn., and Gilbert, Minn. At Detroit an inquiry for 500 tons is still open. We quote as follows, per net ton, Chicago: Water pipe, 4 in., $34.50; 6 in. and larger, $31.50, with $1 extra for Class A water pipe and gas pipe.

Old Material.—The spectacular prices being paid by the dealers for old car axles, both iron and steel, are still a feature of the market, though they have little bearing upon domestic consumption. A somewhat freer buying of steel scrap is noted. There is also more activity in the buying of foundry grades, the International Harvester Company being in the market for stove plate and No. 1 cast. Sales of locomotive tires at prices as high as $23 are also noted. The general market continues to reflect an upward tendency in prices predicated upon the firm expectation of a considerable buying movement in the near future. Offerings of railroad scrap last week included a large list from the Pennsylvania Lines, 4300 tons from the Chicago & Northwestern, a like amount from the Santa Fé and 700 tons from the Chicago Great Western. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Old iron rails	$19.25 to $19.75
Relaying rails	19.50 to 20.50
Old carwheels	11.75 to 12.25
Old steel rails, rerolling	17.75 to 18.25
Old steel rails, less than 3 ft.	18.25 to 18.50
Heavy melting steel scrap	16.25 to 16.75
Frogs, switches and guards, cut apart	16.25 to 16.75
Shoveling steel	15.50 to 16.00
Steel axle turnings	8.75 to 9.25

Per Net Ton	
Iron angles and splice bars	$18.75 to $19.00
Iron arch bars and transoms	20.50 to 21.00
Steel angle bars	15.25 to 15.75
Iron car axles	30.00 to 30.50
Steel car axles	32.50 to 33.50
No. 1 railroad wrought	16.75 to 17.00
No. 2 railroad wrought	16.00 to 16.50
Cut forge	16.00 to 16.50
Pipes and flues	12.25 to 12.75
No. 1 busheling	14.25 to 14.75
No. 2 busheling	9.75 to 10.25
Steel knuckles and couplers	14.75 to 15.00
Steel springs	15.25 to 15.50
No. 1 boilers, cut to sheets and rings	10.25 to 10.75
Boiler punchings	14.00 to 14.50
Locomotive tires, smooth	22.75 to 23.25
Machine-shop turnings	5.50 to 6.00
Cast borings	6.50 to 7.00
No. 1 cast scrap	12.50 to 12.75
Stove plate and light cast scrap	9.75 to 10.25
Grate bars	10.00 to 10.25
Brake shoes	9.75 to 10.25
Railroad malleable	11.50 to 12.00
Agricultural malleable	11.00 to 11.50

Philadelphia

PHILADELPHIA, PA., Oct. 3, 1916.

Activity in the pig-iron market has been led by a tremendous movement in low phosphorus, both standard and copper-bearing. It is estimated that at least 50,000 tons has been placed under contract for export in the past few days, while domestic consumers have been large buyers for first half delivery and in some cases the entire year. Foundry grades are moving more freely also. All grades of pig iron now show advances or a decided stiffening in price. The pressure for steel products is increasing, and a new buying movement is under way, if that can be possible at a time when demand is so general. Deliveries of coke are slow, and prices are stronger. The embargoes against the Coatesville plate mills have been raised and a tide of old material will start to flow in that direction.

Pig Iron.—All grades are active and stronger, with low phosphorus in extremely heavy demand. It is estimated that about 50,000 tons has been taken in the past few days for export, at least 21,000 tons of which was copper-bearing iron. Domestic consumers have taken large quantities also, and it is predicted that the price will go to $40, delivered. Lebanon low phosphorus has sold for export recently at $30 to $31, furnace, while makers of standard are asking $36 to $37, delivered. Of the latter probably 20,000 tons has been taken in past week. Most of the transactions call for delive over the first half of 1917, although in some instances

they are to run over the entire year. In basic, not much has been done since the recent large buying by the Lukens Iron & Steel Company, but quotations are stronger at $20 to $20.50, delivered. Foundry iron is moving much more freely, and some makers, principally those who are comfortably sold up, have advanced their prices. One maker asks $21.50, delivered, for his No. 2X. Another has advanced his quotation for eastern Pennsylvania No. 2X from $19.50 to $20, furnace, making the delivered price about $20.75. The Baldwin Locomotive Works has placed orders for about 6000 tons, mainly of what it terms floor iron, or No. 2X. Pipe makers have bought extensively, the largest individual lot reported being about 4500 tons, first quarter delivery. All told, about 25,000 tons of pipe iron has been taken, a considerable part of it being Southern iron. It is not believed that much No. 2 Southern is now available at $14.50, Birmingham, the asking price being $15 to $15.50. Virginia iron is unchanged at $20.25c., delivered, for No. 2X, but the situation is a tighter one, owing to recent buying, and one maker is talking of advancing his prices. A radiator company has taken 10,000 tons of foundry iron, part of which was placed in this district for delivery at Trenton. The Lenoir City Car Works has inquired for 1000 tons. Quotations for standard brands, delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa. No. 2 X foundry	[illegible]
Eastern Pa. No. 2 plain	[illegible]
Virginia No. 2 X foundry	[illegible]
Virginia No. 2 plain	[illegible]
Gray forge	[illegible]
Basic	[illegible]
Standard low phosphorus	[illegible]

Iron Ore.—The only arrival of iron ore at this port in the week ended Sept. 30 consisted of 7900 tons from Cuba.

Ferroalloys.—Representatives of English producers continue to quote $165, seaboard, for 80 per cent ferromanganese, but those handling the domestic product will accept $164 in many cases, and it is thought probable that even the latter price might be shaded. Makers in this country are casting around for ore. A deal is reported to have been closed for 200,000 tons of Brazilian manganese ore for shipment over 1917, details of which will be found elsewhere. At this port last week 1089 tons of English ferromanganese arrived. Blast-furnace ferrosilicon, 11 per cent, is higher at $35.44, Philadelphia, and 50 per cent material ranges from $87 to $89, Pittsburgh, according to quantity.

Plates.—Private shipbuilding yards have been supplied with quotations on the plates and shapes required for the execution of the Government naval program, and are now formulating their estimates, which are to be submitted Oct. 25. The pressure on the mills is increasing, and business with Spain, Japan and England has been turned down. Other export business has been taken at 4c., Pittsburgh, and higher. Domestic consumers are placing contracts which must be specified in the first half. Where early deliveries are made they command premiums over 4c., Pittsburgh, or 4.159c., Philadelphia. A new steel company at Pottstown, Pa., is installing a flanging department which will be ready for operation about the first of the year. One eastern Pennsylvania mill is under the general market on plates of limited size, quoting down to 3.159c., Philadelphia.

Bars.—At 2.759c., Philadelphia, the nominal quotation for steel bars is unchanged, but the actual price is 2.909c., Philadelphia, or higher. Both domestic and foreign demand for iron bars is active, and the quotation is very firm at 2.659c., Philadelphia.

Structural Material.—Contradictory reports are heard as to the placing of the contract for the Philadelphia Electric Company at Chester, Pa., requiring about 6000 tons. Rumor has given the contract to the American Bridge Company. No new propositions have been consummated, but the general demand for shapes continues extremely good. To preferred customers one mill quotes a minimum of 2.859c., Philadelphia, and to others up to 3.159c., according to deliveries, etc. Another maker quotes 2.909c., Philadelphia.

Billets.—Open-hearth rerolling billets are quoted at $48 to $55, Eastern mill, and forging steel at $65. Export interests continue to comb the market for steel.

Sheets.—The quotations for No. 10 blue annealed range from 3.159c. to 3.409c., Philadelphia, but the market is stronger.

Coke.—Shipments of coke are being made slowly. For spot, furnace, makers are asking up to $4, and some taking $3.50. Some makers ask $3.75 for prompt foundry. The general range of quotations follow: $3.25 to $3.50 per net ton at oven for spot furnace; $3 for contract furnace; $3.50 to $3.75 per net ton at oven for prompt or contract foundry. Freight rates from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85 and Mountain, $1.65.

Old Material.—The embargoes against the plate mills in Coatesville have been raised and a freer movement of scrap to that point will ensue at once. Heavy melting steel is stronger in reflection of the buying at Pittsburgh. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates from $35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$15.00 to $15.50
Old steel rails, rerolling	18.00 to 18.50
Low phos. heavy melting steel scrap	21.25 to 23.50
Old steel axles (for export)	35.00 to 36.00
Old iron axles (for export)	37.00 to 38.00
Old iron rails	20.00 to 20.50
Old carwheels	15.50 to 16.00
No. 1 railroad wrought	21.00 to 22.00
Wrought-iron pipe	15.50 to 16.00
No. 1 forge fire	12.00 to 12.50
No. 1 bushelings	12.00 to 12.50
No. 2 bushelings	10.50 to 11.00
Machine-shop turnings	7.50 to 8.00
Cast borings	9.50 to 10.00
No. 1 cast	16.00 to 16.50
Grate bars, railroad	11.75 to 12.25
Stove plate	11.75 to 12.25
Railroad malleable	13.50 to 14.00

Birmingham

BIRMINGHAM, ALA., Oct. 2, 1916.

Pig Iron.—Furnace operators here all ask $15 for deliveries in the first half of 1917. The lead was taken by the Sloss-Sheffield Steel & Iron Company about Sept. 22, and all were practically in line in the next few days. One interest, which had sold 10,000 tons for 1917 delivery at $14.50 during the first two days of the last week in the month, booked as much more for the same delivery during the remainder of the week at $15. The largest foundry interest, after turning down offers of at least 30,000 tons at $14.50, booked 25,000 tons at $15 in two days. The deliveries cover the South, Middle West and Northwest. One small interest has been forced to withdraw from the market on account of capacity sold up. September sales were large. One foundry-iron maker sold 100,000 tons, another 50,000 tons, another 40,000 tons, and so on. Bookings in the past six weeks have approximated 400,000 tons, much of which is basic. The Woodward Iron Company puts its second furnace on basic this week. For spot iron the same price is asked as for forward, but regular customers and attractive business may possibly secure some immediate iron at $14.50. The one certain thing is that furnace iron for 1917 is firm at $15, with a tendency to advance. Some more iron was taken for Norway. Attention is now confined to shipments. The car shortage bids fair to remain embarrassing until November, by which time relief is expected, owing to the probable early movement of the small cotton crop. A shipment of 3000 tons for Italy was made the past week, and there were other export movements. Production remains at the record-breaking point of the past ten months, which is 2,500,000 tons per annum for Alabama. Warrant stocks have gone down to 80,000 tons, much of which is consumers' iron. We quote, per gross ton, f. o. b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	$15.00 to $15.50
No. 2 foundry and soft	14.50 to 15.00
No. 3 foundry	14.00 to 14.50
No. 4 foundry	13.75 to 14.25
Gray forge	13.50 to 14.00
Basic	14.50 to 15.00
Charcoal	22.00 to 22.50

Cast-Iron Pipe.—If the leading interest secures all or a portion of the order of 60,000 tons of water pipe to be awarded by Buenos Ayres this month, its Bessemer plant will share largely in the production. This interest has not made additional large bookings, but

the aggregate has been considerable in tonnage. Reports from the pipe field are of generally satisfactory conditions. We quote the recently advanced prices, per net tons, f. o. b., yards, as follows: 4-in., $29; 6-in. and upward, $26, with $1 added for gas pipe and 16-ft. lengths.

Coal and Coke.—Coal is active at slightly better prices, with cars scarce and customers clamoring for delivery. The demand for coke continues greater than the output and prices are firm. Furnaces continue to take much coke made by independents. Shipments to Texas are large. We quote, per net ton, f. o. b. oven, as follows: Standard beehive foundry, $4.25 to $4.50 for forward and regular contracts and $4.75 for spot; furnace coke, $3.25 to $3.50.

Old Material.—The scrap market seems to be steadying around the recently raised prices. While orders are absent from steel billet-making plants, which provide their own scrap, activity in foundries more than compensates. Wrought, however, is in greatest demand. The week's business was of fairly good volume. We quote, per gross ton, f. o. b. dealers' yards, as follows:

Old steel axles	[illegible]
Old steel rails	[illegible]
No. 1 steel scrap	[illegible]
No. 1 wrought	[illegible]
No. 1 cast	[illegible]
Stove plate and light	[illegible]
Carwheels	[illegible]
Tram carwheels	[illegible]

St. Louis

ST. LOUIS, MO., Oct. 2, 1916.

Coke—There is little activity, all the consumers being well covered. The small purchases are rather below the market. By-product coke is held on a parity with Connellsville figures.

Old Material—The market continues very strong, both because of the activity of steel foundries and mills and of the anxiety of dealers to fully cover themselves against their contracts. The steel consumers are entering the market and buying readily at such prices as suit them and these prices are higher than figures which were turned down by them not long ago. There seems to be a fear that a serious shortage is prevailing and this is helping dealers to maintain their prices and encouraging the customers to pay the figures asked. Rolling mills are not as actively in the market as they were and in some instances embargoes have been declared for the time being. No lists are out, although the usual monthly offerings will be made by the railroads during the week. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton

Old iron rails	[illegible] to $18.00
Old steel rails, rerolling	17.00 to 17.50
Old steel rails, less than 3 ft.	17.00 to 17.50
Relaying rails, standard section, subject to inspection	24.00 to 26.00
Old carwheels	12.50 to 13.00
No. 1 railroad heavy melting steel scrap	16.00 to 16.50
Heavy shoveling steel	15.00 to 15.50
Frogs, switches and guards cut apart	15.75 to 16.25
Bundled sheet scrap	8.25 to 8.75

Per Net Ton

Iron angle bars	[illegible] to [illegible]
Steel angle bars	15.00 to 15.50
Iron car axles	27.50 to 28.00
Steel car axles	31.00 to 32.00
Wrought arch bars and transoms	22.00 to 22.50
No. 1 railroad wrought	16.50 to 17.00
No. 2 railroad wrought	16.00 to 16.50
Railroad springs	16.00 to 16.50
Steel couplers and knuckles	16.00 to 16.50
Locomotive tires, 42 in. and over, smooth inside	21.50 to 22.00
No. 1 dealers' forge	13.25 to 13.75
Cast-iron borings	7.25 to 7.75
No. 1 busheling	14.50 to 15.00
No. 1 boilers, cut to sheets and rings	10.50 to 11.00
No. 1 railroad cast scrap	12.50 to 13.00
Stove plate and light cast scrap	9.25 to 9.50
Railroad malleable	11.00 to 11.50
Agricultural malleable	10.00 to 10.50
Pipes and flues	11.00 to 11.50
Heavy railroad sheet and tank scrap	11.00 to 11.25
Railroad grate bars	10.00 to 10.50
Machine shop turnings	7.50 to 8.00

Pig Iron—The buying movement which set in here last month has continued during the past week. Several furnace representatives report little iron available for the remainder of this year and the first quarter of next. The smaller consumers have, apparently, become alarmed over the prospects. One furnace representative claims he could sell in a single day 20,000 tons of Southern iron at the going prices. Such sales as were made ranged from 1000 tons downward and aggregated probably 10,000 tons for the week.

Finished Iron and Steel—The demand continues about the same as for some time past. Deferred deliveries do not prevent the placing of orders, but no large contracts are noted. The warehouses are being resorted to to meet immediate needs regardless of the cost of such material. We quote for stock out of warehouse as follows: Soft steel bars, 3.30c; iron bars, 3.20c to 3.25c; structural material, 3.30c; tank plate, 3.80c; No. 10 blue annealed sheets, 3.45c; No. 28 black sheets, cold rolled, one pass, 3.60c; No. 28 galvanized sheets, black sheet gage, 5.05c; this latter quotation having been advanced because of steel conditions rather than spelter prices.

Cincinnati

CINCINNATI, OHIO, Oct. 4, 1916.—(*By Wire.*)

Pig Iron.—The past week was a very active one. A large tonnage of both Southern and Northern iron changed hands. Southern prices are much firmer. The majority of furnaces are quoting $15, Birmingham basis, for this year's shipment, but there is yet some No. 2 foundry iron obtainable at $14.50 both from furnace operators and speculators. One furnace has advanced its quotation to $16, and others are said to be contemplating the same move. Basic iron for delivery before July 1 is scarce, and a nearby consumer has bought 20,000 tons from a Lake furnace, shipments from Nov. 1, this year, to June 30, next year. Another sale, of 2000 tons, of Northern basic was made in this territory for delivery this year. Foundry iron melters apparently are also anxious to get under cover, and business booked last week by different sales agencies justifies this statement. In central Ohio quite a number of sales of Southern foundry iron were made for first half shipment, chief among which were two 1000-ton lots, and a local melter also took 1000 tons for the same delivery. Several 500-ton sales of Southern iron were made to Indiana and Michigan melters. The small lot business in this territory for delivery this year has been surprisingly good. Furnaces in the Hanging Rock district have their books well filled for this year but have been taking some business for foundry iron, with sales confined mostly to Michigan territory and to nearby melters why buy on an analysis basis. The Ohio silvery irons have been especially active. Two sales of 1200 and 1500 tons, respectively, were made to Michigan manufacturers and other smaller contracts were consummated with Indiana and Ohio buyers, with shipments extending through the first half of next year. Based on an 8 per cent analysis, the minimum price is $27 at furnace. The Southern high silicon irons are quoted at $22, Birmingham. Quite a lot of Lake Superior charcoal iron has been contracted for lately, the largest order being for 6000 tons for a Michigan manufacturer, with shipments extending to July 1. The general inquiry is light and business is transacted mostly with selling agencies direct. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	$17.90 to $18.40
Southern coke, No. 2 f'dry and 2 soft	17.40 to 17.90
Southern coke, No. 3 foundry	16.90 to 17.40
Southern coke, No. 4 foundry	16.40 to 16.90
Southern gray forge	15.90 to 16.40
Ohio silvery, 8 per cent silicon	28.26 to 28.76
Southern Ohio coke, No. 1	21.26 to 21.76
Southern Ohio coke, No. 2	[illegible] to 20.76
Southern Ohio coke, No. 3	19.76 to 20.26
Southern Ohio malleable Bessemer	20.26 to 20.76
Basic Northern	20.26 to 20.76
Lake Superior charcoal	21.20 to [illegible]
Standard Southern carwheel	[illegible] to [illegible]

(*By Mail*)

Finished Material.—Prices for prompt delivery on all kinds of finished material are very firm and in many cases premiums are being paid. The local warehouses are receiving requests for quotations on less than carload lots of steel shafting as well as the common sizes of steel bars from Southern buyers and the local de-

mand is also very heavy. Structural shapes and twisted reinforcing concrete bars are needed badly and at present it is more a question of delivery than of price. The call for both black and galvanized sheets is taxing the resources of nearby mills which are now having trouble in taking care of their old customers. We quote No. 28 black sheets at 3.40c., Cincinnati or Newport, Ky., and No. 28 galvanized sheets at 4.65c. The store price on No. 10 blue annealed sheets is now 3.50c. The warehouse price of wire nails is unchanged at $2.85 per keg base; barb wire, $3.70 per 100 lb.; steel bars and structural shapes, 3.35c.; twisted steel bars, 3.50c.; cold rolled steel rounds, 2-in. and larger, 3.90c.

Coke.—The car shortage has had considerable influence in advancing the price of prompt coke. Some Connellsville 48-hr. coke that was loaded on cars brought as high as $3.40 per net ton at over and 72-hr. coke $3.75. Foundry coke is quoted at $3.50 to $3.75 per net ton at oven, except New River, which is held at $3.90 to $4.

Old Material.—There has been a better demand for wrought scrap, and as a consequence prices have been advanced on various grades. For instance, old iron rails and rerolling steel rails have been marked up $1 per ton, while advances have been made on No. 1 railroad wrought scrap and iron axles. A slight improvement is noted in the demand for borings and turnings, which are now quoted about 25c. per ton higher. The following are dealers' prices, f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton

Bundled sheet scrap	$11.50 to $12.00
Old iron rails	17.50 to 18.00
Relaying rails, 50 lb. and up	22.75 to 23.25
Rerolling steel rails	16.00 to 16.50
Heavy melting steel scrap	15.00 to 15.50
Steel rails for melting	14.50 to 15.00

Per Net Ton

No. 1 railroad wrought	$15.00 to $15.50
Cast borings	4.75 to 5.25
Steel turnings	5.00 to 5.50
Railroad cast	12.00 to 12.50
No. 1 machinery cast	14.00 to 14.50
Burnt scrap	9.00 to 9.50
Iron axles	27.75 to 28.75
Locomotive tires (smooth inside)	22.00 to 22.50
Pipes and flues	10.00 to 10.50
Malleable and steel	11.75 to 12.25
Railroad tank and sheet	9.25 to 9.75

New York

NEW YORK, Oct. 4, 1916.

Pig Iron.—Interest in pig iron is largely centered in heavy purchases of steel-making grades for export. The American representative of the British Government has bought approximately 30,000 tons more low phosphorus iron from Eastern furnaces in the past few days, making the total amount secured in the last two weeks about 60,000 tons. Foreign interests were constrained to accept some high sulphur metal, the supply of standard low phosphorus available being inadequate to meet requirements. The prices paid ranged from $28 per ton for low grade to $35, at furnace, for standard specifications. Shipments are to be made over the remainder of this year and through several months of 1917. Large sales of Southern basic also were made for export, presumably to Great Britain and to France. Upward of 50,000 tons came to the surface in the last day or two. One Alabama blast furnace interest has sold close to 200,000 tons, through Eastern export agents, on this movement and the other Southern basic producing interest is credited with having sold over 100,000 tons, but has refused to accept additional orders needing the metal for its own steel plant. Exporters are said to have induced some other Southern furnaces to turn from foundry to basic ore to meet pressing foreign needs. If this proves correct the upward movement in prices of foundry grades—more pronounced in the past week—is likely to be accelerated. Another interesting statement is that large sales of Southern basic have been made for shipment into the Pittsburgh territory to compensate for the inroads made upon supplies there by recent sales for foreign shipments. Numerous small sales of foundry and special analysis iron have been made to neutral countries, including Norway, Sweden, Denmark, Holland, Greece and South America. Domestic consumers of foundry grades are purchasing more freely, Buffalo furnaces having taken orders for 25,000 tons for Eastern shipment in the last quarter of this year and through the first half of 1917. Early sales last week were made at $19 to $19.50, furnace, and later at $20; some exceptional sales were made at $20.50, furnace. Several of the eastern Pennsylvania furnaces contend that higher prices must prevail because of the rising cost of production due to scarcity of coke, expressed in higher prices, and to the higher labor wage scale. A Connecticut foundry interest has bought moderately against an inquiry for 20,000 tons of malleable Bessemer. An eastern Pennsylvania manufacturer has taken 1000 tons of basic at $20, for shipment in the next six months. A furnace manufacturer in New Jersey has placed a supplementary order for 1500 tons of No. 2 X foundry. An Elizabethport consumer has closed for 2000 tons, foundry grades, and a radiator manufacturer has bought 5000 tons for Trenton delivery. A soil pipe foundry has come into the market for several thousand tons for Baltimore delivery, having provided for the Newark plant. We quote at tidewater for early delivery: No. 1 foundry, $20.50 to $21; No. 2 X, $20 to $20.50; No. 2 plain, $19.75 to $20; Southern iron at tidewater, $20 to $20.50 for No. 1 and $19.75 to $20 for No. 2 foundry and No. 2 soft.

Ferroalloys.—Little new demand for ferromanganese is in evidence. Only a few sales of small lots, aggregating less than 1000 tons, have been made the last week. These have gone at the prevailing quotations of $164, seaboard, for the British alloy and $165, delivered, for the domestic product. Both grades have been sold. Specifications on contracts are insistent and indications are that arrivals, which are very good from England, are being consumed quickly. Most dealers are behind on their contract deliveries. Spiegeleisen is quiet, though about 2000 tons have been sold to both foreign and domestic consumers. The foreign sales went at $45, furnace, for early delivery. Forward delivery material can probably be obtained for less. Ferrosilicon, 50 per cent, is active and strong; consumption and delivery on contract are brisk. Bessemer ferrosilicon is in strong demand, with good sales reported at $31 per ton, furnace, for the 10 to 11 per cent; $32 for the 11 to 12 per cent; $33 for the 12 to 13 per cent alloy. The 14 to 15 per cent alloy is commanding $45 per ton, furnace. Ferrovanadium is active and strong at $2.75 to $3, Pittsburgh, per pound of contained vanadium. Ferrotungsten has recently sold at $2.60 to $2.75, New York, per pound of contained tungsten. Ferrocarbon-titanium is quoted at 8c. per pound in carload lots, 10c. per pound in ton lots and 12½c. per pound in lots less than a ton. Ferrochrome, 60 to 70 per cent, is unchanged at 16c. to 20c., New York, per pound of contained chromium.

Structural Material.—Sales of fabricated structural steel in September were substantially larger than in August, the gain being estimated at 10 to 12 per cent. The prospect for October is even more encouraging from the standpoint of volume, although there is less activity in building projects in the New York Metropolitan district in point of number. The most important development is the closing of a contract for 15,000 tons of shapes for the New York Central Hotel, awarded to the American Bridge Company. It is also interesting to note that about 6000 tons more steel may be ordered for the Pennsylvania Railroad Hotel, making the total 18,000 tons. Plans for each of these structures, however, may be modified in the near future. The contract for 6000 tons steel for the power house at Chester, Pa., reported to have been awarded to the American Bridge Company is still held in the balance. George D. Wyn, who has been awarded the general contract for the Norfolk Navy Yards buildings by the Government, having obligated himself to complete the work in 180 days, has given the order for the 4000 tons of structural steel required to the McClintic-Marshall Company. The latter company also has been awarded the contract for 1650 tons of steel

for the car storage buildings at 239th Street, New York City. Railroad bridge work is developing in large volume, but thus far only small orders have been placed. The Southern has placed 300 tons for four turntables to the Phoenix Bridge Company. The New Haven will take bids about the middle of the month on the superstructure of the Thames River bridge, requiring 4000 to 8000 tons. The Hammermill Paper Company has placed 400 tons at Erie, Pa., with the Pittsburg Bridge & Iron Works. About 500 tons steel for an extension to the J. B. Bucks, Jr., building at Detroit will be fabricated by the Russel Wheel & Foundry Company. Numerous small orders have been placed for buildings in this city, including 225 tons for the Hebrew Social Center, at 131 West Eighty-sixth Street, with the Hinkle Iron Works; 125 tons for the Baker & William warehouse, at 519 West Twentieth Street, with the Levering & Garrigues Company, and 150 tons for the Defiance Mfg. Company, at 32 East Forty-second Street, reported to have gone to Post & McCord. The Central Railroad of New Jersey is reported to be preparing plans for a station at Newark requiring 600 tons; bids to be taken Oct. 15. Tenders will be submitted to-morrow on 150 tons shapes for U. S. Arsenal at Watervliet, N. Y. We quote mill shipments of plain structural material at 2.769c. to 3.019c., New York, 2.869c. minimum for largest lots for fair delivery, and warehouse shipments, which have advanced $2 per ton, at 3.35c., New York.

Steel Plates.—The pressure for marine plates is increasing rather than otherwise, although the mills have capacity sold for the next nine to fifteen months. The Steel Corporation subsidiaries have taken on additional orders for upward of 75,000 to 100,000 tons, which, with previous sales and reservations, take up mill capacity for the whole of 1917. Independent plate mills report orders booked equal in tonnage to six to nine months' capacity, yet inquiries for 100,000 tons are in the market, half of which are for export. Jose Marimon, of Cuba, has placed an order for 11,000 tons plates with a Western mill for boats to be constructed in this country, and is still negotiating for about 37,000 tons. The order for 6 and 8 in. pipe placed by the Sinclair Oil & Refining Corporation requires 60,000 tons of plates. One small Eastern shipyard is trying to buy 1000 tons plates, together with 500 tons shapes. The foreign inquiries include 10,000 tons of plates, with 15,000 tons of shapes, for shipment to Great Britain; 15,000 tons plates for Italy; 10,000 tons plates, with 15,000 tons shapes, for Japan, and 8000 to 10,000 tons plates and shapes for China. The latter inquiry comes from British merchants. The demand for small lots for reasonably early shipment is urgent, but scarcely any are available even at 5c. per pound, base, Pittsburgh. Wide plates are difficult to buy before the third quarter of 1917, and command 4c., Pittsburgh. Plates up to 7 ft. in width likewise take 4c., but deliveries may be made in 6 to 8 weeks, while universal plates are not in good demand and may be obtained in a few weeks and at 3.50c., Pittsburgh. Warehouse prices range from 4c. to 4.50c., New York.

Iron and Steel Bars.—A strong tone prevails and prices are higher. The Cambria Steel Company late yesterday advanced prices $3 per ton to 2.75c., base, Pittsburgh. Others are asking 2.60c., base, but will take orders only at "convenience of the mill"; capacity has been sold well through the third quarter of 1917, according to information obtainable here. The domestic demand is active on small lots, and has been throughout the week. Italy, unable to buy 45,000 tons billets for the manufacture of shells, has taken 40,000 tons of mild steel. One interest sold 20,000 tons, including 15,000 tons for shipment over the last quarter of this year and 5000 tons for export in the first quarter of 1917. The other half was bought in small lots. It is difficult to buy steel bars under 2.869c. to 2.919c., New York, or under 3.50c. from store, which is minimum at 3.25c. Iron bars are stronger at 2.669c. and 3.25c., New York, respectively, for mill and warehouse shipments.

Cast-Iron Pipe.—The largest public letting advertised for a long time is that of the city of Detroit, which will buy 30,430 tons of 36 to 48-in., principally of the larger sizes. Proposals will be opened Oct. 10. New York City will open bids on two contractors' jobs Oct. 10 which will involve the purchase of a total of 1200 tons. While municipal lettings in this vicinity are few, private buying is maintained in quite good volume. Some inquiries and an occasional purchase are appearing for spring delivery. Carload lots of 6-in. class B and heavier are firm at $31.50 per net ton, tidewater, with $1 per ton extra for class A and gas pipe.

Old Material.—The tone of the market is strong, the belief being prevalent that an early improvement will be felt in the demand and that prices will be higher. Iron rolling mills in eastern Pennsylvania are still buying good quantities of wrought scrap and other rolling-mill stock, and a better demand for heavy melting steel scrap is being experienced from western Pennsylvania. While the embargo has been lifted at Coatesville, Pa., the steel companies there are limiting shipments on contracts. It is believed, however, that the near future will see a much better movement, accompanied by renewed buying. Heavy melting steel scrap for Pittsburgh is bringing $14 to $14.25, New York, and steel scrap intended for eastern Pennsylvania is slightly higher than in recent weeks. Brokers quote buying prices for the Eastern trade about as follows to local dealers and producers, per gross ton, New York:

Heavy melting steel scrap (eastern Pennsylvania specifications)	$12.00 to $12.50
Old steel rails (short lengths) or equivalent	12.75 to 13.00
Relaying rails	28.50 to 29.00
Rerolling rails	17.50 to 18.00
Iron and steel car axles (for export)	38.50 to 39.00
No. 1 railroad wrought	19.75 to 20.00
Wrought-iron track scrap	16.75 to 17.00
No. 1 yard wrought, long	14.50 to 15.00
Light iron (nominal)	3.50 to 4.00
Cast borings (clean)	7.00 to 7.50
Machine shop turnings (nominal)	5.50 to 5.75
Mixed borings and turnings (nominal)	5.50 to 5.75
Wrought pipe	13.00 to 13.50

Foundries continue to buy moderately. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

No. 1 cast (machinery)	$16.00 to $16.50
No. 2 cast (heavy)	14.00 to 14.50
Stove plate	11.50 to 12.00
Locomotive grate bars	10.00 to 10.50
Old carwheels (nominal)	15.00
Malleable cast (railroad)	12.00 to 12.50

Cleveland

CLEVELAND, OHIO, Oct. 3, 1916.

Iron Ore.—Lake ore shipments in September amounted to 9,600,786 gross tons, showing only a slight falling off as compared with August, when the movement was 9,850,140 tons. The total movement up to Oct. 1 was 48,816,650 tons, or only a little behind the record-breaking season of 1913, with 49,070,478 tons. Based on the shipments so far, it is now estimated that the total for the season will reach 63,000,000 tons. This is the first year that the capacity of the Lake fleet has ever been tested. Although the movement continues heavy, the vessel situation has eased off somewhat and more wild tonnage for ore is being offered than earlier in the season. Some of the fleets will clean up fairly well on their contracts this month and it is expected there will be plenty of vessel tonnage available to supply the late demand. Some additional chartering is reported at the regular rate of $1 per ton. Additional reservations of ore for next year are being made. Some of the ore firms estimate that the advance in cost of production, including the higher Lake rates, will be from 60c. to 70c. per ton next year, as compared with this year, and think that the advance in ore prices should be close to $1 per ton. We quote 1916 prices as follows for delivery at lower Lake ports: Old range Bessemer, $4.45; Mesaba Bessemer, $4.20; old range non-Bessemer, $3.70; Mesaba non-Bessemer, $3.55.

Pig Iron.—The market is very active, particularly in steel-making grades. Sales reported by Cleveland interests include one lot of 10,000 tons of [illegible] another large lot for first quarter delivery at [illegible] and several other lots aggregating 25,000 tons [illegible] One Cleveland [illegible]

basic. We note the sale of 1000 tons of Bessemer at $22 for first half delivery and another sale of 10,000 tons of Bessemer. The Cleveland market is very firm at $19 for foundry, basic, and malleable iron, and one producer has advanced its price to $19.50, delivered, Cleveland, for the three grades. Toledo prices are firm, but the price advances for shipment from that point have not been as rapid as in some other centers. The minimum Toledo prices are now $19 on basic, foundry and malleable iron. The demand in this territory for foundry iron is quite active and most consumers are now covered for their first half requirements. Detroit stove foundries have been active buyers the past few days. Southern iron is fairly active in lots up to 500 tons, mostly for first half delivery. Sales are reported at $15, Birmingham, for No. 2 for first half and $14.50 for the remainder of the year, these prices being quoted by most producers. Ohio silvery iron is firm. One producer has made sales at $27.50, or 50c. above recent price, and is now asking $28 for 8 per cent. We quote, delivered, Cleveland, as follows:

Bessemer	[illegible]
Basic	[illegible]
Northern No. 2 foundry	[illegible]
Southern No. 2 foundry	[illegible]
Gray forge	[illegible]
Jackson Co., silvery 8 per cent	[illegible]
Standard low phos., Valley furnace	33.00

Coke.—The market is firm but quiet. Some producers have advanced their prices for standard Connellsville foundry coke to $4 per net ton at oven for prompt shipment and for delivery up to July. We quote standard Connellsville foundry coke at $3.50 to $4 per net ton at oven for prompt shipment and contract. Connellsville furnace coke is held at $3.25 at oven for prompt shipment.

Finished Iron and Steel.—New demand for small lots of finished material continues fairly active, particularly for plates. The plate market is even firmer than it has been, and its strength is indicated by the fact that an Ohio tank shop has taken 900 tons of tank plates at 4c., Pittsburgh, for fourth quarter delivery, this being the minimum price for wide plates except for extended future shipment. Plates in narrow widths are quoted around 3.25c. to 3.50c. for fairly early delivery. We note the sale of 800 tons of standard Bessemer rails to an industrial company for prompt shipment at $50 per ton. An inquiry is pending from the Lake Shore Electric Railway for 600 tons of standard rails. In structural lines a great deal of work is coming out requiring less than 100 tons, for which fabricators are able to make rather prompt deliveries, but no large building work has been placed recently. The bar-iron market is firm at 2.50c. to 2.60c., Pittsburgh, and local mills are well filled with orders. The sheet market continues active, with considerable irregularity in prices. While most mills are quoting 3c. as the minimum price for black and blue annealed sheets, the 2.90c. price has not disappeared, and, on the other hand, sales are being made as high as 3.25c. We quote sheets at 2.90c. to 3.25c., Ohio mill, for No. 28 black and No. 10 blue annealed, and 4.25c. to 4.40c. for No. 28 galvanized. Warehouse prices are 3.40c. for steel bars and structural material, 3.75c. for plates and 3.25c. for iron bars.

Bolts, Nuts and Rivets.—The demand for bolts and nuts continues active. Some consumers are in the market for their first half requirements. Sales have been made for first quarter delivery, but some manufacturers are unwilling to take orders for shipment beyond the first quarter. Rivet prices are unchanged at 4c., Pittsburgh, for structural and 4.10c. for boiler rivets. Bolt and nut discounts are as follows:

Common carriage bolts, [illegible] rolled thread, 50 and 5; cut thread, 40, 10 and 5; longer, 35 and 2½; machine bolts within h. p. nuts, in., smaller and shorter, rolled thread, 50 and 10; cut thread, 50; larger and longer, 40 and 5; lag bolts [illegible] point, 50 and 5; square h. p. nuts, blank or tapped, $2.70 off the list; hexagon h. p. nuts, blank or tapped, $2.70 off [illegible] c. and t. sq. nuts, blank or tapped, $2.40; hexagon nuts, all sizes, $2.80 off; cold pressed semi-finished hexagon nuts, all sizes, 60 and 5

Old Material.—The market is not active but firm. The advance in pig-iron prices has had an effect on scrap prices and advances have been made on several grades. A Canton consumer is inquiring for steelmaking scrap, being the only mill in this territory that is actively in the market. However, there is considerable demand from dealers who are covering on contracts and buying for stock with the expectation of higher prices. Busheling has again advanced to $13, this price being offered by dealers. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton

Steel rails	$15.25 to $15.75
[illegible]	18.50 to 19.00
[illegible] axles	32.00 to 33.00
Heavy melting steel	16.25 to 16.75
[illegible]	12.75 to 13.00
Relaying rails, 50 lb. and over	25.00
Agricultural malleable	12.50 to 12.75
[illegible] malleable	14.25 to 14.50
Steel axle turnings	12.00 to 12.50
Light bundled sheet scrap	12.00 to 12.25

Per Net Ton

[illegible] car axles	$26.00 to $27.00
Cast borings	6.25 to 6.50
Iron and steel turnings and drillings	5.50 to 5.75
No. 1 busheling	13.00 to 13.25
No. [illegible] railroad wrought	15.50 to 16.00
No. [illegible] cast	13.25 to 13.75
Railroad grate bars	10.25 to 10.75
Stove plate	10.00 to 10.25

Buffalo

BUFFALO, N. Y., Oct. 3, 1916.

Finished Iron and Steel.—Mills and selling agencies report that September was the heaviest month for specifications for several months. Users generally are endeavoring to anticipate their spring requirements, but it is probable that deliveries on such requirements will not be made until well into the second quarter. The domestic demand is so great that it is almost impossible to get orders on the mills' books for export, domestic business being given preference by sellers.

Old Material.—The scrap market is showing strength, with a larger demand for heavy melting steel, low phosphorus steel, No. 1 railroad wrought, cast scrap, old carwheels and wrought pipe. Heavy melting steel, No. 1 railroad wrought and wrought pipe have each advanced $1 per ton and old carwheels 50c. Dealers consider the outlook bright for a still further rise, based on the present very active market. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	$17.00 to $17.50
Low phosphorus steel	21.00 to 21.50
No. [illegible] railroad wrought scrap	18.50 to 19.00
No. [illegible] railroad and machinery cast scrap	16.00 to 16.50
[illegible] axles	32.00
Iron axles	32.00
Carwheels	13.50 to 14.00
Railroad malleable	15.50 to 16.00
Machine shop turnings	6.00 to 6.50
Heavy axle turnings	12.00
Clean cast borings	7.50 to 7.75
[illegible]	18.00 to 18.50
Locomotive grate bars	11.50 to 12.00
Stove plate (net ton)	11.50 to 12.00
Wrought pipe	13.00 to 13.50
Bundled sheet scrap	11.50 to 12.00
No. 1 busheling	13.00 to 13.50
No. [illegible] busheling	11.00 to 11.50
Bundled tank scrap	15.00 to 15.50

Pig Iron.—The business of the past week has been large, totaling 30,000 to 35,000 tons of all grades, including Bessemer and charcoal, with a considerable tonnage of special irons, ferrosilicon and fluorspar. Inquiry aggregates over 25,000 tons. One of the largest producers is now adhering to a range of $19 to $20 for all grades; another has raised its minimum for any grade to $20, furnace; and another, one of the largest, announces that it is entirely out of the market, and will not sell at any price for first half delivery. Practically all resale iron has been eliminated from the market as less than 3000 tons remains unsold, while of this not over 20 per cent is available at present market prices. The Donner Steel Company has leased for three years, with an option to purchase, the property of the Tonawanda Iron & Steel Company, on the Niagara River at North Tonawanda, and will immediately put one of the furnaces in condition for the manufacture of ferromanganese. This will take the two stacks of this company out of the column of merchant furnaces in

the Buffalo district. We quote as follows, f.o.b. Buffalo, for delivery to and including the first half of 1917:

No. 1 foundry	$19.50 to $20.00
No. 2 X foundry	19.50 to 20.00
No. 2 plain	19.00 to 20.00
No. 3 foundry	19.00 to 20.00
Gray forge	19.00 to 20.00
Malleable	19.50 to 20.00
Basic	20.00 to 20.50
Bessemer	22.00
Charcoal, regular brands and analysis	21.00 to 22.00

Iron and Industrial Stocks

NEW YORK, Oct. 4, 1916.

For the greater part of the past week the furious activity on the Stock Exchange continued. Prices of securities, however, made few new records, wide fluctuations showing a great deal of profit taking. No fear appears to be entertained of an early collapse in values. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com.	25¼- 27¾	Pressed Stl., com	60 - 70
Allis-Chal., pref.	80¾- 83⅝	Pressed Stl., pref.	104 -104⅞
Am. Can, com...	64¼- 68½	Ry. Stl. Spring, com	54½- 56½
Am. Can, pref...	114 -115⅜	Ry. Stl. Spring, pref.	100⅞-102
Am. Car & Fdy., com.	66⅛- 73½	Republic, com.	70⅞- 83¾
Am. Car & Fdy., pref.	118 -119	Republic, pref.	111⅛-112¾
Am. Loco., com..	77½- 84½	Sloss, com.	60 - 65
Am. Loco., pref..	106 -107	Sloss, pref.	97½- 98
Am. Steel Fdries.	58 - 62⅜	Pipe, com	21⅞- 28
Bald. Loco., com.	86⅜- 93⅝	Pipe, pref.	53¾- 57
Bald. Loco., pref.	106½-108¾	U. S. Steel, com..	114⅞-120⅝
Beth. Steel, com.	554 -569½	U. S. Steel, pref.	120⅞-121⅝
Beth. Steel, pref.	134⅞-137	Va. I. C. & Coke	47½- 56¼
Colo. Fuel	56¾- 63¼	Westing. Elec.	64⅛- 65⅞
Deere & Co., pref.	93¾- 94¾	Am. Rad., com	400
Gen. Electric....	179 -186¼	Am. Ship, com.	49⅞- 50¼
Gt. No. Ore Cert	43½- 47	Am. Ship, pref..	94 - 95
Int. Harv. of N. J., com.	115¼-117¼	Chic. Pneu. Tool	72½- 75
Int. Harv. of N. J., pref.	118 -119	Cambria Steel	83 - 88
Int. Harv. Corp., com.	79 80½	Lake Sup. Corp..	14 - 15⅞
Int. Harv. Corp., pref.	109	Warwick	95⅛- 9¾
Lacka. Steel	84¼- 90	Cruc. Steel, com.	91⅞- 96⅞
Nat. En. & Stm., com.	29 - 31⅜	Cruc. Steel, pref.	121 -122
Nat. En. & Stm., pref.	95¼- 96	Harb.-Walk. Refrac., com	105 -106¼
N. Y. Air Brake.	145 -160⅞	La Belle Iron, com	66½ 74
Pitts. Steel, pref.	103½-105	Can. Car & Fdy., com	40
		Carbon Stl., com.	86½- 91
		Driggs-Seabury	90 - 99
		Midvale Steel	73⅞- 77

Dividends

The Scovill Mfg. Company, regular quarterly 2 per cent and extra 10 per cent, payable Oct. 1.

The Chicago Pneumatic Tool Company, regular quarterly, 1 per cent, payable Oct. 25.

The Standard Screw Company, extra, 20 per cent on the common stock, payable Oct. 2.

The Westinghouse Electric & Mfg. Company, regular quarterly, 1¾ per cent on the preferred stock, payable Oct. 16, 1½ per cent on the common, payable Oct. 31.

The Linde Air Products Company, dividend of 25 per cent on the common stock, payable Nov. 1.

The New Jersey Zinc Company, 10 per cent, payable Oct. 10. This makes a total of 62 per cent paid by the company so far this year, amounting to $21,700,000.

The General Fireproofing Company, regular quarterly, 1¾ per cent on the common stock and 1¾ per cent on the preferred stock, payable Oct. 1.

The Moline Plow Company, 2 per cent on the common stock, payable Oct. 15. This is the first dividend paid since 1914.

The Steel Company of Canada, regular quarterly, 1¾ per cent on the preferred stock, payable Nov. 1.

The American LaFrance Fire Engine Company, regular quarterly, 1¾ per cent on the preferred stock, payable Oct. 1.

The American Shipbuilding Company, regular quarterly, 1¾ per cent on the preferred stock, payable Oct. 14.

The Pittsburgh Steel Company, 2 per cent on the common stock, payable Oct. 2.

The Sharon Steel Hoop Company, regular quarterly, 1¾ per cent, payable Oct. 1.

The Western Electric Company, regular quarterly, 1½ per cent on the preferred stock and 2 per cent on the common stock, payable Sept. 30.

The Youngstown Iron & Steel Company, regular quarterly, 1¾ per cent on the preferred stock, payable Oct. 1.

The New Albany Chamber of Commerce, New Albany, Ind., is considering a plan to raise a fund with which to purchase available local factory sites. These would be held subject to resale to manufacturers desiring to locate in the city.

Export Rates Not Advanced

WASHINGTON, D. C., Oct. 3, 1916.—As the result of strong protests made by iron and steel manufacturers, the Interstate Commerce Commission on Sept. 29 suspended, pending investigation, tariffs filed by carriers providing for the cancellation of export rates on iron and steel articles from Pittsburgh, Chicago and other points in Central Freight Association and Eastern trunk line territories to Atlantic coast and Gulf ports. The cancellation of these export rates meant substantial increases, it having been proposed to put them on the same basis as domestic freight rates. The carriers filed the tariffs to become effective Oct. 1 and later dates, and the commission has suspended them to Jan. 29. Meanwhile a comprehensive investigation will be conducted by the commission into the whole subject.

The present and proposed rates, carloads, from various points of origin to New York for export, which may be taken as characteristic of the proposed increases, are as follows:

From	Pig Iron, Per Gross Ton	Billets and Blooms Per Gross Ton	Finished Products, Per 100 Lb
Pittsburgh:			
Present	$1.74	$1.84	$0.11
Proposed	2.58	2.76	0.16
Advance	$0.84	$0.92	$0.05
Chicago			
Present	$3.36	$3.52	$0.210
Proposed	4.98	5.26	0.315
Advance	$1.62	$1.74	$0.105
Cleveland:			
Present	$2.34	$2.44	$0.140
Proposed	3.18	3.36	0.199
Advance	$0.84	$0.92	$0.059
Cincinnati			
Present	$2.92	$3.06	$0.183
Proposed	4.34	4.58	0.274
Advance	$1.42	$1.52	$0.091

The commission recently held a preliminary hearing in connection with the proposed increases, at which appeared representatives of leading iron and steel companies who maintained that, while they are now doing a largely increased business, conditions are but temporary and they would require the preferential export rate to meet foreign competition in foreign markets and that their present adjustment should not be disturbed simply because of the extraordinary conditions that exist at this time.

Representatives of the carriers admitted that the withdrawal of their export rates was in the nature of a temporary move, and that when conditions become normal it might be advisable, and probably would be, to restore the lower export rate. The iron and steel men charged at the hearing that the carriers, in seeking to increase export rates by making them the same as domestic rates, were attempting to participate in the present profits on iron and steel products.

Following its action as to Atlantic coast and Gulf rates, the commission, Oct. 2, suspended until Dec. 29 a proposed increase of 50 per cent in rates on iron and steel articles for export through Pacific coast terminals.

W. L. C.

New Railroad Line on Ohio River

The last stretch of unoccupied river frontage on the Ohio River between Pittsburgh and Wheeling is about to be opened up, according to Ralph W. Cooke, industrial agent, Pennsylvania Lines West of Pittsburgh. A new line 12 miles in length is to be constructed by the Pittsburgh, Cincinnati, Chicago & St. Louis Railroad, commencing at Chester, W. Va., and skirting the south bank of the Ohio River east as far as the mouth of Raccoon Creek, which is about three miles below Beaver. The Pan Handle now has a branch, known as its New Cumberland Branch, passing through Weirton, New Cumberland and Chester, and the new line will be a continuation of this branch. It is the intention to have the extension in complete operation some time in the coming year. Ferguson & Edmundson, Pittsburgh, have been awarded the contract for the construction of the first portion of the road. The development will open up sites for manufacturing plants.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, effective from April 10, 1916, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c.; Pacific coast (by rail only), 65c.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 2.60c. to 2.75c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	[illegible]
Angles over 6 in., on one or both legs	[illegible]
Angles, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Handrail tees	[illegible]
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Plates.—Tank plates, ¼ in. thick, 6 in. up to 100 in. wide, 3c. to 4c., base, net cash, 30 days, or ½ of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras

	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers)	.10
Boiler and flange steel plates	.15
"A. B. M. A." and ordinary firebox steel plates	.20
Still bottom steel	.30
Locomotive firebox steel	[illegible]

Marine steel, special extras and prices on application.

Gage Extras

	Cents per lb.
Rectangular, 1¼ in. thick, over 6 in. wide to 100 in. wide	Base
Lighter than ¼ in., to 3/16 in., up to 72 in. wide	.10
*Lighter than ¼ in., including 3/16 in., over 72 in. to 84	.20
*Lighter than ¼ in., including 3/16 in., over 84 in. to 96	.30
*Lighter than ¼ in., including 3/16 in., over 96 in. to 100	.40
*Lighter than ¼ in., including 3/16 in., over 100 in. to 102	.45
Lighter than 3/16 in., including No. 8, up to 72 in. wide	.15
*Lighter than 3/16 in., including No. 8, over 72 in. to 84	.25
*Lighter than 3/16 in., including No. 8, over 84 in. to 96	.35
Lighter than No. 8, including No. 10, up to 60 in. wide	.30
Lighter than No. 8, including No. 10, over 60 in. to 64	.35

Up to 72 in. and not less than 10.2 lb. per sq. ft. will be considered ¼ in.
Over 72 in. must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.
Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.
Over 72 in., ordered weight 3/16 in., take No. 8 price.
Over 72 in., ordered weight No. 8, take No. 10 price.

Width Extras

Over 100 in. to 110 in. inclusive	.05
Over 110 in. to 115 in. inclusive	.10
Over 115 in. to 120 in. inclusive	.15
Over 120 in. to 125 in. inclusive	.25
Over 125 in. to 130 in. inclusive	.50
Over 130 in.	1.00

Length Extras

Universal plates 80 ft. long up to 90 ft. long	.05
Universal plates 90 ft. long up to 100 ft. long	.10
Universal plates 100 ft. long up to 110 ft. long	.20

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over.

Lengths under 3 ft. to 2 ft. inclusive	.25
Lengths under 2 ft. to 1 ft. inclusive	.50
Lengths under 1 ft.	1.55
Circles 3 ft. in diameter to 100 in.	.30
Circles over 100 to 110 in. (width extra)	.55
Circles over 110 to 115 in. (width extra)	.40
Circles over 115 to 120 in. (width extra)	.45
Circles over 120 to 125 in. (width extra)	.55
Circles over 125 to 130 in. (width extra)	.80
Circles over 130 in. (width extra)	1.00
Circles under 3 ft., to 2 ft., inclusive	.55
Circles under 2 ft., to 1 ft., inclusive	.80
Circles under 1 ft.	1.85

Half circles take circle extras.
Sketches not over four straight cuts, inc. straight taper .10
Sketches having more than four straight cuts .20
Plates sheared to a radius take complete circle extras.

*Including extra for width.

Wire Rods.—Including chain rods, $55 to $60.

Wire Products.—Prices to jobbers effective Aug. 5: Fence wire, Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, $2.55; galvanized, $3.25. Galvanized barb wire and staples, $3.45; painted, $2.75. Wire nails, $2.60. Galvanized nails, 1 in. and longer, $2 advance over base price; shorter than 1 in., $2.50 advance over base price. Cement-coated nails, $2.50. Woven wire fencing, 60 per cent off list for carloads, 59 off for 1000-rod lots, 58 off for less than 1000-rod lots.

The following table gives the price per 100 lb. to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	6 to 9	10	11	12&12½	13	14	15	16
[illegible]	1- 60	$2.65	$2.70	$2.75	$2.80	$2.95	$3.05	$3.15
[illegible]	2- 30	3.35	3.40	3.45	3.55	3.65	4.10	4.20

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect on black pipe from Sept. 7, 1916, and on galvanized pipe from July 24, 1916, all full weight:

Butt Weld

Steel			Iron		
In.	Black	Galv.	Inches	Black	Galv.
[illegible]	62	35½	⅛ and ¼	51	24
[illegible]	66	41½	⅜	52	25
[illegible]	69	45½	½	56	38
			¾ to 1½	59	43

Lap Weld

[illegible]	60	39½	1¼	46	31
2½ to 6	66	53½	1½	52	38
7 to 12	63	49½	2	53	39
[illegible]	60½	[illegible]	2½ to 4	55	42
[illegible]	51	[illegible]	4½ to 6	55	42
			7 to 12	54	41

Reamed and Drifted

1 to 3, butt	67	53½	1¼, lap	41	25
2, lap	61	48½	1½, lap	47	32
2½ to 6, lap	64	51½	2, lap	48	33
3 to 12½, butt	54	37	2½ to 4, lap	51	36

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	58	40½	⅛, ¼ and ⅜	51	34
[illegible]	68	50½	½	56	43
¾ to 1½	64	54½	¾ to 1½	60	45
2 to 3	68	57½			

Lap Weld, extra strong, plain ends

[illegible]	61	49½	1¼	48	33
2½ to 4	64	52½	1½	53	39
4½ to 6	63	51½	2	55	42
7 to 8	59	45½	2½ to 4	57	45
9 to 12	54	40½	4½ to 6	56	44
			7 to 8	50	38
			9 to 12	45	33

Butt Weld, double extra strong, plain ends

[illegible]	54	43½	¼	43	31
¾ to 1½	57	46½	¾ to 1½	46	34
2 to 2½	60	49½			

Lap Weld, double extra strong, plain ends

[illegible]	53	42½	1½	42	30
2½ to 4	55	44½	2	42	30
4½ to 6	54	43½	2½ to 4	44	35
7 to 8	49	38½	4½ to 6	43	34

To the large jobbing trade an additional 5 per cent is allowed on the above discounts.
The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts on less than carloads, freight to destination added, effective from Sept. 7, 1916, are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1½ in.	33	1½ in.	25
1¾ and 2 in.	45	1¾ and 2 in.	37
2¼ in.	42	2¼ in.	34
2½ and 2¾ in.	48	2½ and 2¾ in.	40
3 and 3¼ in.	53	3 and 3¼ in.	45
3½ to 4½ in.	54	3½ to 4½ in.	46
5 and 6 in.	47	5 and 6 in.	39
7 to 13 in.	44	7 to 13 in.	36

Locomotive and steamship special charcoal grades bring higher prices.
1¾ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.
2 in. and larger, over 22 ft., 10 per cent net extra.

Sheets.—Makers' prices for mill shipments on sheets of U. S. standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Blue Annealed Sheets

	Cents per lb.
Nos. 3 to 8	2.95 to 3.05
Nos. 9 and 10	3.00 to 3.10
Nos. 11 and 12	3.05 to 3.15
Nos. 13 and 14	3.10 to 3.20
Nos. 15 and 16	3.20 to 3.30

Box Annealed Sheets, Cold Rolled

Nos. 17 to 21	2.90 to 2.95
Nos. 22 and 24	2.95 to 3.00
Nos. 25 and 26	3.00 to 3.05
No. 27	3.05 to 3.10
No. 28	3.10 to 3.15
No. 29	3.15 to 3.20
No. 30	3.35 to 3.40

Galvanized Sheets of Black Sheet Gage

Nos. 10 and 11	3.25 to 3.35
No. 12	3.35 to 3.45
Nos. 13 and 14	3.35 to 3.45
Nos. 15 and 16	3.50 to 3.60
Nos. 17 to 21	3.65 to 3.75
Nos. 22 and 24	3.80 to 3.90
Nos. 25 and 26	3.95 to 4.05
No. 27	4.10 to 4.20
No. 28	4.25 to 4.35
No. 29	4.40 to 4.50
No. 30	4.65 to 4.75

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin,			Spelter	
		Electro-	New	New	St	New	St
Sept	Lake	lytic	York	York	Louis	York	Louis
27	28.00	28.62½	38.75	[illegible]	[illegible]	[illegible]	9.00
28	28.00	28.50	39.12½	[illegible]	[illegible]	[illegible]	9.12½
29	28.00	28.50	39.25	[illegible]	[illegible]	[illegible]	9.12½
30	28.00	28.50	[illegible]	[illegible]	[illegible]	[illegible]	9.12½
Oct.							
2	28.25	28.50	39.25	[illegible]	[illegible]	[illegible]	[illegible]
3	28.25	28.50	39.25	[illegible]	[illegible]	[illegible]	[illegible]

NEW YORK, Oct. 4, 1916.

Copper is quieter but strong. Tin has been active on one or two days, and a good movement is believed to be impending. Lead is steady but less active. Spelter is higher, but buying has not been large. Antimony continues dull, and is lower.

New York

Copper.—As was to be expected, the heavy buying on both foreign and domestic account has tapered off and the market is now comparatively quiet. First hands are well sold up for the remainder of the year and hold their quotations firmly, but there is indication of easiness in resale metal. October electrolytic is quoted at 29c., November at 28.50c., December at 28c., January at 27.50c. and first quarter at 27.25c. A peculiarity of the market is that some producers when asked for nearby quotations will not give them, but if a definite proposition is put up to them negotiations usually follow which result in an agreement to deliver the metal desired. Lake is strong, with November nominal around 28.25c. For spot Lake 29.50c. has been asked, but it cannot be learned that any business was done at this figure. January Lake is held at 27.50c. and first quarter at 27.25c. The brass and copper mills are extremely busy and are taking their choice of the new business that is offered, turning much of it away. The London market for electrolytic is firm at £140, whereas it stood at £138 a week ago. The exports in September totaled 29,803 tons. European statistics just cabled show that the stocks in Great Britain and France, together with quantities afloat from Chile and Australia, Oct. 1 totaled 10,371 tons, against 11,668 Sept. 15, a decrease of 1297 tons in the two weeks.

Copper Averages.—The average price of Lake copper for the month of September, based on daily quotations in THE IRON AGE, was 28.03c., and for electrolytic, 28.28c.

Tin.—The tone of the market is excellent, sales are more regular and steady, and the feeling in the trade is that a good buying movement is not far distant. Last Friday the market took a decided spurt late in the day, and in the course of one hour between 300 and 400 tons was dealt in. The large tin-plate manufacturers were the principal buyers and the selling was confined to but a few hands. Thursday the market was quieter, with small sales amounting to about 100 tons. On Friday not much was done in spite of a fair amount of inquiry. This week more interest has been shown in futures, especially first quarter delivery, but not a great deal has been done since last week. Straits was quoted for prompt delivery at 29.25c. yesterday. The monthly statistics for September show that deliveries of the month totaled 4025 tons, making the total delivery 44,413 tons since Jan. 1, against 36,905 tons in the same period of 1915. At the end of the month there was in stock and landing 4769 tons. The quantity now afloat is 2145 tons.

Lead.—The market has presented a rather mixed aspect. On Wednesday last a good business was done at prices ranging from 7c. to 7.12½c., New York, the independent sellers and producers taking most of the business. Since then there has been less activity and the metal was easily obtainable yesterday at 7.05c., New York. The leading interest continues to quote 7c., New York, and 6.92½c., St. Louis. Independents yesterday quoted 6.85c., St. Louis. Some sections of the trade have indulged in a great deal of bullish talk over prices, but those who are more conservative believe that present quotations will hold for a few weeks and that the market will be rather quiet, basing their belief on the large sales made recently. The London market for spot is £31 15s. The exports of September were large, amounting to 8857 tons.

Spelter.—Prices have advanced on comparatively small buying. Prompt prime Western was quoted yesterday around 9.70c., New York, and 9.50c., St. Louis, last quarter at 9.25c. to 9.37½c., St. Louis, and first quarter at 9c. to 9.12½c., St. Louis. Representatives of producers are optimistic and believe that the market will continue strong although no radical advances are expected. While the market has been rather quiet something has been done every day, some of the buying having been on the part of galvanizers. The greatest sustaining influence at present is the expectation that the entente allies will sooner or later buy heavily in connection with their recent large copper purchase. The London market for spot yesterday was £52. The exports in September were exceptionally large, amounting to 14,309 tons.

Antimony.—The market is quiet and unchanged, with dealers quoting Oriental grades at 10c. to 10.25c., duty paid.

Aluminum.—This metal continues strong at 62c. to 63c. per lb. for No. 1 virgin aluminum, 98 to 99 per cent pure.

Old Metals.—The tendency is still upward. Dealers' selling prices are as follows:

	Cents per lb
Copper, heavy and crucible	26.50 to 27.00
Copper, heavy and wire	25.00 to 26.00
Copper, light and bottoms	22.00 to 23.00
Brass, heavy	14.50 to 15.25
Brass, light	11.75 to 12.25
Heavy machine composition	20.50 to 21.50
No. 1 yellow rod brass turnings	14.75 to 15.50
No. 1 red brass or composition turnings	16.00 to 17.00
Lead, heavy	6.50
Lead, tea	6.00
Zinc	7.00 to 7.50

Chicago

OCT. 2.—The very heavy buying of metals has supported with great firmness even the existing high level of prices. Though some concessions are to be had on purchases of lead, tin and spelter in small quantities from second hands, the attitude of producers is decidedly rigid. We quote: Casting copper, 26.50c. to 27c.; Lake copper, 28.50c. to 29c.; tin, carloads, 39.50c., and small lots, 41c.; lead, 6.90c. to 6.95c.; spelter, 9.25c.; sheet zinc, 15c.; Cookson's antimony, 50c.; other grades, 13c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 22c.; copper bottoms, 20c.; copper clips, 21c.; red brass, 18.50c.; yellow brass, 14c.; lead pipe, 5.50c.; zinc, 6c.; pewter, No. 1, 25c.; tinfoil, 27c.; block tin pipe, 32c.

St. Louis

OCT. 2.—Non-ferrous metals have been quiet, with practically no feature to the trading. Lead is quotable at 6.85c. to 6.95c., according to delivery; spelter, 9.25c.; tin, 41c. to 41½c.; Lake copper, 29c., nominal; electrolytic copper, 28.75c. to 29c.; antimony, 16c. for Asiatic. In the Joplin ore district zinc blende ranged from $45 to $65 per ton, with the average for the week about $57. Calamine ranged from $30 to $40, with the average about $36. Lead ore was firm at $75. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 9c.; heavy yellow brass, 12c.; heavy red brass, 17c.; heavy copper and copper wire, 19c.; zinc, 6c.; lead, 5c.; pewter, 25c.; tinfoil, 31c.; tea lead, 3.50c.

Frank B. Gilbreth, consulting engineer, Providence, R. I., is to give an address on motion study before a meeting in Buffalo, N. Y., on Nov. 1, of men of the American Society of Mechanical Engineers. C. H. Bierbaum of the Bierbaum-Dollar Company and vice-president of the Lumen Bearing Company, at a meeting on Nov. 29 is to tell of his research work in graphite.

AUGUST EXPORTS AND IMPORTS

Another Record Made for Exports of Iron, Steel and Machinery

WASHINGTON, D. C., Oct. 3, 1916.—The suggestion made in this correspondence in connection with the statistics of iron and steel exports for July, which showed a downward tendency, that it would be well to wait a month or two before deciding that the high-water mark of the big war boom had been reached, is fully justified by the astonishing figures for the month of August, which have just been compiled by the Bureau of Foreign and Domestic Commerce. Another big forward stride is recorded in total exports by values, in shipments of tonnage commodities and in machinery, the figures showing not only substantial gains over June and July but surpassing by a handsome margin the unprecedented totals reached last May.

The value of all shipments of iron and steel products in August was $86,296,703, as compared with $37,726,822 for the same month of 1915; while for the eight months the total was $528,958,703, as compared with $212,697,467 for the same period of 1915.

The exports of iron and steel for which quantities are given aggregated 598,192 gross tons in August, 1916, as compared with 401,298 tons for the same month of 1915. The record for such exports was made in May of this year with a total of 540,591 tons. The total for the eight months ended August was 3,714,426 gross tons, as compared with 2,077,783 tons for the same period of 1915.

The following table shows the exports of tonnage iron and steel for August and for the eight months ended August, 1916, as compared with 1915:

Exports of Iron and Steel

	August		Eight Months	
	1915 Gross Tons	1916 Gross Tons	1915 Gross Tons	1916 Gross Tons
Pig iron	18,567	60,264	127,[illegible]	283,[illegible]
Scrap	[illegible]	18,149	[illegible]	121,[illegible]
Bar iron	4,005	5,207	20,043	52,245
Wire rods	13,000	11,451	104,072	107,584
Steel bars	42,327	79,338	261,698	524,584
Billets, ingots and blooms, n.e.s.	89,134	160,921	353,119	[illegible]
Bolts and nuts	2,767	2,653	12,887	19,[illegible]
Hoops and bands	3,675	3,649	15,888	29,590
Horseshoes	3,109	872	13,[illegible]	[illegible]
Cut nails	220	278	2,48[illegible]	[illegible]
Railroad spikes	596	1,366	4,[illegible]	13,[illegible]
Wire nails	11,272	14,809	56,876	99,341
All other nails, including tacks	774	1,160	5,190	[illegible]
Cast-iron pipes and fittings	2,[illegible]	[illegible]	[illegible]	[illegible]
Wrought pipes and fittings	11,152	22,454	83,615	93,514
Radiators and cast iron boilers	137	434	1,[illegible]	[illegible]
Steel rails	52,040	41,820	178,[illegible]	[illegible]
Galvanized iron sheets and plates	[illegible]	[illegible]	[illegible]	[illegible]
All other iron sheets and plates	1,983	4,909	11,577	31,436
Steel plates	30,[illegible]	[illegible]	[illegible]	[illegible]
Steel sheets	5,422	8,536	62,788	68,110
Structural iron and steel	22,843	27,581	139,191	182,533
Tin and terne plates	21,939	18,758	82,794	160,357
Barb wire	20,596	46,843	140,147	299,515
All other wire	24,613	26,068	146,404	188,203
Total	401,[illegible]	[illegible]	2,077,[illegible]	[illegible]

Exports of machinery in August, 1916, were valued at $24,657,597 as compared with $11,439,291 for the same month of 1915. Shipments of metal-working machinery aggregated $8,134,473 in August as compared with $3,624,411 for the same month a year ago and $9,935,806 the high record of May of the present year. Exports of machinery of all kinds for the eight months ended August, 1916, were valued at $148,061,832, as against $79,396,113 for the corresponding period of 1915.

Imports of tonnage iron and steel in August, 1916, amounted to 32,258 gross tons, as compared with 27,560 tons in the same month of 1915. These imports have risen steadily of late, but are still below the record for the current calendar year. Imports for the eight months ended August, 1916, were 177,466 gross tons, against 152,183 tons for the same period of 1915.

The following table shows the imports of tonnage commodities for August and for the eight months ended August, 1916, as compared with 1915:

Imports of Iron and Steel

	August		Eight Months	
	1915 Gross Tons	1916 Gross Tons	1916 Gross Tons	1916 Gross Tons
Ferromanganese	....*	8,525	....*	48,687
Ferrosilicon	86	479	3,632	4,521
All other pig iron	10,819	5,882	51,844	28,857
Scrap	3,795	7,143	20,689	41,432
Bar iron	560	952	5,782	5,792
Steel bars, rods and steel	127	55	1,153	1,067
Steel billets without alloys	81	105	1,116	8,135
All other steel billets	788	1,411	7,292	10,418
Steel rails	10,801	7,056	54,373	23,576
Sheets and plates	165	122	857	1,217
Tin and terne plates	50	105	2,189	775
All other	288	423	3,256	2,989
Total	27,560	32,258	152,183	177,466

*Not separately reported.

Preliminary reports from the leading ports indicate that the export movement was well sustained throughout September, but as there were only 24 official working days in the month it remains to be seen whether the August figures will be equaled or exceeded.

W. L. C.

Pittsburgh and Nearby Districts

More than 75,000 invitations to visit Pittsburgh on Nov. 1, 2 and 3 will be sent by its manufacturers, jobbers and wholesalers to merchants and business men within 150 miles of the city in initiating Pittsburgh's eleventh inbound excursion. As a result of the activity of the trade extension committee of the Chamber of Commerce, many of the leading business men in the cities and towns in western Pennsylvania, eastern Ohio and West Virginia are expected to visit Pittsburgh during the celebration of the charter centennial to be held on the above dates.

The board of directors of the Westinghouse Electric & Mfg. Company has authorized the issuance of a call for the redemption on Jan. 1, 1917, at 105 and interest, of all the outstanding convertible sinking fund 5 per cent bonds of the 1915 issue.

Business men of New Brighton, Pa., will organize a commercial body on the plans of the Pittsburgh Chamber of Commerce. It will take an active part in the discussion of current issues and will do what it can in the way of upbuilding business institutions already in New Brighton and inducing other manufacturing concerns to locate there.

The Driggs-Seabury Ordnance Company, Sharon, Pa., has secured an additional order for 50,000 shells for the Allies. Work will be started on it as soon as material is received. The order amounts to $750,000. The company now has enough work booked to run for a year or more.

Reports that the Crucible Steel Company of America, Pittsburgh, has received orders for 40,000 6-in. and 19,000 12-in. howitzers for the Allies are officially denied. The company has been negotiating with a New York house to supply the steel for some 12-in. shells, but the negotiations have not been concluded.

The annual meeting of the West Virginia Manufacturers' Association will be held in Charleston, W. Va., Nov. 17 and 18. Judge E. H. Gary, chairman of the United States Steel Corporation, and E. A. Hurley, chairman of the Federal Trade Commission, are expected to be among the speakers.

The Sharpsville Boiler Works Company, Sharpsville, Pa., is in the market for a 10-ton electric crane to be installed in an addition it is making to its plant. This addition will be 50 x 150 ft., constructed of steel, for which the Independent Bridge Company, Pittsburgh, has the contract.

The Fuller Engineering Company and the Lehigh Carwheel & Axle Works, both at Catasauqua, Pa., have opened offices in room 706 Farmers Bank Building, Pittsburgh, with J. H. Schuler in charge.

The Matthews Gravity Carrier Company, Ellwood City, Pa., is erecting a new building to facilitate assembling and shipping materials; a new storage house, 80 x 80 ft., for raw and finished materials, and a new forge shop, 40 x 60 ft. The equipment in the present

forge shop will be moved into the new shop, which will also contain the case-hardening furnaces, two more having been furnished by the Flexible Shafting Company, Chicago. The company has recently purchased considerable new equipment, including blacksmith forges, bending rolls, two automatic screw machines from the National-Acme Mfg. Company, Cleveland, Ohio, four drawing presses from the E. W. Bliss Company, Brooklyn, N. Y., three from the American Can Company, Chicago, and two from the Progressive Machine Company, Minneapolis, Minn., a 24-in. milling machine, a grinding machine and automatic feed tables for punching machines and presses.

M. B. Kelley, president American Steel Company, Pittsburgh, has acquired the plant of the Osterberg Tin Plate Company, Waynesburg, Pa., which has been idle for several years. Ownership in the plant for some time has been vested in J. W. Closser, who owned three-fifths interest, and M. B. Kelley, who owned two-fifths. Mr. Kelley has bought Mr. Closser's interest. The plant contains four hot tin mills, three cold mills and six tinning stacks. Mr. Kelley expects to put it in operation as soon as an organization can be formed and minor repairs made.

The American Steel Company, Park Building, Pittsburgh, which operates a wire and wire-nail plant at Ellwood City, Pa., is adding a flat wire and a cold-rolled strip department and will then turn out flat wire up to 1 in. in width and cold-rolled strips up to 10 in. in width. A wire drawing department is also being added for drawing round, oval, square and cotter pin wire.

The W. P. Hannon Company, Youngstown, has received a contract for the structural steel and fireproofing material, foundations and walls for soaking pit furnaces in the new open-hearth steel plant being built by the Mark Mfg. Company at Indiana Harbor, Ind.

The monthly meeting of the Metallurgical Section of the Engineers' Society of Western Pennsylvania was held in its rooms in the Oliver Building, Pittsburgh, on the evening of Sept. 26. Patrick Mullen, mine inspector of the H. C. Frick Coke Company, with headquarters at Scottdale, Pa., talked about "New Mining Methods as Practised by the H. C. Frick Coke Company."

The Semet-Solvay Company, Syracuse, N. Y., has received a contract for the building of 100 Semet-Solvay by-product coke ovens at Portsmouth, Ohio, where the Whitaker-Glessner Company, Wheeling, W. Va., will build a blast furnace to supply pig iron for its open-hearth steel plant at Portsmouth. The ownership of these ovens will be vested in a holding company, in which the Semet-Solvay Company will own one-third of the stock; the Whitaker-Glessner Company, one-third, and the Columbus Iron & Steel Company, Columbus, Ohio, one-third. The plant will make about 1400 tons of coke per day which will be used in the new furnace of the Whitaker-Glessner Company and in the two present furnaces of the Columbus Iron & Steel Company at Columbus, Ohio.

New Strip Steel Plant in Massillon

A new plant will be established in Massillon, Ohio, by the National Pressed Steel Company, to manufacture hot and cold rolled strip steel and metal lumber. The company is allied with the Massillon Rolling Mill Company and the Central Steel Company, Massillon, and R. E. Bebb, president of those companies, has been elected its president. The other officers are: Harry M. Naugle, first vice-president and general manager; F. J. Griffith, second vice-president; A. J. Townsend, third vice-president, and K. R. Jenson, secretary and treasurer. Mr. Griffiths is with the Central Steel Company and Messrs. Naugle, Townsend and Jenson have been connected with the Berger Mfg. Company, Canton, Ohio. The company will shortly begin the erection of a new building for a strip mill on a site adjoining the plants of the Massillon Rolling Mill Company and Central Steel Company, and will remodel another building on this site. It is the intention to provide a plant with an annual capacity of 40,000 tons of strip steel. It is planned to have it in operation next spring.

STRIKES AND SETTLEMENTS

Milwaukee Striking Machinists Return to Open Shops

Practically every union machinist who joined in the organized demand for an 8-hr. day when the strike was declared in the Milwaukee district July 18, had returned to work up to Saturday, Sept. 30. While the percentage of returned men is not yet 100, this is due to the fact that some of the strikers accepted positions in other cities. The strike leaders now claim that the employers have been forced to make the concession of a 52½-hr. working week. As is generally known, every employer of consequence in the Milwaukee district on July 1 voluntarily instituted a 52½-hr. weekly working schedule in place of the former 55-hr. week, and it is on this basis that the men have been taken back. At the same time the Metal Trades and Founders' Association promised to further reduce the working schedule when economic conditions should make this possible. It is significant that all employers treated with the men solely as individuals and, whenever efforts were made to confer as organized bodies, the employers declined to enter into negotiations. Thus the conclusion of the strike appears to be a complete victory for the employers, as the movement for an 8-hr. day has made no headway, the unions have received no recognition, and the open shop principle has not been prejudiced in any manner. The employers are still operating their works without being obliged to consult with or take orders from the unions.

General Electric Strike at Pittsfield Continues

Efforts to bring about a settlement of the strike at the Pittsfield, Mass., plant of the General Electric Company have been futile. A proposal was made by the company which incorporated its previous offer to advance wages 5 per cent Oct. 1; to permit the employees by Australian ballot to determine whether the working hours shall be 50 or 52½ hr. per week; and to make adjustments in pay, following the return of the employees to work, which may be necessary to bring the present rates of pay up to fair market rates. This offer was rejected by the striking employees, and the State board of conciliation and arbitration has resumed hearings in an effort to bring about a settlement. There has been a steady increase in the number of men at work, and practically half of the former number of employees are reported to be on the present payroll. There has been a decided gain in the foundry force.

The Eagle Lock Company, Terryville, Conn., posted a notice that wages would be advanced 10 per cent commencing Oct. 2. About 1400 employees are affected. The company gave a similar 10 per cent raise in October, 1915.

Following a walkout of the molders at the plant of the Wildman Mfg. Company, Norristown, Pa., manufacturer of knitting machines, the company posted a notice announcing that hereafter its employees would be asked to work only 48 hr. a week instead of 54 hr., as heretofore, at the same wages.

Tin now ranks first among Bolivia's mineral exports, having displaced silver in 1915. The exports of tin last year were 36,492 tons, valued at $16,300,000, copper exports ranking second at 23,812 tons, valued at $5,200,000. Antimony exports in 1915 were 17,923 tons, valued at $5,000,000, against only 186 tons in 1914 and 62 tons in 1913. Exports of tungsten were 792 tons last year, with a valuation of $2,000,000, compared with 276 tons in 1914 and 474 tons in 1912.

A meeting of the National Association of Sheet and Tin Plate Manufacturers was held in the William Penn Hotel, Pittsburgh, on Tuesday, Sept. 26. Only routine business was transacted. It is said this association has about ready for adoption a standard form of contract for the sale of sheets and tin plate, and which will be submitted to the members at an early date for their approval.

LEHIGH VALLEY INQUIRING

General Electric Issues Another List

Allis-Chalmers Mfg. Company Finishes Shell Contract and Will Concentrate on Regular Output—Skilled Mechanics Scarce

General conditions show but little or no change. Orders continue to accumulate with the makers of standard machine tools, and some of them see deliveries being thrust further forward, despite the pressure under which they are working and the extent to which they have enlarged their facilities.

The Lehigh Valley Railroad is making inquiry in the New York market for a large list of tools, but orders may not be placed in the near future. The General Electric Company has issued a list, including nine boring mills. The company has been a large buyer in recent months.

In Cleveland manufacturers who have finished munitions contracts are offering round lots of second-hand tools, and deliveries of heavy-duty machines are easier, but the general demand is active, with buyers showing a disposition to place orders despite the long deliveries.

Steel mills continue to buy extensively in Cincinnati. In that city railroad buying is spasmodic, and the scarcity of raw materials is becoming acute.

An interesting item from Milwaukee is that the Allis-Chalmers Mfg. Company has completed its shell contract, and is rearranging its equipment for its regular output. The orders it has in hand will require all the employees who have been on munitions work. More mechanics are needed in Milwaukee, although the collapse of the machinists' strike has relieved the situation.

Renewal of operations in the small arms plant of the Rock Island Arsenal, Rock Island, Ill., will require an expenditure of $1,250,000.

Detroit needs 20,000 additional workmen, but is confronted by the lack of sufficient homes.

Texas reports that exports of machinery to Mexico show a decided increase.

Shipbuilding continues the feature in the Pacific Northwest.

New York

NEW YORK, Oct. 4, 1916.

At least two excellent lists of miscellaneous tools are before the trade, while general inquiries for one or two machines continue numerous. Some of the latter are slow in closing.

The Lehigh Valley Railroad is taking bids on an extensive list of shop equipment, but there is no certainty as to when orders will be placed.

The General Electric Company is again in the market, its latest inquiry calling for nine boring mills and a number of other tools. Its boring mill requirements consist of two 42-in., three 34-in., one 72-in., two 52-in. and one 36-in. machines.

The Hurlburt Motor Truck Company, Third Avenue and Harlem River, New York, is in the market for several machines, including turret lathes. Like most motor truck makers, the company is very busy.

The manufacturers of ball bearings have been extensive purchasers in recent months, and will be accepting deliveries for some time. Shipments of standard machine tools are far behind, and the makers' unfilled orders are as great as ever.

The banking houses of Merrill, Lynch & Co., 7 Wall Street, New York, and Cassatt & Co., of Philadelphia, have bought the business of the Spicer Mfg. Company, Plainfield, N. J., which manufactures universal joints for over 45 different automobiles and 62 different commercial trucks, and is one of the largest producers of these parts in the country. A new company has been formed with the same name and incorporated with a capital stock of $5,000,000. The business has been steadily increasing its output from about 140,000 universal joints in 1912 to an estimated output of 500,000 in 1916. Additional plant facilities have already been provided and machinery is being installed to increase the production to about 700,000 joints in 1917. The present equipment includes a power plant of 1000 kw. and a drop-forging plant with an output of 3,120,000 forgings per year. A working force of about 1000 men is maintained. C. A. Dana will continue as president of the new corporation.

The Diehl Mfg. Company, Elizabeth, N. J., manufacturer of electrical equipment, has taken out a permit for a plating, polishing and lacquering building, 80 x 120 ft., one story, to cost about $6,000.

It is reported that the Samuel L. Moore & Sons Corporation, Elizabeth, N. J., will file plans shortly for the construction of its proposed power house.

The Port Henry Light, Heat & Power Company, Port Henry, N. Y., has been sold to new financial interests, who have increased the capital stock from $50,000 to $100,000 and have recently completed a new power house, adding about 1220 kw. to its capacity. George H. Barwise is secretary.

The McNeil Iron Works, Pioneer Street, Brooklyn, N. Y., has let contract for the erection of a one-story addition, 90 x 175 ft.

The Secretary of State of New York, Albany, has recently announced the following increases in capital stock: The Ridden Motor Truck Company, 16 West Sixty-first Street, New York, $10,000 to $500,000; the Hydraulic Race Company, Lockport, N. Y., $100,000 to $400,000; the Pope Cut Glass Company, 170 Broadway, New York, $50,000 to $100,000, and the International Belt Company, 476 Broadway, New York, $125,000 to $135,000.

The Chemical Pump & Valve Company, Perth Amboy, N. J., has let contract for the erection of a two-story plant, 70 ft. square.

The commanding officer of the Watervliet Arsenal, Watervliet, N. Y., has called for bids for the following work at that post: Rebuilding central section of large gun shop; extension of south end and west side of large gun shop; furnishing and installing monorail trolleys for gun lathes; alterations of brick pillars of south wing of large gun shop; extension of smith shop; erection of lumber-storage shed; improvement of shrinkage pit; erection of toilet buildings, locker and recreation rooms.

The Zahn Mfg. Company, Buffalo, Chas. A. Nagel, manager, manufacturer of brewery supplies and machinery, has purchased a three-story brick factory at 74 East Jewett Avenue to provide additional manufacturing facilities.

The Harvey Top & Body Company, Buffalo, has been incorporated with a capital stock of $20,000 and will establish a plant for the manufacture of autos, auto tops, bodies, etc. Lambert G. Smith, Farnham, N. Y.; Henry C. Harvey and Harvey B. Harrison, 614 Morgan Building, Buffalo, are the incorporators.

The W. C. Davies Paper Box Company, Buffalo, has leased factory space at Wells and Seneca streets for use in manufacturing paper boxes, cartons and containers.

The Becker-Hertzog Motor Company, Buffalo, has been incorporated by Frederick and Anna E. Becker and Albert Zog, Buffalo, to manufacture autos, motor trucks, etc. The capital stock is $25,000.

The Newton Arms Company, Buffalo, has purchased a three-story brick factory at East Jewett Avenue, 60 x 140 ft., and is equipping it for the manufacture of small calibre sporting rifles under patents of Charles Newton, 506 Mutual Life Building, president of the company.

Mangcraft, Inc., Buffalo, N. Y., has been organized with a capital stock of $15,000 to manufacture toys and art novelties. Gustav Mang, Arthur D. Colburn, Buffalo, and Aaron R. Merritt, East Aurora, N. Y., are the incorporators.

The Sterling Engine Company, Buffalo, manufacturer of motors for motor boats and aeroplanes, is building an extensive addition to its plant at Niagara Street and Auburn Avenue.

The Gehnrich Indirect Heat Oven Company, 60 Franklin Avenue, Brooklyn, is having plans prepared by Francisco & Jacobus, consulting engineers, 200 Fifth Avenue, New York, for a four-story factory, 143 x 217 ft., to cost about $100,000.

The Auto Supply & Equipment Company, 587 Jackson Avenue, Long Island City, N. Y., has had plans prepared for a five-story factory, 50 x 110 ft., to cost about $50,000.

The Contact Process Company, Abbott Road, Buffalo, N. Y., has had plans completed for two one-story factory buildings, 26 x 30 ft., to cost about $5,000, and 16 x 40 ft., to cost about $4,500.

The Perth Amboy Chemical Company, Matawan, N. J., will start the construction of an addition to its plant, one story, 40 x 100 ft., to cost about $4,000.

Frank Van Roden, Rutherford, N. J., will erect a two-story machine shop and garage, 50 x 146 ft., to cost about $10,000.

Swift & Co., 154 Ninth Street, Jersey City, N. J., have awarded contract to Egan & Montague, 1 Montgomery Street, Jersey City, for the construction of a one-story boiler room addition, 36 x 59 ft., to cost about $3,000.

J. H. Lehman, Newark, will build a two-story garage and machine shop at 295 Badger Avenue to cost $10,000.

The New York & New Jersey Express Company, 309 Broadway, New York, recently organized, is planning for the erection of a cold storage plant on Front Street, Newark. G. H. Ludlum, president of the Federal Motor Truck Company, Newark, is also president of this company.

Frank Wiegand & Co., Newark, will build a two-story brick plant, 26 x 140 ft., at 1082 Springfield Avenue, for the manufacture of jewelry at an estimated cost of $15,000.

The C. R. Williams Toy Company, 810 Orange Street, Newark, has been incorporated with a capital of $25,000 to manufacture toys. C. R. Williams, A. M. Brooks, and Philip C. Brooks, Newark, are the incorporators.

The C. A. Woolsey Paint & Color Company, Jersey City, will build a two-story and basement concrete addition on Colden Street, to cost $20,300.

The Pennsylvania Railroad has awarded a contract to Henry M. Doremus & Co. for reconstruction work at its tool and vise shops at Meadow Yards, Kearny, N. J.

The Electrical Alloy Company, Morristown, N. J., will build a plant about 100 x 160 ft., on Ridgedale Avenue, for the manufacture of wires and high resistance specialties.

The Standard Aero Corporation, Plainfield, is considering the erection of a new plant at Newark or vicinity, and the removal of its present factory to such site. Daniel L. Meeman, Jr., is treasurer.

The Niles-Bement-Pond Company, 111 Broadway, New York, manufacturer of machine tools, will build an addition to the foundry at its Bement Works, on Donath Street, Philadelphia.

The Princeton Ice Company, Princeton, is planning for the erection of a 20-ton ice manufacturing plant on Spring Street. James Margerum is president.

The Westinghouse Lamp Company, Bloomfield, will build a brick addition to its plant on Clearfield Avenue, Watsessing.

The Kent Motors Corporation, 1790 Broadway, New York, recently incorporated, has acquired a tract of land near Hillside Park, Washington Avenue, Belleville, and plans the erection of a plant with a total area of about 120,000 sq. ft., for the manufacture of automobile parts. The plant will comprise one-story structures of reinforced concrete, including a power plant and an administration building. Marvin & Davis, 303 Fifth Avenue, New York, are the architects. Frederick H. Clarke is president.

The Manhattan Rubber Mfg. Company, Passaic, N. J., manufacturer of mechanical rubber goods, has increased its capital from $1,000,000 to $2,000,000.

The Chevrolet Motor Company, Flint, Mich., has acquired property on Monmouth Street, Hightstown, N. J., and will build a plant for assembling work for all cars sold throughout this section, including Trenton and vicinity.

Catalogs Wanted

The Moore Steam Turbine Corporation, Wellsville, N. Y., manufacturer of single and multi-stage steam turbines, desires catalogs of factory equipment and supplies.

Philadelphia

PHILADELPHIA, PA., Oct. 2, 1916.

Manufacturers at Wilmington, Del., are complaining of a scarcity of workmen. The American Car & Foundry Company reports a lack of ship carpenters to work on wooden ships. Its contracts for steel boats now aggregate 20,000 tons. It is reported that the company expects to receive a number of additional contracts.

The Wilmington Steel Company is erecting several buildings, and both the Pusey & Jones Company and the steel company have advertised for men in other cities. The Riverside plant of the Bethlehem Steel Company, where projectiles were loaded, has closed for a time, but as soon as arrangements can be made it will reopen and will employ nearly double its former force.

At the plant of the Sharpless Separator Company, West Chester, Pa., some of its workmen who left to work in the factory of the Remington Arms Company at Eddystone are reported to have returned, and additional workmen have been given employment in the several departments.

Because of increasing business the American Bronze Company, Berwyn, Pa., has erected a building 50 x 60 ft., of steel and concrete, in which it will install melting furnaces, and at least six new melting pots. With this improvement much-needed floor space will be available in the foundry.

Walker & Davis, Inc., machinists, 2765 Kensington Avenue, Philadelphia, have awarded contract to Fred A. Havens & Co., 845 North Nineteenth Street, Philadelphia, for a one-story factory building to cost about $10,000.

The Bement-Miles Works of the Niles-Bement-Pond Company, Twenty-first and Callowhill streets, Philadelphia, has awarded contract to Fred A. Havens & Co., 845 North Nineteenth Street, Philadelphia, for the construction of a one-story addition to its foundry, 24 x 79 ft., and 21 x 32 ft., at a cost of about $5,000.

L. B. Botfield, 624 South Front Street, Philadelphia, is taking estimates on the construction of a two-story factory for the manufacture of fire brick, 28 x 100 ft., to cost about $10,000.

James J. Allen, 621 Gale Building, Philadelphia, has had plans drawn for a brick manufacturing plant estimated to cost about $25,000.

It is reported that the American Manganese Mfg. Company, Bullitt Building, Philadelphia, has purchased the foundry of the Best Foundry Company at New Kensington, Pa., which operated a gray-iron jobbing foundry of about 20 tons a day capacity.

J. B. Millard & Son, Annville, Pa., are reported to be taking bids on several pumps of 5000-gal. per min. capacity and for other machinery for its stone quarries nearby.

The O. M. Weber Company, maker of mill work, cabinet work, flooring, etc., North Wales, Pa., is in need of new or nearly new wood-working machines, as follows: One multiple wood boring machine; one 16-in. hand planer, or hand jointer; one combination sash and door sticker; one double spindle upright molder or shaper; one emery wheel stand complete; one double-wheel emery grinding wheel complete; one belt sander; wood bending equipment, complete; glue jointer; one multiple molding machine.

New England

BOSTON, MASS., Oct. 2, 1916.

The New York, New Haven & Hartford Railroad has been allowed by the Interstate Commerce Commission to continue its extra $5 a day demurrage charge for two months more. This tariff has been hard on many consignees and shippers, but is believed to have been an effective measure in overcoming the delays in loading and unloading cars. The general embargo has not been found necessary lately, but frequently lists are published which put temporary embargoes upon certain manufacturers who have been delinquent in handling shipments.

The New Departure Mfg. Company, Bristol, Conn., through its engineers, Lockwood, Green & Co., Boston, is asking bids on a factory building, 102 x 352 ft., three stories, and a crane shed and bridge, 80 x 228 ft., one story.

The plant at Amston, Conn., which is to be occupied by the Sterling Automobile Mfg. Company, now located in Paterson, N. J., is being rushed to completion.

The Blakeslee Forging Company, Plantsville, Conn., is installing new machinery in its new addition.

The American Brass Company, Waterbury, Conn., has secured a permit to erect [illegible] with an ell, 48 x 240 ft.

The Simplex Time Recorder Company, [illegible]

has had plans prepared for a three story factory which will more than double its present floor space.

The Chase Metal Works, Waterbury, Conn., has secured a permit for an addition, 61 x 140 ft., one story, on Thomaston Avenue.

The R. N. Bassett Company, Derby, Conn., has bought the three-story factory at Benedict and West Clay streets, and will manufacture steel frames, locks, hinges and other accessories used in making suit cases. It is expected that over 300 workers will be employed. The company now carries on a large business in the manufacture of corset materials.

Pittsburgh

PITTSBURGH, PA., Oct. 3, 1916.

In the surrounding territory advices are that the new demand for heavy machine tools of all kinds is still very active. The best deliveries promised by the makers run from 8 to 10 months on machine tools, and on motors from 7 to 8 months. The new demand for cranes is also very active, and deliveries run all the way from 8 to 10 months or longer. Inquiry is only fairly active for small machine tools, and on account of the high prices and the long deliveries ahead, many intending buyers of small machine tools are picking up second-hand tools wherever they can be found, in preference to ordering new tools at the high prices and waiting so long for deliveries. A recent inquiry came out from the Westinghouse Machine Company at East Pittsburgh, Pa., for equipment as follows:

One 10-ft. planing machine, 10 ft. high, 26-ft. table, 4 heads
One 14-ft. planing machine, 12 ft. high, 26-ft. table, 4 heads
One 10-ft. vertical boring mill, 7 ft. between table and rail
One 8-ft. vertical mill, 6 ft. between table and rail
Two 6-ft. planing machines, 6 ft. between table and rail, 4 heads
Two 4-ft. planing machines, 4 ft. between table and rail, 4 heads
One 3-ft. planing machine, 3 ft. between table and rail, 3 heads
One 6-ft. vertical milling machine, 4 ft. between table and rail
Two 5-ft. vertical milling machines, 3 ft. 6 in. between table and rail
Two 4-ft. vertical milling machines, 3 ft. between table and rail
Three horizontal milling machines, 6 or 7-in. spindle, 42 in. from table to center of bar
One post boring milling machine, 7-in. spindle
Two horizontal boring mills, 3 or 4-in. spindle
All of the above machines to be motor-driven on a 220-volt, direct current.
One 1000-ton forging press, sufficient to handle 40-in. ingot
Five 4-ft. plain radial drills
Six 42-in. geared head lathes
One 48-in. geared head lathe
One 84-in. geared head lathe
Two 6-ft. plain radial drills

Chicago

CHICAGO, ILL., Oct. 2, 1916.

Reports from manufacturers of machinery indicate that business is being largely sustained by virtue of sales abroad and that domestic buying in the last few months has fallen short of normal. This applies to manufacturers of mining and excavating machinery in particular. It is also true to a lesser degree of builders of plate and structural steel fabricating tools, for which there has been an unusual demand for shipbuilding. In standard lines of machine tools no important changes in market conditions have appeared. New inquiry for lathes is reported and also a large aggregate demand for milling machines and automatics. It is of interest to note that the Allis-Chalmers Mfg. Company, Milwaukee, has announced that it will take on no more shell work after Oct. 1, when its standing contracts were completed. It is stated that the company's orders for such machinery and equipment as it normally manufactures will now fully engage its capacity.

The Willard Storage Battery Company, 2424 South Wabash Avenue, Chicago, is having a two-story factory built, 50 x 170 ft., to cost $30,000.

The Standard Spiral Pipe Works, 4800 South Rockwell Street, Chicago, is in the market for a 300 to 500 ton hydraulic press and the necessary pump and accumulator.

The Burnside Steel Company, 548 Railway Exchange Building, Chicago, has been incorporated with a capital stock of $100,000. A tract of land has been purchased at Ninety-second Street and Kimbark Avenue, upon which a foundry, 80 x 200 ft., an office, 30 x 50 ft., and a pattern storage building, with the necessary material bins, etc., are being erected. A side blow converter will be installed, and it is expected to have the plant producing steel castings on Dec. 1. H. F. Wardwell is president, George L. Pollock, vice-president and treasurer, and C. S. Daniels, secretary.

Raynolds Brothers, 1835 West Twenty-second Street, Chicago, will build a garage, 50 x 125 ft., to cost $15,000, and the Chicago Auto Service Company, 5343 South Ashland Avenue, Chicago, a one-story garage, 50 x 121 ft., to cost $12,000.

The Bosch Magneto Company, 119 East Twenty-fourth Street, Chicago, has awarded contracts for its new service building, 60 x 94 ft., which it is to build at 3737 South Michigan Avenue at a cost of $18,000.

The Metal Specialties Company, 3200 Carroll Avenue, Chicago, is building a four-story light manufacturing building, 100 x 160 ft., estimated to cost $100,000.

The Metropolitan Elevated Railway Company, Chicago, is building a new power plant, the building to cost $12,000.

The Douglas Iron Works, Chicago, has been organized with a capital of $100,000 by Irving Zimmerman, 155 North Clark Street, Isadore Brown and E. Peterson.

M. Briskin, 2137 Fowler Street, Chicago, has taken out a permit covering the erection of a two-story machine shop to cost $15,000.

The Packers' Machinery & Equipment Company, Chicago, has been incorporated with a capital of $10,000 by Eugene R. Cohen, Bessie Swick and James Glassner.

The Rockford Automatic Machine Company, Rockford, Ill., has been organized with a capital of $25,000. The incorporators are L. N. Daniels and Oscar T. Wilson.

The Sheridan Stove Company, Quincy, Ill., has been incorporated with a capital of $25,000 by E. H. Huenefeld, Lawrence D. Smith and W. H. Govert.

The Decatur Malleable Iron Company, Decatur, Ill., has filed notice of an increase in capital stock from $75,000 to $100,000.

The Union Products Company, Rockford, Ill., organized by A. A. Martin, formerly sales manager of the Burd High Compression Ring Company, will manufacture automobile accessories, particularly piston rings.

Plans for the Rock Island Arsenal, Rock Island, Ill., provide for the renewal of operations in the small arms plant and extensions for which an expenditure of $1,250,000 is contemplated.

The Enderes Mfg. Company, Littleport, Iowa, manufacturer of hardware specialties, has completed arrangements whereby its business will be moved to Albert Lea, Minn., where a new plant will be erected.

The Megow Traction Company, St. Paul, Minn., is considering the erection of a tractor plant in that city at a cost of $100,000.

The Electric Steel Company, a proposed corporation, of which G. W. Harrison, 1011 Merchants Bank Building; Max Toltz of the Toltz Engineering Company, and Louis Paper of Paper, Calmenson & Co., all of St. Paul, Minn., are the organizers, is expected to build a large foundry and machine shop for the production of electric steel and the manufacture of munitions.

The Federal Cartridge & Machine Company, Minneapolis, Minn., has been incorporated with a capital of $500,000 by Paul R. Seidel, A. C. Egelston and Z. H. Austin, respectively president, vice-president and secretary-treasurer of the company.

The C. & E. Mfg. Company, Marshalltown, Iowa, manufacturer of automobile parts and hardware specialties, is building a new factory which it expects to occupy about Dec. 1.

The Tom Thumb Tractor, Thirtieth Avenue, Southeast, and Northern Pacific Railway, Minneapolis, Minn., announces that its buildings and grounds are ample to take care of its rapidly expanding business for at least some years to come; but that it is short of machinery. The company expects to be in the market for early spring delivery for engine and turret lathes, vertical turret lathes, both vertical and horizontal boring mills, gear shaping machines, milling machines and grinding machines, case hardening ovens and complete floor equipment for its foundry. George C. Jones is president.

The Minnesota Tire & Rubber Company will be incorporated with a capital stock of $200,000 by Nels L. Werner, Red Wing, Minn.; Harry A. Trenholm, of Minneapolis, and James W. Adams, of Ellsworth, Wis. Headquarters will be at St. Paul, Minn. The plant location has not yet been decided on. The company will manufacture rubber goods generally, specializing in automobile tires. Mr. Werner is purchasing agent and will be pleased to get in touch with manufacturers of rubber reclaiming machinery, such as calenders, etc.

Indianapolis

INDIANAPOLIS, IND., Oct. 2, 1916.

The Metal Auto Parts Company, Indianapolis, will erect a factory at Chase and Henry streets to cost $80,000. The plant will cover four acres. The enameling plant will contain 20 ovens. The company will employ there 500 men. It has been working with 150 in its present establishment. B. E. Thompson is president and G. H. Scott is secretary.

The American Metal Furniture Company, Indianapolis, has been incorporated with $10,000 capital stock. The directors are J. A. Miner, Stanley C. Brooks and Edward J. Bennett.

The Mutual Motors Company, Indianapolis, has increased its capital stock from $1,000,000 to $1,500,000.

The Union Refrigerators Companies, Richmond, Ind., have been incorporated with $500,000 capital stock to manufacture refrigerators. Joseph H., E. W. and Elbert W. Shirk, John W. Parkhurst and Jesse E. Moyer are the directors.

The Permalite Corporation, Indianapolis, has been incorporated with $100,000 capital stock to manufacture batteries and other automobile accessories. The directors are E. C. Bacon, E. B. McNabb and Charles S. Shotwell.

The plant of the Bicknell Light & Power Company, Bicknell, Ind., will be moved to Edwardsport and will be enlarged to supply seven neighboring towns. It has been bought by the Indiana Water & Power Company, of Chicago, Ill.

The George J. Hummel Saddletree Company, Madison, Ind., has been incorporated with $10,000 capital stock to manufacture saddletrees, stirrups, etc. The directors are George J. Hummel, Harrison Hoover and D. H. Leitch.

The Hoosier Machine Company, Lebanon, Ind., has been incorporated with $60,000 capital stock to manufacture machinery. Waldo E. Callane, Martin Odekerk and Meredith E. Callane are the directors.

The Poole Engineering & Machine Company, Baltimore, Md., has obtained a controlling interest in the Motsinger Device & Mfg. Company, Lafayette, Ind. The latter company originally made carburetors and automobile devices, but has been giving its attention the last year or so to munitions. Homer N. Motsinger will be consulting engineer for the Poole Company.

The Kokomo Brass Works, manufacturer of plumbing specialties and automobile accessories, Kokomo, Ind., at the present time intends building only a high-grade iron foundry. John W. Johnson is treasurer and manager.

Milwaukee

MILWAUKEE, WIS., Oct. 2, 1916.

A supreme effort is being made in every division of the metal-working industry to provide facilities for handling the constantly increasing volume of business, which in many cases will take up maximum capacity until well into next year. Manufacturers who have been gradually extending their capacities the last 8 to 10 months find it necessary to continue such work, but on a larger scale, in spite of the increasing cost of materials. The question of getting equipment as needed, notably machine tools, is a perplexing one. Tool builders are so crowded with bookings that orders require from 6 to 8 or 12 months for delivery.

The failure of the machinists' strike, which in the last fortnight has brought practically all of the men back to work, has afforded some relief of the congested condition of tool factories. The foundry labor situation is probably more serious, and this condition contributes to some extent to the unsolved problem of the machine-tool trade, particularly as it affects those shops which are obliged to depend upon outside foundries for considerable casting work.

The Allis-Chalmers Mfg. Company, Milwaukee, completed work on its shrapnel shell work contracts on Saturday night, Sept. 30, and is converting the space thus released into a standard machine shop to accommodate regular machine work from other departments of the mammoth plant. The company accepted contracts in August, 1915, for machine work on war munitions from the Bethlehem Steel Company. It is announced that no further shell work contracts will be accepted because of the large demands upon its facilities from regular sources. None of the machinists engaged in work on shells will be dropped from the payroll, but will be distributed among other departments. Work in hand requires many more men than are available, it is stated. The demand for practically every line of production at the various Allis-Chalmers works is said to be the heaviest in years and will keep the capacity well occupied until late in 1917.

The Thorp Automobile Company, Thorp, Wis., is erecting a new public garage, 48 x 70 ft., which is to contain a complete machine and general repair shop.

The Pearson Engine & Mfg. Company, Boston, Mass., maker of internal combustion engines, capitalized at $300,000, may relocate at Green Bay, Wis. Negotiations are being carried on between the company and the Green Bay business men's club. C. D. Ferguson, president, spent the past week on Green Bay to inspect available factories.

The Hart, Dahl Automobile Company, LaCrosse, Wis., is having plans prepared for a two-story garage and service station, 60 x 145 ft.

The Johnson & Field Mfg. Company, Racine, Wis., manufacturer of tanning mills and farm machinery, has leased space in another factory building to compensate for manufacturing space reduced by fire on Sept. 21, when the two upper floors were wrecked. The damaged plant will be rebuilt.

Chalmers Lane, Stevens Point, Wis., has opened a machine shop at 111 North Third Street.

The Reeseville Auto Supply Company, Reeseville, Wis., will build an addition, 40 x 60 ft., to provide more repair shop room.

The Lakeside Bridge & Steel Company, North Milwaukee, Wis., is building additions which will double the capacity of its fabricating and erecting plant. The work is in charge of the Coddington Engineering Company, North Milwaukee.

The Chicago & North-Western Railroad Company has awarded the contract for the construction of its No. 3 ore dock at Ashland, Wis., to the Grant & Smith Construction Company, St. Paul, Minn. The project will involve $2,000,000.

The Chatfield Brass & Iron Works, Escanaba, Mich., has disposed of its business to Hubert and Frank Schepeck and C. H. Van Donk, who have reorganized under the style of Chatfield Machine & Foundry Company. O. P. Chatfield has been in ill health for some years and will retire. The business was established 15 years ago. Peter Brandenberg is retained as superintendent, and the business will be managed by these officers: President, Hubert H. Schepeck; vice-president, C. H. Van Donk; secretary and treasurer, Frank Schepeck.

Chicago interests are reported to be negotiating for the purchase of the John F. Dornfeld machine shop and foundry at Watertown, Wis. The plant has been operating only part time for several months, following the readjustment of the financial affairs.

A report from Eau Claire, Wis., says that C. M. Conradson, known as a designer of lathes and other machine tools, is organizing a company to manufacture several new types of tools at Chippewa Falls, Wis. Details of the plans are not available.

The Metal Stamping & Mfg. Company, of Milwaukee, has changed its name to the Best Register Company, not the reverse, as was stated in THE IRON AGE of Sept. 7.

The Aluminum Goods Mfg. Company, Manitowoc, Wis., is preparing to build a three-story building, 100 x 250 ft., on the site of the present two-story shop, immediately upon the completion of work on the new five-story factory, storage, office and warehouse building, now under way. The building to be replaced is the original unit of the present plant. Plans for the new structure are being prepared by Earl F. Miller, architect, Manitowoc, and the contract probably will be awarded to Walter Oeflein, Milwaukee.

W. H. Cone, Minneapolis, Minn., has practically decided to locate at Eau Claire, Wis., a factory for the production of motion picture machines adapted principally for educational purposes and now being manufactured under contract in Minneapolis and St. Paul. For the present most of the manufacturing operations on parts would be done by Eau Claire concerns, and assembled in the company's plant, but within a year it is intended to establish a complete manufactory.

The Wisconsin Sugar Company, Milwaukee, is preparing to resume operations in its big sugar mill at Menominee Falls, Wis., and will add considerable new equipment, in addition to completely overhauling the present plant. Kurtis R. Froedtert, Milwaukee, is president and general manager.

Charles Skidd and J. Hepmeyer, Kenosha, Wis., are negotiating for a site at Chippewa Falls, Wis., for the location of a proposed plant for the manufacture of pasteurizing milk coolers. The board of commerce, Chippewa Falls, is expected to furnish a three-acre site and a building costing about $30,000, title to which is to pass to the promoters when wage payments have reached a certain stipulated figure.

Martin Tullgren & Sons, architects, 133 Second Street, Milwaukee, are taking bids for the erection of a garage at Downer Avenue and Webster Place. It will be 110 x 122 ft., two stories and basement, and cost $45,000. The Neacy & Read Investment Company is the owner.

The Cumberland Fruit Package Company, Cumberland, Wis., is doubling the capacity of its works by erecting a two-story addition, 32 x 105 ft., of brick and concrete. Additional machinery will be installed.

The Steam Appliance Company, Milwaukee, awarded the general contract for the erection of its new foundry at Sixty-third Avenue and Burnham Street to the Foster Construction Company, Caswell Block, Milwaukee. The steel work has been sublet to the Northwestern Bridge & Iron Company, Milwaukee.

Bids are being taken until Oct. 5 by the board of education, Escanaba, Mich., for the erection of a manual training addition to the present high school at a cost of $30,000. It will be 47 x 100 ft., three stories and basement. The architects are G. Arnzten & Brother.

Bids are being received until the end of the week for the erection of a $15,000 garage and Ford service station at Fifth and Wells streets, Milwaukee, for the Gilman Estate, to be occupied by the Auto Mart of Milwaukee. It will be of brick and steel, 65 x 135 ft., one story and basement. The work is in charge of Thomas Van Alyea, architect, 420 Jefferson Street.

The Armour Packing Company, Chicago, will erect a new branch house and refrigerator building at Ashland, Wis., and has awarded the contract to Tomlinson & Egan, 322 Second Avenue, Ashland. It will be 60 x 80 ft., two stories and basement, and cost $45,000 with equipment.

Fire in the plant of the Green Bay Foundry & Machine Works, Green Bay, Wis., on Sept. 26 caused a loss of $1,500. Repairs are under way.

Cleveland

CLEVELAND, OHIO, Oct. 2, 1916.

Some round lots of second-hand machinery are being offered by manufacturers who have completed munition contracts and have no further need for special equipment. The general demand from all sources for single machine tools and small lots continues quite active. Most of this is wanted for early delivery, but buyers are taking the best delivery they can secure. Shipments of heavy-duty drilling machines have eased off somewhat. As a whole the delivery situation, however, has not improved although the trade is being better supplied than some time ago through regular shipments on stock orders. The demand for forging machinery continues heavy, with an increase of orders from the railroads. Grinding machines are very scarce for early shipment. Considerable new demand has developed for steam hammers. Some good orders for cranes for steel plants have come out the past few days. It is understood that crane equipment, heavier than ever before built, will be required for handling the larger sizes of guns to be made for the United States Government.

A plant to manufacture cold-drawn steel will be established in Cleveland by the Drawn Steel Company, which has been incorporated with a capital stock of $200,000. J. H. Worbs, formerly connected with the Adams-Bagnall Electric Company, Cleveland, is a stockholder. A building site has not yet been selected.

The Peerless Motor Car Company, Cleveland, has placed contracts for two three-story factory buildings, one 60 x 270 ft. and the other 53 x 160 ft. It has completed plans for a one-story steel-frame building with saw-tooth roof, 120 x 300 ft., all to be used in the manufacture of touring cars.

The Chandler Motor Car Company, Cleveland, will enlarge its plant by the erection of a four-story reinforced concrete building, 60 x 500 ft., to be used for assembling and finishing. Ernest McGeorge, Cleveland, is the architect and engineer.

The Winton Company, Cleveland, is having plans prepared for an addition to its automobile plant to cost $80,000. Contracts will be placed so that the work can be started early in the spring.

The Sheer Brothers Fence & Iron Company, Cleveland, is understood to be looking for a site for a new plant with a view of doubling its capacity.

The Metals Plating Company, Cleveland, has been incorporated with a capital stock of $5000 by Edmond W. Hyde, Ralph W. Edwards and others.

The Ackerman Wheel Company, recently incorporated with a capital stock of $2,500,000 is planning to erect a plant in Cleveland to manufacture wheels for automobiles, motorcycles and aeroplanes. Among the incorporators are W. A. Bennett and Henderson McIntyre, 1108 Engineers Building. The company has taken over the business of the Ideal Wheel Company, Massillon, Ohio.

The Buckeye Engine Company, Salem, Ohio, is planning an enlargement to its plant due to increased business. A portion of the old plant will probably be replaced by a building, definite plans for which have not yet been decided upon. In addition to manufacturing gas engines it is making a complete line of presses for the Cleveland Machine & Mfg. Company, an allied interest.

The Advance Electric Company, Leetonia, Ohio, maker of electric devices, of which A. J. Wayman is president, has arranged to move its plant to East Palestine, Ohio.

The Findlay Steel Castings Company, Findlay, Ohio, recently incorporated, has acquired an option on the building now occupied by the Grant Motor Company.

The American Hard Rubber Company, Akron, Ohio, will erect a new plant consisting of five one-story buildings.

The Acme Steel Company, Akron, Ohio, has been incorporated with a capital stock of $60,000 by B. M. Herrick, C. A. Spencer and others.

The Miller Rubber Company, Akron, Ohio, will build a new eight-story brick and steel factory building.

The Sandusky Foundry & Machine Company, Sandusky, Ohio, has increased its capital stock from $100,000 to $200,000 to take care of the growth in its business.

The plant of the Dover Mfg. Company, Canal Dover, Ohio, manufacturer of gas and electric sadirons, was almost totally destroyed by fire Sept. 26. Plans are under way for rebuilding.

Steiner Brothers, Lima, Ohio, makers of tools and jigs, have about completed plans for a new one-story factory, 40 x 150 ft.

The Massillon Foundry & Machine Company, Massillon, Ohio, is understood to be considering the erection of a new plant, having outgrown its present quarters.

The Akron Mold & Machine Company, Akron, Ohio, has increased its capital stock from $60,000 to $300,000 to take care of the growing business.

The Coffield Tire Protector Company, Dayton, Ohio, has been incorporated with $50,000 capital stock by J. P. Coffield and others. The company will have its device manufactured under contract and will not require any equipment.

The Dayton Steel Wheel Company, Dayton, Ohio, has been incorporated with $50,000 capital stock by George Walther and others. Manufacturing plans have not yet been given out.

Detroit

DETROIT, Mich., Oct. 2, 1916.

The demand for machine tools the past week more than made up for the slight falling off of the previous week. A decrease in foreign inquiries is evident, but manufacturers are using this lull to catch up on orders. The larger tools still require several months for delivery. A demand for 20,000 skilled mechanics exists in Detroit, but the lack of houses continues to drive many away. Similar conditions are reported in the larger cities of the State.

The McCord Mfg. Company, Wyandotte, Mich., is planning a two-story one-block addition, which will double the capacity of its plant. The company has been in operation only six months, at that time taking over the plant of the defunct Tilden Saw Company.

The Fay Foundry Company, St. Joseph, Mich., will at once begin building an addition to its plant which will double the capacity.

The Wizard Auto Parts Mfg. Company, Bay City, Mich., has been organized by F. B. Scheurmann and L. J. Weatherwax to manufacture a steering device.

The Motor Products Corporation, Detroit, has begun operations in the plant recently acquired from the Lozier Motor Company. It is the successor of the Diamond Mfg. Company, Detroit, and Walkerville, Ont.; the Rand Mfg. Company, the Vanguard Mfg. Company, the Universal Metal Company, all of Detroit, and the Superior Mfg. Company, Ann Arbor, Mich. All of the Detroit factories are being combined under one roof. The Ann Arbor factory will be maintained for special work, while the plant at Walkerville will be enlarged to take care of the Canadian trade. Property adjoining the Detroit plant has been secured to allow for additions. The output of the company includes hub caps, radiator parts, tubing and metal shapes, exhaust tubes and other automobile parts. Special die and stamping work is also done. The officers are W. C. Rands, president; C. F. Jensen, vice-president and director of purchases; D. D. Lee, treasurer and general manager; H. H. Seeley, vice-president and sales manager, and M. L. Brown, secretary.

The Chatfield Machine & Foundry Company, Escanaba, Mich., has been incorporated for $25,000, to do general foundry and repair work. The stockholders are Frank G. Shepeck, H. H. Shepeck and C. H. Vandonk, all of Escanaba.

The Lansing Pure Ice Company will spend $20,000 this fall in re-equipping its plant for greater capacity.

The River Raisin Paper Company, Monroe, Mich., has purchased 35 acres of land on the Shore Line Railway at

Monroe. G. H. Wood, general manager, has announced that a factory will be built next spring for the manufacture of paper.

The Baker-Vawter Company, Benton Harbor, Mich., has been incorporated for $1,500,000 to manufacture office systems and supplies. William A. Vawter and W. W. Switzer are stockholders.

The Randolph-Pennington-Davis Machine Company, Detroit, has been incorporated to manufacture machinery. The stockholders include Gordon M. Pennington, 2579 Woodward Avenue, Detroit; Eldon W. Randolph and Edward Davis.

The Atlas Drop Forge Company, Lansing, Mich., has increased its capital stock from $200,000 to $500,000.

The Filer Fiber Company, Manistee, Mich., has been organized with $300,000 to manufacture pulp. The principal stockholder is E. G. Filer. Philip H. Schnorback, formerly of Muskegon, will be manager. Work on the erection of a new plant, to be completed within eight months, will begin at once.

The Columbia Motor Car Company is seeking a factory or factory site in Detroit, according to J. G. Bayerline, 1003 East Grand Boulevard.

The Lansing Stone Block Company, Lansing, Mich., has been incorporated by R. H. Fletcher, Reg William Graham and George M. Tews, all of Bay City, Mich., to manufacture cement blocks.

The Metalwood Mfg. Company, Detroit, manufacturer of high-speed machinery, equipment, valves, fittings, etc., is adding 6000 sq. ft. of floor space to its factory and installing new machinery. William R. Keen, secretary and treasurer, will shortly be made president and general manager.

A. M. Chesbrough, Toledo, Ohio, is planning the erection of a saw mill at Newberry, Mich., next spring, to cost $150,000.

The Grand Rapids Furniture Company, Grand Rapids, Mich., will spend $20,000 on a four-story manufacturing addition to its plant.

Cincinnati

CINCINNATI, OHIO, Oct. 2, 1916.

The rolling mills are buying more machine tools than at any time in the history of the trade. Large-sized lathes are in good demand and a number of inquiries are noted for planing and radial drilling machines. Railroad buying is somewhat spasmodic, and only a few orders have been reported recently. The shortage of finished material is becoming a matter of greater concern to all manufacturers. Cold-rolled shafting is hard to obtain for prompt delivery. Shipments of high-speed steel are easier, but the demand is yet in advance of the supply.

The labor situation is more satisfactory. No trouble is reported from local plants. The strikers at Dayton are gradually returning to work, and the trouble there is expected to end within a few days.

The Star Motor Car Company, Cincinnati, has been incorporated with $200,000 capital stock and will establish a plant for assembling steam-driven automobiles. Among the equipment wanted is one 16-in. lathe, several upright drilling machines and portable electric drilling machines. R. M. Wallingford, 1003 Race Street, is secretary.

The Tower Mfg. Company, Cincinnati, is in the market for tack machines, either new or second-hand, to be installed in its plant on Elm Street.

It is currently reported that the Ohio Mold & Foundry Company, Cincinnati, recently incorporated with $100,000 capital stock, contemplates refitting the foundry of the Lane & Bodley Company, in Bond Hill suburb, to be used for the manufacture of ingot molds. Harry L. Klein, Union Trust Building, Cincinnati is one of the incorporators

The Central Tool & Die Company, Dayton, Ohio, has been incorporated with $10,000 capital stock by J. R. Baughman, and others. Manufacturing plans have not been given out.

Contract for the superstructure of the new Dayton Power & Light Company's plant, Dayton, Ohio, has been let to the Structural Concrete Company, Dayton. The plant is expected to be ready for the installation of the necessary equipment early next spring.

The Ohio Malleable Iron Company, Columbus, Ohio, a subsidiary of the Jeffrey Mfg. Company, has had plans prepared for an addition to its foundry estimated to cost $70,000.

The Fischer Auto Sales Company, Columbus, Ohio, will erect a two-story sales building at 269 East Broad Street, which will contain an automobile repair shop.

The Miller Improved Gas Engine Company, Springfield, Ohio, has its new foundry in full operation. No additional equipment will be required just now.

The plant of the Jackson Stone Company, Piqua, Ohio, was completely destroyed by fire last week. It will be rebuilt at an early date.

The Kelly-Springfield Tire Company, Wooster, Ohio, announces that it will build a large addition to its plant.

The American Fork & Hoe Company, Geneva, Ohio, will build a brick addition to the [illegible], 60 x 400 ft. A forge room, 42 x 110 ft., is also contemplated.

It is reported that the Hirsch Iron & Steel Company, St. Louis, Mo., is making arrangements to locate a branch in Cincinnati for handling scrap iron and second-hand machinery.

Baltimore

BALTIMORE, MD., Oct. 2, 1916.

The Crown Cork & Seal Company, 1511 Guilford Avenue, Baltimore, will have a one-story substation, 40 x 80 ft., built at a cost of about $11,000.

A large acid phosphate plant will be built by the Standard Guano Company, 1500 Continental Building, Baltimore, at its plant at Curtis Bay, Md.

The Blackard Stave & Cooperage Company, Stuart, Va., will build a cooperage plant containing a wood-working shop.

The Baltimore Enamel & Novelty Company, foot of Woodall Street, Baltimore, manufacturer of license tags, etc., will build a plant at Westport, Md.

The Chester Shipbuilding Company, Chester, Pa., has awarded a contract for turbine equipment for 15 vessels to the Westinghouse Machine Company, Pittsburgh, Pa. The contract is understood to amount to almost $1,000,000.

The Central South

LOUISVILLE, KY., Oct. 2, 1916.

An increased number of inquiries for power and ice-manufacturing equipment is reported by local manufacturers as the outstanding feature of the week. Projects for establishment of electric-lighting and power plants in the smaller cities of the section continue to come out. A low stage of the river, precluding shipments of Pittsburgh coal, and continued shortage of cars which is having the effect of driving many coal operators virtually out of the open market on steam coals, are threatening enforced suspensions of numerous industrial plants in this section.

The Louisville Provision Company, Louisville, Ky., has let a contract to the Alt Building Company, Louisville, Ky., for construction of a six-story reinforced concrete addition which will double the capacity of its packing plant. J. M. Emmart is general manager.

Fire destroyed the machine shop and engine room of the McDougall Kitchen Cabinet Company, Frankfort, Ky.

The Russell Brothers Company, Perryville, Ky., plans to build an electric light plant at a cost of $50,000.

The Gus Edwards Motor Company, Paducah, Ky., has been incorporated with capital stock of $5,000. G. W. Katterjohn is president. Gus Edwards, secretary, treasurer and manager.

Robert Crow, Madison, Ky., has let a contract to W. L. Hall for the erection of a garage, 40 x 160 ft.

The Security Producing & Refining Company, Irvine, Ky., is to be incorporated in Delaware with capital stock of $3,700,000 to develop oil lands in Estill County, Ky., build and operate refineries, etc. George B. Williams, Irvine, Ky., is president; W. Hume Logan, Louisville, Ky., vice-president, and John M. Hodkin, Winchester, Ky., secretary. The company has acquired rights on nearly 20,000 acres.

G. O. Tuck & Co., Louisville, Ky., are negotiating with Mt. Sterling, Ky., interests for the erection of a tobacco redrying plant at that point, to cost $30,000, which the Louisville Company would lease. The equipment would include a boiler and engine, and tobacco-handling equipment. J. W Vaughn is president of G. O. Tuck & Co.

The Price Mfg. Company, Chattanooga, Tenn., has been incorporated with capital stock of $95,000 and will manufacture foundry products. The incorporators are S. S. Price, W. D. Moon, J. S. Price, F. J. Miller and J. H. Cantrell.

The Knoxville Motor Company, Knoxville, Tenn., has been incorporated with $10,000 capital stock by W. T. Rowe, J. E Dupes, O. A. Kohlhase and others.

The Lockwood Automobile Company, Memphis, Tenn., has been incorporated with $5,000 capital by Robert, Charles G. C. Lockwood, William O'Halloran and Thomas J. Davis.

A. R. Pryor, Jasper, Tenn., has begun construction of a garage and machine shop, [illegible]. Dunwody, South Pittsburg, Tenn., has [illegible]

The water commission, Knoxville, Tenn., has approved the design and specifications for a triple-expansion centrifugal pump of 15,000,000 gal. per day capacity for the municipal water system. H. C. Anderson, Cincinnati, Ohio, consulting engineer, is now preparing revised specifications. The water commission has asked for estimates of the cost of enlarging the present pump house and boiler room, as well as for the construction of new pump house and a filter plant. A $225,000 bond issue is to be voted on by the city Oct. 24.

The Colonial Lumber Company, Bearden, Tenn., is asking for prices on a new or second-hand lighting plant equipment for a small town; second-hand 6 or 7-ft. band sawmill and a new or second-hand engine lathe.

The John G. Duncan Company, Knoxville, Tenn., is in the market for a second-hand, 500-hp. or larger Corliss engine, for quick delivery.

Birmingham

BIRMINGHAM, ALA., Oct. 2, 1916.

Machinery houses report a good volume of business. New construction work is increasing. The graphite mining development in Alabama is constantly calling for apparatus for hydroelectrically operated plants. Activity in the sawmill trade is curtailed somewhat by car shortage.

H. C. Murname, Memphis, Tenn., and associates, contemplate the construction of a shipbuilding plant in Mobile.

The Birmingham Slag Company, Birmingham, which is building a slag-crushing plant with a daily capacity of 3000 to 4000 tons, is nearly ready to purchase machinery. H. G. Ireland is general manager.

The Guin Cooperage Company, Guin, Ala., has been incorporated with a capital stock of $12,000 by J. Miley, Fayette, Ala., and others.

The Clark-Pratt Cotton Mills, Prattville, Ala., will rebuild its hydroelectric dam washed away by floods. An expenditure of $25,000 is involved.

Winchester, Ga., voted $45,000 of bonds for a waterworks and sewerage system.

The Plant City Public Service Company, Plant City, Fla., has acquired the properties of the Plant City Ice & Power Company and proposes to enlarge them. Roscoe Nettles, Plant City, is secretary.

St. Louis

ST. LOUIS, Mo., Oct. 2, 1916.

Business continues good in the machine-tool trade, with all divisions showing a satisfactory volume. While it continues a market of practically single tools the aggregate is keeping up well. On some classes of equipment delivery dates are being anticipated somewhat, indicating that manufacturers are catching up.

The plant of the St. Louis Plate Glass Company, Valley Park, St. Louis, is to be rehabilitated and put in operation.

The Fore Electrical Mfg. Company, St. Louis, has been incorporated with a capital stock of $10,000 by Albert Wehmeier, J. H. McEwen and L. R. Brown to manufacture electrical and mechanical devices.

The Polar Wave Ice Company, St. Louis, will build a branch plant to cost $20,000 exclusive of ice-making equipment.

The Lafayette Motor Car Company, St. Louis, has been incorporated with a capital stock of $15,000 by Milton B. Strauss, W. H. Anderson and Jesse A. Wolfort to equip a machine shop.

The board of public service, St. Louis, has prepared plans for waterworks improvement, including one engine and pump of 100,000,000 gal. per day capacity.

The Motor Repair & Storage Company, Kansas City, Mo., has increased its capital stock by $12,000, and will add new equipment.

The Carthage Foundry & Machine Works, Carthage, Mo., will erect a building to cost about $15,000, and will require some new equipment.

The E. A. Martin Machinery Company, Joplin, Mo., has been incorporated with a capital stock of $10,000 by E. A. and L. M. Martin and Grover C. Jones.

Love & Martin, Joplin, Mo., will erect a garage 70 x 140 ft., which will be equipped with a machine shop.

Trenton, Mo., will receive bids until Oct. 11 for equipment for a filter plant of 1,200,000 gal. capacity, three units; two centrifugal pumps of 1000 gal. per minute; one 60-kw. generator, etc. E. E. Harper, Kansas City, Mo., is engineer.

The McGehee Water and Light District, McGehee, Ark., H. W. Wright superintendent, will install one 175-hp. oil engine, direct connected to one 130-kw. three-phase, 60-cycle, 2300-volt alternating current generator, etc.

Conway, Ark., J. C. Dawson, mayor, will equip a steam pumping station to supplement its electric pumping equipment.

E. L. Bruce & Co., Little Rock, Ark., will rebuild their flooring plant, expending about $100,000 and doubling the former capacity. New wood-working equipment will be needed.

The Prairie Oil & Gas Company, Tulsa, requires heavy pumps for an oil pipe line between Tulsa, Okla., and St. Louis, Mo.

The Ajax Gasoline Company, Nowata, Okla., has been incorporated with a capital stock of $500,000 by J. W. Sanders, Tulsa, Okla.; William H. McCrum and John J. McPherson of Kansas City, Mo., and will equip a refinery.

R. L. Jones, Bristow, Okla., will replace his machine shop and garage recently burned with a loss of $20,000.

Tulsa, Okla., will equip a low-service pumping station at its waterworks plant. Stevens & Stiles, Kansas City, Mo., are the engineers.

About $100,000 is to be expended for the enlargement of the plant of Morris & Co., meat packers, of Chicago, at New Orleans, La.

The Burguires Company, New Iberia, La., will build a sugar refinery to cost about $50,000.

The Jeffery Sales Company of Louisiana, New Orleans, La., has leased a garage and will install about $10,000 worth of equipment.

The Oak Lawn Sugar Company, Franklin, La., is in the market for equipment for an isolated electric plant.

Texas

AUSTIN, TEX., Sept. 30, 1916.

Machinery exports to Mexico show a notable increase the last few weeks. The lines of railroad leading from Rio Grande River points to interior portions of Mexico are now open to regular freight and passenger traffic. The machinery and tool trade in Texas continues to show a steady improvement.

It is stated by Vories F. Brown, San Antonio, president of the San Antonio & Austin Interurban Railway Company, that the financing of that project has been accomplished and that the construction will start soon. An electric power plant is included in the plans.

The Texas Gas Company will install a gas compressing station near Mexia. The Hope Engineering Company, Pittsburgh, Pa., has been awarded the contract.

The Atlantic Electric & Ice Company, Atlanta, Tex., will rebuild its electric light and power plant and ice factory which were recently burned. The cost will be about $40,000.

The Round Bale Gin Company, Seguin, will install machinery to replace that recently damaged by fire.

The Atlantic & Gulf Petroleum Company, Houston, which has a capital stock of $1,500,000, contemplates building an oil refinery upon a tract of land which it owns, fronting the ship channel. R. E. Burt is president.

The Glenn Broom Mfg. Company will install machinery at El Paso for manufacturing brooms. The plant will cost about $10,000.

The Pacific Northwest

PORTLAND, Ore., Sept. 26, 1916.

There seems to be no end to the expansion of shipbuilding facilities. Most of the new projects now being undertaken are for the construction of wooden vessels, practically all to be equipped with steam or Diesel engines, as well as steam, gas or electric subsidiary equipment for handling cargo, etc. Builders of steel vessels also are still adding to their equipment. The completion of vessels now building will give an outlet for a great amount of lumber, for which a strong and increasing foreign demand has been created.

The domestic lumber market is steadily improving, but car shortage has been so serious that some mills have been compelled to close for a time. Mill equipment is rather quiet, but a revival is expected in the spring. Mining, ore-milling and smelter machinery is still an important factor. Preliminary work is being done on several important railway construction jobs in Oregon, and construction of irrigation works is active. Slow delivery of all kinds of manufactured goods from Eastern sources is causing a steady expansion of miscellaneous industries on the Pacific Coast,

developing a demand for power units and specialized machinery for many purposes.

James Feeney, Tillamook, Ore., has organized the Vancouver Ship-building Company, and plans to establish a plant below Vancouver, Wash., for the construction of motorships.

A large part of the steel to be used in building five steamers for Norwegian interests by J. F. Duthie & Co., Seattle, will be fabricated by the Northwest Steel Company, Portland. Ships now under contract in the Portland customs district are valued at over $16,000,000.

J. H. Hansen & Co., San Francisco, agents for Skandia Diesel engines, are having eight 240-hp. engines built in San Francisco shops for vessels now under construction at Astoria, Ore., and Hoquiam, Wash.

The Port of Coos Bay Commission, Marshfield, Ore., is considering plans for the construction of a suction dredge at an estimated cost of $50,000. The Port of Bandon, Ore., is also having plans prepared for a suction dredge for use in Coquille River.

W. L. Corson, chief engineer of the Union Gas Engine Company, San Francisco, has gone East to make arrangements for the construction of Diesel engines under the patents of the James Craig Engine & Machine Works, Jersey City, by the Union Company, which already has the sales agency for these engines.

The Pacific Coast Steamship Company, Seattle and San Francisco, plans the early construction of two 20-knot passenger and freight steamers at a cost of $1,500,000 each. The work on the vessels will be hastened due to recent destruction of its steamship Congress. The boats will be built probably in the Northwest.

The plant of the Everett Box & Mfg. Company, Everett, Wash., was destroyed in a recent fire, with a loss of $30,000. It is understood the plant will be rebuilt.

A shop building of the Empire Copper Company, Mackey, Idaho, was completely destroyed by fire with a loss of about $20,000. It housed the machine shops, sawmill and blacksmith shop. A structure is being built to replace it, and a complete new machine shop will be installed.

Two structures of the International Cement Company's plant at Irvine, Wash., were destroyed by fire with a loss of $100,000. One of the buildings housed the stock of the company. The plant will be rebuilt.

The Dunning & Erich Harvester Company, Harrington, Wash., plans improvements and additions to its plant, to provide for increased business. A structure 50 x 150 ft. will be built this winter.

The Oregon Portland Cement Company, Wilcox Building, Portland, plans improvements to its plant at Oswego, Ore. A river-front dock, conveying system, and a number of barges are included in the program.

The Columbia Engineering Works, Linnton, Ore., will soon lay the keel of the first vessel to be constructed at its new wooden shipbuilding plant. A. M. Mears is superintendent.

Plans for the plant of the Hanover Gypsum Company at Lewistown, Mont., to cost $600,000, are practically completed, and foundation work has been started.

Canada

TORONTO, Oct. 2, 1916.

Fire completely destroyed the machinery and plant of the Percival Plow & Stove Company, Merrickville, Ont., including many patterns.

The utilities board, London, Ont., proposes to purchase motor-driven direct-connected air compressors. E. V. Buchanan is manager.

The McClary Mfg. Company, London, Ont., has let the contract for a galvanizing plant to C. Insell & Sons. The plant will be of brick construction and cost $30,000.

The ratepayers of Dunnville, Ont., passed a by-law to spend $53,000 for an electric light plant. J. W. Holmes is clerk.

The London & Port Stanley Railway, London, Ont., will spend $30,000 in extending its shops and barns.

Tenders are being received for the construction of a machine shop, 50 x 150 ft., of steel and concrete, to be erected at Belleville, Ont., for J. C. Wilson & Co., Glenora, Ont. J. W. Evans, Belleville, is the architect.

E. R. Gray, city engineer, Hamilton, Ont., has been authorized to prepare plans for waterworks buildings and equipment, including a high-duty triple expansion steam unit and steam turbine, to cost $300,000.

Hawkesbury, Ont., is calling for tenders for one electrically driven turbine pump of 1,000,000 gal. per day capacity, direct connected to [illegible] 750,000 gal. per day capacity, with 75-hp. motor, and for one pump of 500,000 gal. per day capacity with 50-hp. motor. M. Gareau is town clerk.

The Superior Barn Equipment Company, Fergus, Ont., is erecting a plant for the manufacture of [illegible] etc.

The Harriston Casket Company, Harriston, Ont., will erect a plant there to replace one recently destroyed by fire.

All arrangements have been completed whereby the Partridge Rubber Company, Montreal, will lease the plant of the Standard Tire & Rubber Company at Guelph, Ont. The Partridge Company is preparing to install machinery in the Guelph plant for the manufacture of [illegible]

The Brunner-Mond of Canada, Ltd., Toronto, has been incorporated with a capital stock of $[illegible] preparations for the erection of a plant at Amherstburg, Ont., for the manufacture of [illegible] products. The Semet-Solvay Company, Syracuse, N. Y., is interested in the enterprise.

The Frost Wire Fence Company, Stevenson Avenue, North Hamilton, Ont., will build a [illegible] to cost in the neighborhood of $4,000.

The contract has been let by the [illegible] Steel Company, Depew Street, Hamilton, Ont., to Messrs. [illegible] & Peebles, Bank of Hamilton Building, for the erection of [illegible] to cost $75,000.

John Bertram, Sons & Co., Dundas, Ont., are making extensive additions to their plant for the manufacture of machine tools, etc.

The Alton Foundry Company, Ltd., Alton, Ont., is in the market for 3-phase, 60-cycle, 220-volt motors of 5, 10, 20 and 25 hp.

The Russell Motor Car Company, King & Duncan streets, Toronto, has received a permit for the erection of a machine shop at Dufferin and Liberty streets to cost $10,000. T. A. Russell is president.

The Dodge Metal Hose Company of Canada, Ltd., Toronto, has been incorporated with a capital stock of $150,000 by Donald L. McDonald, care of the Trust & Guarantee Company; Ella De G. Gibson, Ellis Granger, and others to manufacture rubber and metal hose connections, etc.

The Panther Rubber Company, Ltd., Sherbrooke, Que., has been incorporated with a capital stock of $100,000 by Harry R. Fraser, Frederick S. Rugg, Charles A. Joslin and others to manufacture rubber, hose, etc.

The Manville Asbestos Company, Ltd., Montreal, has been incorporated with a capital stock of $1,000,000 by Gordon W. Macdougall, William B. Scott, James G. Cartwright and others.

The Scrap Metals, Ltd., Montreal, has been incorporated with a capital stock of $40,000 by Edward J. Lyons, Henry A. Larin, Anselme G. Laporte and others.

The Hamilton Brass, Ltd., Hamilton, Ont., has been incorporated with a capital stock of $40,000 by Herbert S. Lees, John M. Telford, Robert P. McBride and others.

The Carola Company of Canada, Ltd., Toronto, has been incorporated with a capital stock of $40,000 by Warren K. Cook, 262 Rusholme Road; Herman R. Petersen, 74 Hepbourne Street; Frank J. Foley, 156 Yonge Street, and others to manufacture phonographs, etc.

The Bishop Lumber Company, Ltd., Nestorville, Ont., has been incorporated with a capital stock of $300,000 by Harry H. Bishop, Harry W. Bishop of Chicago, Ill.; John L. O'Flynn, and others, of Sault Ste. Marie, Ont.

The Alberta Lumber Company, Vancouver, B. C., has been granted a permit for the erection of a lumber mill to cost $100,000.

Government Purchases

WASHINGTON, D. C., Oct. 2, 1916.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until Oct. 10, schedule 162, for one banding press for Charleston; schedule 164, for one 200-ton gantry crane and transfer truck, and schedule 165, for one internal grinding machine, both for Washington; until Oct. 24, schedule 194, for eight turbine-driven blowers for Brooklyn and Mare Island; until date not set, schedule 198, for one electric blue printing machine for Portsmouth; schedule 205, for one combined air circulating pump, two feed main and auxiliary pumps, one main air pump and two fuel oil service pumps, all for Charleston; schedule 211, for furnishing and installing an electrically-operated refrigerating apparatus for Puget Sound; schedule 212, for one track-turning turret machine for Mare Island; schedule 214, for two carriage case annealing furnaces, two cartridge case head turning lathes, one 2500-ton hydraulic heading press and four hydraulic [illegible]

The general purchasing officer of the Panama Canal, Washington, will receive sealed proposals, under circular 1086, until 10.30 a. m., Oct. 19, for furnishing motor-driven centrifugal pumps; under schedule 1085, until 10.30 a. m., Oct. 30, for pumps driven by induction motors, traveling cranes, water turbine-driven exciter, etc.

The following bids were received under proposal No. 70 by the commanding officer, Frankford Arsenal, Philadelphia, Sept. 22, for furnishing under item 1 four hydraulic presses, $68,377; item 2, one duplex pump with motor, $9,300; item 3, one 300-ton horizontal drawing press, $18,200, motor capacity, 250 hp.

Bids were received by the Bureau of Supplies and Accounts, Navy Department, Washington, Sept. 26, for supplies for the naval service, as follows: Schedule 77, steam engineering, class 11, Brooklyn and Mare Island—Eight motor-driven air compressors with spare parts—Worthington Pump & Machinery Corporation, $30,340, $31,564 and $31,308; Westinghouse Air Brake Company, $21,719.70; Ingersoll-Rand Company, $39,064.24 and $34,338.94; class 12, Brooklyn and Mare Island—Four vertical steam-driven air compressors with spare parts—no bids

NEW TRADE PUBLICATIONS

Engine Lathes.—Hendey Machine Company, Torrington, Conn. Catalog. Size, 9 x 12 in.; pages, 67. Pertains to a line of engine lathes for manufacturing purposes built with swings ranging from 12 to 24 in. The various parts of the lathe are described, the text being supplemented by a number of line and halftone engravings and this is followed by illustrations, brief descriptions and condensed specification tables of the various tools, including several for cutting metric threads. Mention is made of various attachments that can be supplied for relieving work, spacing the carriage, supplying power feed to the turret, etc., and a number of illustrations of motor-driven lathes are presented.

Foundry Facings, Supplies and Equipment.—Hill Brunner Supply Company, Cincinnati, Ohio. Catalog No. 10. Size, 6 x 10 in.; pages, 352. Describes with numerous illustrations a complete line of facings, supplies and equipment for all foundry purposes. In addition a number of pages are devoted to the presentation of information that is of special interest to foundrymen. Among the subjects covered are practical suggestions concerning the elements of pig iron, rules for mixing iron by analysis, directions for cupola operation, analyses of pig iron and coke, data relating to the chemical composition of gray-iron castings for various purposes, analyses of alloys, etc. Tables giving the melting point, weight, tensile strength and specific gravity of metals and various other useful information are included.

Piston Rings.—Burd High Compression Ring Company, Rockford, Ill. Pamphlet entitled, "The Burd Piston Ring Directory." Calls attention to the various sizes of piston rings for use on different types of automobiles, motorcycles, cycle cars, trucks, tractors, engines, etc. The rings are arranged alphabetically by code words with the size of the ring and data on the various engines upon which they may be used, the model, number of rings per piston and the number of cylinders. To enable the proper ring for any type of engine to be located readily an alphabetical index at the back giving the name of the engine, the year and model and the page number upon which the ring is listed, is provided. Instructions for installing the rings and a number of tables of useful information are included.

Foundry Equipment.—Whiting Foundry Equipment Company, Harvey, Ill. Booklet No. 125, entitled "A Model Foundry." Calls attention to the general principles underlying the arrangement of a foundry and describes the various departments of an establishment producing gray-iron castings. The descriptive matter is supplemented by engravings of the equipment used in the different departments and a typical layout and list of equipment are given. Mention is also made of the equipment required for brass, carwheel and malleable-iron foundries and railroad shops

Pumping Engines and Jaw Crusher.—Allis-Chalmers Mfg. Company, Milwaukee, Wis. Two bulletins. The first, No. 1637, refers to a horizontal cross compound crank and flywheel pumping engine. The description of the construction of the engine is supplemented by numerous halftone and line engravings, and instructions for making a duty test of the engine are given, together with data on the flow of water through pipes. A number of engravings of actual installations and testimonial letters from users are included. The other bulletin, No. 1810, gives a general description and specifications for a crusher of the all-steel jaw type. The description of the crusher is supplemented by drawings and engravings and a set of dimension diagrams and tables is included.

Furnaces.—Tate, Jones & Co., Inc., Pittsburgh, Pa. Two circulars. The first, No. 153, is devoted to a line of furnaces for heating plates for flanging and annealing, angles for bending or forming and rods for continuous bolt or rivet making machines. A number of illustrations of various types of furnaces in use supplement the descriptive matter, and tables of the standard sizes that can be supplied are included. The other circular, No. 154, points out the advantages of using the overfired type of furnace for which accurate regulation of temperature, ease and economy of operation and increased output are claimed. The furnace is built with a stationary hearth for light work or equipped with a car for work that cannot be easily handled without the use of a crane or other hoisting device. Views of both types in use are presented, together with dimension diagrams and tables.

Automatic Grinding and Polishing Machine.—Excelsior Tool & Machine Company, East St. Louis, Ill. Circular No. 27. Illustrations and descriptive matter explain the operation of an automatic grinding and polishing machine for finishing miscellaneous stove castings. Several views of the machine showing the lid retaining rollers, exhaust system and a pipe polishing attachment are given, and a condensed specification table is included. An illustrated description of this machine appeared in THE IRON AGE, March 30, 1916.

Hardware.—E. C. Stearns & Co., Syracuse, N. Y. Catalog. Illustrates and describes a general line of hardware, including various kinds of tools, riveting machines, brackets, etc. Mention is also made of a combined receptacle and destructor of garbage and waste matter which is built in either the portable or wall type.

Water Softening.—Dearborn Chemical Company, Chicago, Ill. Pamphlet. Discusses the character of waters from the standpoint of their suitability for boiler feed. The material is divided into three chapters dealing with corrosion, including pitting, grooving and electrolysis; incrustation, including soft and hard scale of varying compositions, and foaming, including priming, bagging, causes of explosions, etc., with a discussion on oil in boilers. The various subjects are gone into at some length and methods for remedying the trouble caused are pointed out.

Traction Engines.—Tom Thumb Tractor Company, Minneapolis, Minn. Pamphlet. Illustrations and descriptive matter explain the operation of a tractor of the endless track type in which the traction element is located in the center of the rear end of the tractor. The description of the tractor is supplemented by engravings of the various parts, and a detailed diagram, in which all the parts are marked, is included.

Boiler Room Specialties.—Lagonda Mfg. Company, Springfield, Ohio. Booklet T2. Contains illustrations of different types of tube cleaners and other boiler room specialties, such as automatic cut-off valves, multiple strainers, feed water filters, valve reseating machines and automatic lubricators. One page is devoted to each specialty and the descriptions are of necessity brief, with references to the large catalog giving the detailed information.

Combination Jig Sawing and Drilling Machine.—John Royle & Sons, Paterson, N. J. Circular No. 271. Illustrates a combination motor-driven jig sawing and drilling machine in which the two sections which were formerly built separately are combined in a single unit. The construction of the machine is gone into at some length, the text being supplemented by numerous engravings of the various parts and illustrations of the machine equipped with hand and pedal control and either belt or motor drive are included.

Oxy-Acetylene Welding and Cutting Apparatus.—Alexander Milburn Company, 1418 West Baltimore Street, Baltimore, Md. Catalog No. 24. Deals with a line of oxy-acetylene welding and cutting apparatus and the applications of the process to shipbuilding, foundry, construction and repair work and the wrecking of steel structures. This is supplemented by a number of engravings showing typical shop and field repairs and cutting. The portable and stationary types of apparatus are illustrated and described and mention is made of the different torches and gages used. Illustrations and brief descriptions of the oxygen and acetylene generating plants are given and mention is made of a lead burning outfit and portable acetylene light for out-of-door night work.

Tools.—Vlchek Tool Company, Cleveland, Ohio. Catalog No. 7. Pertains to a line of drop and hand forged tools which includes hammers, picks, drills, drift pins, chisels, punches, flue beading and calking tools, screwdrivers, wrenches, etc. Illustrations of practically all are presented and in a number of cases tables giving the different sizes that can be supplied are included. A number of specially-

THE IRON AGE

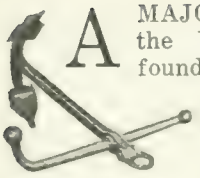
New York, October 12, 1916

ESTABLISHED 1855 VOL. 98 : No. 15

Steel Anchors for Merchant and Battleships

Large Increase in Demand on Eastern Steel Foundries—Stockless Type Versus Old Style—Heat Treatment—How Anchors Are Tested

BY EDWIN F. CONE



A MAJORITY of the anchors made in the United States are produced by foundries in the Chester, Pa., district, and they are cast of steel. While this particular phase of the steel-casting business has been always a minor one, it has at present assumed much larger proportions than ever before. The phenomenal increase in the number of ships of all kinds being built in this country is the immediate cause.

Previous to this the principal demand came from the United States Government, and the larger sized anchors made in the last fifteen or twenty years have been furnished for battleships, cruisers, dreadnaughts, etc. Every Government vessel, of course, has its quota of anchors, several to each. As the size of the dreadnaughts has increased so has the size of the anchor. The largest one ever made in this country, probably in the world, is shown by the larger illustration on this page. Its weight is 20,000 lb., and represents the large ones used in the superdreadnaughts of the U. S. Navy. It was made by the Penn Works, at Chester, Pa., of the Penn Seaboard Steel Corporation, for the U. S. S. Pennsylvania. It represents the type of anchor now generally used on all American merchant and naval ships. They vary in size from 200 lb. up to the one here represented, which is the Baldt anchor, manufactured for the Baldt Anchor Company of Chester, and named after the inventor, Fred Baldt, a pioneer steel foundryman.

Previous to the general introduction of this modern type, and when ships were much smaller, the style of anchor generally used is shown in the small illustration at the introduction of this article. It is known as the old-style anchor, in contradistinction to the one now in use, which is generally called the stockless type. The older style was usually made of wrought iron, but is now cast of steel, and is sometimes in request even now, especially for small vessels. The Baldt anchor was one of the first of the stockless type brought on the market. Since then several other designs of this type have been invented, so that more than one of the large steel foundries of the Chester district has its own anchor which it exploits. Some of these are the Admiral, the Dunn, the Bower, etc.

Some of the special features claimed for the stockless anchor here illustrated, as well as for others of the same general type, are:

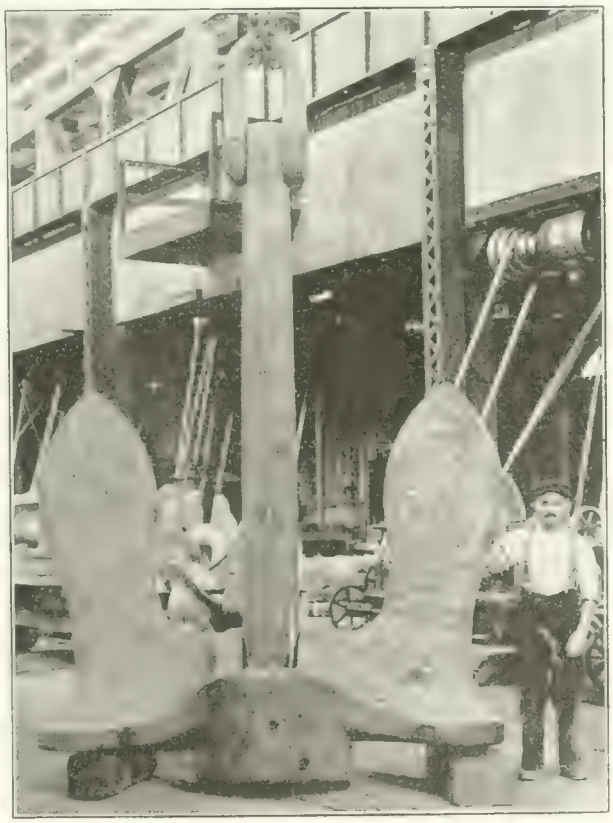
It is impossible to foul this anchor.

It is built on the ball and socket principle. Most anchors are hinged on a pin. After a time the shank shears off the pin and pulls through the head. In this particular design it is necessary to burst the head asunder to pull this shank through.

In the construction the back pin holds the shank in position, but this pin could be dispensed with, for the shank being rectangular would pull up in position and not interfere with the working of the anchors.

The base of the anchor is especially designed so that it fits in the hawsepipe of the ship, acting as a stopper. The flukes (or blades) rest against the side of the ship. The anchor does not catch on the base of the hawsepipe so that when the steamer or sailing vessel is under way the water can wash through the hawsepipe on deck.

In general, it is claimed that any anchor, like the old style, with a shank in an upright po-

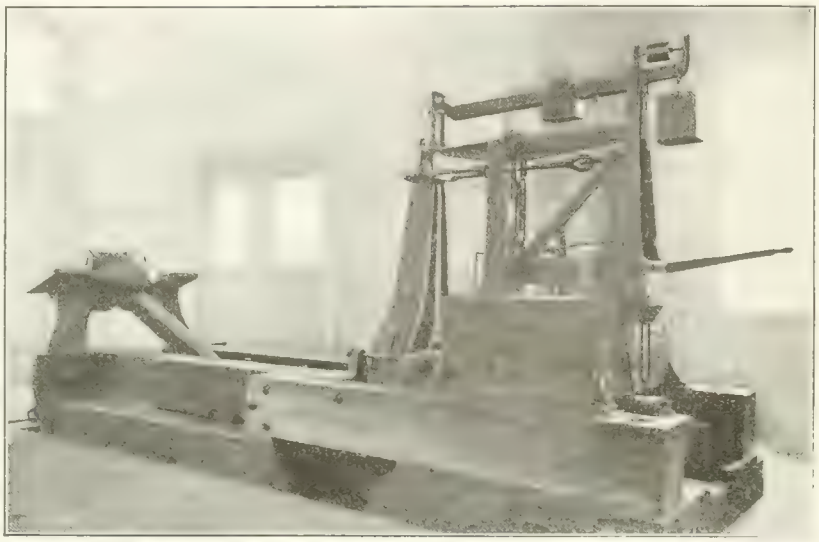


The Largest Anchor Ever Made. It weighs 20,000 lb. and is a Baldt stockless anchor. These are now used on the U. S. S. Pennsylvania and other superdreadnaughts

sition when in service, is at a decided disadvantage, because it is essential that the anchor have sufficient cable to allow the shank to lie on the bottom. This is always easily possible with the stockless anchor.

The metal incorporated in the anchors now made is medium acid open-hearth steel containing 0.25 to 0.30 per cent carbon, 0.60 to 0.70 per cent manganese, 0.25 to 0.30 per cent silicon, and about 0.035 to 0.045 per cent sulphur and phosphorus. The tensile strength after proper heat treatment is 65,000 to 75,000 lb. per square inch, with an elastic ratio of about 50 to 52 per cent, and an elongation in 2 in. of about 22 to 30 per cent, and a reduction of area of about 35 to 45 per cent.

These static qualities could be easily improved by incorporating either vanadium or nickel in the steel, at the same time increasing the dynamic resistance of the metal. Thus far, neither the U. S. Government, nor any other purchaser, has considered it necessary. Nor has the adoption of a higher carbon metal—0.40 per cent carbon, with a tensile strength of 80,000 lb. per square inch—been chosen for the anchors, though for a few years now this grade of metal has been specified for all stems and stern frames of battleships and dreadnaughts.



The Standard Anchor Testing Machine Used for Making the Proof Test on the Completed Anchor. This one is located at the Penn Works of the Penn Seaboard Steel Corporation, Chester, Pa.

In the use of anything but the metal at present employed, the heat treatment would be a more vital question, and one to be more carefully watched, because in the case of vanadium, nickel or high carbon cast steel insufficient or improper heat treatment means a weaker casting than ordinary mild steel.

The proper heat treatment of an anchor has been often the bone of contention between the steel foundryman and the Government as represented by its inspector. The Government, in its specifications for anchors, has a special clause dealing with the annealing, and the claim from the other side has been made that its demands are unreasonable. Briefly, the clause referred to insists on a total annealing period of 108 hr. This period is divided into a certain number of hours in which to bring the casting to the required temperature, into the number of hours at which the casting must be held at this temperature and then into the number during which the heat must be allowed to die out.

To the average commercial foundryman, bent on getting out tonnage and not cognizant of the metallurgical reasons involved, these specifications have seemed unnecessary and unreasonable. The filling of them has often meant interference with the regular routine of annealing operations where the average casting is annealed in less than half the time, or else has involved the use of a special annealer for treating anchors only. In the past, when orders for anchors have been few, and the necessity of taking them has been wise, and almost compulsory, it can be readily appreciated that the temptation to shorten the annealing or to let the filing of the order drag has been a strong one, and one often yielded to.

Aside from the details of the correctness of the stipulated number of annealing hours, it is now more generally recognized than ever before that the Government has erred, if at all, on the safe side. The microscope has enabled us to delve into the inside of a casting. It has shown us that, especially in the case of thick sections of metal, such as in a 15,000 to 20,000-lb. anchor, that the inside may contain very large crystals while the outside may be properly heat treated.

To refine completely the metal of a large casting, time is necessary. To remove entirely all internal strains, complete and proper refinement are essential. To insure producing an anchor that is as strong and safe as possible, proper and complete annealing is vital. It is recognized that the safety of a large battleship or merchant vessel is often dependent on its anchor. One weak section or spot, due to careless or supposedly sufficient annealing, might involve the loss of lives or property. The stipulation of the time for heat treatment, and the watching of it carefully by the inspectors, are guarantees that complete refinement has been obtained, and that a reasonably safe anchor is the result. Subsequent static and drop tests will not ordinarily reveal incomplete refinement.

The majority of the anchors produced in this country are made to three different specifications:

The United States Government
The American Bureau of Shipping
Lloyds Register (British)

Static tests of the metal after annealing are required by inspectors representing each one of these. The extent to which these are carried out, or the importance attached to them, varies widely. For the Government, very careful tests, representing two 8-in. test bars from each fluke of shank, are made, and the demands strictly adhered to. The American Bureau of Shipping and Lloyds Register, under the supervision of which many vessels are built in this country, do not attach so much importance to these tests, in many cases only a bending test being made.

In the light of recent knowledge and experience, it is a question to what extent a test bar of a steel casting really reflects the metal in the casting. To depend on this alone would be unwise. The drop test is employed to supplement the static test. Each important part of the anchor is lifted to a height determined by its size and allowed to fall by its own weight on a hard surface of some stipulated nature. It is then lifted by a crane and hammered all over with a heavy hammer. The ring of the metal being satisfactory, the specifications are met.

This is the extent to which the U. S. Government goes in purchasing anchors.

A full-size test of all anchors is required by the American Bureau of Shipping and Lloyd's British Register. This involves a special machine, shown in one of the illustrations. After the various parts of the finished anchor have been assembled it is tested as shown in the photograph. After placing the anchor in the position indicated, the clevis is attached to a plunger located in the trough of the construction. By pneumatic pressure a definite pull is exerted on the shank and flukes of the anchor, the amount being determined by the anchor's weight, as fixed by the tables of the inspection bureau. To test a 1000-lb. anchor, the proof strain demanded in Lloyd's is about 25,000 lb. The weight on the beam is set at 25,000 lb., and when, from the pull exerted, the beam lifts, the test is completed. For a 17,800-lb. anchor the proof strain required is very close to 200,000 lb. The proof strain for the large 20,000-lb. anchor would be about 225,000 lb., but so large an anchor has never been tested. They have been made only for the U. S. Government. Several of these are in use, or ready for use, on the Pennsylvania, the Arizona and the Mississippi. Usually, an anchor easily stands this test, though some shanks have broken from defects in the metal due to blow holes, poor annealing, etc. It will be noticed that in this test the anchor is very much in the position that it is in service.

Why the U. S. Government has never adopted this test is not clear. It has been used by the British Government for years. It would seem that it would make assurance doubly sure, if of any value at all, for, as already stated, static and drop tests do not necessarily bring to light all the defects of so important a casting, especially in the case of unsatisfactory heat treatment.

The fitting up and putting together of these anchors is by no means a small matter. It is not in line with the general routine of a steel foundry's work, and interferes often with the regular work; nor has there even been enough of such work to make it a specialty. It is natural that the foundries of the district referred to should be looked to for such castings. It is these foundries which for so many years have supplied the U. S. Navy with all its very large and small important steel castings for its battleships, cruisers and dreadnoughts, as well as for very many merchant ships. A new problem comes to them now, for the demand for these anchors has many times more than doubled. Driven as they never have been before, with orders of all kinds, the filling of such orders, while a patriotic duty, is, nevertheless, a decided burden.

It is interesting to speculate as to just what sized anchors will be necessary for the new 850-ft. superdreadnoughts about to be built for our new navy. They will be, of course, considerably larger than the 20,000-lb. anchor, now the largest. It is the writer's distinct memory that only a few years ago several 10,500-lb. Dunn anchors were shipped from Chester, Pa., to the Pacific Coast for use by the U. S. S. Ohio, then being built at the Union Iron Works. Then those were considered very large.

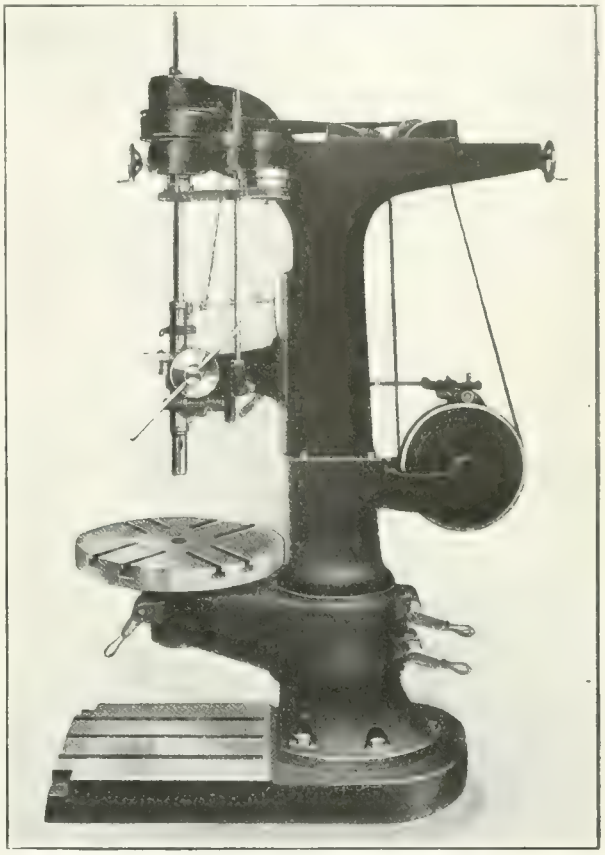
The industrial preparedness census has shown a co-operation of the industries to the extent that 75 to 80 per cent of firms doing business annually in excess of $100,000 have responded.

Mayor James Rolph, Jr., San Francisco, Cal., is preparing to have a practical test made of a method of reducing iron ore with oil fuel, invented by A. Bourcoud, a Spanish engineer.

New Sensitive Drilling Machine

The Cincinnati Pulley Machinery Company, Covington, Ky., has recently put on the market a type of a sensitive drilling machine, which is provided with a flat working base, measuring 24 x 26 in., and resting on the floor, so that heavy castings can be worked on, which is sometimes not possible on the usual table furnished. For light work a round swinging table 24 in. in diameter is supplied that can be swung out of the way when the bottom base is used.

The maximum distance from the spindle to the round table is 18 in. and from the spindle to the floor base 42½ in. and the minimum distance from the spindle to the floor base is 17½ in. Changes of spindle speed are obtained in the usual manner by shifting the belt to the different steps of the countershaft cone pulley. Holes from ¾ to 1⅛ in. in diameter can be drilled and the maximum speed is 12,000 r.p.m.



This Single-Spindle Sensitive Drilling Machine Is Equipped with a Round Swinging Table for Ordinary Work and a Flat Base for Heavy Castings

The Welsh Tin-Plate Trade

Tin-plate exports from Swansea, Wales, have shown a steady decline since the war started. In July, 1913, they were 27,031 gross tons, from which they declined to 26,100 tons in July, 1914, to 19,470 tons in July, 1915, and to 17,384 tons in July, 1916, of which 8166 tons went to France, 3044 tons to Scandinavia, 2343 tons to Japan, 1658 tons to China, Hong-kong, Straits Settlements and Siberia and 137 tons to Chile. The decline in exports of black plates and galvanized sheets has been equally pronounced. A comparison of the exports of the three commodities is shown as follows in gross tons for the calendar years:

	1913	1914	1915
Tin plates	261,646	221,670	201,712
Black plates	57,561	17,216	42,086
Galvanized sheets	49,417	27,598	9,851

Tin-plate exports from the United States in 1915 were 154,541 gross tons, and for the fiscal year ended June 30, 1916, they had advanced to 230,472 tons.

L. J. Cohen & Co., dealers in old metals and metal goods, have acquired a building at 4812 McKissock Avenue, St. Louis, Mo.

Iron Carburization by Blast-Furnace Gas*

Effect on Wrought Iron and Analyses of the Deposits—Remarkable Disruption of Screw Threads — Disintegration of Fire Brick

BY DR. J. E. STEAD

T. H. BYROM, in his paper on "The Carburization of Iron at Low Temperatures in Blast-Furnace Gases,"† showed that soft steel, when exposed to the action of the gases from blast furnaces at the Wigan furnaces, which were employed in the manufacture of ferromanganese, is substantially converted into carbide of iron, Fe_3C, without the formation of any free carbon in the interior of the mass. The temperature of the gases varied between 600 and 700 deg. C.

Sir Lowthian Bell, previous to 1872, showed that when carbonic oxide is passed over iron oxide at 400 deg. C. and above, reduction of the oxide to the metallic state is more or less complete, and coincidentally the carbonic oxide is reduced to free carbon in the spongy mass. John Pattinson, previous to 1876, working in conjunction with Charles Wood, proved that firebricks, used in furnace linings, if they contained free oxides of iron, disintegrated in course of time, due to the same peculiar reaction. The carbonic oxide penetrating the porous bricks, attacked the oxide and deposited carbon, which, exerting enormous pressure, burst the bricks into pieces.

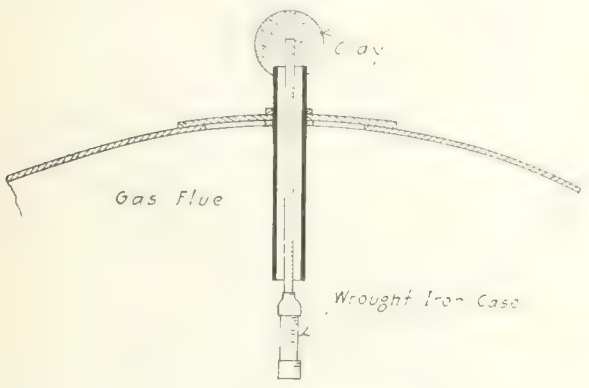


Fig. 1—Method of Suspending the Wrought-Iron Case in the Gases

Pattinson also recorded the results of an examination of a black powder found in the concrete of a gas-flue at the Tees Iron Works. It contained the following:

	Per Cent
Carbon	91.76
Iron	3.54
Phosphorus	0.012
Silica oxygen	1.777
Loss on drying at 212 deg. Fahr.	2.880
Ratio of iron to carbon	91.76 carbon / 3.54 = 25 carbon : 1 iron

Pieces of cast iron, having all the properties of Cleveland pig iron, were found inside the mass of black deposit. In the incombustible part of the black substance, excluding the oxygen, the elements were found to be associated in the same ratio as they exist in Cleveland pig iron. It was assumed that rusted pieces of Cleveland scrap iron had accidentally got into the concrete, that the carbonic oxide had attacked the rust, and the spongy iron produced had induced the continuous deposition of carbon from the carbon oxide.

The exact reactions which actually occur are far from being clear, and it is doubtful whether they can be dismissed by the formula usually advanced. The question as to whether the lower oxides of iron play any part in the reaction is not clear.

It is known that during the carburization of iron in the cementation process, the carbonic oxide gas is the vehicle of the carbon and that carbon dioxide and iron carbide are the products:

$$3Fe + 4CO = Fe_3C + CO_2$$

and that it is improbable that oxides of iron play any part as an intermediary.

Much might be written on the alleged chemical and catalytic reactions, but it is not proposed to do this at present, the object being to show that apparently the oxides imprisoned in wrought iron induce carbon precipitation, and the partial disintegration of the iron itself, when such iron is heated in blast-furnace gases rich in carbonic oxide. It has been shown that at 550 deg. C. and above, gases containing about 30 per cent carbonic oxide and 3 to 4 per cent carbonic acid rapidly carburize iron, but at lower temperatures than 500 deg. C. there is no carburization.

The object here is to describe the effect of blast-furnace gases on wrought iron, at temperatures between 400 and 500 deg. C. The phenomena were observed quite incidentally when experimenting on the magnetic properties of manganese steels with the object of ascertaining the effect of very prolonged heating at relatively low temperatures. Bars of steels were placed inside of a wrought-iron tube or case, and the case with contents was placed in the middle of a gas flue, where the temperature ranged between 400 and 500 deg. C., and was allowed to remain there for nearly two years, but the case and the bars were removed and examined at intervals.

Fig. 1 clearly shows the method of suspending the case in the gases. After exposure for a year, the wrought-iron tubes were found to be blistered in many places, and at certain points layers of the iron had been torn away from the places where the screwing terminated and were beginning to curl over in the way illustrated in the sketches.

As one had the opportunity of examining the outside of the case at intervals, the gradual and progressive tearing action was followed. From the first it was clear that carbon was being deposited from the gas and was responsible for causing the disruption. Fig. 2, *a*, *b*, *c*, *d*, show step by step the mechanical effect of the carbon. It is almost certain that that element was continually deposited along the line of cinder, and behaved just as if it were the point of a planing tool.

The iron itself was not carburized, as was proved by an analysis which gave only 0.05 per cent carbon, a fact justifying the conclusion that the temperature had not exceeded about 500 deg. C. On screwing off the cap to get at the bars, a considerable quantity of fine dense black powder fell out with

*From a paper presented at the autumn meeting of the Iron and Steel Institute in London, England, Sept. 22, 1916.

†Delivered before the autumn meeting of the Institute in Sept., 1915. Abstracted in THE IRON AGE, Nov. 18, 1915.

the bars, and the lower part of the upper tube contained much of the same substance loosely adhering to its sides. In physical appearance the powder resembled lamp-black.

All the blisters on the tubes were filled with this black powder, and some had deposited on the inside walls of the thicker tube as well as the walls of the thin tube. Originally these walls, as well as the exterior surfaces, were coated with a thin layer of blue scale, as is usual with all such hot rolled material. Carbon seems to have deposited over the whole interior surfaces, but none at all on the exterior portions, excepting at the parts which had been cold distorted at the screwed portions beyond the terminations of the caps. Fig. 3 represents a section through the wrought-iron case and upper tube and the parts marked *A* where carbon had deposited.

A most remarkable circumstance was noted about the places at *A*. Parts of the screw-threads had been removed by the disruptive effect of the carbon from the gases. Originally the threads were continuous to the end *B*, but after two years only the black deposit remained, together with particles of the iron which had been disrupted. A slight coating of black deposit was found on the bars of manganese steel, even on the faces that had been polished.

There was not sufficient of the powders to make thorough analyses, but both free iron and magnetic oxide were isolated. The free iron was determined by finding the amount of copper, given weights of the powders precipitated, and from that the iron was calculated. Each of the powders on treating with dilute sulphuric acid gave off hydrogen gas.

The residue, after dissolving out the free iron, contained carbon and a black substance readily attracted by a magnet, and after this was separated the carbonaceous residue contained non-magnetic oxides equivalent to about 20 per cent of non-magnetic oxide on the original sample. The partial analyses were as follows:

	Inside the Case, Per Cent	Inside the Upper Tube, Per Cent
Carbon	27.8	72.60
Free iron	10.9	7.90
Non-magnetic oxide	21.0	Iron 13.50
Magnetic oxide	26.0	
Manganese oxide	1.3	0.25
Silica	2.9	0.90
Total iron	44.4	21.4

The quantity of powder from the upper tube was not sufficient on which to determine the amount of magnetic and other oxides. The larger amount



Fig. 2—The Mechanical Effect of the Carbon is Shown Here Step by Step. It is believed to have acted much as if it were the point of a planing tool

of manganese in the deposit found in the case itself suggests that a portion of it had come from the surfaces of the manganese steel bars. As the caps were screwed tightly on to the ends of the case, it was supposed the case was quite gas-tight; and if it was, one is forced to the tentative conclusion that carbonic oxide passed through the solid iron.

That it is capable of penetrating iron to a depth of about a quarter of an inch at 600 to 650 deg. C. has been proved by previous experiment, but that it should penetrate right through the iron and deposit carbon on the inside walls of the iron tubes at under 500 deg. C., if true, is very remarkable, and further trials are being conducted to confirm or negative these observations.

The explanation offered for the disruptive action on the screwed portion of the tube is that, in the act of making the screw, the inclosed cinder



Fig. 3—A Section Through the Wrought-Iron Case and Upper Tube. Portions marked *A* are where carbon has deposited

layers and threads were crushed and made very porous to gases, and the CO gas penetrated and burst away the metal above the cinder layers.

On testing the black deposits for carbon by color, only traces were found in the deposit from the upper tube, but 0.21 per cent in that from the lower tube; a portion of this may have come from the manganese steels, which contained up to 2 per cent carbon. Incidentally, it may be remarked that at high temperatures spongy iron reduced from iron ore is rapidly carburized, and it is justifiable to believe that as ore is reduced and descends down the shaft of a blast furnace it becomes highly carburized before it reaches the melting zone, and not, as is usually assumed, that it remains as spongy iron till it begins to melt. It is more than probable that before the reduced iron is half way down to the hearth it will have combined with at least 2 per cent carbon.

In reviewing the result of the observations and experiment given in this note, it would appear:

That even hard and refractory iron scale and the magnetic cinder inclosed in wrought iron are capable of reacting with carbonic oxide at temperatures between 400 deg. and 500 deg. C.

That wrought iron containing free oxides is capable of being partially broken up by the action of carbonic oxide gas on the inclosed oxides or cinder.

That under the conditions named even initially non-oxidized steel acts on carbonic oxide gas, inducing carbon to be deposited on the surface.

Announcement is made that the Chinese Government has closed a contract with the Siems-Carey Company of St. Paul, Minn., for the construction of more than 2000 miles of railroad in China. The Siems-Carey Company is financed by the American International Corporation of New York. The route of the railroad has not been determined upon. The probable cost of the work, according to dispatches from Peking, will be over $100,000,000.

RECLAMATION OF BRASS ASHES*

Processes Outlined for Recovering Coal as Well as Fine Metal Particles

BY ARTHUR F. TAGGART

Considerable loss is sustained in brass foundries by the failure to reclaim as fully as might be done the metals and unburned fuel which are now disposed of as part of the waste of the plant. A sizing-assay test of a typical casting shop ash showed 10.05 per cent copper, which on the basis of 65-35 brass meant 5.4 per cent zinc. A sorting test revealed about 15 per cent

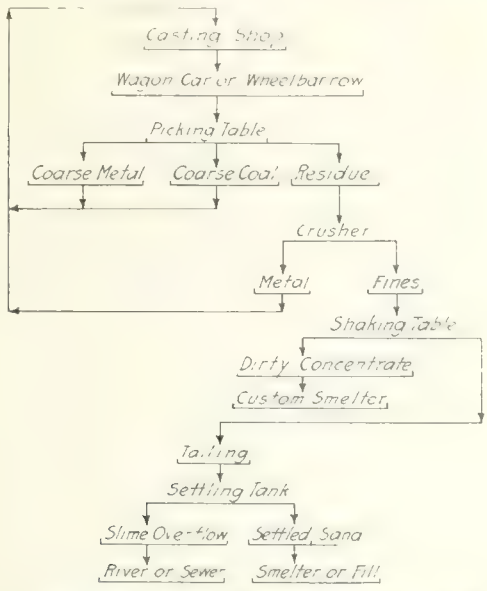


Fig. 1—The Ordinary Process of Reclaiming Brass Ashes Wastes a Large Percentage of the Valuable Material

of unburned or partly burned coal. The money value per ton of this ash, at normal prices for materials is:

Copper, 10 per cent, 200 lb. at 13c.	$26.00
Zinc, 5.4 per cent, 108 lb. at 6c.	6.48
Coal, 15 per cent, 300 lb. at $2 per ton.	.30
	$32.78

The method of recovering these values varies in different plants, according to the size of the plant and the consequent production of ashes, and according also to the technical talent available. Some small plants sell directly to local junk dealers, others ship to custom scrap metal plants; the large majority treat the ashes by some crude method to recover the coarse metal. Some of these sell the fine residue at absurdly low prices, while others use it for filling in low ground around the plant. A few of the larger companies treat the ashes in modern, well-designed reclaiming plants, obtaining as products clean coarse metal which can be melted directly into ingots, and fine rich concentrate which is smelted on the ground and which also yields ingot metal.

In many brass foundries the reclaiming plant consists of a picking floor or table, from which coarse metal and lump coal are removed, followed by a grinder with restricted discharge. A part of the residue from the picking table is charged into the grinder, and when the discharge through the screen has practically ceased, the accumulated cleaned metal is removed. This process is repeated until the accumulation of ashes is cleaned up. The fine product from the grinder is usually run over a shaking table of the Wilfley type, from which a dirty concentrate is recovered. The tailing of the table goes to a settling tank or pond, the overflow of which goes to the river or the sewer. The material settling in the tank is sold for what it will bring. Fig. 1 is a flow-sheet of such a plant.

The above process recovers only a fraction of the metal and coal in the ash, whereas a proper method of treatment would recover nearly all. The factors which must be considered in the design of such a plant are:

1. The character and quantity of the ashes; 2, the treatment of the products of the concentrating plant; 3, the characteristics of the machinery to be employed; 4, costs, both capital and operating, and their effect on percentage of recovery.

The first step is to make a sizing-sorting-assay test of the original ashes, to obtain the necessary information concerning the distribution of metallic values and coal and the amount of slag that must be ground. Grinding, sorting and microscopic tests on the slag afford knowledge as to the distribution and size of the metallic shot which it contains and thus tell to what extent comminution must be carried in order to free for concentration the economic maximum of metal. From the knowledge thus gained an experimental flow-sheet or mill scheme is built up in the laboratory and a test run made to confirm the deductions from the original test. From this test run, and, if necessary, subsequent test runs, a tentative flow-sheet for the mill installation is drawn up. This scheme must be examined from the point of view of economical operation, and a balance struck between capital charges and operating costs for the particular quantity of ashes available for daily treatment.

It is best to outline the tentative flow-sheet without consideration of the tonnage to be treated, with the aim only of maximum recovery, and estimate the capital and operating costs of this installation. Then by the

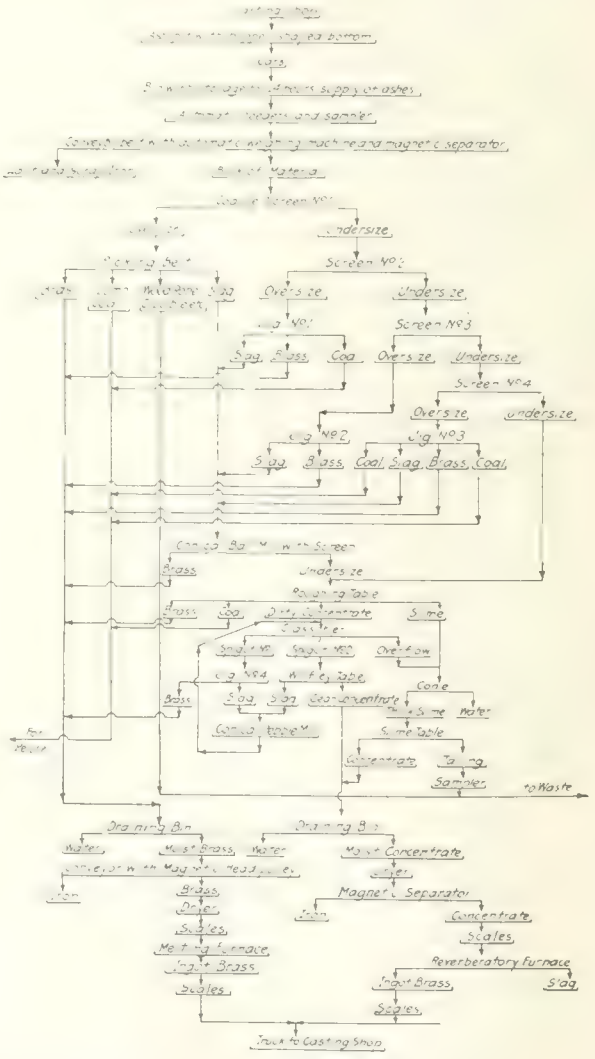


Fig. 2—A Complete Reclaiming Plant Will Recover All but a Minute Fraction of the Coal and Metal from the Ashes

successive elimination of one machine after another and a corresponding revision of cost figures and recovery percentages a point will be finally reached which promises maximum financial return.

In Fig. 2 is given a tentative flow-sheet for a plant to treat casting ashes ranging in size from 4 in. down

*Abstract of a paper presented Sept. 13, 1916, at the meeting of the American Institute of Metals at Cleveland. The author is identified with the Hammond Laboratory, Yale University, New Haven.

to dust and containing 15 to 20 per cent metal and 25 to 30 per cent unburned and partially burned coal. Certain fundamental principles leading to a maximum recovery have been followed. No material containing free metal, *i. e.*, metal with no adhering slag, has been sent to a crusher. This means no unnecessary grinding of metal, which would produce fine metallic flakes difficult to recover. No coal is ground. Only the slag which contains included metal shot is sent to the grinders. No material is thrown away until it has been ground to the finest size. This is done because microscopic examination of the slag has shown included shot in slag particles as small as 0.005 in. diameter. Such a plant as this can be made to discharge tailing containing not more than one-half of one per cent metallic copper. Not less than 5 tons of ashes per hour

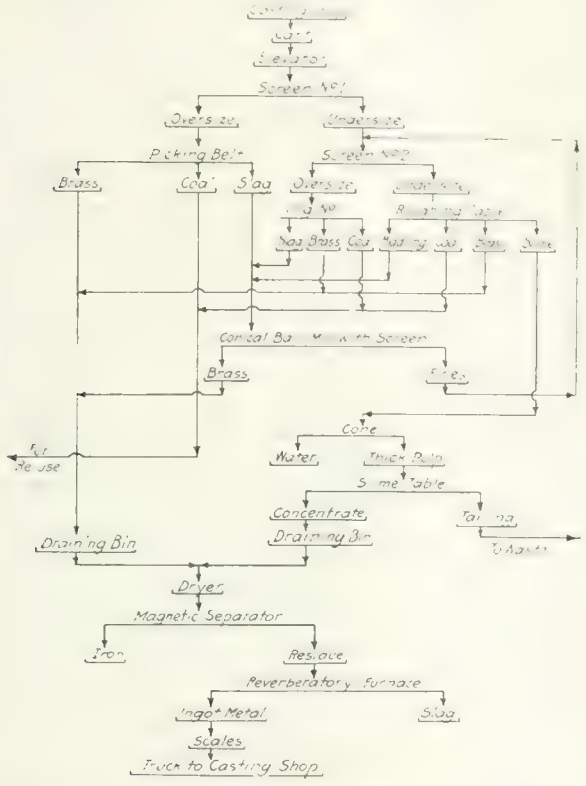


Fig. 3.—Where the Amount of Material to be Handled is of Small Volume This Simpler Arrangement will be Economical

should be handled in such an elaborate plant. A simpler plant for a smaller quantity is outlined in Fig. 3.

The costs of the plants above outlined will depend, of course, on the character of the housing. The smaller plant, with a capacity of 20 tons per day, housed in a wooden building, will cost $15,000 to $20,000. The larger, with a capacity up to 200 tons per day, housed in a steel building, will cost $80,000 to $100,000.

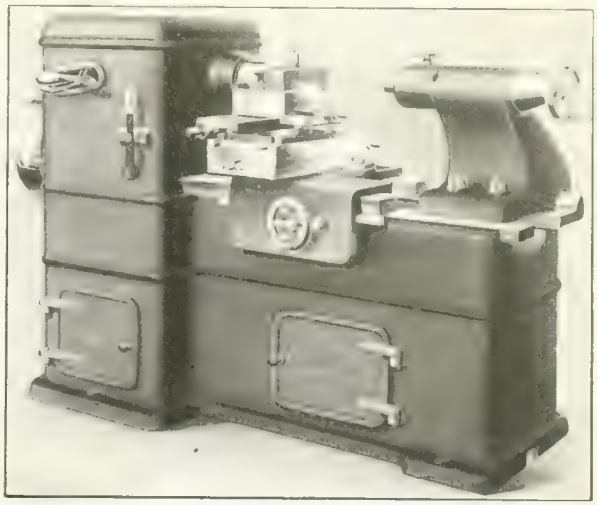
Smokestacks of Spiral Pipe

A smokestack 50 ft. high has been supplied to the city of Chicago by the Standard Spiral Pipe Works. It is a single piece of the company's standard reinforced spiral pipe. The company recently built for its own use two stacks 55 ft. long from single pieces of 20-in. pipe. These stacks were guyed with but one set of wires each and recently were given a severe test when a wind storm passed over that section of the city. It is stated that other smokestacks in this neighborhood having from two to four sets of guys of the same length were blown down, together with telegraph poles and trolley wires, while the stacks in question were not affected.

The Timken Roller Bearing Company, Canton, Ohio, started its new steel plant last week, taking the first heat from one of its 6-ton Heroult electric furnaces. The company will ultimately install four Heroult furnaces for the manufacture of steel billets for use in its own plant, but it will probably be some time before the other three furnaces are erected.

Machine for Relieving Formed Cutters

A machine designed for relieving formed milling cutters up to 13½ in. in diameter and any number of flutes from 1 to 28 inclusive and every even number of flutes from 28 to 42 has been brought out by the Cleveland Milling Machine Company, Cleveland, Ohio. This is



This Machine Was Designed to Give Straight, Side or End Relief on Cutters up to 13½ In. in Diameter and Having from 1 to 28 Flutes

said to be the only standard relieving machine on the market. It has been customary for makers of milling cutters to fit up an attachment to a lathe to do this work or design a special machine for relieving. The Cleveland relieving machine is designed to give straight, side and end relief for all work within its capacity.

It is made extremely rigid, heavily ribbed, the box section being used in constructing the main parts. The spindle is driven by a large wormwheel lined with solid taper bearings adjustable by one nut at the outside of the machine. The spindle has a clutch drive to insure the positive rotation of the tool to be relieved. All gears and shafts are hardened and ground and run in oil on roller bearings.

The machine is arranged for a single-pulley drive providing five mechanical speed changes for the spindle in geometrical progression. One of the important features of the machine is the single-throw cam that is adjustable from nothing to ¾-in. relief. The camshaft runs directly through the center of the machine and operates almost exactly under the tool slide. The machine is arranged so that the tooth to be formed can be placed in proper rotation with the forming tool without loosening any bolts or nuts. Another advantage claimed for this machine is that the tool holder block is adjustable for holding tools from ¼ to ¾ in. in thickness. The carriage and apron are made in one piece, thus assuring additional rigidity to the tool slide which is readily adjustable for setting for side and end relief. The machine weighs approximately 7000 lb.

A Course in Foreign Trade

A foreign trade course for the season of 1916-17 is to be given by the Philadelphia School of Commerce and Accounts at the Central Y. M. C. A., Philadelphia. The first term of the new year began Oct. 2, when a beginners' course was planned. Advanced instruction is also to be given. The second term begins Jan. 29, 1917. Each of the two evenings a week devoted to this course is divided between foreign trade topics and languages.

The sales offices at 90 West Street, New York City, of the Erie Engine Works, Erie, Pa., maker of steam engines and boilers, will hereafter be conducted under the management of W. B. Connor, Inc., which concern has been appointed general sales agent for New York territory and for export.

Educational Extension by Practical Men

The Man Who Is Employed Can Make Himself More Valuable or Rise to Become an Executive by Continuing to Educate Himself

BY STERLING H. BUNNELL

No matter how scarce unskilled labor may be, skilled labor is always scarcer. Men capable of leadership are never enough for the opportunities waiting. Manufacturers and business men are therefore always interested in the attempts made by some few of their employees to develop capacity for responsibility. A fair day's work can hardly do more than maintain the worker in the position where he is, and can give him only the hope of slow promotion as continued experience provides increasing manual or clerical skill. To break out of the ranks into leadership requires unlimited effort, disregard of the eight-hour limit "approved by society" in one's own personal schedule of work, and an intelligent and persistent effort to continue and extend whatever education may have been already obtained.

EDUCATION SHOULD NEVER STOP

Much energy was expended a few years ago in arguing the proposition that college education disqualifies men for success. Interest in the controversy ceased as educational opportunities increased the proportion of successful men who have been through college or technical school. However, conspicuous examples of leading executives who started as office boys or mill hands at 14 years of age are as numerous as ever. The obvious conclusion is that the kind of education which brings success is something that may be pursued out of school, and is not necessarily among the branches taught in college.

In the broadest sense, education never stops for any man. From school or college to the end of business life, the education that gives the knowledge necessary to the handling of unusual conditions goes on continuously. The ability to carry responsibility, to act when and as required by unusual circumstances, may develop gradually out of the ordinary routine of work, but can be gained more rapidly and surely by constant and direct study.

Education in connection with an illustration of practical experience is the purpose of the numerous private auxiliary and special vocational schools which supplement the general educational system. Schools for teaching bookkeeping and clerical work, stenography and typewriting, salesmanship, advertising and commercial practice are within reach of almost every resident of a town or city, and form part of the free school plan of not a few large cities. Specializing further, there are apprentice and trade courses, and textile, agricultural, accounting and banking schools, some privately operated by corporations, others provided by city or State governments.

THE DAY'S WORK MAKES PART OF A MAN'S EDUCATION

All these schools express the fact that direct study along particular lines makes workers more efficient and therefore increases their earning power. But attendance at such schools is not necessary to success in business. The same or better educational results can be secured by every man who will take the trouble to make his day's work part of his education, and continue in the shop or office the same habits of observation and study that are required for success in school.

It is perfectly evident that the successful executive who commenced work as a boy of 14 did not then understand the theories of salesmanship, accounting, management and finance, but must have acquired the knowledge somewhere along the way to his present responsibilities. Obviously, every factory or office worker who looks forward to a better job should get busy at once on the necessary self-education. For observer and teacher he must serve himself, and learn to look on himself and on his work as impartially as on another man. Let him consider the methods he used in getting his job. They must have succeeded, which is to say that he must have presented himself as the most competent applicant for the position. That was salesmanship; he sold his services, took the order for himself, and established pleasant relations with his employer.

Success in getting and holding a job is always connected with salesmanship, and with this idea in mind the opportunity for education along this line is in reach. The material for practical experiment and demonstration is at hand in the fellow workers. Each has his own likes, dislikes, strong and weak points. The ability to take successful charge of a force later is gained by studying one's associates from day to day. The big man is less often the man whose mind is full of figures and data than the man who knows how to keep a body of workers from developing time-wasting friction between themselves.

The general principle of salesmanship, like that of management, is to interest the other man in doing what you want him to do for the advantage of both of you. Having grasped the idea of the principle, the theme may be expanded by reading some of the numerous books on management and on salesmanship, lists of which may be found in libraries everywhere.

The backbone of all business is finance, a subject which is not taught in the common schools. While absolutely necessary to success, it is among average men studied about as frequently as classical Greek. The illiterate immigrant running a two-chair bootblacking stand is an expert in finance compared with the average well-paid foreman, office man or shop superintendent. The bootblacking capitalist with one employee knows he must take in more than he pays out, and he also knows what hours bring in the most nickels and dimes, what outlay for rent affords a location that will catch enough customers to pay his expenses, what part of his takings go for labor, supplies and repairs, and what his "good will" is worth when he is ready to sell out and move to a better stand. His little business is a financial primer from which he learns his practical lesson.

A member of a large manufacturing organization has in comparison with the bootblack a whole library of text-books from which to learn the principles of cost-keeping, accounting and corporation finance along with his daily work. He ought to investigate and illustrate to himself such matters as the effect of a raise in wages on the cost of the factory product; the proportion of cost which waste in using materials may affect; the value of the time which he consumes in unnecessary conversation, wasted efforts and unnecessary mistakes and false moves. He should know in advance whether his own work is worth an increase in wages, and, if so, whether the business can afford to pay it. He must know how to ascertain all such facts before he can hope to hold a position as general manager.

The methods used in commerce and in transportation should be part of the education of the man who intends to succeed. Large sums are saved to corporations, and large salaries earned, by traffic men who know how to reduce the volume of shipping packages, arrange shipments so as to take classifications as goods carrying low freight rates, and route so as to save time or obtain more convenient delivery at destination. Railroad maps are more important to most business men than the lines of counties and states. The well-informed man should be familiar with the routes of the principal systems and their smaller competitors, down to the little feeder lines which always indicate on the

map the location of factories, mines, farm regions and other sources of wealth.

PRACTICAL EDUCATIONAL SUBJECTS ALMOST UNLIMITED

The list of practical subjects for continuing an education might be indefinitely extended. International trade, export and import customs and conditions, articles and materials exchanged with foreign countries, and national systems of weights, measures and coinage are daily becoming more important. Men are in demand who are familiar with these details and can assist in developing foreign trade. Foreign languages, which are not considered too difficult for general study in other countries than the United States, should not be too difficult for Americans. Language and literature are important indications of the characteristics of the citizens of a country, and some knowledge of them opens the door to success in foreign trade.

We of the United States have yet much to learn of the possibilities of practical education. The country in general continues to offer only the one-track general school course commenced by the pioneers of a new continent in an age when specialized manufacturing was unknown. The small proportion of the population who are able to go to the end of the track at graduation from college have the advantage of the best the system can offer for professional work. But, like the boys and girls who turn off the track just beyond the elementary school, they can attain success only by continuing their education in practical subjects through the work of every day.

To Build Direct-Driven Gas-Engine Compressors

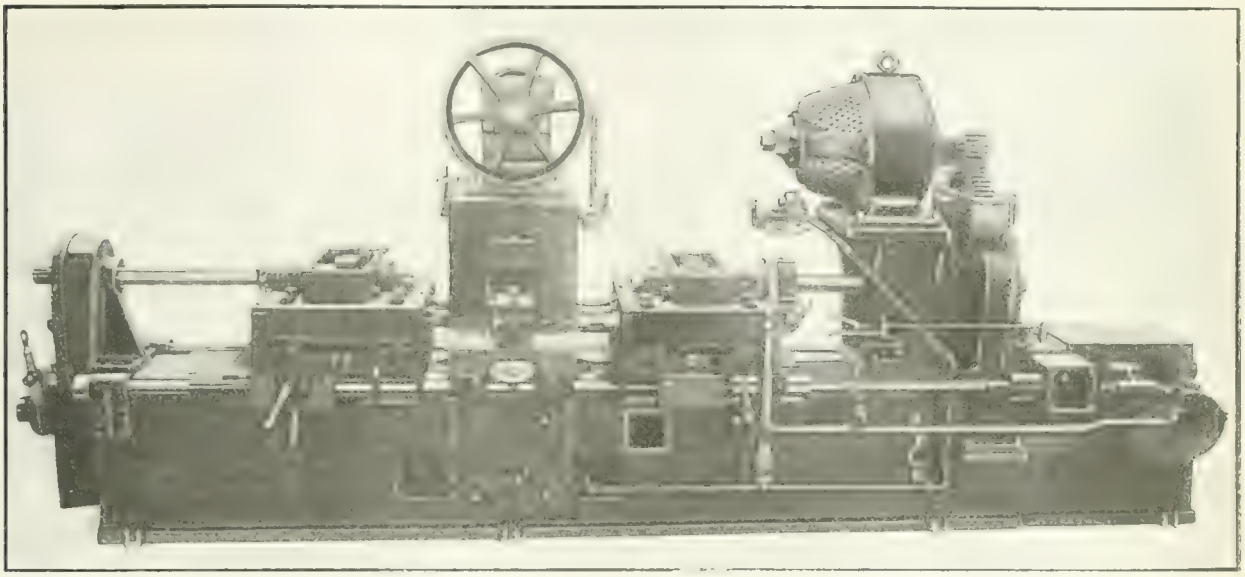
Clark & Norton, Wellsville, N. Y., have erected a gray-iron foundry, 80 x 160 ft. in size, adjoining their plant. It is equipped with a 60-in. cupola, two jolt and one turn-over molding machines and a 15-ton 38 ft. 5 in. span crane. New Erie and Buffalo & Susquehanna railroad sidings have been put in, and hereafter the firm will devote the entire plant, which includes a modern machine shop, to the manufacture of direct-driven gas-engine compressors for gas line work. The units will be of two cycle types up to 80 hp. and four cycle type for 100 hp. and over, up to 200 hp. In the foundry the firm has contracted for a period of four years to make all the gray-iron castings for the adjoining plant of the Kerr Turbine Company. F. A. Ansell is manager for Clark & Norton.

The Pennsylvania workmen's compensation board has ruled that a posthumous child of a man killed in the Central Iron & Steel Company's plant at Harrisburg, Pa., is entitled to compensation.

A Five-Spindle Rail Drilling Machine

A horizontal rail drilling machine capable of drilling five holes at one time has been placed on the market by the Newton Machine Tool Works, Inc., Philadelphia, Pa. The holes are drilled by two groups of spindles located on opposite sides of the rail. Among the advantages claimed for the machine is the drilling of holes at close center distances.

The spindles are arranged in two groups, the one at the right of the rail consisting of a fixed central spindle and two outer ones which can be adjusted to give center distances ranging from 4 to 10½ in. In the other head the spindles can be adjusted to within 1 in. of the center line of the central fixed spindle on the opposite head. In this way it is possible to drill holes with a center distance of 1 in., and these spindles can be adjusted to give center distances ranging from 4 to 19 in. The maximum distance between the ends of the spindles is 26 in., and each spindle has a feed of 12 in. and four different rates. The arrangement of the feed, it is pointed out, enables a full length drill to be removed without disturbing the setting of the rail. Rapid power traverse is provided in both directions. All the spindle gears are of heat-treated alloy steel.



In This Five-Spindle Horizontal Rail Drilling Machine the Center Spindle in the Head at the Right Is Fixed in Position While the Others in That Head and Those in the Opposite One Are Adjustable to Give Variable Distances Between Their Centers

The spindle saddles have a full bearing on the base with strap and taper shoes to compensate for wear. A common pair of feed screws with right and left hand threads are provided to secure simultaneous operation. An adjustable automatic stop for the feed motion and a rapid power return are provided for the saddles, together with a safety limit, which is relied upon to prevent jamming at either end of the saddle movement.

An adjustable elevating table with an air-controlled clamp is provided to take care of the different sizes of rails. The machine is driven by a 15-hp. motor having a speed range of from 400 to 1200 r.p.m.

The Judson Mfg. Company is preparing to build a 30-ton open-hearth furnace at its plant in Oakland, Cal. A steel building 100 ft. square will be erected to house the furnace, charging machine, 40-ton crane, etc. The tack and nail department now occupying the site will be moved. Plans are under way to improve the rolling mill later.

ELECTRIC REVERSING MILLS

The Mills Built and Building—The Record at Hamilton, Ont.

On Tuesday evening, Oct. 3, Wilfred Sykes, general engineer of the Westinghouse Electric & Mfg. Company, East Pittsburgh, read a paper entitled "Electrically Driven Reversing Rolling Mills," before the mechanical section of the Engineers' Society of Western Pennsylvania. Mr. Sykes said in part:

The first successful installation of a reversing electric blooming mill was that of the Steel Company of Canada, at Hamilton, Ont. This installation consists of a double reversing motor capable of developing about 10,000 hp. maximum, and is supplied with power from a flywheel motor-generator set with two generators. This mill has been in operation for over three years with very satisfactory results. It is at present working at a rate considerably in excess of the capacity specified when it was installed. The following are particulars of the mill and driving equipment:

Size of ingot	15 by 17 in.
Weight	4000 lb.
Finished material	4 by 4 in.
Elongation	16
Number of passes	19
Capacity, tons per hour	60
Roll diameter	30 in.
Pinion diameter	34 in.
Speed, full motor field	70 r.p.m.
Speed, weakened motor field	100 r.p.m.
Driven from motor	Direct
Number of motors	2
Voltage across each armature	600
Maximum operating torque	900,000 ft. lb.
Maximum motor horse power	10,000
Number of generators	2
Rated power of driving motor of set	1800 hp
Weight of flywheel	100,000 lb.
Speed of flywheel set	500 r.p.m.

The largest installation at present in operation is that of the Bethlehem Steel Company which drives the 35-in. blooming mill at the Lehigh plant.

The following is a list of electrically driven reversing rolling mills installed or building in the United States and Canada, 18 in all:

Mill	Horse-power	Started Operation
30-in. universal plate mill, Illinois Steel Company	8,000	1907
35-in. blooming mill, Algoma Steel Company	8,000	1913
34-in. blooming mill, Steel Company of Canada	10,000	1913
35-in. blooming mill, Bethlehem Steel Company	12,000	1915
34-in. blooming mill, Central Steel Company	8,000	1915
35-in. blooming mill, United Steel Company	12,000	Installed
40-in. blooming mill, Inland Steel Company	15,000	Building
32-in. blooming mill, Inland Steel Company	8,000	Building
28-in. structural mill, Inland Steel Company	8,000	Building
40-in. blooming mill, National Tube Company	15,000	Building
40-in. blooming mill, Illinois Steel Company	15,000	Building
35-in. blooming mill, Mark Mfg. Company	15,000	Building
27-in. universal plate mill, Mark Mfg Company	8,000	Building
24-in. billet mill, Mark Mfg. Company	5,000	Building
24-in flat mill, American Steel & Wire Company	3,000	Building
34-in. blooming mill, Ashland Steel Company	8,000	Building
34-in blooming mill, Keystone Steel & Wire Company	8,000	Building
34-in blooming mill, Chattanooga Steel Company	8,000	Building

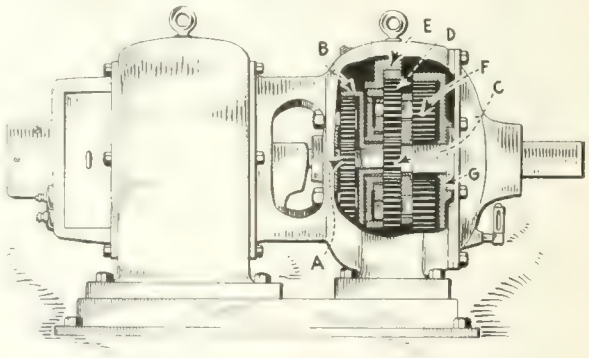
The question of maintenance is of great importance, and the figures given by Mr. Jefferies of the Steel Company of Canada, in a discussion at the convention of the American Institute of Electrical Engineers, showing the results obtained in their mill over a period of three years, are of interest. The figures for power consumption are also notable as they were obtained with the mill working much below its normal capacity.

Item	1913	1914	1915
Operating	9 months	8 months	12 months
Tonnage	119,283	92,622	174,460
Kilowatt-hours per ton	23.9	22.8	21.5
Repairs and maintenance	$924	$857	$700
Miscellaneous supplies	$420	$465	$427
Labor in operation	$1,680	$1,488	$2,975

Differential Speed Reducing Mechanism

The Foote Bros. Gear & Machine Company, 210 North Carpenter Street, Chicago, Ill., has placed on the market a double differential speed reducing mechanism of the all spur gear type. This differs from the company's standard type which has been on the market for some time. In the new device the first part of the mechanism is non-planetary and the second set is planetary, which it is emphasized, eliminates the objection to the high speed planetary set of idlers that were fastened to a flat plate and rotated around the high-speed shaft. Another advantage claimed for this arrangement is the ability to get a considerable speed reduction in a small space.

The first king pinion *A* is keyed directly on the motor shaft, which eliminates the flexible coupling between the motor and the speed reducing mechanism and also enables the connection to be made much shorter by using a thimble. This thimble connection is counterbored to go over the standard cover of the motor and forms a part of the front side of the reducer case. The first set of studs and idlers is rigidly fastened in the case and transmits motion from the king pinion to the internal gear *B* that is partly journaled on the slow-speed shaft. This gear is also supported at its outer edge by the hub on the planetary cage carrying the planetary pinion. A pinion *C* is rigidly fastened to the hub of the first internal gear which gives a planetary motion of the second set of idler pinions *D*. The outer periphery of these pinions meshes with the stationary rack *E* which is rigidly fastened in the case and gives the pinions a planetary motion around the king pinion. A shaft is introduced into these planetary



A Double Differential Speed Reducing Mechanism of the All Spur Gear Type in Which the High-Speed Set of Planetary Gears Has Been Eliminated

pinions and supports another set of idler pinions *F* that mesh with the last gear *G* which rotates the slow-speed shaft.

It is explained that this arrangement makes it possible to get a very large reduction in the last two sets of gears by having slightly fewer teeth in the last internal gear *G* than in the stationary rack *E*. For example, if the last internal gear has 60 teeth and there are but 59 in the stationary rack, the ratio in this pair is 59 to 1 which when multiplied by 5 to 1, the ratio of the first reduction gears, gives a total reduction of 295 to 1.

The Luxemburg iron manufacturers are reported to have extended their contract with the German Blast-Furnace Owners' Association until 1920. Up to 1910 the Luxemburg plants formed a joint association with the blast furnaces of the Lorraine district, and in 1911 some of them joined the German association, followed gradually by others. The question came up when the war started whether it was consistent with neutrality that the country's steel plants should supply materials to German munition plants. The Luxemburg Government was powerless to act but protests are heard from time to time in criticism of the cordial relations with German blast-furnace owners.

The Reading Iron Company, Reading, Pa., has increased the pay of its puddlers from $7 to $7.50 per ton, the highest rate ever paid in the Schuylkill Valley.

QUEBEC BRIDGE CASTINGS

Design in Itself Unsafe—Casting Probably Defective, as Others Stood Overload

Careful analysis of the evidence available bearing on the wrecking of the Quebec bridge center span tends to confirm the explanation already given of the cause of the failure. Although attributed to the breaking of the intermediate rocker casting at the southwest corner of the span, according to the *Engineering News* the specifications for the cast steel rockers, shoes, etc., were fully met by the metal furnished. Regarding the analysis of the steel and the foundry practice followed, that journal says:

> The material was acid open-hearth, made by the Canadian Steel Foundries, Ltd. The test report from the foundry laboratory shows for the chemical composition: Carbon, 0.26 per cent; phosphorus, 0.033 per cent; sulphur, 0.032 per cent; manganese, 0.55 per cent; and for test results: Elastic limit, 36,300 lb. per square inch; maximum strength, 69,700 lb. per square inch; elongation, 29 per cent; reduction of area 44.7 per cent.
>
> The heat from which the rockers were cast included other castings, and it is not known from which casting the test coupon was taken. Nor can the coupon be located now for examination of fracture and structure. However, the process of molding, pouring and annealing was carried out in exactly the same way as for other highest-grade castings. The melt was treated with 1265 lb. ferrosilicon and 525 lb. ferromanganese to 18 tons charged. The rockers were molded top down, bottom-gated, with four shrink heads taken off the sides of the top (the lower or longitudinal brackets) and rising 20 in. high above the casting. No welding or other curing of defects was done, it is stated very positively. Annealing was done at 1700 deg. to 1800 deg. Fahr., and according to best recollections these castings were in the furnace 36 hr.

Full approval on these points is also voiced by the *Engineering Record*, which states:

> As to the castings, the tests and analysis of specimens leave no ground for criticism as to the character of the metal. The composition is up to the specifications; the strength and ductility very satisfactory. There were no rejections, and the inspection was careful. No details are available to show the history of the annealing; the usual practice of the Canadian Steel Foundries, Ltd., which furnished the castings, was followed.

A recent measurement of the chains of the southeast hanger, which received the full weight of that end of the span when it tore away from the southwest stirrup, shows an elongation of about ½ in. in each 30-ft. link, proving an overload on the castings at that point of at least 60 per cent. It has been established that despite such stresses the rocker here did not fail. Nevertheless the estimated load on each hanger of 3,000,000 lb., including 20 per cent allowance for impact, while sufficient for a stable load, did not allow an adequate factor of safety for a detail on which such tremendous possibilities for disaster rested. In this regard, the *Engineering Record* says:

> The computations reveal an interesting condition. If the load were to be carried entirely in direct compression the stresses that would have developed in an intermediate casting without wings would be well within the limits of good practice. Manifestly the design of an intermediate member that would act only in compression was out of the question. Longitudinal stability was required not only during hoisting, but while the span was on the bents at Sillery Cove. But the addition of the longitudinal wings actually weakened the casting, or, to put it in a better way, required the casting to take bending stresses. These were limited by the designers (with their assumption of stress distribution) to 20,000 lb. per square inch. . . . These stresses are checked by an alternative assumption as to stress distribution. The factor of safety, however, it seems, was too low for a member in such a responsible position. . . . While, in the opinion of this journal, a higher factor of safety would have been advisable, the only conclusion that seems warranted is that the failure was due to a defect in the metal.

"Simply regarded," says *Engineering News*, "the 'stress calculation' for the Quebec rocker support is merely some formal and unimportant figuring to verify minor features of the design. It does not analyze or approve the design, but tacitly accepts the design as adequate and then deduces a few auxiliary figures from it. It is therefore chiefly significant as being an expression of complete faith in the trained eye and sound judgment of the designer who sketched out the proportions of the castings. Unfortunately that faith was not justified by the event."

Device to Prevent Motor Reversals

To guard against the serious results attendant upon alternating-current motor reversals, especially when these motors are installed in connection with elevators, hoists, conveyors, cranes, machine tools and textile machinery, the General Electric Company, Schenectady, N. Y., has developed a reverse phase relay. It operates on the same principle as a squirrel cage induction motor and is made in both circuit opening and circuit closing types. The interchanging of wires by power companies, as when repairs to cables are made, is a condition, for example, to be guarded against. The type of contacts required for any installation depends on the method of tripping out the motor switch. The operating coils of the relay correspond to the stator of an induction motor, while a hollow aluminum cylinder connected to the contacts corresponds to the rotor. The latter, however, does not rotate but moves either upward or down when one of the phases of the line is reversed. This movement causes the toggle to buckle and move the contacts.



A Reverse Phase Relay Which Opens the Circuit if the Phases Have Been Reversed and Thus Prevents Accidents Due to a Reversal of Motor Rotation

A Portable Light Hoist Using Manila Rope

For the use of Manila rope instead of wire rope for light hoisting and hauling a new model portable pneumatic hoist has been brought out by the Ingersoll-Rand Company, 11 Broadway, New York City. This hoist is essentially the same as the one illustrated in THE IRON AGE, Sept. 3, 1914, the main differences being the diameter and length of the hoisting drum, the width of the flanges and the main frame and over-all dimensions. Like the earlier type, either compressed air or steam can be used. The hoist has a drum 7 in. in diameter and 17 in. long with 5-in. flanges and will accommodate 300 ft. of ⅞-in. Manila rope. The capacity of the hoist is 600 lb. and the weight is 358 lb. The over-all dimensions of the hoist are length 21½ in., width 31¼ in. and height 23 in. Although designed primarily for underground work, the hoist can also be employed in industrial plants for all around hoisting and hauling.

A brief filed in the United States Supreme Court Oct. 2 by the Government against the Merchants & Manufacturers Association of Sacramento and the traffic bureaus of several other cities in California appeals from a decision handed down by the Federal Court for the Northern District of California officials to advance the case on the calendar for an early hearing because of its widespread importance. The original litigation, commonly known as the Pacific Coast Terminal case, was a suit brought to enjoin enforcement of certain orders of the Interstate Commerce Commission, which denied to inland California cities the same rates as were enjoyed by San Francisco and other ports on the Pacific. If the commission is reversed, it is believed the entire theory of the long and short haul clause of the act to regulate commerce may have to be revised.

Qualities and Defects of Steel Ingots*

Type of Mold for Bottom or Top-Cast Steel—Advantages of Using Tun Dishes for Top-Poured Metal

BY J. N. KILBY

NO place was until recently surrounded by a bigger wall of prejudice than the core of what has been called the hub of the steel trade, and with the exception of a few firms and individuals the clinging to oldest and routine process is to-day as strong as ever. Any suggested deviation from the beaten track usually brings forth the answer, "Our fathers built their trade on this method. It was good enough for them; it is good enough for us." Any sound point gained by experience admittedly must be retained, but it is also expected that methods which have no real value except their antiquity should be relegated to their proper place.

Brands of iron and mixtures have meant finality to a host of arguments upon the quality and defects in steel ingots. These may be very convenient when no other label can be found, but it is not conducive to improvement or economy. The virtue existent in the much cherished brands of iron is purely one of consistency and not of extraordinary chemical or physical properties.

Whether the steel is made from Swedish, West Coast, or East Coast materials matters not as far as pipe, segregation, and surface defects are concerned. These defects cover 90 per cent of those found in steel ingots upon which this and further papers will deal. Defects mentioned are caused by bad type of mold and methods of casting. Faulty casting and mold type are directly responsible for most of our present day tight-laced specifications. Engineers find in spite of restrictions upon the sulphur and phosphorus content and demands for huge discard, to be clear of pipe, that defects continually crop up; hence their firm conviction against relaxing their specifications.

BOTTOM AND TOP-CAST STEEL

Molds and beds of numerous types are used to-day in the making of bottom-poured steel. Some of the molds are absolutely unfit for the production of sound steel. Sketches A, B, C, D, E, F, G, H and I (Fig. 1) show various types of both top and bottom cast ingots, and the table describes them. These are not shown to scale, and are for illustrative and comparative purposes only. They are based upon the cutting up of a huge number of ingots some years ago. Later experience has fully confirmed them.

For bottom-cast steel the only type of mold which is reliable is the one cast wide end up, the steel feeding the ingot through the central nozzle in the mold bottom, the mold having a feeder head. The only type of bed is one which is radial, the ingots being equidistant from the feeding trumpet.

The type of mold most suitable for top-poured steel is the one wide at the top with feeder head. Steel cast direct from the ladle into the mold often

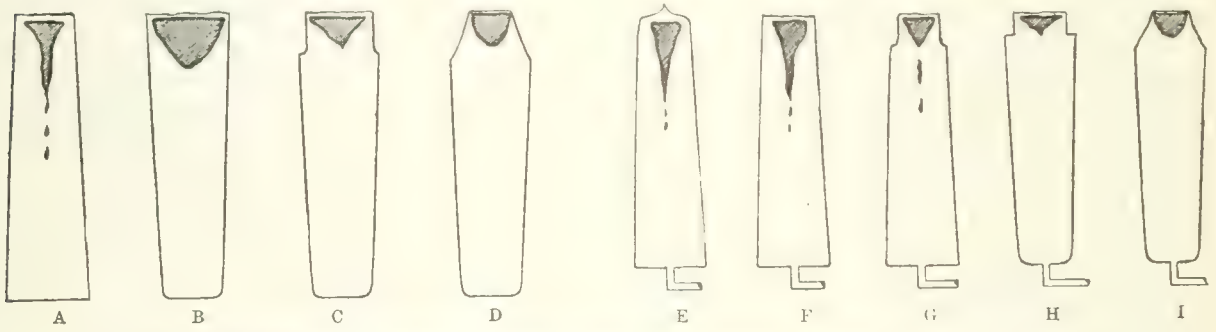


Fig. 1—Various Types of Top and Bottom Cast Ingots, Details of Which Are Given in the Table

cracks in rolling or forging, and is apt to produce unsound material. An 18-in. ingot cast direct may produce 3-in. billets, the defect being so fine as to escape ordinary inspection, and on first examination appear almost like superficial scratches. The pickling of such material would show up these defects,

Table Showing Details of Ingots Shown by Fig. 1.

Ingot	Type of Mold Used	Amount Lost and Nature of Defect	Surface
A	Top poured, with [illegible] per cent of Cracks and secondary pipe.		Practically free from occluded fluxed brick.
B	Top poured, with [illegible] per cent of secondary pipe.	Same as A	Same as A.
C	Same as B with [illegible]	Under 12 per cent of Same as A. ingot.	Same as A.
D	Same as B with [illegible]	Same as A	Same as A.
E	Bottom-poured, narrow mold and top closed top.	[illegible] ingot. Always has secondary pipe. Worst possible ingot for pipe and [illegible]	Liable to occluded fluxed runner brick.
F	Bottom-poured, narrow mold and top.	Up to 60 per cent of Good.	Same as E.
G	Same as F, but with [illegible]		Same as E.
H	[illegible] end at top, adjustable brick head.	No secondary pipe.	Same as E
I	Same as H		Same as E.

and also what a small percentage of top-poured steel is actually sound. The same ingot worked into, say, a 10-in. bar would yield as much unsound as sound material. The more "work" upon the steel, the more the defect is hid. It is present nevertheless. Top-poured steel is more liable to cracks than

*From a paper presented at the autumn meeting of Iron and Steel Institute in London, England, Sept. 22, 1916.

bottom-poured steel on account of the quick rate the mold is filled. Hot steel, of course, yielding worse than that cast at a moderate temperature.

Temperature of the steel depends a good deal upon the workman, who is liable to err on the high

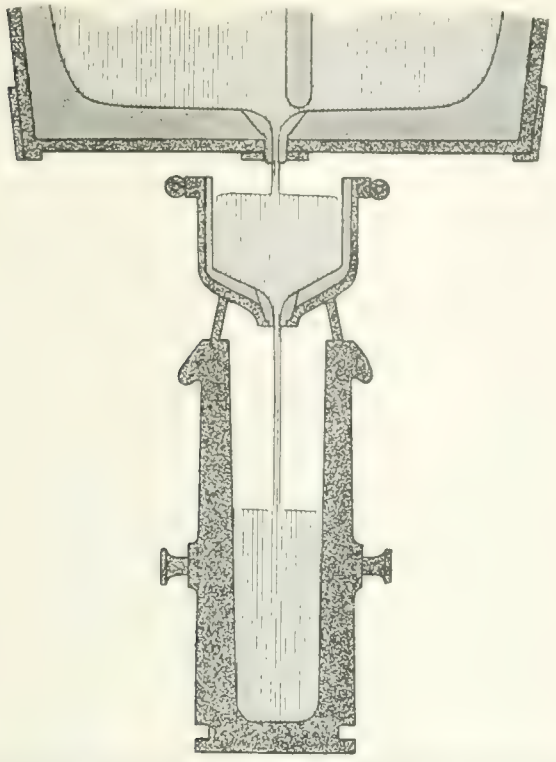


Fig. 2—The Application of a Tun Dish as Recommended for Top-Pouring Steel Ingots. The metal passes from the ladle through the dish to the ingot

side. This is natural, seeing that he is usually paid per ton of ingots, and not upon the yield of sound material in the mill or forge. The difference in temperature between what is termed a "hot cast" and one which runs nicely is not so great as is often supposed. No professor has yet been able to demonstrate or even lay out any definite lines for the maker to work upon. Harry Brearley's paper before the West of Scotland Institute is about the only practical paper aiming in this direction and illustrative of the effects of temperature.

TUN DISHING FOR TOP-POURED STEEL

To obtain the best results from top-poured steel the material should not be cast from the ladle into the mold direct, but should pass through a secondary ladle or tun dish attached to the ladle or resting upon the molds as illustrated by Fig. 2. It may be a dish containing one or more nozzles according to the tonnage to be cast and the nozzle or nozzles in the large casting ladle. The different types are shown by Fig. 3. If tun-dishing is carried out thoroughly, the quantity of ingots suffering from cracks while being rolled or forged is reduced to a minimum.

A number of firms have tried this method of top-casting steel; some have been highly successful, others have unfortunately not had this success. Failure in this class of work is brought about usually by expecting to do too much at once. The size or relative values of nozzles are not taken sufficiently into account, neither is the personal factor of the workmen. Steel does not require to be excessively hot to be cast in this manner. The effect of mold shape and ratio of cross-sectional area to length have influences upon the ingot produced.

Large Orders for Turbines

Orders totaling more than $2,700,000 have recently been received by the Westinghouse Machine Company, East Pittsburgh, Pa., for equipping with propelling machinery 44 merchant ships, now under construction or contracted for at the yards of shipbuilding companies on the Atlantic and Pacific coasts. The company also has in immediate prospect the equipping of 16 merchant ships in addition to the 44 above mentioned, bringing the total number of ships up to 60 and the total value of the orders for machinery to be supplied by the Westinghouse Machine Company to approximately $3,750,000. The ships are to be equipped with the latest refinements in the line of propelling machinery, consisting of Westinghouse turbines with double reduction gears and, with few exceptions, condensing equipment. The first ship which has been so equipped is the Malmanger, launched at the yards of the Chester Shipbuilding Company, Chester, Pa., on Aug. 26.

The business above described covers strictly merchant ships and does not include orders received for propelling machinery for the United States Navy or for foreign governments.

New Iron and Steel Plant in China

The Han-Yeh-Ping Iron & Coal Company, Ltd., Hanyang, China, has begun the erection of a new iron and steel plant at Tayeh, about 20 miles from its iron-ore mines. The site consists of about 670 acres. The new plant will start with two blast furnaces, of 400 tons daily capacity each, with necessary equipment, and will eventually be extended to comprise eight blast furnaces, with sufficient open-hearth steel furnaces and rolling mills to convert the blast-furnace production into finished products. The contract for the first two blast furnaces was last year awarded to the Riter-Conley Mfg. Company, Pittsburgh, but some delay ensued owing to a misunderstanding between that company and the agent of the Chinese company. Matters have now been adjusted, and it is expected that the material for the furnaces will be delivered by the end of this year. Some of the auxiliary machinery has been ordered from England and electrical apparatus from the Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa. The program of erection contemplates the blowing in of the furnaces early in 1918.

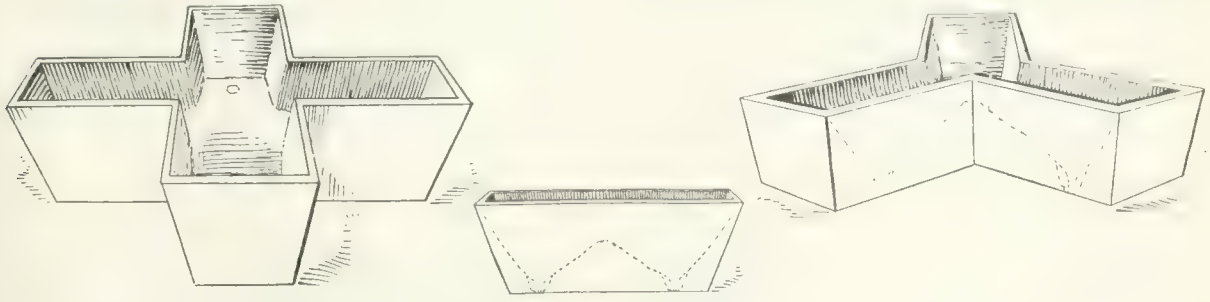


Fig. 3—Types of Tun Dishes Recommended for Top Pouring Two, Three or Four Ingots from the Same Ladle

Forty-four White motor trucks, working for eight different contractors or building material companies, have hauled over 60 per cent, it is estimated, of the thousands of tons of materials used in the construction of Cleveland's new $4,000,000 high level bridge.

POWER IN COLD-ROLLING

Formulas for Ascertaining Horsepower Requirements—Investigations Necessary

The action of a rolling mill in the cold rolling of metal was analyzed in the *Engineer* of London, England, Aug. 18, 1916, by C. E. Davies, in an attempt to outline a theory governing the consumption of power in the process. As there are no great number of experimental data on the subject, the formulas developed are largely empirical, but they indicate the direction that experimental investigation should take, and they also show broadly the main factors controlling the demand for power in the rolling mill. The analysis was confined to cold rolling, for while the same general principles would apply, the introduction of the temperature factor would render the application of the theory a complicated matter.

In developing his theory the author uses the analogy of a press for the reduction of the section of an ingot, considering the rolling mill as a continuous press. The work done by the rolls in reducing the thickness of the metal is the same as it would be if applied by direct pressure under a press where the vertical load sufficient to overcome the resistance of the metal to displacement is distributed over the whole area and exerted through a distance equal to the amount of reduction effected. While the action of a press would cause the metal to flow equally in all directions at right angles to the line of applied pressure, the reasoning is in no way affected if it is assumed that the flow takes place in one direction only, that is in the direction of the line of travel of the piece between the rolls in the rolling mill. The load per square inch necessary to produce flow varies with the relative amount of compression effected, and must here be considered as the average between the maximum and minimum pressures at the beginning and end of the compression respectively.

By a process of mathematical reasoning that it is not necessary to repeat here the author develops the following formula for the horsepower required to drive the mill, the actual displacement of the metal alone being considered:

$$\text{Hp.} = \frac{F_c \frac{L}{2}(1+X)B\left(\frac{t}{12}\right)}{33{,}000}$$

in which F_c is the resistance of the metal to crushing up to the point where flow begins, in lb. per sq. in.; L is the length of the piece before rolling; B the width of the piece, and t_1 and t_2 the thickness of the piece before and after rolling, all in inches, and X is the ratio of $\frac{t_1}{t_2}$. It is assumed that the width of the piece is unchanged by rolling, all variation in dimensions being in the length and thickness. This formula may be transformed into another in which the speed of the rolls is a factor as follows:

$$\text{Hp} = \frac{F_c R N B d}{63{,}024} \qquad (2)$$

in which N is the number of revolutions per minute; R the radius of the roll barrel in inches, and d, the reduction or "pinch" $= t_1 - t_2$.

A large proportion of the power delivered to the rolling mill is lost in friction. Ignoring the losses in the driving gear, pinions, etc., the power lost in the roll bearings will be found to be a quantity dependent with any given speed and roll dimensions on the vertical pressure necessary to effect the desired reduction. All power supplied to a rolling mill, both that employed in reducing the section of the metal and that lost in bearing friction is converted into heat, which must be continually dissipated. Part of this is carried away by the rolled metal and part by water circulation, the remainder disappearing in the form of radiation from the roll surfaces and mill frame.

The horsepower absorbed in the roll friction is expressed by the formula

$$\frac{\sqrt{Rd}\,BF_c\,\mu\,r\,N \times 2}{63{,}024} \qquad (3)$$

μ being the coefficient of friction of the roll bearings, and r the radius of the roll necks, in inches. The value of r is usually proportional to R and may be expressed as xR, the value of x being generally put at 0.7. Formula 2 may then be combined with formula 1 to give the value for the total horsepower required for driving rolls. The combined value would be

$$\text{Hp.} = \frac{Rb\,F_c\,N}{63{,}024}\left(d + \sqrt{Rd}\,\mu \times 2\right) \qquad (3)$$

It is evident that for any rolling mill with rolls running at a given speed the total horsepower required is proportional to the term within the parenthesis in formula 3. The useful work done in reducing the thickness of the metal is directly proportional to the "pinch" d, expressed in inch units, while the frictional work is more complex and depends on the coefficient of friction of the bearings.

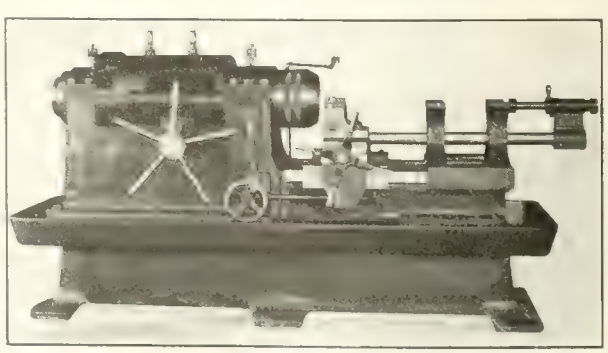
Of the various factors entering into the problem it is only resistance of the material to crushing and the bearing frictional losses which are difficult to determine. Constants for these can be determined by a set of careful experiments, but there are at present no reliable data on which to work. It is possible, however, to assign approximate values to F_c and μ which will render the formula useful for arriving at a sufficiently reliable estimate of the power required by a rolling mill for any given duty. Such researches as have been made indicate the value of the coefficient μ decreases with increase of pressure. On the other hand, the conditions of lubrication are poor and for approximate calculations of the power required, it is advisable to assume a rather high value for this coefficient. About 0.05 would seem to give results which agree with practice.

Resistance of any metal to crushing under the conditions that are present in a rolling mill is not a constant quantity, but is dependent on the amount of reduction effected proportionate to the original thickness of the material. In the calculations, the resistance to crushing F_c has been taken as an average value for the specified reduction and as uniform over the projected area of the roll which is in contact with the metal. While this assumption does not materially affect the accuracy of the results, it should be borne in mind that F_c is not a constant for any particular metal or alloy, but is a variable proportional in some way to the ratio $d \div t$. The first step, therefore, in attaining greater accuracy in the solution of the problem must be in the direction of careful research into the resistance to crushing of the various metals and alloys under varying degrees of compression, thus obtaining the necessary data without which no close estimate of the power required by rolling mills for any given duty is possible.

Geared Head Cutting-Off Machine

A new cutting-off machine designed for solid or tubular stock up to 6 in. in diameter has been brought out by the Etna Machine Company, Toledo, Ohio. This is a geared head machine with four spindle speeds. It is designed for operation at from 100 to 110 ft. per minute on various sizes of stock and is driven either by a constant-speed motor or by single belt from the line-shaft. The control is by a friction clutch having a lever within easy reach of the operator.

The collet has a 5/16-in. opening and automatically



A Geared Head Cutting-off Machine for Solid or Tubular Stock Having Four Spindle Speeds

adjusts itself to the different sizes of stock. It is operated by a large pilot wheel on the front of the machine. All of the working parts of the head and collet are inclosed and run in oil.

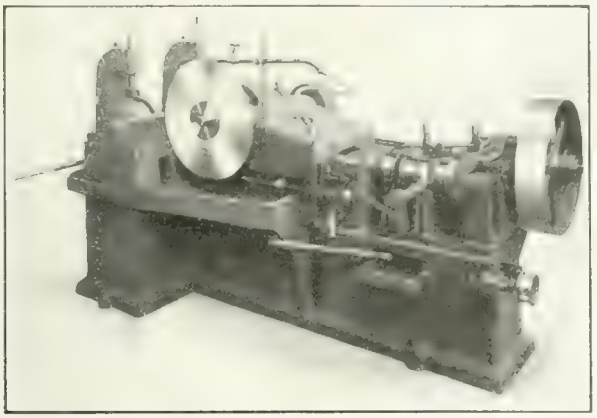
The cutting-off tool is placed at an angle of 15 deg. and is 3/16 x 1 in. in size. The cutting-off slide is adjustable longitudinally by means of a handwheel and screw. The diameter of the push tube is 6⅜ in.

The machine is equipped with a large stock support which contains a stop provided with a cam to back it away after the stock commences to revolve. Lubricant for the cutting tool is supplied by a geared pump.

The machine is 114 in. long, 64 in. wide including motor bracket, 32 in. high and weighs 7900 lb.

Small Size Cold Metal Sawing Machine

For handling round stock up to 5½ in. in diameter the Newton Machine Tool Works, Inc., Philadelphia, Pa., has built a small size of cold metal sawing machine. It has a geared feed in place of one of the friction type.



Cold Metal Sawing Machine for Solid Stock up to 5½ In. in Diameter or Combinations of Small Stock of Equivalent Section in Which a Geared Feed Has Replaced the Friction Type

The machine is of the spindle-driven type. The spindle revolves in capped bearings and is driven by spur gears which receive their power from a worm and wormwheel. The former is fitted with roller thrust bearings and the wormwheel is of solid bronze. A saw blade 20 in. in diameter of either the solid or inserted high-speed type is used. The saddle has underlocking gibs which are cast solid with it. Vertical and horizontal adjustments are made by taper shoes. A fast power return is provided for the saddle in addition to a gear box which provides the necessary changes without removing gears. Trips to stop the feed at any predetermined point are fitted to the saddle together with safety stops for each extreme of its travel.

As to the gear feed, it is pointed out by the builder that a friction feed that is powerful enough to advance the blade will not prevent the blade from breaking and will also wear the blade to pieces by simply rubbing against the stock. It is also emphasized that it is not the feed that breaks the teeth, but the metal choking the teeth that causes trouble.

Provision is made for supplying lubricant to the point at which cutting is being done, the equipment including a pump, piping and the necessary attachments. The lubricant tank is located inside the base of the machine at the rear and oil pans cast solid with the base are provided to return the used lubricant.

In tests made of this machine it has been possible to cut off a piece of 0.50 per cent carbon stock 6 in. in diameter in 3 min. The machine is not designed, however, for a feed greater than 1 in. per minute.

The Jeffrey Mfg. Company, Columbus, Ohio, has opened an agency with the Gustin-Bacon Mfg. Company, Kansas City, Mo. J. S. Davidson, who has spent several years in the sales and engineering departments of the Jeffrey Company, has associated himself with the Gustin-Bacon Company.

WASTE FOUNDRY SAND

Wisdom of Re-using—How Sometimes Disposed of—Burnt Core Sand

To ascertain how best to dispose of waste foundry sand, a set of ten questions was sent out to foundrymen by H. B. Swan of the Cadillac Motor Car Company, Detroit. A summary of the answers to these questions was given in a paper by him read before the American Foundrymen's Association at Cleveland, Sept. 12, 1916. From this the following notes are abstracted:

In general, no attempt is made to re-use burnt core sand, while in a number of cases old molding sand is treated for re-use. In the great majority of cases the old sand is carted to the dump at an expense which varies with the location of the foundry and the methods available for handling it. Mechanical means of handling new and waste sand will often cut the net cost of sand 50 per cent.

Some foundries have used refuse sand for concrete mixtures, with good results. It is well adapted for such use in foundations and similar structures, and has even been used in sidewalks, although there has been some flaking of the surface due to the flour in the cores. In one case the sand has been used as a filler for fertilizer.

The personal experience of the author has been, in attempting to use burned sand in new core sand mixtures, that the cores are weak, soft, require an excessive amount of binder, and do not resist the action of the metal well. Even after burned sand has been washed and cleaned, if examined under the microscope it will be found that the individual grains are coated with a black carbonaceous residue. These absorb an excessive amount of binder and where seacoal has been used either in facing sand or in the core sand mixture, this has been coked and it is impossible according to his experience to wash it all out. It must also be borne in mind that nearly all foundry sands contain a small amount of alkalis which are inimical to oil binders.

In a contribution to the same paper, Henry M. Lane, consulting engineer, Detroit, pointed out that a washing or dry cleaning process which would remove the burnt clay and fine sand dust would make possible the re-use of a large percentage of the burned sand. A number of patents have been taken out for dry cleaning systems, these ranging all the way from a thorough scouring to simple removal of the fine dust.

According to Mr. Lane, from a commercial standpoint the process which will produce a product, just good enough for use, at the lowest cost, is the one that will ultimately be used, even if other systems may give a better, though more expensive, product. In steel foundry practice the ultimate factor is the cost of a ton of finished castings, and a process which recovers, say, 80 per cent of the sand in a fairly usable condition may be better than the one which recovers 90 per cent in a better condition but at a higher cost.

Furthermore, continued Mr. Lane, at least 80 per cent of all waste sand material shipped out of the ordinary foundry can be recovered for re-use in some form. In the case of heavy gray iron work it can be dry cleaned, rebonded with the proper kind of clay, and used as heavy-work molding sand. In the case of aluminum and brass work the general run of sand from the foundry can be cleaned and used in core work with resin or water soluble binders. It, however, does not work well with oil. For the thorough cleaning of certain classes of sand, the wet process seems to be the best, but this necessitates first a scrubbing and then a washing, and takes quite a complicated plant, though the actual cost of cleaning per ton is low.

National Founders' Association to Meet in New York City Nov. 15 and 16

The National Founders' Association will hold its twentieth annual convention at Hotel Astor, New York, on Wednesday and Thursday, Nov. 15 and 16. The convention banquet will take place on Wednesday evening, Nov. 15.

Death of Col. R. C. McKinney

With the death of Col. Robert Cochran McKinney, chairman of the board of directors of the Niles-Bement-Pond Company, passed a pioneer of the machine-tool industry and the creative genius to which the great manufacturing company with which he was connected owed its existence. As stated in THE IRON AGE, last week, Colonel McKinney died at his home at Belle Haven, Conn., Oct. 3, following a protracted illness. Although he had not been in good health for two or more years, he nevertheless had been in his office frequently in that period.

It has been said that the Niles-Bement-Pond Company identified and illustrated the life career of Colonel McKinney, and to those who knew him and of his activities the statement is entirely within bounds. From its organization until his death his life was practically that of the company, although latterly others of sturdier vitality had charge of its active affairs.



COL. R. C. M'KINNEY

Colonel McKinney was born at Troy, N. Y., 65 years ago. In 1861 his parents removed from Troy to Cincinnati, where he attended the public schools and Woodward High School until 18 years of age. In the early seventies he took a partial course in mechanical engineering at Cornell University. His student life was followed by employment in the drafting room and office of a company which manufactured steam pumps at Hamilton, Ohio. In 1877 he became associated with the Niles Tool Works at Hamilton, which was the first plant of its kind established and operated west of Philadelphia. At the time, the country was just recovering from the disastrous effects of the panic of 1873, and financial conditions were still somewhat chaotic. Within two years he was appointed secretary of the company, and a little later made treasurer and general manager.

Under his management the business of the Niles Tool Works expanded to such an extent that a reorganization and additional capital were found imperative, and the capital stock was increased to $2,000,000. His title of colonel was gained while with this company, through his service on the staff of Governor Bushnell of Ohio. In line with the expansion of the company, the plant and business of the Cope & Maxwell Mfg. Company, whose product was steam pumps, were purchased, although later this company was sold to another corporation and became a part of the International Steam Pump Company. Throughout this period Colonel McKinney visualized the future of the machine-tool industry and his plans bore fruit in 1898 when the first step toward the present great corporation was taken through the purchase of control of the Pond Machine Tool Company, Plainfield, N. J., this purchase being supplemented by options on the works of Bement-Miles & Co., Philadelphia, and the Philadelphia Engineering Works. From these beginnings evolved the company which was incorporated in 1899, which owns the companies named, and owns or controls the Pratt & Whitney Company, Hartford, Conn.; the Pratt & Whitney Company of Canada, Ltd.; the Milwaukee Machine Tool Company, John Bertram & Sons, Ltd., Dundas, Ont., and the Ridgway Machine Company, Ridgway, Pa.

In February, 1915, Colonel McKinney relinquished the active work of the presidency, being succeeded by James K. Cullen, but was made chairman of the board. He was one of the founders of the Machinery Club of the City of New York, and was made first vice-president at the time of its organization. He was the second president elected, and a director at the time of his death. He was a member of the American Society of Mechanical Engineers, the Union League, Lotos, Engineers' and Cornell clubs of New York, the Hartford Club of Hartford, and Queen City Club of Cincinnati.

Philadelphia Bourse Studying Metric System

The Philadelphia Bourse is conducting an inquiry among manufacturers and exporters of Philadelphia and nearby industrial centers as to the extent to which they must use the metric system in foreign business and their attitude toward its general adoption in the United States. Early results indicate, it is stated, that "such a change is favored by progressive concerns. A number of these held that the adoption of the metric system is essential to our growing foreign export trade and that it would simplify and facilitate domestic business."

The statement includes the following opinions:

A. N. Hargrave, foreign sales manager of the J. G. Brill Company, car and truck builders, Philadelphia: "We are fully in accord with the agitation for the universal adoption of the metric system in export trade and in point of fact consider it advantageous as applied to domestic trade. During the last two years we have received quite a number of export orders which we have executed entirely in the metric system. The procedure is simple and advantageous, and we consider it far more satisfactory than converting the metric system into feet and inches."

N. C. Bradley, assistant superintendent, Midvale Steel Company, Nicetown, Philadelphia: "One of our shops is now working under the metric system. * * * We occasionally have work which is produced under the metric system and we believe that if it could be adopted universally it would be an improvement over our present system."

Schuylkill Forge Company, forgings, Philadelphia: "We believe that the general adoption of the metric system in the United States would be a good thing and that it would greatly facilitate our dealings with foreign countries."

Tindel-Morris Company, Eddystone, Pa.: "We do not manufacture for the export trade directly, but are frequently called on to manufacture crankshafts for automobiles and gas and oil engines, the dimensions of which are given in the metric system. Our shop men, after some experience, approve this system."

It is announced that a new steel foundry will be established in Ravenna, Ohio, by interests that have concluded negotiations with the Ravenna Chamber of Commerce for a site. It is stated that the plans contemplate one building 41 x 160 ft., for a steel foundry for light castings, and another building, 90 x 160 ft., for the manufacture of heavy steel castings and chilled and sand rolls.

The 1917 business of the Goodyear Tire & Rubber Company, according to the forecast made at a sales conference held at Akron, Ohio, indicates that 6,000,000 tires will represent the 1917 production and in Neolin soles a production of 25,000,000 pairs is expected.

Chairman Schwab and President Grace Entertained

Charles M. Schwab, chairman, and Eugene G. Grace, president of the Bethlehem Steel Corporation, and a number of other iron and steel manufacturers were guests at a noon luncheon of the Lebanon, Pa., Chamber of Commerce, and at the annual dinner of the Harrisburg, Pa., Chamber of Commerce, the afternoon and evening of Oct. 2.

Mr. Schwab and his party were met at Lebanon by a reception committee, which included George F. Speaker, president of the Chamber of Commerce, and B. Dawson Coleman, James Lord, John Penn Brock, E. R. Coleman, Frank B. Dutton and Lloyd Wolfe. At the Lebanon Club, at 1.30 p. m., Mr. Schwab, Mr. Grace and a number of others spoke.

The Bethlehem officials then went to Harrisburg and were met by a committee from the Chamber of Commerce and taken on an automobile inspection trip of the city. The banquet in the evening was held in the Masonic Temple. Nearly 500 were present. Addresses were made by Mr. Schwab, Mr. Grace, Quincy Bentz, general manager of the Steelton plant, and others. Mr. Schwab paid a glowing tribute to President Grace, whom he declared to be "at the very head of the steel industry in the world to-day," and predicted that the greatest growth of the steel industry would hereafter be in the East, because of its proximity to the sea and the fact that the Lake ores will eventually be exhausted, while the East has access to great deposits accessible by sea. Mr. Grace outlined the plans of the Bethlehem interests to spend $90,000,000 in improvements within the next three years and announced a number of changes at Steelton. The company store there will be divorced from the steel plant and all real estate interests would be transferred, he said.

Bethlehem's Great Gun-Proving Grounds

The greatest gun-proving plant in the world is to be established at May's Landing, a few miles from Atlantic City, N. J., by the Bethlehem Steel Company, primarily for the use of the United States Government. The company has purchased a tract of land comprising 20,000 acres, nearly 18 miles long and from 3 to 6 miles wide. Nearly a million dollars has been spent in acquiring the land and another half million will have to be expended before proving can be begun. The tract is as level as a floor. It is bounded on two sides by the Great Egg Harbor and Tuckahoe River, while a fine State boulevard extends along a third side and an electric railroad on the other.

The situation of the proving ground makes it possible that, in the event of war with a sea power, which would attack the Jersey coast between New York and Philadelphia, the Government could establish thereon a military base. With a little dredging, the inlet and the large bay could be made navigable for warships, while interior coast waterways connect with New York Harbor and the Delaware River.

The Edgewater Steel Company

The Edgewater Steel Company, Oakmont, Pa., near Pittsburgh, whose incorporation has already been noted in these columns, has completed the details of its organization and has taken over the entire plant of the Kennedy-Stroh Corporation. The plant is now equipped with one open-hearth furnace and another will be added, work on which will be started in a short time. In addition to carrying on the former lines of manufacture in steel and brass, new construction is now under way to give this company a well equipped plant for the manufacture of locomotive and carwheel tires, rolled steel wheels, gear rims, roll shells and turbine rings. F. B. Bell is president; M. R. Jackson, vice-president; W. H. Schoen, treasurer; J. H. Baily, secretary, and F. C. Riddile, general manager. The directors are Charles T. Schoen, E. W. Mudge, Maurice Falk, William L. Jacoby, E. T. Weir, Leon Falk, W. H. Schoen, M. R. Jackson, C. M. Thorp, J. H. Baily and F. B. Bell. The general offices of the company will be in the Farmers Bank Building, Pittsburgh.

NATIONAL RESEARCH COUNCIL

Engineering Foundation Gives Funds to Help Solve War and Peace Problems

Arrangements have just been completed whereby the resources of the Engineering Foundation, under the auspices of the four principal national engineering societies, are placed at the disposal of the National Research Council, which was appointed by the National Academy of Science at the request of President Wilson. The object of the council is to co-ordinate the scientific research work of the country in order to secure efficiency in the solution of the problems of war and peace. The council was without funds until the Engineering Foundation, established to further scientific and engineering research, offered to place its resources at the council's disposal, including the services of its secretary, Dr. Cary T. Hutchinson, to act as secretary of the council. The offer was accepted and plans for immediate activities have been placed in the hands of an executive committee.

Dr. George E. Hale, director of the Mount Wilson Solar Observatory, is chairman of the council. Medicine is represented on the council by Dr. William H. Welch, president National Academy of Science; by Brig.-Gen. William C. Gorgas, surgeon general of the United States Army; by Dr. Simon Flexner, director of the Rockefeller Medical Institute, and by Dr. Victor C. Vaughan, past president of the American Medical Society. Chemistry is represented by Dr. A. A. Noyes, Massachusetts Institute of Technology, and Dr. L. H. Baekeland; physics by Dr. A. A. Michelson of the University of Chicago; and electricity by Prof. M. I. Pupin, Columbia University. Clemens Herschel, president American Society of Civil Engineers; John J. Carty, chief engineer American Telephone & Telegraph Company; Gano Dunn, president J. G. White Engineering Corporation; C. E. Skinner, director of the research laboratory of the Westinghouse Company, and Dr. W. R. Whitney, director of the research laboratory of the General Electric Company, are among those who will represent the engineering side of the council's work.

The important military aspects will be presented to the council by Maj.-Gen. William Crozier, chief of ordnance U. S. A., by Lieut.-Col. George O. Squier, chief of aviation, U. S. A., and Chief Constructor David W. Taylor, U. S. N. Other branches of the government are represented by Dr. S. W. Stratton, director Bureau of Standards; Van H. Manning, director Bureau of Mines and Prof. Charles F. Marvin, chief United States Weather Bureau.

Other members of the council are: Dr. John A. Brashear, Pittsburgh; Dr. W. F. M. Goss, dean of engineering, University of Illinois; Dr. William H. Holmes, curator United States National Museum; Dr. W. W. Keen, president American Philosophical Society; Prof. E. C. Pickering, director Harvard College Observatory; Charles F. Rand, president United Engineering Society; Prof. Theodore W. Richards, Harvard University; Prof. R. A. Millikan, University of Chicago; Ambrose Swasey, Cleveland; Dr. Elihu Thomson, Swampscott, Mass.; Dr. C. R. Van Hise, president American Association for the Advancement of Science; Dr. Charles D. Walcott, secretary Smithsonian Institution; Dr. J. M. Coulter, professor of botany, Princeton University; Prof. R. H. Chittenden, dean Sheffield Scientific School, Yale University; Prof. Raymond Pearl, biologist, Maine Experiment Station, Orono, Me.; M. T. Bogert, professor of organic chemistry, Columbia University.

A souvenir gold dollar, specially minted by the U. S. Treasury Department in connection with the new McKinley Birthplace Memorial now in course of erection at Niles, Ohio, where the martyred president was born, is now ready for distribution. It has on one side a likeness of McKinley and on the other a bas relief of the magnificent memorial building. These coins, of which no more will be minted, will be sold at $3 each, and may be obtained from the leading banks in the principal cities, or from the McKinley Birthplace Memorial Association, Youngstown, Ohio.

SUPPLIES OF FERROMANGANESE

Apparent Supply Still Large and Adequate—Manganese Ore Imports a Record

The output of manganese-iron alloys made in the United States since the war started reached its height in June, 1916, when 41,278 gross tons were made, according to the blast-furnace reports of THE IRON AGE. The largest previous total was 35,844 tons in May. These figures are corrected to date. Since June there has been a gradual decline. The output in September was 29,551 tons of ferromanganese and spiegeleisen. The present average monthly output of 31,411 tons, however, is very much larger than that for 1915, which was 19,985 tons per month, and exceeds by over 11,000 tons per month the rate for 1913, the record year.

PRODUCTION OF MANGANESE-IRON ALLOYS

The following table, compiled from the monthly blast-furnace figures of THE IRON AGE, shows the combined and relative output of these alloys for the last four years and to date this year:

Production of Ferromanganese and Spiegeleisen in the United States—Gross Tons

	Ferromanganese and Spiegeleisen	Average per Month	Ferromanganese	Spiegeleisen
1912	244,884	20,407	125,378	119,506
1913	245,576	20,464	119,495	126,081
1914	206,448	17,204	106,883	100,36[illegible]
1915	239,824	19,985	146,742	93,082
1916 to Oct. 1	282,699	31,411*	146,702	135,997

*At this rate the 1916 output will be about 376,932 tons consisting of 195,605 tons of ferromanganese and 181,327 tons of spiegeleisen.

These figures show that the output this year of the manganese-iron alloys will approximate 377,000 tons if maintained at the present monthly rate. Our last analysis, published in THE IRON AGE, June 15, 1916, showed the monthly output to May 1, 1916, to have been 29,167 tons with the ferromanganese production at 16,110 tons per month and the spiegeleisen at 13,056 per month. The ferromanganese output has changed but little—16,300 tons to Oct. 1, 1916—but the spiegeleisen production has advanced from 13,058 tons per month on May 1, 1916, to 15,110 tons per month to Oct. 1, 1916.

IMPORTS OF FERROMANGANESE

The imports of ferromanganese have fallen off slightly in the last 5 months. To May 1, 1916, they were 25,898 gross tons or 6474 tons per month. The imports in July were 5341 tons and in August 8525 tons. The average to Sept. 1, 1916, had fallen to 6086 tons per month as the following table of Government data shows:

Imports of Ferromanganese into the United States

	Gross Tons	Per Month, Gross Tons
Total for 1915	55,201	4,600
Total for 1913	128,070	10,672
Total for 1916 to Sept. 1	48,687	6,086
Total for 1915 at this rate	73,031	6,086
Average per year for 5 years (1910 to 1914)	100,793	8,399

The present import rate is about 60 per cent of the record rate in 1913 and nearly 32 per cent larger than that of 1915. It is about 72 per cent of the 5-yr. average. Receipts in September from two of the ports which have thus far furnished THE IRON AGE with their imports amount to 7792 tons. It is therefore likely that the total imports for the year will not fall below 75,000 tons.

BRITISH AND AMERICAN MANGANESE ORE SUPPLIES

British imports of manganese ore thus far this year have been very good. To Sept. 1 the total has been 306,005 gross tons or 38,250 tons per month. Comparative official figures are as follows:

	Gross Tons
Imports per month in 1913	[illegible]
Imports per month in 1914	39,953
Imports per month in 1915	[illegible]
Imports per month to Sept. 1, 1916	38,250

The imports have gradually increased during 1916, having been only 33,049 tons per month to May 1, 1916, at the time of the last analysis of the situation.

Manganese-ore imports into the United States now are larger than ever before. To Aug. 1, 1916, they averaged 45,566 gross tons, those for July having been 81,942 tons and for May 74,825 tons. Comparative Government statistics are as follows:

Manganese-Ore Imports into the United States

Period	Gross Tons	Per Month, Gross Tons
[illegible]	320,782	26,731
[illegible]	283,294	23,608
[illegible]	347,030	28,757
Average for 5 yr. (1910-1914)	269,949	22,470
To April 1, 1916	51,545	17,181
To Aug. 1, 1916	318,965	45,566
Total for 1916 at present rate	501,239	45,566

It will thus be seen that the imports thus far reported this year are but little short of the total for 1915, and not far from double the pre-war monthly record in 1913. Should the import rate be maintained at the present average for the remaining four months of this year the total will be 501,239 tons, an amount never reached before. Most of this has come from Brazil, the supply from our own country being negligible. Before the war but 20 per cent of our supply came from Brazil, the remainder coming from Russia and India, now practically shut off.

Early this year a considerable amount of manganese-iron alloys with a manganese content between 25 per cent and 75 per cent was being made and eagerly consumed, demanding a high price. At present these are not made in so great a quantity. The demand is less because the supply of the standard alloys is larger.

SUMMATION OF THE DATA

Summarizing the foregoing tables and taking the sum of the importations and the production of the standard 80 per cent ferromanganese as the apparent available supply for consumption, we have the following:

Apparent Supply of Ferromanganese in the United States

Period	Imports Gross Tons	Production, Gross Tons	Apparent Supply Gross Tons	Apparent Supply, per Month, Gross Tons
1912	98,137	125,378	224,515	18,709
1913	128,070	119,495	247,565	20,630
1914	82,317	106,883	188,200	15,691
1915	55,201	146,542	201,743	16,812
Average for 5 yr., 1910 to 1914	100,793	99,363	200,156	16,679
1916	75,000*	195,605*	270,605*	22,550*

*Probable figures based on the monthly returns to August and September this year.

These figures show that there has been very little change in the general situation since the review in THE IRON AGE, June 15, 1916, which showed an apparent supply for 1916 of 271,008 tons or 22,584 tons per month, at the rate of importation and production then. It is not only considerably larger than the 5-year average up to 1915, but is 2000 tons per month in excess of the apparent monthly supply in 1913, the pre-war record.

The striking and significant fact is that, at the present large production rate, an output in 1916 of nearly 196,000 tons of standard ferromanganese is assured. This contrasts with the previous record production before the war of 125,378 tons in 1912 and of 146,542 tons in 1915.

APPARENT SUPPLY AND CONSUMPTION

The relation of the probable apparent 1916 supply to that of the present needs of the American steel industry is an important one. While somewhat conjectural, comparatively reliable estimates are possible. The estimated steel output of all kinds in the country on Jan. 1, 1916, was 40,000,000 gross tons per year, and on June 1, about 44,000,000 tons. Recent new capacity now in operation or to be producing by Dec. 31, 1916, will bring the output to at least 45,000,000 tons per year. Taking 17 lb. of ferromanganese to the ton of steel as the average consumption, then 341,518 tons of this alloy would be necessary to produce the 45,000,000 tons of steel. But large quantities of spiegeleisen are used to make high-carbon Bessemer steel. If two-fifths of the Bessemer steel output of the country is high carbon steel and if 73 per cent of the total steel output is non-Bessemer steel requiring ferromanganese, then

the amount of ferromanganese necessary, or the present rate of consumption, would be, taking 17 lb. of the alloy per ton of steel:

45,000,000 × 0.75 = 33,750,000 gross tons
45,000,000 − 32,850,000 = 12,150,000 gross tons
12,150,000 × 2 = 24,300,000 gross tons
12,150,000 − 4,860,000 = 7,290,000 gross tons
32,850,000 × 7,290,000 = 40,140,000 gross tons
40,140,000 × 17 = 682,380,000 lb. or 304,634 tons

To supply this apparent necessary consumption in 1916 we have 270,605 tons as the apparent supply based on present output and imports. This makes, therefore, an apparent deficit of about 34,000 tons. This compares with an apparent deficit of nearly 27,000 tons for the year based on data to May 1, 1916.

In analyzing the entire situation, account must be taken of the fact that not only have unusual economies in conserving supplies of ferromanganese been practised, but spiegeleisen as well as some ferrosilicon have been important and extensive substitutes for the regular alloy. The extent of the use of spiegeleisen is indicated by the large increase in its production to Oct. 1, 1916, an increase of 46 per cent over that for all of 1915. The conclusion is reasonable, therefore, that the apparent ferromanganese deficit of 34,000 tons for the year has been fully met by the economies and substitutes referred to. This statement is further strengthened by the fact that the price has fallen from $200 to $250 per ton in June, 1916, to $160 to $165 per ton now.

Preceding analysis of the ferromanganese situation appeared in THE IRON AGE, March 4 and Aug. 5, 1915, and Jan. 27 and June 15, 1916.

Seasoning Cracks and Self-Annealing of Brass

Seasoning cracking and self-annealing of brass is a problem that should receive the serious attention of metallurgists. Such is a statement made by W. Arthur, Frankford Arsenal, Philadelphia, in a paper read by him at the meeting of the American Institute of Metals at Cleveland, Sept. 15, 1916. He cited the loss of spring temper of hard-drawn brass wire held in storage for any considerable length of time, and the tendency to discard the use of brass springs on account of this feature. Another instance cited was the failure, due to seasoning cracking, of brass cartridge shells. Heads have been known to crack entirely from the body, without having been subjected to any shock or sudden temperature change.

While no satisfactory explanation has yet been advanced to explain these phenomena, the most probable one, according to the author, is that when the crystals are broken and distorted, resulting in the production of amorphous metal, a slight increase in volume occurs. When the metal attempts to crystallize or regain its normal condition, the decrease in volume produces a condition of strain, which, unless relieved some other way, produces a break in the metal.

Steel-Bar Exports Continue to Mount

Our exports of steel bars have continued to mount until in July and August this year they were 78,947 and 79,338 gross tons respectively. Taking the average of these as a basis, the movement is at the rate of 949,704 tons per year. They have increased continually since January, when they were 58,401 tons. The following table of Government data illustrates the situation and gives the exports in gross tons:

Period	Total	Tons Per Month
Fiscal year ended June 30, 1916	625,585	52,132
Fiscal year ended June 30, 1915	230,274	19,189
Fiscal year ended June 30, 1914	149,113	12,426
Calendar year, 1915	426,002	35,500
Calendar year, 1914	123,008	10,251
Calendar year, 1913	211,716	17,643
To Sept. 1, 1916 (8 months)	524,591	65,574

The present export rate of 65,574 tons per month, or 786,888 tons per year, is nearly 13,000 tons per month in excess of that for the fiscal year of 1916 and nearly four times that of the previous pre-war record of 17,643 tons per month in 1913.

MANGANESE BRONZE FAILURE

An Explanation of the Unsatisfactory Material on the Catskill Aqueduct

An elaborated discussion of the failure of manganese bronze as an engineering material was published in THE IRON AGE, Dec. 2, 1915, being an abstract of a paper by A. D. Flinn before the American Institute of Metals. The information given therein has been supplemented by a paper by Paul D. Merica and C. P. Karr, of the Bureau of Standards, presented to the same organization at its Cleveland meeting, Sept. 14, 1916, which is condensed below.

It is stated that the failures described in the earlier paper occurred in valve castings and that "in most cases, indeed in nearly all, these cracks appeared to be close to or in a repair made by the method of burning in . . ."

The castings referred to are quite large, up to 22,000 lb. in weight, so that neither preheating of the casting for the welding or burning-in of defective areas, nor subsequent annealing of the whole casting could be conveniently carried out. As a result of the local heating of welding and consequent unequal contraction of different constrained parts of the casting, stresses remained in the casting, particularly severe near and within the burned-in areas; these stresses were in all probability responsible for the subsequent failure at these points.

A series of experiments was carried on to determine the value of such stresses in correlation with the physical properties and structures of manganese bronze as welded or burned in. The material used was from a scrapped casting of the following composition:

Copper	58.5 per cent
Zinc	39.1 per cent
Tin	1.0 per cent
Iron	1.4 per cent
Lead	Trace
Manganese	None

Bars from which a central portion was removed by sawing were used in the tests, the sawed out piece being replaced by burning-in. The conditions of the experiments simulated as closely as possible those existing in burning-in repairs in large castings. The results were uniformly sound welds. A calculation of the stresses introduced in the burned-in portion shows that at some temperatures they are greater than the elastic limit of the material, and the material yields. No bending or distortion tending to relieve these stresses was possible in the casting on which the experiments were made, and this should be borne in mind in applying the results to castings where such distortion is possible.

The conclusions to be drawn from the experiments are:

(1) That the welding-in of constrained portions of castings, forgings and wrought articles of manganese bronze produces, in general, local initial tensional stresses within and near the burned-in zone, of value equal to the true elastic limit of the material, unless the shape of the casting is such that extensive distortion may occur.

(2) That such castings should, therefore, be either preheated carefully for welding, so that all parts of the casting cool down together from a dull red heat, or, the casting should be subsequently annealed. Experience indicates that a low temperature anneal is sufficient for this purpose, e.g., from 760 to 945 deg. Fahr. for from one to two hours. Either of these precautions should eliminate these local stresses resulting otherwise from the burning-in and should produce castings free from danger of subsequent cracking.

On Saturday, Sept. 30, 2700 employees of the New Departure Manufacturing Company, Bristol, Conn., stopped the manufacture of New Departure ball bearings for the day and enjoyed a barbecued dinner of grilled lamb and accompaniments, said to be the biggest thing of the kind ever held in New England. The company furnished everything for the day and the men were enthusiastic in their commendation of the completeness with which President DeWitt Page authorized the features of the big holiday.

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Manganese and Tungsten Resources

The steel trade undoubtedly derives a considerable degree of satisfaction in knowing that our apparent supply of manganese-iron alloys continues adequate. An analysis of the situation on another page of this issue of THE IRON AGE shows that our present rate of production insures an output of nearly 196,000 gross tons of ferromanganese and over 181,000 tons of spiegeleisen for 1916, both nearly double that of two years ago and much in excess of that of the best pre-war record. This output, together with the present sub-normal imports of British ferromanganese, makes the apparent supply adequate—an unexpected achievement two years ago.

A striking feature of the situation is that the manganese ore necessary to produce this large ferromanganese output is coming almost entirely from Brazil. To produce the 146,702 tons of alloy made to Oct. 1, 1916, not less than 366,750 tons of manganese ore was necessary. Our ore imports to Sept. 1, 1916, were over 306,000 tons. These imports to Jan. 1, 1917, will amount to 501,000 tons if maintained at the present rate, and from this over 183,600 tons of ferromanganese will have been possible. This, with the imports from Great Britain, will meet the tremendous demand of our steel industry.

Some insecurity, however, lurks behind the apparent glamor of these facts. To supply this most necessary of elements in making steel, our own territory has furnished scarcely any manganese ore. Our steel industry is dependent almost absolutely upon foreign sources for manganese, without which thus far good steel is impossible. Were war to break out between the United States and a first-class foreign power, capable of controlling entirely or in part the high seas by submarine or other warfare, the situation would be a precarious one, for no nation can defend itself without steel. Assiduous efforts to discover good deposits of manganese ore in this country have been unavailing.

The tungsten situation presents a decided contrast. When the war broke out, the steel industry was confronted with a possible famine in manganese and tungsten. Since plain or alloy steels are impossible without manganese, so tungsten is essential to high speed steel. Steel for ammunition and ships and steel to machine it are absolutely essential fighting factors. Before the war Great Britain controlled the tungsten ores and Germany the manufacture of tungsten alloys. To-day, spurred by high prices, the United States leads the world in the production from its own territory of tungsten ores and alloys. We are still dangerously dependent as to manganese. It is to be hoped that either metallurgical science will discover a substitute or that the electric furnace, in the event of a scarcity, be available as the chief melting and refining medium for steel because its consumption of manganese is one-third or less than that of any other process to attain the same result.

Remarkable Tin-Plate Season Opening

What has hitherto been an annual event seems destined to be a semiannual event in future. The tin-plate mills have announced prices for next year's deliveries, but state that they will in future sell for only a half year instead of a year. The new price is $6, Pittsburgh, per base box, for contracts made with manufacturing consumers for the first six months of 1917, comparing with $3.60 announced Nov. 11, 1915, as the price for the present year. The change in the period has been discussed for years, and it is not surprising that the mills should actually undertake to make the change at this time, considering what may be regarded as the disastrous experience of the present year. When the $3.60 tin-plate price was announced sheet bars were selling in the open market at $26.50, Pittsburgh, per gross ton, whereas to-day it would be difficult if not impossible to buy them for next year at double the price. Wage rates have advanced sharply, and the wage cost of production has increased still more by labor becoming less efficient. When the mills sold tin plate for the year 1916 they were unable to cover fully on all their raw materials, and were unable to cover on any part of their labor.

In the tin-plate as in many other branches of the finished steel trade, contracts have been drawn quite loosely in the past, the mill usually obligating itself for a total tonnage greater than it could produce, as contracts are not usually specified in full. This year the contracts are being specified in full, and have been already in most instances, whereby the tin-plate mills will carry over into the new year about two months' production, chiefly at low prices. In the circumstances it is quite natural that the mills should now be endeavoring to confine their obligations to actual sales of material that will be

taken out when it is possible to produce and ship it.

The tin-plate price of $6 is a high one according to the conventional method of comparing the price with the market prices of steel and pig tin, for a continuation of the average margin that has obtained in the past few years, with a liberal allowance for increased costs of labor and other materials, apart from steel and tin, would not indicate a price much above $6, but the usual relations are lost in the tin-plate market as has been the case already in some other steel products.

The tin-plate mills look upon the question purely as one of supply and demand, that tin plate for next year is simply a question of deliveries. The conviction is expressed that it will be physically impossible to produce enough tin plate in the first half of next year to supply the domestic demand plus that portion of the export demand the mills have lately been supplying.

The possible tin-plate production is much larger than might be supposed. The mills will be able to make much more tin plate than they have ever made in the past. In the first place, there are more mills, as several of the independents have largely increased their capacity in the past few months. In the second place, the tin-plate works will be able, on an average, to produce much more tin plate per mill than they have hitherto produced, because they intend, on account of the heavy demand for tin plate, to give up the making of black plate specialties.

The new year will open with a total of some 440 mills, about 45 per cent being controlled by the leading interest and about 55 per cent by independents. Working under the same conditions as obtained in 1915, the mills, operating full for 50 weeks of the year, would be able to produce more than 1,400,000 gross tons of tin and terne plate. In 1915, however, almost 20 per cent of the total "tin-mill" product was in the form of tin-mill specialties, produced chiefly at the regular tin-plate works, as there are relatively few tin mills in the regular sheet plants. Assuming, however, that the amount of tin-mill specialty business to be given up by the regular tin-plate works is only one-half the proportion obtaining in 1915, it would be possible to produce in 1917 about 1,600,000 gross tons of tin plate. Last year's production was 1,055,936 tons, passing the record of 962,971 tons made in 1912. Only a rough guess can be hazarded at the current year's production—perhaps 1,200,000 tons. An increase of 50 per cent in tin-plate production in two years would certainly be astonishing, but the present attitude of the mills as to prices and form of contract cannot be harmonized with any other expectation.

The first United States tin-plate production officially reported was for 1891, the grand total then being 999 tons. Assuming no production in 1890, production rose above 100,000 tons in 1895, above 500,000 tons in 1906 and above 1,000,000 tons in 1915, while there are certain indications that production may be above 1,500,000 tons in 1917. The original protective duty, which established the industry, was the McKinley duty of 2.2 cents per pound, effective July 1, 1891, the McKinley bill having passed in October, 1890. The present duty is an ad valorem one, 15 per cent. At prices obtaining in the Welsh market when the present tariff was enacted, this would be equal to a specific duty of about 0.44 cent per pound. At prices now quoted abroad it would equal a duty of about 1.18 cents per pound. The situation in Europe thus supplies the place, for the present, of tariff protection. American mills are quoting higher prices on export than on domestic business, yet those prices are much lower than are quoted abroad. If a time came when tariff protection were really needed the present ad valorem rate would have to be raised considerably.

Our Inefficient Tariff

A very disturbing factor in the national revenue situation is the rapid increase in importations without a corresponding increase in customs collections. Ever since the Underwood-Simmons tariff act was placed on the statute books in October, 1913, there has been a steady downward movement in the average ad valorem rate of duties collected until at the present time importations are paying barely 8 per cent, as against 19.4 per cent for the entire period of the Payne-Aldrich law and 25.9 per cent for the Dingley law. Under this relatively low ad valorem it is not surprising that the customs collections should be far below normal, notwithstanding the fact that importations are showing impressive totals. For the month of August of the current year the total imports amounted to approximately $200,000,000, as against $142,000,000 for the same month of 1915, an increase of 40 per cent. That this is not merely sporadic is clearly shown by an examination of the figures for the eight months ended August, 1916, during which the total importations aggregated $1,666,155,000, as against $1,150,858,000 for the same period of 1915, a gain of 45 per cent.

The significance of these figures is emphasized by the fact that only once in the history of the Government have the imports of the eight months exceeded the figures for 1915, those for 1913 having aggregated about five and a half million dollars more. It will therefore be seen that the imports for the past eight months have exceeded the previous high water-mark by nearly 45 per cent. The gains as compared with last year are distributed throughout nearly all the great groups into which current imports are divided. Crude materials for use in manufacturing have risen from $53,464,000 to $82,888,000; food stuffs in crude condition and food animals, from $18,192,000 to $18,954,000; food stuffs partly or wholly manufactured, from $21,729,000 to $25,946,000; manufactures for further use in manufacturing, from $23,069,000 to $37,628,000.

Perhaps the most significant feature of these statistics is the striking manner in which they refute the claims of the framers of the Underwood-Simmons bill that it would stimulate the importation of food stuffs rather than partially or wholly completed manufactures. The gain in the two classes of food stuffs is seen to be but $4,779,000, while that in manufactured goods is $22,683,000. If these conditions can prevail when the leading manufacturing countries of Europe are at war, and therefore are concentrating their energies upon the production of war material, what will happen when their manufacturing facilities are released for the

production of standard goods for general consumption?

In this connection the statistics for August and for the eight months ended August embrace some exceedingly interesting figures, showing the extent to which all the belligerent countries, save Germany alone, are increasing their respective shares in our import trade. During August of this year we received from France merchandise to the value of $10,061,000, as compared with $7,538,000 for the same month of 1915, while for the eight months of 1916 the total was $75,832,000, as against $46,994,000 for the same period a year ago. Our receipts from the United Kingdom during August of this year aggregated $24,596,000 as against $18,535,000 for the same month of 1915, while for the eight months of this year the total was $219,115,000, as against $161,737,000 last year. Even Russia participates in this exhibit, and while her share is not large it is increasing more rapidly than that of any of the other allies, having risen in August from $440,000 in 1915 to $1,703,000 in 1916. Russia's share for the eight months of 1915 was only $912,000, but for the same period of 1916 it is $3,558,000, an increase of nearly 300 per cent. For the month of August, Italy shows a gain from $2,694,000 to $3,908,000, and for the eight months an increase from $34,496,000 to $42,632,000. Even little Belgium is steadily increasing her share in our imports, the record showing a gain from $76,368 in August, 1915, to $90,768 for the same month of 1916.

The argument that the reduction in duties has been a benefit to anyone falls flat when there is the practical experience that the cost of living has increased. The sum and substance of the whole matter is that a large volume of imports is going to waste so far as the production of revenue is concerned, and it cannot be seen that anyone is benefited.

Government Needs Get Preference

Navy Department officials, according to Washington advices, are paying high tribute to the patriotism of American shipbuilders and of manufacturers of materials entering into the construction of war vessels.

Confident predictions are made that there will be plenty of genuine competition for the contracts covering the 1917 building program to be let upon the basis of bids to be opened Oct. 25 on 59 vessels and Dec. 6 on 4 battle cruisers. The confidence of the Department is based not only upon the large number of applications for plans and specifications but also upon written and verbal assurances that have come from some of the leading men in the shipping industry, in the steel trade, and in other lines of manufacture tributary to shipbuilding. It has been made perfectly clear to the Department that the shipyards are not looking for business, but on the contrary that their facilities are mortgaged for a long time to come. Shipbuilders, however, have given very positive assurances that they will not only accord the naval work a distinct preference, as compared with all merchant work not already contracted for with specified deliveries, but that wherever possible existing facilities will be expanded liberally, irrespective of any business that may follow the contracts now offered by the Department. This public-spirited attitude on the part of the shipbuilders is the more notable in view of the unjust criticism to which they have been subjected by the Secretary of the Navy because of their failure to meet his views concerning the cost of constructing the dreadnaughts authorized a year ago.

British Labor Wants National Control of Resources and Large Industries

The national control of land, the national ownership of food warehouses, of war munition manufacture, of mines and railroads and a first claim for the State on the use of shipping was urged in a resolution which passed unanimously in a trade union congress held in Birmingham, England, Sept. 4. The congress was attended by 663 delegates representing 2,850,547 wage earners. The president in his annual address emphasized that the unions want the State to take over the mines, railroad and shipping and to control the great storage warehouses and granaries. He also said that they demanded the creation of a Ministry of Labor and this was also incorporated in the resolution. He admitted that the problems to be solved on the declaration of peace are serious. The Government, he said, should take necessary steps in advance, in the national organization of industry, to provide that extensive public works of all kinds be undertaken to prevent widespread or lasting unemployment. He believed that employers should agree to put their business on a new footing by admitting workmen to some participation, not in profits but in control.

It was reported that there had been correspondence with the American Federation of Labor, the latter recommending the holding of an international trade union congress at the same time and place as the meeting of the plenipotentiaries arranging terms of peace. The recommendation was rejected by a majority of two to one, it being deemed impossible to have any dealings with delegates of the enemy nations. A resolution in favor of the adoption of an 8-hr. day was passed with a view to facilitating the problem of unemployment.

Our Huge Crude Steel Exports

Attention was called last week to the striking volume of our crude steel exports. It was shown that, based on the average monthly rate for this year to Aug. 1, 1916, the present outgo was at the rate of a little over 1,000,000 gross tons per year. Since this estimate was made the official figures for August have been published, which show that for that month the exports of steel ingots, billets and blooms were 160,921 tons, the largest monthly exports since the war started and ever recorded. Revising the estimates and taking the monthly exports for May, June, July and August (142,782, 116,425, 135,827 and 160,921 tons respectively), the average for which is 138,989 tons, the present export rate for 1916 on this basis is 1,667,868 tons. This one product exceeds the total steel exports of 1,549,543 gross tons for the year 1914 and of 1,540,895 tons for 1910.

The North Cornwall furnace of the Lackawanna Iron & Steel Company, at Lebanon, Pa., will be lighted some time this month, according to a statement in a local paper attributed to Lloyd Wolfe, local manager. The stack, which has been out of blast for years, has been rebuilt at a cost of about $100,000. A new engine, new stock house and new tracks have been added.

The Thew Automatic Shovel Company, Lorain, Ohio, has increased its capital stock from $750,000 to $1,000,000, the increase to be distributed as a stock dividend.

The Standard Steel Car Company, Pittsburgh, has appropriated $300,000 to be spent in new buildings and additions to its plants at New Castle, Pa.

Lake Superior Corporation's Meeting

That the financial affairs of the Lake Superior Corporation are in such a condition as to make a reorganization desirable, including among other things a reduction in the capital stock, was imparted by J. Frater Taylor, vice-president, at the annual meeting held in Camden, N. J., Oct. 4. No statement was given out that might throw light on the actual financial condition of the corporation, so far as its present earnings are concerned, but Mr. Taylor said: "You will have noted the large sum of $47,974,556, which still appears unsecured in the balance sheet. We must deal with this drastically."

After referring to the weak points dragging the corporation back, Mr. Taylor outlined the success obtained in reducing the fiscal obligations in the last year. Among these he cited the payment of $1,200,000 borrowed from banks, leaving the sheet clean in this respect. Seven years ago, he said, the first mortgage bonded indebtedness was more than $10,000,000, an obligation which now is scarcely more than one-half that sum. Money would be needed to improve the Algoma Eastern Railway and to develop the Algoma Steel Corporation to handle a varied line of products, as it would not be on a substantial basis until it was able to make something else besides steel rails.

A number of the income bondholders desired an explanation of the reason for not paying interest on this class of security, saying it had been earned. The company's policy, said Mr. Taylor, was to conserve every bit of the earnings toward paying off $2,500,000 of notes due next March. By wiping out this debt a saving of $150,000 annually would be effected.

The directors re-elected were Herbert Coppell, New York; Joseph S. Dale, New York; W. C. Franz, Sault Ste. Marie, Ont.; Thomas Gibson and Alexander Taylor, Toronto; Walter K. Wigham, London; Harvey I. Underhill, South Orange, N. J., and the following from Sault Ste. Marie: A. H. Chitty, J. F. Taylor and James Hawson.

The directors elected the following officers: J. Frater Taylor, president; Herbert Coppell, W. C. Franz and James Hawson, vice-presidents; Alexander Taylor, secretary; James Hawson, treasurer, and Walter K. Wigham, chairman of the board.

Steel-Plate Exports Assuming Large Proportions

Steel-plate exports have recently shown a large increase over both recent records in excess of the record exports in 1913. As judged by those to Sept. 1, 1916, they are at the rate of 238,168 gross tons per year. The exports since January have varied between 18,612 tons in March and 26,297 tons in August, with the average for the eight months at 21,514 tons. The following table of Government data gives the exports for various periods, in gross tons:

Period	Total	Tons Per Month
Fiscal year ended June 30, 1916	266,815	22,234
Fiscal year ended June 30, 1915	123,914	10,326
Fiscal year ended June 30, 1914	160,389	13,365
Calendar year, 1915	222,472	18,539
Calendar year, 1914	111,642	9,303
Calendar year, 1913	223,814	18,651
To Sept. 1, 1916 (8 months)	172,117	21,514

The present monthly rate, at 21,514 tons per month, considerably exceeds the previous pre-war record of 18,651 tons per month in 1913. The destination of these exports has also been unusually diversified.

Allison & Co. Buy Economy Boiler Works

Allison & Co., Chester, Pa., announce that they have purchased the plant of the Economy Boiler Works at Fifth and Lincoln streets, Chester, and that they intend to have a well equipped machine shop operating there by Oct. 15. Plans have been drawn for a new forge shop, 40 x 60 ft., and a new machine shop, 60 x 75 ft., which will be used for the manufacture and finishing of special forgings, such as crankshafts, etc. The inauguration of this work will probably not be started before the spring of 1917. W. G. Seeley has been appointed sales manager, having severed his connection with E. I. du Pont de Nemours & Co.

New Machinery Corporation Organized

The Inter-Continental Machinery Corporation has been incorporated at Wilmington, Del., with a capital stock of $500,000. Its head offices are in the City Investing Building, 165 Broadway, New York, and it will deal in machinery in general, but specialize in machine tools both in the United States and foreign countries. The company has already several exclusive agency arrangements, as well as contracts to purchase material for foreign commissions, the work on which is under way.

The company will establish branch offices in the principal countries of Europe, beginning with Russia. As the principal manufacturers in Russia are in and around Petrograd, the company will establish its branch in that city, following with Moscow, Odessa and Vladivostok for the sale of American machine tools. Offices and salesrooms at Paris, Milan and London will follow.

It is also planned to open offices in China and Japan. In China a different procedure is required than that in the European territories. The need there is for complete plants. The company will accordingly make arrangements whereby its engineers will be able to sell to Chinese customers all necessary products without its clients going to various manufacturers for their needs. In other words, it will specialize in equipping complete plants in China, furnishing engineering services where necessary.

The organization is headed by Charles N. Thorn, who has had 25 years' experience in the machine-tool industry, having been for 14 years connected with Manning, Maxwell & Moore, Inc., and until recently was vice-president of the Allied Machinery Company of America, which is now part of the American International Corporation. For the latter, Mr. Thorn spent five years in Europe developing continental business. The other officers consist of Joseph S. Clark, of E. W. Clark & Co., Philadelphia, vice-president; R. E. Robinson of R. E. Robinson & Co., bankers, 30 Broad Street, New York, vice-president; Chester B. Overbaugh, formerly manager of the Thompson-Starrett Company, Washington, D. C., vice-president, and the secretary is Arthur M. Watkins, who is also sales manager for the United States. Mr. Watkins is a practical engineer and is fitted for estimating on necessary mechanical equipment. He has spent many years in various large shops and for the last 17 years in marketing machines for one of the largest machine-tool companies in the world. The directors are Frank J. Humphrey of the Kissel-Kinnicutt Company, bankers, 14 Wall Street, New York; George W. Hendrick, 3d, of E. W. Clark & Co., and the president and vice-presidents of the company. The company has been financed and no securities will be offered to the public.

Decrease in Steel Corporation's Orders

The United States Steel Corporation's statement for September showed a decrease of 137,733 net tons in unfilled orders on its books at the close of business Sept. 30, 1916. The total orders were 9,522,584 tons against 9,660,357 tons on Aug. 31, 1916. The showing a year ago was 5,317,618 tons, but only 2,787,667 tons on Sept. 30, 1914. The following table shows the unfilled tonnage for each month from January, 1913.

	1916	1915	1914	1913
January	7,922,767	4,245,271	4,613,680	7,827,368
February	8,568,966	4,345,371	5,026,440	7,656,714
March	9,[illegible]	4,[illegible]	4,[illegible]	7,[illegible]
April	8,[illegible]	4,[illegible]	4,[illegible]	6,[illegible]
May	9,[illegible]	4,[illegible]	4,[illegible]	6,[illegible]
June	9,[illegible]	4,[illegible]	4,[illegible]	5,[illegible]
July	9,[illegible]	4,[illegible]	4,[illegible]	5,[illegible]
August	9,660,357	4,908,445	4,213,331	5,223,468
September	9,522,584	5,317,618	2,787,667	5,003,785
October	.....	6,165,452	3,461,097	4,513,767
November	.....	7,189,489	3,324,592	4,396,347
December	.....	7,806,220	3,836,643	4,282,108

The A. P. McCulloch Machine Company has removed its machine shop from Chelsea, Mass., to 216 High Street, Boston, where it will have larger quarters and increased facilities for getting out work promptly, and will continue to manufacture tools and special machinery.

CHANGES IN MIDVALE

Vice-President Barba Resigns and Is Succeeded by E. E. Slick

William P. Barba resigned as vice-president of the Midvale Steel Company on Oct. 6 and E. E. Slick, vice-president and general manager of the Cambria Steel Company, at Johnstown, Pa., has been appointed to succeed him. Mr. Slick is to have complete charge of operations at the works of the Midvale Steel Company, Cambria Steel Company, Worth Brothers Company and Wilmington Steel Company. He will be located in the



E. E. SLICK

general offices of these companies in the Widener Building, Philadelphia.

Mr. Barba retires after 36 years' connection with the Midvale plant at Nicetown, Philadelphia, and it is understood that he has resigned from the board of directors of the Midvale Steel & Ordnance Company. He served in succession as chemist and metallurgist, department superintendent, general manager of sales, general superintendent, general manager and finally, after the purchase by the Midvale Steel & Ordnance Company, as one of the vice-presidents.

It was late in 1912 that Mr. Slick resigned his position as chief mechanical engineer of the Carnegie Steel Company to assume the newly created position of general manager of the Cambria Steel Company. His first position was with the Cambria Iron Company, but he left the drafting room there in 1890 to go to the Edgar Thomson steel works, where he afterward became chief engineer. At the formation of the United States Steel Corporation he was made the chief engineer of the Carnegie Steel Company. He was associated on the committee of engineers advising on the building of the Gary and Duluth plants of the Steel Corporation.

The Philadelphia Bourse has received a communication from the Chamber of Commerce, Paris, which says in part: "The large factories in the suburbs of Paris, in the neighborhood of Lyons, St. Etienne, Rouen and Annonay, built for the preparation of acids, powder and explosives, will be, after the war, converted into works for the manufacture of perfumes, chemicals used in photography and pharmacy and dyeing materials, both organic and inorganic."

Railroad Equipment Business

The buying of railroad equipment is increasing in volume notwithstanding the oversold condition of steel mills. Export contracts for about 50,000 tons of rails running from 60 to 100 lb. to the yard are understood to have been placed by New York agents with several different mills for shipment to France and Italy over the second half of 1917; the understanding is that probably none of the shipments will be made before the last quarter. Inquiries are still in the market for 100,000 to 150,000 tons including 50,000 tons for France, 50,000 tons for Belgium and from 25,000 to 50,000 tons for Denmark. Several other recent sales of small lots of standard sections have been made for export at prices ranging from $50 to $60 per ton at the mill.

There are numerous small inquiries from domestic roads for as early shipment as the mills can promise, but few contracts are being placed because rail manufacturers will not promise shipments before the last quarter of 1917 or the first quarter of 1918.

Railroads and locomotive shops are also actively in the market for boiler tubes for shipment during the last quarter of 1916 and the first quarter of 1917. One $40,000 order has just been placed for this year's shipment. A heavy demand is being experienced for track work, especially for frogs and switches, to be used in new terminals and sidings. Two large Eastern trunk lines have bought double the amount they would purchase in ordinary times.

Car shops report inquiries for about 15,000 freight and passenger cars, but only two-thirds of the business pending is expected to be closed in the near future. The Western Maryland has awarded a contract for 2000 steel hopper cars to the Pullman Company. The Wheeling & Lake Erie is understood to have divided a contract for 1000 cars equally between the Standard Steel Car Company and the Pressed Steel Car Company. The latter shops have also received an order for 10 tank cars from Island Petroleum Company. The Chicago & Northwestern is in the market for 3200 cars, including 1700 gondolas, 1000 wooden box cars and 500 steel ore cars.

British Ferromanganese Market

The ferromanganese market report of the London *Iron and Coal Trades Review*, in its issue of Sept. 22, 1916, has the following to say:

The advance in the price of Indian manganese ore only two weeks ago naturally adds to the cost of production here. Supplies of ore, however, are on a much larger scale than they were at this time last year, the imports in August, for example, having been 46,700 tons against 10,600 tons in August, 1915. But the consumption, of course, is continually increasing. The market for ferromanganese, however, remains quiet and generally firm. The export demand does not improve, and it is believed that the current price may be shaded for delivery over next year, although no business on this basis is reported and no change of any importance is expected.

At Seattle, Wash., Sept. 28, the Manufacturers' Association gave a banquet in honor of the men who have been instrumental in developing in the Pacific Northwest the new era of shipbuilding. Two hundred and fifty shipbuilders, lumbermen, merchants and brokers from Vancouver, B. C., to Portland, Ore., were in attendance to celebrate "Shipbuilders' Night." Statistics presented showed that more than $30,000,000 worth of merchant ships are now under contract in that region. Among the speakers at the banquet were Will H. Parry, member of the Federal Trade Commission; Dr. Henry Suzzallo, president University of Washington; William Piggott, president Manufacturers' Association, and D. E. Skinner, Skinner & Eddy Shipbuilding Corporation, at whose Seattle yards a steel merchant ship was launched on the same day.

The Torsion Balance Company, 147 Eighth Street, Jersey City, N. J., maker of balances, scales, testing and precision instruments, has purchased the warehouse of the United States Express Company as an addition to its machine shop and manufacturing space, and will handle brass and instrument work.

BRITISH STEEL EXPORTS

August Shipments Next to the Highest for the Year—Imports Lower

Great Britain's export of iron and steel for August, composed mostly of supplies sent to the Allies, were 319,928 gross tons, excluding iron ore and including scrap. Despite considerable effort to restrict exports those for August rank second for the year 1916, the largest having been 395,750 tons in May, with June third at 310,595 tons. The average monthly exports for the first eight months of this year are now 312,755 tons, which compares with the monthly average in 1915 of 270,858 tons.

Pig-iron exports for August were 43,183 tons, against 62,917 tons in July, this year, and 42,712 tons in August, 1915. To Sept. 1, 1916, total pig-iron exports were 346,849 tons, as compared with 191,757 tons to Sept. 1, 1915. France and Italy continue to take the bulk of these exports.

Ferromanganese exports in August were about 52,000 tons, against 30,000 tons in August, 1915. To Sept. 1, 1916, they were about 327,000 tons, contrasting with only 126,000 tons to Sept. 1, 1915. The present export rate is therefore about 40,000 tons per month, as compared with only about 15,000 tons per month in the same period a year ago.

Steel-bar exports in August were 59,637 tons (50,288 tons going to France), against 39,668 tons in August, 1915. The total to Sept. 1, 1916, was 466,587 tons, as compared with 307,794 tons to Sept. 1, 1915. France has taken 395,826 tons of the former total.

Rail exports in August were only 1983 tons, a decided contrast to the 32,962 tons exported in August, 1915. The total rail exports to Sept. 1, 1916, were only 33,746 tons, or only about one-sixth of the exports of 190,152 tons for the same period in 1915. The movement in galvanized sheets continues at about 50 per cent of that of last year, having been only 8238 tons in August, as compared with 19,580 tons in August, 1915. The total for the first eight months of this year was 103,454 tons and for the same months in 1915, 218,129 tons.

Exports of tin plates continue about the same, the monthly change for 1916 having been slight. In August they were 34,124 tons, against 38,174 tons in July. The total exports to Sept. 1, 1916, were 260,896 tons, against 260,435 tons to Sept. 1, 1915. France took 55,595 tons of the former total.

Imports of iron and steel in August, excluding iron ore and including scrap, were unusually low, having been 72,033 gross tons, against 83,186 tons in July, 1916, and 128,486 tons in August, 1915. The record month for 1916 was May, with 86,303 tons. The monthly average for 1915 was 107,944 tons.

Blooms, billets and slabs imported in August were 20,104 tons, comparing with 10,898 tons in July and 46,919 tons in August, 1915. The total to Sept. 1, 1916, which was 106,998 tons, was only one-third of that for the same period last year—316,776 tons. Of the former total the United States supplied 85,889 tons, against 252,330 tons last year.

Iron-ore imports in August were large, having been 741,612 tons, against 572,378 tons in August, 1915. The total to Sept. 1, 1916, was 4,879,221 tons, compared with 4,239,167 tons to Sept. 1, 1915.

The valuation of the exports for the first eight months of this year is reported to be £40,804,243 against £25,671,153 for the same eight months of 1915.

German Steel Shipments Decreasing

August shipments of the German Steel Works Union were 250,831 metric tons, which is the lowest for any month this year. The July shipments were 282,875 tons, and in August, 1915 and 1914, they were 250,080 tons and 94,984 tons respectively. The record for 1916 thus far was 311,620 tons in May. The August shipments were made up of 73,208 tons of semi-finished steel, 94,977 tons of railroad material and 82,646 tons of shapes.

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Chrome-Nickel Iron and Steel Products*

Possibilities for Their Development Presented by the Iron Ores of Mayari, Moa Bay and Other Districts in Cuba

BY DR. LEONARD WALDO

The following historical review has been inspired more particularly by the great possibilities in the way of iron and steel products of exceptional quality and value which are offered by the chrome-nickel iron ores found at Mayari, Moa Bay and other points on the north coast of Oriente Province, Cuba.

The very distinguished French chemist, Berthier, published† nearly a century ago his interesting researches into the relation of chromium to iron. He found, first, that by applying a strong heat to a mixture of the oxide of chromium and an oxide of iron contained in a charcoal lined crucible, these oxides were completely reduced and a perfectly hemogeneous combination of the two metals was obtained. A steel maker, M. Merimee, took two of the chrome-iron alloys, one containing 1 per cent of chromium and the other 1½ per cent, and, with the aid of a co-worker skilled in the making of swords and razors, made with these alloys both swords and razors which were found to be of most excellent quality, with hard and lasting cutting edges. In addition to their fine quality as a steel, the blades received a very beautiful damaskeening of a variety of veins of brilliant silver white after the blades were treated by rubbing with sulphuric acid. M. Berthier was much impressed with the quality and beauty of this steel and only regretted that the costliness of chromium would make such a steel too dear in his time. He, however, points out with the instinct of the metallurgical prophet that if such steel could be made serviceable in the arts it might be obtained cheaply, if we could substitute chrome iron ore instead of chromium in its manufacture, and he further outlines a process by which such chrome iron ore might be used.

EARLY APPLICATIONS OF NICKEL STEEL

The immortal Michael Faraday, experimenting upon meteoric iron in the Royal Institution, found that this iron consisted of an alloy which had all the excellent qualities of our modern nickel steel; and it is told of Captain Barrow, who found a meteorite in South Africa in 1820, that he had made from it a sword blade 2½ ft. long which acquired in tempering a remarkable degree of elasticity and which is now the property of the emperors of Russia. It is told of the Esquimos, whom Captain Ross encountered in his expeditions to the North Pole, that their knives were made from meteorites, and we have in these early uses the first applications of nickel steel.

Just as in the case of the East Indian steels being favorably affected by small quantities of aluminum, so in these early steels we have incipient qualities which contemporary metallurgy has developed to the highest degree with reference to the extreme hardening qualities of chromium and the toughening qualities of nickel.

In considering the three elements, we have for chromium a specific gravity of 6.50; for iron a specific gravity of 7.76, and for nickel a specific gravity of 8.57. The iron, which is the matrix for the other two, thus has a density midway between them. The melting point of the cromium is 2750 deg. Fahr.; that of iron almost the same, and that of nickel 2640 deg. Fahr. We have, therefore, in these three metals a similarity of melting points and densities which leads to great ease of diffusion when melted together—a quality which works for homogeneity of the mixture and which homogeneity is the first condition of successful billet manufacture, as well as of castings in modern steels.

FIRST WORK ON CHROMIUM STEEL

A long line of distinguished metallurgists, attracted by the great promise of nickel and chrome-steel alloys, have devoted themselves to their critical study. Vanquelin, who had discovered chromium in 1797, published in the following year his "Memoire sur le Nouveau Metal Appelé Chrome." This was followed by Faraday's "Alloys of Steel" paper in 1822 and by Berthier's paper upon the "Alloys of Chrome with Iron and with Steel" in 1823. Frémy described blast-furnace alloys of oxide of chromium and metallic iron in 1857, and in 1861 Mushet, the father of our modern high speed steels, took out an English patent for "adding to and melting with any mixture of metals which, when melted, produced cast-steel, a quantity of a mixture of pulverized pig iron, cast iron or refining iron and oxide of manganese with pulverized chrome ore or oxide of chromium commercially." In 1877 his firm had supplied the works of Sir Robert Hadfield at Sheffield with 30 per cent ferro-chromium at as low a price as two shillings per pound.

Following Mushet, Julius Baur of New York, to whom Sir Robert Hadfield gives the credit of first introducing on a practical scale the manufacture of chromium steel, took out an American patent in 1865, claiming "a steel greatly improved, toughened and hardened by the addition of chromium," and also claiming to be the first to establish the fact that chromium could be used practically in making steel. From this time on we may regard chromium steel as having been launched on its distinguished career. In 1892 there appeared in the *Journal* of the Iron and Steel Institute Hadfield's classic paper on the alloys of iron and chromium, followed by Osmond's report on the chromium steel of R. A. Hadfield, giving plates showing the penetration effected by Hadfield 13.5-in. chromium steel projectiles fired at Shoeburyness from the 63-ton. B.-L. gun, and also plates showing 9-in. compound armor plate penterated by Hadfield's chromium steel projectiles.

The action of nickel when alloyed with iron is very different from that of chromium. It can be added up to one-third of the entire weight of the iron, in which case we have the remarkable invar steel, a steel with practically no coefficient of expansion up to twice the temperature of boiling water. There seems to be no appreciable chemical union of the nickel with the iron, and its general effect is to increase the temporary toughness, to raise the elastic limit and to make a commercial steel of great value. But in the percentages ordinarily used, up to 3½ per cent say, nickel, shows no remarkable qualities as compared with the action of chromium in steel.

CHROME-NICKEL-IRON SERIES

Recent investigators, such as Moisson, Carnot and Goutal, have shown that the action of chromium is very complex, in that it forms compound carbides of chromium, carbon and iron, and that in the presence of nickel the action of the chromium as a hardening element is greatly increased. These discoveries have led to a satisfactory explanation of the peculiar excellent qualities of steels and irons in which the nickel, chromium, carbon and iron are united. The immediate result of the discovery of the fact, and a formulation of the reason, has led to the development of the chrome-

*From a report prepared for the Moa Bay Iron Company, New York.

†Annales de Chem. Tome XVII, p. 63, Paris, 1821.

nickel-iron series of alloys unexampled in the development in amount of any other series of commercial alloy steels.

At the autumn meeting of the British Iron and Steel Institute in 1913 there was a most interesting paper on the manufacture of armor-piercing projectiles, followed by a discussion most favorable to the art of the work done at the Girod plant in Ugine, France; at the Cockerill works in Belgium; at the Hadfield works in Sheffield and at other plants. Results were described in this paper of projectiles penetrating Krupp cemented plates of a thickness equal to the diameter of a projectile of 10 in., weighing 485 lb., and having an initial velocity of 1784 ft. per second. Another result was that of a 12-in. projectile piercing, without breaking, a 12-in. plate, the projectile weighing 922 lb. and having an initial velocity of 1984 ft. per second. These examples are cited because the severest mechanical test known for the combined qualities of a commercial steel is in withstanding the strain of the impact of projectiles. The manufacture of armor plates and projectiles is one in which the cost of manufacture is subordinate to the result to be obtained. Material of this high order of excellence finds a wide use in other and more peaceful applications, and the extent of such other uses is proportional to the lowering of the price of manufacture. The first volume of Carnegie Scholarship Memoirs of the Iron and Steel Institute for 1909 gives a long list of chrome-nickel steels, which in their cast state give the greatest adaptability to gears, heavy and light. The author, Revillon, cites cases where the tensile strength of such steels is considerably in excess of 200,000 lb. per square inch, and with elongations as high as 10 per cent in 2 in.

CHROME-NICKEL IRON ORES OF CUBA

The chromium-nickel alloys have been rendered commercially possible in mechanical structural engineering by the great lowering of cost, brought about by the discovery in Cuba of chrome-nickel iron ores which, unlike other chrome-nickel iron ores, are remarkably free from sulphur and phosphorus. These Cuban ores compare very favorably with the best Dannemora ores from Upsala province in Sweden. These latter ores will contain from 0.013 to 0.08 per cent sulphur, and from 0.01 to 0.03 per cent phosphorus, whereas in certain of the Cuban ores from the Moa and Mayari districts, the sulphur and phosphorus are negligible, according to Professor Kemp's paper on the Mayari Iron Ore Deposits of Cuba, published in Vol. 51 of the Transactions of the American Institute of Mining Engineers.

In the Cuban ores the chromium is generally in excess of the nickel, oftentimes in a ratio as high as 2 to 1. It can, however, be reduced in practice from this high ratio to practically any ratio required for the particular chrome-nickel steel alloy it is desired to produce. Incidentally, the very important point is to be noted that the high cost of chromium and nickel, when produced as separate metals and then added to produce a synthetic steel, is altogether avoided.

ANALOGY OF MONEL METAL

We have an analogous metal to this in the so-called Monel metal mined in the Sudbury district in Canada. Here nickel is found in a natural alloy with copper, and the cost of the Monel metal is very much less than the cost of a copper alloy made by adding to copper the same amount of nickel as the Monel metal contains. In the case of the Monel metal, which has been longer studied and commercially used than the nickel-chrome iron natural alloys, many advantages of greater homogeneity and higher mechanical qualities have been ascribed to its being a natural instead of a synthetic product. Whatever advantages the Monel metal has shown from this cause are equally applicable to the chrome-nickel-iron Cuban product.

USES OF NATURAL CHROME-NICKEL ALLOYS

As with all iron ores the Cuban ore passes through the blast furnace and the pig metal resulting has two important markets; for use as an ingredient for steel furnace charges and, secondly, for cupola or air-furnace practice; so that the contained nickel and chromium, with the low phosphorus and sulphur, may be effective in heavy castings, such as rolls or parts of heavy and light machines subjected to a strain. Heavy rolls for rolling mill service are made containing about 0.5 per cent of chromium and 0.25 per cent of nickel, but with not more than 0.02 per cent sulphur or 0.04 per cent phosphorus, which latter elements are largely introduced by the furnace fuel used.

High service railroad rails containing 0.8 per cent of nickel and 0.25 per cent chromium, with 0.04 per cent sulphur and 0.01 per cent phosphorus, are made in large quantities.

In both these two typical cases the manufacture proceeds without greater difficulties than in ordinary roll and rail manufacturing. The low sulphur in rolls is sometimes added to in order to obtain the peculiar hardening properties of rolled surfaces, which occur with the use of sulphur, but this is immaterial to the great value of the nickel-chromium content in the roll casting itself.

The entire situation is summed up in this statement: That for the first time in the history of iron and steel, we are able to secure highly desirable mechanical qualities which obtain by the addition of chromium and nickel steel at a small fraction of the cost of such additions when chromium and nickel are added as separate metals, and that the natural additions which we have occur in an ore of such great purity as to be comparable to the finest Swedish ores which have given the deserved reputation to Swedish irons and steels.

The works production of chrome-nickel steel in the United States, according to a bulletin of the United States Bureau of Mines, was estimated to be 100,000 tons in 1913, exclusive of the natural Cuban chrome-nickel-iron product. This same bulletin expresses the opinion that "it is likely that in the near future the tonnage of Mayari steels will surpass that of all the other chrome-nickel steels taken together." This situation is already realized. The total of Cuban nickel-chrome ores reported as mined between January, 1910, and Sept. 30, 1915, is 3,279,824 tons, which is approximately 600,000 tons a year. This tonnage was largely used in rails, rolls and structural work.

As a demonstration of the excellence of nickel-chrome rails when properly made, the case is cited of the Central Railroad of New Jersey, which has had but one failure out of 6400 tons of 100 lb. per yard rails rolled for it, and put in service in 1912.

The prompt further development of these north coast Cuban ores and their immediate manufacture into standardized iron and steel ingot forms for casting, rolling and forging should be a highly desirable as well as profitable undertaking.

Blast Furnaces in France

The number of blast furnaces in France in unoccupied territory is now 48 in blast, according to *L'Usine*, Paris, with 8 ready to be blown in as soon as coke can be obtained. These furnaces are situated on the coast at Calais, Outreau, Panillac, Trignac and Le Bouceau; m central and southern France at Le Creusot, Chasse, Givors, Firminy, Alais, Montlucon, Decazeville, Furnel, Saut-du-Taru, Tarascon-sur-Ariège and Ris. The furnaces use both French and foreign ore, and their present output is only from 110,000 to 120,000 tons per month. The basin of Nancy furnishes over 50,000 tons of ore per month, while the plants on the coast get ore mostly from Bilbao, Spain. The output of the Algerian and Tunis iron-ore mines is exported to England, whence it is sent back to France as hematite pig iron. The Normandy iron-ore mines, which belonged to alien enemies of France and have been sequestered, are idle except the one at Saint-André, in Calrados, which produces about 2500 tons of ore per month. In July, 1914, just before the war, 45 plants had 116 blast furnaces in operation, producing 420,000 tons of pig iron per month, but the invasion of France considerably reduced the available output.

Iron and Steel Markets

PIG IRON STILL HIGHER

Railroad Buying Broadening

No Abatement in Export Demands—Trend to Higher Prices—Ore Situation

The movement toward higher price levels is clearer than in any of the last few weeks. In so many lines will 1916 business crowd the first quarter that 1917 necessities of some manufacturing consumers are threatened with curtailment. Much of the buying of the week has shown confidence in the duration of present conditions, and on the one hand are the bewildering volume of sales of pig iron for export and the continued deluge of requests for shipbuilding material, and on the other hand meetings of sales managers have been held to apportion as best they can what percentage of product they can give to different territories.

Railroad buying is mounting. It appears that all of 100,000 tons of rails has been closed for first quarter of 1918 shipment, presumably to insure deliveries. Among the roads may be included the Burlington, the Nickel Plate and the St. Louis & San Francisco. Over 8500 cars have been bought and the Chicago market has contracted to supply about 100,000 tons of the material.

The collective demands of the roads for structural steel for buildings and bridges exceed 10,000 tons in fresh projects and over 100 locomotives are under consideration.

After the burst of buying of pig iron in late September and early October, it is not surprising that the volume is diminishing somewhat. It has forced further price advances of 50c. and more per ton in all grades. Pittsburgh reports the sale of 30,000 to 40,000 tons of basic and Bessemer at the new prices and over 40,000 tons of foundry iron at $1 higher than last week.

The increase in ocean freight rates resulting from the activities of the German submarine at our Atlantic coast has held up shipments, estimated at 200,000 tons, mostly Southern iron. As regards the tremendous export movement, 100,000 tons are put down as last week's contribution, including 20,000 tons of standard Bessemer for Great Britain. Foundry iron has been sold to neutral European countries to the extent of 20,000 tons.

A considerable number of domestic foundries are still unprovided for, and charcoal iron is up $1 in Chicago and No. 2 foundry 75c. in the Cleveland district. Southern iron is competing in some markets and $14.50 Birmingham has not entirely disappeared. Ohio points close to blast furnaces have bought Southern iron at an advantage and for the first time in some years.

The straining to accelerate the Lake movement of ore has gone to the point of making definite plans for keeping boats in service as far into December as possible. Ore on Lake Erie docks on Oct. 1 amounted to 7,230,000 gross tons or only 755,000 tons less than a year ago, but the dock balance was increased because of car shortage. Boats are sometimes held 24 and 48 hours awaiting cars and some may be delayed for three full days on this account.

The look in the ore situation is now ahead to next year. Stock piles at blast furnaces if not at lower lake ports may in the spring remind one of laboratory samples if the present rate of mining and importing about 9¼ tons of ore to every 10 tons smelted is maintained. Estimates persist that contract vessel rates may be on the basis of $1 per ton next year. The amount of ore will, of course, depend on the boat capacity obtainable. All of the lake shipbuilding space for craft of any size has been pre-empted for 1917 and mostly for ocean-going ships. One small fleet of 12,000-ton boats is under option for sale at 2½ times their cost.

Automobile manufacturers are seeking to cover with Eastern mills for 50,000 tons of bars for the first half. Meanwhile the leading independent steel mill in the Middle West has withdrawn from the market on all its products, as its entire output of semi-finished steel for the first half has been sold, including new capacity not yet completed.

Tin plate for the first half of next year has been put at $6 per box by a number of mills and the leading interest, following its allotment of output of sheets and tin plate, will make its announcement to-morrow. Bessemer black sheets are commonly quoted at 3.25c., Pittsburgh, for the first half, although 3.15c. has not disappeared. On blue annealed sheets for the same delivery, 3.25c. is also expected.

It is estimated that no less than 50 ships are under inquiry at Atlantic shipyards. Three more ships have been put under contract at Seattle and 10,000 tons of plates for them have been bought for delivery in the first quarter of 1918. Great Britain is asking for 25,000 tons of plates besides 18,000 tons of shapes, blooms and billets. Japan has paid 5c. for relatively early shipment on 5000 tons of plates. The Victorian government, Australia, wants 4000 tons.

Pittsburgh

PITTSBURGH, PA., Oct. 10, 1916.

Considerable activity has been displayed in Bessemer and basic pig iron and a moderate degree in foundry and forge iron, and prices on all grades have moved up about 50c. per ton. Some of the independent tinplate mills have fixed their price for first half of 1917 delivery at $6 per base box, and the leading interest will announce its price on tin plate and also on all grades of sheets for first half of 1917 delivery on Thursday morning, Oct. 12. The shortage in supply of billets and sheet bars is getting more acute, and quotations as high as $60 per ton have been made. The high prices offered for coal and the shortage of labor in the coke districts have forced up prices on prompt and contract coke. Prompt has sold as high as $4.40 per net ton at oven, while there are reports of high-grade furnace coke having been sold for first half of 1917 at $3.50. Scrap is in better demand, and prices on steel-making grades are up 50c. per ton or more. The minimum mill price on bars and shapes is now 2.70c., and on plates 3.50c. at mill, the latter for delivery in second half of 1917. The railroads are buying material more freely. Some good sized car orders have been placed, and there are inquiries out from domestic

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

	Oct. 11, 1916.	Oct. 4, 1916.	Sept. 13, 1916.	Oct. 13, 1915.
Pig Iron, Per Gross Ton:				
No. 2 X, Philadelphia	**$20.00**	$19.75	$19.50	$16.25
No. 2, Valley furnace	**20.00**	19.00	18.50	14.75
No. 2 Southern, Cin'ti	17.40	17.40	17.40	14.40
No. 2, Birmingham, Ala.	14.50	14.50	14.50	11.50
No. 2, furnace, Chicago*	**19.00**	18.50	18.00	14.25
Basic, del'd, eastern Pa.	20.00	20.00	19.75	17.00
Basic, Valley furnace	**20.00**	19.50	18.00	15.00
Bessemer, Pittsburgh	**23.95**	23.45	21.95	16.95
Malleable Bess., Ch'go*	**19.50**	19.00	19.00	15.00
Gray forge Pittsburgh	**20.45**	19.95	18.70	14.70
L. S. charcoal, Chicago	**20.75**	19.75	19.75	15.75
Billets, etc., Per Gross Ton				
Bess. billets, Pittsburgh	45.00	45.00	45.00	24.50
O.-h. billets, Pittsburgh	45.00	45.00	45.00	25.00
O.-h. sheet bars, P'gh.	45.00	45.00	45.00	25.50
Forging billets, base, P'gh	69.00	69.00	69.00	34.00
O.-h. billets, Phila.	**50.00**	48.00	48.00	30.00
Wire rods, Pittsburgh	55.00	55.00	55.00	31.00
Finished Iron and Steel,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.47½	1.47½	1.47½	1.25
O.-h. rails, heavy, at mill	1.56½	1.56½	1.56½	1.34
Iron bars, Philadelphia	2.659	2.659	2.659	1.559
Iron bars, Pittsburgh	2.60	2.60	2.60	1.40
Iron bars, Chicago	2.35	2.35	2.35	1.35
Steel bars, Pittsburgh	2.75	2.75	2.60	1.40
Steel bars, New York	2.919	2.919	2.769	1.569
Tank plates, Pittsburgh	4.00	4.00	4.00	1.40
Tank plates, New York	4.169	4.169	4.169	1.569
Beams, etc., Pittsburgh	2.75	2.75	2.60	1.40
Beams, etc., New York	2.869	2.869	2.769	1.569
Skelp, grooved steel, P'gh.	**2.50**	2.35	2.35	1.40
Skelp, sheared steel, P'gh.	**2.60**	2.45	2.45	1.45
Steel hoops, Pittsburgh	3.00	3.00	3.00	1.50

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton

	Oct. 11, 1916	Oct. 4, 1916	Sept. 13, 1916	Oct. 15, 1915
Sheets, Nails and Wire,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black No. 28, P'gh	3.10	3.10	3.00	2.00
Galv. sheets, No. 28, P'gh	4.25	4.25	4.15	3.00
Wire nails, Pittsburgh	2.60	2.60	2.60	1.70
Cut nails, Pittsburgh	2.60	2.60	2.60	1.70
Fence wire, base, P'gh	2.55	2.55	2.55	1.60
Barb wire, galv., P'gh	3.45	3.45	3.45	2.60
Old Material, Per Gross Ton				
Iron rails, Chicago	**20.00**	19.25	18.75	15.50
Iron rails, Philadelphia	**21.00**	20.00	20.00	18.50
Carwheels, Chicago	**12.50**	11.75	11.75	12.00
Carwheels, Philadelphia	13.50	13.50	13.50	11.00
Heavy steel scrap, P'gh.	**18.00**	17.50	16.00	14.00
Heavy steel scrap, Phila.	**15.50**	15.00	14.75	15.00
Heavy steel scrap, Ch'go	**16.50**	16.25	16.00	11.75
No. 1 cast, Pittsburgh	**16.00**	15.00	14.50	13.00
No. 1 cast, Philadelphia	16.00	16.00	16.00	14.00
No. 1 cast, Ch'go (net ton)	**13.25**	12.50	12.00	10.50
No. 1 RR. wrot, Phila.	**22.00**	20.00	20.00	16.00
No. 1 RR. wrot, Ch'go (net)	**17.50**	16.75	16.50	11.00
Coke, Connellsville, Per Net Ton at Oven				
Furnace coke, prompt	**$4.25**	$3.25	$2.90	$1.85
Furnace coke, future	**3.25**	3.00	2.50	2.25
Foundry coke, prompt	**3.50**	3.25	3.00	2.25
Foundry coke, future	**4.00**	3.75	3.50	2.50
Metals,				
Per Lb. to Large Buyers	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	**28.50**	28.25	28.00	18.00
Electrolytic copper, N. Y.	28.50	28.50	28.12½	18.00
Spelter, St. Louis	9.50	9.50	9.00	13.00
Spelter, New York	**9.75**	9.70	9.25	13.25
Lead, St. Louis	6.85	6.85	6.60	4.42½
Lead, New York	7.00	7.05	6.75	4.50
Tin, New York	**42.75**	39.25	38.25	32.75
Antimony, Asiatic, N. Y.	**11.50**	10.00	11.00	28.50
Tin plate, 100-lb. box, P'gh	**$6.00**	$5.75	$5.75	$3.15

roads for close to 100 locomotives. Prices on every steel commodity are strong, and show indications of going higher. There is still a shortage of labor at nearly all manufacturing plants, and this is keeping down the output to some extent.

Pig Iron.—It is said the great increase in insurance rates on export pig iron, on account of the German submarine boat scare, has held up close to 200,000 tons of iron, mostly Southern. It is a question as to when this iron may get out of this country, if it gets out at all. It is not improbable that a part of it may be turned back to domestic consumers. There is still great activity in the local market in Bessemer and basic iron, with further advances in prices, and this has also extended to foundry iron. The Trumbull Steel Company, Warren, Ohio, has closed for 36,000 tons of basic for next year's delivery, of which 26,000 tons was sold by a Mahoning Valley furnace and 10,000 tons by another interest, the latter quantity going at $20, Valley furnace. It is understood the buyer will pile this iron, as it is not expected its new open-hearth steel plant will be ready to make steel before late next year. We also note other sales of basic amounting to 10,000 tons or more, at prices ranging from $19.50 to $20 at furnace. The Bethlehem Steel Company is inquiring for 24,000 tons of Bessemer iron for delivery to South Bethlehem, starting November, silicons running from 2.50 to 3 per cent. The Andrews Steel Company, Newport, Ky., is in the market for 6000 tons of Bessemer, and there are other inquiries. We note a sale of 10,000 tons of Bessemer for delivery in first half of next year made by a Mahoning Valley furnace to a dealer at $23 at furnace, also a sale of 3000 tons and another of 5000 tons at the same price. It is stated that a local consumer closed in the past week for 30,000 to 40,000 tons of pig iron, about equally divided between Bessemer and basic, on the basis of $23 for the Bessemer and $20 for the basic, Valley furnace. There have also been sales of No. 2 foundry iron at $20, Valley furnace, and this price now seems to be minimum of the market. We note sales of 4000 to 5000 tons of No. 2 foundry at $20, Valley furnace, for first quarter delivery, and 1000 tons of No. 3 at $19.75. A sale is reported of 1500 tons of gray forge at $19.50, Valley furnace. The whole pig-iron market is very strong, with the supply of Bessemer and basic limited, and prices on these two grades seem likely to be higher. We quote standard Bessemer iron, $23; basic, $20; No. 2 foundry, $20; malleable Bessemer, $19.75 to $20; and gray forge, $19.50, all at Valley furnace, the freight rate for delivery in the Pittsburgh and Cleveland districts being 95c. per ton. As showing the scarcity in supply, we can state that Bessemer and basic iron has recently been brought into the Pittsburgh district from furnaces at Wellston and Ironton, Ohio, and Buffalo, N. Y.

Ferroalloys.—There is a fair amount of new inquiry for ferromanganese, but no large lots have recently been closed. English 80 per cent is held quite firmly at $164, seaboard, while domestic is quoted at $165, delivered to any points of consumption east of the Mississippi. Several cargoes of ferromanganese from India have recently come into this country, and this product is being offered at a slightly less price than domestic or English, say about $2 per unit. English ferromanganese runs about 0.25 in sulphur and domestic 0.17 to 0.18, while ferromanganese from India runs from 0.60 to 0.75 in sulphur. For this reason it is offered at a lower price. No prices have yet been fixed on 50 per cent grades of ferrosilicon for next year's delivery. We quote 18 to 22 per cent spiegeleisen at $40 to $45, and 25 to 30 per cent $55 to $65 at furnace. On 50 per cent ferrosilicon we quote $88 to $89 in lots up to 100 tons; over 100 tons, $87 to $88, and over 600 tons, $86 to $87, all per gross ton, f.o.b. Pittsburgh. We quote Bessemer ferrosilicon as follows: 9 per cent, $30; 10 per cent, $31; 11 per cent, $32; 12 per cent, $33; 13 per cent, $34.50; 14 per cent, $36.50; 15 per cent, $38.50, and 16 per cent, $41. Seven per cent silvery is $28.50; 8 per cent, $29; 9 per cent, $29.50; 10 per cent, $30; 11 per cent, $31, and 12 per cent, $32. These prices are f.o.b. furnace, Jackson or New Straitsville, Ohio, or Ashland,

Ky., all having a freight rate of $2 per gross ton to Pittsburgh.

Billets and Sheet Bars.—The demand for billets and sheet bars, both export and domestic, continues enormously heavy, and the shortage in supply seems to be getting more acute. Consumers who have been trying to buy steel rounds to be made into shells for shrapnel are not able to get them and are now buying small ingots from steel-casting plants and turning them on lathes into steel rounds. One export inquiry is in the market for about 4000 tons of cast ingots, 6¼ in. thick by 16½ in. long, to be made into 6-in. rounds. It is said that quotations as high as $55 and $60 per ton have been made on ordinary soft Bessemer billets and sheet bars, but we do not hear of any steel being sold as yet at these prices. The absolute minimum on soft Bessemer and open-hearth steel billets and sheet bars is $45 at mill on contracts, and up to $50 and higher to consumers who are short of steel and trying to buy in the open market. A sale of 1500 tons of open-hearth sheet bars is reported to have been made at $48 per ton, maker's mill. We quote soft Bessemer and open-hearth steel billets and sheet bars at $45 to $50 at mill, Youngstown or Pittsburgh. We quote forging billets at $69 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take $1 extra.

Steel Rails.—It is said that contracts for considerable quantities of standard section rails have been placed lately by several railroads, deliveries running into 1918. Some orders have also been placed for standard sections for delivery in third and last quarters of 1917, and the rail mills seem assured of full work through all of next year. The new demand for light rails is active from the coal-mining interests, and several of the rerolling rail mills have recently made fairly large sales of rerolled rails for export. We quote 25 to 45 lb. sections at $47; 16 and 20 lb., $48; 12 and 14 lb., $49, and 8 and 10 lb., $50, in carload lots, f.o.b. at mill, the usual extras being charged for less than carload lots. We quote standard section rails of Bessemer stock at $33 and of open-hearth $35, per gross ton, Pittsburgh.

Plates.—The situation in plates is getting more tense, and the market as regards supply is in a state of famine. The demands of the shipbuilding companies for plates are still enormously heavy. One leading mill has sold several large lots of sheared plates for delivery in the second half of 1917 at 3.50c. at mill, and could have sold more if it cared to do so. Orders for steel cars are coming out freely, and this is helping to make the shortage in supply of plates more keenly felt. The export demand is heavy. It is said that foreign inquiries call for over 100,000 tons. The Carolina, Clinchfield & Ohio Railroad has placed 400 steel hoppers and 100 steel gondolas with the Pressed Steel Car Company. The Western Maryland is reported to have placed its order for 2000 steel hopper cars with the Pullman Company. The New York Central has placed 2000 gondolas and 1000 box cars with the American Car & Foundry Company and 2000 gondolas with the Standard Steel Car Company, in addition to the 5000 cars it previously ordered. The Père Marquette has bought 100 steel underframes from the Pressed Steel Car Company. Active inquiries in the market include 500 to 1000 tank cars for the Union Tank Line, 500 50-ton steel ore cars for the Chicago & Northwestern and 1000 50-ton hopper cars for the Chesapeake & Ohio. We quote ¼-in. and heavier plates at 3.50c. at mill for delivery in second half of 1917, while for delivery in two to four months fairly large lots are quoted at 4c. up to 5c. at mill. Small lots for reasonably early shipment are reported to have sold above 5c. at mill. The demand for universal mill plates is not so active, and these can be had for delivery in two to three months at 3.50c., or slightly less, at mill.

Structural Material.—The new demand is active and a good many jobs are being placed. The Riter-Conley Company has taken close to 5000 tons for new open-hearth steel buildings for the Trumbull Steel Company, Warren, Ohio. The McClintic-Marshall Company has taken 1650 tons for the 239th Street subway yard in New York City, 800 tons for the Neville Island bridge for the Pittsburgh & Lake Erie Railroad, and about 1000 tons of miscellaneous jobs. The Fort Pitt Bridge Works has taken 700 tons of bridge work for the Cincinnati, Hamilton & Dayton. The Carnegie Steel Company will furnish 5000 tons of plain structural steel to Canadian fabricators who will construct another span for the Quebec bridge. It is likely the St. Lawrence Bridge Company will fabricate this material. The Baltimore & Ohio Railroad has distributed orders for some small bridges among several independent shops, calling for about 500 tons of steel, and the Pennsylvania has an inquiry out for about 1500 tons of shapes for small bridges. The Kauffman warehouse to be erected in this city will take about 1000 to 1500 tons of steel shapes and reinforcing bars. The minimum price on beams and channels up to 15-in. is now 2.70c. at mill for delivery in second and third quarters of next year. Small lots from stock for reasonably prompt shipment bring 3c. to 3.25c., Pittsburgh.

Tin Plate.—The Jones & Laughlin Steel Company, Phillips Sheet & Tin Plate Company, McKeesport Tin Plate Company and Trumbull Steel Company have announced their price on tin plate for the first six months of 1917 at $6 for primes, 100 lb., 14 x 20 plates, f.o.b. Pittsburgh. It is stated that the contracts for next year will be binding on both parties, not subject to cancellation. On Monday and Tuesday of this week eight of the sales managers of the American Sheet & Tin Plate Company were in Pittsburgh attending a conference, and were advised of how much tin plate will be allotted to them for their own particular territories, and the independent companies will follow the same policy. This year it is not going to be a question of price but of delivery, as indications are there will not be enough tin plate to go round. After the mills have allotted their output to their regular customers they will sell any surplus they may have at good prices, which from all indications will be considerably above $6 per base box. The American Sheet & Tin Plate Company has not announced its price for the first half of next year, but will do so on Thursday morning, Oct. 12. The company is out of the market as a seller of tin plate for this year and, with independent mills, will carry over into 1917 at least two months' and possibly more production. These contracts will be cleaned up as rapidly as possible and the new contracts at the $6 price will then be started on. With present prices of sheet bars and pig tin, the price of $6 for tin plate is regarded as fair to the mill and to the customer; but consumers who do not have regular sources of supply will probably have to pay a good deal more than $6 per box for their tin plate for next year. The situation in this trade is without precedent, and has made it necessary for the mills to allot their output to regular customers in order to distribute their product as equitably as possible. We now quote tin plate at $6 per base box for 100 lb., 14 x 20, for delivery over the first half of 1917.

Sheets.—As is the case with tin plate, the American Sheet & Tin Plate Company has decided to allot its output of sheets for the first half of next year, and its prices on these products will be announced on Thursday morning, Oct. 12. It looks as though practically the same conditions will prevail in the sheet trade for the first half of 1917 as in the tin-plate trade. Several of the leading mills have put their prices on Bessemer black sheets at 3.25c. for delivery in the first half. Others are still naming 3.15c., which seems to be the minimum of the market. On blue annealed prices range from 3c. to 3.25c., the latter figure being quoted by several of the larger makers. It is probable this week two or three of the leading makers of blue annealed sheets will announce their minimum price on Nos. 9 and 10 gages as 3.25c. for shipment in the first half. We now quote Nos. 9 and 10 blue annealed sheets at 3c. to 3.25c.; No. 28 black, 3.10c. to 3.25c.; No. 28 galvanized, 4.25c. to 4.40c.; Nos. 22 and 24 black plate, tin mill sizes, H. R. & A., 3c. to 3.10c.; Nos. 25, 26 and 27, 3.10c. to 3.20c.; No. 28, 3.20c. to 3.30c., and No. 29, 3.30c. to

3.40c. These prices are for carloads and larger lots, f.o.b. mills, Pittsburgh.

Rivets.—The new demand is heavy from boiler shops and structural concerns, and rivet makers are filled up for the remainder of this year and are entering contracts for delivery in the first quarter and first half of 1917. There is an insistent export demand for rivets, but on some of these inquiries local makers are not quoting, as they cannot make the deliveries. It is stated the unevenness in prices among jobbers has largely disappeared, and they are now quoting the usual differentials over mill prices. Makers' quotations are as follows: Buttonhead structural rivets, ½ in. in diameter and larger, $4 per 100 lb., base, and conehead boiler rivets, same sizes, $4.10 per 100 lb., base, f.o.b. Pittsburgh. Terms are 30 days net, or one-half of 1 per cent for cash in 10 days.

Railroad Spikes and Track Bolts.—The new demand for railroad spikes is heavier than for some time and prices are very firm. The Pennsylvania Lines West recently placed about 30,000 kegs, divided among three makers. The Baltimore & Ohio is in the market for its 1917 requirements of spikes, and the Chicago Great Western and the Vandalia have recently placed fair-sized orders. Railroad spikes are selling at $1 per ton less than the price of steel bars, and some makers believe that an early advance in prices is likely. The demand for track bolts is heavy, inquiries being in the market for round lots from a number of the leading roads. We quote track bolts with square nuts at 4.50c. to 4.75c. to railroads and 5c. to 5.25c. in small lots to jobbers, base. Track bolts with hexagon nuts take the usual advance of 15c. per 100 lb. Prices on spikes are as follows:

Standard railroad spikes, 4½ x 9/16 in. and larger, $2.65 to $2.75; railroad spikes, ½ and 7/16 in., $2.75 base; railroad spikes, ⅜ in. and 5/16 in., $3.05 base; boat spikes, $2.80 base, all per 100 lb. f.o.b. Pittsburgh.

Iron and Steel Bars.—The minimum mill price on steel bars is now 2.70c. at mill for indefinite delivery, which would probably not be before the second or third quarter of 1917, nearly all mills being sold up over the remainder of this year and largely through the first half of 1917. The new demand is heavy. Export inquiry for steel rounds is still large and in some cases small ingots are being bought which are being machined into rounds for shrapnel. Specifications from car-builders are heavier than for some time and from the implement trade are also very active. It is said that orders for steel bars from the implement trade are much larger this year than for a long time. The new demand for iron bars is active and prices are very strong. We quote steel bars at 2.70c. at mill for delivery in the first quarter and first half of 1917, while for shipment from warehouse stocks prices rule as high as 3.25c. We quote refined iron bars at 2.75c. to 2.85c., and railroad test bars at 2.85c. to 2.90c., f.o.b. Pittsburgh.

Cold-Rolled Strip Steel.—Several makers have opened their books on contracts for cold-rolled strip steel for the first quarter and first half of 1917 at the present price, which is $6 per 100 lb., f.o.b. Pittsburgh. Nearly all consumers are covered over the remainder of this year. A large amount of cold-rolled strip steel will be carried over into next year on old contracts, some of which are at less than the $6 price. We quote cold-rolled strip steel at $6, base, on contracts for delivery through the first quarter and first half of 1917, and $6.50 to $6.75 in small lots for prompt shipment. Terms are 30 days net, less 2 per cent off for cash in 10 days, delivered in quantities of 300 lb. or more when specified for at one time.

Wire Rods.—As in the case of wire products, there is an acute shortage in the supply of rods, and consumers who have to buy in the open market are having much trouble in getting them. It is said that up to $62 has been paid for ordinary soft rods for delivery over the next three or four months. Prices range all the way from $50, which is made only to consumers who make products that enter into competition with mills that make their own rods, up to $60, and as high as $65 per net ton. It would take a very exceptional order to be placed at the lower price. We therefore quote soft Bessemer, open-hearth and chain rods at $55 to $60 per ton, f.o.b. Pittsburgh.

Nuts and Bolts.—Most consumers are covered over the remainder of this year, and new inquiries now are for delivery in the first quarter and first half of next year, and it is understood some contracts have been closed for these deliveries. Prices are very firm. Deliveries of steel bars by the mills are reported unsatisfactory, and are restricting the output of nuts and bolts a good deal. Prices are firm and an advance in the near future is not unlikely. Discounts are as follows, delivered in lots of 300 lb. or more, where the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days:

Carriage bolts, small, rolled thread, 50 and 5 per cent; small, cut thread, 40, 10 and 5 per cent; large, 35 and 5 per cent.

Machine bolts, h. p. nuts, small, rolled thread, 50 and 10 per cent; small, cut thread, 50 per cent; large, 40 and 5 per cent.

Machine bolts, c. p. c. and t. nuts, small, 40 and 10 per cent; large, 35 per cent. Blank bolts, 40 and 5 per cent. Bolt ends, h. p. nuts, 40 and 5 per cent; with c. p. nuts, 35 per cent. Rough stud bolts, 15 per cent. Lag screws (cone or gimlet point), 50 and 5 per cent.

Forged set screws and tap bolts, 10 per cent. Cup and round point set screws, case-hardened, 60 per cent. Square or hexagon head cap screws, 55 per cent. Flat, button, round or fillister head cap screws, 30 per cent.

Nuts, h. p. sq., tapped or blank, $2.70 off list; hex., $2.70 off. Nuts, c. p. c. and t. sq., tapped or blank, $2.40 off; hex., $2.80 off. Semi-finished hex. nuts, 60 and 5 per cent. Finished and case-hardened nuts, 60 and 5 per cent.

Rivets, 7/16 in. in diameter and smaller, 45, 10 and 5 per cent.

Wire Products.—It is stated, but not officially confirmed, that the long expected advance in prices will take place late this week, to become effective from Monday, Oct. 16. Both the export and domestic demand for wire nails and barb wire are still very heavy. The output of nails for this year is practically under contract and in barb wire the mills report they could make sales abroad at higher than domestic prices if they could make the deliveries wanted. Specifications are large and it is still insisted that there will not be enough barb wire and wire nails to meet the demand this fall. Prices to the large trade in effect at this writing are as follows: Wire nails, $2.60, base, per keg; galvanized, 1 in. and longer, including large head barbed roofing nails, taking an advance over this price of $2, and shorter than 1 in., $2.50. Bright basic wire is $2.65 per 100 lb.; annealed fence wire, Nos. 6 to 9, $2.55; galvanized wire, $3.25; galvanized barb wire and fence staples, $3.45; painted barb wire, $2.75; polished fence staples, $2.75; cement-coated nails, $2.50, base, these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing remain at 60 per cent off list for carload lots, 59 per cent for 1000-rod lots, and 58 per cent for small lots, f.o.b. Pittsburgh.

Shafting.—Some contracts for cold-rolled and cold-drawn shafting have been made for delivery in the first quarter and first half of 1917 at 15 per cent off the list, but on a few of the most desirable of such contracts it is said the discount was 20 per cent off. The output of shafting is sold up for this year and on small current orders for delivery in two to three months about 10 per cent off the list is quoted. Some large inquiries are in the market for first quarter and first half delivery. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots for delivery in the last quarter of this year and first quarter of 1917, and 10 per cent off in less than carload lots, f.o.b. Pittsburgh, freight added to point of delivery.

Merchant Steel.—Mills report the new demand strong and say that instead of catching up on shipments they are getting further behind. Specifications against contracts are active and if nothing unusual happens the output and shipments this month may break all records. In the matter of shipment the

depends largely upon the car supply, which is none too good at present. For small lots, prices are a sfollows: Iron-finished tire, ½ x 1½ in. and larger, 2.60c., base; under ½ x 1½ in., 2.75c.; planished tire, 2.75c.; smooth channel tire, ¾ to ⅞ and 1 in., 2.85c. to 2.90c.; 1⅛ in. and larger, 3.10c.; toe calk, 3.10c. to 3.15c., base; flat sleigh shoe, 2.75c.; concave and convex, 2.85c.; cutter shoes, tapered or bent, 3.25c. to 3.35c.; spring steel, 3.25c. to 3.50c.; machinery steel, smooth finished, 2.90c. to 3c., all f.o.b. at mill.

Hoops and Bands.—The new demand is active, in spite of the fact that most consumers are covered over the remainder of this year, and specifications against contracts are coming in freely. Two of the largest makers have not yet opened their books for contracts for delivery in the first quarter and the first half of next year, but will likely do so in a short time. Steel hoops remain firm at 3c. and bands at 2.60c., with extras on the latter as per the steel bar card, but it is expected that prices on bands will be higher in the near future.

Wrought Pipe.—It is understood that the 560 miles of 8-in. and 220 miles of 6-in. line pipe bought recently by the Sinclair Oil & Refining Corporation will be delivered in very quick time, considering the congested condition of the pipe mills, in order that the company can lay this line this fall before the ground freezes. The new demand for tubular goods is heavy. The mills are sold up for four or five months on lap-weld pipe and oil country goods, but on butt-weld sizes fairly prompt deliveries can be made. The Jones & Laughlin Steel Company is now operating one of its butt-weld pipe furnaces at Aliquippa, Pa., and expects to have the other, and also the two lap-weld furnaces, on before the close of this year. Discounts on iron and steel pipe, which are firmly held, are given on another page.

Boiler Tubes.—The demand for locomotive and merchant tubes is still very great, but mills are sold up for six to eight months and several of the largest are not taking new orders for delivery before the second and third quarters of 1917. On seamless steel tubing the makers have sold practically their entire output for all of next year. Prices on iron and steel tubes are very strong. Discounts are given on another page.

Coke.—The market is active for both prompt and contract coke. A considerable range prevails in prices at which contracts are being closed. One leading Eastern consumer has bought 15,000 tons for delivery over all of 1917 at $2.65 per net ton at oven, while on another contract for 10,000 tons per month, over all of 1917, $3 was paid. A Shenango Valley furnace interest has closed for about 5000 tons of high grade coke per month for the first half of 1917 at $3.25 at oven, and another furnace interest is reported to have paid $3.50 for 10,000 tons per month over the first half of 1917. Some of the coke companies are quoting $3.50 on contract coke and will not accept less, while some grades can be bought readily at $3 and $3.25. An Eastern steel company is expected to close shortly for 50,000 to 60,000 tons of furnace coke per month for all of next year, and another interest is about to close for 15,000 tons per month for the first half. There is a scarcity in the supply of prompt furnace coke and it has sold at $4 to $4.25 at oven. Scarcity of labor and high prices ruling for coal are given as the main causes of the higher prices for coke. Some of the coke makers believe that they will soon be able to obtain $3.50 for their coke for next year, and for this reason are not in a hurry to close contracts. We quote best grades of prompt furnace coke at $4 to $4.25, and on contracts, from $3 up to $3.50 per net ton at oven. Best grades of 72-hr. foundry coke are held at $3.50 to $3.75 for prompt shipment, and from $3.75 to $4 per net ton at oven on contracts. The output of coke in the upper and lower Connellsville regions for the week ended Sept. 30 was 412,364 net tons, an increase over the previous week of 7764 tons.

Old Material.—The local market is much better, both in demand and prices. Two local consumers that have not been buying for some time have lately taken in some fair-sized lots of heavy steel scrap, paying as high as $18, delivered. There is also a good demand for low phosphorus melting stock, which has advanced fully $1 per ton, and borings are also quite active, at slightly higher prices. Dealers believe that with the heavy advances in Bessemer and basic pig iron they will soon get more money for scrap and therefore are not anxious to sell. There is a heavy demand for rerolling rails, large quantities of which have recently been sold for export at good prices. We note sales of 5000 to 6000 tons of heavy steel scrap at $17.50 to $18, delivered; 2000 to 3000 tons of low phosphorus melting stock at about $22, delivered, and 1200 to 1500 tons of borings at $9.25 to $9.50, delivered. Prices now being quoted by dealers for delivery in Pittsburgh and points that take the same rates of freight, per gross ton, are as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge Sharon, Monessen, Midland and Pittsburgh, delivered	$18.00 to $18.25
No. 1 foundry cast	16.00 to 16.25
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	19.00 to 19.25
Hydraulic compressed sheet scrap	14.50 to 14.75
Bundles, sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	11.50 to 11.75
Bundled sheet stamping scrap	11.00 to 11.25
No. 1 railroad malleable stock	15.25 to 15.50
Railroad grate bars	11.25 to 11.50
Low phosphorus melting stock	21.50 to 22.00
Iron car axles	35.00 to 36.00
Steel car axles	36.00 to 37.00
Locomotive axles, steel	38.00 to 39.00
No. 1 busheling scrap	14.00 to 14.25
Machine-shop turnings	7.50 to 7.75
Old carwheels	14.50 to 14.75
Cast-iron borings	9.00 to 9.25
*Sheet-bar crop ends	19.00 to 19.25
No. 1 railroad wrought scrap	19.00 to 19.25
Heavy steel axle turnings	10.50 to 11.00
Heavy breakable cast scrap	13.00 to 13.50

*Shipping point

Chicago

CHICAGO, ILL., Oct. 11, 1916.—(*By Wire.*)

Despite high prices and the indefiniteness of deliveries, bookings of rolled steel again mounted to exceptionally large totals last week. A conservative reckoning of orders placed at Chicago would show not less than 275,000 tons. Of this approximately 100,000 tons will go into cars; 35,000 tons, plates and bars for ship building and miscellaneous export requirements; 20,000 tons, rails, and similarly large quantities of other forms. A round tonnage of forging billets for local work was bought at $65, f.o.b. mill. The freedom with which buyers, including the large jobbers of steel, are engaging to take materials at the existing level of prices has no parallel. It represents necessity on the one hand and confidence in the duration of conditions on the other. The leading independent mill has announced an absolute withdrawal from the market affecting all of its products. Its entire output of semi-finished steel for the first half is sold, including new capacity not yet completed. The attitude of the railroads is indicated in the inquiry for tie-plates. In the face of an advance to $54 per ton, one road was insistent on the booking of 3000 tons. Car purchases reported in the week totaled 6750, not including orders for trucks and various miscellaneous lots. An increased demand for light gage black sheets for export has arisen, one inquiry for 1500 tons for Japan being noted. Mill prices have advanced, and 3.25c., Pittsburgh, for No. 28, is a common quotation. Jobbers also are asking higher prices for black and galvanized sheets and for bolts and nuts. The buying of pig iron shows signs of having passed the high point of the present movement, both in the number of transactions and the quantities involved. Considerable inquiry remains to be closed. Prices show the further effects of the heavy buying, and advances are recorded for charcoal, malleable Bessemer and Northern and Southern foundry irons. Prices of scrap have moved up sharply. Sales are more frequent, and melters more interested but labor and car shortage are contributing to the scarcity of available scrap.

(By Mail)

Pig Iron.—The buying of pig iron has continued freely, although not at the rate of the preceding week, neither in respect of the number of transactions nor the

size of individual lots. The market activity still represents a widespread interest, leaving, it is reported, a considerable number of foundries still unprovided for. The continuance of demand at the rate maintained in the latter part of September and the first week of October through a much longer period could hardly have been expected without a suspicion of speculative purchases. With the advance of $1 per ton in the price of charcoal iron, announced by the leading interest, prices have also been advanced for malleable Bessemer and strong Northern iron. A minimum price of $19 at the furnace is now asked for the lower grades of charcoal iron and for malleable Bessemer $19.50 is quoted. High phosphorus Northern iron has advanced with the price of Southern foundry, the minimum quotation now being equivalent to $15, f.o.b. Birmingham. For Southern iron, only one large furnace interest is known to be selling freely at $15, prices ranging from that to $16. Numerous sales at the lower price are reported, an aggregate of 10,000 tons being a conservative estimate of business placed at that figure. Charcoal iron has been selling in quantity, and the furnace position as to stocks suggests the firmer attitude that has been taken. The local makers of ferromanganese report a much more receptive market for their product. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of $1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 7	$20.75
Lake Superior charcoal, No. 1	21.25
Lake Superior charcoal, No. 6 and Scotch	21.75
Northern coke foundry, No. 1	19.50 to 20.00
Northern coke foundry, No. 2	19.00 to 19.50
Northern coke foundry, No. 3	18.50 to 19.00
Southern coke, No. 1 f'dry and 1 soft	19.50 to 20.00
Southern coke, No. 2 f'dry and 2 soft	19.00 to 19.50
Malleable Bessemer	19.50
Basic	19.50
Low phosphorus	34.00
Silvery, 8 per cent	29.50
Bessemer ferrosilicon, 10 per cent	33.50

Rails and Track Supplies.—Many indications point to the difficulty of securing materials as the only curb upon the eagerness of railroads to buy supplies and equipment. At St. Louis three railroads have been in the market for tie-plates, one for as much as 3000 tons. The Terminal Railroad at St. Louis is understood to have closed for iron tie plates within the past week. Quotations for steel plates have been advanced to $54. Domestic rail sales last week amounted to 20,000 tons and the inquiry from British Columbia is still under consideration. Local mills have declined to quote on rails for export in the amount of about 30,000 tons. Thus far no business has been taken in the West for delivery in 1918. Quotations are as follows: Standard railroad spikes, 2.75c. base; track bolts with square nuts, 3.25c. to 3.50c., base, all in carload lots, Chicago; tie-plates, $52 to $54, f.o.b. mill, net ton; standard section Bessemer rails, Chicago, $33, base; open-hearth, $35, light rails, 25 to 45 lb., $40; 16 to 20 lb. $41; 12 lb., $42; 8 lb., $43; angle bars, 2c., Chicago.

Structural Material.—The buying of cars in large numbers was continued last week, and it is estimated that orders placed for car steel at Chicago approximate 100,000 tons. The Pullman Company will build 2000 cars for the Western Maryland, while the New York Central Lines have placed orders for a total of 4750 cars in addition to buying trucks for 2000 cars. Further inquiry from another road for 2000 cars is under consideration. The American Bridge Company took the contract for 1100 tons of ore spouts for the Chicago & Northwestern Railway Company dock at Ashland and the Kenwood Bridge Company the order for 1300 tons for machine shop and yard crane runway extensions for the Pullman Car Works. The quotation of 2.70c., Pittsburgh, appears to be the minimum price now obtainable on plain material and one large interest is selling Bessemer shapes for delivery in the last and first quarter at 2.85c. Except for small tonnage requirements for prompt shipments, the buying of structural material seems to have been largely covered in the closing of contracts at 2.60c., immediately preceding the advance. We quote for Chicago delivery of structural steel from mill 2.889c.

We quote for Chicago delivery of structural steel out of jobbers' stocks, 3.25c.

Plates.—Fully 30,000 tons of plate and bar steel, largely for shipbuilding in the Orient, was sold last week. High prices apparently place no limitation upon the demand and the Indiana Harbor mill has had recourse to complete withdrawal from the market as the only refuge against the insistent demand. We quote for Chicago delivery of plates from mill, at its convenience, 3.189c. For prompt shipment we quote 3.439c. to 3.689c. in widths up to 72 in., and for wide plates 4.189c.

We quote for Chicago delivery of plates from jobbers' stocks, 3.75c.

Sheets.—Both the American Sheet & Tin Plate Company and the Inland Steel Company have withdrawn all quotations and are considering no further inquiry for sheets. Such mills as are quoting are asking 3.25c., Pittsburgh, for black sheets, although some of the mills are taking care of their trade at prices as low as 3.15c. Demand for sheets has been featured by large inquiry for export, especially in the last week, for light sheets. Of this the major portion has been from the Orient, one inquiry for 1500 tons for Japan being illustrative. Indications point to the purchase of these black sheets in lighter gages as intended for galvanizing in Japan. The demand for the heavier gages also persists. We quote for Chicago delivery, blue annealed, No. 16 and heavier, 3.439c.; box annealed, No. 17 and lighter, 3.189c. to 3.289c.; No. 28 galvanized, 4.439c.

Prices for black and galvanized sheets out of stock have been advanced from $2 to $4 per ton and we quote for Chicago delivery of sheets out of stock, minimum prices applying on bundles of 25 or more, as follows: No. 10 blue annealed, 3.40c.; No. 28 black, 3.45c. to 3.55c.; No. 28 galvanized, 4.75c. to 4.85c.

Bars.—Sales of mild steel bars for miscellaneous consumption were large in the last week and for ship and car building purposes were especially heavy. Bessemer mild steel bars are obtainable from some of the Eastern mills for delivery in 60 to 90 days at a price of 2.75c., Pittsburgh, and some sales are noted on this basis. The scarcity of semi-finished steel, particularly in the form of forging billets, continues to be emphasized in sales at $65 and $70, f.o.b. mill, one transaction of the past week involving a round tonnage at the lower price. An inquiry for 250 tons of 9-in. and 10-in. forging billets has gone the round of the mills without any takers. For iron and rail-carbon bars, the mill situation promises to be much tighter than it has been. We quote mill shipment, Chicago, as follows: Bar iron, 2.35c.; soft steel bars, 2.789c.; hard steel bars, 2.50c.; shafting, in carloads, 20 per cent off; less than carloads, 15 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 3.25c.; bar iron, 3.25c.; reinforcing bars, 3.25c. base with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting net list.

Wire Products.—The ease with which some of the mills are able to secure an advance of $2 per ton for wire products for only moderately prompt delivery gives point to the expectation of a further advance in quotations. Demand for wire nails and barb wire continues strong. We quote as follows per 100 lb.: Plain wire, Nos. 6 to 9, base, $2.839; wire nails, $2.789; painted barb wire, $2.939; galvanized barb wire, $3.639; polished staples, $2.939; galvanized staples, $3.639; all Chicago.

Rivets and Bolts.—The makers of bolts and nuts, already sold up nearly to capacity, are now confronted not only by the tardy and somewhat unexpected demand from the implement interests but also by large inquiries from the railroads. The difficulty of securing materials of construction for plant extensions, long delays in the delivery of machinery and labor shortage practically limit increases in productive capacity, and relief from the existing situation appears remote. We quote as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 50-5; cut thread, 40-10-2½; larger sizes, 35-2½; machine bolts up to ⅜ x 4 in., rolled thread, with hot

pressed square nuts, 50-10; cut thread, 50; large size, 40-5; gimlet-point coach screws, 50-5; hot pressed nuts, square, $2.70 off per 100 lb.; hexagon, $2.70 off. Structural rivets, ¾ to 1¼ in., 4c. to 4.15c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

Store prices for bolts have been advanced and we quote as follows: Structural rivets, 4c.; boiler rivets, 4.10c.; machine bolts up to ⅞ x 4 in., 50; larger sizes, 40-5; carriage bolts up to ⅞ x 6 in., 40-10; larger sizes, 35-5; hot pressed nuts, square, $3, and hexagon, $3 off per 100 lb.; lag screws, 50-5.

Cast-Iron Pipe.—The expected award of 30,000 tons of pipe at Detroit represents one of the largest municipal lettings of recent years. Aside from this business and 600 tons to be placed at West St. Paul, Minn., there is little inquiry. We quote as follows, per net ton, Chicago: Water pipe, 4 in., $34.50; 6 in. and larger, $31.50, with $1 extra for Class A water pipe and gas pipe.

Old Material.—In the past week, prices of nearly all grades of scrap were sharply advanced. The apparent shortage of old material which has been attributed to labor scarcity at dealers' yards and with the railroads, preventing the collection of scrap, has been augmented by the holiday period of the last two weeks. Many grades of scrap are, for the present, difficult to secure. On the other hand, several of the leading consumers, particularly among the rolling mills, are known to have reached a point where their stocks need replenishing. A railroad is understood to have sold rerolling rails in quantity for Ohio delivery at $19.50, iron angles brought as high as $21.15, No. 1 wrought has been selling freely on the basis of $17.50, while transactions in No. 2 wrought are noted at prices in excess of $15.75 per net ton. Railroad offerings of scrap are somewhat heavier and include 3300 tons from the Michigan Central, 3200 tons from the Big Four and smaller lots from the Milwaukee road and Soo Line. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	$20.00 to $20.50
Relaying rails	19.50 to 20.50
Old carwheels	12.50 to 13.00
Old steel rails, rerolling	19.00 to 19.50
Old steel rails, less than 3 ft	18.25 to 18.50
Heavy melting steel scrap	16.50 to 17.00
Frogs, switches and guards, cut apart	16.50 to 17.00
Shoveling steel	15.50 to 16.00
Steel axle turnings	8.75 to 9.25

Per Net Ton

Iron angles and splice bars	$21.00 to $21.50
Iron arch bars and transoms	22.25 to 22.75
Steel angle bars	15.75 to 16.25
Iron car axles	30.00 to 30.50
Steel car axles	32.50 to 33.50
No. 1 railroad wrought	17.50 to 17.75
No. 2 railroad wrought	16.75 to 17.25
Cut forge	16.00 to 16.50
Pipes and flues	12.25 to 12.75
No. 1 busheling	14.75 to 15.25
No. 2 busheling	10.00 to 10.50
Steel knuckles and couplers	14.75 to 15.00
Steel springs	15.25 to 15.50
No. 1 boilers, cut to sheets and rings	10.75 to 11.25
Boiler punchings	14.50 to 15.00
Locomotive tires, smooth	22.75 to 23.25
Machine-shop turnings	5.50 to 6.00
Cast borings	6.75 to 7.25
No. 1 cast scrap	13.25 to 13.50
Stove plate and light cast scrap	10.00 to 10.50
Grate bars	10.75 to 11.25
Brake shoes	10.50 to 11.00
Railroad malleable	12.00 to 12.50
Agricultural malleable	11.25 to 11.75

Philadelphia

PHILADELPHIA, PA., Oct. 10, 1916.

The quotations for low-phosphorus pig iron continue to soar, and close to $40 has been paid for high-grade iron; but of greater interest is the strength that has developed in foundry iron, which has long been a laggard. For one brand of eastern Pennsylvania No. 2 X, $22, furnace, is quoted, while other sellers want at least $21, furnace. The spread of prices is unusually wide, depending on the extent to which the furnaces concerned are sold ahead. More iron would be consumed were it not for difficulty in securing molders and other foundry labor. Southern irons show added strength, but Virginia quotations are unchanged. Apprehension is beginning to be felt over the ore supply, inasmuch as some which is contracted for is not yet down the Lakes. Much depends on how long Lake navigation will remain open. Meanwhile there is no business in foreign ore, and no prospect of any. About the only tangible effect of the German submarine activity off Nantucket Island was the strengthening of domestic ferromanganese. The plate makers are more than ever swamped with business. Billets are stronger and sheets have a better tone. Prompt coke is scarce, and made more so by the refusal of certain railroads to permit its delivery in box cars, these being needed for other purposes. The old-material market has a better tone.

Pig Iron.—The actual price levels of most grades of iron are difficult to gage because of the uniformly bullish sentiment on the part of producers and their representatives. They report that the market has continued fairly active, and are firm in the belief that it will become more so. No large sales have been made, but the aggregate of moderate-sized orders from miscellaneous directions has been good. In the business done, some sellers see a greater demand for prompt shipments. Foundries continue to be hampered by a shortage of help, particularly molders, some of whom work but intermittently while others utilize the demand for their craft to change the place of their employment frequently. Founders complain that, whereas they were starving for work not long ago, they are now obliged to turn business away because of the lack of labor. Despite these conditions, the absorption of iron has been such that many Northern furnaces are booked with orders to an extent that appears to justify advances in price. The cost of production is greater, several furnaces having paid $4 for prompt coke, which is an added influence making for higher pig-iron prices. One eastern Pennsylvania furnace, the product of which takes a freight rate of 79c. to Philadelphia, quotes $22, furnace. For another brand $21.40, delivered, is quoted, and $21, furnace, is not unusual. It is safe to say the higher figure has not yet been paid unless in exceptional cases. A few thousand tons of pipe iron have been taken, most of it Southern iron, which is stronger at $14.50 to $15, Birmingham, for No. 2, delivery over the remainder of the year, and $15 to $16 for first quarter. In Virginia iron there is no change in price, although the makers have done a heavy business since they made their quotation $17.50, furnace, or $20.25, Philadelphia. Basic is quiet but very firm, and only a test would determine how much could be obtained at $20 to $20.50, delivered. In the past week prices of low phosphorus have been on the upgrade, and several thousand tons have been taken at prices ranging from $35 to $38, delivered, according to analysis and other conditions, and sales at close to $40, delivered, are reported. For standard low phosphorus $37 to $40, delivered, is quoted, the top of the range being for pig iron with not over 0.03. Quotations for standard brands, delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa. No. 2 X foundry	$20.00 to $20.50
Eastern Pa. No. 2 plain	19.75 to 20.00
Virginia No. 2 X foundry	20.25
Virginia No. 2 plain	20.00
Gray forge	18.75 to 19.25
Basic	20.00 to 20.50
Standard low phosphorus	37.00 to 40.00

Iron Ore.—The possibility of new business in foreign ore is temporarily, at least, made more remote by German submarine activity on this side of the Atlantic. A further detriment is that not only has the marine-insurance rate been advanced but American ships cannot be insured against capture. Eastern Pennsylvania furnace operators are also expressing apprehension over the possibility of their not receiving all the Lake Superior ore they have under contract. Some business in Indian manganese ore has been done. In the week ended Oct. 7, 5899 tons of Swedish ore arrived at this port.

Ferroalloys.—The agents of English makers quote $165, seaboard, for 80 per cent ferromanganese, but this price is subject to confirmation from abroad. Domestic material has been offered in the Middle West at $160, delivered. On the other hand, a domestic maker in the East withdrew his price following news of the recent German submarine activity. The report that a Buffalo furnace is to go on ferromanganese is con

firmed by the fact that the lessee has available a few thousand tons of manganese ore. In the week ended Oct. 7, arrivals of English ferromanganese at this port aggregated 930 tons. Blast-furnace ferrosilicon, 11 per cent, is quoted at $35.44, delivered. While $87 to $89, Pittsburgh, is nominally quoted for 50 per cent ferrosilicon, $91 has been paid for delivery over the remainder of the year, the sellers not being willing to contract into 1917.

Plates.—With most makers the principal question is not one of price but of deliveries. They are selecting the business they care for and can fill. Their minimum for tank steel is 4c., Pittsburgh, or 4.159c., Philadelphia. Steel for marine boilers is quoted at 8c. to 10c. per pound, taking an extra of 40c. per 100 lb. as well as the usual 15.9c. for freight. One maker has in hand an inquiry for 40,000 tons of ship plates and shapes for export, but does not see how he can handle any of it. A large tonnage for pipe-line work is going begging. A local shipyard which had an option on a quantity of plates was offered $60,000 for it. Makers have been invited to bid on deliveries to be made in the latter part of 1917 and even early 1918. A maker whose quotation has been the minimum is practically filled up for the year and has advanced his quotation, but still will consider 3.659c., Philadelphia.

Bars.—The market is strong and active at 2.859c., Philadelphia, for steel bars and 2.659c. for iron bars.

Structural Material.—The contract for the Southern Hotel, Baltimore, Md., has been placed with Dietrich Bros., of that city. It involves 2000 tons. Shapes continue in demand in many directions, despite the lack of noteworthy building projects. Quotations range from 2.859c. to 3.009c., Philadelphia, for structural material and up to 3.659c., Philadelphia, for ship shapes. One mill is not taking contracts into next year, although some of its 1916 commitments will run over.

Billets.—Open-hearth rerolling billets are stronger at $50, Eastern mill, while forging steel is quoted at $65 to $75, according to specifications. The demand is heavy, especially from export sources. Makers of shell forgings are looking for steel also.

Sheets.—Quotations for No. 10 blue annealed still range from 3.159c. to 3.409c., Philadelphia, but the market has a stronger tendency.

Coke.—Furnaces have paid up to $4 per net ton at oven for spot furnace coke, and up to $4.25 is asked. Contract is around $3.25. Prompt foundry is stronger at $3.75 to $4 at oven, with contract foundry unchanged at $3.50 to $3.75. The situation in prompt coke is made worse by the refusal of certain railroads to ship in box cars. Freight rates from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Old Material.—The mills have not yet taken any heavy melting steel, but they are more active with regard to other items. Steel is stronger because of buying at Pittsburgh. Rerolling rails are scarce. The embargoes have been raised at all places except Burnham, Pa., and a few carloads have got into that place. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$15.50 to $16.00
Old steel rails, rerolling	18.50 to 19.00
Low phos. heavy melting steel scrap	21.25 to 23.50
Old steel axles (for export)	35.00 to 36.00
Old iron axles (for export)	35.00 to 36.00
Old iron rails	21.00 to 22.00
Old carwheels	15.50 to 16.00
No. 1 railroad wrought	22.00 to 22.50
Wrought-iron pipe	16.00 to 16.50
No. 1 forge fire	12.00 to 12.50
Bundled sheets	12.00 to 12.50
No. 2 busheling	10.50 to 11.00
Machine-shop turnings	8.00 to 8.50
Cast borings	10.00 to 10.50
No. 1 cast	16.00 to 16.50
Grate bars, railroad	11.75 to 12.25
Stove plate	13.00 to 13.50
Railroad malleable	13.00 to 13.50

The McCallip Mfg. Company, maker of wire and iron work, is removing its plant from Philadelphia, Pa., to Columbus, Ohio, where it will occupy a building at Spruce Street and Dennison Avenue.

Cleveland

CLEVELAND, OHIO, Oct. 10, 1916.

Iron Ore.—Ore on Lake Erie docks Oct. 1 amounted to 7,230,024 gross tons, or only 755,000 tons less than was on the docks Oct. 1 a year ago. The dock balance increased the past month 1,440,000 tons. The large increase in ore placed on the docks in September was caused by the car shortage, and much is being placed on the docks this month that would go direct to the furnaces were cars available. The car shortage is seriously interfering with the ore movement, many boats being held at Lake Erie ports awaiting cars. Boats are being delayed from 24 to 48 hours, and it is expected that some of those now at Lake Erie ports will not get away inside of 72 hours from the time of arrival. Because of the slackening up of the ore movement shippers are not getting vessel tonnage as fast as wanted, and some who expected to get cleaned up early will probably be rushed with shipments until the close of navigation. Iron ore receipts at Lake Erie ports in September amounted to 7,871,551 gross tons out of the total Lake shipments of 9,600,786 tons. Some of the blast-furnace people are beginning to show considerable interest in next season's prices, but no prices have as yet been named. We quote 1916 prices as follows for delivery at lower Lake ports: Old range Bessemer, $4.45; Mesaba Bessemer, $4.20; old range non-Bessemer, $3.20; Mesaba non-Bessemer, $3.55.

Pig Iron.—The market is fairly active and prices are higher on all grades. Local furnaces have advanced their prices on foundry iron for Cleveland delivery about 75c. per ton, one now quoting No. 2 foundry at $20 for Cleveland delivery and another asking $20, at furnace, or $20.30 delivered. For out-of-town shipment, quotations range from $19.50 to $20. Sales are reported at $20 by Cleveland and Valley furnaces for first-half delivery. Some malleable iron has also been sold as high as $20 in the Valley, and it is believed that the $19.50 price on basic, foundry and malleable iron in the Valley will soon disappear. Bessemer iron is held at $23, Valley furnace, but a small lot is reported sold at $23.50. We note the sale of 10,000 tons of basic to a northern Ohio consumer for first-half delivery. Southern iron prices have not kept up with the advances on Northern grades, and at several northern Ohio points in close proximity to blast furnaces, Southern iron has been sold in the past few days at a delivered price of about 50c. lower than Northern grades could be secured. Some consumers who have not used Southern iron for several years are taking advantage of the lower price and placing orders for Southern grades. A number of sales are reported in lots of 500 tons and under. Minimum quotations on Southern iron are $14.50, Birmingham, for No. 2 for this year's delivery and $15 for first half. One or two producers have advanced their quotations 50c. above these prices during the past few days. Ohio silvery iron has been advanced to $28 for 8 per cent, or $1 per ton higher than the recent prevailing price. Tennessee silvery is quoted at about $24 delivered in Ohio territory. The demand for low phosphorus iron is active, and little is available for this year's delivery. There is considerable inquiry for low phosphorus iron for first half. Prices on this grade have been marked up $1 or more per ton. We quote, delivered Cleveland, as follows:

Bessemer	$23.95
Basic	$20.00 to 20.30
Northern No. 2 foundry	20.00 to 20.30
Southern No. 2 foundry	18.50 to 19.00
Gray forge	19.50
Jackson Co., silvery 8 per cent silicon	29.62
Standard low phos., Valley furnace	34.50

Coke.—The by-product coke plant of the Dover By-Product Coke Company, Canal Dover, Ohio, was placed in operation Oct. 9. It has the Roberts type of ovens and its daily capacity is about 440 tons. The foundry coke market is very firm and prices are higher. The car shortage is seriously interfering with shipments, and some consumers unable to secure Connellsville coke are placing orders for prompt shipment Virginia

coke at $4 per net ton at oven. We quote standard Connellsville foundry coke at $3.75 to $4 per net ton at oven, for prompt shipment and contract.

Finished Iron and Steel.—The demand for finished steel for early delivery continues fairly heavy, particularly for steel bars and plates. Some last quarter plate contracts with tank and boiler makers have been placed at 4c., Pittsburgh. A local mill making plates in narrow sizes has advanced its price from 3.25c. to 3.50c., Pittsburgh, and a Pittsburgh mill has advanced its price from 3c. to 3.25c. for narrow plates for future delivery. Most mills are now asking 2.70c., Pittsburgh, for steel bars and structural material for future delivery, having advanced their price from 2.60c. The Lackawanna Steel Company has taken 5000 tons of rails for the Nickel Plate Railroad. Rail inquiries in the local market include 6000 tons for export and 1500 tons for an industrial company. Among other foreign inquiries is one for 20,000 tons of rerolling billets for export to Sweden. We note the sale of a small lot of forging billets at $60, Eastern mill, although the usual quotation is $65. In structural lines 1200 tons for an addition to the John Harkness Brown Building, Cleveland, will be furnished by a leading independent mill. The McClintic-Marshall Company has taken 250 tons for new buildings for the Peerless Motor Car Company, and the Penn Bridge Company has taken 270 tons for extensions to the plant of the Atlas Car & Mfg. Company, Cleveland. Local fabricators are figuring on an inquiry from the Chicago, Burlington & Quincy Railroad for the Harrison Street terminal, Chicago, requiring 5000 tons in 1917 and 5000 tons in 1918. The Wheeling & Lake Erie Railroad has placed 1000 steel cars, dividing the order equally between the Standard Steel Car Company and the Pressed Steel Car Company. There is a heavy demand for sheets from both manufacturers and jobbers, and prices on black sheets are firmer. We quote black sheets at 3.10c. to 3.25c., Ohio mill, for No. 28; blue annealed, at 3c. to 3.10c. for No. 10, and galvanized at 4.35c. to 4.40c. for No. 28. Bar-iron prices are unchanged at 2.50c. to 2.60c., Pittsburgh. Warehouse prices are 3.40c. for steel bars and structural material; 3.75c. for plates and 3.25c. for iron bars.

Old Material.—The market is more active than for some time, particularly in heavy melting steel, and prices are firm. Heavy melting steel scrap has advanced about 50c. per ton and several other grades are higher. The Otis Steel Company bought a round tonnage at prices that are understood to range from $17.50 to $18, delivered. The Upson Nut Company is reported in the market for a round tonnage of the same grade at about $17.50. A Canton mill has taken heavy melting steel at $18 to $18.50. The advance in pig iron has forced cast scrap up about 25c. per ton. There is more activity between dealers in turnings and the price on this grade has been advanced about 25c. per ton. An embargo has been declared against the plant of the Upson Nut Company. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton

Steel rails	$15.25 to $15.75
Iron rails	18.50 to 19.00
Steel car axles	33.00 to 35.00
Heavy melting steel scrap	17.25 to 17.50
Carwheels	12.75 to 13.00
Relaying rails, 50 lb. and over	25.00
Agricultural malleable	12.50 to 12.75
Railroad malleable	14.25 to 14.50
Steel axle turnings	12.00 to 12.50
Light bundled sheet scrap	12.00 to 12.25

Per Net Ton

Iron car axles	$26.00 to $27.00
Cast borings	6.00 to 6.25
Iron and steel turnings and drillings	5.75 to 6.00
No. 1 busheling	13.25 to 13.50
No. 1 railroad wrought	16.00 to 16.50
No. 1 cast	13.75 to 14.00
Railroad grate bars	10.25 to 10.75
Stove plate	10.25 to 10.75

Bolts, Nuts and Rivets.—While the demand for bolts and nuts is not so heavy as a few weeks ago, manufacturers are getting a good volume of business for delivery during the remainder of the year. Leading manufacturers are inclined to hold off in taking orders for next year's delivery, although some business has been placed for the first quarter. Prices are firm. The demand for rivets continues fairly active. Prices are unchanged at 4c., Pittsburgh, for structural and 4.10c. for boiler rivets. Bolt and nut discounts are as follows:

Common carriage bolts, ⅜ x 6 in., smaller or shorter, rolled thread, 50 and 5; cut thread, 40, 10 and 2½; larger or longer 25 and 2½; machine bolts within h. p. nuts, ⅜ x 4 in., smaller and shorter, rolled thread, 50 and 10; cut thread, 50; larger and longer, 40 and 5; lag bolts, gimlet or cone point, 50 and 5; square h. p. nuts, blank or tapped, $2.70 off the list; hexagon h. p. nuts, blank or tapped, $2.70 off; c. p. c. and t. sq. nuts, blank or tapped, $2.40; hexagon nuts, all sizes, $2.80 off; cold pressed semi-finished hexagon nuts, all sizes, 60 and 5.

Cincinnati

CINCINNATI, OHIO, Oct. 11, 1916.—(*By Wire.*)

Pig Iron.—A prominent maker in southern Ohio has withdrawn from the market as far as prompt-shipment business is concerned, its order books being well filled for this year. However, $19, Ironton, can still be done for this year, and contracts over the first half of 1917 are solicited at the same figure. Southern iron is firmer, but for this year there is some still available at $14.50, Birmingham basis. A number of sales are being made at $15, which is the quotation of the majority of furnaces in that district. Quite a number of sales at this figure have also been made in Indiana and southern and central Ohio, among which are 1000 tons for first half delivery and several 500-ton lots. The carload business for prompt shipment is still good, but Indiana melters appear to be taking more small tonnages of iron than other sections. Virginia irons continue to be a factor in this market, and the freight rate of $1.90 from furnace added to the price of $17.50 on No. 2 X enables operators in that district to compete successfully with Ohio River iron. The general inquiry is light and business is mostly transacted by salesmen direct. Some malleable has lately been sold, the largest reported sale being 1000 tons for first half. Northern basic is temporarily at a standstill, but unconfirmed reports are to the effect that more Southern basic has been sold in this territory than is generally known. Reports received late to-day indicate that $15, Birmingham, will be the minimum for Southern iron before the end of this week. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft.	$17.90 to $18.40
Southern coke, No. 2 f'dry and 2 soft.	17.40 to 17.90
Southern coke, No. 3 foundry	16.90 to 17.40
Southern coke, No. 4 foundry	16.40 to 16.90
Southern gray forge	15.90 to 16.40
Ohio silvery, 8 per cent silicon	28.26 to 28.76
Southern Ohio coke, No. 1	21.26 to 21.76
Southern Ohio coke, No. 2	20.26 to 20.76
Southern Ohio coke, No. 3	19.76 to 20.26
Southern Ohio malleable Bessemer	20.26 to 20.76
Basic, Northern	20.26 to 20.76
Lake Superior charcoal	21.20 to 22.20
Standard Southern carwheel	24.90 to 25.40

(By Mail)

Coke.—The situation as far as the Connellsville district is concerned is somewhat complicated. It is known that some contracts for furnace coke have been made at $3.50 per net ton at oven for nearby shipment and long time contracts around $3. The labor shortage and the scarcity of cars have had much to do with advancing the coke price in all districts. Contracts made lately for furnace coke cover shipments of approximately 8000 tons a month to two different consumers in this territory. Connellsville foundry coke is now quoted around $3.75, and as high as $4 is asked. Pocahontas and Wise County operators are quoting on the same price level as New River operators on foundry coke.

Finished Material.—The warehouse business is rather slow and the lull is welcomed by both the mills and the jobbers. Mill shipments on old orders are going forward at a more satisfactory rate, although both manufacturers and wholesalers are not disposed to take on new business except in extreme cases where the material is needed. It is a difficult proposition now to take care of the needs of regular customers. We quote No. 28 black sheets, f.o.b. Cincinnati or Newport, Ky., at 3.40c. and No. 28 galvanized at 4.65c. Jobbers' prices are unchanged as follows: No. 10 blue annealed sheets, 3.50c.; wire nails, $2.85 per keg, base; barb wire, $3.70

per 100 lb.; steel bars and structural shapes, 3.35c.; twisted steel bars, 3.50c.; cold-rolled steel rounds, 2-in. and larger, 3.90c.

Old Material.—The market is gaining strength, although no general advances have been recorded in the past few days. The rolling mills and foundries are good customers, but practically all users are slow in making long time contracts. The policy of consumers seems to be to buy only for nearby requirements. The following are dealers' prices, f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton	
Bundled sheet scrap	$11.50 to $12.00
Old iron rails	17.50 to 18.00
Relaying rails, 50 lb. and up	22.75 to 23.25
Rerolling steel rails	16.00 to 16.50
Heavy melting steel scrap	14.00 to 15.50
Steel rails for melting	14.50 to 15.00

Per Net Ton	
No. 1 railroad wrought	$14.00 to $15.50
Cast borings	4.75 to 5.25
Steel turnings	5.00 to 5.50
Railroad cast	12.00 to 12.50
No. 1 machinery cast	14.00 to 14.50
Burnt scrap	9.00 to 9.50
Iron axles	23.75 to 24.25
Locomotive tires (smooth inside)	22.00 to 22.50
Pipes and flues	10.00 to 10.50
Malleable and steel	11.75 to 12.25
Railroad tank and sheet	9.25 to 9.75

Birmingham

BIRMINGHAM, ALA., Oct. 9, 1916.

Pig Iron.—On Oct. 4 the leading interest advanced its price of all deliveries on pig iron to $16, being well provided for, and, it is presumed, prepared to await another rise. The largest foundry producer advanced to $15.50 about the same time, and made sales both North and South. Other interests made sales at $15, which may be regarded as the minimum of date of Oct. 7. The upward trend is marked. Alabama now has four more furnaces on basic than ever before. Woodward put one on basic in July and another on Oct. 1. In the first week of October the Sloss-Sheffield changed a foundry stack over to basic at North Birmingham and blew in a City stack on basic to take care of its 100,000 tons of basic ordered by the British Government. Woodward is also manufacturing for that government. These four stacks are fully booked on basic for six months. Additional offers of basic by the British Government were declined. The two companies would scarcely have done the booking but for the consignee providing the ships. Free foundry-iron stocks would have gone below 200 000 tons in September but for the car shortage. Export metal has been shipped to New York in flat cars. An interest with bookings calling for the delivery of 1000 tons per diem is shipping only 500 tons. The car shortage is intense. One producer company is sold up for the remainder of the year and to the extent of two-thirds capacity for the first half of next year. This and another large producer are out of the market for the remainder of 1916. Sales have been enormous. One interest booked 30,000 tons in the first week of the month—all foundry iron. Consumers are not well provided for for the first half of next year and are becoming restless. The output continues at a record-breaking pace. Foundries are consuming their full quota. We quote, per gross ton, f. o. b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	$15.50 to $16.00
No. 2 foundry and soft	15.00 to 15.50
No. 3 foundry	14.50 to 15.00
No. 4 foundry	14.25 to 14.75
Gray forge	14.00 to 14.50
Basic	15.00 to 15.50
Charcoal	21.50 to 22.00

Cast-Iron Pipe.—An explosion in the old plant of the United States Cast Iron Pipe & Foundry Company at Bessemer, Ala., last Saturday, caused some damage, but will not affect operations. No large recent orders are reported. Shipments to South America have been attended with such inconveniences as to indicate that resident agents in that country will alone solve the problem. Operations continue around capacity. The Lynchburg pipe plant at Anniston is to be repaired and will resume operations. We quote, per net ton, f. o. b. pipe shop yards, as follows: 4-in., $29; 6-in. and upward, $26, with $1 added for gas pipe and 16-ft. lengths.

Coke.—The market is very strong. One interest sold 6000 tons, part Southern and part Mexican delivery, at $4 per net ton, f. o. b. oven. This is the contract price for large lots. Small lots and spot sell at $4.25 to $4.50 for standard beehive foundry, with furnace coke going at $3.25 to $3.50. Sloss-Sheffield is buying coke from Republic and Pratt Consolidated to help out in its operation of six blast furnaces.

Old Material.—Dealers report an increase in the volume of business. Wrought and steel scrap have been quite active. Shipments to Knoxville, St. Louis, Youngstown, Anniston, Alabama City and the Middle West have been on a large scale recently. Yard stocks are no longer heavy. We quote, per gross ton, f. o. b. dealers' yards, as follows:

Old steel axles	$28.00 to $30.00
Old steel rail	13.00 to 13.50
No. 1 steel scrap	11.00 to 11.50
No. 1 wrought	12.50 to 13.25
No. 1 cast	11.00 to 11.50
Stove plate and light	8.75 to 9.25
Carwheels	11.00 to 12.00
Tram carwheels	11.00 to 11.50

Buffalo

BUFFALO, N. Y., Oct. 10, 1916.

Pig Iron.—Sales for the week have aggregated 18,000 to 20,000 tons, all grades, and for deliveries extending over the rest of 1916 and the first half of next year. All of the re-sale iron in this district has now been disposed of. Inquiry continues to be quite general, although not quite so heavy in volume as a week ago. Heavy sales have caused another large producing interest to advance its price 50c. per ton today to an absolute minimum of $19.50 for any grade and making it the same as the lowest price established by other large producers a week ago. Some of the furnaces of the district are now maintaining a minimum of $20 per ton, establishing a range of $19.50 to $20.50, according to grades. There is apparently no No. 2 X iron in the district at less than $19.50, and the average price is $20 for first half delivery. We quote as follows f.o.b. furnace, Buffalo, for delivery to and including the first half of 1917:

No. 1 foundry	$20.00 to $20.50
No. 2 X foundry	19.50 to 20.00
No. 2 plain	19.50 to 20.00
No. 3 foundry	19.50 to 20.00
Gray forge	19.50 to 20.00
Malleable	19.50 to 20.00
Basic	20.00 to 20.50
Bessemer	22.00
Charcoal, regular brands and analysis	21.00 to 22.00

Finished Iron and Steel.—Demand for plates is so greatly in excess of the supply that almost any price could be secured. The minimum price of the larger manufacturers is 3½c. per pound, with no tonnage to offer to buyers, as mills have on their books sufficient orders to carry them over next year. For reasonably prompt shipment as high as 5½c. per pound has been paid. The prospects are that there will be much more tin-plate business offered to mills than can be accepted, and that mills will confine their sales to their regular established trade. It is believed that in the early part of 1917 tin plate will bring $7 or more, per base box. Not more than 75 per cent of the offerings in bars and shapes are being accepted. Sellers are compelled to turn down a large percentage of orders, even from established customers. Bids are being opened to-day for 350 tons for a barge canal bridge at Rochester, and for 1600 tons of structural steel, reinforcing bars, steel sheet piling, etc., for barge canal work at various points. The city of Buffalo will open bids next week for repairs to eight viaducts over the New York Central, Pennsylvania and Erie railroads, involving about 1000 tons of structural steel and 1000 to 1200 tons of cast-iron plates. The Hammermill Paper Mill, Erie, Pa., has awarded 400 tons of steel to the Pittsburgh Bridge & Iron Works. The American Bridge Company has booked 100 tons steel shapes for a blacksmith shop for the Morrow Mfg. Company at Elmira, N. Y.

Old Material.—Dealers of the Buffalo District report that trading in practically all lines of scrap material has become decidedly spirited in the last week. Heavy

melting steel is holding firmly at $17 to $17.50, and only small tonnages are obtainable at that figure. Advances in prices are noted in low phosphorus, wrought and cast scrap, iron and steel axles, No. 1 and No. 2 busheling scrap and car wheels. No large sales are reported as dealers are holding stock. Inquiry coming in is of very good volume and for all grades. It is stated there are no large tonnages of steel scrap available in this market. We quote dealers asking prices, per gross ton f.o.b. Buffalo, as follows:

Heavy melting steel	$17.00 to $17.50
Low phosphorus steel	21.50 to 22.00
No. 1 railroad wrought scrap	19.00 to 19.50
No. 1 railroad and machinery cast scrap	16.50 to 17.00
Steel axles	32.00 to 33.00
Iron axles	32.00 to 33.00
Carwheels	15.50 to 16.00
Railroad malleable	15.50 to 16.00
Machine shop turnings	6.00 to 6.50
Heavy axle turnings	12.00
Clean cast borings	7.50 to 7.75
Iron rails	18.00 to 18.50
Locomotive grate bars	11.50 to 12.00
Stove plate (net ton)	11.50 to 12.00
Wrought pipe	13.00 to 13.50
No. 1 busheling	14.00 to 14.50
No. 2 busheling	11.50 to 12.00
Bundled sheet scrap	11.50 to 12.00
Bundled tin scrap	15.00 to 15.50

St. Louis

ST. LOUIS, Oct. 10, 1916.

Pig Iron.—The requirements of foundries and other consumers in the St. Louis industrial district have, according to developments and investigations, been pretty well covered, as a result of the rather heavy buying which has been going on during the past several weeks, at least for the first half of 1917. In consequence, there has been some slacking up of purchases and this has been emphasized somewhat by the shortage of labor. As a result some foundries are not melting within 20 per cent of their capacity. One or two furnace representatives have been notified of a willingness of their principals to accept business for the last half of 1917 on the basis of $15.50, Birmingham, but most of the representatives are acting upon advices that their furnaces are sold up, at least as nearly so as the management desires at the present time and at present prices. The impression seems to be that advances are to be expected and furnaces represented in this territory do not desire to take any more business at current figures. Sales during the week aggregated possibly 4000 tons.

Coke.—Very little was done in the week, as consumers are covered by their contracts. Special needs are being filled in carload lot orders at prices somewhat above the market. The local by-product plant is holding its coke on a parity with Connellsville quotations.

Finished Iron and Steel.—The finished product demand is still good, but the extremely deferred deliveries prevent anything in the way of large contracting. Consumers are, however, urging the mills to take on business, which the latter are disinclined to do under present conditions. Consumers with immediate needs are continuing to take stock out of warehouses at the higher prices and passing the cost along to the consumer. For stock out of warehouse, we quote as follows: Soft steel bars, 3.30c.; iron bars, 3.20c. to 3.25c.; structural material, 3.30c.; tank plate, 3.80c.; No. 10 blue annealed sheets, 3.45c.; No. 28 black sheets, cold rolled, one pass, 3.60c:; No. 28 galvanized sheets, black sheet gage, 5.15c.

Old Materials.—The scrap market continues stiff in spite of heavy offerings by the railroads and the opinion is more definite that a shortage of considerable proportions really exists. Steel mills, foundries and rolling mills are in the market to a considerable extent, while dealers are still doing considerable buying to cover their shortages and to hold against further advances, which they expect. The irregularities of the demand at this point continue to keep some of the quotations out of line with those made in other markets. Relaying rails, standard section, are scarce and high, while a sharp new demand has sprung up for light relaying rails, with an advance in price. Lists out, closing this week, include the Vandalia, 500 tons; Kansas City Southern, 500 tons; Big Four, 3500 tons; Southern Railway, 2300 tons. The lists coming out last week and closing this week aggregated in excess of 5000 tons, but the heavy offerings had no appreciable effect on the market, which was, if anything, stronger than before the offerings appeared. We quote dealers' prices, f.o.b. St. Louis industrial district, customers' works, as follows:

Per Gross Ton

Old iron rails	$17.50 to $18.00
Old steel rails, rerolling	17.00 to 17.50
Old steel rails, less than 3 ft.	17.00 to 17.50
Relaying rails, standard section, subject to inspection	24.00 to 26.00
Old carwheels	12.00 to 12.50
No. 1 railroad heavy melting steel scrap	15.75 to 16.25
Heavy shoveling steel	15.00 to 15.50
Frogs, switches and guards cut apart	15.75 to 16.25
Bundled sheet scrap	8.25 to 8.75

Per Net Ton

Iron angle bars	$17.25 to $17.75
Steel angle bars	14.75 to 15.25
Iron car axles	28.50 to 29.00
Steel car axles	31.00 to 32.00
Wrought arch bars and transoms	20.00 to 20.50
No. 1 railroad wrought	16.25 to 16.75
No. 2 railroad wrought	15.75 to 16.25
Railroad springs	15.00 to 15.50
Steel couplers and knuckles	14.50 to 15.00
Locomotive tires, 42 in. and over, smooth inside	21.50 to 22.00
No. 1 dealers' forge	14.50 to 15.00
Cast-iron borings	6.50 to 7.00
No. 1 busheling	14.50 to 15.00
No. 1 boilers, cut to sheets and rings	10.50 to 11.00
No. 1 railroad cast scrap	12.50 to 13.00
Stove plate and light cast scrap	9.25 to 9.50
Railroad malleable	11.00 to 11.50
Agricultural malleable	10.00 to 10.50
Pipes and flues	11.00 to 11.50
Heavy railroad sheet and tank scrap	11.00 to 11.25
Railroad grate bars	10.00 to 10.50
Machine shop turnings	7.50 to 8.00

San Francisco

SAN FRANCISCO, CAL., Oct. 3, 1916.

The tonnage of new orders for finished materials in general continues very heavy. Many buyers are seeking to hasten deliveries, notwithstanding the large shipments that have been coming forward for some time on old contracts. Increasing anxiety is also noted as to supplies for the coming year, though the placing of new contracts is still limited. The activity, however, is mainly with the larger manufacturers, for special purposes, or for export. The routine jobbing business continues to be adversely affected by high prices and, though normal in most lines, shows no exceptional activity. Merchants' stocks, as a rule, are in fair shape.

Bars.—The Oriental demand is increasingly urgent, but such inquiries get little response from sellers. Local mills are not anxious to repeat last year's experience, when they tied up a large tonnage by export contracts and were unable to meet home requirements; and Eastern mills show little eagerness for business outside of their regular trade. Merchant bar specifications from implement and other manufacturers, shipbuilders, etc., continue heavy, most of their requirements being covered by contracts; while merchants' specifications are about normal for this season. The tonnage of reinforcing bars holds up well. Resale prices on merchant bars in small lots remain at 4c. for steel and 3.90c. for iron.

Rails.—There is considerable talk of extensive construction by several new railroads in Oregon and Washington, as well as by the Western Pacific, though thus far little has been heard from them in regard to rails. As for the Western Pacific, at least, it is expected that relayers will cover a large part of the extensions, which will tap several important districts. Aside from this, the greatest demand is from mining and industrial concerns. While new orders for light rails are numerous, the tonnage of relaying rails brought out by the present prices is surprising.

Structural Material.—The Union Iron Works has placed a small fabricating contract with a local concern for its new office building. Fabricators are quite busy on old work and report figuring fairly active, but new inquiries are almost entirely of a small nature, and generally in outside towns. Bridges and manufacturing plants are about the most important items.

Arrangements are about complete for the purchase of the lot at California and Montgomery streets by the Merchants' Exchange, which will build a three-story class A building adjoining its present 14-story structure. Plans are being drawn for a new Y. W. C. A. building. A deal has about been closed for the construction of a 10-story building in San Diego. The city of Sacramento will take bids Oct. 5 for a $130,000 Carnegie library. Shipbuilders and other manufacturing concerns continue actively in the market for plain shapes.

Plates.—While shipbuilders are receiving a heavy tonnage on old contracts, the deliveries are far short of requirements, and all possible efforts are being made to hasten shipments. Some new inquiries also are appearing, though it is difficult to obtain early delivery except at prices ordinarily prohibitive. Heavy shipments are now passing through here for Japan, and the demand in that country is apparently increasing. The Lacy Mfg. Company and the Llewellyn Iron Works have taken some very large contracts for riveted pipe for Los Angeles and Los Angeles County. Distributive movement is very fair, though many of the small consumers are getting delivery on special orders placed some time ago.

Sheets.—The usual run on corrugated sheets is not appearing, notwithstanding early rains. Apparently other materials are being drawn upon to provide the usual increase in country warehouse space. The recent acceleration in plain galvanized sheets, however, has kept up quite well, and blue annealed sheets also are moving somewhat better in a jobbing way. Specifications from large consumers show no curtailment, and there is considerable inquiry for early delivery, as well as efforts to cover future requirements. Black sheets are of little consequence in this market, but a few seasonable inquiries are coming out.

Tin Plate.—Export demand continues strong and insistent, and there has been great activity among local packers in contracting for next year's needs, at prices to be named later.

Wrought Pipe.—With Los Angeles aqueduct contracts amounting to about 5000 tons, and a sudden spurt of oil-field business, the local branch of the leading interest has booked about the largest month's business in its history. This was entirely unexpected, as the previous month was rather quiet, and there is nothing to indicate continued activity. Tonnage booked by other concerns, though not remarkable, was quite large, consisting principally of oil well supplies. New demand for merchant pipe from the mills has been light, and the resale business is at best not above normal.

Cast-Iron Pipe.—Corporation buying has subsided somewhat since Sept. 1, nearby requirements having been fairly well covered before that date. Small municipal inquiries are fairly numerous. Los Angeles will take bids Oct. 3 for 417 tons; the Government will take bids Oct. 5 for about 80 tons of small pipe for a fort in Arizona; Hermosa Beach, Cal., will take bids Oct. 17 for a small lot; and the city of San Francisco is expected in the market soon for a fair tonnage. Prices have advanced $1, now being $40 per net ton for 4-in.; $37 for 6-in. and larger; $1 extra for class A and gas pipe.

Pig Iron.—Another shipment of 1000 tons of Hanyang iron has arrived on old contracts. The local market is quiet and uninteresting, with heavy stocks in melters' hands; but prices are firmly held, furnace agents quoting No. 1 Southern foundry iron at $26.50 to $27 per gross ton.

Coke.—Stocks are ample for foundry requirements for two to three months ahead, and business is about at a standstill, with prices entirely nominal.

Old Material.—Steel melting scrap is in adequate supply for all nearby requirements, with a large tonnage at outside points which could easily be drawn upon. The heaviest needs are covered by contracts, and new business is limited to small transactions as a rule, prices being from $10 to $12 per gross ton. Buyers in distant markets who sometimes pick up scrap here are taking no interest. Cast-iron scrap is fairly active at $16 or slightly over per net ton.

E. A. Wilson, president Pacific Coast Steel Company, has purchased 33 acres adjacent to the plant in South San Francisco, and leased 50 acres more, to facilitate expansion to be started shortly.

New York

NEW YORK, Oct. 11, 1916.

Pig Iron.—A strong and confident tone prevails, with prices of foundry grades 50c. to $1 per ton higher in eastern Pennsylvania and at Buffalo. Steel-making iron is also stronger, with low phosphorus $2 to $3 per ton higher for export and small sales of standard made as high as $40 at eastern Pennsylvania furnace, for shipment to domestic consumers. Interest during the week was again centered in large export sales, mainly of steel-making grades for shipment over the remainder of the year and through the first quarter of 1917. Sales made to foreign interests in the New York market aggregated over 100,000 tons for the week, including 20,000 tons of standard Bessemer for export to Great Britain made in the last two days. One sale of 10,000 tons of low phosphorus iron is reported to have been made at $37 per ton at furnace and another lot of 10,000 tons is under negotiation for shipment to Italy. One Alabama furnace interest is reported to have sold an additional lot of 50,000 tons of basic at $15, Birmingham basis, for export to France. Neutral European countries have taken about 20,000 tons more of foundry grades, including 10,000 tons for the Netherlands and a number of smaller lots, aggregating 10,000 tons, for shipment to Scandinavian countries, to Greece and to Switzerland. Several other unsatisfied inquiries are still in the market for export, including 3000 tons of low-phosphorus iron for Japan. Domestic consumers have bought a little less freely of foundry grades, but sales aggregating about 20,000 tons have come to the surface, made up mainly of small lots ranging from a few hundred to 1500 tons each for shipment over the rest of this year and the first half of 1917. One manufacturer of soil pipe is reported to have closed a contract for about 5000 tons of foundry iron, including some Virginia metal, for shipment to a plant near Baltimore. This same interest has also taken 1500 tons of foundry iron for shipment to Newark, N. J. Several eastern Pennsylvania furnaces emphasize the effect of higher productive cost by advancing prices over $1 per ton, with some sales made at the higher level. We quote at tidewater for early delivery: No. 1 foundry, $21 to $22; No. 2 X, $20.50 to $21.50; No. 2 plain, $20 to $20.50; Southern iron at tidewater, $20.25 to $20.75 for No. 1 and $20 to $20.25 for No. 2 foundry and No. 2 soft.

Ferroalloys.—Speculation as to the possible effect of nearby submarine warfare on imports of ferromanganese, as well as manganese ore, is demanding some attention, but thus far no excitement has resulted. Inquiries are few and sales the past week have not exceeded 1000 tons. This has been principally domestic alloy, which has gone at $165, delivered, and this is now regarded as the firm quotation. A small tonnage was sold at $160, delivered, but this was made partly from Cuban manganese ore and the sale involves special features. The quotation for British ferromanganese is $164, seaboard, for any delivery. Spiegeleisen is quiet at $40 to $45, furnace. Ferrosilicon, 50 per cent, is very active, and the filling of specifications on contracts is difficult. Inquiries are more numerous, especially for next year's delivery, and it is not unlikely that the quotation will be advanced to $100, Pittsburgh.

Structural Material.—A more active demand is being experienced for plain structural shapes on the basis of 2.75c., Pittsburgh mill, and in some instances slightly higher prices have been asked and paid for shipment over three to six months. The fabricating shops are taking more orders in the Eastern territory on the basis of 2.70c. to 2.80c. for plain material. The rail-

roads are placing more contracts for bridges and larger contracts are assured in the near future. The Cincinnati, Hamilton & Dayton has divided a contract for 800 tons of bridge work between the Fort Pitt Bridge Company and the Toledo Bridge & Crane Company, 700 tons of the total going to the former company. The Chicago Northwestern has given an order for 1076 tons for ore spouts to be installed on dock No. 3 at Ashland, Wis., to the American Bridge Company. The Chicago, Burlington & Quincy has asked for tenders on 5000 tons for terminal work at Chicago; the Chicago & Alton is to build a freight shed at Chicago requiring from 2000 to 3000 tons. The Pennsylvania railroad has come into the market for 1500 tons of bridge work and the Baltimore & Ohio asks tenders on 500 tons for 13 spans. The Southern Railway, for repair shops to be constructed at Spencer, N. C., will require 500 tons of shapes. The Seaboard Air Line is expected to make an award on several hundred tons of steel for car shops at Savannah, bids for which were recently submitted. Steel building work is more animated. Among the most recent contracts closed are the following: 250 tons for an extension to the South Ferry building, awarded to the Passaic Structural Steel Company; 350 tons for the Jewish Center on Eighty-sixth Street, to the Hinkle Iron Works; 500 tons for the Baker & Williams warehouse, South Morton Street, to the Levering & Garrigues Company; 800 tons for the Joseph Paterno apartment on 104th Street and West End Avenue, to the Passaic Steel Company, and 350 tons for a loft building at 39th Street and Seventh Avenue to the George A. Just Company. The Aluminum Company of America has placed 276 tons for plant extension with the McClintic-Marshall Company; the Pullman Company has awarded a contract for 1200 tons of steel for a building at Pullman, Ill., to the Kenwood Bridge Company. The Adams Express Company is about to take bids on 1500 tons of steel for a building at Chicago. Tenders went in yesterday on 1200 tons of steel for a loft building at 43 West Thirty-sixth Street, New York City, for the Nameloc Company. Bids have been asked on 800 tons of steel for the Union Square Building. A station for the Central Railroad of New Jersey at Newark will require 1200 tons. We quote mill shipments of plain structural material at 2.769c. to 3.019c., New York, 2.869c. minimum for largest lots for fair delivery, and warehouse shipments at 3.35c., New York.

Steel Plates.—Shipyards are overwhelmed with inquiries for boats from foreign and domestic interests. Norwegian companies are most importunate. Builders on the Atlantic coast report active inquiries for 50 ships, and each day adds to the number for which prices are asked. In turn, the steel mills are being pressed for plates and shapes for boat construction. One contract for 15,000 tons of plates is on the point of being closed with an Eastern mill by a domestic builder. Other inquiries are in the market from shipyards on the Pacific and Atlantic coasts, aggregating about 40,000 tons. Export inquiries are in larger volume. Great Britain is asking for prices on 43,000 tons of plates, shapes, blooms and billets, the largest single item being 25,000 tons of plates. Japan has placed an order for 5000 tons of ship plates at 5c. base mill, for relatively early shipment, and has put out another inquiry for 6800 tons. Italian interests are still in the market for 15,000 tons of plates. The Victorian government, Australia, is asking for prices on 4000 tons of ship plates and there are numerous other small inquiries ranging from 2000 to 5000 tons each from other countries. Wide plates are difficult to buy before the third quarter of 1917, and command 4c., Pittsburgh. Plates up to 7 ft. in width likewise take 4c., but deliveries may be made in 6 to 8 weeks, while universal plates are not in good demand and may be obtained in a few weeks and at 3.50c., Pittsburgh. Warehouse prices range from 4c. to 4.50c., New York.

Iron and Steel Bars.—Automobile manufacturers are actively in the market for bars for the first half of 1917, including various lots of 15,000, 8000, 6000 and 3000 tons. The aggregate is fully 50,000 tons. Most of the inquiries come from Detroit to Eastern mills. Agricultural implement manufacturers are also in the market for supplementary lots of soft steel bars in lots of 2000 to 6000 tons each for shipment over the first half of next year. Independent mills are making sales at 2.70c. to 2.75c. base, and small lots are sold at 3c. to 3¼c. per lb. Among the foreign inquiries is one lot of 12,000 tons hard steel bars and it is understood that a portion of this contract has been placed. Iron bars are strong at 2.669c. and 3.25c., New York, respectively, for mill and warehouse shipments. Steel bars are 3.25c. to 3.50c. from store, New York.

Cast-Iron Pipe.—Nothing of importance has transpired in municipal lettings, which are, of course, far apart at this season. Private buying keeps up quite well, with inquiries and some negotiations for next pear's delivery. Prices are firm, with an inclination to advance. Carload lots of 6-in., class B and heavier, are held at $31.50 per net ton, with $1 per ton extra for class A and gas pipe.

Old Material.—The market is gradually growing better, both as to sales and prices. The principal demand for heavy melting steel scrap comes from Pittsburgh, and brokers are now paying $14.25 to $14.50 for shipment to that locality. While embargoes have been lifted in eastern Pennsylvania, the steel companies there appear to be well covered and are not making new contracts, but shipments are still due on old contracts, to cover which the dealers are buying. The iron rolling mills are quite active in the market, as they have been for some weeks, and all kinds of rolling-mill stock are stronger. Machine-shop turnings and mixed borings and turnings are being bought quite freely by owners of blast furnaces in eastern Pennsylvania. Brokers quote buying prices for the Eastern trade about as follows to local dealers and producers, per gross ton, New York:

Heavy melting steel scrap (eastern Pennsylvania specifications)	$12.75 to $13.25
Old steel rails (short lengths) or equivalent	14.00 to 14.25
Relaying rails	28.50 to 29.00
Rerolling rails	17.50 to 18.00
Iron and steel car axles (for export)	38.50 to 39.00
No. 1 railroad wrought	19.75 to 20.00
Wrought-iron track scrap	16.75 to 17.00
No. 1 yard wrought, long	14.50 to 15.00
Light iron (nominal)	3.50 to 4.00
Cast borings (clean)	7.50 to 8.00
Machine-shop turnings (nominal)	5.75 to 6.00
Mixed borings and turnings (nominal)	5.75 to 6.00
Wrought pipe	13.25 to 13.75

Foundries are buying scrap steadily, although not in large quantities. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

No. 1 cast (machinery)	$16.00 to $16.50
No. 2 cast (heavy)	14.00 to 14.50
Stove plate	11.50 to 12.00
Locomotive grate bars	10.00 to 10.50
Old carwheels (nominal)	15.00
Malleable cast (railroad)	12.00 to 12.50

British Steel Market

American Black Sheets Sold at High Price—Tin Plates Declining

LONDON, ENGLAND, Oct. 11, 1916.

(*By Cable*)

The Cleveland pig-iron market is quiet but strong, and export business is fair. American billets are slow with 2 to 4 in. sizes being offered for November shipment at £14 c.i.f. Liverpool. Tin plates are declining and stock plates are quoted at 32s. 6d. American black sheets, standard specification, have sold at £21, November delivery, c.i.f. Liverpool. We quote as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 28s. to 28s. 6s.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £20 5s.

Steel ship plates, Scotch, delivered local yards, £13 17s. 6d.

Steel rails, export, f.o.b. works, £10 17s. 6d.

Hematite pig iron, f.o.b. Tees, about 140s.

Sheet bars (Welsh) delivered at works in Swansea Valley, £10 7s. 6d.

Steel bars, export, f.o.b. Clyde, £18.

Ferromanganese (nominal), £35.

Ferrosilicon, 50 per cent, c.i.f., £27

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin,	Lead		Spelter	
		Electro-	New	New	St	New	St.
Oct	Lake	lytic	York	York	Louis	York	Louis
4	28.50	28 62½	39.75	7.00	6.85	9.75	9.50
5	28.50	28.75	39.75	7.00	6.85	10.17	10.00
6	28.50	28.75	39.75	7.00	6.85	10.17	10.00
7	28.50	28.50	...	7.00	6.85	10.17	10.00
9	28.50	28.50	42.75	7.00	6.85	10.00	9.75
10	28.50	28.50	42.75	7.00	6.85	9.75	9.50

NEW YORK, Oct. 11, 1916.

Copper is quieter but strong. The tin market was highly excited by news of the German submarine activity on this side of the Atlantic and spot advanced to 42.75c. in an active market. Lead is quiet, but firm. Spelter moved up in a flurry of buying late last week, but is now quieter and easier. Antimony is higher following buying of metal in bond.

New York

Copper.—The market is by no means devoid of inquiry, especially for delivery next year, but as compared with previous weeks it is much quieter. Spot electrolytic is quoted at 29c., November at 28.50c., December at 28c., January at 27.50c., and first quarter at 27.25c. A manufacturing company was offered first quarter at 27c., last week, but on the following day, when it attempted to place an order, the sellers balked and asked 27.25c. It is intimated, however, that a large quantity might be had at 27c. for first quarter. The market is getting back to a more normal basis, although the producers and sellers are so heavily booked that they are extremely independent. Lake was sold on Monday at 27.12½c. for second quarter delivery. Its nearby positions are nominally at par with electrolytic. The prices for brass products are nominally unchanged, although the mills are a month or more further behind in shipments than they were two weeks ago, and where they quote on deliveries to be made in 2 or 3 months they exact premiums of 1c. to 2c. The London market for spot electrolytic was quoted yesterday at £142, or £2 higher than a week previous. The exports this month, including yesterday, total 7125 tons. Exports of brass in bars, plates, etc., in seven months of this year totaled 51,372 tons, compared with 18,089 tons in the same period of 1915.

Tin.—On Monday, when the trade received news of the German submarine activity, the tin market became greatly excited and the spot price advanced to 42.75c. A good business was done, mostly for futures, November and December deliveries selling around 40.75c. to 41c. Banca was active at 39.75c. to 39.87½c. Probably 500 tons changed hands during the day. Last Wednesday and Thursday the market appeared quiet on the surface, but it leaked out that a good business was being done quietly, probably 500 tons changing hands on the two days, mostly shipments from the East at a price close to 39.75c. Banca tin, December arrival, sold on the two days at about 38.75c., a fact regarded as interesting because it means a resumption of Banca shipments from the East. Yesterday the market was quieter, but firm, although spot Banca was taken at 41.60c. The London market for spot Straits advanced yesterday to £181 from £178 2s. 6d. The arrivals of the month total 1015 tons, and there is afloat 2245 tons.

Spelter.—Last Thursday a heavy business was done, and the price for prompt and October deliveries mounted to 10c., St. Louis, and 10.17c. and upward, New York. Much of the buying was on the part of the producers and sellers themselves, for just what reason appears uncertain. The activity on Thursday was so great that the day was described as a wild one. Friday brought a quieter market, and on Monday the sellers were looking for business. The activities of the German U-boat appeared to have a quieting effect on the metal. Prime Western was quoted yesterday at 9.75c., New York, and 9.50c., St. Louis; November at 9.62½c., St. Louis; fourth quarter at 9.62½c., St. Louis, and first quarter at 9.50c., St. Louis. The demand for brass-mill special is impaired by the large quantity of high-grade scrap available. The minimum is about 10.75c., St. Louis. The exports this month, including yesterday, total 3032 tons. The spot price at London yesterday was £56, against £52 a week previous.

Lead.—Since the last report the market has been quiet but steady. Sellers have not been anxious to sell, nor have consumers shown any desire to buy. Less talk is heard of higher prices, despite the fact that production and consumption keep about even. The leading interest adheres to 7c., New York, and 6.92½c., St. Louis, with independents quoting from 7c. to 7.12½c., New York, and 6.85c. to 6.90c., St. Louis, for prompt deliveries. The exports this month, including yesterday, total 1882 tons. The London quotation for spot yesterday was £30 15s., against £31 15s. a week ago.

Antimony.—Prompt metal has been taken at 10.50c., but the market is stronger at 11.50c., duty paid. The better tone is due to considerable activity in lots in bond at around 10.50c.

Aluminum.—The market is more active and the quotation for No. 1 virgin, 98 to 99 per cent pure, has advanced to 65c. to 67c.

Old Metals.—The market continues strong. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible	26 [illegible] to 27 [illegible]
Copper, heavy and wire	25 00 to 26 00
Copper, light and bottoms	22 00 to 23 00
Brass, heavy	15 00 to 15 50
Brass, light	12 00 to 12 50
Heavy machine composition	20 [illegible] to 21 50
No. 1 yellow rod brass turnings	15 00 to 15 50
No. 1 red brass or composition turnings	16 00 to 17 00
Lead, heavy	6 50
Lead, tea	6 00
Zinc	7 00 to 7 50

Chicago

OCT. 9.—The heavy sales of copper already consummated, with further large buying in prospect, has set up a very strong market. Spelter is higher, but the lead market remains quiet. Tin quotations are much affected by the submarine situation, and prices shot up in spectacular fashion. Scrap metals show sharp advances. We quote: Casting copper, 27.50c.; Lake copper, 28.50c. to 29c.; tin, carloads, 45c. and small lots, 45c.; lead, 6.90c. to 6.95c.; spelter, 9.87½c. to 10c.; sheet zinc, 15c.; Cookson's antimony, 50c.; other grades, 13c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 24c.; copper bottoms, 22c.; copper clips, 23c.; red brass, 20c.; yellow brass, 16c.; lead pipe, 6c.; zinc, 8c.; pewter, No. 1, 25c.; tinfoil, 30c.; block tin pipe, 37c.

St. Louis

OCT. 9.—Metals have been quiet but with prices firmly held. The closing quotations today were: Lead, 6.85c. to 6.95c.; spelter, 10c.; tin, 45c.; Lake copper, 29c.; electrolytic copper, 28.75c.; antimony, Asiatic, 15c. In the Joplin ore market zinc blende showed an advance on the top grades of $2.50 per ton, while on the lower grades advances in some instances were as high as $10. The average for the week throughout the district was $58. Calamine averaged $38. Lead ore averaged $68. We quote dealers' buying prices for miscellaneous scrap metals as follows: Light brass, 8c. to 8.50c.; heavy yellow brass, 11.50c. to 12c.; heavy red brass and light copper, 15.50c. to 16c.; heavy copper and copper wire, 18.50c. to 19c.; zinc, 5.75c. to 6c.; lead, 5c.; tea lead, 3.50c.; pewter, 25c.; tinfoil, 31c.

The Berlin Federation for Import Trade, founded some months ago in collaboration with the Berlin Chamber of Commerce, is reported to have formed a special group for metals and metalliferous ores. Thirty-one firms constitute the membership, including the leading electrical, wire-making, engineering and metal-dealing firms. The president is Herr Deutsch of the Allgemeine Elektrizitäts Gesellschaft and the vice-presidents are Herr Levy of N. Levy & Co., and Herr Warning of the Metallgesellschaft in Frankfurt.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c. Denver, pipe, 76.1c., minimum carload 46,000 lb.; structural steel and steel bars, 83.6c., minimum carload 36,000 lb. Pacific coast (by rail only), pipe, 65c.; structural steel and steel bars, 75c., minimum carload 50,000 lb.; structural steel and steel bars, 80c., minimum carload 40,000 lb. No freight rates are being published via the Panama Canal, as the boats are being used in transatlantic trade.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 2.60c. to 2.75c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs	.10
Angles, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Plates.—Tank plates, ¼ in. thick, 6 in. up to 100 in. wide, 3.50c. to 4c., base, net cash, 30 days, or ½ of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras

	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers)	.10
Boiler and flange steel plates	.15
"A. B. M. A." and ordinary firebox steel plates	.20
Still bottom steel	.30
Locomotive firebox steel	.50

Marine steel, special extras and prices on application.

Gage Extras

Rectangular, ¼ in. thick, over 6 in. wide to 100 in. wide	Base
Lighter than ¼ in., to 3/16 in., up to 72 in. wide	.10
*Lighter than ¼ in., including 3/16 in., over 72 in. to 84	.20
*Lighter than ¼ in., including 3/16 in., over 84 in. to 96	.30
*Lighter than ¼ in., including 3/16 in., over 96 in. to 100	.40
*Lighter than ¼ in., including 3/16 in., over 100 in. to 102	.45
Lighter than 3/16 in., including No. 8, up to 72 in. wide	.15
*Lighter than 3/16 in., including No. 8, over 72 in. to 84	.25
*Lighter than 3/16 in., including No. 8, over 84 in. to 96	.35
Lighter than No. 8, including No. 10, up to 60 in. wide	.30
Lighter than No. 8, including No. 10, over 60 in. to 64	.35

Up to 72 in. and not less than 10.2 lb. per sq. ft. will be considered ¼ in.

Over 72 in. must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.

Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.

Over 72 in., ordered weight 3/16 in., take No. 8 price

Over 72 in., ordered weight No. 8, take No. 10 price.

Width Extras

Over 100 in. to 110 in. inclusive	.05
Over 110 in. to 115 in. inclusive	.10
Over 115 in. to 120 in. inclusive	.15
Over 120 in. to 125 in. inclusive	.25
Over 125 in. to 130 in. inclusive	.50
Over 130 in.	1.00

Length Extras

Universal plates 80 ft. long up to 90 ft. long	.05
Universal plates 90 ft. long up to 100 ft. long	.10
Universal plates 100 ft. long up to 110 ft. long	.20

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over.

Lengths under 3 ft. to 2 ft. inclusive	.25
Lengths under 2 ft. to 1 ft. inclusive	.50
Lengths under 1 ft.	1.55
Circles 3 ft. in diameter to 100 in.	.30
Circles over 100 to 110 in. (width extra)	.05
Circles over 110 to 115 in. (width extra)	.10
Circles over 115 to 120 in. (width extra)	.15
Circles over 120 to 125 in. (width extra)	.25
Circles over 125 to 130 in. (width extra)	.50
Circles over 130 in. (width extra)	1.00
Circles under 3 ft., to 2 ft., inclusive	.50
Circles under 2 ft., to 1 ft., inclusive	.80
Circles under 1 ft.	1.85
Half circles take circle extras.	
Sketches not over four straight cuts, inc. straight taper	.10
Sketches having more than four straight cuts	.20
Plates sheared to a radius take complete circle extras.	

*Including extra for width.

Wire Rods.—Including chain rods, $55 to $60.

Wire Products.—Prices to jobbers effective Aug. 5: Fence wire Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, $2.55; galvanized, $3.25. Galvanized barb wire and staples, $3.45; painted, $2.75. Wire nails, $2.60. Galvanized nails, 1 in. and longer, $2 advance over base price; shorter than 1 in., $2.50 advance over base price. Cement-coated nails, $2.50. Woven wire fencing, 60 per cent off list for carloads, 59 off for 1000-rod lots, 58 off for less than 1000-rod lots.

The following table gives the price per 100 lb. to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	6 to 9	10	11	12&12½	13	14	15	16
Annealed	$2.60	$2.65	$2.70	$2.75	$2.85	$2.95	$3.05	$3.15
Galvanized	3.30	3.35	3.40	3.45	3.55	3.65	4.10	4.20

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect on black pipe from Sept. 7, 1916, and on galvanized pipe from July 24, 1916, all full weight:

Butt Weld

Steel: Inches	Black	Galv.	Iron: Inches	Black	Galv.
⅛, ¼ and ⅜	62	35½	⅛ and ¼	51	24
½	66	51½	⅜	52	25
¾ to 3	69	55½	½	56	38
			¾ to 1½	59	43

Lap Weld

2	63	50½	1¼	46	31
2½ to 6	66	53½	1½	52	38
7 to 12	63	49½	2	53	39
13 and 14	63½	..	2½ to 4	55	42
15	51	..	4½ to 6	55	42
			7 to 12	54	41

Reamed and Drifted

1 to 3, butt	67	53½	¾ to 1½, butt	54	37
2, lap	61	48½	1¼, lap	41	25
2½ to 6, lap	64	51½	1½, lap	47	32
			2, lap	48	33
			2½ to 4, lap	51	36

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	58	40½	⅛, ¼ and ⅜	51	34
½	63	50½	½	56	43
¾ to 1½	67	54½	¾ to 1½	60	45
2 to 3	68	55½			

Lap Weld, extra strong, plain ends

2	61	49½	1¼	48	33
2½ to 4	64	52½	1½	53	39
4½ to 6	63	51½	2	55	42
7 to 8	59	45½	2½ to 4	57	45
9 to 12	54	40½	4½ to 6	56	44
			7 to 8	50	38
			9 to 12	45	33

Butt Weld, double extra strong, plain ends

¼	54	42½	¼	43	31
⅜ to 1½	57	46½	¾ to 1½	46	34
2 to 2½	59	48½			

Lap Weld, double extra strong, plain ends

2	53	43½	1¼	42	30
2½ to 4	55	45½	2	42	30
4½ to 6	54	44½	2½ to 4	44	35
7 to 8	49	35½	4½ to 6	43	34

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts on less than carloads, freight to destination added, effective from Sept. 7, 1916, are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1½ in.	33	1½ in.	25
1¾ and 2 in.	37	1¾ and 2 in.	37
2¼ in.	42	2¼ in.	34
2½ and 2¾ in.	38	2½ and 2¾ in.	40
3 and 3¼ in.	45	3 and 3¼ in.	45
3½ to 4½ in.	44	3½ to 4½ in.	46
5 and 6 in.	42	5 and 6 in.	39
7 to 13 in.	44	7 to 13 in.	36

Locomotive and steamship special charcoal grades bring higher prices.

1¾ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Sheets.—Makers' prices for mill shipments on sheets of U. S. standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Box Annealed Sheets, Cold Rolled

	Cents per lb.
Nos. 17 to 21	2.90 to 3.05
Nos. 22 and 24	2.95 to 3.10
Nos. 25 and 26	3.00 to 3.15
No. 27	3.05 to 3.20
No. 28	3.10 to 3.25
No. 29	3.15 to 3.30
No. 30	3.35 to 3.50

Galvanized Sheets of Black Sheet Gage

Nos. 10 and 11	3.25 to 3.40
No. 12	3.35 to 3.50
Nos. 13 and 14	3.35 to 3.50
Nos. 15 and 16	3.50 to 3.65
Nos. 17 to 21	3.65 to 3.80
Nos. 22 and 24	3.80 to 3.95
Nos. 25 and 26	3.95 to 4.10
No. 27	4.10 to 4.25
No. 28	4.25 to 4.40
No. 29	4.40 to 4.55
No. 30	4.65 to 4.80

Blue Annealed Sheets

	Cents per lb.
Nos. 3 to 8	2.95 to 3.05
Nos. 9 and 10	3.00 to 3.10
Nos. 11 and 12	3.05 to 3.15
Nos. 13 and 14	3.10 to 3.20
Nos. 15 and 16	3.20 to 3.30

Judicial Decisions

ABSTRACTED BY A. L. H. STREET

FORMATION OF BINDING CONTRACTS.—Although an order for machinery taken by a traveling salesman subject to approval by his employer does not constitute a binding contract until such approval has been expressed, that may be done by the mere shipment of the machinery, without other notice to the buyer. When a seller, in accepting an order, attaches a new condition, such as a condition that title shall remain in him until payment of the purchase price, there is no binding contract until the buyer signifies his acceptance of the condition. (Alabama Supreme Court, Sturdivant vs. Mount Dixie Sanitarium, Land & Investment Company, 72 Southern Reporter, 502.)

ACCEPTANCE OF DELIVERY BY BUYER.—Under the general rule that the buyer under a single contract cannot accept part of the goods contracted for and reject the remainder, where there was an agreement for a sale of two freezing machines, the buyer was entitled to reject the whole apparatus on part of it proving deficient, but he had no right to accept part of the machinery and reject the remainder. The buyer's right to inspect and approve goods delivered before being deemed to have accepted them, when such right is reserved without mention of the time within which it is to be exercised, must be exercised within a reasonable time. Failure to reject delivery within a reasonable time is equivalent to an acceptance. So, in this case, the buyer's continued use for several months of part of the apparatus delivered to him amounted to an acceptance of the whole equipment, although part of it proved unsatisfactory and was not used. (Connecticut Supreme Court of Errors, Emery Thompson Machine & Supply Company vs. Graves, 98 Atlantic Reporter, 331.)

BREACH OF CONTRACTS FOR SALE OF MINERAL PRODUCTS.—A company which contracted to sell its output of zinc concentrates was not justified in terminating the contract merely because the buyer failed to make a small payment when due, if the buyer had customarily made payments when convenient, and especially if the seller first announced an intention to break the contract, carrying with such breach a claim for substantial damages in favor of the buyer. When, under such a contract, the buyer is unable to obtain a substitute quantity of the same kind of ore elsewhere, his recoverable damages are to be ascertained with reference to the market value of the best available substitute. (United States Circuit Court of Appeals, Second Circuit, Tri-Bullion Smelting & Development Company vs. Jacobsen, 233 Federal Reporter, 646.)

German Steel Works Union on Trade Conditions

At the regular meeting of the German Steel Works Union, on Aug. 31, a report was authorized which stated that the domestic demand for semi-finished steel continued good, so that, in spite of no exports, considerable difficulty was experienced in meeting it. Fourth quarter orders were accepted at unchanged prices and conditions. In railroad material the Prussian State Railways had placed a supplementary order for small accessories. The Wurttemberg State Railways' orders for the current financial year are equal to those of last year. Mine rail demand is urgent, with the specifications for grooved rails equal to those of the last few months. Orders from neutral countries have been few. In shapes there is no change, but demand from neutral countries continues active. To meet domestic requirements export sales have been restricted and no new contracts accepted.

The Rhenish-Westphalian coal mines have recently experienced trouble in getting mine rails so that the German Steel Syndicate has approached the Mining Union at Essen suggesting that the union ascertain from the collieries their approximate requirements for the next half year and undertake the distribution of the supplies.

Iron and Industrial Stocks

NEW YORK, Oct. 11, 1916.

The orderly movement of the stock market was rudely interrupted by the exploit of a German submarine on Sunday last in sinking a number of British and neutral ships not far from Nantucket Island. A violent break was precipitated on Monday when the stock market opened and all of the recent active stocks suffered heavily. A conspicuous instance was Republic common, which had sold up to 82 on the preceding Monday and had closed on Saturday at 76, but fell to a low of 60 on Monday, from which it recovered to 77. As the developments on Monday appeared to indicate that this country was not likely to be involved in any complications the market steadied and closed with a good gain from the bottom, which was maintained on Tuesday, but the level of prices obtained on Saturday was not reached. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com.	24⅛ - 27½	Pressed Stl., com.	60 - 69
Allis-Chal., pref.	79¼ - 81¾	Pressed Stl., pref.	104 -105
Am. Can, com.	56 - 66⅛	Ry. Steel Spring, com.	51⅝ - 57¾
Am. Can, pref.	114 -115	Ry. Steel Spring, pref.	101⅞-102¼
Am. Car & Fdy., com.	65 - 72¼	Republic, com.	60 - 82
Am. Car & Fdy., pref.	117	Republic, pref.	110 -112⅜
Am. Steel Fdries.	58 - 65½	Sloss, com.	55½ - 66¼
Bald. Loco., com	79½ - 91¼	Sloss, pref.	96 - 98½
Bald. Loco., pref.	108½	Pipe, com.	22½ - 26⅞
Beth. Steel, com.	535 -559	Pipe, pref	56⅞
Beth. Steel, pref.	135	U. S. Steel, com.	108 -118¾
Case (J.I.), pref.	83 - 83¾	U. S. Steel, pref.	119 -121¼
Colorado Fuel	48¾ - 61	Va. I. C. & Coke.	42 - 47⅛
Am. Loco., com.	75 - 84	Westing. Elec.	59½ - 67¼
Am. Loco., pref.	106 -107	Am. Rad., com.	400 -400½
Deere & Co., pref.	94½ - 95	Am. Ship, com.	52½ - 55
Gen. Elec.	175½-183	Am. Ship, pref.	94⅜ - 95
Gt. No. Ore Cert.	41 - 45⅝	Chic. Pneu. Tool	72 - 74½
Int. Harv. of N. J., com.	116 -121	Cambria Steel	80 - 95
Int. Harv. of N. J., pref.	120 -122	Lake Sup. Corp.	11½ - 14½
Int. Harv. Corp., com.	78 - 79	Warwick	9⅜ - 9⅞
Int. Harv. Corp., pref.	110	Cruc. Steel, com	83½ - 95¾
Lacka. Steel	82 - 88⅜	Cruc. Steel, pref.	121 -122
Nat. En. & Stm., com.	25½ - 30	Harb.-Walk. Refrac., com.	115
Nat. En. & Stm., pref.	95 - 96	Harb.-Walk. Refrac., pref.	106½
N. Y. Air Brake.	153½-162¾	La Belle Iron, com.	74¼ - 80
Pitts. Steel, pref.	104 -106	Carbon Stl., com.	92 - 95
		Driggs-Seabury	88¼ - 90
		Midvale Steel	66 - 75½

Dividends

The Westinghouse Air Brake Company, extra 10 per cent. or $5 a share, payable Nov. 21.

The Harbison-Walker Refractories Company, regular quarterly, 1½ per cent on the preferred stock, payable Oct. 20.

The American Shipbuilding Company, regular quarterly, 1¾ per cent on the preferred stock, payable Oct. 14.

The Atlantic Steel Company, quarterly, 1½ per cent on the common stock, payable Oct. 10.

The Chalmers Motor Company, regular quarterly, 1¾ per cent on the preferred stock and 2½ per cent on the common stock, paid Oct. 1.

The Charcoal Iron Company of America, initial dividend on the preferred stock, 1 per cent payable Nov. 1, 1 per cent payable Dec. 1 and 1 per cent payable Jan. 2.

The American Laundry Machinery Company, regular quarterly, 1¾ per cent on the preferred stock, payable Oct. 14.

The Canadian Westinghouse Company, Ltd., regular quarterly, 1¾ per cent, payable Oct. 10.

The General Motors Company, regular quarterly, 5 per cent on the common stock and 3½ per cent on the preferred stock, payable Nov. 1.

The National Enameling & Stamping Company, regular quarterly, 1¾ per cent on the preferred stock, paid Sept. 30.

The United States Cast Iron Pipe & Foundry Company, regular quarterly, 1½ per cent on the preferred stock, payable Nov. 15.

Record Imports of Manganese Ore in July

Manganese ore imports into the United States in July were 81,942 gross tons, the largest this year. The total for the seven months to Aug. 1, 1916, is 318,965 tons, against only 87,136 tons to Aug. 1, 1915, and 163,390 tons to Aug. 1, 1914. The rate for this year is 45,566 tons per month, which contrasts with 28,757 tons per month in 1913, the best previous record, and 22,470 tons per month as the average for the five-year period of 1910 to 1914.

PERSONAL

Marvin A. Neeland, assistant to vice-president, and chief engineer of the United States Steel Corporation, has resigned to accept the position of consulting engineer of the American International Corporation, with headquarters at 120 Broadway, New York. John Hulst, chief engineer of the Carnegie Steel Company, has been appointed to succeed him.

Mr. Neeland joined the corporation in 1905. He was then general manager of the William Tod Company, Youngstown, Ohio. He has, however, been actively connected with the steel business for some 24 years, having been chief engineer of the Duquesne works of the Carnegie Steel Company from 1892 to 1898; chief engineer of what was then the Ohio Steel Company, Youngstown, from 1898 to 1900, and chief engineer of the National Steel Company, Youngstown, from 1900 to 1901, when he became identified with the William Tod Company. He is perhaps best known as the originator of the Neeland top for blast furnaces. This was developed when as chief engineer of the Carnegie Duquesne works he designed the Duquesne blast-furnace plant, which represents the first modern furnace plant equipped mechanically throughout with the automatic filling of the furnace and the automatic and mechanical handling of ore and other materials in the stock yard. The blast furnace plant built when he was chief engineer of the Ohio Steel Company marked a further step in the mechanical handling of materials through the use of a car dumper for handling ore in connection with ore bridges. He was chief engineer of the National Steel Company when the Mingo Junction blast furnaces were designed. He was identified with the committee on the construction of the Gary and Duluth plants of the Steel Corporation and was a member of the committee on construction of the new plant at Ojibway, Ontario.

Mr. Hulst, prior to becoming chief engineer of the Carnegie Steel Company, when he succeeded E. E. Slick on the latter's becoming general manager of the Cambria Steel Company, was chief engineer of the Ohio steel works of the United States Steel Corporation.

R. A. Bull, widely known as president of the American Foundrymen's Association, and for more than ten years past associated with the Commonwealth Steel Company, Granite City, Ill., has resigned as manager of production for that company, effective Nov. 1.

Henry Ford, the famous Detroit automobile builder, visited last week the Edgar Thomson blast furnaces of the Carnegie Steel Company at Bessemer, Pa., and then spent several days in Youngstown, Ohio, with Julian Kennedy, consulting engineer, Pittsburgh, and others, making an inspection of the blast furnaces, steel works and finishing mills of the Youngstown Sheet & Tube Company. As announced some time ago, Mr. Ford contemplates the building of two large blast furnaces near Detroit, Mich., for which Mr. Kennedy is consulting engineer. It is planned to connect the furnaces with the Ford foundry, so that it will be possible to keep the iron in a molten state from the time it leaves the furnace tap hole until it is poured into the foundry molds.

Robert Bentley, president Ohio Iron & Steel Company, on his return from a sojourn in the Adirondacks, announces that plans have been made to rebuild the Mary furnace at Lowellville, Ohio. All material for the rebuilding has been delivered. It is planned to erect a temporary shell stack, which will permit operations while the new work is going on. The capacity in the remodeling is to be increased 25 per cent.

Ralph G. Farrell has been appointed vice-president and general manager of the Bridgeport Screw Company, Bridgeport, Conn., effective as of Oct. 1. W. H. Farrell, his father, has resigned the position of general manager, but still retains an active interest in the business as president. Ralph G. Farrell is a 1914 graduate of Sheffield Scientific School, Yale University. He has since been connected with the Carnegie Steel Company's works at Youngstown, American Steel & Wire Company's Worcester plant, and as assistant manager of the United States Steel Products Company. He is a nephew of James A. Farrell, president United States Steel Corporation.

Byron C. Hamilton has resigned as assistant superintendent of the structural department of the Cambria Steel Company, Johnstown, Pa., to become works manager of the National Steel Car Company, Hamilton, Canada. He has been identified with the Cambria Company about 20 years.

Otis C. Friend, who resigned from the Mitchell Motors Company, Racine, Wis., two months ago to become vice-president and general manager of the United Motors Corporation, has returned to the Mitchell Company, succeeding H. L. McClaren as president and general manager. John W. Bate remains vice-president, in charge of manufacturing, and chief engineer; W. H. Armstrong, secretary and treasurer, and F. L. Mitchell, comptroller.

Frank L. Eidmann has resigned as efficiency engineer with the American La France Fire Engine Company, Elmira, N. Y., to accept a position with the Heald Machine Company, Worcester, Mass.

Harry Kaplan has joined the Winchester Repeating Arms Company, New Haven, Conn., as efficiency engineer.

Barton Cruikshank, recently associated with the Ashcroft Mfg. Co., Bridgeport, Conn., is now New York manager of the C. G. Garrigus Machine Company.

Elmer E. Gibson has been made superintendent of the Ashcroft Mfg. Co., Bridgeport, Conn.

Cecil Reilly, son of W. C. Reilly, general superintendent of the mills of the Youngstown Sheet & Tube Company, has accepted a position with the Colorado Fuel & Iron Company.

A. Walter Lorenz has been made chief chemist for the Bucyrus Company, South Milwaukee, Wis. He was formerly chemist for the Lebanon Steel Foundry, Lebanon, Pa.

John Comstock has been made assistant superintendent of the blast-furnace department at the Steelton plant of the Bethlehem Steel Company.

B. D. Gray was elected to succeed F. E. Bright as president of the Hess-Bright Manufacturing Company, Philadelphia, at a meeting of the directors of the company, Oct. 6. Mr. Bright remains chairman of the board. Mr. Gray was formerly manager of the company.

Leo C. Steinle, recently of New York City, is now in England, where he will open an office for handling sales of machine tools in Great Britain and France. He will represent the Steinle Turret Machine Company, Modern Tool Company and other tool builders.

The Chain Belt Company, Milwaukee, Wis., has appointed C. F. Messinger manager of its concrete mixer department. He is a graduate of the Sheffield Scientific School of Yale University and has for years managed the advertising department. He will take charge at once, and will augment the service feature which has always accompanied Chain Belt mixers.

O. W. Cook has been promoted from manager of works to manager of the Canadian Cartridge Company, Ltd., Hamilton, Ont.

H. M. Hawkesworth, manager of the Sharon, Pa., works of the Driggs-Seabury Ordnance Company for the past year, has resigned on account of ill health. A. B. Davenport will fill the position. S. E. Gross, purchasing agent, has resigned and will be succeeded by M. H. Carter.

Burt B. Brewster, for the past two years manager in Alaska for the Sullivan Machinery Company, Chicago, has been transferred to Salt Lake City, Kearns Building, as manager of the company's branch office

there, succeeding H. E. Moon, resigned. Walter F. O'Brien, who has for some time been associated with Mr. Brewster, will take his place as local manager for Alaska, with headquarters in the Forrest Building, Juneau.

A cash bonus was offered a few weeks ago to its chemists by the Nova Scotia Steel & Coal Co., Ltd. It was awarded to John Vetter, Sydney Mines, who had to his credit the largest percentage of heats for the past month's specifications.

William H. Tabor, until recently instructor of industrial engineering at Pennsylvania State College, State College, Pa., has been appointed assistant industrial engineer of the tool department of the Winchester Repeating Arms Company, New Haven, Conn.

Emile J. Bayle has been appointed assistant to the president, and production engineer with the Pfaudler Company, Rochester, N. Y.

American Iron and Steel Institute New Members

The following have been elected to membership, subject to the occurrence of vacancies, Oct. 6, 1916:

George E. Dix, sales department, Midvale Steel Company, Philadelphia, Pa.

John M. Garvin, manager and treasurer, Bass Foundry & Machine Company, Rock Run, Ala.

Earl H. Collester, superintendent coke plant, La Belle Iron Works, Steubenville, Ohio.

Laurence D. Weaning, vice-president and general manager, Variety Iron & Steel Works Company, Cleveland, Ohio.

James C. Jones, president and manager, Cleveland Steel Company, Cleveland, Ohio.

Adam R. Demory, vice-president and general manager, Timken Detroit Axle Company, Detroit, Mich.

Henry G. Barnhurst, chief engineer, Fuller Engineering Company, Allentown, Pa.

John H. Schuler, metallurgical engineer, Fuller Engineering Company, Allentown.

John G. Rummel, president Detroit Steel Products Company, Detroit.

Edward F. Goltra, president Mississippi Valley Iron Company, St. Louis, Mo.

Isac B. Merriam, Jr., president and treasurer Chattanooga Boiler & Tank Company, Chattanooga, Tenn.

George A. Sagendorph, treasurer, Penn Metal Company, Boston, Mass.

M. Arthur Tutein, New England sales agent, Thomas Iron Company, Boston.

George I. Stanford, president and general manager, Stanford Steel Products Company, Milford, Conn.

Daniel F. Eschenbrenner, general sales agent, Laclede Steel Company, St. Louis.

Harry J. Steinbreder, vice-president, Laclede Steel Company, St. Louis.

William H. Sommer, vice-president and general superintendent, Keystone Steel & Wire Company, Peoria, Ill.

Harry G. Moore, general sales manager, Keystone Steel & Wire Company, Peoria.

Charles R. Hook, vice-president, American Rolling Mill Company, Middletown, Ohio.

L. L. Helmer, general manager, Cumberland works, N. & G. Taylor Company, Cumberland, Md

Albert T. Keller, chief engineer, Maryland plant, Bethlehem Steel Company, Sparrows Point, Md.

Col. Thomas Cantley, president Nova Scotia Steel & Coal Company, New Glasgow, Nova Scotia, was elected a director of the Institute to fill the vacancy caused by the death of Thomas J. Drummond.

Installations of Heroult Electric Furnaces

Two more Heroult electric steel furnaces have been licensed to operate by the United States Steel Corporation, as follows:

The Carpenter Steel Company, Reading, Pa., will install one 6-ton furnace for making special and alloy steels. This is in addition to the 6-ton furnace announced in THE IRON AGE, April 13, 1916.

The Union Electric Steel Company, Pittsburgh, Pa., will install one 6-ton furnace for making alloy steels. This is a new company recently organized.

These two installations bring the total Heroult furnaces operating or contracted for in the United States and Canada to 78.

OBITUARY

SAMUEL N. TRUMP, president Trump Brothers Machine Company, Wilmington, Del., died Oct. 5 at his home in Silverdale, near Wilmington, aged 81 years. He had been ill about two months. A native of Baltimore, he went to Port Chester, N. Y., where, with his brother, the late C. Newbold Trump, he engaged in the manufacture of machinery. In 1873 the brothers, with Christian Frederick, went to Wilmington where they organized the Trump Brothers Machine Company. On the death of his brother in 1912 Samuel N. Trump became president of the company. For many years he served as president of the old Arnoux Electric Company, Wilmington, which now is a part of the Wilmington & Philadelphia Traction Co. Although he continued as president of the machine company he had taken no active part in the work for several years, living practically a retired life. He was a director of the Wilmington Trust Company, and it was largely through his efforts, while serving as a member of the Board of Education, that the manual training system was introduced in the public schools of the city. He leaves his widow, four sons and two daughters.

FREDERICK DAVIDSON, Pittsburgh, formerly of Beaver Falls, Pa., died from heart failure while bathing in the surf at Atlantic City, N. J., Oct. 5. He was born in Connellsville, Pa., Oct. 29, 1869, and was educated in the public schools of Beaver, Pa., and then attended a military academy in Chester, Pa. He commenced his business career as a bank messenger and later became secretary and treasurer of the Union Drawn Steel Company, Beaver Falls, Pa., holding that position until his health failed about three years ago. He was also president and director of the Beaver Clay Manufacturing Company, a member of the Beaver College board of trustees, secretary and treasurer and a director of the Davidson Coal & Coke Co., vice-president and director of the Davidson Ore Mining Company of Buffalo, a director of the Ingram-Richardson Manufacturing Company of Beaver Falls, a director in the Bank of Pittsburgh, and president of the Monterey Nail Manufacturing Company in Mexico. He was an active patron of sports in Pittsburgh, and was a member of the Union Club. He leaves his widow.

JAMES H. ANTHONY, Providence, R. I., died Oct. 7 from heart trouble, aged 76 years. He was born in Swansea, Mass., entered the employ of the Providence Tool Company in 1865 and became its general superintendent. He made several trips to Turkey at the time when his company was making rifles for the Turkish Government. When the Providence Tool Company became the Household Sewing Machine Company, Mr. Anthony retained his position as general superintendent until 1885. From 1885 to 1893 he was superintendent of the Moore Mfg. & Foundry Co., Milwaukee, Wis. In recent years he had been connected with the Brown & Sharpe Mfg. Co.

Bids for Naval Guns

The Navy Department on Oct 5, opened bids for the forgings for 24 of the 50 14-in. guns with which the new battle cruisers will be armed. A complete set of forgings is estimated to weigh 225,600 lb. There were two competitors, namely, the Bethlehem Steel Company, which bid 35¼c. per pound for the entire allotment and the Midvale Steel & Ordnance Company, which offered to furnish 12 guns only at 35c. per pound. It is understood that the 24 guns will be divided equally between the two companies. The Department has not yet determined when bids will be taken for the remaining 26. The Crucible Steel Company of America was the lowest bidder on 10 sets of 5-in. forgings, at 34.35c. per pound for nickel steel, and 28.75c. per pound for gun steel. When the new munition tax is considered, these figures are virtually the same as those at which contracts for similar forgings were awarded last year.

Our August Exports of Machinery

The following details of United States exports of machinery for August, 1915, and 1916, and for the two eight months' periods ended with those months, have been compiled from the report of the Bureau of Foreign and Domestic Commerce of the Department of Commerce:

	August		Eight Months	
	1915	1916	1915	1916
Adding machines	[illegible]	$129,067	$313,720	$956,869
Air-compressing machinery	[illegible]	131,690	284,889	513,555
Brewers' machinery	[illegible]	48	53,940	11,325
Cash registers	$1,188	299,288	$64,884	1,171,109
Parts of	[illegible]	16,176	70,735	103,710
Cotton gins	[illegible]	21,922	40,082	61,266
Cream separators	[illegible]	25,499	192,949	346,362
Elevators and elevator machinery	[illegible]	180,404	553,511	1,128,769
Electric locomotives	[illegible]	[illegible]	195,977	377,042
Gas engines, stationary	[illegible]	36,783	335,482	248,729
Gasoline engines	[illegible]	2,032,931	5,532,017	11,256,199
Steam engines	[illegible]	1,841,236	2,402,972	7,518,864
All other engines	134,881	315,943	712,672	3,454,630
Parts of	[illegible]	1,297,185	2,795,710	6,311,024
Laundry machinery, power	23,712	41,497	215,945	212,405
All other	23,023	26,804	159,509	146,461
Lawn mowers	16,055	23,119	246,754	170,719
Metal-working machinery (including metal-working tools)	3,624,411	8,134,143	27,587,226	55,316,874
Meters, gas and water	[illegible]	69,979	180,015	271,071
Milling machinery (flour and grist)	[illegible]	[illegible]	1,491,167	1,698,545
Mining machinery, oil well	151,721	316,911	933,570	1,439,620
All other	[illegible]	750,076	3,425,675	4,269,737
Paper-mill machinery	63,564	108,514	384,196	525,985
Printing presses	85,945	207,375	975,391	1,260,043
Pumps and pumping machinery	[illegible]	527,970	1,906,309	3,523,658
Refrigerating and ice-making machinery	106,866	64,177	607,602	483,939
Sewing machines	[illegible]	[illegible]	1,064,943	3,744,281
Shoe machinery	[illegible]	82,624	1,000,108	666,450
Sugar-mill machinery	[illegible]	1,074,104	1,773,126	3,028,172
Textile machinery	[illegible]	[illegible]	1,203,499	2,389,367
Typesetting machines	[illegible]	54,649	294,245	792,551
Typewriting machines	637,023	1,438,199	4,616,295	7,337,448
Windmills	[illegible]	83,046	564,011	761,798
Wood-working machinery, saw mill	33,209	[illegible]	245,262	290,715
All other	97,981	[illegible]	544,374	608,733
All other machinery	2,094,702	4,104,910	[illegible]	25,663,807
Total	[illegible]	[illegible]	$79,396,113	$148,061,832

Pittsburgh and Nearby Districts

Former owners of the Burrows Foundry Company, Ellwood City, Pa., and W. H. Christy, formerly superintendent of the Bessemer Foundry Company, Grove City, Pa., and O. B. Dow of the Babcock Lumber Company, Pittsburgh, have incorporated themselves under the name of the Lawrence Foundry Company, which will succeed to the business of the Burrows Foundry Company, manufacturer of high grade gray-iron castings. Equipment is being installed to increase the capacity of the plant from 20 tons to 25 tons a day.

The Wharton Coke Company, whose coke plant is located at Coral, Indiana County, Pa., consisting of 230 ovens and 2500 acres of coal land, has sold its entire holdings to the Potter Coal & Coke Company, a recently organized corporation of which S. F. Potter is president; George P. Donohoe, general manager; Edward E. Donohoe, secretary and treasurer, and C. Rae King, general superintendent.

Rapid progress is being made in the building of the new steel bar and small shape mills of the Carnegie Steel Company at McDonald, between Girard and Niles, Ohio. The American Bridge Company, which has the contract for all the structural work, is now erecting the steel work for the large machine shop. It is the intention of the Carnegie Company to erect nine bar mills in the first installation, and to start them as soon as ready. The order for the mill cranes has been placed with the Morgan Engineering Company, Alliance, Ohio, and within the next month it is expected a large lot of machinery and building material will arrive. William Dennison is superintendent of construction and Fred Hubbard is engineer.

The Penn Central Coal & Coke Company, Pittsburgh, has filed notice at Harrisburg, Pa., of an increase in its debt to $250,000.

The Keystone Tire & Rubber Company, Keystone Building, Pittsburgh, plans to build a new plant at Penn Station, on the Pennsylvania Railroad, about 25 miles from Pittsburgh. The main factory building will be three stories high, 60 x 190 ft., of brick and steel construction.

It is stated that shipments of electrical equipment of the Westinghouse Electric & Mfg. Company, East Pittsburgh, in September made a new high record for any one month in the history of the company, the total amounting very close to 1200 cars. President E. M. Herr has been quoted recently as saying that he expects orders for electrical apparatus after the war is over to increase greatly.

The Brier Hill Steel Company, Youngstown, expects to have its new No. 11 open-hearth furnace in operation about Dec. 1, and the new No. 12 in January. When the entire 12 furnaces are in operation the company will have a daily capacity of close to 1500 tons of open-hearth steel ingots.

C. B. Kelly, for some time connected with the Hubbard, Ohio, works of the American Sintering Company, has been made manager of the new plant being built at Youngstown adjacent to the by-product coke ovens of the Republic Iron & Steel Company. This plant is expected to be ready in November, and will take care of the flue dust from the blast furnaces of the Republic Iron & Steel Company, Mary furnace of the Ohio Iron & Steel Company, the four furnaces of the Youngstown Sheet & Tube Company and one stack of the Struthers Furnace Company.

Blast-furnace operators of the Youngstown district will enter a protest before April 1, 1917, against the change in ore hauling rates as fixed recently by the Interstate Commerce Commission and which imposed on some furnace districts higher rates than previously existed. The old ore hauling rate was 56c. per ton from Ashtabula Harbor to Youngstown, and the new schedule also makes it 56c., but with 6c. additional charge at the docks for loading the ore on cars, and furnace operators are also required to pay for placing cars on the ore trestles at the furnaces.

A large new pumping station is being installed at the Edgar Thomson works of the Carnegie Steel Company at Bessemer, Pa. The work is being done by the T. A. Gillespie Company, Pittsburgh. A system of towers and chutes is used to distribute construction material to all parts of the foundations being built in the Monongahela River. Trouble in securing enough laborers is holding back the completion of the work to some extent.

The Pittsburgh Cold-Rolled Strip Steel Company, which has been located on Twenty-ninth Street, Pittsburgh, has bought a site at Verona, Pa., 10 miles from the city, where it will build a plant which will about double its capacity. The equipment in use will be removed to the new plant, and a new tandem mill, to be

built by the Waterbury-Farrell Foundry & Machine Company, Waterbury, Conn., will be installed. The company expects to have its new plant in operation about Jan. 1.

It is probable that further enlargements will be made to the plant of the Carnegie Steel Company at Farrell, Pa. These enlargements may include large billet and tin bar mills. Definite plans have not yet been made and may not be for some time.

The Pittsburgh Trolley & Forge Company, Pittsburgh, has employed W. E. Moore & Co., engineers, Pittsburgh, to rearrange its forge and machine shops and equip them with an electric plant including individual motor drive, electric welders and other improvements.

The West Virginia Rail Company, Huntington, W. Va., has filed a complaint with the Interstate Commerce Commission against the rate of $2.42 per gross ton on scrap and old rails from Pittsburgh to Huntington. It is urged a rate of $2 would be reasonable, and the commission is asked to order the railroads to establish this rate.

Starting at 6 p. m. Saturday, Oct. 7, and running for a full week, the Youngstown Sheet & Tube Company is conducting a "Safety First Week" at its plants at East Youngstown, Ohio. The object is to see how accidents can be reduced within a given period when everyone about the plants is using his best effort to be careful on the theory that many accidents could be prevented if the men were careful at all times. The test is being made under the direction of J. M. Woltz, safety director of the company. Prizes are to be given to foremen who can report no accidents in their department during the week.

The first of the three new 75-ton open-hearth furnaces of the Carnegie Steel Company at its Farrell, Pa., works was started on Monday, Oct. 9. The other two furnaces are expected to be ready for operation about Oct. 15.

The plant of the Great Western File Works, Beaver Falls, Pa., which has long been idle, has been sold to the Pittsburgh Radium Company, a new organization, which will partially rebuild the plant and equip it for the treatment of carnotite ores and the extraction of vanadium, uranium and allied products. The company announces it will have the plant in operation before Jan. 1. The purchase was closed by W. J. Stevenson, secretary; G. E. Erb, vice-president, and Henry Fitzpatrick, a director of the company, all of Pittsburgh. Samuel Jeffrey, Ithaca, N. Y., is president of the company.

The Pennsylvania Auto Wrecking Company, Pittsburgh, with a capital stock of $10,000, has been incorporated by Joseph H. Josselson, 712 St. Clair Street, Pittsburgh, Leon Bluestone and William Steinberg, to deal in automobile junk and other metal.

The Gilmore Fire Clay Company, Pittsburgh, with a capital stock of $50,000, has been incorporated by A. L. Gill, Germania Savings Bank Building, Pittsburgh, C. A. Bursner and D. E. Mitchell, to mine clay, coal, iron ore and other minerals.

The North East Foundry & Machine Company, North East, Erie County, Pa., with a capital stock of $25,000, has been incorporated by Frank G. Pottmeyer, Edmund A. Finnerty, William G. O'Malley and John J. Finnerty to operate an iron, steel and brass foundry.

The German Bronze Company, Erie, Pa., L. T. Briggs, president, is having plans prepared for an extension of its plant at Nineteenth and Chestnut streets, to cost approximately $40,000.

Kugel-Miner-Morse, Inc., Erie, Pa., with a capital stock of $5,000, has been incorporated by Henry K. Kugel, Pierce A. Miner and Henry L. Morse, to deal in iron and steel, shop and mill supplies, tools and machinery.

The A. M. Byers Company has banked its furnace at Girard, Ohio, for a few days while repairs are being made. There is a stock of metal in the furnace yard to take care of the company's mills.

The Barger Mfg. Company is fitting up a plant at Michigan and Buttles avenues, Columbus, Ohio, that will be used for the manufacture of fire extinguishers.

Penn Seaboard Buys National Steel Foundry

The Penn Seaboard Steel Corporation, 132 South Fifteenth Street, Philadelphia, Pa., has purchased the steel casting plant at New Haven, Conn., formerly known as the National Steel Foundry. A force of men is already at work at this plant making the necessary repairs to place it in operation and it is the expectation that steel will be made within 30 days. The original plant contained two 25-ton acid open-hearth furnaces and was operated for several years as a jobbing steel casting foundry, but went into the hands of a receiver about 10 years ago. It is understood that for the present steel ingots will be the principal product of this plant. Fred G. Wertz has been appointed manager and is already on the ground. The acquisition of this plant constitutes the fourth unit of the Penn Seaboard Steel Corporation recently organized, the other three being what were known formerly as the Penn Steel Castings & Machine Company, the Seaboard Steel Casting Company, both of Chester, and the Baldt Steel Company, New Castle, Del.

Central Iron & Steel Company Elects Officers

At a meeting of the stockholders of the Central Iron & Steel Company, Harrisburg, Pa., the following officers and board of directors were elected to take charge of the affairs of the company after the present receivers are discharged by the court: Officers—Robert H. Irons, president; Francis J. Hall, vice-president; L. D. Perry, secretary and treasurer. Board of directors—Edward Bailey, Charles L. Bailey, Jr., James M. Cameron, Donald McCormick and H. B. McCormick. The receivers will continue to operate the plant until the debts are finally liquidated and they are discharged by the court. From present indications the receivership will terminate some time next year.

Luria Brothers Open a Pittsburgh Office

Luria Brothers & Co., prominent dealers in old material, whose main office is in Reading, Pa., have opened a branch office in the Park Building, Pittsburgh, with D. L. Wilkoff as district manager. Mr. Wilkoff was formerly of the Wilkoff Company, dealing in old material in Youngstown and Pittsburgh. Luria Brothers & Co. are proprietors of the Donaghmore Iron & Steel Company, Donaghmore Station, Pa., and have extensive yards at that point as well as in Reading and Lebanon, Pa. They also maintain a New York office in suite 1277, 50 Church Street, of which M. L. Tyroler is manager.

May Sell United Steel Plant

The United Steel Company, Canton, Ohio, has practically concluded a deal for the sale of its plant to an important unnamed Eastern interest. The proposal will be submitted to the stockholders for their ratification at a special meeting, Oct. 14. The company announces that if the sale is consummated the plant will be greatly enlarged with the additional capital made available and that in the reorganization there will be no change in the management except that the Eastern interests will have representation on the directorate.

A first and final dividend of 1.43 per cent, amounting to $6,337, has been declared in favor of creditors of the Racine Iron & Metal Company, Racine, Wis., which failed in June, 1915. The total amount of allowed claims was $443,215, of which $417,464 was claimed by the Commercial & Savings Bank of Racine, also now defunct. The company did a large business and was managed by Morris F. Fox.

The Texas Resources Development Company, of which A. B. Wolvin, Duluth, Minn., is president, is considering plans for the construction of blast furnaces and a steel plant at Texas City, Tex. The company owns extensive iron-ore fields in Cass County, in eastern Texas. Among others who are reported to be interested in the company are H. Vanderhoof and W. R. Condict of Chicago.

Protection of Iron by Electroplating

The "Protection of Iron by Electroplating" was discussed by Oliver P. Watts and Paul L. DeVerter, of the laboratory of applied electrochemistry of the University of Wisconsin, in a paper before the American Electrochemical Society's convention in New York, Sept. 28, 1916. The conclusions of their investigation are as follows:

These experiments confirm the orthodox view that the superiority of electrogalvanizing over deposits of other metals for the protection of iron is due to voltaic action.

It has been shown that thin electro-deposits of zinc, copper, nickel and brass are full of holes, and therefore only the first may be relied on to prevent rusting, unless deposits are made much heavier than is at present the rule.

Deposits of nickel should exceed 0.0015 in. (0.038 mm.) in thickness in order to protect iron out of doors, and copper or brass plate should have three times this thickness. Even then it is a question how long such coatings will afford protection.

For the protection of electroplating of iron which is to be exposed to the weather, zinc (or cadmium) is the only metal worthy of consideration.

The foregoing experiments do not show that double coatings—zinc followed by copper or brass—are distinctly superior to a single heavy coating of the latter metals. If zinc is to be used advantageously, it should form the outer coating.

It is very desirable that some method be found for producing a uniform electroplate, free from the holes which were responsible for rusting in these experiments. Could such plating be done deposits of nickel, copper and brass would form a far more effective protection to iron than at present.

Alloys for Thin Ornamental Castings

The alloys used in the making of thin ornamental castings for cash registers were described in a paper by R. S. B. Wallace, National Cash Register Company, Dayton, Ohio, presented to the American Institute of Metals at its meeting at Cleveland, Sept. 13, 1916. Two classes of alloys are used, one for bronze finish parts and one for nickel plated parts. For bronze finish, the alloy is:

Copper	86.0 per cent
Tin	1.5 per cent
Lead	11.0 per cent
Zinc	1.5 per cent

1/20 oz. of manganese-copper per lb. of copper.

For the nickel plated parts the alloy is:

Copper	70.5 per cent
Zinc	26.5 per cent
Lead	2.0 per cent
Tin	1.0 per cent

In all mixtures the zinc, tin and lead are made into alloys which reduce the cost of weighing the necessary metals and eliminate the chances of error.

In melting the metal it must at all times be covered with charcoal. After the crucible has been placed in the furnace and the necessary coke around it, a few pounds of gates or scrap metal of the same composition required in the heat are placed in the bottom of the crucible, and the copper is placed across the top of the crucible at the same time. By the time the gates are melted the copper is ready to be placed in the crucible and as the copper melts it falls into the bath of metal made by the melting of the gates. After the metal has become properly melted the necessary alloy is added in proportion to the amount of copper.

Locomotive Orders

The American Locomotive Company has taken an order for 25 Mallet locomotives for the Chesapeake & Ohio, 10 Mallet locomotives for the Wheeling & Lake Erie and six 10-wheel locomotives for the Long Island Railroad. These, together with 3 small locomotives placed with the Baldwin Locomotive Works, make the recent orders 44. The Western Maryland is inquiring for 20 Mallet and the Carnegie Steel Company for 10 to 15 locomotives, for use in the Youngstown, Ohio, district.

Customs Decision

EMBROIDERY MACHINES

Another attempt to take the protective feature out of the present tariff's provision for embroidery machines has fallen flat before the Board of United States General Appraisers. An earlier move having for its object the inclusion of embroidery machines in the free list paragraph covering sewing machines failed. In the present case the same end was sought, but from a different angle. The decision just rendered by the general board was written by Judge Fischer, and, in the opinion of officials connected with the Department of Justice, should go a long way toward discouraging further litigation of this kind under the Underwood law.

The protestant was the Durbrow & Hearne Mfg. Company, which made an importation of steel shuttles at New York. The Government claimed that the shuttles were for use on embroidery machines, while the importing concern claimed the articles were for use on sewing machines. The collector of customs returned the articles at 20 per cent under the provision for "manufactures of metal not specially provided for" appearing in paragraph 167. The importer asked free entry under paragraph 441, as "parts of sewing machines," this paragraph also exempting sewing machines themselves from duty.

Judge Fischer, in his decision coincided in by the seven other members of the board, overruling the protest, said in part: "The testimony clearly and conclusively establishes the contention of the Government that these shuttles are used chiefly on embroidery machines, and chief use is the one essential and determinative fact which must govern in the decision of this case. Nor will it in anywise avail the importer to contend, as it here does, that embroidery machines consist merely of gang sewing machines, and that there is no real difference between sewing and embroidery machines."

Weight of Steel in New War Vessels

WASHINGTON, D. C., Oct. 10, 1916.—The Navy Department will, on Oct. 25, open bids for the construction of vessels appropriated for in the naval appropriation act of Aug. 29, 1916. Bids have already been opened for a fuel ship, a hospital ship and a gunboat, which were included in this appropriation act. The Bureau of Construction and Repair has prepared a statement showing the approximate weight of steel material in each type of vessel appropriated for in the measure. The officials of the Bureau state that at present it is not practicable to divide the tonnage into plates, sheets, angles, etc. The statement is as follows:

	Type	Steel per Vessel, Tons	Total Steel of Each Type, Tons
6	Battleships	13,761	54,944
4	Battle cruisers	15,025	60,100
3	Scouts	2,997	11,988
20	Destroyers	325	6,500
1	Fuel ship	5,300	3,300
1	Hospital ship	4,000	4,000
1	Ammunition ship	4,000	4,000
1	Gunboat	548.5	548.5
10	Submarines	187.6	5,600

It is stated at the Navy Department that the selection of a site for the Government armor-plate plant will not be announced for at least two months. Hearings close on Thursday of this week. One hundred and twenty-five sites have so far been offered, and many of these will be visited by the board before a decision is reached. W. L. C.

The F. E. Partridge Rubber Company, Ltd., Montreal, has been incorporated with a capital stock of $125,000 by George V. Cousins, Nathaniel R. Curry, Frederick E. Partridge, and others, to manufacture rubber tires and goods.

The Eichenburg-Murray Scrap Iron & Metal Company, Kansas City, Mo., has been incorporated with a capital stock of $15,000 by John A. Murray, Meyer Eichenburg, and others.

Machinery Markets and News of the Works

BETHLEHEM TO BUY CRANES

Government Wants Tools for Gun Shop

National Tube Company and General Electric Company Also Buying—Business on Pacific Coast Is More Active

The United States Government is in the market for a list of tools required for the Watervliet Arsenal, including a gun lathe with a swing of 113 in., and measuring 82 ft. from the face plate to the boring bench. But few firms can bid on such a machine.

The National Tube Company is inquiring for a notable list of tools for improvements it is making at Lorain, Ohio.

The Bethlehem Steel Company is taking bids on about 35 cranes required at its Maryland Steel Company plant, Sparrows Point, Md. The capacity of the cranes range from 5 to 175 tons.

The General Electric Company, Schenectady, N. Y., is in the market for several large engine lathes and boring mills.

Large orders have been placed for machinery to equip Russian automobile truck plants at Petrograd and Moscow.

Only good reports come from the machine tool manufacturing and distributing centers. In Cleveland the foreign demand, especially that from England, is stronger.

The volume of inquiry in Chicago is larger and of a varied character. In Milwaukee no large inquiries have been received, but inquiry for standard machine tools continues active.

The demand in Detroit grows, despite the fact that the high cost of building materials is handicapping factory extensions in that city, as it is elsewhere.

The Pacific Northwest and the San Francisco districts, which were slow to be affected by the prosperity of recent months, are now very active, a decided improvement having been shown in San Francisco in the past month. Not only are inquiries more numerous, but deliveries show a betterment. Several California shops are reported to be working on projectiles and other war equipment, while the shipyards are busy and making work for other industries.

Industrial enterprises in Canada, which received a set-back at the beginning of the war, are beginning to show more life.

New York

NEW YORK, Oct. 11, 1916.

The crane requirements of the Bethlehem Steel Company for improvements at the plant of the Maryland Steel Company, Sparrows Point, Md., constitute one of the largest inquiries ever received by builders. About 35 cranes, ranging in capacity from 5-ton to 175-ton will be purchased.

The General Electric Company has issued further inquiries, now asking for bids on one 42-in., two 36-in. and two 30-in. engine lathes and four 42-in. vertical boring mills.

The Hurlburt Motor Truck Company, Third Avenue and Harlem River, New York, referred to a week ago as in the market for tools, has plans for turning out a new one-ton motor truck, beginning Jan. 1. Certain driving parts will be manufactured, otherwise the truck will be an assembled machine. It is expected to turn out 5000 a year.

The Terench Company, 140th Street and Canal Place, Bronx Borough, New York, last week purchased four 14-in. turret lathes. The company, whose name is a contraction of Terry & Tench, contractors, is finishing shells on a contract secured from the Bethlehem Steel Company. It is doing the work successfully in a smooth-running shop, employing about 100 men.

An imposing list of tools for delivery to the Government arsenal at Watervliet, N. Y., is before the trade. One item on which but few manufacturers can bid specifies a motor-driven gun boring lathe, having a swing of 113 in., the distance between face plate and boring bench to be 82 ft. Other tools called for are as follows:

One motor-driven horizontal boring mill, 4½-in. spindle.
Six No. 4 Brown & Sharpe universal milling machines.
Two No. 3 Brown & Sharpe universal milling machines.
One No. 5 Brown & Sharpe universal milling machine.
One No. 2 Brown & Sharpe universal milling machine.
One vertical surface grinder.
One vertical shaper.
Two universal tool grinding machines.
One vertical drill.
One 16-in. engine lathe.
One 4-in. turret lathe.
One 3-in. turret lathe
One 1½-in. turret lathe.
One motor-driven air compressor, 2-stage, 19 x 12 x 16, duplex.

Structural fabricators, who have not been buying machinery for a considerable time, have lately issued several inquiries for punches and shears.

Business generally continues to hold up in an excellent manner. Dealers note a gain in shipments last month, and are pleased with the fact. Some deliveries are held back by difficulty in getting prompt shipment of electric motors, one such motor, special in character, requiring three and one-half to four months for delivery. Manufacturers of all kind look forward to a long period of activity.

Kraeuter & Co., Inc., 563 Eighteenth Avenue, Newark, N. J., manufacturer of drop forgings, is in the market for one 300 or 400-lb. drop-board hammer and one heavy-duty milling machine with 22 in. between centers.

The Foster Bros. & Chatillon Company, manufacturer of knives, Fulton, N. Y., had a serious fire Sept. 11, destroying a part of its plant. One week later the company was again operating and manufacturing such work as those buildings which were not damaged were able to produce. The burned buildings have been removed, foundation is already laid and machinery is being replaced where necessary. The company expects to be in full operation about Nov. 1. The loss is less than $20,000. The buildings which were destroyed were wooden and the plant is being rebuilt with brick and steel. C. E. Foster is president.

The Norwich Wire Works, Inc., Norwich, N. Y., has broken ground for another factory building which will be erected by Everett Wells at the rear of the present plant. The new building was completed July 1 when the wire works were moved from Front to State Street, but business has been increasing with such strides that another equally large building is needed. F. V. Fernaled is treasurer.

The Delaney Forge & Iron Company, Buffalo, has let contract for the erection of a forge and machine shop building to replace the one destroyed by fire several weeks ago, to cost approximately $50,000.

The Dunkirk Glass Company, Dunkirk, N. Y., will build additions to its plant on Lamphere Street which will double its capacity. The principal addition will be 80 x 200 ft., two stories, of brick. New furnaces will be installed.

The Arrow Head Mills, Fulton, N. Y., is taking bids for a one-story power plant, 40 x 50 ft.

The Holliday-Kemp Company, Woodside, N. Y., manufacturer of aniline dyes, has leased the Consumers Brewery building at that place and will equip it for the manufacture of dyes.

Incorporation papers have been filed by the Automobile Crankshaft Corporation, Albany, capitalized at $325,000, to manufacture automobiles, aeroplanes and tractors. J. M. Hibbard, Detroit, Mich., E. E. McCrone and W. C. Rice, 21 Second Street, Troy, N. Y., are the incorporators.

W. W. Wotherspoon, State superintendent of public works, Albany, is receiving sealed proposals for furnishing and in-

stalling new governor equipment for the hydroelectric power plant on the Erie Canal near the west end of Crescent dam and also for furnishing pumping plants along the Allegheny River and Olean Creek.

The Atlas Steel Castings Company, Buffalo, is building a concrete and steel addition to its foundry at Elmwood Avenue and the Erie Railroad.

The Ferris-Stevenson Corporation, Amherst, N. Y., has been incorporated with a capitalization of $150,000 to manufacture machinery specialties. W. Stevenson, Amherst; C. R. Stevenson, Buffalo, and A. Becker, 413 Mutual Life Building, Buffalo, are the incorporators.

The Cygnet Rear Car Company, Buffalo, manufacturer of trailers for automobiles and rear cars for motorcycles, has leased a three-story factory at 408 DeWitt Street and will equip it.

The Jamestown Chair Company, Jamestown, N. Y., has plans in preparation for alterations and additions to its factory, 80 x 300 ft., three stories.

The Bausch & Lomb Optical Company, St. Paul Street, Rochester, has completed plans for a one-story addition to its factory, 70 x 120 ft.

Work has been commenced on a foundry, 175 x 180 ft., to be erected at the plant of the Universal Winding Company, South Auburn, N. Y.

The Sauer-Georgi Mfg. Company, Buffalo, has been incorporated with a capital stock of $50,000 to manufacture special patented articles. A. J. Sauer, J. J. Georgi and C. F. Wheeler, Buffalo, are the incorporators.

The Acme Pattern & Machine Company, Buffalo, manufacturer of knitting and silk-weaving machines, has started construction of a factory at Niagara Street and Forest Avenue to cost $100,000. It will be ready for installation of machinery and equipment about Dec. 1.

The Island Paper Company, Tannery Island, Carthage, N. Y., C. W. Pratt, general manager, will build a machine shop, 40 x 80 ft.

The Sprague Electric Works of the General Electric Company, Bloomfield, N. J., has filed plans for the first section of its new reinforced-concrete addition, to cost about $90,000.

Miller, Broderson & German, 520 Broad Street, Newark, will make alterations and extensions in their automobile repair and machine shop, to cost about $7,000.

The Rubber & Celluloid Harness Trimming Company, Newark, will build a one and two-story addition to its plant on Hamburg Place, to cost about $50,000.

The Firestone Tire & Rubber Company, Akron, Ohio, has purchased property at Broad and Kinney streets, Newark, as a site for a three-story service station, about 50 x 170 ft. The plant is estimated to cost $125,000.

The Martin Dennis Company, 859 Summer Avenue, Newark, manufacturer of tanners' supplies, has awarded contract for a two-story brick addition to its plant, 46 x 160 ft., to cost about $25,000.

The Marden, Orth & Hastings Company, Newark, manufacturer of chemicals, will build a two-story brick ice-manufacturing plant and storehouse at Avenue R and the Plank Road, to cost about $20,000.

The Motor Car Devices Company, 845 Broad Street, Newark, has been incorporated with a capital of $100,000, to make automobile specialties. Horace Walker, R. L. Hubbard and Ralph Alton are the incorporators.

The Simmons Pipe Bending Works, Newark, manufacturer of pipe bends and coils, will build a one-story addition at the foot of Avenue D.

Schrenk & Co., Hoboken, N. J., manufacturers of mirrors, have increased their capital from $125,000 to $170,000, to provide for increased operations.

The Harris-Clark Company, Broad and Clark streets, Westfield, N. J., has been incorporated to manufacture engines, boilers and machinery, with a capital of $100,000. M. A. Harris, Lawrence A. Clark and E. C. Harris, Westfield, are the incorporators.

James Spence, Jersey City, will build an addition to his foundry at 917-921 Garfield Avenue.

The Calumet Iron Works, Newark, structural steel fabricator, has awarded a contract for alterations and improvements in its plant on Ball Lane.

The Titanium Alloy Mfg. Company, Niagara Falls, N. Y., has had plans completed for a one and two-story boiler house, 28 x 42 ft., to cost about $7,000.

Plans are being prepared for a two-story machine shop, 60 x 100 ft., for the Laing Machine Auto Repair Company, 412 Sycamore Street, Plainfield, N. J., to cost about $10,000.

The Roessler & Hasslacher Chemical Company, Perth Amboy, N. J., has awarded a contract for the construction of an addition to its boiler room, two stories, 26 x 59 ft., to cost about $3,000.

The Electrical Alloy Company, Morristown, N. J., has awarded contract to Henry R. Kent & Co., 141 Broadway, New York, for a one-story factory, 100 x 150 ft.

Bids will be received till 3 p. m., Oct. 18, for power-house equipment for the Union County Tuberculosis Hospital at New Providence, N. J. The George W. Knight Company, [illegible] Building, Newark, N. J., is the engineer.

Philadelphia

PHILADELPHIA, PA., Oct. 9, 1916.

The William Cramp & Sons Ship & Engine Building Company, Philadelphia, is remodeling its power plant to meet increased power requirements.

Bids are due Oct. 16 for a one-story brick and steel forging plant, 100 x 200 ft., for the Frankfort Arsenal, Philadelphia.

The Budd Wheel Corporation, capitalized at $2,000,000, has started the erection of a plant, with approximately six acres of floor space, at Twenty-fifth Street and Hunting Park Avenue, Philadelphia, for the manufacture of wire automobile wheels. The machinery, it is reported, will cost more than $500,000, and the plant will employ over 1500 mechanics. The Budd Corporation is an expansion of the Edward G. Budd Mfg. Company, manufacturer of pressed steel automobile bodies.

The construction of new buildings for the Pennsylvania Shipbuilding Company at Gloucester, N. J., is going rapidly forward and it is announced that by the middle of February the company expects to have 2600 men at work.

The H. A. May Foundry Company, Thirtieth and Ludlow streets, Philadelphia, will purchase one 60-in. cupola and blower and one 5-ton electric traveling crane for 46-ft. span.

The Mulconry Company, Fifty-fourth and Jefferson streets, Philadelphia, is seeking a turret lathe, spindle hole 2-2¼ in, swing 12 in. to 16 in., fitted with oil pumps, chip pan and wire feed.

James F. Griffith, 420 Meyer Street, Philadelphia, will buy a 40-in. to 50-in. lathe and a vertical boring mill of the same size. Good second-hand tools are acceptable.

It is reported that the Sun Shipbuilding Company, 1428 South Penn Square, Philadelphia, is about to start the construction of a one-story shop building, 60 x 128 ft., to cost about $[illegible].

P. J. Collins, 14 North Wyndale Avenue, Lansdowne, Pa., has awarded contract to the Smith Hardican Company, Philadelphia, for one-story machine shop, 12 x 108 ft., to cost about $[illegible].

The Sharples Separator Company, West Chester, Pa., will purchase a 36-in. x 36-in. x 10-ft. planing machine in good condition, [illegible] planing mill for about a 2½-in. [illegible] housings.

The Southwark Foundry & Machine Company, 400 Washington Avenue, Philadelphia, is in the market for one 500 to 700-kw. generator to run 150 r.p.m. and one 200 to 250-kw. generator to run 300 r.p.m., both for a 250-volt direct current.

Permit has been granted to the A. R. Raff Construction Company, 313 South Broad Street, Philadelphia, for alterations and additions to the factory and machine shop of W. [illegible].

Because of its increasing business, the O. K. Clutch & Machinery Company, Columbia, Pa., has had to move into larger quarters recently, and the employees are now working overtime to meet deliveries.

The Susquehanna Cut Glass Company, Columbia, Pa., is now turning out more than 100 barrels daily of its wares. An extension of the factory is reported now under contemplation.

The Cumberland Valley Utilities Company is the name of a new company which will take over the Chambersburg, Green Castle & Waynesboro trolley line, the Chambersburg & Shippensburg trolley, Waynesboro gas plant, Waynesboro electric light plant, Green Castle electric light, and the Shippensburg gas and electric light companies. A syndicate has closed options on these properties. The headquarters of the new company will be in Chambersburg and it is stated that a large sum of money will be spent improving the various utilities.

Construction work was started recently on the $500,000 power house of the Philadelphia Suburban Gas & Electric Company at Cromby, to supply the communities of Pottstown, Phoenixville and West Chester. The present plants at these places will be used as auxiliary stations. The new power plant will cost about $500,000.

The American Horse Shoe Company, Phillipsburg, N. J., is in the market for one 12 or 14-in. lathe and one 12 or 14-in. shaping machine.

The Benjamin Iron & Steel Company, Hazleton, Pa., is seeking a 12-in. swing second-hand vertical boring mill.

The Troy Engine & Machine Company, Troy, Pa., has had plans prepared by Fletcher Thompson, Inc., engineers, 207 Market Street, Newark, for a one-story steel and concrete addition, about 60 x 145 ft.

The John A. Roebling's Sons Company, Trenton, N. J., manufacturer of wire and wire rope, has acquired a five-story factory at 223 Arch Street, Philadelphia, and will establish a branch manufacturing plant for its regular specialties, as well as the products of the New Jersey Wire Cloth Company, a subsidiary organization. The structure will also be used as branch office.

R. B. Brown & Co., Camden, N. J., has been incorporated with a capital of $25,000 to manufacture locking machines. R. B. Brown, Philadelphia; P. M. Satterthwaite, Lansdowne, Pa., and W. Hancock Payne, Wenonah, N. J., are the incorporators.

The Philadelphia Steel & Forge Company, Milnor and Bleigh streets, Philadelphia, has acquired a tract of land to be used for extensions to its plant.

The Pratt & Moser Motor Company, Philadelphia, has been incorporated with a capital stock of $25,000 by S. H. Bailey Mercer, 1815 North Sixteenth Street; A. Zimmerman, 5643 Larchwood Street; W. A. Herbert, 5430 Haverford Avenue; James J. Tauney, 5604 Spruce Street; A. V. Fox, 1803 Poplar Street, Pittsburgh, and Mahlon H. Dickinson, Swarthmore, to manufacture automobiles, motorcycles, etc.

The Santa-Marie-Biddle Company, Philadelphia, has been incorporated with a capital stock of $5,000 by A. Mercer Biddle, Jr., Torresdale, Pa.; Albert H. Santa Marie, Wawa, Pa., and Lawrence J. Glesson, 5137 Arch Street, to operate a garage and repair shop.

The Donecker-Heller Oil Refining Company, Allentown, Pa., with a capital stock of $25,000, has been incorporated by Edwin A. Donecker, 1501 Linden Street, Philadelphia, and others, to refine oil, etc.

The Inter-State Motor Company, Athens, Pa., has been incorporated with a capital stock of $7,500, by W. M. Snyder, Sheshequin, Pa.; S. O. Billings and B. B. Overfield, Athens, Pa., to operate a garage and repair shop.

New England

BOSTON, MASS., Oct. 9, 1916.

With the return of the employees of the Pittsfield, Mass., plant of the General Electric Company, New England metal-working industries are free from large labor disturbances. The men returned to work on practically the terms first offered by the management of the plant.

The New Departure Mfg. Company, Bristol, Conn., has awarded a contract for a three-story factory, 400 ft. long, to be erected on ground directly across the railroad tracks from its present factories. Besides the main building there will be an annex, 250 ft. long, one-story. The company now has under construction another large factory which will cost approximately $650,000, and the contract which has been awarded will bring the expenditure for new buildings within a year's period to about $1,100,000. The company has also awarded a contract for an addition to its plant at Elmwood, Conn., 60 x 86 ft., two stories, and for the building of an additional story, 50 x 60 ft., to one of its present buildings.

The Standard Oil Company of New York has purchased 23 acres of land on Wawarme Avenue, Hartford, Conn. The company engineers are planning two large plants, one a refinery, the other a distributing plant, which when completed will employ more than 2000 workmen. The site borders upon the Connecticut River, and it is planned to use material dredged from the river to grade a portion of the site. The deepening of the river will permit large barges to come from the docks of the Standard Oil Company of New Jersey directly to the Hartford plant. It is understood that construction work will begin at once.

The Barnum-Richardson Company, Lime Rock, Conn., is building at East Canaan, Conn., a retort plant for the manufacture of wood alcohol and acetate of lime, with charcoal as a by-product. The charcoal will be used in the company's blast furnaces at East Canaan and Lime Rock. It is the first plant of this type to be erected in New England.

The Fairmount Foundry Company, Woonsocket, R. I., has been incorporated with capital stock of $35,000. The incorporators are Matthew M. Sweeney, George E. Bouvier, Clifford Teachman and Charles W. Neyman. The new company will locate on Second Avenue near Fairmount Street. A 3-ton hand traveling crane for 30-ft. span and other used [illegible] equipment [illegible].

[illegible] & Co., [illegible], Mass., want a 36-in. to 40-in. open-side planing machine to plane 37 in. under cross rail to 12-ft. platen.

The Waterbury Buggy & Bridge Company, Waterbury, Conn., has awarded a contract for the erection of a factory, 40 x 161 ft., one story and basement, on East Main Street, extending the plant of the Manufacturers Clamping [illegible].

The Barnes & Ross Company, sash manufacturer, Springfield, Mass., has awarded a contract for an addition, 16 x 83 ft., four stories, to [illegible].

The Wyman & Gordon Company, Worcester, Mass., is to build an office building, 45 x 60 ft., two stories, at Gold and Mercer streets, to be connected with the factory by a bridge, 20 x 34 ft., of the second story, which will be used also as a drafting room.

The Mead-Morrison Mfg. Company, East Boston, Mass., requires a No. 1 Sibley or equal tool grinding machine and a 36-in. to 48-in. post boring machine for cutting steel pinions, both new or second hand.

The Wollaston Foundry Company, Quincy, Mass., is asking bids on the erection of a foundry from prix to plans.

John W. Conway, 426 Broad Street, Hartford, Conn., has awarded a contract for a foundry, 60 x 70 ft., and 40 x 90 ft., one and two stories.

The Norton Company, Worcester, Mass., is beginning the erection of an addition, 44 x 138 ft., five stories, to its present administration building.

The American Brass Company, Waterbury, Conn., has awarded a contract for an addition, 50 x 201 ft., three stories, to its factory on Main Street.

The Chase Rolling Mill Company, Waterbury, Conn., is building a storehouse, 68 x 93 ft., two stories.

The Lehnert Textile Machinery Company, Boston, Mass., has been incorporated with capital stock of $10,000. The directors are H. H. Lehnert, president; George Blaney, 53 State Street, treasurer, and W. J. E. Sander.

The Mansfield Foundry Company, Mansfield, Mass., has been incorporated with capital stock of $150,000, by J. M. Bullard, president; Arthur B. Colvin, treasurer, and P. D. Dean.

The Franklin Needle Company, Franklin Falls, N. H., has let a contract for a two-story factory.

The Stockbridge Machine Company, 70 Abbott Street, Worcester, Mass., is building an addition, 66 x 80 ft., two stories, for office and factory purposes.

The Universal Grinding Machine Company, Fitchburg, Mass., has been incorporated with capital stock of $170,000, by Allen Hollis, president; Robert D. Gould, treasurer, and Thomas Allen, Jr.

The E. Horton & Son Company, Windsor Locks, Conn., has bought the plant of the Windsor Locks Machine Company, an adjoining property. This acquisition will add about one-third to the floor space of the company. It is reported that the Windsor Locks Machine Company has disposed of its special equipment for repairing paper mill machinery to the American Writing Paper Company, and that C. W. Sadler, president and manager, will devote his attention to a line of special machinery which he is developing.

The Wallace Barnes Company, Bristol, Conn., is seeking one 10 to 15-ton traveling crane for 40-ft. span for a 220-volt alternating current.

The A. H. Nilson Machine Company, Bridgeport, Conn., is building an addition, 25 x 47 ft., one story, to its plant on Bostwick Avenue.

The Clamping Devices Mfg. Company, Hartford, Conn., has been incorporated with capital stock of $75,000, by Frank M. Villa, James M. Motto, A. M. Le Roy of Hartford and Robert A. Fosdick of Stamford.

The Somers Company, Waterbury, Conn., has been incorporated with capital stock of $50,000, to manufacture machinery and metals. The incorporators are Joseph E. Somers, Robert D. Somers and Louis J. Somers.

C. Cowles & Co., manufacturers of carriage hardware, New Haven, Conn., have awarded a contract for an addition 61 x 100 ft., five stories.

The Silex Company, Boston, Mass., has been incorporated with capital stock of $150,000 to manufacture [illegible] heaters, etc. The directors are John F. Collins, 67 [illegible] Street, Boston, president and treasurer; H. M. Bridgman, and William T. Good.

Michael Blasberg, manufacturer of [illegible]

Falls, Mass., is to erect an office and storehouse, 30 x 100 ft., on Avenue A.

The Off-Set Tool Company, Bridgeport, Conn., has been incorporated with capital stock of $25,000, by Daniel J. Trivers, Cyrus Barker and William J. Buckley.

The Atwood Machine Company, Stonington, Conn., is planning for an addition to its plant, and is moving some structures which now occupy land needed for expansion.

The Worcester Machine Screw Company, Beacon Street, Worcester, Mass., has recently purchased a tract of land in the Greendale section of Worcester, which it intends to use before many months for plant expansion.

The Bay State Metal Corporation, a company in process of organization, with capital of $250,000, has purchased four acres of land in Campello, Mass., on which it will build a plant for the manufacture of fireproof steel furniture. Walton H. Atwood, Boston, is president, and the directors include E. A. Norris, Harry C. Chabby, Charles R. Hillberg and N. E. W. Wilbur, all of Brockton.

The Foster Machine Company, Westfield, Mass., has been incorporated, with capital stock of $150,000. The directors are H. M. Davis, president; Ralph W. Dunbar, 75 Ames Building, Boston, treasurer, and H. C. Brookings.

The United States Vaporizor Company, Boston, Mass., has been incorporated with capital stock of $150,000, by Harvey J. Elms, president; George O. Olsen, 729 Morton Street, Mattepan, treasurer, and R. H. Elms

Pittsburgh

PITTSBURGH, PA., Oct. 9, 1916.

Manufacturers and dealers in machine tools in this district continue to report active inquiries for heavy machine tools, such as lathes, planing machines, drill presses, milling machines, etc. Most of these inquiries come from iron and steel companies that are making large extensions to existing plants or else are building new works. A recent inquiry from the Brier Hill Steel Company, Youngstown, Ohio, contained a large number of heavy machine tools, most of which, it is understood, have been bought. Last week the National Tube Company, Pittsburgh, which is making large additions to its works at Lorain, Ohio, including a new blooming mill, open-hearth steel furnaces and by-product coke ovens, sent out an inquiry for motor-driven machine tools which are now being figured on, as follows:

One 24-in. heavy planing machine
One universal milling machine
One 15-in. slotting machine
One 18-in. slotting machine
Two 32-in. engine lathes, 8 ft. between centers
One 24-in. engine lathe, 15 ft. between centers
One 24-in. engine lathe, 6 ft. between centers
Four 20-in. engine lathes, 5 ft. between centers
One 60-in. horizontal boring mill
One 2-in. turret lathe
One 36-in. x 23-ft. engine lathe
One 36-in. x 36-in. x 12-ft. planing machine
One 60-in. carwheel lathe
One 72-in. plain radial drilling machine
One 26-in. Travers head shaping
One toolroom lathe
One 72-in. portable slotting machine
One 52-in. hobbing machine
One 36-in. vertical turret lathe
One 5-ft. universal radial drilling machine
One 24-in. shaping machine
One 34-in. shaping machine
One lathe tool grinding machine

Baltimore

BALTIMORE, MD., Oct. 9, 1916.

Plans have been completed for the establishment of the Kelly-Springfield Tire Company, automobile tire manufacturer, in the city of Cumberland, Md. A large plant will be erected there, and in time the entire interests of the company, which are now centered at Akron, Ohio, will be removed to Cumberland. About 4000 men and women will be employed from the start, and the payroll will eventually amount to $750,000 a month. The new plant is expected to consume 1000 tons of coal daily.

The Elizabeth Iron Works, Norfolk, Va., has been incorporated with $50,000 capital stock. W. M. Jones, Norfolk, is president.

The Crawford-Vaughan Boiler & Locomotive Works, Richmond, Va., has been incorporated with $40,000 capital stock James B. Crawford is president and general manager

The Baltimore Rivet & Mfg. Company, Baltimore, Md., has been formed by John T. Newkirk, 2929 East Monument Street, B. Frank Seal, and others.

With $40,000 capital stock the Interstate Tool Company, Richmond, Va., has been formed. J. J. Bailey is president.

The F. O. Smith Shipbuilding Company, Brambleton, Va., contemplates the construction of additions to its plant.

With capital stock of $50,000, the Enterprise Mfg. Company, Radford, Va., has been incorporated to manufacture veneers, etc. F. J. Wells is secretary.

A garage, 116 x 122 ft., including a repair shop, will be built at Eleventh and King streets, Wilmington, Del., for the Delaware Motor Sales Company.

A new building, which will be constructed for the Electric Hose & Rubber Company, Twelfth and Dure streets, Wilmington, Del., will be 40 x 102 ft., and will cost about $10,000.

Plans are being made, it is reported, by the Pocahontas Consolidated Collieries, Pocahontas, Va., for the construction of a machine shop.

The Dixie Mfg. Company, manufacturer of exhaust fans and dust-collecting systems, Russell and Stockholm streets, Baltimore, will build an additional factory at Russell and Ostend streets. James W. Toohey is president.

Plans are being made by the Bethlehem Steel Company, Sparrows Point, Md., for the construction of two 900-ft. piers. One will be known as the export pier and the other as the import pier.

Chicago

CHICAGO, ILL., Oct. 9, 1916.

Inquiry for machine tools has been coming out the past week in noticeably large volume, and, despite the inability of local interests to satisfy a large part of the demand, many sales have been closed representing values from $5,000 to $10,000. The inquiry is exceedingly varied in character and arises equally from the building of new shops, the extension of equipment and export requirements. There is inquiry in this market for 30 small automatics and a like number of large lathes, both of which could normally be filled more logically in the East. Other demand covers boring mills, milling machines and drills considerably in excess of the available supply of tools. Buyers inquiring for machines of some particular make are taking any tool that can be had. A partial return to the earlier conditions of the machine-tool market appears to have been made. The manufacturers seem to be making no headway against their backlog of orders, and deliveries of standard tools are unimproved.

The Alfred O. Blaich Company, 1954 Clybourn Avenue, Chicago, has awarded contracts for the erection of a case hardening plant, 47 x 109 ft., to cost $7,000.

The Imperial Brass Company, 512 South Racine Avenue, Chicago, has awarded contracts for a six-story addition to its factory. An expenditure of $85,000 is contemplated.

The Chicago, Milwaukee & St. Paul Railroad is planning the erection of car shops and a roundhouse at Sioux City, Iowa, construction to begin in the spring. An estimated cost of $500,000 is reported.

The Gulbranen-Dickenson Company, 620 North Kedzie Avenue, Chicago, manufacturer of piano player actions, will build a two-story addition to its factory.

A. Stein & Co., Chicago, will erect a five-story brick factory at 1145-9 West Congress Street, to cost $100,000. A. S. Alschuler, 28 East Jackson Boulevard, is the architect.

W. L. Eaton will build a three-story brick factory at 28-31-37 South LaSalle Street, to cost $50,000. W. H. Pruyn, 122 South Michigan Avenue, is the architect.

The Metal Specialties Company, 3200 Carroll Avenue, Chicago, has had plans prepared by Davidson & Weiss for a four-story brick factory to cost $100,000.

O. Baun, Kedzie Avenue and Thirty-first Street, Chicago, will build a one-story foundry, 40 x 200 ft., costing $10,000.

The Carolus Mfg. Company, Sterling, Ill., manufacturer of metal clippers, is building an addition to its shops.

The S. Ward Hamilton Company, Chicago, is erecting a factory at Harvey, Ill., where it will manufacture steel specialties.

The Weisner Mfg. Company, Rockford, Ill., has been incorporated with a capital of $5,000 by C. E. Swenson, H. W. Weisner and E. C. Kraner.

Geneseo, Ill., has issued bonds in the sum of $48,000 for the construction of a municipal electric light plant.

The National Iron Company, Duluth, Minn., will erect a pattern shop adjoining its plant to cost $10,000

Detroit

DETROIT, MICH., Oct. 9, 1916.

Machinery manufacturers report a continuous increase in demand. Building operations continue unabated and factories are increasing their facilities, but more moderately than last spring and early summer. The high price of materials and the unusual scarcity of labor are retarding operations. The labor difficulty is being overcome somewhat, as large automobile factories are cutting down their working forces. The men released, however, are mostly unskilled workmen.

The Perlman Rim Company, Jackson, Mich., is working on an addition to its factory, 100 x 140 ft. A similar unit has just been completed, also an addition, 50 x 350 ft. These were made necessary by increased business.

The Michigan Malleable Foundry Company, St. Joseph, Mich., has decided to increase the size of the building now under way. One building, 100 x 300 ft., is being rushed to completion and an addition, 60 x 80 ft., will be begun at once.

The Superior Foundry Company, Holland, Mich., recently organized, has found it necessary to increase its floor space 5000 sq. ft. It has just secured a contract which calls for 1500 tons of castings a year.

The Springfield Body Company, Detroit, will increase its capital stock for the construction of its new plant, to be ready for operation Jan. 1.

The Swiss Mfg. Company, Chicago, manufacturer of magnetos, will move to Monroe, Mich., at once. For the present it will utilize the plant of the Elkhart Mfg. Company, but is having plans prepared for several additions.

The MontaMower Company, Traverse City, Mich., has purchased a tract of land near the city and expects to start Jan. 1 the manufacture of 10,000 mowing machines, the output planned for 1917. Bert Montague is president.

The Columbia Motors Company, Detroit, has acquired the Argo Electric Vehicle Company, Saginaw, Mich., and will manufacture a six-cylinder automobile. A factory has been secured and the necessary machinery will be installed at once. The officers are J. G. Bayerline, president; William E. Metzger, vice-president; A. T. O'Connor, secretary and treasurer.

The Baker-Vawter Company, Benton Harbor, Mich., manufacturer of metal files and furniture, will erect a two-story factory, 60 x 200 ft.

The Monroe Binder Board Company, Detroit, Mich., has had plans drawn for a new box board factory which it has decided to erect at Monroe, Mich., at a cost of about $400,000, with facilities for duplicating the initial installation, giving a plant to cost in all about $1,000,000. It maintains a plant at Monroe, embracing several acres and another at Aurora, Ill., covering about 14 acres.

Cleveland

CLEVELAND, OHIO, Oct. 9, 1916.

The foreign demand for machine tools is more active than for some time, particularly from Great Britain. The volume of orders for turret lathes continues heavy, but consists mostly of small lots. The local demand for small lots of machine tools is large, the better grade of machines for tool room purposes being more active. Most buyers want early shipments and not much prospective business is placed, as manufacturers are unable to make deliveries for several months. The demand for storage battery trucks and locomotives for industrial purposes continues very heavy. Twist drill manufacturers report no falling off in the heavy demand and are three or four months behind on deliveries. A local twist drill manufacturer the past week turned down a very large export order, offered at attractive prices, because it would have been unable to properly take care of its domestic trade.

The Atlas Car & Mfg. Company, Cleveland, has placed contracts for additions to its plant which include an erecting building, 160 x 160 ft., to be joined to the main building; a blacksmith shop, 80 x 80 ft.; a pattern shop, 80 x 80 ft.; a pattern storage building, 60 x 100 ft., and a power house, 60 x 60 ft.. A mezzanine floor will be provided in a portion of the main building to provide space for light machine work. Two 250-hp. boilers and a generator will be installed in the power house. The main building will probably be provided with two 25-ton and some smaller cranes. The steel buildings will be erected by the Penn Bridge Company.

The Grant-Lees Gear Company, Cleveland, will erect an addition to its plant to cost $30,000.

The National Screw & Tack Company, Cleveland, has acquired a site, 45 x 143 ft., adjoining its present plant, on which to build additions.

The Cleveland Clutch Company, Cleveland, has been incorporated with a capital stock of $[illegible],000 by C. A. McMorris and others.

A new malleable iron foundry will be established in Toledo, Ohio, by the Houghton Malleable Castings Company, with temporary offices at [illegible] Franklin. The new company is installing equipment in the old Wilkes foundry building on Worthington Street, and the Wyoming Heat Regulator. L. L. Houghton, formerly with the National Malleable Castings Company and the U. S. Malleable Castings Company, is president and treasurer.

The Electric Converter Company, Toledo, has been incorporated with a capital stock of $[illegible],000 by M. L. Groves, M. C. Delaney, and others.

The Toledo Shipbuilding Company, Toledo, will build a four-story pattern storage building, 30 x 64 ft.

The Ironwood Mfg. Company, Bellefontaine, Ohio, maker of automobile accessories and farm implements, is contemplating the enlargement of its plant.

The Stevens Metal Products Company, Niles, Ohio, is equipping a plant to manufacture metal casks. Operations are expected to begin about Nov. 1.

The M. & D. Mfg. Company, Girard, Ohio, recently incorporated with a capital stock of $75,000, has purchased the vacant plant of the Ohio Sash Weight Company near Girard and will remodel the buildings and erect an additional structure, 40 x 100 ft. It will manufacture electric, gas and gasoline sadirons, etc.

The Pressed Steel Company, Grafton, Ohio, will erect a one-story factory, 40 x 145 ft.

Milwaukee

MILWAUKEE, WIS., Oct. 9, 1916.

Tool builders report an active demand for standard types, but orders are for single tools or very small lots, no large-sized inquiries having come in for some time. Buying seems to be mainly for replacements and equipment of enlarged shops. All plants are operating to capacity, and practically no relief is in sight before May 1. New business is being booked at a very satisfactory rate.

A feature of the situation in this district is that some important shop extension work which was postponed since last year because of the inability to get equipment, is now being undertaken.

The Milwaukee Dairy Supply Company, 934 Thirtieth Street, Milwaukee, is ready to proceed with plans for erecting a new factory and machine shop at Thirtieth and Burleigh streets. This project was deferred early this year because of the inability to procure equipment and because contractors were unable to guarantee deliveries of structural steel, etc. The main building will be of brick and steel, 120 x 127 ft., one-story and part basement. Herbst & Hufschmidt are the architects.

The E. A. Swendson Motor Company, 722-724 National Avenue, Milwaukee, is taking bids for a brick and steel garage and repair shop, 50 x 140 ft., one-story and basement.

The Osborne Casting Company, Racine, Wis., is a new company, which is establishing a moderate-sized gray-iron foundry, to be ready for operations on or before Jan. 1. John H. Osborne and Charles G. Holmes, who have had years of experience as foundrymen, are investing from $20,000 to $25,000 in a new casting shop and pattern works at Layard Avenue and the Chicago and Northwestern Railroad tracks. About thirty skilled men will be employed at the start. Enough business has been booked to insure a long run.

The Simple Gas Engine Company, Ashland, Wis., which interrupted production about six months ago to make changes in its designs, is preparing to resume operations and will build a new type of internal combustion engine in five different sizes.

Shaw & Kren, 1171 National Avenue, Milwaukee, will build a one-story machine shop, 50 x 74 ft., of concrete and brick, on South Pierce Street. J. George Shaw, manager of the Milwaukee Steel Foundry Company, 157 Virginia Street, is president.

W. Heck, Kewaunee, Wis., is in the market for an 18-in. lathe, a drill press, a milling machine, an oxy-acetylene welding unit, and motor-generator set, for automobile repair work.

The Dumphy Boat Works, Eau Claire, Wis., will build a new factory on the river front, to be of frame, iron-clad.

The Perfex Radiator Company, Racine, Wis., maker of automobile [illegible] devices, started operations in its new factory Oct. 9. The building is 70 x [illegible] ft., and has a capacity of [illegible] daily. The factory represents an investment of $50,000. F. M. Opitz is president.

The Western Malleables Company, Beaver Dam, Wis., which recently added automobile parts to its general line of railroad and other malleable castings, is erecting a brick and steel addition, 90 x 26 ft., to its Elm Street foundry, where a larger coreroom and new [illegible] are being provided. A new air compressor room is being erected at the South Street plant.

The Johnson & Field Mfg. Company, Racine, Wis., maker of fanning mills, is operating in a brick building owned by the American Seating Company and probably will make no decision until Jan. 1 as to rebuilding its plant damaged by fire.

The Gillette Safety Tire Company, Eau Claire, Wis., is installing machinery and will start production Oct. 16. Ground has been broken for the office building, [illegible] K. B. Gillette is general manager.

The Fisher Fish Company, Green Bay, Wis., will build a new cold storage unit, 50 x 135 ft., two-story and basement, and awarded the contract to J. H. Geniesse. It will be of frame and corrugated iron.

Fire in the plant of the Green Bay Foundry & Machine Company, Green Bay, Wis., resulted in a loss of about $1,500.

Indianapolis

INDIANAPOLIS, IND., Oct. 9, 1916.

The Madison Motors Company, Anderson, Ind., announces that the Madison Motors Corporation with a capital of $2,000,000 will take over the former company. Cecil Gibson will be president of the new organization. Associated with him are C. D. Edinburg, general manager of the American Maize Products Company, New York; W. F. Wickham, president of the Wickham Coal Company, St. Louis; Paul H. Haynes, attorney, Anderson; G. S. Sarber, Indianapolis, and H. M. Caldwell, Evanston, Ill.

The South Bend Machine Tool Company, South Bend, Ind., will purchase several plain knee-type milling machines with 30 to 40-in. table feed. Good second-hand tools will be accepted.

The Automatic Register Sales Company, Indianapolis, has been incorporated with $100,000 capital stock to manufacture accounting machines. The directors are Benjamin Boose, John R. Hubbel, John G. Wimberg, C. B. Enlow and P. C. Kittle.

The Swartz Electric Company, Indianapolis, manufacturer of automatic light and power plants, will build an addition to its factory to cost $20,000, doubling the capacity of its plant.

The Metal Auto Parts Company, Indianapolis, has completed plans for the erection of a new plant to cost $80,000. B. E. Thompson is president and general manager.

The American Metal Furniture Company, Indianapolis, has been incorporated with a capital of $10,000 by Joseph A. Miner, Stanley C. Brooks and Edward J. Bennett.

The Buettner-Shelburne Machinery Company, Terre Haute, Ind., will build an addition to its plant and install new machinery.

The Huse Appliances Company, Gary, Ind., has been incorporated with $100,000 capital stock to manufacture fuel-saving devices. The directors are C. W. Huse, D. F. Van Lieu and Carl Schmidt.

The Shoals Light & Power Company, Shoals, Ind., has been incorporated with $10,000 capital stock. The directors are George A. Harrop, Benjamin C. Johnson and Lee D. Hincher.

Richmond, Ind., through the efforts of its Commercial Club, has raised a factory fund of $100,000.

The Excell Furniture Factory, Shelbyville, Ind., has been sold to C. A. and Carl Tindall and S. L. Dorsey, Shelbyville, and Frank Gerling, Connersville. The company will probably be reorganized as the Tindall-Dorsey Furniture Company.

The Stewart Brothers Company, Montpelier, Ind., has been incorporated with $6,000 capital stock to manufacture household articles.

The Rex Buggy Company, Connersville, Ind., has changed its name to the Rex Mfg. Company.

Joseph Burke and Egbert Gazell, receivers for the William H. Clore Plow Works, Washington, Ind., have been ordered by the court to offer the factory for sale for not less than $40,000.

The Hardware Specialties Company, Wabash, Ind., has been incorporated with $15,000 capital stock to manufacture harness and hardware supplies. The directors are Nelson and Holmes Hunter and Aline Mattern.

At the annual meeting of the Sefton Mfg. Company, Anderson, Ind., the following officers were re-elected: O. H. Hicks, Redlands, Cal., president; J. E. Clenney, Chicago, general manager; Winfield T. Durbin, Anderson, vice-president.

H. R. Humphries & Co., Corydon, Ind., manufacturer of woodenware, will move their plant to New Albany, where it will be enlarged. Automobile bodies and parts of wagon beds will be added to their products.

Cincinnati

CINCINNATI, OHIO, Oct. 9, 1916.

Additional orders for different machine tools have been lately received from Russian agents, and the export business is generally very satisfactory. The call for portable electric drilling machines from abroad is better than at any time since this particular industry was started. The domestic machine tool trade is also holding up very well, but late orders are mostly from automobile and auto-truck manufacturers.

Boiler and tank makers are busy, and there has lately been a much better demand for large high-pressure boilers. The wood-working machinery business shows some improvement. The foundries are still working at full capacity, with only a few exceptions to be noted.

The Cincinnati Artificial Leather Company, Cincinnati, has been incorporated with $15,000 capital stock, and will fit up a plant on Wyoming Avenue for the manufacture of artificial leather. James Reid is president.

The Stevens Pressed Brick Company, Cincinnati, is a newly formed company that intends establishing a plant for the manufacture of building brick and tile. Fremont C. Stevens is one of the principal stockholders.

The United States Machine Tool Company, Cincinnati, a firm of recent origin, is having plans prepared for a plant to be erected on Burns Street. The proposed structure will be 70 x 90 ft., of brick and concrete. Equipment details are not yet available.

It is reported that the Fischer Specialty Mfg. Company, manufacturer of screw machine products, Cincinnati, contemplates making an addition to its plant on Reading Road.

E. T. Gardner, Middletown, Ohio, has purchased the plant of the National Boxboard Company, and will add new equipment.

The Recording & Computing Machines Company, Dayton, Ohio, is adding to its equipment in order to take care of an order recently received for shell detonating devices.

Springfield, Ohio, is changing the location of its repair shop that is operated for keeping its fire-fighting and other city vehicles in repair. Very little new equipment will be needed.

The Columbus Show Case Company, Columbus, Ohio, whose plans were recently mentioned, has let contract for an addition to its plant on Grant Avenue.

The Central South

LOUISVILLE, KY., Oct. 9, 1916.

Iron, steel and machinery interests of this section are citing the prediction of Henry Walters, chairman of the board of directors of the Louisville & Nashville Railroad, that the end of the war will see the beginning of generous prosperity for the whole South as their view of the outlook for business. They propose to make preparations accordingly, and report that much of the immediate business they are handling is based on expectations of their customers for continued substantial prosperity in the South. No let-up is found to the volume of orders and inquiries in every line canvassed, shortage of materials and shipping facilities being the principal hindrances. Farm machinery manufacturers are especially active.

Fire Oct. 6 destroyed the power house and other buildings of the Monarch Coal Company, Middlesboro, Ky., with a loss estimated around $5,000.

The Commercial Automobile Company, Lexington, Ky., will equip a plant for assembling automobile running gears and bodies and for the manufacturing of bodies, etc. Equipment to cost $8,000 will be installed. W. R. Williams is president.

The American Cast Iron Pipe Company, Chicago, Ill., has purchased the plant of the Harlan Water & Ice Company, Harlan, Ky., from the receiver, and plans to make extensive improvements. A. A. McCorkle is manager.

The Hirsig Auto & Supply Company, Nashville, Tenn., has been incorporated with capital stock of $25,000, by W. G. Hirsig, C. P. Healy and others.

The Stanley Motor Car Company, Chattanooga, Tenn., has been incorporated with capital stock of $10,000, by Z

C. Patten, Jr., O. B. Andrews, A. T. Whiteside and others; will equip a garage.

The Bristol Traction Company, Bristol, Tenn., has begun construction of a power dam across the Holston River at Emmetts, Tenn., and will transmit power to that city.

The Cole Motor Sales Company, Knoxville, Tenn., has incorporated with $25,000 capital stock by Robert M. and H. H. Lindsay, Robert S. Young and others.

Birmingham

BIRMINGHAM, ALA., OCT. 9, 1916.

Machinery dealers report business approaching about what they can well take care of. Small engines and pumps and gasoline engines are in strong demand. Ensilage cutters are on the active list. Mine and mill machinery is sought. Collections have improved with the high prices obtained for cotton and sales of live stock and other diversified farm products. Better conditions than in several years appear to be forming.

H. C. Murnan, Memphis, Tenn., will establish a shipbuilding plant and drydock in Mobile, having purchased water front property for that purpose. The initial plant is to cost $50,000.

Martin O'Rear, Jasper, Ala., has sold 13,000,000 ft. of timber to Monroe Aaron, Cordova, Ala., and Henry McNeal, Baldo, Ala., who will establish two sawmills at once.

The Barwick Hoe Works, Macon, Ga., has been incorporated with a capital stock of $25,000 by J. W. Barwick and others, and plans to establish a plant for the manufacture of hoes, plows and other farming implements.

John L. Herring and others, Tifton, Ga., propose to build a meat packing plant and are now forming a company with $500,000 capital to construct a plant estimated to cost $200,000.

St. Louis

ST. LOUIS, MO., OCT. 9, 1916.

The machine-tool business continues at a very satisfactory aggregate, but with little or no special feature. New demand is keeping up steadily, though little disposition is shown to put out calls for large lists. For the most part, when machine tools are wanted excursions into the market are made and orders placed wherever the necessary equipment is found. Extensions, replacements and purchases for new industries continue and are of the broadest character.

The Wrought Iron Range Company, St. Louis, Mo., will erect an addition to its machine shop.

The Emil Sieloff Provision Company, Natural Bridge Road and Newstead Avenue, St. Louis, has acquired a site adjoining its plant for the erection of a cold storage plant, to be electrically operated.

The Brilliant Sign Company, St. Louis, Fred A. Kehl president, is erecting a building for the manufacture of electrical sign and display devices.

The Cosmic Products Company, St. Louis, has been incorporated with a capital stock of $10,000 by James M. and John W. Matlock, and others, to manufacture oil burners.

Charles L. Hamer and O. W. Clifton, Rockport, Me., have acquired a franchise to equip a complete new electric light and power plant to replace the municipal plant.

The St. Joseph Lead Company, Herculaneum, Mo., will install two Marcus conveyors at its sintering plant.

The American Express Company, Kansas City, Mo., will erect and equip a garage and repair shop at a total cost of $70,000.

Paris, Mo., will receive bids for the installation of two electrically driven centrifugal pumps, etc. George C. Blakey is superintendent.

The Arenzville Light & Power Company, Arenzville, Ill., has been incorporated with a capital stock of $10,000 by John G. Pratt, J. G. Neiger, and others, and will equip a municipal waterworks and electric light and power plant.

The Aluminum Ore Company of America, East St. Louis, Ill., has acquired 56 additional acres adjacent to its present site. It has also bought a fleet of sixteen barges to transport its ore from its Arkansas mines to East St. Louis, Ill.

E. L. Bruce & Co., Little Rock, Ark., manufacturers of hardwood flooring and trim, are in the market for saws, resaws, matchers, planers, moulders, trim saws, filing room tools, engine, etc.

The Pine Bluff Company, Pine Bluff, Ark., has increased its capital stock from $1,200,000 to $2,000,000 to cover improvements in its waterworks plant, electric light plant, etc.

The Ponca Refining Company and Sub Oil Company, Ponca, Okla., the Cushing Refining Company, Cushing, Okla., and the Producers Refining Company, Gainesville, Tex., have been acquired by Henry L. Doherty & Co., New York, and it is reported extensive pipe lines and pumping equipment are planned.

Cosden & Co., Tulsa, Okla., have increased their capital stock to $8,000,000 and their bonds to $6,000,000 to increase their plant capacity and operations.

The Safety Pipe Lock Company, Shawnee, Okla., has been incorporated with a capital stock of $15,000 by C. C. Nash, R. B. Bond and W. L. Chapman to manufacture stove pipe locks.

Marlow, Okla., will expend about $25,000 on a sewer system, including a disposal plant. A similar amount will be expended on waterworks equipment, including pumps, generator, motor, etc.

The cotton gin of Case Brothers, Shawnee, Okla., which has been burned with a loss of about $7,000, will be re-equipped.

Texas

AUSTIN, TEX., OCT. 7, 1916.

An unusually large demand exists for machinery for equipping manufacturing plants. The small tool trade is also brisk. Banks report that their deposits are heavier than ever before, due to the proceeds of the cotton crop, which is now being marketed.

The Pierce-Fordyce Oil Association, Texas City, is having plans prepared for an addition to its refinery, to be used for a canning factory. The proposed plant will be capable of turning out 10,000 cans and 5000 wooden cases per day for canning the various grades of oil. It will cost about $100,000. J. P. Gillen is superintendent.

The Texas City Transportation Company, Texas City, will build and equip oil docks and warehouse at an expenditure of $50,000.

The Texas Bridge Company, Weatherford, has been incorporated with a capital stock of $15,000. R. P. Lowe is a stockholder.

The Farmers Gin Company, Barstow, will build a cotton gin to cost $6,000.

The Dallas Boiler Works, Dallas, has been incorporated for the purpose of operating a boiler manufacturing plant. The company has a capital stock of $50,000. C. R. Moore is a stockholder.

The City Commission, Houston, has prepared plans for a reinforced concrete municipal warehouse to cost $350,000. It will be equipped with carriers and other machinery for handling goods.

The cottonseed oil mill of the Frio County Oil Company, Pearsall, which was recently destroyed by fire, will be rebuilt at a cost of about $20,000.

The Bushbert Gin Company, Deport, will build a new cotton gin, to cost $8,000.

The oil refinery and oil compound manufacturing plant of the Walker Refining Company, Austin, which was destroyed by fire a few days ago at a loss of $75,000, will be rebuilt.

San Francisco

SAN FRANCISCO, CAL., Oct. 3, 1916.

Reports from local machinery merchants show a decided improvement within the last month, especially in machine tools. Not only are inquiries increasing, but orders are coming through in better shape, many buyers being no longer deterred by slow delivery. The shipbuilding shops are constantly in the market, and some of them are getting out new specifications for heavy equipment. Government business is a very important item, including not only various large tools for the Navy Yard, but considerable shop equipment for new vessels; and a good many tools are also being bought for privately-owned steamers. Several California shops are also working on Government orders for projectiles and other war equipment. Demand for general shop and foundry supplies has for several months been surpassing all former records, and is keeping up well. The outlook for the near future is considered very encouraging, as there are many projects in contemplation, and capital seems easier to obtain than for some years. All sorts of special machinery for miscellaneous manufacturing processes is in good demand.

The Richmond Machine & Boiler Works, San Francisco, has been incorporated with a capital stock of $50,000 by A. J. Timmons, E. Ott and F. Reishert.

The Gould Compensating Gear Company, San Francisco, has completed arrangements for the manufacture on a large scale in the East of a differential device, controlled by this company. Alfred R. Ruff is secretary.

The Standard Gas Engine Company has [illegible]

and salesroom to its plant in Oakland. The equipment recently purchased from the Corliss Gas Engine Company, Petaluma, has also been moved to Oakland and is being overhauled, many of the tools being remodeled for special-purpose work.

The Main Street Iron Works, San Francisco, is building several 1000 hp. marine steam engines for wooden vessels under construction in the Northwest.

A. A. Haskins, Hollister, Cal., who is operating a quarry nearby, plans to build an aerial tramway from the plant to that town.

The Valley Foundry, Fresno, Cal., is building a brick addition, 50 x 75 ft., to its plant.

The Union Iron Works, San Francisco, has secured a permit to build a powerhouse to cost $22,500 at its new shipbuilding plant in Alameda.

Considerable equipment is being purchased for the production of potash and other chemicals from kelp. E. K. Woods, of the Hercules Powder Company's plant at La Jolla, near San Diego, was recently in San Francisco for additional machinery. The Verona Products Company, Santa Barbara, Cal., is building a large kelp reduction plant, and has ordered a number of power boats, etc. The International Potash & Fertilizer Company is being organized at Los Angeles by Dr. R. S. Oppenheim and others to build a kelp fertilizer factory.

The Stauffer Chemical Company has secured a permit to build an oil-refining plant in addition to its factory in West Berkeley, Cal.

The Pacific Northwest

SEATTLE, Oct. 3, 1916.

Machine tools, both new and second-hand, are in good demand. Repair work in all lines is in demand, and a number of first-class machine shops have been placed in operation during the summer in Puget Sound cities.

The Walstad Machine & Electric Company, Tacoma, Wash., has moved from the city waterway to the new tideflats factory section in Tacoma, where it occupies a two-story building, 50 x 150 ft. The company has recently installed new equipment. It manufactures structural iron work, machinery, etc.

The Duggan-Cropper Mfg. Company, Everett, Wash., has been incorporated for $50,000 by D. J. Duggan and S. Cropper. It will establish a factory to manufacture patented devices.

The Utah-Idaho Sugar Company, which plans establishment of a sugar factory in North Yakima, Wash., announces that the required acreage has been signed.

The Western Iron & Wire Works Company, Tacoma, has moved its plant from South Twenty-first and C streets, to the new tideflat industrial section, where it occupies a three-story frame building, 80 x 100 ft. The company manufactures ornamental iron and wire and has made many improvements in its new location. B. E. Paul is president and manager.

The Pacific Boiler Works has moved from 2224 East D Street, Tacoma, to the tideflat section. Donald McGregor is the proprietor.

The North Alaska Salmon Company, Seattle, has been incorporated for $700,000 by Phillip Larmon and H. W. Hardy, and plans the establishment of a salmon cannery nearby.

It is reported the Star Lumber Company, St. Paul, Minn., plans the establishment of a pulp mill at Reedsport, Ore., where it owns several thousands of acres of spruce timber. Warren Reed, Reedsport, is one of the promotors.

The Vancouver Shipbuilding Company, Vancouver, Wash., has been incorporated by James Feeney and G. B. Percival, and has secured a site for its plant. Work will begin immediately. The first contract will be for a sailing vessel.

According to a recent report the Doernbecher Mfg. Company, Portland, Ore., manufacturer of bedroom and dining room furniture, plans the erection of a new chair factory adjoining its plant at Twenty-eighth Street and the Union Pacific tracks. The proposed structure will be three stories, 100 x 300 ft., costing $50,000. Jacobberger & Smith, Board of Trade Building, Portland, it is understood, will prepare the plans.

The Heath Shipbuilding Company, Portland, Ore., which is starting to fill the location for a new shipyard in South Portland, has opened offices at 410 Oregon Building. Plans are now ready for the first of the frame buildings to be erected. This work will be handled mostly by day labor.

The Port of Bandon, Ore., is having plans prepared for a suction dredge for the Coquille River harbor work to cost $30,000.

The Spokane Sash & Door Company, Spokane, has completed plans for improvements to its plant which will cost $100,000, and will double the output. Enoch Engdahl is president.

Canada

TORONTO, Oct. 7, 1916.

For several months the demand for steel and iron in Canada has reached a point hitherto unsurpassed. Part of this is on account of munitions orders, but aside from this the demand for ordinary consumption has shown unusual activity. This means the re-opening of those industrial enterprises which suffered a severe setback at the beginning of the war.

Agricultural implement manufacturers find the demand from all parts of Canada much better than they anticipated, and on a scale greater than they were prepared to handle. Although the crop in the Canadian West was very light, buying has been good and on a large scale. This would indicate that agriculturalists are not dispirited because of a crop about half the volume of last year's.

The Dodge Metal Hose Company of Canada, Ltd., Galt, Ont., recently incorporated with a capital stock of $150,000, has purchased a site on Beverly Street, Galt, and will erect a factory for the manufacture of malleable iron hose to couple air line between cars, etc. The new plant will cost $50,000. William Lennox is president and Harvey O. Bee vice-president. The directors are John McNaughton, John Mason and E. J. Adams, all of Toronto.

The Canadian Buffalo Forge Company, Kitchener, Ont., will double the capacity of its plant. An addition 50 x 100 ft., will be erected at a cost of $100,000. The company is engaged in the manufacture of munition machinery.

The Ford Motor Company of Canada, Ltd., Ford City, Ont., has commenced the erection of an assembling plant at Calgary, Alberta.

The contract for the erection of a plant for the Dominion Steel Castings, Depew Street, Hamilton, Ont., has been awarded to Mackay & Paulin, Bank of Hamilton, at a cost of $75,000.

Fire Oct. 4 destroyed the foundry and machine shop at Renfrew, Ont., owned by Limbleau & Sons, with a loss of several thousand dollars.

Strong & Dowler, 406 Grain Exchange Building, Calgary, Alberta, are erecting grain elevators at the following towns in Alberta: Braitree, Redlands, Aberlin, Bon Accord, Metiskow, Tofield, Scotford, Rocky Mountain House and Ardenade.

Brown's Copper & Brass Rolling Mills, Ltd., New Toronto, Ont., is building an addition to its plant, of brick and steel, to cost $25,000.

The United Shoe Machinery Company, Bennett Street, Maisonneuve, Que., has begun to erect a plant. H. C. Stone, 84 St. Francois Xavier Street, Montreal, is the architect.

Alrick Archambault's planing and sawmill at St. Martine, Que., was destroyed by fire with a loss of $9,000.

The Canadian Kodak Company, Mt. Dennis, Ont., will erect a concrete and brick factory to cost $12,000.

A. G. Nosworthy, 111 Mountain Hill, Quebec, is preparing plans for a garage and service station to be built in Fabrique Street, Quebec, at a cost of $18,000. It will be of steel, concrete and mill construction.

Work will start at an early date on the erection of a cold storage plant for the Ontario & Manitoba Cold Storage Company, Notre Dame Avenue, Winnipeg, Man. The plant will cost $100,000.

Fire destroyed the cold storage plants at Lindsay, Ont., owned by Flavelles, Ltd. Damage to the ammonia plant and engine room was heavy. The loss will amount to upward of $300,000.

Aimwell D. McIntyre, Toronto, has closed an agreement with the City Council, Port Arthur, Ont., whereby a company in which he is a promoter will establish a plant there for the manufacture of pulp, etc. It will have a capacity [illegible] which will be extended at a later date to 150 tons.

The first unit of T. McAvity & Son's new plant at St. John, N. B., is now completed, and operations are under way looking to the output of a small order of 8-in. shells. As soon as this order is finished, additional equipment now being installed, will, with that already in service, start on the large contract for the machining of 9.2 in. shells.

The Dominion Steel Foundries, Ltd., Hamilton, Ont., proposes to make further extensions to its plant.

The Willys-Overland, Ltd., is making extensive improve-

ments to its plant at West Toronto, Ont., and proposes to make further additions. T. A. Russell, 276 King Street West, Toronto, is in charge.

The Danville Chair & Specialty Company's factory at Danville, Que., was destroyed by fire with a loss of $8,000.

The Western Power Company of Canada, Ltd., Montreal, has been incorporated with a capital stock of $[illegible] by Charles M. Holt, Alexandre Chase-Casgrain, Errol M. McDougall, and others, all of Montreal, to build plants to generate electric power, heat, etc.

The Tip-it Welding Company, Ltd., Montreal, has been incorporated with a capital stock of $20,000 by Henry Weinfield, Marcus M. Sperber, Jacob Y. Fortier, and others, to manufacture steel and metal products, etc.

The C. F. Cole Company, Ltd., Toronto, has been incorporated with a capital stock of $50,000 by James S. Lovell, 25 King Street West; Charles D. Magee, 300 St. George Street; William Bain, 185 College Street, and others, to manufacture engineering and scientific instruments, etc.

Work will be commenced at once on the erection of a concrete and brick addition to the plant of the Goldie & McCulloch Company, Ltd., machinery manufacturer, at Galt, Ont. It will be 60 x 144 ft., and will be placed between the boiler shop and the Grand Trunk Railway tracks. The cost will be $15,000. H. P. Second & Sons, Brantford, Ont., have been awarded the contract. A new power plant to cost $20,000 is also being erected on West Main Street.

The Canadian Northern has completed a carbuilding plant in Vancouver, B. C.

The Eastern Car Company, New Glasgow, N. S., will buy a 10 to 15-ton electric traveling crane of 75-ft. span.

Government Purchases

WASHINGTON, D. C., Oct. 9, 1916

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until date not set, schedule 225, for one 135-ton overhead traveling crane, one turret lathe, four milling machines, two wire screw feed machines, two 18-in. x 6-in. x 9½-in. surface grinding machines and one 3-spindle drill press, all for Washington; schedule 242, two wood-working machines for Brooklyn and Mare Island; schedule 243, for one steam hoisting engine and one steam ram pile hammer, both for New Orleans; schedule 244, for five hydraulic lifting jib cranes and one hydraulic bending beam press, all for Norfolk; schedule 245, for one 9-in. x 4-in. outside molder for Boston; schedule 246, for two electrically driven deck winches for Brooklyn; schedule 247, for miscellaneous cutting-off machines, lathes, grinding machines, etc., for Norfolk; schedule 248, for one 16-in. automatic tapping machine for Boston; schedule 249, for one yoke type jaw riveter for Puget Sound; schedule 250, for eight engine room, fire and bilge pumps for Brooklyn and Mare Island; schedule 254, for one metal sawing machine, one 26-in. diameter circular metal saw, one motor-driven high-speed saw and ten 14-in. diameter metal slitting saws, all for Newport; schedule 255, for one pipe and nipple threading machine for Norfolk; schedule 256, for one electric spot welder for Philadelphia.

The following bid was received from the Bethlehem Steel Company under proposal No. 66, by the commanding officer, Frankford Arsenal, Philadelphia, Sept. 22, for furnishing the following:

Item 1, a 500-ton press, installed, with pump, to load shell up to 6-in. for the sum of $36,000. Item 3, 500-ton press with specifications of item 1, to load shell up to and including 4.7-in., for $32,700. Quotation does not include ballast or electric equipment for pump. Price for electric equipment, $1510, f.o.b. arsenal.

The following bids were received by the commanding officer Frankford Arsenal, Philadelphia, Sept. 26, under proposal 107, for furnishing the following: Item 1, four automatic screw machines; item 2, two automatic cutting-off machines; item 3, four automatic screw machines; item 4, six slotting attachments; item 5, two attachments.

Brown & Sharpe Mfg. Company—Item 1, $1,498.50 each, feed tubes $22.50 extra; item 2, $721 each; item 3, $2451 each; item 4, $122 each; item 5, $87.50 each.

Cleveland Automatic Machine Company—Item 1, $1175 each; item 2, $570 each; item 3, $1560 each.

The chief of the Bureau of Yards and Docks, Navy Department, Washington, received bids Sept. 30 for the construction of a structural shop at the Norfolk Navy Yard.

No bids were received for furnishing one duplex air compressor under class 1, Panama Canal circular 1081, opened Oct. 3.

Bids were received by the Bureau of Supplies and Accounts, Navy Department, Washington [illegible] for the naval service, as follows:

Schedule 111, Steam Engineering

Class 91, Brooklyn—Two [illegible] Bid 7, $441; 24, $[illegible] and $[illegible].

Schedule 114, Steam Engineering

Class 92, converting planer from belt to motor drive [illegible] Bid 7, Navy Yard, Brooklyn, $[illegible].

Schedule 130, Steam Engineering

Class 113, Brooklyn—[illegible] lathe—Bid 7, $[illegible].

Class 114, Brooklyn—One motor-driven toolroom lathe—Bid 7, $1,[illegible].

Class [illegible], Brooklyn—[illegible] Bid 7, $1,[illegible].

Class 116, Brooklyn—One motor-driven column tool shaping machine—Bid 44, $1,338; 115, $1,891.80; 132, $1,[illegible] 167, $1,611.

Class 117, Brooklyn—One motor-driven plain radial drilling machine—Bid 44, $3,251; 132, $1,615; 167, $1,667.

Class 118, Brooklyn—One high-speed sensitive drilling machine—Bid 32, $1,6[illegible]0, 78, $[illegible] and $[illegible].

Class 119, Brooklyn—One universal milling machine—Bid 69, $2,392.20

Class 120, Brooklyn—One [illegible] chine—Bid 21, $234; 33, $260.

Class 121, Brooklyn—One surface grinding machine and one motor-driven drilling machine—Bid 21, $146; 33, $163 [illegible] 166, $214.

Schedule 138, Construction and Repair

Class 192, Brooklyn and Mare Island—Eight turret turning motors with 2 set of spare parts—Bid 2[illegible], $11,[illegible]60 57, $10,450; 176, $11,315.16.

Schedule 139, Construction and Repair

Class 193, Brooklyn and Mare Island—Two saw tables—Bid [illegible], $[illegible]40, 30, $844, 37, $[illegible]70, 44, $1,0[illegible]2, 78, [illegible] 125, $787, 191, $772

Class 194, New York and Mare Island—Two band saw—Bid 8, $659.20; 30, $708; 44, $900; 125, $827; 191, $692.

Class 195, Brooklyn and Mare Island—Two wood-working lathes—Bid 8, $1,128; 125, $1,122.

Class 196, Brooklyn and Mare Island—Two drill presses—Bid 191, $916.

Class 197, Brooklyn and Mare Island—Two emery grinding machines—Bid 21, $320; 30, $332; 33, $202.

The names of the bidders and the numbers under which they are designated in the above list, are as follows:

Bid 8, American Woodworking Machinery Company; 21, Cincinnati Electrical Tool Company; 22, Cutler-Hammer Mfg. Company; 30, W. Irwin Cheyney; 33, James Clark, Jr., Electric Company; 37, Alexander Dodd & Co.; 44, Fairbanks Company; 52, General Electric Company; 57, B. F. Goodrich Company; 69, Hill, Clarke & Co., Inc.; 78, Kemp Machinery Company; 85, Leland-Gifford Company; 105, Manning, Maxwell & Moore, Inc.; 115, Niles-Bement-Pond Company; 125, Oliver Machinery Company; 132, Henry Prentiss & Co.; 166, United States Electrical Tool Company; 167, Vandyck-Churchill Company; 176, Westinghouse Electric & Mfg. Company; 191, D. Nast Machinery Company.

Sealed proposals will be received by the quartermaster department; United States Marine Corps, 1100 South Broad Street, Philadelphia, until 11 a. m., Oct. 16, for furnishing one 20-hp. stationary boiler.

German Machinery Industry Substituting Materials

At a recent meeting of the German Machinery Manufacturers' Association the president stated that the chief task had been to obtain substitutes for the lacking raw materials and to reorganize the works to produce war materials. He considered the situation clear up to the end of the war, but the position of the trade after that could not be foreseen; nevertheless, the industry felt itself strong enough to carry on the struggle successfully even though the conditions might be difficult. A paper was read on the use of substitute materials in which it was stated that certain new lead alloys are being successfully used as a bearing metal together with cast iron subjected to a special heat treatment. Wrought-iron tubes have been used in condensers without affecting the vacuum. Lubricating oil is being diluted with graphite, especially for cylinders, and leather driving belts are being replaced by steel bands on paper-yarn belts—all of which will render the country more independent of foreign supplies in the future

NEW TRADE PUBLICATIONS

Chain Drives.—Diamond Chain & Mfg. Company, Indianapolis, Ind. Booklet entitled, "Diamond Tooth Form for Roller Chain Sprockets." Covers the subject of power transmission by roller chains and includes information on the design of roller chains and sprockets with formulæ for calculating chain lengths, center distances where the chain has no slack, pitch and outside diameters, horsepower transmitted, chain velocity and pull, sprocket speeds and the maximum allowable pitch and speed. A table of useful data is included and a problem in the selection of the proper chain and sprocket for a set of given conditions is worked out and discussed to illustrate the application of the formulæ.

Bronze Alloy.—Sherritt & Stoer Company, Inc., 633 Finance Building, Philadelphia, Pa. Form No. 507. Deals with a bronze alloy known as Machinebronze for use in automobile and machinery construction and repair. Tables of the various sizes of solid and cored bars that can be supplied in 12-in. lengths are included.

Gage Standards.—Wismach & Ibsen, Milwaukee, Wis. Circular. Treats of a line of rectangular steel gage blocks and standards for use in a holder. An illustration showing the way the units are combined and one of the units mounted in a holder are presented. Tables of the various combinations that can be furnished are included.

Safety Appliances.—Wheeler & Holcomb, 1360 Wells Street, Chicago, Ill. Pamphlet. Lists a line of fireproof gloves, mittens, leggins, aprons, pants, coats and other specialties made from asbestos cloth and fireproof duck and leather. Illustrations and brief descriptions are presented, together with tables of the various sizes that can be furnished.

Eye Protectors.—Chicago Eye Shield Company, 2300 Warren Avenue, Chicago, Ill. Circular. Illustrations and descriptive matter explain the use of the various types of eye protectors made for use in foundries, industrial establishments and railroad and blast-furnace work. A line of respirators and safety helmets is also shown.

Chucks.—Thomas Elevator Company, 20 South Hoyne Avenue, Chicago, Ill. Folder. Mentions a line of wrenchless chucks for machine tools in which the opening and closing of the jaws is accomplished by a set of gears that are always in mesh. Views of the chuck in use, a number of dimension diagrams and a drawing of the operating mechanism are included.

Portable Electric Tools, Electric Motors and Flexible Shafting.—Stow Mfg. Company, Binghamton, N. Y. Three bulletins. The first, No. 100, shows the various adjustable and constant speed motors than can be supplied. The text is supplemented by a number of drawings illustrating the construction and dimension tables and diagrams. The second, No. 101, contains illustrations and brief descriptions of the various electric tools, which include drilling, buffing and grinding, screw driving and sensitive drilling machines. Tables of the different sizes of each tool that can be supplied are included. The last bulletin, No. 102, describes and illustrates a number of applications of the company's flexible shafts to various types of tools.

Fuel Oil Appliances.—W. S. Rockwell Company, 50 Church Street, New York City. Bulletin No. 31. Presents some of the fundamental principles governing the handling and burning of fuel oil. This introductory section is supplemented by views of installations of oil-fired furnaces for various purposes and is followed by illustrated descriptions of the various appliances used, such as burners, pumps and pumping systems, blowers, storage and pressure tanks, regulating valves, strainers, pressure gages, etc. A partial list of the various types of furnaces which the company has built is included.

Galvanometer.—Leeds & Northrup Company, 4901 Stenton Avenue, Philadelphia, Pa. Bulletin No. 250. Describes a galvanometer for general laboratory use. The description of the instrument is quite comprehensive and is arranged in paragraphs with a bold face heading indicating clearly the subject covered. Views of the galvanometer with and without the case are presented and mention is made of a number of attachments that can be supplied for use with it.

Electric Motors.—Lincoln Electric Company, Cleveland Ohio. Booklet. Relates to a line of induction motors for use on two or three phase alternating-current circuits. After a brief discussion of the advantages of motor drive, the various parts of the motor are described at some length, the text being supplemented by numerous illustrations. This is followed by descriptions of the different classes of motors for elevators and hoists, pumps, fans, blowers and compressors. A number of illustrations of the motors in use in a great variety of industrial establishments are included. Mention is also made of an arc welding machine which was illustrated in THE IRON AGE, Aug. 5, 1915.

Power Presses.—Cleveland Machine & Mfg. Company, Cleveland, Ohio. Catalog. Size, 6 x 9 in.; pages, 120. Describes and illustrates a complete line of power presses including inclinable, open back, punch, single and double crank straight sided and gap frame, horning, wiring, screw, knuckle joint, cam and toggle drawing and notching types. Mention is made of other sheet metal working machinery, such as seaming machines, power brakes, power hammers and power squaring, gap splitting and squaring shearing machines.

Non-Packing Valves.—Universal Valve Company, 910 South Michigan Avenue, Chicago, Ill. Pamphlet. Refers to a line of non-packing valves for either saturated or superheated high-pressure steam. After a brief description of the construction of the valve, which employs a non-rising handle, the various forms in which it can be supplied are illustrated with tables of sizes.

Silent Chain Drive.—Link-Belt Company, Thirty-ninth Street and Stewart Avenue, Chicago, Ill. Booklet No. 286. Devoted to lubrication and casings for silent chain drives. Drawings of the casing are presented, together with engravings of it and views of the drive in use.

Gears.—Philadelphia Gear Works, 1120 Vine Street, Philadelphia, Pa. Catalog. Illustrates an extensive line of gears of the spur, bevel and spiral types that can be supplied in steel, brass, iron and rawhide. Under the illustrations of the different gears tables of the various sizes that can be supplied are presented. Mention is made of a line of chains and sprockets and the work which the company is prepared to do in the production of special gearing. A number of tables of useful information are included.

Multiblade Fans.—Clarage Fan Company, Kalamazoo, Mich. Catalog No. 5. Concerned with multiblade type of fan. Capacity tables for various arrangements of inlets and different widths are included, and a diagram and table of dimensions of the several sizes built are given. Mention is made of other products, such as steel plate fans, pipe coil heaters, exhaust fans and pressure blowers, etc.

Small Tools and Cutters.—Brown & Sharpe Mfg. Company, Providence, R. I. Catalog No. 27. Relates to an extensive line of small tools, cutters, screw machine tools, and similar equipment.

Acetylene Gas Tips and Burners.—American Lava Company, Chattanooga, Tenn. Catalog No. 19. Gives illustrations and brief descriptions in French, Spanish and English of a line of standard acetylene gas tips and burners and tips and burners for all other gases. An engraving showing the special shapes that can be supplied in quantity lots is presented.

Autogenous Welding and Cutting Equipment.—Searchlight Company, 415 Karpen Building, Chicago, Ill. Catalog No. 12. Gives specific information on the welding and cutting of metals by the oxy-acetylene process, together with a catalog of the equipment required for such work. After a brief description of the process and its advantages in machine and repair shops and manufacturing plants, a number of views of the apparatus at work are shown, and a list of the uses of the apparatus given. Engravings of the apparatus are presented and mention is made of accessories such as torches, welding rods, fluxes, welding tables, hose, goggles, etc. A table giving the approximate gas consumption an dcost of welding with the various tops is included.

Grinding Wheels.—Waltham Grinding Wheel Company, Waltham, Mass. Catalog No. 16. Illustrates and describes a line of straight, cup and cylinder grinding wheels, together with wheels for standard and special machines. Tables of the several sizes of each kind of wheel that can be supplied and others of the speeds that should be employed for various diameters of wheels are included. A number of general suggestions on the selection, mounting and use of the wheels are presented together with general and shape indexes.

Electric Hammer Drilling Machine.—Chicago Pneumatic Tool Company, Fisher Building, Chicago, Ill. Bulletin No. E-43, superseding No. E-38. Points out the advantages of using a universal electric hammer drilling machine for cutting holes in stone and concrete and for light chipping. A brief description of the machine is presented and the text is supplemented by a view of the machine in use and the different forms of steel that are employed with it.

Lifting Magnets.—Electric Controller & Mfg. Company, Cleveland, Ohio. Calendar hanger measuring 16¼ x 18½ in. The upper half of the hanger is given over to an illustration of one of the company's lifting magnets in use for handling pig iron. The calendar leaves, which contain the dates for three months, occupy practically all of the lower half. Mention is made of the company's lifting magnets and automatic motor starters as a means of reducing labor costs and increasing output.

THE IRON AGE

New York, October 19, 1916

ESTABLISHED 1855 VOL. 98 : No. 16

Production System in a 75-Man Shop

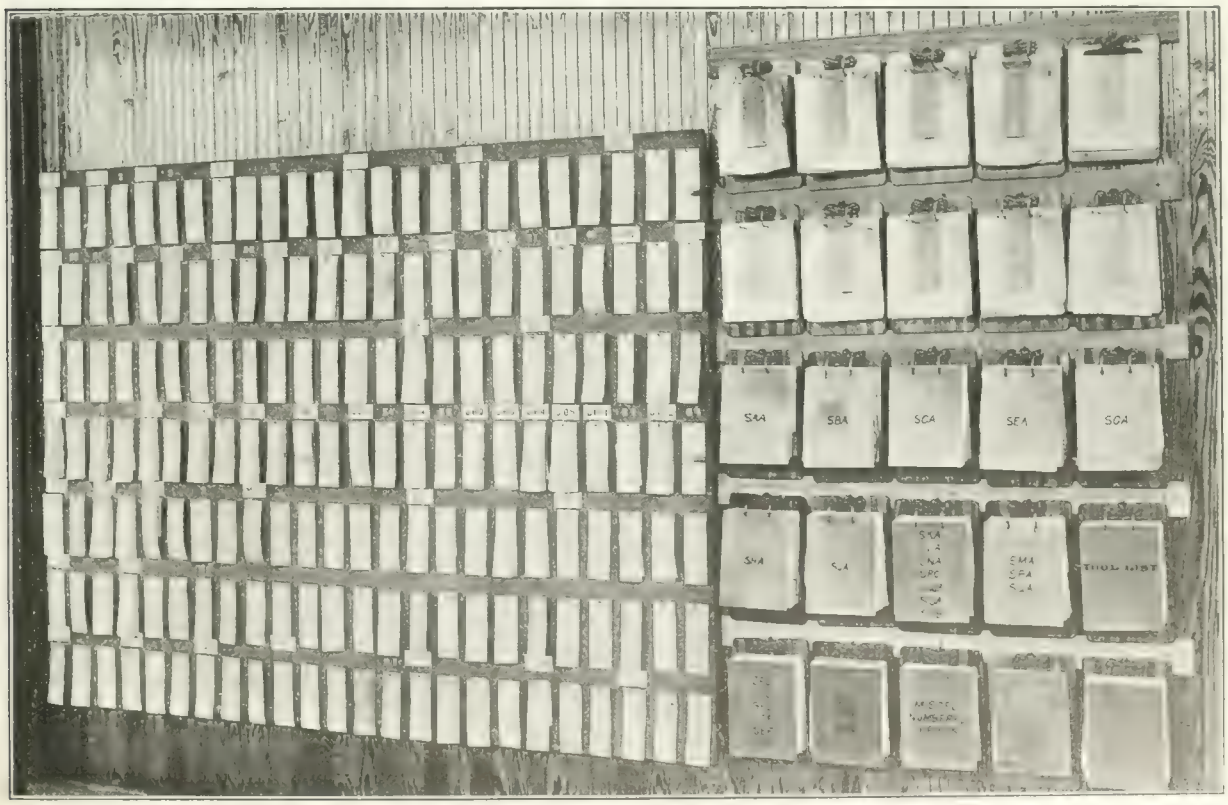
New Plant of Waterbury Tool Company and Some Routing Methods Employed in the Making of Hydraulic Speed Gears

BY W. E. FREELAND

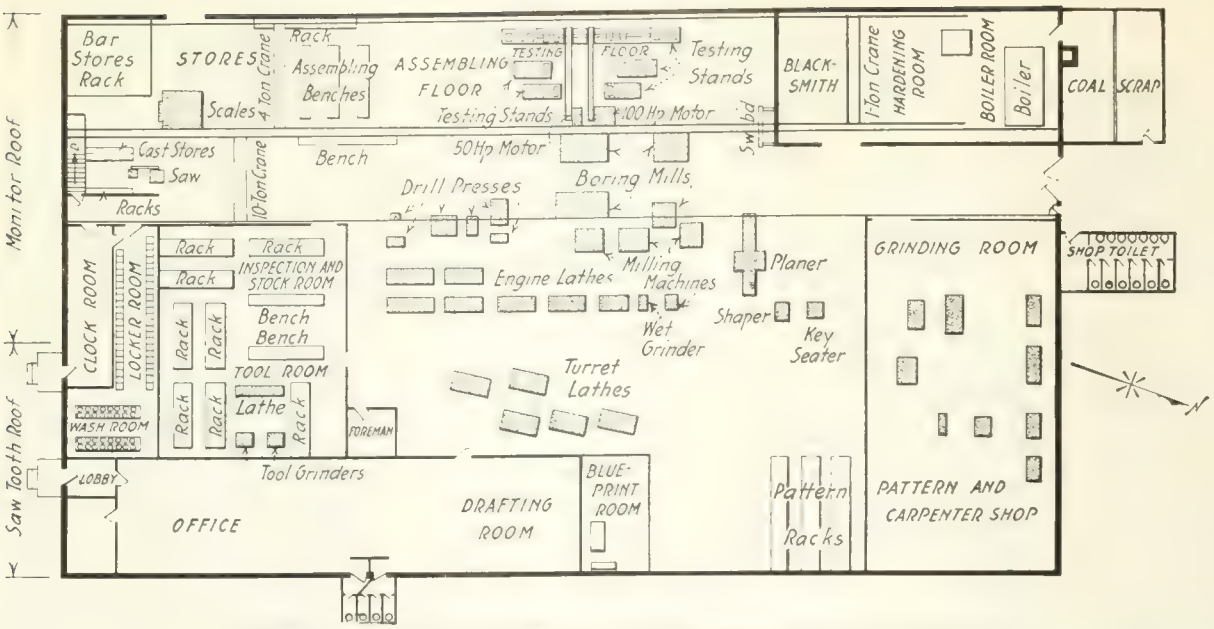
Go where one will on any modern vessel of any modern navy and one is not unlikely to find hydraulic speed gears used for gun elevating, gun training, shell hoists, powder hoists, rammers, aeroplane hoists or similar purposes. This comparatively new type of apparatus is popular because of its positiveness, quickness and delicacy of control. It was described in THE IRON AGE of May 29, 1913, and is made by, or under license from, the Waterbury Tool Company, Waterbury, Conn. The use of this hydraulic speed gearing, while now confined to naval purposes largely, will undoubtedly spread into many industries because of the positive mechanical means for obtaining any desired speed of rotation from zero to maximum of a secondary drive with extreme simplicity of operation.

The speed gear business of the Waterbury Tool Company was started in a portion of the top floor of the factory of the New Britain Machine Company, New Britain, Conn. Later it became necessary to occupy the whole floor. The business continuing to show a healthy growth, it proved desirable to look for larger quarters. A site was bought on East Aurora Street, Waterbury, Conn., and the factory which forms the subject of this article was built.

The main building is 120 x 212 ft., with one section of the roof monitor type and another section saw-tooth type. A portion of this building is now occupied as an office pending the erection of an office building adjoining the existing building. At the time that the various illustrations were made all details of the complete installation had not been finished, as the pressure of business compelled the



The planning board is of the familiar hook-and-tag type, the tags in this case being the daily time cards which are the only production order sent into the machine shop. The two upper rows of the spindle binders shown at the right are the assembly orders (a time card and the assembly sheet of the bill of materials) and the three lower rows are drawings and data sheets arranged and segregated by group symbols. The numbers on the planning board are the various machine numbers



GENERAL PLAN OF THE PLANT OF THE WATERBURY TOOL COMPANY

company to put the plant into operation at the earliest possible moment, leaving some features of equipment and the office building to be taken up after the process of production in the new factory had been brought more nearly to normal conditions. The site selected for the factory adjoins the tracks of the New York, New Haven & Hartford Railroad, and a nearby trolley line affords good transportation facilities for employees.

The workmen enter the plant through a clock room by a door just at the right of the office building. At the further end of this room doors open into the shop and into a large locker and wash room. Stepping from the locker room door, one is directly under the monitor of the roof, looking down a craneway which extends the entire length of the building. This craneway has a 10-ton crane which, like all those in the plant, is hand operated. This end of the craneway is utilized as a store room for castings and rough materials, and has a stairway leading to the cellar of the proposed office building.

On the left of this craneway is another with a

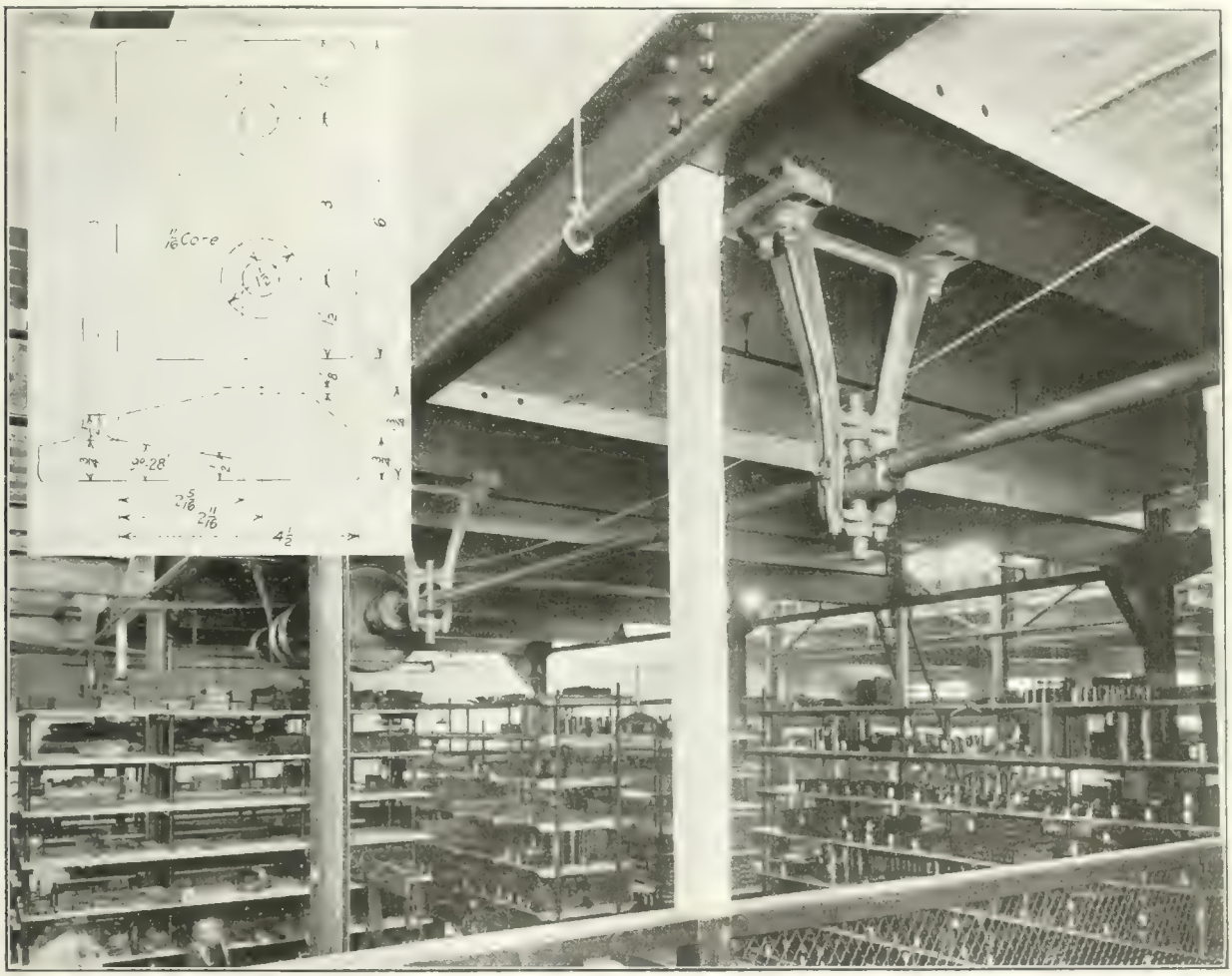


The upper left view shows the drilling machine section, the lower left view covers the engine and turret lathe section, the center picture is of the grinding room, and the lower right gives an idea of the whole machining department. The testing floor for the hydraulic speed gearing, shown in the upper right view, has six testing stands. The testing rig consists of a heavy shaft arranged to be driven by either a 100-hp. motor or a 50-hp. motor, as desired.

4-ton crane, which serves the raw stores section, the assembling floor and the testing floor. A receiving and shipping door opens into the raw stores section, which has racks for bar stock, a cutting-off saw and a platform scale. The assembling floor has several benches and a parts rack, the work of assembling requiring no machine equipment. The testing floor has six testing stands, the testing rig consisting of a heavy shaft arranged to be driven by a 100-hp. or a 50-hp. motor as desired. The shaft has several clutches so arranged that any desired driving combination for one or several testing stands may be employed.

The farther end of this part of the shop is partitioned off for a blacksmith shop, a hardening room and a boiler room, and is served by a 1-ton crane.

On the side of the main craneway adjoining the locker room is a large room given over to a tool room, to final inspection and to the storage of finished parts. The inspection, as characteristic of all shops manufacturing government products, is especially close and severe. Not only must all parts pass close inspection, but all assembled gears must pass a rigid test conducted by government inspectors upon the testing equipment of the company.



A specially designed casting, of the type shown in the drawing, is used to attach the shafting hangers to the I-beam. The view also gives a glimpse of the rack arrangement in the tool room

The hardening shop has one large Tate-Jones furnace using fuel oil with an air supply furnished by a motor-driven centrifugal fan. There are also a furnace for tool treating and cyanide and lead pots. Oil and water tanks for quenching are set in the floor, and all pipes are in ducts covered with iron plates. A boiler is installed for heating purposes. The radiators are installed below the windows in the monitor section and below the lights in the saw-tooth section, the drains running below the floor into a receiving pit in the boiler room. An addition, extending from the boiler room toward the rear of the property, is divided into two sections, one for coal, the other for scrap, oil, etc.

At the end of the main craneway are large doors so that a loaded truck may be driven directly under the crane. The men's toilet is in a small addition extending from the building at the side of these doors opposite the coal shed. There is no door opening directly into the shop from the toilet room. A portion of this craneway is occupied by four large boring mills and a large radial drill press so that these machines can be served by the large crane. Other large machine tools are served by I-beam trolley hoists.

The tool room is equipped with tool grinding machines and a tool lathe.

All drawings are symbolized. First comes a letter designating the general classification, then a second letter designating the size, then a third for the type, then a number showing the order of this piece in the assembled group, then finally a letter designating this group. Each drawing, and its accompanying tool and operation sheet, is pasted upon a stiff piece of fiberboard and filed vertically by group symbols. All larger tools are similarly symbolized and kept on shelves on iron racks, being appropriately marked by groups and subdivisions of groups.

Small tools are kept in racks with inclined shelves, the surfaces of the shelves being shellaced and their under surfaces painted white to reflect the light upon the tools on the shelf below. The

small tools are listed in a visible index form, and are selected from the blueprint of the tool sheet. Tool issues are governed by the daily time cards issued by the planning department, and the routing foreman has a move-man who delivers the tools, the part drawing and the tool set-up drawing to the operator, and collects them after a job is finished The tools are not returned to the tool clerk, but to the tool room foreman, who inspects and puts all tools in good condition before they are replaced upon the shelves.

A large portion of the right side of the shop is occupied by the equipment of machine tools, an especially large use being made of turret lathes. As the nature of the product requires close machining with unusually small tolerances, the machine tools in use are of the most modern type, accuracy of output being the chief aim. Nevertheless, due to the employment of only highly skilled workmen at high wages, to good working conditions and environment, and to the management's policy of encouraging initiative and imagination, the production from these machines is unusually high, being in many cases considerably in excess of ordinary shop standards. In fact, this shop furnishes a good example of the possibilities of production, high in both quality and quantity, existing in the shop of less than 100 hands, when both manager and workman have not lost the personal touch and both are imbued with that spirit of co-operation which smooths out all troubles and brings to the solution of every production problem the experience and knowledge of the men who plan and the men who execute.

A portion of this space is used for a blueprint room and another section for pattern storage racks. The rear of this part of the shop is partitioned off as a grinding room and a pattern and carpenter shop. The partitions of this room are of wood from the floor to a height of 4 ft., above this a 3-ft. wire grill, and then wood from the top of the grill to the ceiling. The partitions of the tool room and the locker room are the same, except that there is no wood above the grill. All these partitions are in sections so that the size of any room can easily be changed. This type of partition is clearly shown in the illustration of the grinding room. The grinding room equipment is modern and comprehensive, consisting of the latest types of cylindrical, internal and vertical spindle surface grinding machines, and a specially developed machine for grinding the ball ends of the connecting rods which form part of the gear assembly.

The office building which will be erected will have two floors. The first floor will have an entrance lobby, a large private office and two smaller private offices, two lavatories, a storage room, a vault, and a large space for the accounting department. The second floor will have a large private office, two laboratories, a blueprint room, a vault, a lavatory, and a large space for the engineering department.

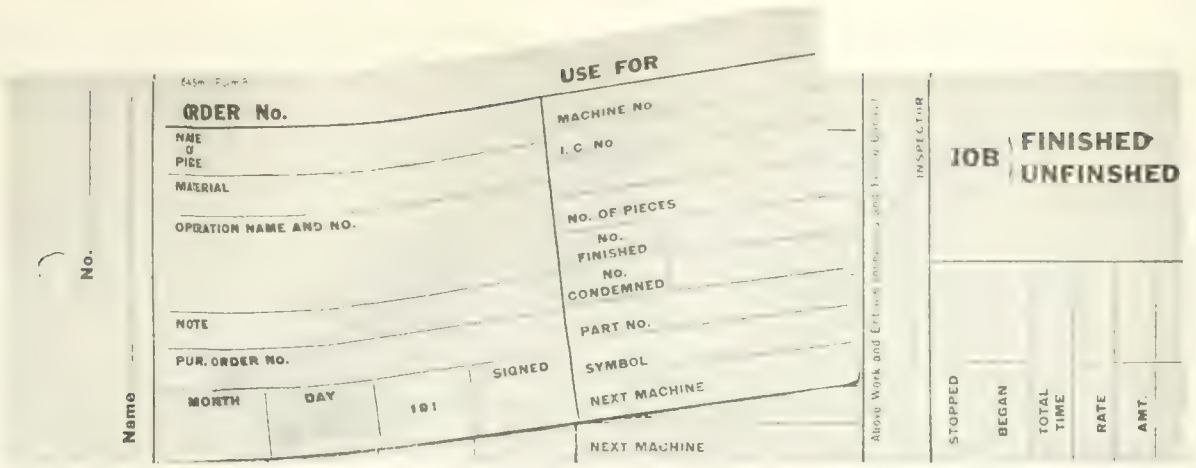
The structural features of the plant are in keeping with the best practice. The plant has fire-extinguishing sprinkler system fed from a 30,000-gal. tower tank and the sprinkler mains are painted red to distinguish them. Heating mains are covered and painted white, while the service water mains are painted black. Electric mains are inclosed in iron pipe, which is painted gray. The larger machine units are driven by individual motors, the smaller units being arranged in group drives.



A circulating inspector keeps close watch upon all machining operations, and the finished parts are given a final inspection in this room. The racks in the background are used for storing worked materials and the larger tools.

Several interesting and uncommon features are found in the system of controlling production and routing work in this plant; the more interesting because this is not a huge plant of the type from which examples of system are usually drawn, but a factory of about 75 employees. While there is always the same need for a good routeing system in the smaller shop, it is not so common to find a workable system developed in the smaller plants.

Shop production sheets are not employed, but a planning board of the hook-and-tag type is used. The size of the shop makes it possible for the superintendent to give personal attention to the sorting of jobs for precedence. No time cards are issued until the work is available. These time cards are of two colors and vary slightly for different purposes. A manila time card is issued for each opera-



The time cards form the only production order issued to the shop. For the first and for each successive operation on a piece, except the final operation, this manila colored form with its attached tickler is issued. For a final operation the form is the same, but the color of card and tickler is blue.

tion except the final one; a blue card is used for the final operation. The first time card for each operation, shown in one of the illustrations, has attached to it a yellow tickler sheet upon which the instructions are written, the manila card being written at the same time by manifolding. The tickler is removed when the card is issued and is put into a tickler file.

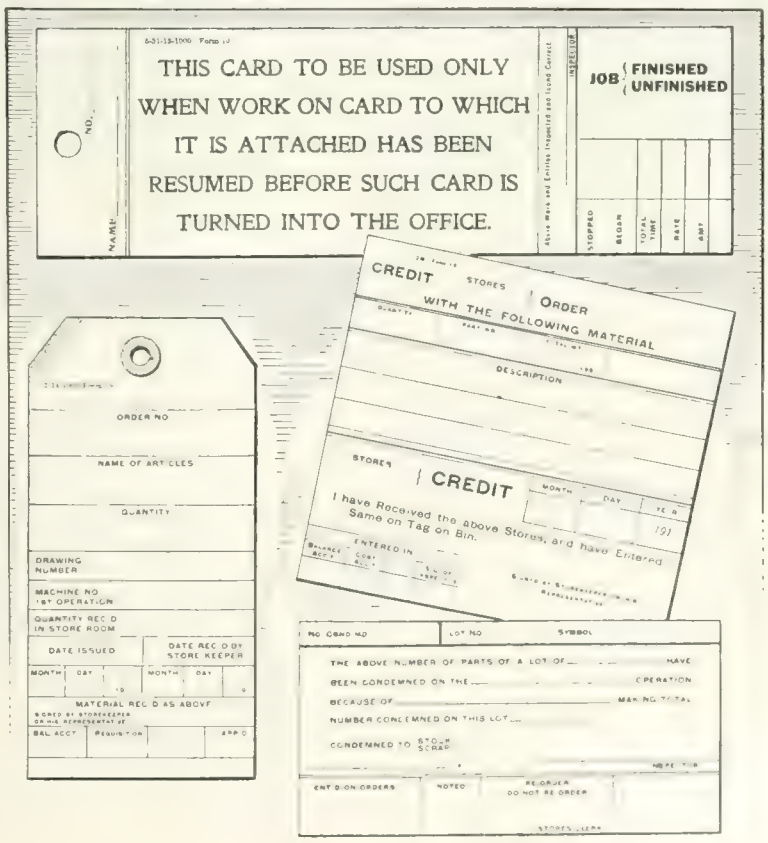
It will be seen from the illustration that the time card bears all the necessary details except the machining instruction and forms a production order. This is the only order issued, except the traveler, which is described later in this article. If the operation is not completed upon the day of issue, another time card of the same form, but without the tickler sheet and with the word "Continuation" printed upon the left end, is issued for the following day. Thus a continuation time card is issued daily until the operation is finished.

If it becomes necessary to take an operator off a job sometime in the day, but he resumes work upon the job on the same day, a third type of time card, also illustrated, is issued, which is attached to the original time card and turned in with it. These time cards are turned over each day to the cost clerk.

For the final operation upon a piece the same form of time card—with tickler slip for the first day and "continuation" card for following days—but blue in color—is used.

The machining instructions for each operation are put upon a tool set-up drawing, which is delivered to the operator with the tools for the job. The planning department fills out a routing card for standard operations on each piece so that a clerk can fill out all time cards by referring to the proper card in the operation card file.

In the nomenclature of this shop, all raw materials are termed "stores"; all machined parts returned to storekeeper are called "worked materials." When the time card for a first operation is issued, a traveler in the form of a tag is sent to the storekeeper as an order for the necessary stock. When issued for other than bar stock—that is, when there is nothing to be returned to stores—the manila tag traveler goes through the shop with the parts. If the requisition is for bar stock, the manila tag and also



If it becomes necessary to "break up" on a job during the day, but the operation is resumed before the day is over, a time card is issued which has a time end but not the other information found on the regular time cards.

The manila traveler tag serves as an order on the storekeeper for needed supplies and goes through the shop with the parts. If the order is for such material as bar stock from which there will be a return to stores, a blue traveler is also used to return to stores with the unused stock.

The storekeeper fills out a blue slip for all issues of stores or worked materials; also white slips for all credits to either stores or worked materials. Black printing indicates "stores" and red, "worked materials."

Original condemnation slips used by the inspectors are yellow; duplicates, blue. If the piece is scrapped, the yellow slip is sent to the cost clerk and the blue duplicate is placed in the inspector's file. If the piece is passed, the superintendent makes a notation on the yellow slip and both the original and duplicate go to the inspector's file.

a blue tag of the same form are issued. The manila tag goes through with the parts and the blue tag is returned with the unused stock to the storekeeper, serving as a means of identification.

In the stores department, small slips are filled out when stores or worked material are issued or returned. Issue slips are on blue paper; credit slips on white. All slips referring to stores, both issue and credit, are printed with black ink; all slips referring to worked materials with red ink. All these slips are sent to the cost clerk.

Upon receipt of an order, the office fills out a shop order, which is turned over to the production department. This shop order gives general information concerning the product desired. The superintendent sends this order to the chief draftsman, who makes out a "bill of material." All correspondence affecting designs and manufacture from designs goes through the hands of the chief draftsman.

The bill of material form is filled out in quadruplicate. The first sheet (white) is a cost ledger sheet; the second (buff) is a production office reference sheet; the third (pink) is a storeroom sheet; the fourth (blue) goes to the assembly foreman. In filling out these forms, the materials are arranged in groups which show the general method of attack in the assembling operations. The blue (assembly) sheet of the bill of materials serves as an order on the storekeeper for the issue of the necessary stores or worked materials, and when the assembly is completed is sent to the cost clerk. A blue time card with the time end off serves as an assembly order.

The planning department specifies all purchases as to quantity and material. A purchase requisition is made out in duplicate, a white copy going to the purchasing department and a yellow copy into a departmental file. The purchasing department issues the purchase order in triplicate, a white sheet serving as the original order, a yellow sheet going to the purchasing department's file and a pink sheet going to the storekeeper's file.

When parts are condemned by an inspector, a condemnation slip is made in duplicate on yellow and blue paper. These yellow slips are turned in each day to the superintendent who, on the following morning, examines each condemned piece and decides whether it shall be passed or scrapped. If scrapped the yellow condemnation slip is sent to the cost clerk. If passed the reason therefor is noted on the yellow slip, and both yellow and blue slips are placed in the inspection department's file. This method obviates any dispute as to responsibility in case a faulty part is discovered in the completed product.

The company has built for rental to its employees nine one-family frame houses on the part of its 10-acre shop site most distant from the present machine shop. A 40-ft. street has been laid and the houses built on both sides of it. They are of five dissimilar types so that the group does not have the appearance of factory houses. They are of five and six rooms, on lots 50 x 120 ft., and have city water, bathrooms, warm-air heating furnaces, electric light and arrangements for sewage disposal by means of septic tanks. The company has also built, for rental to foremen, on lots 60 x 140 ft., within fifteen minutes' walk of the shop, two twin houses with modern improvements.

The officials of the Waterbury Tool Company are Horace G. Hoadley, president and treasurer; Reynold Janney, vice-president and chief engineer; Chas. P. Haight, secretary and assistant treasurer; John J. Crain, sales engineer, and William S. Wilkinson, superintendent.



Nine single family houses rented to employees [illegible] As the factory is located on the outskirts of the city, this housing operation has proved an asset in the matter of retaining skilled workmen

A Canadian Steel Manufacturer's Views

Col. Thomas Cantley, president Nova Scotia Steel & Coal Company, New Glasgow, Nova Scotia, denies that there is any foundation for the rumor that his company and the Dominion Iron & Steel Company are contemplating a merger. In a recent interview Colonel Cantley estimated the steel production of Canada for the current calendar year at 1,500,000 tons, which would make an increase over last year of 53 per cent and over the record year 1913 about 30 per cent. When the war ends it can hardly be expected that the home market will absorb as much, for a year or so, at any rate, as it did in the years preceding the war. To meet whatever demands may eventuate Canada will have enough steel-making capacity. He does not look altogether to the home market to take the product of plants in a position to do export business. He has, however, great expectations even of the Canadian market. For a year or more previous to the war there was very great economy in the purchasing of steel and steel goods. Railroads, he points out, took very little, and they have not been able since to get what is essential to the upkeep of their roads and equipment. Given a normal crop in the West, a state of affairs will be revealed that will startle Canada. Ordinary wear and tear on Canada's roads has not been taken care of, and hence when financing is possible under more normal conditions than at present there will be a very strong demand in Canada for steel. He is further quite confident that Canadian producers will be able to get a part of the trade abroad that was in past years done by Germany. He pointed out that elsewhere than in Canada there had taken place the same forced neglect of plant and equipment of railroads. This is particularly true of South America, where there are very extensive mileages that will have to be almost re-equipped with cars and rails.

The Northern Pacific Railroad has recently completed the construction of 250 box cars at its Tacoma shops and will proceed to build 500 more in its own shops, a large number of which will be built in Tacoma. The work is the result of the company's decision to meet car-shortage conditions by the construction of new equipment.

St. Louis—Its Place in the Steel Industry

The American Iron and Steel Institute to Visit the World's Largest Producing District for Basic Open-Hearth Steel Castings

St. Louis, the meeting place of the American Iron and Steel Institute on Oct. 27 and 28, is the gateway, the distributing center and the clearing house for the great southwestern section of the United States. The fourth city in population, a vast territory is tributary to it—a territory given to agriculture and cattle-raising rather than to manufactures, a section of the country consuming largely of manufactured articles but producing them meagerly. Great railroad systems gridiron the country stretching away to the Gulf, the west coast and the north, and their dependence upon their Mississippi River terminal for equipment and supplies is almost complete. With fifty-one railroads in Missouri, of which 28 important lines enter St. Louis, and with 80,000 miles of railroad, or one-third the country's total, in the States contiguous to Missouri which create the traffic passing through the city, it is not surprising, with particular reference to iron and steel, that St. Louis is outranked by only two cities in the volume of its yearly business in railroad materials. Upon the needs of the railroads has been founded the most conspicuous claim of St. Louis to prominence in iron and steel manufacture—her basic open-hearth castings industry. On how different a foundation has been built St. Louis's latter-day activities in iron and steel from that planned by the pioneers of the lower Mississippi valley!

EARLY PROMINENCE IN IRON ORE

The palmy days of Missouri as a producer of iron ore constitute a chapter in Western industrial annals. The distorted perspective of the writers of the time and their extravagant predictions are not so surprising when it is recalled that even as late as 1880 the greatest sources of our raw material to-day and some of the now conspicuously large iron and steel centers were unknown or undeveloped. In his history of St. Louis, published in that period, Scharf writes: "St. Louis could not occupy its present commanding position and maintain its lofty attitude as a trade center if it were seated . . . in the gateway of a great fresh water pond like Chicago." Later he says: "St. Louis is regarded as the center of that iron region where they have enough ore to run 100 furnaces for 1000 years. With Iron Mountain, Pilot Knob, Shepard Mountain, Simmons Mountain and thousands of other deposits to glut the forges of the future, St. Louis cannot fail to become the grandest iron workshop in the world."

It is of interest to note, 36 years later, that with an ore production in Missouri very nearly as large as the yearly average during the period of rosiest hopes—40,290 tons in 1915—the iron and steel industry of St. Louis is now almost wholly dependent upon iron ore shipped in from Iowa and the Lake Superior district, or upon pig iron produced in other States. The contrast between the then epochal 925,000 tons of Missouri ore mined in the years from 1850 to 1870 and the 55,526,490 tons mined in the United States in 1915 makes the Missouri historian's claims fairly grotesque.

EARLY CAST AND WROUGHT IRON PRODUCTS

The manufacture of forged and cast iron at St. Louis dates back to 1814, when D. Stewart made nails and brads and bar iron, selling the bars at 14c. per pound, and to 1817, when Lewis Newell, a blacksmith, forged edge tools for the furriers who made St. Louis the most important trading center in the country in that line, as it remains to-day. Later Newell also cast hub boxes for wagons, and subsequently he and Samuel Gaty operated a foundry, which under various managements continued the making of castings until 1860. In 1837 Hudson E. Bridge and Samuel S. Rayburn began the manufacture of plows at St. Louis, subsequently branching out into stoves and hollow ware. Philip Kingsland, the connection of whose name with the Kingsland & Ferguson Mfg. Company runs into recent years, organized the Phoenix Foundry & Machine Shop for the purpose of building stoves and making tin plate. This was in 1844. In 1869 he organized the Kingsland Iron Works at Carondelet, building two blast furnaces which later became the property of the Vulcan Steel Works. Present day names again appear in the organization in 1849 of the stove manufacturing concern of Buck & Wright.

The first bar of iron wrought from pig metal in Missouri was made on Cedar Creek, Washington County, in May, 1825, and the first blooms in 1832. These operations were shortly abandoned because of the difficulty of transporting raw materials, particularly fuel. A second furnace, built by one Massey in 1828 in Crawford County, was operated for a long period. The early operation of blast furnaces was greatly handicapped because of the inaccessibility of suitable fuel. The history of the Carondelet furnace, completed in 1864, is an illustration. It was operated for three months on St. Louis County coal, but produced a poor and unprofitable iron. Following an idleness lasting into 1866, the furnace was again leased and run on Indiana coke. In 1868 Illinois coal was substituted, with a considerable degree of success. The yearly production of Illinois coal now approximates 57,500,000 tons with a value of $64,700,000, a value equivalent to $1.12 a ton at the mine, while Missouri produced in 1914 4,000,000 tons of coal with a value of $6,800,000, or $1.73 a ton at the mine.

IRON MOUNTAIN ORE

The presence of iron ore in the famous Iron Mountain was known long before any of it was utilized, but in 1843 James Harrison acquired a one-third interest in the mountain and in company with St. Louis and New York capitalists began opening up the deposits. The Iron Mountain Railroad Company was organized and two charcoal iron furnaces were built. In October, 1846, the first shipment of pig iron from the Iron Mountain Company's furnaces was made to the foundry of Gaty, McCune & Glasby at St. Louis, and it was stated at that time that "the capacity of the furnaces will run from sixteen to twenty tons of pig iron per day, while the supply of ore is inexhaustible." Concerning Iron Mountain, it was written in 1870, "The ore is so excellent that much of it, and also that from Pilot Knob, is now used by the manufacturers on the Ohio River for mixing with ores found there and is especially esteemed for making nails." Simultaneously with the development of Iron Mountain,



ST. LOUIS RIVER FRONT WITH

the ores of Pilot Knob were being exploited by Lewis V. Bogy, incorporated as the Madison Iron Mining Company. In 1870 this company had one furnace in operation and was building a second which would provide an aggregate capacity of 20 tons per day. The company also had an eight-fire forge and was making about 25 tons of blooms per week direct from the ore. Some bar iron was also made.

During the period from 1850 to 1870, the manufacture of pig iron increased very slowly in Missouri. It is estimated that a total of 310,000 tons of iron was made, compared with about 40,000 tons prior to 1850. In the same time about 925,000 tons of ore had been mined, the excess of about 300,000 tons being shipped by boat to Ohio River furnaces, largely from Pilot Knob. A considerable amount was used for fettling or "fix" in puddling furnaces. Ore was also sent to Indiana and Tennessee and at least one shipment to Scotland is recorded.

MISSOURI BLAST FURNACES OF THE SEVENTIES

In 1874 the following blast furnaces were being operated in Missouri, using charcoal as fuel:

Pilot Knob, annual capacity	12,000 tons
Iron Mountain, annual capacity	12,000 tons
Irondale, annual capacity	7,000 tons
Maramec, annual capacity	6,000 tons
Scotia, annual capacity	7,000 tons
Moselle, annual capacity	6,000 tons

The furnaces using bituminous coal and coke were:

Vulcan, annual capacity	25,000 tons
Missouri, annual capacity	25,000 tons
South St. Louis, annual capacity	25,000 tons
Carondelet, annual capacity	8,000 tons

Rolling mills in operation at the same date included the Vulcan Steel Works with an annual capacity of 40,000 tons and Laclede with a capacity of 10,000 tons.

LATER FURNACE AND ROLLING MILL COMPANIES

In 1881 the present day names began to appear. There were in operation at that time ten bituminous coal and coke furnaces with an annual capacity of 224,000 tons and four charcoal furnaces with a capacity of 57,500 tons. The Missouri Furnace Company, operating the Missouri, South St. Louis and Meier furnaces, was the forerunner of the St. Louis Blast Furnace Company, whose property was reorganized last year, taken over and placed in operation by the Mississippi Valley Iron Company. The St. Louis Ore & Steel Works was operating the Carondelet furnace and the Midland, Scotia, Pilot Knob and Sligo charcoal furnaces were making Bessemer iron. There were six rolling mills and steel works in the early eighties, including the Vulcan mill, which in 1876 was changed over from iron to steel and which during 1882 consumed 100,000 tons of pig iron and produced 90,000 tons of steel rails; the Granite Iron Rolling Mills, built in 1879 and now a part of the National Enameling & Stamping Company's works; the Laclede Rolling Mills; the Helmbacher Forge & Rolling Mills, now a part of the American Car & Foundry Company's Granite City works; the St. Louis Steam Forge & Iron Works, abandoned in 1908, and the St. Louis Bolt & Iron Works, still existent. In 1880 St. Louis had as much capital invested in the manufacture of iron and steel products as Philadelphia, 33 per cent more than Chicago and twice as much at Cleveland.

Since the early eighteen-eighties, when the iron and steel industries of St. Louis were largely dependent upon and encouraged by production of local raw materials, the mining of Missouri ores and the production of pig iron have gradually declined, as more favored producing centers have forged ahead and the wealth and more desirable characteristics of other raw material deposits have shown the comparative limitations of the ore and coal resources of Missouri. Rolling mill capacity, based on the reworking of scrap, has remained about the same, being absorbed into the larger organizations which are to-day contributing largely to the production of St. Louis. One prominent exception is the Tudor works of the Republic Iron & Steel Company, which was





EADS BRIDGE AT THE RIGHT

dismantled in 1914 after 35 years operation as a bar mill.

PRE-EMINENCE IN BASIC STEEL CASTINGS

The manufacture of basic open-hearth steel castings, for which, as has already been pointed out, St. Louis claims first place, had its foundation in new conditions and has not been directly a development of the earlier iron and steel industry of the State. The following table is an impressive exhibit of the tonnage of basic steel castings annually produced in the district, which includes St. Louis proper, Granite City, East St. Louis and St. Charles. The figures represent finished castings and not steel melted:

	Tons per Month	Tons per Year
American Steel Foundries, Granite City	6,500	78,000
American Steel Foundries, East St. Louis	4,500	54,000
Commonwealth Steel Company, Granite City	5,000	60,000
Scullin Steel Company, St. Charles	4,500	54,000
Warren Steel Casting Company, St. Louis	100	*1,200
St. Louis Steel Foundry, St. Louis	375	*4,500
St. Louis Frog & Switch Company, St. Louis	275	*3,300
	21,250	255,000

*Electric and converter steel.

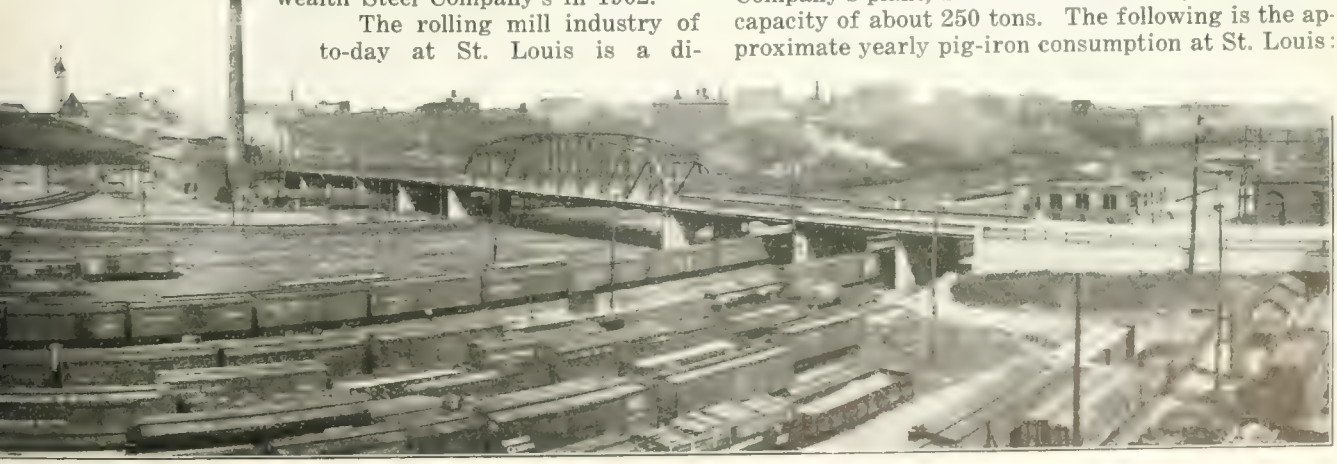
In 1915 the country's production of basic castings was 333,103 tons, less than 100,000 tons greater than that of the St. Louis district. In September of this year at its Granite City plant, the American Steel Foundries made 6800 tons of castings, the largest individual plant output ever attained in one month by a basic open-hearth foundry. In addition to the steel made at St. Louis for castings, the Laclede Steel Company, at its Alton works, produces 75,000 tons of ingots annually. It is noteworthy that this great steel castings industry has had its entire growth almost within two decades. The Granite City plant of the American Steel Foundries was built in 1894; the Scullin Steel Company's first operations as the Scullin-Gallagher Iron & Steel Company began in 1899, and the Commonwealth Steel Company's in 1902.

The rolling mill industry of to-day at St. Louis is a direct descendant of the earliest efforts, particularly as represented in the American Car & Foundry Company's Helmbacher mill and the National Enameling & Stamping Company's Granite City plant. In addition to these organizations, the active rolling mill operators in the St. Louis district include the Laclede Steel Company, the St. Louis Screw Company and the Hirsch Rolling Mill Company. The following is a tabulated statement showing the plant capacities and products of each:

National Enameling & Stamping Company:		
Granite Iron Rolling Mills, built 1879. Black and galvanized sheets		24,000 tons
Granite City Steel Works, built 1895. Ingots, billets, sheet and tin plate bars, universal plates, blue annealed and black sheets		120,000 tons
American Car & Foundry Company:		
Madison Car Works. Steel and wood freight cars	15,000	
Cast-iron car wheels	350,000	
Madison Rolling Mill, built 1900. Merchant bars		60,000 tons
Missouri Car & Foundry Works. Steel and wood freight cars	20,000	
Cast-iron wheels	250,000	
Gray-iron castings (tons)	17,500	
Helmbacher Forge & Rolling Mills, built 1858. Bar, rod and band iron		60,000 tons
Laclede Steel Company:		
Madison Works, built 1911-12. Rail-carbon bars		40,000 tons
Alton Works, built 1913. Ingots, billets, bars, strip steel		100,000 tons
St. Louis Screw Company. Rolling mill built 1914-15. Merchant bars		45,000 tons
Hirsch Rolling Mill Company, built 1900. Merchant and refined iron and steel bars		30,000 tons
Total rolled products		479,000 tons

PIG-IRON CONSUMPTION

For the major part of St. Louis's iron and steel industry, pig iron is the purchased raw material. Following the discontinuance of operations by the St. Louis Blast Furnace Company in 1912, all of the pig iron consumed at St. Louis has been shipped in except for the small production of the Sligo Furnace Company, the output of which is taken by the American Car & Foundry Company, until a few months ago when the Mississippi Valley Iron Company, having remodeled the St. Louis Blast Furnace Company's plant, blew in on basic iron, with a daily capacity of about 250 tons. The following is the approximate yearly pig-iron consumption at St. Louis:



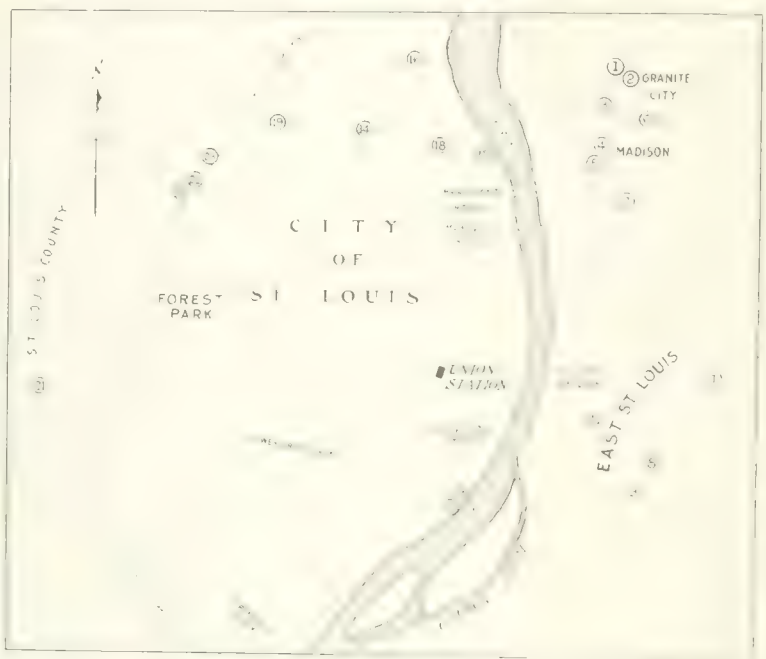
UNION STATION AT ST. LOUIS

Scullin Steel Company	[illegible]
American Steel Foundries	60,000 tons basic
Commonwealth Steel Company	[illegible]
National Enameling & Stamping Company	[illegible]
Laclede Steel Company	20,000 tons basic
Total	230,000 tons basic

In addition there are bought each year about 75,000 tons of foundry iron, 40,000 tons of carwheel iron, 15,000 tons of malleable Bessemer (of which the largest user is the Missouri Malleable Iron Works, having an annual capacity of 25,000 tons of castings), and 10,000 tons of low phosphorus iron for the converter steel foundries, making an aggregate of 375,000 tons of pig iron per year.

With so good a market at hand, the rehabilitation of the blast furnace at St. Louis is not surprising and the basis upon which this resumption was considered profitable has been completely outlined in a report made under the authority of the Business Men's League of St. Louis and published March 16, 1915.

During the ten year period from 1905 to 1915 the price of Southern iron delivered at St. Louis ranged from a minimum of $12.90 to a maximum, apart from the exceptional prices of 1906-7, of $18.40. Northern basic, foundry and malleable iron prices have ranged from $14 up to $20, again excepting 1906-7. For the operations of a single furnace whose entire output could easily be absorbed in the local demand for Northern basic, the St. Louis market thus affords an attractive profit on the basis of pig-iron production costs in other districts.



IRON AND STEEL INDUSTRIES IN ST. LOUIS DISTRICT

1. American Steel Foundries
2. National Enameling & Stamping Company
3. Commonwealth Steel Company
4. American Car & Foundry Company
5. Helmbacher Forge & Rolling Mill Company
6. Granite City Steel Works
7. Laclede Steel Company
8. American Steel Foundries
9. Missouri Bridge & Iron Company
10. Railway Steel Spring Company
11. Missouri Malleable Iron Works
12. American Car & Foundry Company
13. Busch-Sulzer Brothers Diesel Engine Company
14. Heine Safety Boiler Company
15. St. Louis Car Company
16. St. Louis Malleable Casting Company
17. St. Louis Screw Company
18. Wrought Iron Range Company
19. Western Electric Mfg. Company
21. Evans & Howard Fire Brick Company
22. St. Louis Frog & Switch Company
23. Curtis & Co. Mfg. Company

WAUKON IRON ORE THE BASIS

For ore the new company looks to its Waukon, Iowa, deposits, from which ore, beneficiated by a process described in THE IRON AGE of Nov. 12, 1914, and averaging 55 per cent iron, can be delivered on cars at the mine for 75c. per ton. A rail freight of $1.50 from mine to furnace brings the ore cost to $2.25 per ton. It is expected that barge shipment will be made in time and the freight materially reduced. Estimates have placed the quantity of usable ore in the Waukon deposit as high as 10,000,000 tons. The concentrating plant is now in process of enlargement that will give it capacity equal to the yearly demands of the furnace. Pending the completion of these improvements, the furnace at St. Louis is working on Mesaba and Gogebic ores which with an all-rail freight of $2.97 from Minnesota and $2.51 from Wisconsin contribute to an ore cost at the furnace of approximately $5.25 per ton, an outside figure. By the completion of the by-product ovens of the Laclede Gas Light Company, an ample supply of furnace coke of standard grade is obtainable at prices ranging from $3.70 per ton to $4.70 per ton. Adding to the minimum and maximum costs of ore and coke the remaining fairly stationary operating charges, gives an approximate minimum cost of $10.50 and a maximum of $17.50, from which it is apparent that financial success largely hangs upon the dependability of the Waukon ore supply. Confidence in the adequacy of this deposit is evidenced by the gathering, even now, of estimates preliminary to the building of another furnace.

For the growth of the lesser units in the metal working fabric of St. Louis — the foundries, machine shops and other manufacturing establishments—the magnitude of the city's general business gives good promise. In 1914 the total of materials received and forwarded at St. Louis was 52,937,116 tons and the value of manufactured products $359,797,000. In 1915 hardware sales totaled $50,000,000; stoves, ranges and furnaces, $6,750,000; railroad supplies, $12,100,000; vehicles, implements and automobiles, $20,000,000; railroad and street cars manufactured, $18,000,000; tin, enameled and galvanized ware, $15,000,000; steel castings and all foundry and machine shop products, $16,000,000; electrical industries, $18,000,000. With 3200 factories St. Louis is indeed a city of varied industry.

The Refractories Manufacturers' Association of the United States, at its convention in Washington, Sept. 15, adopted trade acceptances instead of open book accounts. It is stated that this organization includes about 85 per cent of the firebrick makers of the country.

The Port Moody Steel Works, Ltd., Port Moody, B. C., is now making merchant bars, and proposes to install larger mills after the two open-hearth furnaces now under construction are in operation.

Modern Methods of Cleaning Castings*

The Development in Apparatus — How Careful Arrangement of Plant Has Made the Cleaning Room Highly Efficient

BY H. COLE ESTEP

ASIDE from the sand-blast, the tumbling mill is the most universally used cleaning-room appliance. In many foundries, particularly gray iron shops handling miscellaneous work, tumbling mills and sand-blast machines are operated side by side. In fact, this may be considered the ideal arrangement for a jobbing foundry. A typical installation of this character, in a prominent Milwaukee gray iron foundry, is illustrated in Fig. 1. The installation includes two motor-driven tumblers and two automatic sand-blast barrels. The smaller tumbling mill is 36 x 48 in. and the larger one 42 x 72 in. The sand-blast barrels are of a standard type, each one being capable of cleaning approximately 500 lb. of castings in from 15 to 20 min.

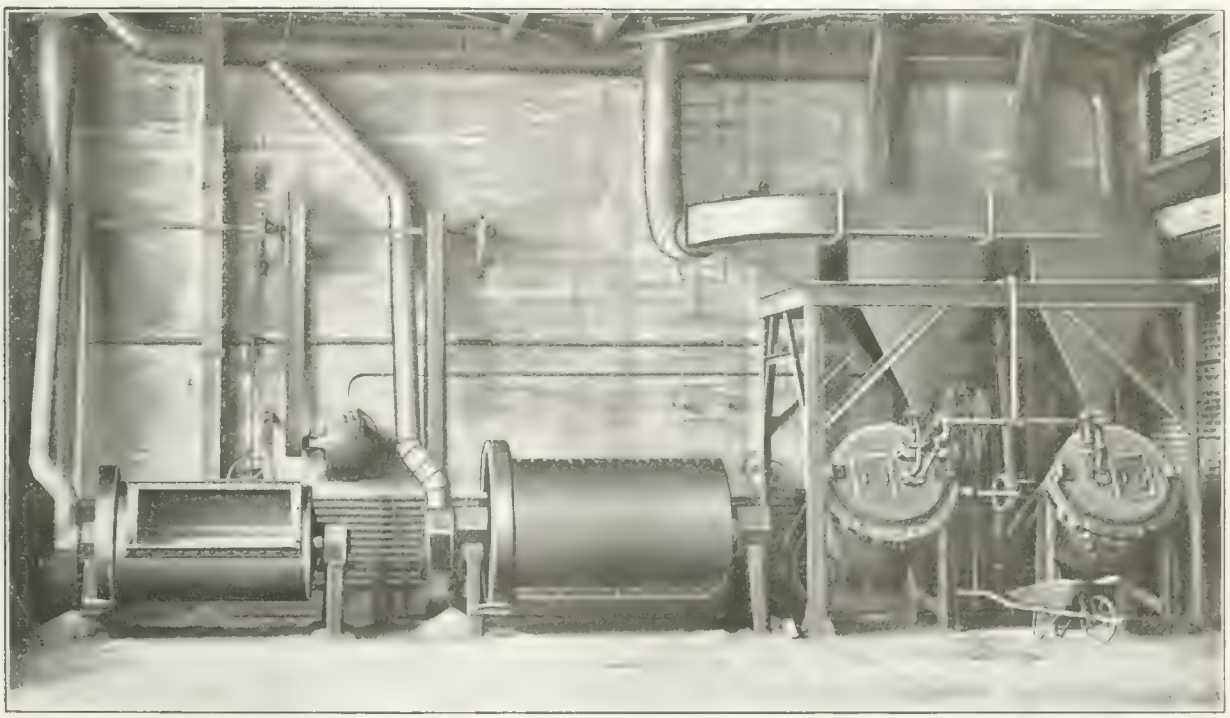


Fig. 1 The two tumbling barrels and two sand-blast barrels in this cleaning room handle 35 tons of castings per day

This apparatus takes care of the work for a gray iron foundry with a molding floor area of 24,700 sq. ft. The shop has an average output of 35 tons of castings per day; some of them, however, are of such a size that ordinary cleaning-room methods are not applicable.

The cleaning room shown in Fig. 1 connects directly with the molding floor and is served by a 5-ton traveling crane with a span of 38 ft. For convenience in chipping work, the room is provided with numerous compressed air outlets. Incidentally it may be stated that few data are available covering the quantity of work which cleaning-room apparatus should be expected to turn out. One authority states that two men should be able to keep six 36-in. rumblers going steadily.

Tumbling mills were designed originally for cleaning small castings. Gradually, however, the size of the mills has been increased, until to-day equipment is available for handling castings weighing several hundred pounds. A battery of large tumblers for handling heavy gray iron castings is shown in Fig. 2. This equipment is installed in the shop of a manufacturer of kerosene-driven farm tractors. The mill in Fig. 2, on which the man is standing, is 60 in. diameter and 72 in. long. The square tumbler immediately at the left is only slightly smaller. If heavy work is to be handled satisfactorily in large tumbling mills it is necessary to provide suitable cranes and hoists for handling the castings.

The foundry in which the mills shown in Fig. 2 are installed has a molding floor area of approximately 36,000 sq. ft. This shop was designed for an output of 100 tons per day. The castings vary from large crank cases weighing 1800 lb. each to small engine parts averaging over a thousand to the ton. The cleaning room is equipped with eight tumbling mills similar to those illustrated in Fig. 2. They are gear-driven by a 10-hp. motor. This department also is equipped with four grinders driven from a line shaft by a 30-hp. motor. A 40-hp. motor operates the fan in the dust collector system. Each tumbling mill is connected to the dust-exhaust fan by direct piping. The dust is discharged into bins situated outside the shop. These bins are provided with hopper bottoms equipped with suitable valves and chutes so the dust may be drawn off into cars and conveniently carried away.

For handling medium size gray iron castings in large quantities open-ended continuous tumbling mills have been installed in a number of foundries. A large mill of this type, 36 ft. long and 28 in

*Abstract of a paper presented at the Cleveland meeting of the American Foundrymen's Association, Sept. 13

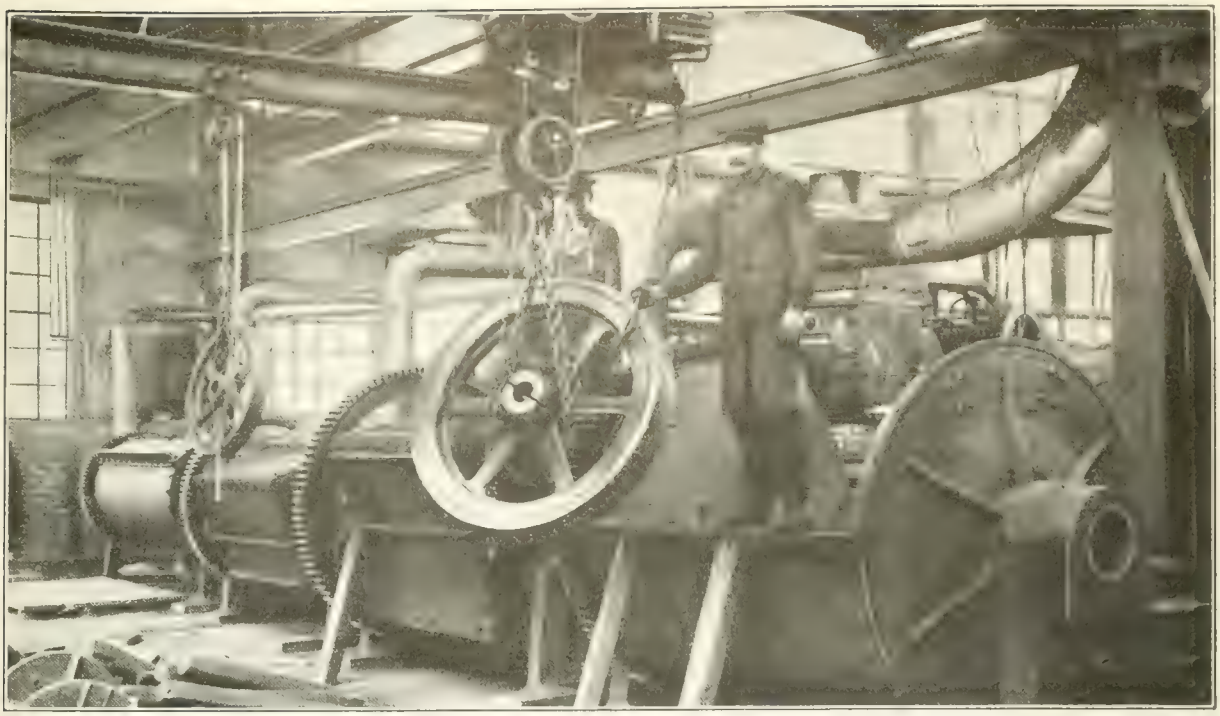


Fig. 2—The tumbling barrel can be used for cleaning extremely large castings. The mill shown here is 60 in. in diameter

diameter, is in operation in an Indiana implement foundry. The outlet of the barrel is provided with a door which can be adjusted at any angle to regulate the discharge of the castings. The castings are charged at one end of the barrel and discharged from the other, the desired incline being secured by two jacks which elevate the entire machine. The exhaust hood is placed near the front end where the castings receive the first cleaning as it has been found that the largest amount of dust accumulates at this end. The barrel is of steel plate construction 1 in. thick and six staggered ribs are riveted to the inside throughout its entire length to prevent the castings from sliding. The mill is belt-driven and in addition to the spur gears on the barrels, two welded tires are provided which rest on roller bearings.

POWER REQUIRED FOR TUMBLING MILLS

In connection with the power required for operating tumbling mills, some data prepared by Lockwood, Green & Co., Boston, are interesting. The investigation was conducted to determine the feasibility of replacing three separate power plants with one central plant in a large manufacturing works. The tumbling barrels were arranged two on a shaft,

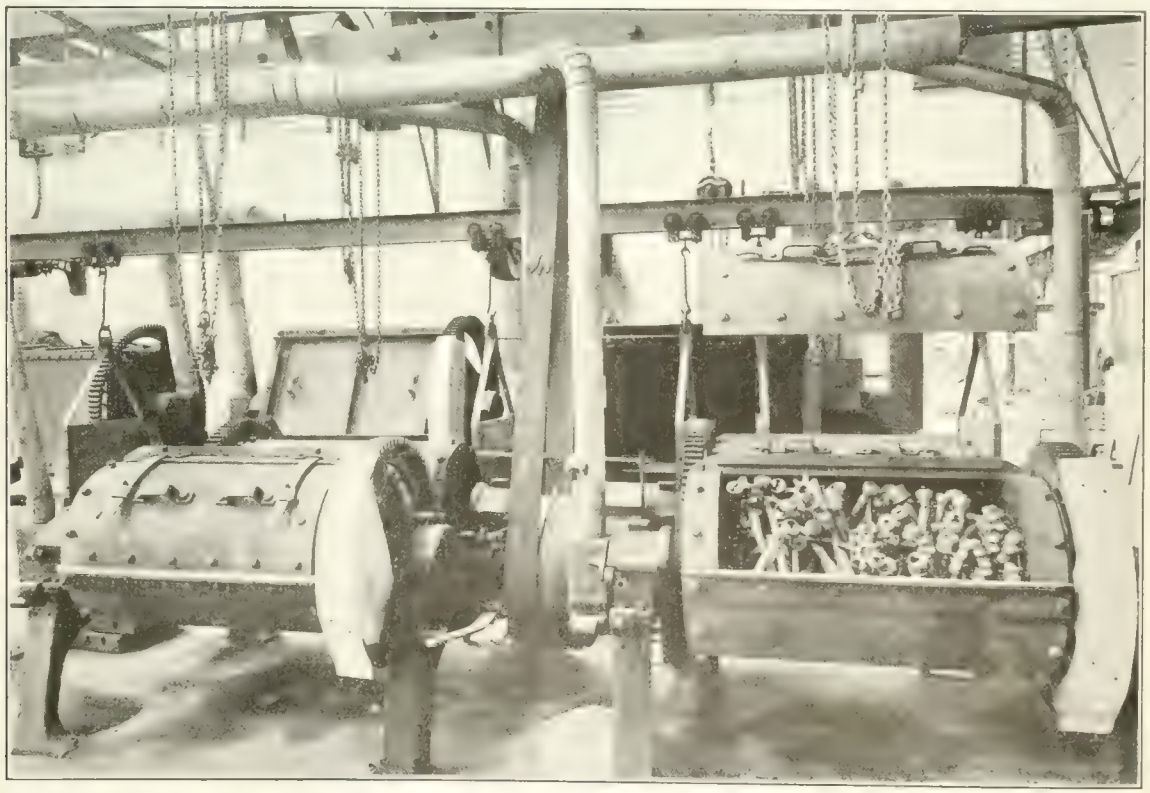


Fig. 3—A typical tumbling mill installation in a modern stove foundry. The covers of the mills are handled by triplex hoists

the size of the barrels being 36 and 40 in. diameter. As a rule only one barrel was loaded, although about 25 per cent of the time both were operated. It was found that the average power demand was 4.3 hp., while the maximum with both barrels loaded was 5.8 hp. The shafting with the barrels running light required 2.75 hp.; with the smallest barrel filled and the larger one empty, the total was 4.15 hp., while with the larger barrel filled and the smaller one empty 4.45 hp. was required. It was decided that a 5-hp. squirrel-cage induction motor would be ample for driving these two barrels.

There is a decided tendency at present toward the use of individual motor drives for cleaning-room apparatus. This is in sharp contrast to previous practice, for as late as 1907 line shafts and belts were used in an overwhelming majority of installations.

The superintendent of a shop turning out exceptionally heavy castings, such as large engine beds, heavy flywheels, etc., is forced to adopt cleaning methods that are radically different from those employed in foundries making light castings exclusively. It usually will be found that the sand-blast room offers the best solution of the problem in this case. In some instances, however, the castings are too large even to be sand-blasted. In this case, it is advisable to use the best possible mold facings and to clean the castings, where necessary, with the old-fashioned scratch brush.

An unusually interesting method of cleaning and removing the cores from large castings by hydraulic power has been developed by James A. Murphy, Hamilton, Ohio. The castings are removed to the yard, where they are treated with a heavy stream of water from a fire hose. Suitable chutes and flumes are provided for carrying off the surplus water. This method has been found to be very efficacious. The disintegrating power of a heavy stream of water is well understood, and the castings come out of their bath thoroughly cleaned and freed from sand.

OPERATING WITHOUT CENTRAL CLEANING ROOM

In recent years, a new type of foundry has been developed in which the central cleaning room is entirely eliminated. These shops are operated on the unit principle, each molding and cleaning unit being complete in itself. Such arrangements are particularly satisfactory for handling large quantities of comparatively light gray-iron castings such as agricultural implement and automobile parts. A shop of this kind located in Illinois is designed for a production of 100 tons per day. The foundry building proper is two stories in height, 60 ft. wide and 340 ft. long. The cleaning apparatus is located on the lower floor. The castings are transferred from the molding floor to the cleaning units through chutes. These chutes are cast iron inclined downward at an angle of 25 deg. to the foundry floor and inward at an angle of 30 deg. The castings are deposited on a landing table with a grating bottom that allows all loose sand to be collected and returned to the sand heap instead of going into the tumbling mill and wasted. Below and in front of the landing table is located a motor-driven steel plate tumbling mill, 30 in. diameter and 60 in. long, located on a platform. This mill is direct-connected to a 5-hp. induction motor. The platform is fitted with self-dumping buckets and steel barrels that discharge into a receiving basin at the front end. Directly in front of the platform is a single-end, roller-bearing, motor-driven grinder of special design.

The chutes or inclines are designed and used as casting cooling reservoirs and have sufficient capacity to accommodate a five-hour maximum production of the molding floors. They also are placed at such an angle as to allow the castings to slide easily, but to avoid breakage due to impact. This unit handles the output of four machine molding floors. The castings are milled in steel plate tumblers 40 in. diameter and 60 in. long, driven by 7½-hp. induction motors. Each unit of four heavy-work molding floors is equipped with two mills of this type.

The exhaust from the tumbling mills is handled by the small unit system. Each unit is designed to take care of the exhaust from five casting-cleaning sections, or 20 molding floors. It consists of a section of piping connected to the tumbling barrels and to a No. 3 Sirocco blower which discharges into a dust reservoir located 80 ft. from the foundry building. The blower is direct connected to a 5-hp. induction motor and handles all the dust-laden air directly through the wheel. The dust receiver is a large sheet-metal box, with an overhanging hood and two discharge spouts leading from the bottom. Connection also is made by the same system to the grinding wheels located at the tumbling barrel installations. The cleaning department is kept remarkably clean, the air being changed every seven minutes.

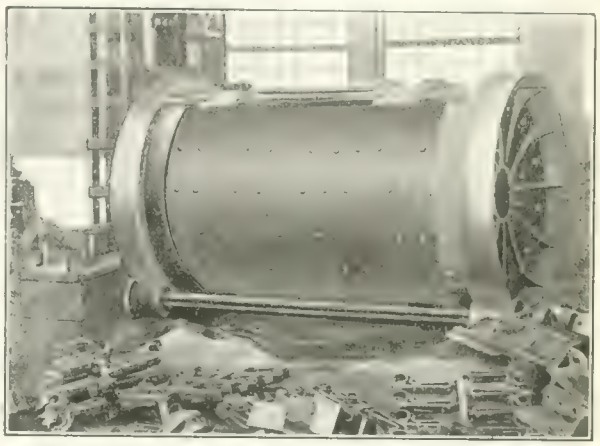


Fig. 4—This tumbling barrel can be lifted from the rollers for filling and emptying. By using three barrels, the cleaning can be made a continuous process

Stove foundries have solved their cleaning-room problems largely through the use of tumbling mills supplemented by sand-blast appliances. A portion of the cleaning apparatus in a large eastern stove plant is shown in Fig. 3. The cleaning equipment in this plant includes one 48 x 48 x 64-in. and two 42 x 42 x 64-in. square tumblers, together with two 36 x 59-in., four 24 x 35-in., two 20 x 42-in. and four 34 x 54-in. round barrels. These machines all are provided with guards to protect the workmen from exposure to the gears. For handling the covers, differential chain hoists are used. The cleaning room also is provided with three belt-driven emery wheel stands. For operating the tumbling barrels, one 15-hp., one 7½-hp. and two 10-hp. motors are provided. The good castings, as shown by the gangway count, are delivered to the cleaning room in buckets suspended from the I-beam trolley shown in the rear of Fig. 3. This shop melts about 30 tons of iron per day.

An interesting special tumbling barrel for cleaning moderate sized steel castings is shown in Fig. 4. This barrel is mounted on friction drive rollers operated by a 25-hp. motor. After the castings have been cleaned, the barrel is lifted from the rollers and carried to a convenient point for dumping. In the meantime, another barrel has been

(Continued on page 914.)

The Bates Steel Mule—Driver from the Rear by the Plowman



The Development of the Farm Tractor

A Profitable Field for the Manufacturer of Machinery—Its Future Stability—Question of Engine and Fuel

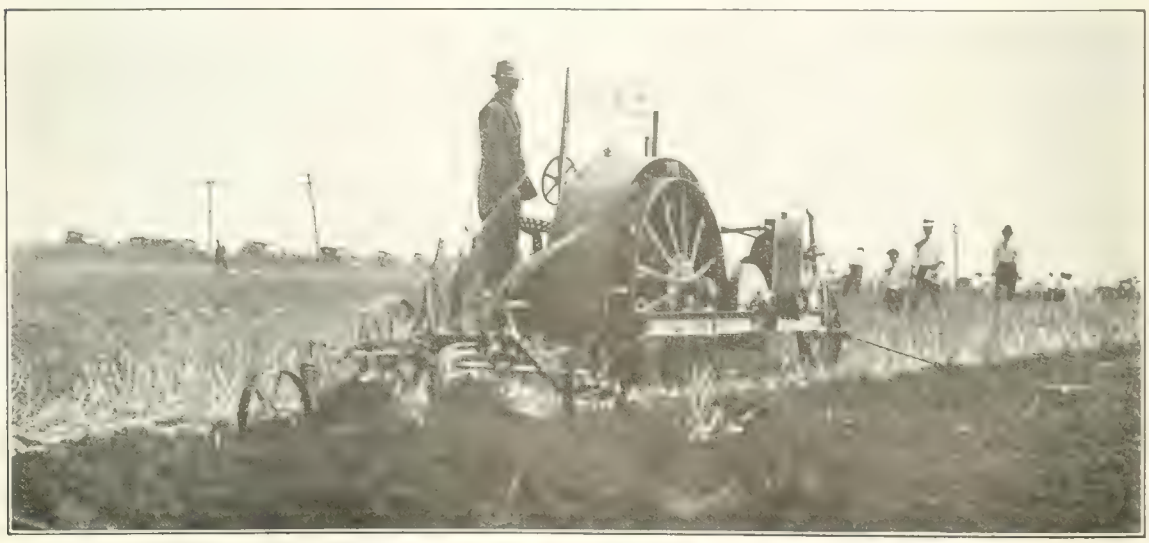
BY STERLING H. BUNNELL*

THE steady progress of mechanical invention reaches from time to time new fields of great promise. In each of these the efforts of many men are expended. Out of the combined results one or more settled types of machines are produced, which become sources of great profit to those manufacturers whose foresight has prompted them to take the risks of an early start in the untried field.

The practical development of the automobile commenced only about fifteen years ago, with the production of crude machines of various types. All of the early designs disappeared and the second thoughts of their inventors merged in the standardized motor car of five years ago, to be gradually improved and refined in the years since. The motor truck followed the pleasure car, but its designers had the advantage of escaping the early years of pioneering in an unknown region, and were able to produce an effective machine by direct methods. In this way the "horseless age," the favorite catchword of a few years ago, has been nearly reached in road traffic; but an enormous number of horses are still in use on the farms of the world, for slow tractive service of a character unsuited to motor car or motor truck, and often on soft, rough or sloping ground. The production of a mechanical tractor suitable to replace horses in ordinary farm work is engaging the attention of hundreds of designers to-day, and offers enormous possibilities to machine shops everywhere.

The farm tractor came into view when some ingenious possessor of an old "Lizzie" hitched it to a small wagon load of hay, and later belted the flywheel of the engine to a feed-cutter. Many old motor cars in rough use on farms pointed out the direction of development of a small slow-geared, powerful tractor with broad, roughened wheels,

*24 State Street, New York



The Peoria Tractor—Operated by One Man

Hart-Parr Tractor with Eight-bottom Plow



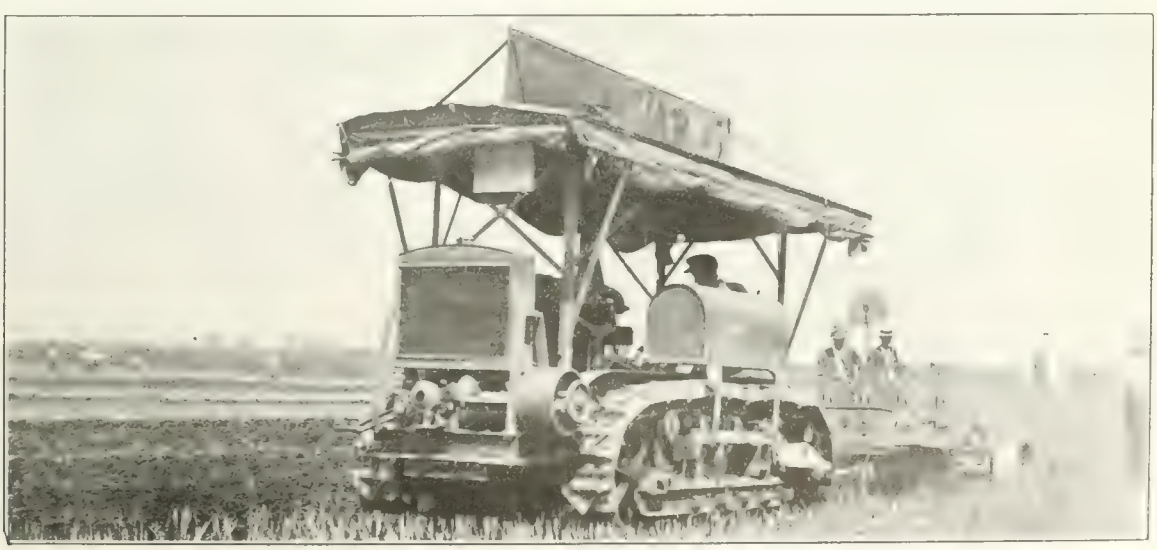
having the power of several horses. Dust, rough ground, unskilled attendance and increasing cost of gasoline were the chief obstacles to be overcome by the designers. Plowing, harrowing and drawing harvesting machinery, the hardest work required of farm horses, must all be done by the tractor in the field, while the tractor engine must be available for driving by belt threshers, cutters and other stationary farm machines.

Compared with horse power, the most obvious advantage of the tractor is its unlimited available working period. The farmer can drive his machine in the frequent farming emergencies as many hours as he can sit on his seat, and then turn it over to his hired man or boy to continue till the work is done. The mechanical farm tractor must eventually become indispensable to every farmer, for its ability to work through daylight and darkness means the elimination of an important number of partial losses of valuable crops.

The actual development of the tractor has followed along several different lines. Small machines with the power of three to six horses are either three-wheeled or four-wheeled. Large machines are invariably four-wheeled, following closely the lines of the familiar steam traction engines. Three-wheeled machines have in some cases two wide traction wheels behind, and one narrow wheel ahead tracking in line with a driving wheel so as to run in the furrow last plowed. Others have one wide traction wheel in the rear, and a fore truck with two narrow wheels, while others still have two wide traction wheels and a castor wheel in front swiveling on a pivot for steering purposes. The ability to turn short around at the end of the furrow or at the corner of the binder cut is an important point, but it cannot be said that any one of the wheeled types of tractors possesses a decided advantage over the others in practical operation.

On soft or swampy ground tractor wheels may sink in to an objectionable depth, or slip and fail to pull the machine. For such service various tractors of "caterpillar" types have been designed. These tractors run on one or more endless chain belts, faced on the outside with wood lags. The machine thus lays a plank road under itself in front and takes it up behind as it proceeds. The lags may be of any length necessary to provide a ground surface sufficient to support the weight of the machine. Caterpillar tractors are thus able to do the work of many horses on swampy ground too soft for horses to work. Their tractive power is almost unlimited. They perform equally well on solid ground, but cannot seriously threaten the sale of wheeled tractors for ordinary farm service, on account of their greater complication, first cost and probable repair expense.

The exterior forms of to-day's farm tractors thus offer plenty of variety. The power plants are equally various. Some makers have designed for their tractors two-cylinder four-cycle engines of motorboat type. Several successful tractors have



The Caterpillar of the Holt Mfg. Company

horizontal engines with two opposed pistons, thus affording a good running balance, with easily accessible parts throughout. There are even a few with heavy single cylinder engines of the type common for stationary service.

As weight is necessary to secure tractive power for the driving wheels, there is no compelling reason for using light automobile-type engines for farm tractors; but the fact that quantity production has brought the four-cylinder automobile motor to an astonishing state of perfection considering the cost, strongly favors the use of such motors on farm tractors. A large proportion of tractors now on the market are equipped with standard vertical automobile motors. The tractor manufacturer can in this way avoid undertaking the design and construction of motors in his own shops, and so reduce his capital investment.

The transmission gearing from tractor motor to wheels requires less speed changes than the motor-car transmission. Two forward speeds and one reverse are usual. Several farm tractors have adapted the friction-disk drive, in which a friction wheel on the engine shaft rolls on the face of one or the other of two cast-iron disks geared to the tractor wheels. By changing the position of the engine friction wheel radially across the face of the disk the speed ratio may be varied within wide limits. The reverse motion is obtained by bringing the opposite disk into contact with the friction wheel on its other side. The full automobile transmission, propeller shaft and axle drive is also in use by at least one maker. The tractor at work is always liable to be brought up solid against some stump, rock or other obstruction, so that the use of a friction which may slip in emergency has something in its favor; however, the great majority drive through gears without breakage from this cause.

Fuel for tractors is now generally kerosene, or in the far west, distillate. Gasoline alone is used by a few which have not been equipped with kerosene-burning devices. The usual system employs a double carburetor, one side feeding gasoline for starting, the other kerosene for regular work. The kerosene carburetor is provided with means for heating by the waste exhaust gases from the engine, and water is also injected to reduce the excessive heat of the explosion. While kerosene is thus in common use, it requires much more care in operation than gasoline, and the feeding system is more liable to derangements. There are as yet no Diesel or hot-bulb types of motors in use on farm tractors.

There are perhaps a hundred makers of farm tractors now on the market, and new ones are constantly appearing. An association of tractor manufacturers supervises an annual series of tractor exhibitions at cities centered in important agricultural regions. At these shows each manufacturer has a large tent sheltering the machines on exhibition and their visitors, while various accessory devices for tractors, plows and other implements for tractor use and other matters of interest to farmers form an important auxiliary exhibit.

The feature of greatest interest is the exhibition of tractor plowing, which goes on continuously during daylight, with impromptu demonstrations by single machines for the benefit of small parties of interested visitors, and great field exhibitions by all types of machines and plows working at once, plowing over fields of a hundred acres or more in a single hour. At the Bloomington exhibition in August, 1916, there were about ninety machines on the field on one occasion, but as each manufacturer was restricted to working only one machine of a size, the number actually at work at any one time was between forty and fifty. The shortness of the lapse of time while the field changed from yellow stubble to black-plowed ground was astonishing, while the crowds of farmers who stood on the edges or followed single machines at work gave an idea of the tremendous volume of business in prospect for the makers of successful tractors for farm use.

The automobile has important advantages over horse traction on good roads, but the horse is still a competitor. The farm tractor is absolutely beyond comparison with horsepower, for it does the work of several horses at once, at equal speed or greater if the character of work would not suffer thereby, for unlimited number of working hours per day, and with the ever-ready reliability of the machine as compared with the animal. The farmer can start his tractor the moment weather conditions are right and run it day and night as long as necessary, then put it away without further expense until the next job is ready. The horses necessary to work a farm require about one-quarter of the ground area for their support, while the tractor requires only fuel while at work. Often the farmer can sell enough of his horses to pay for the tractor, and save continually thereafter. All together, the conditions for the rapid development of the perfect farm tractor are exceedingly favorable.

The Italian Steel Trust

It has been announced that an agreement has been reached whereby the companies forming the Italian steel trust have renewed their understanding until the year 1930, and it has been decided that the Societá Ilva will continue to act on behalf of the trust in commercial matters. In 1911 the leading Italian companies, according to the *Ironmonger*, London, combined to form a trust similar to the German steel syndicate, the Ilva company having been appointed to manage the business part of the undertaking. The companies concerned were the Ilva, Elba, Siderurgica de Savona, Ferriere Italiano, Alti Forni di Piombino and the Societá Ligure Metallurgica. This syndicate or trust maintained close relations with some of the leading British steel works on the one hand and with the German Steel Works Union on the other. When Italy declared war on Austrial in May, 1915, the connection between the Italian steel trust and the German Steel Works Union was dissolved by mutual consent, while that with the British firms, particularly Armstrong, Whitworth & Co., and Vickers, Ltd., is understood to have been correspondingly extended. The Italian syndicate has acquired a financial interest in a daily paper, the *Idea Nazionale*, which has been a strong advocate of the policy of rendering Italy industrially independent of foreign countries after the war. It is stated that the relations between the trust and certain British companies are to be strengthened and that a new Anglo-Italian company is to be constituted to which the business of the members of the trust is to be leased. Interest in the new undertaking on the part of French iron producers is also reported.

Pittsburgh Foundrymen's Association

The monthly meeting of the Pittsburgh Foundrymen's Association was held in the Fort Pitt Hotel, Pittsburgh, on Monday evening, Oct. 16. John M. McComb, credit manager of the Crucible Steel Company of America, Pittsburgh, gave an interesting address on "Credit." There were also shown motion pictures taken during the convention of the American Foundrymen's Association in Cleveland, in September, which were much enjoyed by those present.

Sheet and Tin-Plate Contracts

The National Association of Sheet and Tin Plate Manufacturers, which has its headquarters in the Oliver Building, Pittsburgh, is sending out a pamphlet to the entire trade that handles sheets and tin plate, in which are set forth the views of the association on the new form of proposed uniform contract governing sheet and tin-plate sales. It is stated that the contract now under consideration contemplates an irrevocable sale and purchase, not subject to cancellation, postponement of delivery or price revision because of market conditions.

Freights are to be paid in cash, and are not subject to discount; other provisions and conditions are quite similar to the regular form of contract now in use, except that the contract contains the following liquidating damage clauses:

The buyer's failure to furnish specifications as herein provided shall be deemed a refusal to accept the tonnage unspecified, which thereupon shall be deducted from the contract, and the buyer shall pay the seller, as liquidated damages and not as a penalty, the difference between the contract price of such material for which the buyer has failed to furnish specification (less freight allowance, if any) and the market price thereof at the time of such failure but such damages shall not be less than 10 per cent of said contract price.

If the buyer shall have furnished complete specifications as above provided and shipments are not made by the seller as herein agreed, the tonnage which the seller has failed to ship shall be deducted from the contract, and the seller shall pay to the buyer, as liquidated damages and not as a penalty, the difference between the contract price of such material which the seller has failed to ship (less freight allowance, if any) and the market price thereof at the time of such failure; but such damages shall not be less than 10 per cent of said contract price.

At the July meeting of the association, at which all members were represented and voting, a resolution was unanimously adopted recommending that, from that date, binding contracts only be negotiated and concluded in which there shall be no provisions or conditions guaranteeing prices against market decline, or inconsistent with the spirit and purpose of the contract as recommended.

More than 17,000 copies of this resolution have been distributed among the sheet buyers of the United States and Canada. In the pamphlet are printed admirable letters from sheet manufacturers accompanying the resolution sent to the trade, and also letters from jobbers of sheets, giving favorable views on the new uniform contract, and stating that they will put forth their best efforts to enforce contracts in the future. A list of members of the National Association of Sheet and Tin Plate Manufacturers is given as follows: Alan Wood Iron & Steel Company, Allegheny Steel Company, American Rolling Mill Company, Apollo Steel Company, Berger Mfg. Company, Brier Hill Steel Company, Canton Sheet Steel Company, Carnahan Tin Plate & Sheet Company, Deforest Sheet & Tin Plate Company, Inland Steel Company, LaBelle Iron Works, Mansfield Sheet & Tin Plate Company, Massillon Rolling Mill Company, Newport Rolling Mill Company, Parkersburg Iron & Steel Company, Reeves Mfg. Company, Seneca Iron & Steel Company, Stark Rolling Mill Company, Trumbull Steel Company, Western Reserve Steel Company, Wheeling Corrugating Company, Whitaker-Glessner Company, Youngstown Iron & Steel Company, Youngstown Sheet & Tube Company. W. S. Horner is president; Joseph B. Andrews, vice-president; Walter W. Lower, secretary and treasurer.

Preferential rates for bridge-building materials are indorsed by the Tennessee Railroad Commission, in a ruling of Oct. 6. This was in the case of the Converse Bridge & Steel Company, Chattanooga, Tenn., against the Southern and the Louisville & Nashville railroads. Reduced rates proposed by these lines are held neither unjust nor discriminatory, being open to all alike, and the roads are given 30 days to file tariffs. Preferential rates on bridge materials contribute to good roads, which the State tries to foster, the railroad commission holds.

Lackawanna Steel Company's Earnings

The rate of profit earned by the Lackawanna Steel Company and subsidiary companies for the third quarter of this year is 35.20 per cent on the $34,750,000 of common stock outstanding, against 35.31 per cent for the second quarter. For the nine months the rate of profit is 32.15 per cent. The unfilled orders on Sept. 30 amounted to 745,694 gross tons, against 932,857 tons three months ago and 393,084 tons a year ago. A comparative statement of the income account is as follows:

Income Account, Third Quarter

	1916	1915	Increase
Total net earnings after deducting all expenses, including ordinary repairs and maintenance	$4,044,193 39	$1,882,191 38	$2,163,002 01
Deduct:			
Interest on bonds and notes:			
Lackawanna Steel Company	341,625 00	402,500 00	*60,875 00
Subsidiary companies	75,412.49	77,475.00	*2,062.51
Rentals and royalties	25,359 00	25,359.00	.....
	$442,396 49	$505,334 00	*$62,937.51
Balance	$3,602,796 90	$1,376,857 38	$2,225,939 52
Less:			
Appropriations:			
For extinguishment of mines and mining investments	108,198.33	100,322.58	7,875.75
For depreciation and accruing renewals	433,897.86	365,810.61	68,087.25
	$542,096.19	$466,133.19	$75,963.00
Profit for third quarter	$3,060,700 71	$910,724.19	$2,149,976.52

Income Account, Nine Months

	1916	1915	Increase
Total net earnings after deducting all expenses, including ordinary repairs and maintenance	$11,343,820.16	$3,234,079.86	$8,109,740.30
Deduct:			
Interest on bonds, debentures and notes:			
Lackawanna Steel Company	$1,112,958.34	$1,230,783.34	*$117,825.00
Subsidiary companies	227,904.17	232,425.00	*4,520.83
Rentals and royalties	76,177 00	76,177.00	.....
	$1,417,039.51	$1,539,385.34	*$122,345.83
Balance	$9,926,780.65	$1,694,694.52	$8,232,086.13
Less:			
Appropriations:			
For extinguishment of mines and mining investments	262,588 16	207,482.65	
For depreciation and accruing renewals	1,285,149 65	873,862.21	.....
	$1,547,737.81	$1,081,344.86	$466,392.95
Profit for nine months	$8,379,042.84	$613,349.66	$7,765,693.18

*Decrease.

Two New Norwegian Steel Plants

That two new companies to manufacture steel plates and other forms of steel for vessels have been formed in Norway is reported by U. S. Consul General E. H. Dennison of Christiania. One of these, the A.-S. Norskevalseverker, has purchased ground for its plant in Christiansand. The output will be about 80,000 tons, including 30,000 tons of ship plates and 30,000 tons of rolled sections. The capital will be from $5,000,000 to $10,000,000. The other company will have an annual output of 20,000 tons. Most of the materials for Norwegian shipyards were supplied by Germany before the war. The expectation is that iron and steel can be made more cheaply than it can be imported, despite the high cost of fuel. The American consul has been asked to furnish the names of American manufacturers of machinery for steel works and rolling mills, and of gas producers for open-hearth furnaces.

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Contracts in the Steel Trade

Last July at a meeting in Pittsburgh at which almost all the independent manufacturers of sheets were represented, a resolution was passed unanimously recommending that sales of sheets be made in future in such manner that the obligation should be binding upon the buyer and should carry no expressed or implied arrangement whereby the price would be guaranteed against decline. The sheet makers appeared to be thoroughly in earnest in undertaking a reform and the question at once asked was whether the movement thus instituted would extend to other branches of the finished steel trade. That question is now answered. With the exception of the tin-plate branch, in which there had been concurrently an airing of the subject, there will be no change. In various of the other finished steel products contracts have been made lately with buyers in which the principle of guaranteeing prices against general market declines has been clearly recognized, and perhaps to a greater extent than has sometimes obtained in the past. It would be too late now for any reform to be inaugurated. A large volume of business has been done for far-off deliveries, and the mills are so behind in filling their orders that any attempt at a change would perish at once. The essence of the binding contract proposed in the sheet industry is its mutuality, the seller being obligated equally with the buyer; and the seller of steel bars, for instance, if he proposed a contract binding upon the buyer would at once be confronted with questions as to the deliveries he has failed to make and is quite certain to fail to make in the next few months.

It is not surprising but natural that there should be this divergence. Those who considered carefully the proposed reform in the sheet trade realized that it did not promise simply a change in the form of contract and nothing else. Necessarily it required that business should be done for much shorter periods, periods for which the buyer could forecast clearly his requirements and the mill could compute accurately the relation between prospective production and obligations assumed. The binding contract can be successful, if at all, only when the delivery periods are relatively limited. In the branches of the steel trade in which contracts are made for delivery far ahead the change cannot be made. It is necessary first for the mills to be a much shorter distance behind in their deliveries against existing contracts than they are at present.

Some time ago sheet manufacturers sent broadcast a circular setting forth their desires in the matter of making binding contracts. It is stated that of replies received which expressed any opinion at all, more than 75 per cent were favorable. It is stated furthermore that all or nearly all of those who expressed an unfavorable opinion, from the viewpoint of the sheet buyer, appeared to have overlooked the contention that the proposed sheet contract provides for reciprocal damages, that there is equal provision for assessing damages upon the seller if he fails to deliver and for assessing damages upon the buyer if he fails to specify or accept delivery. Perhaps it is on this account that the movement started in the sheet trade did not extend to other branches of the steel industry. The mills had already become too much involved.

The New Tariff Issue

We have no concern with the party aspect of the tariff discussion. Argument has been plentiful on both sides of the question from partisan sources ever since the Underwood tariff bill was introduced in the House more than three years ago. Whatever the merits of the considerations thus brought out, we have long felt that any changes in the existing tariff might well await the report of a non-partisan tariff commission. That view would still hold good had Europe not gone to war. But the efforts of the two groups of belligerent powers to make a new distribution of international trade has changed the whole aspect of the tariff issue in the United States.

American manufacturers and consumers are not interested now in hearing what Adam Smith taught or what Cobden or Bright stood for, in the old battles over protection and free trade. Nor will they listen with any patience to the arguments that have done service on both sides in the Presidential and Congressional contests of the past 25 years: on the one hand that the tariff is a tax on the many for the benefit of the few; on the other hand that the best revenue system is that which protects the American standard of wages at the same time that it provides for Government expenses in large part from duties absorbed in the selling price of the foreign manufacturer who enters this market. What

they want to know is what the tariff policy of the United States ought to be in the war that is to come after the war, if European economic alliances are made on the lines now proposed.

It is argued that Great Britain aided in Germany's industrial and commercial up-building by her free trade policy and that the United States would not be wise in repeating a policy of which Great Britain is now repenting. There has been no adequate answer to that argument. No good answer has been made, moreover, to the contention that if the rest of the world is to barter with the United States in the future for trade opportunities here, under the new conditions growing out of the war alliances, the United States will be seriously handicapped in trying to get preferential rates on what we want to sell to other countries, with the longest free list it has ever had and the lowest average tariff in more than half a century. With three-fourths of our imports coming in free, we shall have little with which to barter after we pass the early post-bellum period in which from its war-time profits this country may make loans abroad and give the borrowers merchandise instead of gold.

The tariff question as it stands before the country to-day is a new creation of Europe's war. It is to be worked out on the basis of conditions, some of which are already known while others will be developed by the fortunes of war. Congress cannot abdicate its revenue-raising functions and the new tariff commission can only gather facts and give advice. But it is plain that the country cannot go much farther in the development of foreign trade unless the machinery is provided for adjusting its tariffs to the new policies of competing nations. That is the paramount commercial question before the American people to-day, and one that demands a high type of constructive statesmanship.

Present and Historic Steel Prices

A favorite occupation of financial writers of late has been to make comparisons of steel prices for the purpose of showing the height to which the market has advanced. Naturally the information on which a selection of the commodities averaged should be based is usually lacking, and it is not surprising that an average is quoted in a New York paper on "eight leading steel products," the names not being given except that a reference indicates that one of the eight steel products selected is Bessemer pig iron.

What appears to be a fair method of computing the average of finished steel prices is to select the six commodities—bars, plates, shapes, wire, pipe and sheets—and give them equal weight in an average. Each is quite representative of a class of commodities and the tonnages of the different classes are not greatly dissimilar, though of course bars predominate over the other classes. It is not illuminating to the steel trade to compile a general average which includes unfinished steel and pig iron, for it is often desired to compare average finished steel prices with billet or sheet bar prices, and these in turn with pig iron.

By averaging the six steel commodities mentioned, using prices for delivery at mill convenience and not prices for prompt shipment, as the latter may present a range according to the promptness of delivery, we have compiled a table showing high and low prices at various turning points. Neither the high prices nor the low prices are taken at fixed dates, as occasionally one commodity has rounded its turn before another. The first period selected is naturally the top of the market in 1902, when a very strong market obtained and certain of the extreme high prices had been eliminated. Wire, for instance, had been pushed to an unnaturally high level when the wire interest, under its own control, was apparently committed to the policy of a short life and a merry one. Then came the successive declines in 1903 and 1904, resulting in a low level, followed by advances which reached their extreme in 1907. In 1908 there were slight declines and on Feb. 19, 1909, the market broke. One or two commodities started advancing, after the break, before others had reached their lowest, but the average is here compiled by taking the lowest open market level reached in each instance. By the end of the same year the highest prices in the movement had been attained. The next low point fell late in 1911, a general advance following in 1912. The most recent low point was clearly marked in December, 1914, the lowest prices prevailing for but a short time. It chanced that the average level of prices at the beginning of this year was substantially the same as the highest level reached in 1907; hence it is desirable to mark the date, as it may be said that 1915 was spent in attaining the 1907 price level, the highest since 1902, while this year has been spent in seeing how far that record could be beaten. The average of the six rolled products per pound and per net ton are given below:

	Pound	Ton
1902 high	2.20c	$44.00
1904 low	1.61	32.20
1907 high	2.05	41.00
1909 low	1.52	30.40
1909 high	1.80	36.00
1911 low	1.35	27.00
1912 high	1.74	34.80
1914 low	1.34	26.80
Jan. 1, 1916	2.04	40.80
Present	2.88	57.60

Surplus Steel Profits

In the hearings before the Ways and Means Committee prior to the formulation of the Payne-Aldrich tariff one steel manufacturer after another testified, "There is no money in the steel business except by selling out." The observation was generally taken to be directed at Mr. Carnegie, who testified to an opinion that the steel industry required no protection, except perhaps for tin plates; but after all there seemed to be considerable truth in the statement. The steel mills had made a great deal of money but their owners had been unable to take it out. They were forced to spend the larger part of their earnings in improvements. Book values increased rapidly but the chance to "cash in" was continually being postponed, unless an opportunity arose to "sell out."

It is interesting to observe that no such condition obtains at present. However great may be the desire of the steel producers to increase their productive units, improve their plants for more econom-

ical production or add new finishing departments, they find it impossible to hire the men or buy the equipment and materials necessary. The conditions set a limit upon the amount of money they can spend month by month. Many steel interests have plans completed and money appropriated for work which at the present rate of expenditure it will require from one to three years to complete, and still the surplus earnings are coming in. Perhaps it is well for the steel industry that such is the case. After the war, vision will be clearer and decision as to the proper investments may be truer to the conditions as they unfold themselves. In the old days, 20 or 25 years ago, there might have been a race to see whose surplus would last the longest; but happily business is somewhat more enlightened today and no danger of that sort is suggested.

Proposed Merger of Wire Companies

Four wire companies having plants in Worcester and Clinton, Mass., with a present capitalization of $3,450,000, are considering a proposition to merge in a new corporation capitalized at $15,000,000. The companies which have been asked to enter into the new combination are:

The Spencer Wire Company, Worcester, capitalized at $2,000,000 and operating plants in Worcester and Spencer, employing about 900 hands.

The Wright Wire Company, capitalized at $650,000 and operating plants in Worcester and Palmer, employing about 1000 hands.

The Morgan Spring Company, capitalized at $400,000 and operating two plants in Worcester, employing about 600 hands.

The Clinton Wire Cloth Company, capitalized at $400,000 and operating a plant at Clinton, employing about 1000 hands.

The project was started some months ago but up to the present time none of those approached has given an option to the promoters. There is some question as to the final outcome of the deal, as at least one of the concerns interested is not anxious to part with control of its prosperous business which is now largely held in the possession of one family. The officials of the local companies have denied that any steel company is back of the proposed merger. It is expected that some positive action will be taken in the next week or two and it is predicted that at least three of the companies named will be absorbed.

Germany's August Pig-Iron Output a War Record

Germany's pig-iron output in August is reported by the Association of Iron and Steel Producers as 1,145,292 metric tons against 1,134,306 tons in July, the previous war record. The daily output in August was 36,945 tons, the largest of the war, against 36,590 tons per day in July. The August output was made up of 170,145 tons of foundry iron, 11,029 tons of Bessemer iron, 727,096 tons of Thomas or basic iron, 221,051 tons of steel making iron and spiegeleisen and 15,971 tons of forge iron. A wireless press message places the September pig-iron output at 1,116,000 tons.

Exports of Ferrotungsten

It is unusual for the United States to figure as an exporter of ferrotungsten. For July, this year, 140 lb. of ferrotungsten and tungsten metal was exported, bringing the total for the seven months of 1916 to 8407 lb. The valuation reported for the July exports was $150; for those to Aug. 1, 1916, it was $18,254.

Steel Corporation Hearing Feb. 26

On Oct. 16, at the request of the Department of Justice, the United States Supreme Court set Feb. 26 for hearing argument in the Government's anti-trust suit against the United States Steel Corporation.

Specification for Wagon Axles

A table of standard specifications for axles, wheel hubs and flanges for buggies and wagons, developed by the accessory trades, was formally adopted by the Carriage Builders' National Association at its recent convention in Cincinnati. The movement grew in part out of the shortage of material now distressing the vehicle trade. The plan is that the so-called standard sizes will hereafter be the only ones carried in stock, all other sizes to be considered as odd sizes; such are thus not expected to be carried in stock but will have to be made up after the receipt of orders. A table of the specifications has been printed on a sheet about 13 x 17 in. in size and copies can undoubtedly be had for a nominal sum from J. H. Redhead, sales agent, National Malleable Castings Company, 7706 Platt Avenue, S. E., Cleveland, Ohio.

The standardization is the immediate result of a conference held in Cleveland, April 25, at which the following associations and manufacturers were represented:

Associations.—Hickory Products Association, Chicago, H. A. Long, secretary. Carriage Builders National Association, Cincinnati, Emil E. Hess. Eastern Wheel Makers Association, Philadelphia, E. H. Archibald.

Axle Manufacturers.—Cleveland Axle Mfg. Company, Canton, Ohio, J. B. Childe, general manager. Illinois Iron & Bolt Company, Carpentersville, Ill., H. C. McNeil, treasurer. Liggett Spring & Axle Company, Monongahela, Pa., J. H. Neuhart, secretary and treasurer. Sheldon Axle & Spring Company, Wilkes-Barre, Pa., J. F. Armstrong, secretary. Spears Axle Company, Wheeling, W. Va., Andrew Reitz, secretary and general manager. Timken Roller Bearing Company, Canton, Ohio, C. C. Staley, Eastern sales manager.

Wheel Manufacturers.—Archibald Wheel Company, Lawrence, Mass., E. H. Archibald, treasurer. Avoca Wheel Company, Avoca, N. Y., C. D. Carroll, general manager. Bookwalter Wheel Company, Miamisburg, Ohio, Chas. L. Bookwalter, secretary and manager. Crane & MacMahon, St. Marys, Ohio, J. J. Weisner. Hoopes Brothers & Darlington, West Chester, Pa., E. S. Darlington, treasurer. Muncie Wheel Company, Muncie, Ind., O. B. Bannister, president. Mutual Wheel Company, Moline, Ill., J. A. Condo, assistant secretary and treasurer. Pinneo & Daniels Company, Dayton, Ohio, A. N. Wilcox, president and general manager. The Zwick & Greenwald Wheel Company, Dayton, L. H. Rogge, vice-president.

Carriage and Wagon Manufacturers.—Sayers & Scoville Company, Cincinnati, Emil E. Hess, sales manager. Studebaker Corporation, South Bend, Ind., A. C. Hill and H. V. Kimble.

Flange Manufacturers.—Albion Malleable Iron Company, Albion, Mich., H. B. Parker, vice-president and assistant general manager. Dayton Malleable Iron Company, Dayton, W. H. Cassel, secretary. Erie Malleable Iron Company, Erie, Pa., A. J. Sterrett, secretary. National Malleable Castings Company, Cleveland, C. W. Hotchkiss, manager; J. H. Redhead, sales agent, and R. L. Lehman.

Among the reasons given for the desirability of the standards are the following:

Adjustment of the supply to demand, or in other words, opportunity for manufacturers to make up stock intelligently in dull periods and thus be prepared to supply the demands of busy periods, such as the present.

Opportunity for making more prompt deliveries of parts and, therefore, of finished vehicles.

Reduction in the variety of stocks carried by manufacturers and dealers, thereby permitting:

Release of capital now unnecessarily tied up and frequently lost on account of dead stocks.

Reduced costs resulting from elimination of dead stocks.

Better labor conditions obtainable at piece-work rates on account of larger and more uniform runs.

Economies which should better enable the horse-drawn vehicle trade and accessory business to compete with the automobile trade.

It was decided that after Jan. 1, 1917, manufacture of all odd sizes should be discontinued and no orders accepted, except for repairs.

The Adams-Bagnall Electric Company, Cleveland, announces that its New York office is now located in the Engineering Building, 114 Liberty Street, under the management of F. C. Perkins, Eastern representative.

Trumbull Steel Company's Plans

Plans for financing the new steel works of the Trumbull Steel Company, Warren, Ohio, which the company announced several months ago that it would build, have been issued by the board of directors. Additional capital stock will be issued to the amount of $1,250,000 in preferred and $2,500,000 in common stock, being a part of the increase authorized by the stockholders Feb. 23, 1916. Subscription books will be open until Nov. 1. The preferred stock will be offered to both the preferred and common stockholders in proportion to their respective holdings and the common stock will be offered to the common stockholders.

The notice to the stockholders is accompanied by a letter from J. Warner, president, announcing the purposes to which the funds derived from the sale of the stock will be put. In addition to its present production of tin plate, black and galvanized sheets, light plates and various forms of roofing products, the company now has under way the erection of a hot and cold-rolled strip steel plant. The sheet and tin-plate output has been increased from 400 to 700 tons per day, and it is stated that when the hot and cold-rolled strip mills are placed in operation the total output of finished products will approximate 1000 tons a day. The company also has a plant at Fort Smith, Ark., for the manufacture of spelter, which it uses in making galvanized sheets, the surplus production being placed on the market. The policy of the company is to establish a specialized business, and the new mills are designed to make a variety of products. Manganese, nickel and chrome steel are expected to be among the products that will eventually be added. It will not enter into competition with other steel companies in the manufacture of ordinary merchant steel bars. It is stated that the company will continue to buy to a large extent the ordinary grades of steel sheet bars, billets and slabs as heretofore.

The Trumbull Steel Company, Warren, Ohio, has placed contracts for the buildings and considerable of the equipment for its new open-hearth steel plant. The open-hearth building will be 150 x 450 ft. and the blooming-mill building, 70 x 800 ft., to be erected by the Riter-Conley Company, Pittsburgh. The plant will be provided with four 100-ton open-hearth furnaces, to be built by the Alex Laughlin Company, Pittsburgh. The contract for a 36-in. blooming mill and hot and cold strip mill has been awarded to the United Engineering & Foundry Company, Pittsburgh. Hughes gas producers will be provided by the Wellman-Seaver-Morgan Company, Cleveland. The Alliance Machine Company, Alliance, Ohio, will furnish a 175-ton, 4-girder, double-trolley ladle crane, with 54-ft. span; two 5-ton soaking pit cranes, with 76-ft. span; one 150-ton stripping crane, with 76-ft. span; two 10-ton magnet cranes, 90-ft. span, and several standard cranes.

The Mitchell-Diggins Iron Company, Cadillac, Mich., has filed with the Interstate Commerce Commission a complaint against the Ann Arbor Railroad and connecting carriers protesting against an increase in the freight rate on charcoal pig iron from Cadillac to Beaver Dam, Wis. It is alleged that the rate, which was $1.68, has been made $2.28 per ton. It is stated that the company has sold for future shipment large quantities of pig iron based on the rate of $1.68 and that the increase discriminates against it in favor of competitors in northern Wisconsin and the upper peninsula of Michigan.

The Pacific Coast Steel Company, with plants at Seattle and San Francisco, plans the erection of a rolling mill at Willbridge, Ore., between Portland and Linnton. The company will utilize the equipment of the Pacific Hardware & Steel Company in Portland (whose plant has been idle for four years) as the nucleus of the new plant. This equipment will be added to, and it is stated will result in a large plant. The company's move is the result of a year's investigation by William Piggott, vice-president, and E. M. Wilson, president. The plant will be operated electrically.

UNITED STEEL COMPANY SALE

Consideration $16,000,000—United Alloy Steel Corporation to Be Formed

The stockholders of the United Steel Company, Canton, Ohio, voted on Oct. 14 to sell its properties to Hornblower & Weeks, New York bankers, for $16,000,000. With the latter are associated as purchasers the New York banking firms of Dominick & Dominick and Kissel, Kinnicutt & Co. In an announcement made by the syndicate it is stated that the property and business will be vested in the United Alloy Steel Corporation, incorporated in New York State, which will have an authorized capital of 525,000 shares, without par value. Of this amount 500,000 shares will be issued for the property and business plus $4,000,000 cash to be paid into the new company by the syndicate, the remaining 25,000 shares remaining in the treasury. It is understood that the syndicate takes 200,000 shares of the new stock and that 300,000 shares are held by interests connected with the United Steel Company. The management of the new company will be in charge of practically the same men who have been identified with the property heretofore. They include H. R. Jones as president, who has been vice-president, treasurer and general manager of the United Steel Company; E. A. Langenbach, who has been president; E. L. Hang, now secretary; E. D. Rogers, now general manager of sales, and John McConnell, now general superintendent. The principal change is in stockholders and in the election of directors to represent the bankers on the board.

The United Steel Company began operations in August, 1904, with two 35-ton open-hearth furnaces and a small blooming mill. It now has two plants, A and B. Plant A, which is in full operation, consists of nine open-hearth furnaces and two electric furnaces. Plant B, nearly completed, has in operation five 75-ton open-hearth furnaces, and it is expected that five additional furnaces will be in operation about Jan. 1. The total ingot capacity with all plant completed is put at about 50,000 tons a month. On the completion of plant B it is stated that there will be a rolling capacity of about 65,000 tons a month in the form of blooms, billets, slabs and sheet bars, and a finishing capacity of about 25,000 tons a month in the form of merchant bars and plates. The greater part of the company's new output is expected to be alloy steels, as heretofore—vanadium, manganese, chrome, nickel and tungsten. The present sale of alloy steels represents over 90 per cent of the business. The United Furnace Company, owned equally by Pickands, Mather & Co., Cleveland, and the United Steel Company, expects to have its new blast furnace in operation within a month. The furnace company has in operation 47 Koppers by-product coke ovens. The capital of the United Steel Company is 1,500,000 tons. A considerable part of the earnings has been used in making plant additions. A statement of earnings shows $569,636 available for dividends in 1911; $950,273 in 1912; $1,639,684 in 1913; $1,485,856 in 1914, and $2,634,232 in 1915, when the gross sales were $9,808,506. For seven months of 1916 the amount available for dividends is put at $1,675,939 on sales of $8,146,385

New Plate Work Plant in Cleveland

The Interlake Engineering Company, Cleveland, which has been organized with a capital stock of $50,000, will establish a plant on West Third Street on the Cuyahoga River near the Jefferson Street bridge for doing ship repair work and for the manufacture of tanks, stationery boilers, drums and kindred products. A brick and steel building, 60 x 80 ft., will be erected. Orders have been placed for the greater part of the machinery equipment. Frank J. Sullivan is president; W. D. Becker, vice-president; A. W. Thomson, treasurer, and F. L. Leckie, secretary. The three first-named officers, with Fred Saal and George Steinbrenner, compose the board of directors. Thomas E. Deegan, for a number of years with the American Shipbuilding Company, will be manager of the plant. The offices at present are at 808 Rockefeller Building.

A PURCHASING SUGGESTION

How to Buy Sheet-Mill Products, as Seen from a Seller's Viewpoint

Much has been written and more has been spoken about the business of buying and selling. Buyers have advanced to others of their calling most excellent and practical suggestions for specifying their materials and systematizing their departments and sales managers have given time and space to the importance of scientific selling, all of which advice has proved very beneficial, in that it has resulted in a better understanding on the part of each of the problems of the other, thus making it easier to give and easier to get orders. However, the trade journals have published comparatively little practical advice regarding intelligent purchasing and supplying of specific articles of commerce.

There are a limited number of well defined principles which may be applied successfully to a broad field of business, and there are also many rules and restrictions of vital importance and peculiar to each specific class of business, which are thoroughly understood and appreciated by the manufacturer, but accredited as being of minor importance by the busy buyer, which in reality absolutely govern the delivery and adaptability of the product. The purchases of a large institution are many and varied, and its buyer could hardly be expected, even in a lifetime of conscientious and systematic study, to become sufficiently familiar with his company's manufacturing problems and requirements and with the quality and relative value of all of the materials required to draft, unassisted, the specifications which must necessarily accompany many of its requisitions. As a consequence of this fact, requisitions often specify the wrong grade or character of material, and for this error, especially when the material is to be reworked by the purchaser, the seller could be made to assume a large measure of responsibility. It is, therefore, the purpose of this article to treat specifically with sheet-mill products, in the hope that some benefit may be derived by giving a seller's views of how to purchase.

CLOSER STUDY OF REQUIREMENTS AND RESOURCES

Much unnecessary time is consumed and money wasted in the purchase and sale of sheet-mill products as a result of unsystematic or unintelligent buying and of ignorance or indifference in manufacturing and selling, both of which can be reduced very materially through a closer study by each party of the requirements of the one and the possibilities of the other. The number of tons of not entirely satisfactory sheets shipped annually as a result of ignorance or carelessness on the part of the buyer or seller and the loss resulting to each, if the figures could be compiled and published, would no doubt astonish the trade.

Is there a manufacturing buyer or seller of any magnitude having losses (in money and prestige) on account of unsatisfactory material coming into or going out of his plant but considers it a serious problem and worthy of close study by himself and his experts? Would he not gladly spend more than the amount of his claim losses to eliminate or even reduce this menace to his good will?

CONDITIONS UNDER UNUSUAL COMMERCIAL ACTIVITY

Standards of quality both in sheets and in articles manufactured therefrom are harder to maintain during periods of unusual commercial activity than under normal business conditions for the following reasons:

1. Demand exceeds supply.
2. Inability to estimate requirements sufficiently far in advance.
3. Importance of quick shipment.
4. Substitutions.

When an order book is filled beyond the point where deliveries can be made as rapidly as required, prices are usually very satisfactory and buyers are most insistent. The inclination at such a time is not to withdraw from the market, but rather, on account of the pressure of business, to speed up production in an effort to make the supply more nearly equal the demand. This speeding up process may unconsciously affect quality.

It is no more reasonable to expect that buyers can always estimate their requirements as far ahead as sheet-mill schedules are filled than to expect the sheet mills to anticipate the increased demand and get ready for it. The result is that a considerable percentage of the material purchased at such a time is wanted long before it can be shipped. A consumer of sheets can and usually does arrange to increase his output very much more quickly than can a manufacturer of sheets, by reason of the fact that he, the consumer, first feels the effect of an increased demand, and the time required in purchasing and installing fabricating machinery is not so great as in building open-hearth furnaces, blooming and bar mills, sheet mills, cold rolls, annealing furnaces, pickling tanks, etc., all of which and more are necessary in producing many of the grades and finishes of sheets being used to-day.

SUBSTITUTIONS NOT SATISFACTORY

Delivery being of paramount importance, the consumer may suggest a substitution of some other grade or finish not ordinarily recommended or used for the purpose, and which, on account of its character, can be obtained quicker. Such material is unlikely to produce as satisfactory an article as the grade usually employed, as it must receive special attention and treatment in the process of transformation, thus interfering with well-established practices. A change in demand for any article is the result of its popularity or practicability as expressed by the opinion of the ultimate user, the effects of which are first noticed by the dealers as a class, next by the jobbers or distributors, then by the manufacturer of the article and last by the sheet mill, which is primarily responsible for the supply.

If, by some process of elimination, the sheet mills would be the first to feel the increase in demand, a considerable saving could be made in the important element of time. However, as it appears that the demand for a product becomes known to all of those having to do with its origin inversely in the order of its manufacture and distribution, it would seem necessary for each in his turn to anticipate the demand a little further. The retailer, by carrying larger stocks; the dealer and jobber by contracting for larger amounts; the manufacturer, by placing his specifications further ahead, and the sheet mills, by refusing to contract for more than they can supply and by reserving ample space for filling each order as promised, can do much toward maintaining a constant (though inadequate) supply.

The manufacturer, before selling at a more rapid than his present rate of output, should be reasonably sure that he can purchase the necessary additional material. The manufacturing and selling departments should keep the purchasing department fully advised of any increase or contemplated increase in output, also of changes in design, as this will assist the purchasing department in making doubly sure of a constant supply of the proper character of material.

IMPORTANT TO KNOW THE PURPOSE AIMED AT

It is always desirable and oftentimes necessary, in the interest of quality, which is mutually beneficial, for the purchaser and the seller to have a thorough understanding and appreciation of the problem, to the end that the orders specify clearly the quantities, gages and sizes required, the finish desired and *the purpose for which the material is required.* With this information in hand, the seller will have an opportunity to manufacture intelligently, and if he is unable to meet the requirements he will frankly admit it.

Not many years ago sheet manufacturers were of the opinion (some of them decidedly so) that a very few grades and finishes could be used successfully for a great variety of purposes. Much time and money was spent in a fruitless attempt to cover the entire field of drawing, stamping and flat work with sheets of only one or two chemical structures and mechanical

treatments. Finally, however, the repeated failures of the material convinced them that different usages would require sheets of a wholly different texture. Work was immediately started along this line by the more progressive mills, with the result that the usages for sheet metal have, in the last few years, increased several fold and to-day 50 or 60 different grades and finishes (chemically and mechanically) are being regularly produced, each of which has its peculiar virtue for drawing, stamping, enameling, etc., in the manufacture of hotel, hospital and kitchen equipment, light machinery, automobiles, office furniture, tanks, metal lockers, mines, torpedo tubes and countless other articles.

When the sheet mills have had the co-operation of intelligent consumers they have invariably been able to develop a satisfactory sheet quicker and with less expense, and this has resulted to their mutual advantage; to the mill in expense, to the purchaser in price, and to both in time of shipment and output. Some sheet mills maintain a corps of experts, who are thoroughly familiar with the working and finishing possibilities of the various grades of sheets they produce, and who are at the service of the consumer at any time to study his requirements and recommend a suitable material. All mills making special finish sheets must necessarily sell them for manufacturing purposes, and they now know that the purposes for which a single grade is suitable are limited. Consequently, they cannot ship sheets for a manufacturing purpose with any assurance that they will be suitable unless they make and select the sheets with the particular requirement in view.

NECESSARY STEPS TO ASSURE A CONSTANT SUPPLY

If a buyer would assure himself of a constant supply of satisfactory material, he should first become acquainted with the mills which specialize in material similar to that required. His next step should be to ascertain as nearly as possible from his own manufacturing department the precise character of the material desired, providing it is for an already well-established practice and article. If for a new article or for fabricating under a new process, it would be well to describe the finished article, the various fabricating steps, the permissible tolerances in gage and size, and suggest to the sheet mill that it submit samples or send an expert to ascertain the requirements first hand. In placing repeat orders it is preferable that the buyer describe the material in the same terms as previously described to him by the shipper from whom he is ordering, as each shipper has for each of his products a well-defined term or name thoroughly familiar to his own operatives. In rare cases will a term given to a sheet by one mill be used by any other mill in describing a sheet of similar characteristics.

Having used due care in describing the material wanted, the buyer should place his order as far as possible in advance of his needs, particularly when volume of business prevents prompt filling of orders. In the event that it is impossible to write up the final specifications sufficiently early to insure delivery when wanted, arrangements can usually be made with the sheet mills to change grades, gages or sizes at any time prior to the actual rolling of the sheets; consequently, the buyer need have no hesitancy in placing his order, providing he is sure of the quantity he wants. Such an order, however, should by all means be entered with the proviso that he be notified before rolling, as some changes may be necessary.

It would seem to be preferable, however, in the event the specification has not been completely standardized and proved, for the buyer to place a measure of responsibility on the willing shoulders of the sheet mill, by extending it an invitation to consult with his manufacturing department. Co-operation between the buyer and the seller will always result in more complete satisfaction to both, in that it distributes the measure of responsibility which rightly rests with each one having any part in manufacturing an article or evolving a process. It is right to expect that each should willingly and cheerfully assist the other with problems, the solving of which will prove of mutual advantage. Constant and intelligent effort along this line is bound to result in a more satisfactory product, an increased demand, less time and expense in fabricating, larger production, quicker shipments, greater profits both for the buyer and seller, and a growing mutual confidence.

SHEET MILL.

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The improvements in the dry preparation of bituminous coal that have been stimulated in the Illinois district by competition of other coal fields have been described in Bulletin 88 of the Engineering Experiment Station of the University of Illinois, Urbana, Ill., by E. A. Holbrook, assistant professor of mining engineering at the university.

INDUSTRIAL HOUSING

Papers Read at a Meeting of the National Housing Association at Providence

The fifth annual conference on housing under the auspices of the National Housing Association was held in Providence, R. I., Oct. 9 to 11. The first section, particularly devoted to industrial housing, was on Tuesday morning, Oct. 10. The various phases of the industrial housing question were discussed during the day, culminating in a general meeting of all sections in the evening, which was devoted wholly to the question of industrial housing. One of the principal speakers at this meeting was John Nolen, Cambridge, Mass., who has been particularly active in certain developments of the past year in Bridgeport, Conn.; Waterbury, Conn.; Kenosha, Wis., and Akron, Ohio. Some of the points brought out in his address were these:

OF DWELLINGS $2,400,000,000 BUILT ANNUALLY

Building operations in the United States amount annually to the stupendous sum of $4,000,000,000, and 60 per cent of this great total, or $2,400,000,000, is spent (I should like to say invested, if I could) in dwellings. A large percentage of all houses are poorly conceived for their purposes, and 80 per cent of all of them are built of wood, many of these under space and distribution conditions which make wood unsafe and unsatisfactory. The result is an excessive depreciation and a fearfully costly fire hazard. This constitutes a huge economic loss amounting by the most conservative estimate to hundreds of millions of dollars annually, which sum must be paid, as other carrying charges are paid, out of production, and finally must be taken care of in the wage earner's pay-roll.

A fundamental question closely related to housing is that of wages and standards of living. Consider, for example, these four points, and their relation to one another:

1. The minimum desirable house of four or five rooms cannot be provided in the United States for less than about $1800 or $2000—that is, for house and lot, with street improvements, essential public utilities and neighborhood recreation.

2. A house costing that sum cannot be offered on the basis of an economic rent of, say, 5 or 6 per cent net, for less than $15 per month.

3. Unless a wage earner with a normal family of wife and three dependent children has an income of $15 a week, or $800 a year, he cannot afford to pay as much as $15 a month for rent.

4. More than one-half of all the fathers of workingmen's families earn less than $15 a week.

The change in housing methods will come, if it does come, from the transfer of housing from the field of speculation to that corresponding to legitimate manufacturing. To my mind, however, a peculiar opportunity is now presented. Something relatively new has recently happened in this country. Employers of labor, not a few, but many, are having such great difficulty in getting and keeping employees, and they are so embarrassed by the new conditions and their great costs, that they are ready to consider any practicable proposition that will lessen their troubles.

ACTIVITY IN WATERBURY AND ELSEWHERE

In the four cities investigated the local organization resolved that before plunging in and building something they would find out by careful investigation the extent and character of the demand for houses, and also the experience of other places in meeting somewhat parallel conditions and requirements.

The data collected for Waterbury showed that there were from 1000 to 2000 families to be provided for; that 35 per cent of these were skilled workingmen and 65 per cent unskilled; that the average weekly wage of the skilled was about $20 and of the unskilled $17; that 54 per cent of the total were married men; and that the consensus of opinion with regard to the type or types of houses was that the one family house should be preferred, if the family could afford it. If not, a double house, or two one-family houses built together, with separate yards, and that only when necessary the three or four-tenement flat should be built.

The recommendations were somewhat different for the different cities, because of different local conditions. However, those submitted to the Bridgeport Chamber of Commerce are typical, and will serve for illustration. They were seven in number, as follows:

1. That the Bridgeport Housing Company be formed at once, with a capital of at least $1,000,000.
2. That some one with special fitness be employed by the company to give all his time to the problem of providing houses or apartments for workingmen.
3. That various tracts of land suitable in character and location and low enough in price for the housing of workingmen, be purchased by the company.
4. That the housing company undertake the early building of houses and apartments primarily for rent.
5. That the company should provide especially the single family, detached dwelling, for sale on easy terms.
6. That the proposed housing company should co-operate with the family which has acquired title to a building lot, but has not yet built upon it.
7. That the housing company should facilitate, so far as possible, broad city planning improvements, especially those relating to main thoroughfares, parks, playgrounds and the distributing of the city.

What has actually been accomplished so far is briefly as follows:

In Waterbury two large manufacturing concerns, the Scovill Mfg. Company and the American Brass Company, have begun operations and a considerable number of new houses of desirable types will be completed and available this autumn. Furthermore, the attention of all the manufacturers of the city has been effectively drawn to the subject and through the publication of the report in a Sunday newspaper, public interest has been aroused and public opinion formed favorable to the energetic prosecution of the subject. No joint action, however, on the part of manufacturers or of business interests generally, has yet been secured and it will be interesting to observe how much can be accomplished without it.

In Kenosha, the movement was begun by the Manufacturers' Association and had the approval and support from the start of all the business interests of the city. Although the investigation was not taken up until May, the Kenosha House Building Company and the Kenosha Homes Company were successfully organized in July. Land was purchased and building begun early in August. Plans have been made for the construction of at least 400 single family houses. Some are already completed and occupied and a new house is started every day. So far the operation is confined to the detached cottage type of five or six rooms. The price of the first houses on 40-ft. lots which had already been laid out when purchased will be under $2500. It is hoped that later operations will make possible houses at about $2000, on a minimum of 50-ft. lots. The work is on a good business basis, yielding a good return. It places no dependence upon philanthropy and charity. It is being done by the entire community for the entire community. It is free from any taint of paternalism or embarrassing relation of employer and employee.

The topic of industrial housing was resumed again at the session of Wednesday morning. The first paper in this session was read by Perry R. MacNeille, of Mann & MacNeille, architects, New York. The subject of this paper was "What Types of Houses to Build."

The recent work of Mr. MacNeille, in connection with the housing projects of Neponsit Garden Village, East Walpole, Mass.; the New London Ship & Engine Company, Groton, Conn., and at Kistler, Pa., Waterbury, Conn., and Rome, N. Y., lends to his conclusions an authority which makes his paper of peculiar interest. In part Mr. MacNeille said:

CROWDING GOOD HOUSES ON CHEAP LAND

There is a recent example where relatively cheap land has been built up with houses so congested that

the seeds have already been sown for future slum conditions. This development, which is for one of the large munition factories in Bridgeport, has carefully planned houses of expensive and durable construction, but the houses are crowded closely together, shutting out light and air, and by the very size of the population they have brought have increased the value of all the surrounding land and made continued congestion, in any new houses that may be built in this vicinity, financially necessary.

A large portion of the men in any plant, sometimes a decided majority, are either single men or men living alone because their families are temporarily in some other city. These men live either in cheap hotels or in worse, or they live as members of the family of some other workingman. In the former case they are removed from all home influences with the consequent disadvantages. In the latter case the intimate relationship is apt to develop family troubles and even immorality. The boarding-house arrangement, nevertheless, under right planning and management, can be made the ideal arrangement. This can be done by developing the type of small boarding house. These houses should never be so large that one woman, with possibly the assistance of a daughter, cannot easily care for. This small unit makes it much easier to group in each house men who are socially agreeable to each other. It also makes it possible to maintain the home atmosphere.

EXTERIOR TREATMENT OF HOUSES

The treatment of the exterior of workingmen's houses will probably always remain a most important question. We had occasion recently to design the houses for the new village of Kistler, in Pennsylvania, and among the different types that we planned there were three in which the practical was made of secondary consideration to the artistic. The cost of all of the houses was the same and the community was one of workingmen so that we feared that the more cramped accommodations of the artistic houses would cause them to go begging. Quite the contrary proved to be the case, however, and of the three most popular houses in the village two of them were of the artistic type. When some of the tenants were asked why they preferred these houses, they said it was because they were "so cosy and homelike."

There is a style of house that has been worked out by successive alterations and improvements as the result of the criticisms of different factory managers and tenants. It was first designed for Neponsit Garden Village, East Walpole, Mass., and then, with successive modifications, for the New London Ship & Engine Company, Groton, Conn., for the new village of Kistler, in Pennsylvania, for Waterbury, Conn., and lastly for Rome, N. Y. It is two stories in height, has a central hall and stairs, with two bedrooms at the left and one of them equally available for a parlor. At the right is a combined living room and kitchen. Upstairs there are two bedrooms, a bathroom and attic space. There is a cellar under half of the house and hot air heat. The exterior is a modification of the familiar New England type of house with gable roof, a porch across the front with high wooden columns and a rear service porch. This house has met with the requirements in cost, has proved popular with the tenants and has an artistic appearance.

The fluctuation in price between different sections of the country is continually varying, due to local conditions. Our own experiences based on last year's conditions are:

Comparison Between Costs in New York and Elsewhere

These percentages are based on an operation of $30,000 or more.

	Per Cent
New York	100
Waterbury	97
Bethlehem, Pa., Bridgeport, New Haven, Springfield, Worcester, East Walpole and Boston	90
Pittsburgh and Scranton	73
Wilkes-Barre, Easton, Allentown, Hauto, Baltimore, Pottsville, Minersville and Akron	70

We once made a comparison between the cost of six different types of construction. With the exception of the first type, the difference was entirely one of the material for the outside walls.

COSTS OF DIFFERENT CONSTRUCTIONS

The first type was that of the summer cottage: A small cellar and foundations of wooden posts, a wooden frame exposed on the interior, partitions of ⅞-in. boards, outside walls of sheathing boards covered with paper and shingles, a bathroom, but no plastering or heat.

The second type was the usual form of wooden construction, with clapboards on the exterior, a cellar, plastering, a bathroom and hot-air heat.

The third type was similar to the second except that the outside walls were built of tex-faced hollow tile blocks, the blocks exposed on the exterior and the plastering applied directly to the blocks on the interior.

The fourth type had the usual hollow tile blocks instead of the tex-face and these were covered with stucco on the exterior.

The fifth type was of frame construction veneered with common brick.

The sixth type was of tile block construction veneered with common brick.

If the cost of the first type is taken as a basis of comparison the increase in cost for the remaining types was as follows—that is, houses built of the second type of construction cost 15 per cent more than those built of the first type. The third type cost 13 per cent more; the fourth type 16 per cent more; the fifth type 17 per cent more; the sixth type 18 per cent more. The masonry construction either of tile blocks or brick veneer costs so much less in repairs and painting that a tile block house covered with stucco would save its additional cost over the frame building covered with clapboards in less than two years.

If we take the average experience both in America and England, it will be found, I think, that a fair average rent for a man to pay is one-fifth of his monthly income, and if he is purchasing his home on the installment plan, his payments can be increased to one-quarter of his income, that is, a man receiving $2.50 a day could afford to pay $13 a month rent or $16 in monthly installments on the purchase price.

The relation between the cost of the land and the cost of the house is more or less empirical, but good practice would approximate one-eighth the total investment for the land and seven-eighths for the house when located on land of an acreage value not in excess of $1000, and one-quarter the total investment for the land and three-quarters for the house on city property. With a total investment of $2,000, a house built in the city should be of such a type that its cost should not exceed $1500 per family, and if built in the country, the house should not exceed $1,750. New houses can be built for a higher grade of labor and thus make the houses they vacate available for the lower grade.

The conference closed with a banquet Wednesday evening, presided over by Henry D. Sharpe of the Brown & Sharpe Mfg. Company, at which the principal speakers were President W. H. P. Faunce of Brown University and the Marchioness of Aberdeen.

Canadian Movement for Ship Subsidies

A conference of the heads of the largest shipbuilding companies in Canada, acting in conjunction with the past presidents of the Canadian Manufacturers' Association, was recently held in Montreal, to formulate a memorandum outlining a plan of government ship subsidies which will be laid before the authorities at Ottawa. The conference is said to have represented the most influential assembly of Canadian manufacturing interests ever gathered together for such a purpose. Individual and influential members of the government have been approached in the past few months and it is understood that the proposal to grant subsidies will meet with favorable consideration at Ottawa.

The agreement between the governments of Great Britain and Norway regarding the exportation from Norway of raw copper, as referred to in THE IRON AGE of Sept. 21, 1916, has now been changed and the American minister at Christiania states that the 3000 tons of copper thought to be immediately available from the United States will not be released at present.

Iron and Steel Markets

THIRD QUARTER WAR STEEL

Inquiry from Allied Governments

Further Advances in Wire, Tin Plate, Sheets, Coke and Pig Iron

The appearance of the Allies in this market inquiring for shell steel for the third quarter of 1917 is the latest development in the pre-emption of next year's output. Deliveries on existing contracts extend only to July 1. These latest inquiries confirm steel manufacturers in the opinion that as long as the war lasts export demand for war and other needs will take practically all the steel the United States can supply.

A new factor is the Roumanian Commission, which has come to New York as a buyer of munitions. Its needs are large ordnance and its buying may not run heavily into tonnage. For France the latest inquiry is for 19,300 tons of ⅜ to ⅝-in. Bessemer steel bars.

Shell makers who have contracts with the United States Government are also sounding the market. Three such inquiries are for 3750, 6000 and 3500 tons. All told, the Government munitions program represents 300,000 tons.

With so many steel producers, especially those of smaller outputs, avoiding long delivery contracts, there are times when some mill needs to round out a schedule and then the seller seeks the buyer. In this way variations in tank plate prices, for example, have come about, early delivery business in some cases going at 3.50c., Pittsburgh, or at 3.25c. for universal plates, whereas 4c. is usual for wide sheared plates of specification material.

Chicago mills have just sold 60,000 tons of rails, of which 24,000 tons are for the Pacific & Great Eastern of British Columbia and 20,000 tons for the Missouri Pacific. Recent buying for 1918 includes 57,000 tons for the Frisco, placed with the Alabama mill.

Fabricators have an average of about four months' work on their books, but labor is so scarce and so inefficient that some of this will carry over into the second quarter of next year. Railroad more than architectural work is counted on in this trade. The Bridge Builders' and Structural Society's figures show but 52.5 per cent of the shop capacity contracted for in September lettings.

The American Sheet & Tin Plate Company named $5.75 as its base price on 1917 tin plate contracts and has sold freely at that figure. As high as $6 has been paid for tin plate for the first half of next year. Greater activity has developed also in sheets, and the leading interest has made advances ranging from $3 to $5.

That wire prices would go higher has been an almost outworn prediction, but this week has brought it to pass. On Oct. 18 wire nails went to $2.70, annealed fence wire to $2.65 and galvanized barb wire to $3.55—all up $2 a ton. The discount on woven-wire fencing was shortened one point to 59.

For a proposed oil line from Oklahoma to St. Louis, 400 to 500 miles of 6 to 8-in. pipe will be required and other large oil interests are figuring.

The foundry pig iron market, particularly in the South, has responded sharply to recent heavy sales. On Southern No. 2, $15.50 Birmingham is now firmly established for next year's iron, and sales have been made at $16—representing a $1 advance for most sellers.

In Central Western markets the advances on Northern foundry iron have ranged from 50c to $1. The Chicago market is still out of line, prices of foundry and malleable irons being held in check by competitive conditions.

It is plain that export demand for steel-making irons is far from satisfied. The sale of 100,000 tons of Southern basic to Great Britain could readily be duplicated.

Merchant furnacemen are showing a confidence in higher prices that has not been known in that field in many months. Bessemer iron has sold at $24 at Valley furnace as against $23 last week, though some of the $24 iron has been higher than standard silicon. A sale of 10,000 tons of 2.2 to 2.5 silicon iron has been made on that basis to an Eastern steel company.

The coke advance is sensational. Labor scarcity is accentuated, while high prices for steam coal have an effect. A sale of 25,000 to 30,000 tons of high-grade furnace coke has been made at $4.50 at oven, deliveries over the remainder of the year. With ore up $1 a ton next year, an advance of $3 to $3.50 in pig-iron cost is in sight.

Pittsburgh

PITTSBURGH, PA., Oct. 17, 1916.

The announcement by the American Sheet & Tin Plate Company of a price of $5.75 on tin plate for shipment in the first half of 1917, advances by the same interest of $3 to $5 per ton on all grades of sheets, and the reported sale of Bessemer pig iron at higher than last week's level are the leading developments of the past week. Already very large quantities of tin plate have been sold, most of it at $5.75 and some at $6 per base box, for delivery in the first half of next year. Large sales have also been made for delivery in the second half, the price hereafter established for that delivery to apply on these contracts. It is a question whether there will be enough tin plate to meet the demand for next year, and this also applies to sheets to some extent. The new demand for sheets is reported heavy, and large contracts have been closed for delivery in the first quarter and first half of next year, but some large consumers got under cover before the heavy advances in the market took place. Coke is displaying a runaway tendency, having sold up to $5 per ton on best grades for prompt shipment.

Pig Iron.—An interest not a consumer is credited with having bought in the past week 10,000 tons of Bessemer iron at $23 for speculative purposes, believing the market will be higher. The Bethlehem Steel Company is reported to have bought 10,000 tons of high silicon Bessemer iron, silicon running 2.20 to 2.50 per cent, from a furnace east of Pittsburgh, that has a rate to Bethlehem of $2.58 per ton, against $2.98 from the Valley. The price is said to have been $24 at furnace. Sales of upward of 2000 tons of Bessemer are reported to have been made at $24 Valley furnace. Inquiries are out for probably 20,000 tons of Bessemer, including one

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Oct. 18, 1916.	Oct. 11, 1916.	Sept. 20, 1916.	Oct. 20, 1915.
No. 2 X, Philadelphia	**$20.50**	$20.00	$19.50	$16.25
No. 2, Valley furnace	20.00	20.00	18.50	15.00
No. 2 Southern, Cin'ti	**18.40**	17.40	17.40	14.90
No. 2, Birmingham, Ala.	**15.50**	14.50	14.50	12.00
No. 2, furnace, Chicago*	19.00	19.00	18.00	14.75
Basic, del'd, eastern Pa.	20.00	20.00	19.75	17.00
Basic, Valley furnace	20.00	20.00	18.25	15.00
Bessemer, Pittsburgh	23.95	23.95	22.20	16.95
Malleable Bess., Ch'go*	19.50	19.50	19.00	15.50
Gray forge, Pittsburgh	20.45	20.45	18.95	14.70
L. S. charcoal, Chicago	20.25	20.75	19.75	15.75

Rails, Billets, etc., Per Gross Ton:				
Bess. rails, heavy, at mill	33.00	33.00	33.00	28.00
O.-h. rails, heavy, at mill	35.00	35.00	35.00	30.00
Bess. billets, Pittsburgh	45.00	45.00	45.00	24.50
O.-h. billets, Pittsburgh	45.00	45.00	45.00	25.00
O.-h. sheet bars, P'gh	45.00	45.00	45.00	25.50
Forging billets, base, P'gh	69.00	69.00	69.00	34.50
O.-h. billets, Phila	50.00	50.00	48.00	32.00
Wire rods, Pittsburgh	55.00	55.00	55.00	32.00

Finished Iron and Steel, Per Lb. to Large Buyers	Cents	Cents	Cents	Cents.
Iron bars, Philadelphia	2.659	2.659	2.659	1.559
Iron bars, Pittsburgh	2.75	2.75	2.60	1.40
Iron bars, Chicago	2.35	2.35	2.35	1.35
Steel bars, Pittsburgh	2.75	2.75	2.60	1.45
Steel bars, New York	2.919	2.919	2.769	1.619
Tank plates, Pittsburgh	4.00	4.00	4.00	1.45
Tank plates, New York	4.169	4.169	4.169	1.619
Beams, etc., Pittsburgh	2.75	2.75	2.60	1.45
Beams, etc., New York	2.869	2.869	2.769	1.619
Skelp, grooved steel, P'gh	2.50	2.50	2.35	1.40
Skelp, sheared steel, P'gh	2.60	2.60	2.45	1.45
Steel hoops, Pittsburgh	3.00	3.00	3.00	1.50

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire, Per Lb. to Large Buyers:	Oct. 18, 1916. Cents.	Oct. 11, 1916. Cents.	Sept. 20, 1916. Cents.	Oct. 20, 1915. Cents.
Sheets, black, No. 28, P'gh	**3.30**	3.10	2.90	2.00
Sheets, galv., No. 28, P'gh	**4.40**	4.25	4.15	3.50
Wire nails, Pittsburgh	**2.70**	2.60	2.60	1.85
Cut nails, Pittsburgh	2.60	2.60	2.60	1.70
Fence wire, base, P'gh	**2.65**	2.55	2.55	1.70
Barb wire, galv., P'gh	**3.55**	3.45	3.45	2.70

Old Material, Per Gross Ton				
Iron rails, Chicago	$20.00	$20.00	$19.25	$13.50
Iron rails, Philadelphia	21.00	21.00	20.00	17.50
Carwheels, Chicago	**13.00**	12.50	11.75	12.00
Carwheels, Philadelphia	15.50	15.50	15.50	13.50
Heavy steel scrap, P'gh	**18.50**	18.00	16.25	14.50
Heavy steel scrap, Phila.	**16.00**	15.50	14.75	14.50
Heavy steel scrap, Ch'go.	**16.75**	16.50	16.25	11.75
No. 1 cast, Pittsburgh	16.00	16.00	14.50	12.75
No. 1 cast, Philadelphia	16.00	16.00	16.00	14.00
No. 1 cast, Ch'go (net ton)	**13.50**	13.25	12.25	10.50
No. 1 RR. wrot, Phila	22.00	22.00	20.00	16.00
No. 1 RR. wrot, Ch'go (net)	**17.75**	17.50	16.50	11.00

Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	**$5.00**	$4.25	$2.85	$2.00
Furnace coke, future	**3.50**	3.25	2.75	2.25
Foundry coke, prompt	**3.75**	3.50	3.25	2.25
Foundry coke, future	4.00	4.00	3.50	2.60

Metals, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	28.50	28.50	28.25	17.75
Electrolytic copper, N. Y	28.50	28.50	28.50	17.75
Spelter, St. Louis	9.50	9.50	9.50	13.25
Spelter, New York	9.62½	9.75	9.75	13.50
Lead, St. Louis	6.85	6.85	6.85	4.42½
Lead, New York	7.00	7.00	7.00	4.50
Tin, New York	40.75	42.75	38.50	33.25
Antimony (Asiatic), N. Y.	**13.00**	11.50	11.00	29.00
Tin plate, 100-lb. box, P'gh.	$5.75	$6.00	$5.75	$3.15

lot of 10,000 tons. There is little Bessemer to be had and the market is very strong. There is a fair amount of new inquiry for foundry iron. We quote standard Bessemer iron at $23 to $24; basic, $20; malleable Bessemer, $20; gray forge, $19.50, and No. 2 foundry, $20, all at Valley furnace, the freight rate for delivery in the Pittsburgh and Cleveland districts being 95c. per ton.

Ferroalloys.—Reports are that a decided weakness has appeared in prices of ferromanganese, largely due to offerings by domestic producers in order to effect sales. It is claimed that 80 per cent domestic ferromanganese has been offered at $160 per ton, delivered, and possibly less. New inquiry is light and consumers seem to be well covered for the time being. We quote 80 per cent English ferromanganese at $164 per ton, seaboard, and domestic 80 per cent at about $160 per ton, delivered. We quote 18 to 22 per cent spiegeleisen at $40 to $45, and 25 to 30 per cent $55 to $65 at furnace. On 50 per cent ferrosilicon we quote $88 to $89 in lots up to 100 tons; over 100 tons, $87 to $88, and over 600 tons, $86 to $87, all per gross ton, f.o.b. Pittsburgh. We quote Bessemer ferrosilicon as follows: 9 per cent, $30; 10 per cent, $31; 11 per cent, $32; 12 per cent, $33; 13 per cent, $34.50; 14 per cent, $36.50; 15 per cent, $38.50, and 16 per cent, $41. Seven per cent silvery is $28.50; 8 per cent, $29; 9 per cent, $29.50; 10 per cent, $30; 11 per cent, $31, and 12 per cent, $32. These prices are f.o.b. furnace, Jackson or New Straitsville, Ohio, or Ashland, Ky., all having a freight rate of $2 per gross ton to Pittsburgh.

Billets and Sheet Bars.—A local steel interest claims it has been offered in the past two days up to $55 per ton for either Bessemer or open-hearth billets or sheet bars for prompt shipment, and turned the offer down, needing its entire output for its own finishing mills, while it could readily use more steel if it were to be had. This offer shows the extremities to which consumers are being put in order to get steel to fill up gaps in their supply, either through tardy shipments from the mills or from the fact they have not bought enough to meet their needs. With billets or sheet bars at $55 per ton, there is more profit in the steel than in some lines of finished product made from it. On the other hand a dealer reports having secured about 1000 tons of open-hearth billets for reasonably prompt shipment at about $47 at mill. Prices on Bessemer and open-hearth billets and sheet bars range all the way from $45, this price applying on some contracts up to $55, this latter price representing offers by consumers that are in need of steel for prompt shipment. A local interest that started to make small ingots lately reports that its entire output has been sold up for three or four months and states it secured $45 and better for small open-hearth ingots of ordinary carbons. We quote soft Bessemer and open-hearth steel billets and sheet bars at $45 to $55 at mill, Youngstown or Pittsburgh. We quote forging billets at $69 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take $1 extra.

Steel Rails.—Four or five of the leading railroads have bought additional quantities of standard sections, over the amounts called for in their contracts placed early in the year, but it is said on none of this business will the rail mills be able to make deliveries before the third quarter of next year. The higher prices for coal have stimulated the demand for light rails, and more orders are coming in from the coal mining interests than for some time. A rerolling rail mill recently made a sale of 6000 tons of light rails for export, for which it is said above $50 per ton was paid. We quote 25 to 45 lb. sections at $47; 16 and 20 lb., $48; 12 and 14 lb., $49, and 8 and 10 lb., $50, in carload lots, f.o.b. at mill, the usual extras being charged for less than carload lots. We quote standard section rails of Bessemer stock at $33 and of open-hearth $35, per gross ton, Pittsburgh.

Plates.—New orders for steel cars are coming out quite freely. The Louisville & Nashville has placed 100 steel gondolas, 500 steel hoppers and 750 steel underframes with the Pressed Steel Car Company, and the same interest has taken 500 steel hopper cars from

the Wheeling & Lake Erie. The Chesapeake & Ohio has placed 1000 more steel hoppers with the Standard Steel Car Company. The Pressed Steel Car Company has also taken 70 passenger cars for the Long Island Railroad and 150 steel ore cars for the Utah Copper Company. The Wheeling & Lake Erie has placed 500 steel hopper cars with the Standard Steel Car Company, and is in the market for 1000 to 1500 steel gondolas and 500 steel hoppers. The situation in the supply of plates is getting tighter, and it is not believed any could be secured for delivery before the second or third quarter of next year at less than 3.50c. at mill, while for shipment in two to four months from 4c. to 4.50c. at mill is paid for specification plates, and 5c. and higher has been done in some cases on small lots. We quote ¼-in. and heavier plates at 3.50c. at mill for delivery in second half of 1917, while for delivery in two to four months fairly large lots are quoted at 4c. up to 5c. at mill. Small lots for reasonably early shipment are reported to have sold above 5c. at mill. The demand for universal mill plates is not so active, and these can be had for delivery in two to three months at 3.50c., or slightly less, at mill.

Structural Material.—It is understood that revised bids are being asked on about 5000 tons of steel shapes for the proposed new plant of the Westinghouse Machine Company at Eddystone, Pa., near Philadelphia. The Pennsylvania Railroad has placed 1500 tons of bridge work, divided among three independent fabricators. The American Bridge Company will furnish 800 tons of eyebars for the center span of the Quebec bridge. The minimum price on beams and channels up to 15 in. is now 2.70c. at mill for delivery in second and third quarters of next year. Small lots from stock for reasonably prompt shipment bring 3c. to 3.25c., Pittsburgh.

Wire Products.—As yet nothing has been heard of the predicted advance in prices of wire products. The condition of the wire and wire-nail market as regards demand, with the high prices ruling for steel, warrants higher prices for nails and wire, according to the makers. Local makers say that practically their entire output of wire and nails is under contract for the remainder of the year, and they are turning down new inquiries for nails on which they are not able to make the deliveries. There is a very heavy export demand for wire nails, one recent inquiry being for 10,000 kegs for shipment this year. Prices are as follows: Wire nails, $2.60, base, per keg; galvanized, 1 in. and longer, including large head barbed roofing nails, taking an advance over this price of $2, and shorter than 1 in., $2.50. Bright basic wire is $2.65 per 100 lb.; annealed fence wire, Nos. 6 to 9, $2.55; galvanized wire, $3.25; galvanized barb wire and fence staples, $3.45; painted barb wire, $2.75; polished fence staples, $2.75; cement-coated nails, $2.50, base, these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing remain at 60 per cent off list for carload lots, 59 per cent for 1000-rod lots and 58 per cent for small lots, f.o.b. Pittsburgh. [Wire prices have since been advanced 10c. per 100 lb., effective Oct. 19.—EDITOR.]

Shafting.—Manufacturers continue to make contracts with consumers of shafting for delivery in the first quarter and first half of 1917, some of these at 20 per cent off the list and others at 15 per cent off. The output of shafting for this year is sold up and prompt deliveries are very hard to obtain, small lots selling at about 10 per cent off the list and in a few cases have been made at list. The automobile and implement makers and the screw stock machine trade are all placing heavy contracts for next year's delivery. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots for delivery in the last quarter of this year and first quarter of 1917, and 10 per cent off in less than carload lots, f.o.b. Pittsburgh, freight added to point of delivery.

Tin Plate.—Effective Thursday morning, Oct. 12, the American Sheet & Tin Plate Company fixed its price on tin plate for delivery in the first half of 1917 at $5.75 per base box, which is 25c. per box lower than the price announced several days before by several of the leading independent makers. As far as known, none of the makers that had announced a $6 price has revised it to $5.75. It is not improbable that some of the larger customers of the independent mills may get their tin plate for the first half at $5.75, but it is believed the bulk of the business of those mills will be sold at $6. One large independent mill says that it has practically sold already ten months of its output for 1917, and in no case was a single order taken at less than $6. It is conceded that customers of independent mills who might object to paying $6 cannot go to the leading interest and place a contract at $5.75, as its output for the first half of 1917 has already been allotted to its regular customers. We can state that very heavy contracts for delivery in the first half have already been placed at $5.75 and $6 per base box, Pittsburgh, and also that a large amount has been sold by at least several mills for delivery in the second half, no price now being fixed, but to be named later. It is said one inquiry is in the market from India for close to 2,000,000 boxes, and this, with other export inquiries, figures close to 3,000,000 boxes. Some of the independent mills are being importuned to take on part of the inquiry for India, but have refused to do so, stating they need their entire output for the first half for regular customers. The shortage in steel is restricting output to some extent, and the shortage in cars is interfering seriously in shipments. We now quote tin plate at $5.75 to $6 per base box, f.o.b. Pittsburgh, for first half of the year delivery. We quote terne plate, 200-lb. package, carrying 8 lb. of coating, at $9.50 per package; I.C., $9.80; 12-lb., I.C., $10.75; 15-lb., I.C., $11.15; 20-lb., I.C., $11.85; 25-lb., I.C., $12.65; 30-lb., I.C., $13.45; 35-lb., I.C., $14.30; 40-lb., I.C., $15.10, all f.o.b. Pittsburgh.

Sheets.—Effective Thursday, Oct. 12, the American Sheet & Tin Plate Company announced advances of $3 to $5 per ton in blue annealed, Bessemer black and galvanized sheets. Prices on blue annealed and Bessemer black are for delivery to manufacturers and jobbers for the first half, and on galvanized for first quarter only of next year. In blue annealed, changes were made in the methods of quoting on the different gages, Nos. 3 to 12 being $3.25 per 100 lb.; 13 and 14, $3.10, and 15 and 16, $3.15. The price of No. 28 Bessemer black was put at $3.40 per 100 lb., and No. 28 galvanized at $4.50 per 100 lb. Independent mills have also advanced prices, but not as yet to the same extent as the leading interest, quoting from $1 to $2 per ton under its price. The demand for sheets of all kinds is heavy, and prices are very firm. Deliveries on bars from the steel mills are only fairly satisfactory, and the shortage in labor is keeping down the output of sheets to some extent. We now quote blue annealed sheets, Nos. 3 to 12, at 3.15c. to 3.25c.; Bessemer black, No. 28, 3.30c. to 3.40c.; galvanized, No. 28, 4.40c. to 4.50c., and black plate for tinning purposes, No. 28, 3.30c. to 3.40c., in carloads and larger lots, f.o.b. Pittsburgh.

Rivets.—Makers report the new demand quite heavy from boiler and structural shops, and contracts are being made on large quantities of rivets for delivery in the first quarter and first half. The export demand is also active and shipments in carload lots are being made regularly by local makers to India, Japan, South America and elsewhere. The unevenness in prices among jobbers that existed for some time is said to have largely disappeared. Makers' quotations are as follows: Buttonhead structural rivets, ½ in. in diameter and larger, $4 per 100 lb., base, and conehead boiler rivets, same sizes, $4.10 per 100 lb., base, f.o.b. Pittsburgh. Terms are 30 days net, or one-half of 1 per cent for cash in 10 days.

Railroad Spikes and Track Bolts.—The Baltimore & Ohio is asking prices on 20,000 to 25,000 kegs of spikes for new track construction and about 15,000 kegs for maintenance of way, delivery in first half; the Seaboard Air Line is inquiring for 6000 to 8000 kegs, and the Virginian also has a fairly large inquiry out. Some makers are strongly in favor of advancing prices on spikes, claiming that at 2.65c. they are much too low,

this being less than the price of steel bars. The new demand for track bolts is reported quite heavy, and contracts are now being made for first quarter and first half delivery. We quote track bolts with square nuts at 4.50c. to 4.75c. to railroads and 5c. to 5.25c. in small lots to jobbers, base. Track bolts with hexagon nuts take the usual advance of 15c. per 100 lb. Prices on spikes are as follows:

Standard railroad spikes, 9/16 x 5 16 in. and larger, $2.65 to $2.75; railroad spikes, ½ and 7/16 in., $2.75 base; railroad spikes, ⅜ in. and 5/16 in., $3.05 base; boat spikes, $2.80 base; all per 100 lb. f.o.b. Pittsburgh.

Iron and Steel Bars.—None of the steel-bar mills is now quoting less than 2.70c. on contracts for delivery in second and third quarters of 1917, and some makers are asking 2.75c. and higher. There is an insistent export demand for steel rounds, but not much of this business is being placed here, as local mills are filled up so far ahead they cannot make the deliveries wanted. Implement makers are still buying steel bars freely for delivery in first half, and are said to be paying the full price of 2.70c. On some large contracts for steel bars recently, to be used in steel cars, the price of 2.60c. was exacted, this being the highest price paid for steel bars by carbuilders for some years. Mills rolling iron bars report the demand active, and their output well sold up for the remainder of this year. We quote steel bars at 2.70c. at mill for delivery in the first quarter and first half of 1917, while for shipment from warehouse stocks prices rule as high as 3.25c. We quote refined iron bars at 2.75c. to 2.85c., and railroad test bars at 2.85c. to 2.90c., f.o.b. Pittsburgh.

Cold-Rolled Strip Steel.—Demands from consumers that they be permitted to place their contracts for first quarter became so insistent that last week most manufacturers decided to open their books on such contracts at prices ranging from $6.25 to $6.50 per 100 lb., f.o.b. Pittsburgh. Most makers will carry into 1917 considerable production sold on contracts for delivery this year, but which they could not get out. We quote cold-rolled strip steel on contracts for first quarter delivery at $6.25 to $6.50 and on small lots for shipment this year from $6.75 to $7. Terms are 30 days net, less 2 per cent off for cash in 10 days, delivered in quantities of 300 lb. or more when specified for at one time.

Nuts and Bolts.—The demand is fairly heavy, but most consumers are covered over the remainder of the year. It is understood that contracts are now being made with the large trade for delivery in the first quarter and first half. The shortage in supply of labor and steel is restricting the output of nuts and bolts to some extent. Prices are very firm and an early advance is looked for. Discounts are as follows, delivered in lots of 300 lb. or more, where the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days:

Carriage bolts, small, rolled thread, 50 and 5 per cent; small, cut thread, 40, 10 and 5 per cent; large, 35 and 5 per cent.

Machine bolts, h. p. nuts, small, rolled thread, 50 and 10 per cent; small, cut thread, 50 per cent; large, 40 and 5 per cent.

Machine bolts, c. p. c. and t. nuts, small, 40 and 10 per cent; large, 35 per cent. Blank bolts, 40 and 5 per cent. Bolt ends, h. p. nuts, 40 and 5 per cent; with c. p. nuts, 35 per cent. Rough stud bolts, 15 per cent. Lag screws (cone or gimlet point), 50 and 5 per cent.

Forged set screws and tap bolts, 10 per cent. Cup and round point set screws, case-hardened, 60 per cent. Square or hexagon head cap screws, 55 per cent. Flat, button, round or fillister head cap screws, 30 per cent.

Nuts, h. p. sq., tapped or blank, $2.70 off list; hex., $2.70 off. Nuts, c. p. c. and t. sq., tapped or blank, $2.40 off; hex., $2.80 off. Semi-finished hex. nuts, 60 and 5 per cent. Finished and case-hardened nuts, 60 and 5 per cent.

Rivets, 7/16 in. in diameter and smaller, 45, 10 and 5 per cent.

Wire Rods.—There is an insistent heavy demand for wire rods, much larger than the supply, and consumers are having trouble in finding mills that are in position to take their orders. The export demand is also active, but local makers are not paying much attention to such inquiries, needing their entire output of rods for their own consumption or for regular customers. Prices are very firm. We quote soft Bessemer, open-hearth and chain rods at $50 to $60 per ton, f.o.b. Pittsburgh, the lower price being made in very exceptional cases and to consumers whose products enter into competition with mills that make their own rods.

Merchant Steel.—There is a very decided scarcity in all grades of merchant steel, and prices have recently shown a sharp advance. Some mills are being importuned by customers to cover them for the first half of 1917, but in all such cases much higher prices are quoted than are ruling now. Shipments are heavy and the output is also at maximum, and yet mills are not catching up on deliveries, on which they are eight to ten weeks behind. We now quote: Iron-finished tire, ½ x 1½ in. and larger, 2.75c., base; under ½ x 1½ in., 2.85c.; planished tire, 2.90c.; smooth channel tire, ¾ to ⅞ and 1 in., 3c. to 3.10c.; 1⅛ in. and larger, 3.10c.; toe calk, 3.25c. to 3.50c., base; flat sleigh shoe, 2.75c.; concave and convex, 2.85c.; cutter shoes, tapered or bent, 3.50c. to 3.75c.; spring steel, 4c. to 4.10c.; machinery steel, smooth finished, 3.10c. to 3.25c., all f.o.b. at mill.

Hoops and Bands.—Makers report the new demand active, and some consumers who thought they had covered their needs for the remainder of this year are placing new orders, finding they are short of material. It is said that several makers are now disposed to sell both hoops and bands into the first quarter of 1917 on the basis of 3c. for steel hoops and about 2.70c. for bands, with extras on the latter as per the steel bar card.

Wrought Pipe.—Some large pipe line projects are under way which, if put through, will require a very large amount of the larger sizes. The Cities Service Company, headed by Henry L. Doherty & Co., New York City, has recently acquired five or six of the largest oil-producing interests in Oklahoma, having a capacity of probably 25,000 barrels a day, and it is said will build a pipe line from Oklahoma to St. Louis, which will take 400 to 500 miles of 6 and 8-in. pipe. Other large Oklahoma oil interests are figuring on laying lines. The new demand for all kinds of tubular goods, including oil-well supplies, is heavy. On lap-weld pipe and oil-country goods the mills are sold up for five to six months or longer, but can make fairly prompt deliveries on butt-weld sizes. Several of the larger pipe makers say their actual business booked so far this year is very close to double what it was over all of last year. Discounts are firmly held and are printed on another page.

Boiler Tubes.—Mills report the demand for locomotive and merchant tubes very heavy and say they are turning down business nearly every day on which they cannot make deliveries wanted. Several of the larger makers of steel tubes say they are practically sold up over the next eight to ten months. Makers of iron tubes are also having a heavy demand and they have their output sold up for months ahead. Prices on iron and steel tubes are very firm, and discounts are given on another page.

Coke.—On Monday this week sales of considerable lots of high grade furnace coke for prompt shipment were made at $5 per net ton at oven, and there are reports of even a slightly higher price having been paid. The main reasons for the heavy advances in coke are the shortage of labor, the high prices ruling for coal and the shortage of cars. As high as $4 to $4.25 has been paid for gas coal, and all the way from $3.25 to $3.50 for steam coal. It is not believed that much steam coal could be picked up at less than $3.25, or gas coal for less than $3.50 to $3.75 per net ton at mine. Some coke makers are indifferent about selling coke, unless at very high prices, as they can sell their coal and make a larger profit on it than by turning it into coke. Last week a prominent consumer bought 25,000 to 30,000 tons of high grade furnace coke for shipment over the remainder of the year at $4.50 per net ton at oven. It is predicted that spot furnace coke will go to possibly $6 before the present flurry in prices is over. Under present conditions, blast-furnace operators are not

anxious to close contracts for their coke for the first half of the year, preferring to wait until the market settles down. Several leading makers of coke are not trying very hard to get contracts, as they believe prices of coke are getting out of reasonable bounds. We now quote best grades of furnace coke for prompt shipment at $4.50 to $5, and on contracts for the first half of 1917 at about $3.50 per net ton at oven, but some sellers would not accept contracts at that price. We quote spot foundry coke at $5, while on contracts makers of high-grade foundry coke ask $4 and higher at oven. The output of coke in the upper and lower Connellsville regions for the week ended Oct. 12, as reported by the Connellsville *Courier*, was 416,126 net tons, an increase over the previous week of 3762 tons.

Old Material.—Prices are decidedly firmer, and there is more inquiry from consumers who had not been in the market for some time as buyers. It is stated that selected grades of heavy steel scrap have sold at close to $19, and the minimum of the market to-day is $18.50. Some dealers are not anxious to sell much at to-day's market, believing that prices will shortly be higher. The upward movement in pig iron has benefited the scrap market to no inconsiderable extent. Prices now being quoted by dealers for delivery in Pittsburgh and points that take the same rates of freight, per gross ton, are as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	$18.50 to $19.00
No. 1 foundry cast	16.00 to 16.25
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	19.00 to 19.25
Hydraulic compressed sheet scrap	14.50 to 14.75
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	11.50 to 11.75
Bundled sheet stamping scrap	11.00 to 11.25
No. 1 railroad malleable stock	15.25 to 15.50
Railroad grate bars	11.25 to 11.50
Low phosphorus melting stock	21.50 to 22.00
Iron car axles	35.00 to 36.00
Steel car axles	36.00 to 37.00
Locomotive axles, steel	38.00 to 39.00
No. 1 busheling scrap	14.00 to 14.25
Machine-shop turnings	7.50 to 7.75
Old carwheels	14.50 to 14.75
Cast-iron borings	9.00 to 9.25
*Sheet-bar crop ends	19.00 to 19.25
No. 1 railroad wrought scrap	19.00 to 19.25
Heavy steel axle turnings	10.50 to 11.00
Heavy breakable cast scrap	13.00 to 13.50

*Shipping point

Chicago

CHICAGO, ILL., Oct. 18, 1916.—(*By Wire.*)

Additional large sales by Southern furnaces for export account have made such inroads upon their unsold capacity for the first half as to take some producers out of the market and to advance prices from 50c. to $1 per ton. Buying of Northern foundry iron is being freely continued also, though individual purchases are in less quantity than at the height of the movement. Car shortage has begun to create a demand for spot iron. Among the recent purchases of rails it is understood that only the 57,000 tons taken by the Frisco System and the 20,000 tons by the Missouri Pacific are for 1918 delivery. Rail orders closed in the last week totaled 60,000 tons. Other steel sales of size included 30,000 tons of forging billets and a smaller quantity of steel for carbuilding. Structural shapes for building work are less difficult to secure, prices ranging upward from 2.70c., Pittsburgh, for first half to 2.85c. for prompt shipment. Contracts for fabricated steel were awarded to a total of about 5000 tons, of which the Western Electric Company's plant extensions will take 3200 tons. The general advance in the price of sheets carries prices for black sheets as high as 3.75c. in some instances and for galvanized to 5c., though other makers are quoting from $5 to $10 per ton less. The price of blue annealed continues to reflect unusual conditions. On Monday the American Sheet & Tin Plate Company started up its new tin-plate mills at Gary. At Detroit an award of 30,000 tons of cast-iron pipe was made to the local shop of the American Car & Foundry Company. Scrap prices are higher, and the scarcity of railroad and manufactured scrap is more noticeable.

(By Mail)

Pig Iron.—Each succeeding week continues to add to the strength of the pig-iron producers' position. The largest buyers seem to have provided for their wants, particularly among the makers of malleable castings, but last week, as in the week preceding, the number of inquiries for foundry iron in lots up to 1000 tons was sufficiently large to constitute a decidedly active market. There remains considerable uncertainty regarding the amount of iron which Northern furnaces have still unsold in the first half, but the fact that the prices of both foundry and malleable iron are still being held in check by competitive conditions would indicate that the furnaces have sufficient capacity remaining to meet the expected demand. In the South there is more evidence of furnaces being well sold up. One large interest having six stacks in operation has withdrawn from the market, at least temporarily, while others have advanced their price above the competitive level to $16 at Birmingham. Among the developments of the week is the noticeable increase in demand for prompt iron in carload lots. The plausible explanation of this change from the marked absence of inquiry for prompt shipment is that the pinch of car shortage is beginning to be felt. Indications point strongly to serious delays for the coming winter because of the railroads' lack of equipment. Although competitive, high phosphorus Northern irons continue to be quoted at the equivalent of $15, Birmingham, no Southern furnace interest could be found this week quoting less than $15.50, an advance of 50c. above the minimum of a week ago. A limited quantity of prompt shipment iron was sold last week on the basis of $14.50, Birmingham, but that price was quickly withdrawn, as has been the similar quotation on a lot of high silicon Southern iron. In the North, the market is securely lodged on the $19.50 level for malleable, basic and strong foundry irons. The price of charcoal iron was not uniformly advanced $1 per ton in keeping with the announcement of one interest, but is quoted at a minimum of $18.50 at the furnace for Nos. 2 to 5 grades. Ohio silvery irons are being quoted $1 per ton higher by some interests, while the price of low phosphorus iron is soaring in indeterminate fashion. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of $1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5	$20.25 to $20.75
Lake Superior charcoal, No. 1	20.75 to 21.25
Lake Superior charcoal, No. 6 and Scotch	21.25 to 21.75
Northern coke foundry, No. 1	19.50 to 20.00
Northern coke foundry, No. 2	19.00 to 19.50
Northern coke foundry, No. 3	18.50 to 19.00
Southern coke, No. 1 f'dry and 1 soft	20.00 to 20.50
Southern coke, No. 2 f'dry and 2 soft	19.50
Malleable Bessemer	19.50
Basic	19.50
Low phosphorus	40.00
[illegible]	32.50 to 33.50
Bessemer ferrosilicon, 10 per cent	33.50

Rails and Track Supplies.—Among the sales of 60,000 tons of rails last week, the largest transaction provided 24,000 tons for the Pacific & Great Eastern of British Columbia and 20,000 tons for the Missouri Pacific. It is not understood that 25,000 tons recently bought by the Chicago, Burlington & Quincy was for delivery in 1918, but the Frisco System has placed 57,000 tons with the Tennessee mill for that delivery. Additional tie-plate buying is noted, the principal purchases being those of the Northern Pacific and Great Northern, which will take iron plates at prices ranging from $47.50 to $50. Quotations are as follows: Standard railroad spikes, 2.75c. base; track bolts with square nuts, 3.25c. to 3.50c., base, all in carload lots, Chicago; tie-plates, $52 to $54, f.o.b. mill, net ton; standard section Bessemer rails, Chicago, $33, base; open-hearth, $35; light rails, 25 to 45 lb., $40; 16 to 20 lb., $41; 12 lb., $42; 8 lb., $43; angle bars, 2c., Chicago.

Structural Material.—Orders for a large quantity of steel for the carbuilders were booked last week by the mills, but no new car inquiry of importance is noted. It is understood that the Chicago & Northwestern,

which last week placed its order for ore cars, may buy as many as 3000 general service cars, but a large portion of these are likely to be of wood. The week brought out a large number of contracts for steel to be fabricated for building purposes, though, with the exception of 3200 tons taken by the American Bridge Company for additions to the Western Electric Company's plant and 575 tons for an office building for the Bowman Dairy Company, Chicago, placed with the Vierling Steel Company, the contracts were for 300 tons and less. The Green Engineering Company will furnish 260 tons for the new Gorton Machine Company's shop at Racine, the Minneapolis Steel & Machinery Company took a job of 208 tons and the South Halstead Street Iron Works a small job at Kenosha. While most of the fabricators are already protected under contracts at 2.50c., Pittsburgh, the situation for those shops which are still in need of material is not so serious as is the case with other finished products. Bessemer shapes can be had for fourth quarter delivery at 2.85c. and another large mill, which has heretofore restricted its sales, is taking care of its trade for the first half on the basis of 2.70c. We quote for Chicago delivery of structural steel from mill 2.889c.

We quote for Chicago delivery of structural steel out of jobbers' stocks, 3.25c.

Plates.—For delivery at mill convenience, plates can still be had on contract on the basis of 3c., Pittsburgh, though the minimum price of some of the mills for first half delivery, widths being limited largely to sizes used in structural work, is 3.25c. Other sales of narrow plates are being made for prompt shipment at 3.35c., Pittsburgh. Prices for wide plates have closely approached 5c., while deliveries vary greatly. We quote for Chicago delivery of plates from mill, at its convenience, 3.189c. For prompt shipment we quote 3.439c. to 3.689c. in widths up to 72 in., and for wide plates 4.189c. to 4.689c.

We quote for Chicago delivery of plates from jobbers' stocks, 3.75c.

Sheets.—A general, though not uniform, advance in the price of all sheets has been made by the mills. Black sheets are quoted as high as 3.75c., Pittsburgh, and carload lots of galvanized have been sold on the basis of 5c. The leading interest is asking 3.40c. for Bessemer and 3.50c. for open-hearth black sheets, and 4.50c. for galvanized. An unusual condition obtains in the matter of prices of blue annealed sheets in that No. 12 is being sold at a flat price with No. 10 on the basis of 3.25c., Pittsburgh, while lighter gages are being quoted at $2 to $3 per ton less. This spread appears to be the result of a competitive condition arising out of the extension of the operation of some sheet mills into the jobbing mill range of sizes. We quote for Chicago delivery, blue annealed, No. 16 and heavier, 3.289c. to 3.439c.; box annealed, No. 17 and lighter, 3.589c. to 3.689c.; No. 28 galvanized, 4.689c. to 5c.

Prices for black and galvanized sheets out of stock have been advanced from $2 to $4 per ton and we quote for Chicago delivery of sheets out of stock, minimum prices applying on bundles of 25 or more, as follows: No. 10 blue annealed, 3.40c.; No. 28 black, 3.45c. to 3.55c.; No. 28 galvanized, 4.75c. to 4.85c.

Bars.—The demand for reinforcing bars enters largely into the sales of both mild and rail carbon steel material. There is also a very good demand for rerolled rail stock for general purposes, the price of 2.50c. being comparatively attractive. In the bar iron situation there is little or no change, the price remaining at 2.35c. at mill. Sales of forging billets are being made at feature prices, one transaction of 30,000 tons being closed last week at a price in excess of $80 per ton. The business in discard steel is also running into considerable size. We quote mill shipment, Chicago, as follows: Bar iron, 2.35c.; soft steel bars, 2.789c.; hard steel bars, 2.50c.; shafting, in carloads, 20 per cent off; less than carloads, 15 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 3.25c.; bar iron, 3.25c.; reinforcing bars, 3.25c. base with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting net list.

Rivets and Bolts.—A rather surprising irregularity in the price of rivets is reported, some sales having been made at considerable concessions from 4c., Pittsburgh. The demand for bolts and nuts continues to perplex manufacturers and sales appear to be made without difficulty at the highest prices. We quote as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 50-5; cut thread, 40-10-2½; larger sizes, 35-2½; machine bolts up to ⅜ x 4 in., rolled thread, with hot pressed square nuts, 50-10; cut thread, 50; large size, 40-5; gimlet-point coach screws, 50-5; hot pressed nuts, square, $2.70 off per 100 lb.; hexagon, $2.70 off. Structural rivets, ¾ to 1¼ in., 4c. to 4.15c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

Store prices for [illegible] We quote as follows: Structural rivets, 4.25c.; boiler rivets, 4.35c.; machine bolts up to [illegible] carriage bolts up to [illegible] hot pressed nuts, square, [illegible] per 100 lb.; lag screws, 60-5.

Wire Products.—The trade continues to anticipate a further advance in prices and in the meantime buyers are seeking the placement of their orders, hoping to secure desired deliveries at the prevailing quotations, yet apparently willing to pay a premium when necessary. We quote as follows per 100 lb.: Plain wire, Nos. 6 to 9, base, $2.839; wire nails, $2.789; painted barb wire, $2.939; galvanized barb wire, $3.639; polished staples, $2.939; galvanized staples, $3.639; all Chicago. [All up 10c. per 100 lb. Oct. 18.—EDITOR.]

Cast-Iron Pipe.—The city of Detroit awarded the 30,000 tons of pipe for which it was in the market to the Detroit shop of the American Car & Foundry Company at $30.50 per ton. The American Cast Iron Pipe Company was the successful bidder for 600 tons at West St. Paul. Aside from these orders, current business has been limited to small lots. We quote as follows, per net ton, Chicago: Water pipe, 4 in., $34.50; 6 in. and larger, $31.50, with $1 extra for Class A water pipe and gas pipe.

Old Material.—Prices of scrap are still following an upward trend, the advances applying on all of the principal grades. Steel scrap has been quoted as high as $18, No. 1 wrought at $18 and cast as high as $14. Old carwheels brought $13.50 at Michigan City. The rolling mills appear to be especially desirous of securing arch bars and transoms, presumably to be used for sides in place of the more expensive scrap bar, and quotations on this commodity are noted as high as $24 per net ton. The limited quantity of scrap coming into the markets, both from the railroads and the dealers, is more pronounced, evidenced particularly in respect of the railroads, last week, by the absence of any lists of importance. The railroads claim a lack of cars prevents the loading of scrap and the dealers complain of a scarcity of labor for the work of their yards. The quantity of mixed country iron does not seem to be limited but the lack of help handicaps the manufacture of graded material. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Old iron rails	$20.00 to $20.50
Relaying rails	19.50 to 20.50
Old carwheels	13.00 to 13.25
Old steel rails, rerolling	19.00 to 19.50
Old steel rails, less than 3 ft	18.25 to 18.50
Heavy melting steel scrap	16.75 to 17.25
Frogs, switches and guards, cut apart	16.75 to 17.25
Shoveling steel	15.75 to 16.25
Steel axle turnings	8.75 to 9.25

Per Net Ton	
Iron angles and splice bars	$21.25 to $21.75
Iron arch bars and transoms	22.75 to 23.25
Steel angle bars	16.00 to 16.50
Iron car axles	30.00 to 30.50
Steel car axles	32.50 to 33.50
No. 1 railroad wrought	17.75 to 18.25
No. 2 railroad wrought	16.75 to 17.25
Cut forge	16.75 to 17.00
Pipes and flues	12.75 to 13.25
No. 1 busheling	14.75 to 15.25
No. 2 busheling	13.00 to 13.50
Steel knuckles and couplers	14.75 to 15.00
Steel springs	15.25 to 15.50
No. 1 boilers, cut to sheets and rings	10.75 to 11.25
Boiler punchings	11.00 to 11.50
Locomotive tires, smooth	22.75 to 23.25
Machine-shop turnings	5.50 to 6.00
Cast borings	11.00 to 11.50
No. 1 cast scrap	13.00 to 14.00
Stove plate and light cast scrap	11.00 to 11.50
Grate bars	11.00 to 11.50
Brake shoes	11.00 to 11.50
Railroad malleable	11.00 to 11.50
Agricultural malleable	11.25 to 11.75

Philadelphia

PHILADELPHIA, PA., Oct. 17, 1916.

Less emphasis is laid on the demand for ordinary tank plates at 4c., Pittsburgh, and they are to be had at 3.50c. to 4c., Pittsburgh. One mill wants more tank plates to roll. The call for ship plates is more overwhelming than ever, and for this material up to 4.50c., Pittsburgh, is quoted. For plates suitable for cars and structural work, 4c., or higher, is easily obtainable. It is pretty well understood that the first quarter requirements of important buyers of steel are covered, consumers having at least assurances that they will be cared for. Structural shapes are uniformly quoted at 2.85c., Pittsburgh. Bars continue strong at 2.70c. to 2.75c., Pittsburgh. Sheets are in better demand. Foundry pig iron continues fairly active and strong. Basic is quiet, but probably could not be had under $21.50, Philadelphia. Consumers of low phosphorus appear to be hesitating over the top-notch prices which have been reached. The coke situation is a serious one, inasmuch as deliveries on contracts are not up to the mark, and the prices of spot range up to $5, which was paid for spot furnace coke last Saturday. The scrap market shows little change, though prices hold up well. Dealers are confronted by a surplus of old material, and there is more or less difference of opinion as to when it will be absorbed.

Pig Iron.—Under the stimulus of a continued fair demand, and more particularly the increasing cost of production, prices show a tendency to advance, and again there is talk of $25 iron. One maker, as stated last week, quotes $22, furnace, for eastern Pennsylvania No. 2 X, the brand being one which takes a 79c. freight rate to Philadelphia. The price is admittedly above the market, but it has not deterred several consumers from placing orders at that figure. Other makers have taken business at $21.40, delivered. Some furnaces are in acute distress because of the difficulty they are experiencing in getting coke, both deliveries on contracts and prompt. Deliveries on contracts are not what they should be, because of a scarcity of both labor and freight cars. The result is that furnace managers have been obliged to enter the market for prompt fuel, and at least one buyer has paid $5, oven, for spot coke. Under such conditions it is natural that iron makers should want either to keep business away or get higher prices to meet increased expenses. All brands of Virginia iron have been advanced 50c. per ton, making $20.75, Philadelphia, the quotation for No. 2 X. The volume of business which Virginia furnaces have booked in recent days makes it extremely probable that a further advance will soon be announced. Pipe makers continue to buy, largely of Southern iron, and one is reported to have paid $19.50, delivered, for gray forge. The principal users of basic are covered, and in the absence of buying the price is somewhat problematical, but it is believed that at least $21.50, delivered, would be asked. Low phosphorus has quieted down, consumers showing some hesitancy over current prices. Standard low phosphorus is unchanged at $37 to $40, delivered. Quotations for standard brands, delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa. No. 2 X foundry	$20.50 to $21.00
Eastern Pa. No. 2 plain	20.00 to 20.50
Virginia No. 2 X foundry	20.75
Virginia No. 2 plain	20.50
Gray forge	19.00 to 19.50
Basic	20.00 to 20.50
Standard low phosphorus	37.00 to 40.00

Iron Ore.—Arrivals of foreign ore at this port in the week ended Oct. 14 were confined to 7600 tons from Cuba. In the past week there has been some business in Lake Superior ore and in Brazilian manganese ore in this district, but the principals are saying little about it. The manganese ore brought about 70c. per unit.

Ferroalloys.—In the week ended Oct. 14 arrivals of English ferromanganese at this port aggregated 1001 tons. Quotations for 80 per cent material show but little change, except that, as previously reported, domestic ferromanganese is a little stronger. First half 80 per cent imported can be had at $164, although some sellers ask $165. Prompt commands about the same figures. Advices from abroad indicate that no serious stoppage of shipments is expected. Fifty per cent ferrosilicon is strong at $91 to $92, Pittsburgh, for prompt, with the sellers unwilling to go into next year. Blast-furnace ferrosilicon, 11 per cent, is strong at $35.44 to $36.44, Philadelphia.

Plates.—The demand for ship plates is more overwhelming than ever, and up to 4.659c., Philadelphia, has been paid. Marine boiler steel is quoted at 8c. to 10c., Pittsburgh. The general quotation for tank plates is 4c., Pittsburgh, or 4.159c., Philadelphia, but they can be had down to 3.659c., Philadelphia. At least one mill wants orders for tank plates, even at less than 4c., Pittsburgh. This price, of course, does not apply to plates used in car or structural work. So great is the demand for ship plates that orders for thousands of tons are being turned down, one of these calling for 6000 tons, April delivery. The requirements of shipbuilders on the Pacific coast run into thousands of tons, large quantities of which have been booked. First-hand reports from Great Britain indicate a shortage of steel in England. J. P. Morgan & Company, Great Britain's fiscal and purchasing agents in this country, have just made their first inquiry of the kind for about 2000 tons for shipment to England. Meanwhile the carbuilders are becoming more active in their demands on the mills. Plates rolled from discarded shell steel have brought 3.909c., Philadelphia. Universal plates are easier to procure than sheared plates, and transactions at 3.409c., Pittsburgh, are reported.

Bars.—The market is strong, with makers quoting 2.909c., Philadelphia, or 2.75c., Pittsburgh, but it is probable that 2.859c., Philadelphia, or 2.70c., Pittsburgh, can be done. Iron bars are strong but unchanged at 2.659c., Philadelphia.

Structural Material.—Makers are unanimous in quoting 2.85c., Pittsburgh, or 3.009c., Philadelphia, for structural shapes, while up to 3.659c., Philadelphia, is asked for ship shapes. One Eastern mill has not gone into the first quarter except with preferred customers, but is certain that much of its last quarter commitments will extend into 1917. The contract for the Philadelphia Electric Company's power house at Chester, Pa., requiring about 6000 tons, has been placed with the Levering & Garrigues Company, New York. A part of the material will be furnished by the Eastern Steel Company. No other noteworthy propositions are reported, although some of the railroads are inquiring for bridge material.

Billets.—For open-hearth rerolling billets there is a lively demand and quotations are strong at $50 to $55. Forging steel is equally strong at $65 to $75, according to specifications. Some makers are out of the market; others sold up to July.

Sheets.—The recent weakness of sheets has disappeared. Domestic consumers are inquiring more actively, while the export needs are growing also. No. 10 blue annealed are quoted at 3.259c. to 3.409c., Philadelphia.

Coke.—The shortage of labor and cars and the high prices that are being obtained for coal are combining to make coke both scarce and high in price. For spot furnace coke, required by blast furnaces whose deliveries on contracts are short, $5 per net ton at oven has been paid. Foundry coke for early delivery has brought $4.60 per net ton at oven, and up to $5 is asked. Contract furnace is nominal at $3.25 per net ton at oven, and contract foundry, $3.50 to $3.75. Freight rates from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Old Material.—But little change is to be noted, except that the show of strength contributed by recent buying at Pittsburgh is not so much in evidence. The dominant fact is that there is a surplus of scrap available. Some of the mills are showing more interest in some items, and dealers have paid up to $16.50 for heavy steel. Quotations for delivery in buyers' yards

in this district, covering eastern Pennsylvania and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$16.00 to $16.50
Old steel rails, rerolling	18.50 to 19.00
Low phos. heavy melting steel scrap	22.00 to 23.00
Old steel axles (for export)	35.00 to 36.00
Old iron axles (for export)	35.00 to 36.00
Old iron rails	21.00 to 22.00
Old carwheels	15.00 to 16.00
No. 1 railroad wrought	22.00 to 22.50
Wrought-iron pipe	16.00 to 16.50
No. 1 forge fire	12.00 to 12.50
Bundled sheets	12.00 to 12.50
No. 2 busheling	10.50 to 11.00
Machine-shop turnings	8.00 to 8.50
Cast borings	10.00 to 10.50
No. 1 cast	16.00 to 16.50
Grate bars, railroad	13.00 to 13.50
Stove plate	13.00 to 14.00
Railroad malleable	13.00 to 13.50

Cincinnati

CINCINNATI, OHIO, Oct. 18, 1916.—(*By Wire.*)

Pig Iron.—Several reasons are given for the marking up of quotations on both Southern and Northern iron. Sellers of Southern No. 2 foundry are to-day quoting $15.50, Birmingham, as the minimum, but the majority of makers will not accept business below $16 for either prompt delivery or shipment in the first half of next year. The diverting of more Southern furnaces to making basic, part of which is to be exported, has had some effect on the Southern market, as it removed a considerable tonnage of foundry iron that would now be for sale. A number of foundry-iron melters who have not provided for their future requirements are now somewhat anxious, and many sales are made that do not come to light. While the stocks of resale and warrant iron in the South have not been underestimated, holders of this iron seem disposed to await developments before turning loose their purchases. In the Ironton district all makers have temporarily withdrawn from the market. The nominal price to-day is $20, Ironton, and business at this figure has been refused for this year's shipment. Although Virginia No. 2 X is quoted now at $18, furnace, an advance is expected before the end of the week. Quite a number of Virginia foundry-iron sales have lately been made in this territory. The general inquiry is light, but buyers are negotiating in a quiet way for a future supply. Among sales reported is one of 1200 tons of Southern iron to an Indiana melter for first half shipment. A central Ohio consumer also bought 800 tons for the same delivery. A southern Ohio user also took 1000 tons. The only large open inquiries include 1500 tons of mixed Southern and Northern foundry grades for an Indiana manufacturer and another from the same section for 3000 to 5000 tons of malleable, both for first half shipment. The Jackson County silvery irons have been advanced to $30 at furnace, but $27 can be done from a furnace in the same district based on an 8 per cent analysis. Southern high silicon irons are also competing strongly. The car shortage has undoubtedly had some effect in the swift advance on foundry iron, but not to the extent that is currently reported. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft.	$18.90 to $19.40
Southern coke, No. 2 f'dry and 2 soft.	18.40 to 18.90
Southern coke, No. 3 foundry	17.90 to 18.40
Southern coke, No. 4 foundry	17.40 to 17.90
Southern gray forge	16.90 to 17.40
Ohio silvery, 8 per cent silicon	28.26 to 31.26
Southern Ohio coke, No. 1	22.26 to 22.76
Southern Ohio coke, No. 2	21.26 to 21.76
Southern Ohio coke, No. 3	20.76 to 21.26
Southern Ohio malleable Bessemer	21.26 to 21.76
Basic, Northern	21.26 to 21.76
Lake Superior charcoal	21.20 to 22.20
Standard Southern carwheel	24.90 to 25.40

(*By Mail*)

Finished Material.—Jobbers report an unexpected demand for different classes of finished material, included in which is a call for hoops and bands as the shipments from the mills are somewhat delayed. Wire nails are unchanged at $2.85 per keg base and barb wire at $3.70 per 100 lb. Steel bars and small structural shapes are quoted at 3.40c. and twisted steel bars at 3.55c. The nominal quotation on cold-rolled steel rounds, 2-in. and larger, is 3.90c. Sheets have taken another advance, and the quotation to-day from nearby mills on No. 28 block is 3.90c. and on No. 28 galvanized 4.90c., f.o.b. Cincinnati or Newport, Ky. The warehouse price on No. 10 blue annealed is unchanged at 3.60c., although this is below the mill quotation.

Coke.—The shortage of labor and cars in the Connellsville district has advanced the price of 48-hr. coke to $4.50 per net ton at oven for prompt shipment. Contract business would be accepted around $3. Connellsville foundry coke is quoted at $4.50 to $5 for nearby shipment and from $3.50 to $3.75 on contract. A few sales have been made of both furnace and foundry coke, with shipments to be made within 30 days at the high prices named, but these sales are based on the producers being able to obtain cars in which to ship the coke. The Wise County and Pocahontas producers have practically withdrawn from the market except for foundry coke, which is being held around $4 to $4.50 at oven for this year's shipment, with contract prices ranging from $3.75 to $4. New River foundry coke is $4 per net ton at oven, with contracts extending into next year at this figure.

Old Material.—Another advance has been made on practically all grades of scrap, with the exception of borings and turnings. The demand for machinery cast scrap has improved considerably, and wrought scrap has also shown some betterment. The rolling mills appear to be more willing to contract ahead, and the foundries are also looking out for their future requirements. The following are dealers' prices, f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton	
Bundled sheet scrap	$12.00 to $12.50
Old iron rails	18.00 to 18.50
Relaying rails, 50 lb. and up	23.00 to 23.50
Rerolling steel rails	16.50 to 17.00
Heavy melting steel scrap	15.50 to 16.00
Steel rails for melting	15.00 to 15.50
Per Net Ton	
No. 1 railroad wrought	$15.50 to $16.00
Cast borings	4.75 to 5.25
Steel turnings	5.00 to 5.50
Railroad cast	12.50 to 13.00
No. 1 machinery cast	14.50 to 15.00
Burnt scrap	9.25 to 9.75
Iron axles	28.25 to 29.25
Locomotive tires (smooth inside)	22.50 to 23.00
Pipes and flues	10.50 to 11.00
Malleable and steel	12.25 to 12.75
Railroad tank and sheet	9.75 to 10.25

St. Louis

ST. LOUIS, MO., Oct. 17, 1916.

Pig Iron.—Buying has been in small lots. The total was probably 3500 to 4000 tons, mostly No. 2 and No. 3 Southern. In basic an inquiry for 10,000 tons of Northern appeared and is being rather sharply competed for, though prices are firmly held.

Coke.—The market has been somewhat excited, so far as small lots could cause excitement. Prices as high as $4 Connellsville for 48-hr. furnace coke and as high as $6 for best selected 72-hr. foundry coke are noted. By-product coke, held on a parity with Connellsville coke contract prices, is fairly well sold up for the near future.

Finished Iron and Steel.—With neither buyer nor seller inclined to contract at current prices and deliveries, transactions in finished products have been held down to small orders. Movement out of warehouse continues good, with prices well held. For stock out of warehouse we quote as follows: Soft steel bars, 3.30c.; iron bars, 3.25c.; structural material, 3.30c.; tank plate, 3.80c.; No. 10 blue annealed sheets, 3.55c.; No. 28 black sheets, cold rolled, one pass, 3.60c.; No. 28 galvanized sheets, black sheet gage, 5.15c.

Old Material.—Scrap dealers are still trading largely among themselves. Quotations are both high and firm, despite the fact that some of the mills in this district have placed embargoes and none are buying at all heavily at the present time. The supplies on hand in the consumers' yards are not regarded as excessive, and therefore the dealers expect buying to begin shortly. Steel axles wanted for export are especially scarce. Heavy melting steel is also wanted, but not in large supply. Lists out for the week include 250 tons from

the Vandalia, 1000 tons from a local industry and 200 tons from the Chicago, Peoria & St. Louis. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district as follows:

Per Gross Ton	
Old iron rails	$18.00 to $18.50
Old steel rails, rerolling	18.50 to 19.00
Old steel rails, less than 3 ft	17.00 to 17.50
Relaying rails, standard section, subject to inspection	24.00 to 26.00
Old carwheels	12.00 to 12.50
No. 1 railroad heavy melting steel scrap	17.00 to 17.50
Heavy shoveling steel	17.00 to 17.50
Frogs, switches and guards cut apart	17.00 to 17.50
Bundled sheet scrap	9.00 to 10.00
Per Net Ton	
Iron angle bars	$18.00 to $18.25
Steel angle bars	15.50 to 16.00
Iron car axles	31.00 to 31.50
Steel car axles	32.00 to 32.50
Wrought arch bars and transoms	20.00 to 21.00
No. 1 railroad wrought	16.50 to 17.00
No. 2 railroad wrought	16.25 to 16.50
Railroad springs	16.00 to 16.25
Steel couplers and knuckles	16.00 to 16.25
Locomotive tires, 42 in. and over, smooth inside	21.00 to 22.00
No. 1 dealers' forge	15.00 to 15.50
Cast-iron borings	6.50 to 7.00
No. 1 busheling	14.50 to 15.00
No. 1 boilers, cut to sheets and rings	10.50 to 11.50
No. 1 railroad cast scrap	12.50 to 13.00
Stove plate and light cast scrap	9.25 to 9.75
Railroad malleable	11.00 to 11.50
Agricultural malleable	10.00 to 10.50
Pipes and flues	12.00 to 12.25
Heavy railroad sheet and tank scrap	12.00 to 12.25
Railroad grate bars	10.00 to 10.50
Machine shop turnings	7.50 to 8.00

Birmingham

BIRMINGHAM, ALA., Oct. 16, 1916.

Pig Iron.—If pig iron could be moved as made and as it has been ordered by customers, there would be no complaint in this district, but the car shortage is causing serious trouble. The market has toned up to $15.50, with inquiries brisk and makers careful as to bookings. The rise to $15.50 in the latter part of the first week of the month has become general, sales in the second week having been on that level with all makers. Two interests are now asking $16. One of these accommodated a regular customer with 400 tons at $15.50, but remained steadfast so far as the general market is concerned. The largest foundry interest is declining to sell its entire make at $15.50, but has begun to parcel out allotments to customers, confident of a further rise. The disposition to hold for higher prices is general. The clamor for rush shipment is insistent, anticipatory deliveries being desired in many cases. The car shortage, however, prevents the movement of even a full normal supply. The car famine is due to slack business in the South during 1915 and the early portion of this year, cars remaining in the North, while the Southern car shops have been unable to secure steel underframes as ordered, delays being as much as six months. The September production showed a diminution in the foundry output, but an increase of nearly 10,000 tons in basic. The basic output this month will still further decrease the foundry supply. The best-posted iron men continue to forecast something resembling a foundry-iron famine; that it is going to be more eagerly sought than obtained they feel assured. Cotton will soon be out of the way and the car situation should change. Meanwhile, it seriously threatens deliveries and to that extent affects the market. Charcoal iron has been selling at $22.50 and $23 in quantities sufficient to keep active plants going. Southern metal consumption of all kinds is at a maximum. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	$16.00 to $16.50
No. 2 foundry and soft	15.50 to 16.00
No. 3 foundry	15.00 to 15.50
No. 4 foundry	14.75 to 15.25
Gray forge	14.50 to 15.00
Basic	15.50 to 16.00
Charcoal	22.50 to 23.00

Cast-Iron Pipe.—The water pipe market does not improve, but it manages, through the accession of fill-in orders, to maintain the rate of manufacture of the past six months and to secure the advanced prices. The high price of structural material affects both the water and soil pipe markets. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., $29; 6-in. and upward, $26, with $1 added for gas pipe and 16-ft. lengths.

Coal and Coke.—Ordinary contract steam coal, formerly selling at $1 to $1.30, can be disposed of at $2 to $2.50, but there is a dearth of cars. There is a scramble for coal all over Southern territory. The river business is hampered by delays in repairs on craft damaged by the July floods and by failure to get the coal to the river via the short rail lines. Coke remains as strong as ever. Standard beehive foundry brings $4.25 to $4.50 per net ton, f.o.b oven, to the extent of a maximum output, with bids for spot at $5. Furnace coke sells at $3.25 to $3.50.

Old Material.—The market is much stronger, and transactions in both steel and cast are on a large scale, with an extremely brisk inquiry. The recent sag has been replaced by a distinctly rising tendency and an indication of fancy prices for select material. Steel works, rolling mills and foundries are equally vigorous in their demands. We quote, per gross ton, f.o.b dealers' yards, as follows:

Old steel axles	$25.00 to $30.00
Old steel rails	12.25 to 12.75
No. 1 wrought	13.50 to 14.00
No. 1 machinery	11.00 to 11.50
Carwheels	11.00 to 11.50
Tram carwheels	10.50 to 11.00
Stove plate and light	9.25 to 9.75

San Francisco

SAN FRANCISCO, CAL., Oct. 10, 1916.

Distributive business in most lines is falling below expectations for this season, owing apparently to curtailment of building and small improvement work, which are seriously interfered with by present prices. Manufacturing requirements show no sign of contraction, but on the contrary are gradually increasing in many lines. Specifications on fourth quarter contracts are coming out well, and both merchants and large consumers are making provision for requirements many months in the future.

Bars.—Considerable export business has been done in the last few weeks, though prices quoted on foreign inquiries are quite firm. Local business is somewhat less active, sales having failed to materialize for a number of large projects. A fair tonnage of reinforcing material is being booked, however. Merchants' sales are moderate, but they are keeping their stocks in good shape, and manufacturers are buying freely. Iron bars continue in good demand. One of the local mills is preparing to improve its steel making and rolling facilities. Local prices are not quotably higher, the jobbing prices being 4c. for steel bars and 3.90c. for iron.

Structural Material.—New contracts locally are of little importance, and nothing of much interest is being figured at the moment. The Llewellyn Iron Works, Los Angeles, has taken a large department store contract in that city, and the Mercer-Fraser Company, Eureka, Cal., has the construction contract for a steel bridge in Santa Barbara County. The Minneapolis Steel & Machinery Company has secured a small bridge contract at Seattle, and figures are being taken for a steel viaduct in that city. The city of San Diego has plans for a public library. Plans are under way for a seven-story office building in Salt Lake City, Utah.

Plates.—Export demand continues an important factor. Local shipbuilders are receiving a heavy tonnage on contracts, but the supply still tends to lag behind current needs, and there are a number of new ship inquiries in the market. No new pipe business of importance has appeared, but tank work is absorbing a considerable tonnage, and there is a good demand from various manufacturers in the interior. Jobbing business is only moderately active, with price remaining at 4.75c.

Sheets.—The fall acceleration of galvanized in corrugating sizes has been almost entirely absent. Other grades have been moving fairly well in a jobbing way, and a number of buyers have ordered moderate stocks in anticipation of higher prices. Mill prices are quoted higher, varying from 4.40c. to 4.75c., Pittsburgh. Blue

annealed sheets continue in good demand, with some special inquiries for pipe work.

Rails.—Relayers still figure to a large extent in the business transacted, but orders for light rails placed with the mills are quite numerous, and in several cases fairly large. The outlook is favorable for a heavier business from the lumber interests early next year. No important inquiries for standard rails are appearing.

Wrought Pipe.—As expected, last month's jump in the pipe business is not being maintained. A few small municipal and corporation inquiries are appearing, but nothing of importance, and the demand for merchant sizes is slow. Conditions in the oil fields are encouraging, but buyers there have apparently anticipated their requirements for many months in advance.

Cast-Iron Pipe.—The only new order worth mentioning is 450 tons of 30-in. and 10-in. pipe for Los Angeles. Several municipalities are making financial arrangements for needed waterworks extensions, but at the moment the situation is quiet. Prices show no further change, being quoted at $40 per net ton for 4-in.; $37 for 6-in., and $1 extra for class A and gas pipe.

Pig Iron.—The local market is quiet. The tonnage used is keeping up in good shape, but practically all melters are carrying heavy stocks and will not be actively in the market for several weeks.

Coke.—Foundries have ample stock to carry them to about the end of the year, and while they are closely watching the tendency of prices, they are still keeping out of the market.

Old Material.—The larger melters still have considerable steel scrap under contract, and, while requirements are large and increasing, no anxiety is felt as to supplies. Prices range from $10 to $13 per gross ton, with little moving at the top figure. Cast-iron scrap is moving well at about $16 per net ton.

New York

NEW YORK, Oct. 18, 1916.

Pig Iron.—Domestic demand has been moderate in the past week and export business still leads in interest. Southern iron has advanced, in view of the large export sales made by two important Alabama producers in the preceding two weeks. Transactions in this district include 2000 tons at Newark, two foundries taking 1000 tons each. One of these lots was Virginia iron, which at the furnace quotation of $17.50 for No. 2 X recently made, could be delivered in Brooklyn and New Jersey at $20.50. Sales of several 500-ton lots of Pennsylvania and Buffalo iron have also been made. There is little current buying in New England. Some eastern Pennsylvania furnaces have asked as high as $22 for No. 2 X for forward delivery, in other cases $21 and $21.50. The foundry iron market is uneven and the advance is not in line with what has occurred in steelmaking iron. We quote at tidewater for early delivery: No. 1 foundry, $21 to $22; No. 2 X, $20.50 to $21.50; No. 2 plain, $20 to $20.50; Southern iron at tidewater, $20.50 to $21.00 for No. 1 and $20 to $20.50 for No. 2 foundry and No. 2 soft.

Ferroalloys.—Inquiries for ferromanganese are very few. Sales the past week have been small, domestic product having gone at $162, delivered, the sales including some by an Eastern steel company. The quotation for the British standard alloy is $164, seaboard, for any delivery, with the domestic product obtainable at from $160 to $165, delivered. Inquiries for about 500 tons of spiegeleisen are in the market. Quotations are from $43 to $45, furnace. Ferrosilicon, 50 per cent, is still in active demand. There is not much inquiry yet on contract for 1917, the price for which may be around $100, Pittsburgh.

Structural Material.—Fabricators have an average of four months' work on their books. In reality this will figure out at about six months, or through the first quarter of 1917, such is the curtailment from capacity output owing both to shortage and to inefficiency of labor. Thus will time be available for buyers to become used to thinking in terms of present price levels before the fabricator will have occasion to worry over his own prospects. The bulk of new business, it is believed, will come from the railroads. This expectation is based on the earnings of the roads and their needs. It is borne out by such offerings as 1000 tons for the New Jersey & Long Branch, 250 tons for the Lehigh Valley, 2000 placed in the week by the Pennsylvania and a round tonnage for car shops soon to go up near Pittsburgh for a leading road, all on top of the specific jobs noted in this column in the last few weeks. Contracting for material for fabricators for the first quarter is now going on. Universal plates are easy, as noted elsewhere, and it is believed that plain material in lots attractive to the mill has been done at 2.60c., Pittsburgh, for early 1917. For relatively early delivery 2.70c., Pittsburgh, or 2.869c. is minimum, with quotations up to 3.019c., New York, from some mills, and 3.35c. from New York district warehouse.

Steel Plates.—Quite a little buying of universal plates is noted, both on contract to fabricators and for early shipment to round out stocks of warehouses. On large lots there is evidence of 3.25c., Pittsburgh, being done in this connection. Sales of universal plates for export are also noted, at about 3½c. at mill. Sheared plates are stiffer, if possible; domestic business involving several hundred tons for shipbuilding is at this writing about closed at 5c. per pound, Pittsburgh. Offerings of sheared plates for export continue, but much of these will have to be modified as to delivery dates before they will be acceptable to the mills. Wide plates are difficult to get before the third quarter of 1917, and command 4c., Pittsburgh. Plates up to 7 ft. in width likewise take 4c., but deliveries may be made in 6 to 8 weeks, while universal plates may be obtained in a few weeks and at 3.50c., Pittsburgh. Warehouse prices range from 4c. to 4.50c., New York.

Iron and Steel Bars.—Shell makers are sounding the market for steel for the United States Government. One inquiry is for 3750 tons, another for 6000 tons, and one is for 400 tons for shell noses. Meanwhile few mills have made reservations for this material as they have for plates for Government ships. The scarcity of open-hearth steel bars is strengthening interest in bar iron; and while an increase in price is not spoken of, protection under future delivery is now actively sought. There is, if anything, an expansion in inquiry for steel bars for foreign account, and the better delivery in Bessemer steel is recognized in an inquiry emanating from J. P. Morgan & Co. for 19,300 tons of ⅜ to ⅝ in. Bessemer rounds for France. Though 2.60c., Pittsburgh, is unusual for early delivery, about 2500 tons were bought last week in the Philadelphia district for shipment this year at this figure. Shell steel discards rolled into bars are in good demand, largely for concrete reinforcement work, and 2.75c., Pittsburgh, in a few weeks is paid. Iron bars are strong at 2.669c. and 3.25c., New York, respectively, for mill and warehouse shipments. Steel bars are 2.919c., New York, for shipment from mill in a few weeks, and 3.25c. to 3.50c. from store, New York.

Cast-Iron Pipe.—Nothing of importance is announced as to municipal lettings. It is expected that the city of Newark, N. J., will shortly ask for bids on quite a large quantity of pipe. Private buying continues in moderately good volume, with considerable interest in contracts for spring delivery, but the pipe foundries are in position to take much more work than they now have on their books. Prices, nevertheless, are firmly held because of the strength of the pig-iron market. Carload lots of 6-in., class B and heavier, are held at $31.50 per net ton, with $1 per ton extra for class A and gas pipe.

Old Material.—Dealers report a much better demand, although consumers are as yet not disposed to purchase large quantities or to make contracts for extended deliveries. About the only important group of consumers not now in the market are the steel companies in eastern Pennsylvania, which seem to be amply supplied. The iron rolling mills are steadily

buying, the steel companies in western Pennsylvania are quite freely taking material from this section and New England consumers are also absorbing fair quantities. Brokers quote buying prices about as follows to local dealers and producers, per gross ton, New York:

Heavy melting steel scrap (eastern Pennsylvania specifications)	$13.25 to $13.75
Old steel rails (short lengths) or equivalent	15.00 to 15.25
Relaying rails	28.50 to 29.00
Rerolling rails	17.50 to 18.00
Rerolling rails (for export)	22.00 to 22.50
Iron and steel car axles (for export)	38.50 to 39.50
No. 1 railroad wrought	20.00 to 20.25
Wrought-iron track scrap	17.00 to 17.50
No. 1 yard wrought, long	14.75 to 15.00
Light iron (nominal)	3.50 to 4.00
Cast borings (clean)	7.50 to 8.00
Machine shop turnings (nominal)	5.75 to 6.00
Mixed borings and turnings (nominal)	5.75 to 6.00
Wrought pipe	13.75 to 14.00

Foundries are quite regularly in the market, but seem to be satisfied with buying from hand to mouth. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

No. 1 cast (machinery)	$16.50 to $17.00
No. 2 cast (heavy)	14.50 to 15.00
Stove plate	12.00 to 12.50
Locomotive grate bars	11.00 to 11.50
Old carwheels (nominal)	15.00
Malleable cast (railroad)	12.00 to 12.50

Cleveland

CLEVELAND, OHIO, Oct. 17, 1916.

Iron Ore.—Ore men fear that the record-breaking movement of 1916 can hardly be equaled next year should the heavy demand continue, owing to the fact that, because of the shortage of labor, stock piles will be smaller at the opening of the 1917 season of navigation than at the beginning of this season. The movement continues heavy in spite of delays caused by the car shortage, and October shipments are expected to fall a little behind September. Owing to the abnormal demand, lump ore for use in open-hearth furnaces is scarce. We quote 1916 prices, as follows, delivered lower Lake ports: Old range Bessemer, $4.45; Mesaba Bessemer, $4.20; old range non-Bessemer, $3.75; Mesaba non-Bessemer, $3.55.

Coke.—The United Furnace Company, Canton, Ohio, has placed in operation its by-product coke plant, consisting of 47 Koppers ovens with a daily capacity of about 450 tons, and Corrigan, McKinney & Co., Cleveland, on Oct. 25 will start up with their 204 Koppers ovens, having a daily capacity of about 2200 tons. Little coke for prompt shipment is available and prices are higher. Standard Connellsville foundry coke is quoted at $4.50 to $5 per net ton at oven for prompt shipment and $3.75 to $4 for contract. Sales of Connellsville furnace coke are reported at $4.60 for prompt shipment, and as high as $5 is being asked.

Pig Iron.—The market is quieter, as compared with the previous two or three weeks, but there is still considerable activity in foundry grades. The recent advances in prices have not checked buying by consumers who had not previously covered. Furnaces are so well sold up for the first half that they are not eager to take on additional tonnage at the present time. Shipments of foundry iron are slow. Stocks in foundry yards are low, and some consumers are having trouble in getting iron as fast as needed. While the car shortage is partly the cause for this, the delayed deliveries are claimed to be largely due to the fact that the production of many merchant stacks is not normal owing to the poor quality of coke. Prices are firm at the recent advance to $20, Cleveland and Valley furnace, for No. 2 foundry iron. A Valley furnace reports several sales at that price and is now asking $21. A Cleveland interest has sold several lots at $20 for outside shipment and is now trying to get $20.50. Southern iron prices have been marked up to $15.50 to $16, Birmingham, for No. 2, although it is probable that a small amount is still available at $15 for this year's delivery. Several small lot sales for the first half were made at $15 before the price advance. We note other sales aggregating 1200 tons at $15.50. Southern foundry-iron prices are still lower than Northern iron in this territory, and some of the orders that ordinarily go to Northern furnaces are being placed with Southen producers. A Massillon consumer expects to close to-day for 1400 tons of Nos. 1 and 2 foundry. Among other inquiries is one from a new Canton consumer for 1500 tons for delivery this year and through the first half and one from Martins Ferry, Ohio, for 1000 tons for the first half. In the steel-making line we note the sale of 10,000 tons of basic iron by a Valley furnace at $20 and an inquiry from a Cincinnati consumer for a round lot of Bessemer iron for this year's delivery. We quote, delivered Cleveland, as follows:

Bessemer	$23.95
Basic	$20.00 to 20.30
Northern No. 2 foundry	20.00 to 20.30
Southern No. 2 foundry	19.50 to 20.00
Gray forge	19.80
Jackson Co., silvery 8 per cent silicon	29.62
Standard low phos., Valley furnace	34.00 to 35.00

Finished Iron and Steel.—New demand is heavy, particularly for plates. There is a heavy demand for tank cars and Ohio tank shops are in the market for a large tonnage of plates for car tanks. One inquiry for this purpose is for 4000 tons, on which 4c., Pittsburgh, was quoted. For 5000 tons of hull plates for a Western shipyard 4.50c., Pittsburgh, was quoted. The automobile trade has been buying forging bars and alloy steels freely the past week or two, and is mostly under contract for the first half. Most of the automobile companies are contracting for larger tonnages than a year ago. Specifications from the automobile trade, which have been light for the past few weeks during the between season manufacturing period, have become heavier. The pressure on the mills for deliveries is increasing and the situation has become a grave one to many consumers. This is seriously affecting the Lake shipyards. With the heavy demand for boats and orders filling the shipyards a year or more ahead, several Lake shipyard berths have been vacant a month or more because steel was not available to start on the scheduled boats. In semi-finished steel a local mill is taking orders for billets rerolled from shell discard at $46, Pittsburgh. The demand for hard steel reinforcing bars continues heavy, with prices irregular. Orders are being taken at 2.40c. at mill. Jobbers are selling cold twisted soft steel bars for reinforcing purposes at 3.55c. The demand for sheets is heavy, and there is much inquiry for first quarter contracts, but many mills are declining to quote for that delivery. Prices are higher. We quote sheets at 3.25c. to 3.40c., Ohio mill, for No. 28 black, 3.25c. for No. 10 blue annealed and 4.50c. for No. 28 galvanized. Sales of galvanized sheets are reported as high as 5c. for immediate shipment. Bar-iron prices are unchanged at 2.50c. to 2.65c., Pittsburgh. Warehouse business is very heavy, particularly in structural material, and some stock orders for structural shapes as large as 350 tons are reported. Warehouse prices are 3.40c. for steel bars and structural material, 3.75c. for plates and 3.20c. for iron bars.

Bolts, Nuts and Rivets.—The demand for bolts and nuts is holding up fairly well, but so far little inquiry is coming out for next year. The demand for rivets is heavy and some business is being taken for the first quarter at 4c., Pittsburgh, for structural and 4.10c. for boiler rivets, the same prices as are prevailing for early delivery. Bolt and nut discounts are as follows:

Common carriage bolts, ⅝ x 6 in., smaller or shorter, rolled thread, 50 and 5; cut thread, 40, 10 and 2½; larger or longer, 35 and 2½; machine bolts within h. p. nuts, ⅝ x 4 in., smaller and shorter, rolled thread, 50 and 10; cut thread, 50; larger and longer, 40 and 5; lag bolts, gimlet or cone point, 50 and 5; square h. p. nuts, blank or tapped, $2.70 off the list; hexagon h. p. nuts, blank or tapped, $2.70 off; c. p. c. and t. sq. nuts, blank or tapped, $2.40; hexagon nuts, all sizes, $2.80 off; cold pressed semi-finished hexagon nuts, all sizes 60 and

Old Material.—Following the activity of the previous week, during which considerable scrap was purchased by local mills, the market has quieted down and prices on heavy melting steel are slightly easier. While Cleveland consumers paid as high as $18 for this grade of scrap several days ago, they are now offering only $17. There has been further buying of heavy steel scrap by Canton and Massillon mills at $18 and under. Scrap sold by railroads last week brought high prices.

Railroad wrought sold by the New York Central brought $20 per gross ton from a Cleveland mill, and old steel rerolling rails sold by the Michigan Central are understood to have brought over $20 from a Chicago broker and steel axles $38.50. Turnings are weak and slightly lower. Prices on some other grades have been marked up. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton

Steel rails	$16.50 to $16.75
Iron rails	18.50 to 19.00
Steel car axles	37.00 to 38.00
Heavy melting steel scrap	17.00 to 17.25
Carwheels	12.75 to 13.00
Relaying rails, 50 lb. and over	25.00
Agricultural malleable	12.75 to 13.00
Railroad malleable	14.50 to 14.75
Steel axle turnings	12.00 to 12.50
Light bundled sheet scrap	12.00 to 12.25

Per Net Ton

Iron car axles	$29.00 to $30.00
Cast borings	6.25 to 6.50
Iron and steel turnings and drillings	5.50 to 5.75
No. 1 busheling	13.25 to 13.50
No. 1 railroad wrought	17.75 to 18.00
No. 1 cast	13.75 to 14.00
Railroad grate bars	10.75 to 11.00
Stove plate	10.75 to 11.00

Buffalo

BUFFALO, N. Y., Oct. 17, 1916.

Pig Iron.—Prices are steadily rising, owing to the heavy demand, coupled with the actual shortage of iron at furnaces and accumulating evidence of increased consumption. There are no surplus stocks of iron on furnace yards to fall back upon, and no unsold current capacity. Furnacemen are experiencing difficulty in keeping production and shipments at normal, because of shortage of labor, of coke and of the increasing shortage of cars in which to make shipment, all of which tend to increase production cost. Furnace interests believe prices will reach a much higher level before the first of the year. One furnace announces its minimum is $21, small lots for first half delivery being taken at $21.50. Even off grade iron, of 0.05 to 0.10 sulphur, commands $19 at furnace. Sales of all grades for the week aggregate 25,000 to 30,000 tons, with a large amount of unsatisfied inquiry. We quote as follows, f.o.b. furnace, Buffalo, for last half and first half of 1917 delivery:

No. 1 foundry	$21.00 to $22.00
No. 2 X foundry	20.50 to 21.00
No. 2 plain	20.00 to 20.50
No. 3 foundry	20.00 to 20.50
Gray forge	20.00 to 20.50
Malleable	20.50 to 21.00
Basic	21.00 to 21.50
Bessemer	22.00 to 22.50
Charcoal, regular brands and analysis	22.00 to 22.50

Old Material.—Inquiry is of good volume and prices are strongly held by dealers. There is a scarcity of the better grades of steel, and heavy melting has advanced $1 per ton. Prices for machine-shop turnings and cast borings have also advanced. Strong demand is noted for No. 1 railroad and machinery cast scrap and locomotive grate-bars, with increased interest in low phosphorus steel. We quote dealers' asking prices as follows, per gross ton, f.o.b. Buffalo:

Heavy melting steel	$18.00 to $18.50
Low phosphorus steel	21.50 to 22.00
No. 1 railroad wrought scrap	19.00 to 19.50
No. 1 railroad and machinery cast scrap	16.50 to 17.00
Steel axles	32.00 to 33.00
Iron axles	32.00 to 33.00
Carwheels	15.50 to 16.00
Railroad malleable	15.50 to 16.00
Machine shop turnings	7.00 to 7.50
Heavy axle turnings	12.00
Clean cast borings	8.00 to 8.25
Iron rails	18.00 to 18.50
Locomotive grate bars	12.00 to 12.50
Stove plate (net ton)	11.50 to 12.00
Wrought pipe	13.00 to 13.50
No. 1 busheling	14.00 to 14.50
No. 2 busheling	11.50 to 12.00
Bundled sheet scrap	11.50 to 12.00
Bundled tin scrap	15.00 to 15.50

Finished Iron and Steel.—Mills and agencies are still turning down far more tonnage than they are accepting, and there is further tightening up on the reception of business by mills. It is with extreme difficulty that customers, even of long standing, are able to get orders accepted at all. Some sellers are being offered small premiums over current rates for acceptance of business for shipment at mills' convenience. The amount of premium price business offered to mills and refused by them is reaching a large total. Bids were opened by the city to-day on reconstruction of eight viaducts over railroad yards and the Stobel Construction Company, Chicago, was found to be low bidder for seven at a total of $469,100. About 1000 tons of structural steel and an equal tonnage of cast-iron plates are involved.

British Steel Market

American Billets Neglected and Weaker—Tin-Plate Mills Slack

(*By Cable*)

LONDON, ENGLAND, Oct. 18, 1916.

Cleveland pig iron is in active demand, but business is restricted. American billets are neglected and weaker, with 2-in. afloat offered at £14 c.i.f. Liverpool. Wire rods have sold at £19 10s. for November-December delivery. Tin plates are slow and irregular with stock plates unchanged, and mills running at about 40 per cent of capacity. We quote as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 33s. to 36s.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £20 5s.

Steel ship plates, Scotch, delivered local yards, £13 17s. 6d.

Steel rails, export, f.o.b. works, £10 17s. 6d.

Hematite pig iron, f.o.b. Tees, about 140s.

Sheet bars (Welsh) delivered at works in Swansea Valley, £10 7s. 6d

Steel bars, export, f.o.b. Clyde, £18.

Ferromanganese (nominal), £35.

Ferrosilicon, 50 per cent, c.i.f., £27.

Safety at Blast Furnaces

An address has been delivered on the above subject before the Iron and Steel Section of the Fifth Annual Safety Congress of the National Safety Council at Detroit, Mich., which is meeting this week, by F. H. Willcox, metallurgical engineer of the United States Bureau of Mines. This address presents an exhaustive analysis of the causes of accidents occurring at blast-furnace plants. Included in the address is the following table classifying the causes of such accidents and giving the percentage of each class:

Cause	Per Cent
Hand labor	17.9
Hand tools	13.2
Falling and flying material	12.2
Falls of person	11.4
Burns from hot metal	7.4
Cranes, hoists, and rigging tackle	7.1
Railroads, tracks and equipment	5.0
Hot water and steam	4.3
Machinery and mechanism	4.2
Burns from hot cinder	3.1
Flames and explosions	3.0
Illness (including infection)	2.9
Electricity	2.7
Hot flue dust	2.3
Asphyxiation	1.5
Furnace slips	1.2
Fooling and fighting	0.2
Other causes	0.4
Total	100.0

It will be observed from this table that the most frequent accidents are grouped under hand labor, hand tools, falling and flying material and falls of person.

The annual fair at Lyons, France, will be held from March 1 to 15, 1917, inclusive. Buyers from all parts of the world will be present, according to the Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, D. C. The State Department has placed $500 at the disposal of the American consul at Lyons, which will enable him to distribute the catalogs and other literature of American manufacturers who are interested.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c. Denver, pipe, 76.1c., minimum carload 46,000 lb.; structural steel and steel bars, 83.6c., minimum carload 36,000 lb. Pacific coast (by rail only), pipe, 65c.; structural steel and steel bars, 75c., minimum carload 50,000 lb.; structural steel and steel bars, 80c., minimum carload 40,000 lb. No freight rates are being published via the Panama Canal, as the boats are being used in transatlantic trade.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 2.60c. to 2.75c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs	.10
Angles, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Plates.—Tank plates, ¼ in. thick, 6 in. up to 100 in. wide, 3.50c. to 4c., base, net cash, 30 days, or ½ of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras

	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers)	.10
Boiler and flange steel plates	.15
"A. B. M. A." and ordinary firebox steel plates	.20
Still bottom steel	.30
Locomotive firebox steel	.50

Marine steel, special extras and prices on application.

Gage Extras

Rectangular, ¼ in. thick, over 6 in. wide to 100 in. wide	Base
Lighter than ¼ in., to 3/16 in., up to 72 in. wide	.10
*Lighter than ¼ in., including 3/16 in., over 72 in. to 84	.20
*Lighter than ¼ in., including 3/16 in., over 84 in. to 96	.30
*Lighter than ¼ in., including 3/16 in., over 96 in. to 100	.40
*Lighter than ¼ in., including 3/16 in., over 100 in. to 102	.45
Lighter than 3/16 in., including No. 8, up to 72 in. wide	.15
*Lighter than 3/16 in., including No. 8, over 72 in. to 84	.25
*Lighter than 3/16 in., including No. 8, over 84 in. to 96	.35
Lighter than No. 8, including No. 10, up to 60 in. wide	.30
Lighter than No. 8, including No. 10, over 60 in. to 64	.35

Up to 72 in. and not less than 10.2 lb. per sq. ft. will be considered ¼ in.
Over 72 in. must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.
Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.
Over 72 in., ordered weight 3 16 in., take No. 8 price.
Over 72 in., ordered weight No. 8, take No. 10 price.

Width Extras

Over 100 in. to 110 in. inclusive	.05
Over 110 in. to 115 in. inclusive	.10
Over 115 in. to 120 in. inclusive	.15
Over 120 in. to 125 in. inclusive	.25
Over 125 in. to 130 in. inclusive	.50
Over 130 in.	1.00

Length Extras

Universal plates 80 ft. long up to 90 ft. long	.05
Universal plates 90 ft. long up to 100 ft. long	.10
Universal plates 100 ft. long up to 110 ft. long	.20

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over.	
Lengths under 3 ft. to 2 ft. inclusive	.25
Lengths under 2 ft. to 1 ft. inclusive	.50
Lengths under 1 ft.	1.55
Circles 3 ft. in diameter to 100 in.	.30
Circles over 100 to 110 in. (width extra)	.35
Circles over 110 to 115 in. (width extra)	.40
Circles over 115 to 120 in. (width extra)	.45
Circles over 120 to 125 in. (width extra)	.55
Circles over 125 to 130 in. (width extra)	.80
Circles over 130 in. (width extra)	1.30
Circles under 3 ft., to 2 ft., inclusive	.55
Circles under 2 ft., to 1 ft., inclusive	.80
Circles under 1 ft.	1.85
Half circles take circle extras.	
Sketches not over four straight cuts, inc. straight taper	.10
Sketches having more than four straight cuts	.20
Plates sheared to a radius take complete circle extras.	

*Including extra for width.

Wire Rods.—Including chain rods, $55 to $60.

Wire Products.—Prices to jobbers effective Oct. 19: Fence wire Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, $2.65; galvanized, $3.35. Galvanized barb wire and staples, $3.55; painted, $2.85. Wire nails, $2.70. Galvanized nails, 1 in. and longer, $2 advance over base price; shorter than 1 in., $2.50 advance over base price. Cement-coated nails, $2.50. Woven wire fencing, 59 per cent off list for carloads, 58 off for 1000-rod lots, 57 off for less than 1000-rod lots.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect on black pipe from Sept. 7, 1916, and on galvanized pipe from July 24, 1916, all full weight:

Butt Weld

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
⅛, ¼ and ⅜	62	35½	⅛ and ¼	51	24
½	66	51½	⅜	52	25
¾ to 3	69	55½	½	56	38
			¾ to 1½	59	43

Lap Weld

2	63	50½	1¼	46	31
2½ to 6	66	53½	1½	52	38
7 to 12	63	49½	2	53	39
13 and 14	63½		2½ to 4	55	42
15	51		4½ to 6	55	42
			7 to 12	54	41

Reamed and Drifted

1 to 3, butt	67	53½	¾ to 1½, butt	54	37
2, lap	61	48½	1¾, lap	41	25
2½ to 6, lap	64	51½	1½, lap	47	32
			2, lap	48	33
			2½ to 4, lap	51	36

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	58	40½	⅛, ¼ and ⅜	51	34
½	63	50½	½	56	43
¾ to 1½	67	54½	¾ to 1½	60	45
2 to 3	68	55½			

Lap Weld, extra strong, plain ends

2	61	49½	1¼	48	33
2½ to 4	64	52½	1½	53	39
4½ to 6	63	51½	2	55	42
7 to 8	59	45½	2½ to 4	57	45
9 to 12	54	40½	4½ to 6	56	44
			7 to 8	50	38
			9 to 12	45	33

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts on less than carloads, freight to destination added, effective from Sept. 7, 1916, are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1½ in.	33	1½ in.	25
1¾ and 2 in.	45	1¾ and 2 in.	37
2¼ in.	42	2¼ in.	34
2½ and 2¾ in.	48	2½ and 2¾ in.	40
3 and 3¼ in.	53	3 and 3¼ in.	45
3½ to 4½ in.	54	3½ to 4½ in.	46
5 and 6 in.	47	5 and 6 in.	39
7 to 13 in.	44	7 to 13 in.	36

Locomotive and steamship special charcoal grades bring higher prices.

1¾ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Sheets.—Makers' prices for mill shipments on sheets of U. S. standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Blue Annealed Sheets

	Cents per lb.
Nos. 3 to 12	3.15 to 3.25
Nos. 13 and 14	3.00 to 3.10
Nos. 15 and 16	3.05 to 3.15

Box Annealed Sheets, Cold Rolled

Nos. 17 to 21	3.10 to 3.20
Nos. 22 and 24	3.15 to 3.25
Nos. 25 and 26	3.20 to 3.30
No. 27	3.25 to 3.35
No. 28	3.30 to 3.40
No. 29	3.35 to 3.45
No. 30	3.45 to 3.55

Galvanized Sheets of Black Sheet Gage

Nos. 10 and 11	3.40 to 3.50
Nos. 12 to 14	3.50 to 3.60
Nos. 15 and 16	3.65 to 3.75
Nos. 17 to 21	3.80 to 3.90
Nos. 22 and 24	3.95 to 4.05
Nos. 25 and 26	4.10 to 4.20
No. 27	4.25 to 4.35
No. 28	4.40 to 4.50
No. 29	4.55 to 4.70
No. 30	4.70 to 4.90

Tank Mill Black Plate

Nos. 14 and 16	3.10 to 3.20
Nos. 17 to 21	3.15 to 3.25
Nos. 22 to 24	3.20 to 3.30
Nos. 25 to 27	3.25 to 3.35
No. 28	3.30 to 3.40
No. 29	3.35 to 3.45
No. 30	3.35 to 3.45
Nos. 30½ and 31	3.40 to 3.50

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin,	Lead		Spelter	
		Electro-	New	New	St.	New	St.
Oct.	Lake	lytic	York	York	Louis	York	Louis
11	28.50	28.50	41.87½	7.00	6.85	9.87½	9.62½
12	.....	.....	.....	.....	.....	.....	.....
13	28.50	28.50	41.50	7.00	6.85	9.87½	9.62½
14	28.50	28.50	.....	7.00	6.85	9.75	9.50
16	28.50	28.50	41.50	7.00	6.85	9.75	9.50
17	28.50	28.50	40.75	7.00	6.85	9.62½	9.50

NEW YORK, Oct. 18, 1916.

Copper continues strong but quiet. Tin is easier as a result of arrivals and profit-taking. Lead is firm in a quiet market. Spelter tends toward dullness and quotations are lower. Antimony is higher, following activity by Canadian buyers.

New York

Copper.—The market is quieter than a week ago, a condition to be expected in view of the fact that consumers have covered their requirements for the remainder of the year and some of them well into next year. Quotations continue firm, however, and the position of the metal is strong. Needless to say, the producers are in a more comfortable position with regard to bookings than ever before, while there is little copper in second hands and consumption proceeds at a record-breaking pace. Prompt electrolytic ranges from 28.50c. to 28.75c., November and December at 28c. to 28.25c., and first quarter at 27.25c. to 27.50c. First half of 1917 ranges from 26.50c. to 27c. The London quotation for spot electrolytic is £1 stronger than a week ago, at £143. The exports this month, including yesterday, total 11,052 tons. Stocks in Great Britain and France as of Oct. 15 were slightly smaller than at the end of September. On Oct. 15 they amounted to 5620 tons, whereas Sept. 30 they totaled 5796 tons. Including quantities afloat from Chile and Australia, the totals were 10,670 tons and 10,371 tons respectively.

Tin.—Desire by some of the smaller holders of tin to clinch their profits, two or three notable arrivals and an easier feeling abroad have caused the New York price for spot Straits to drop to 40.75c., yesterday's quotation, which is 2c. under that of a week ago. On the whole the market has been quiet, although there have been one or two periods of activity, notably Oct. 11, when a fair demand for futures was shown. In Banca there has been some business every day and at prices closer to those for Straits than usually prevail. Spot Banca was quoted yesterday at 40.50c. The arrivals of the month up to yesterday totaled 1630 tons, and there is afloat 1900 tons.

Lead.—The quotations of the leading interest and independent makers are close together in a market that is quiet but firm. The principal maker quotes 7c., New York, and 6.92½c., St. Louis, while others ask 7c. to 7.05c., New York, and 6.85c., St. Louis. The London quotation for spot yesterday was £30 10s., or 5s. under the quotation of a week ago. The market is in all respects a waiting one, consumers being covered, while producers are so well booked that they have no inclination to force sales. Exports are proceeding at a good rate, those of the month, including yesterday, totaling 2412 tons.

Spelter.—Practically every day there has been some business, but it has at no time been large. Generally, less interest is being shown in spelter, and the market is a little easier, but producers are satisfied with the resistance that has been shown toward a declining tendency. Minimum quotations yesterday were about 9.62½c., New York, and 9.50c., St. Louis, for October and November; 9.37½c., St. Louis, for December, and 9.25c., St. Louis, for first quarter. The galvanizers continue to operate at a low rate of capacity, some estimates placing the rate at 35 per cent. There is no question that the consumption of spelter is heavy and close to production. The exports continue large, those of the month, including yesterday, totaling 4645 tons. The spot price at London yesterday was £53 against £56 a week ago.

Antimony.—Spot antimony, Oriental brands, is stronger, following good buying last week by Canadian interests. The quotation yesterday ranged from 13c. to 13.50c., duty paid.

Aluminum.—The export demand which was held responsible for the recent advance in prices has lessened, and No. 1 virgin metal, 98 to 99 per cent pure, is easier at 65c. to 66c. per lb.

Old Metals.—The market is steady. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible	26.75 to 27.25
Copper, heavy and wire	25.00 to 26.00
Copper, light and bottoms	22.50 to 23.00
Brass, heavy	14.00 to 15.00
Brass, light	12.00 to 12.50
Heavy machine composition	20.00 to 21.00
No. 1 yellow rod brass turnings	14.00 to 14.50
No. 1 red brass or composition turnings	16.00 to 17.00
Lead, heavy	6.50
Lead, tea	6.00
Zinc	7.00 to 7.50

Chicago

OCT. 16.—The strength of the producers' position is being maintained, though not always supported by the dealers. Domestic buying is in good volume. The upward movement in tin and spelter is, for the time, checked. We quote: Casting copper, 27.50c.; Lake copper, 28.50c. to 29c.; tin, carloads, 42c. and small lots, 47c.; lead, 6.90c. to 6.95c.; spelter, 9.60c. to 10c.; sheet zinc, 15c.; Cookson's antimony, 50c.; other grades, 14½c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 24c.; copper bottoms, 22c.; copper clips, 23c.; red brass, 20c.; yellow brass, 16c.; lead pipe, 6c.; zinc, 8c.; pewter, No. 1, 25c.; tinfoil, 30c.; block tin pipe, 37c.

St. Louis

OCT. 16.—Metals have been quiet, with quotations to-day as follows for lots of less than carload quantity: Lead, 7.10c.; spelter, 11c.; tin, 45c.; Lake copper, 29c.; electrolytic copper, 28.75c.; antimony, 16c. In carload lots, lead is quotable at 6.92½c., and spelter, 9.50c. In the Joplin ore district zinc blende stiffened materially and sold up to $70 per ton for choicest ores, the second grade ores ranging down to $62.50, and the average for the week for the district was $64. Calamine sold from $35 to $45, with the average for the week $39. Lead ore was stronger, with the week's average $80. On miscellaneous scrap metals we quote as follows: Light brass, 9c.; heavy yellow brass, 12c.; heavy red brass and light copper, 17c.; heavy copper and copper wire, 19c.; zinc, 6c.; lead, 5c.; pewter, 25c.; tinfoil, 31c.; tea lead, 3.50c.

The Statue of Liberty, gift by the Republic of France to the United States, will be illuminated for the first time with a permanent flood-lighting plant on the night of Dec. 1, according to a program just announced by the Society for Electrical Development. Plans have been made to lay a current-carrying cable from the New Jersey shore to Bedloes Island. In furthering this project the society's general manager, J. M. Wakeman, has addressed letters to the 268 committees arranging for the so-called electrical week, beginning Dec. 2, requesting each committee to set aside Saturday, Oct. 28, as "Liberty Day." This date is the thirtieth birthday of the Goddess of Liberty, and it will be the last day upon which donations will be received to flood-light the statue.

The Cleveland office of the Cutler-Hammer Mfg. Company, Milwaukee, has been moved to the Guardian Building, Euclid Avenue. G. S. Crane continues as assistant manager in charge of the Cleveland division of the company's central district. The moving represents the fourth time that the office has had to increase its quarters.

Cost of Health Supervision of Employees

Surprising Results of an Investigation by the Conference Board of Physicians in Industrial Practice

—BY MAGNUS W. ALEXANDER* —

Ask an employer who maintains a good system of health supervision in his plant what it costs to maintain such supervision of employees, and he will most probably tell you that he does not know, but that, whatever it costs, it is worth it and more!

Ask the question of an employer who has not inaugurated such a system and he will also say that he does not know, but that he believes that, whatever it costs, it costs too much!

The Conference Board of Physicians in Industrial Practice has made considerable investigation along this line and has secured some facts that will surprise both the employer who does and the employer who does not provide for health supervision of his employees.

These facts are presented in the accompanying table. In most cases they relate to the period from Jan. 1 to Dec. 31, 1915. The table reflects the experience of 41 establishments, 29 of them engaged in the metal trades, 2 in lighting and power service, 2 in street railroad service and 8 in various other industries. The establishments vary in their employing capacity from 385 in the smallest to 18,521 in the largest. In the aggregate they furnish employment to 223,416 persons.

In all of the establishments represented, the health service provides first-aid treatment of injured employees and subsequent dressings, either by skilled physicians or under their direct supervision; in a few cases this service is extended to include medical advice and treatment of ailments of employees, usually at the shop, but sometimes at their homes as well. In 25 of the 41 plants, each applicant for employment is physically examined and in several instances re-examinations of employees are made frequently throughout the year.

The figures given do not in all cases reflect the entire service rendered, because some of the establishments do not keep account of the cases treated at the shop or in the dispensary, others neglect to record the number treated at workmen's homes, and others do not enumerate physical examinations made. Making no allowance for these omissions, the figures show that attention was given to 1,090,440 cases of all kinds, *yet the average cost per employee was only* $1.88 *per year!*

Where any part of the medical or surgical expense was paid by an insurance company, it is included in the cost as though it was paid direct by the employer. The cost does not include any overhead expenses, nor wages paid for time lost by employee while visiting the dispensary or hospital for treatment, nor any compensation paid for injuries sustained.

The character or method of the service rendered reflects to some extent the reason for the fluctuation in the average cost in the various establishments. Where the cost is more than the $1.88 average, analysis will show that the above-average cost means above-average service, such as an unusual number of physical examinations made, or a large amount of medical service rendered in employees' homes, or extraordinary medical care required by an employment which involves handling of foodstuffs, or the manufacture of paints or chemicals. In a number of instances, too, the cost is abnormal because the work was in its infancy, and smooth and economical procedure had therefore not yet been attained.

The methods of medical service used in the establishments vary considerably, from that in which a physician is engaged for emergency service or for semi-weekly or daily visits, to that in which one or more physicians, and sometimes a number of surgeons, examiners, specialists and nurses make up an elaborate medical and surgical staff. In some of the smaller plants it is the practice for the employer to combine with a number of others in the same locality in the employment of one physician who devotes his entire time to the service of the several plants.

The table is so arranged that the employer may readily locate the individual instance that most nearly coincides with the needs of his own plant and learn what the expense approximately covers. From this approximation he may judge how little it would cost to maintain such a system for the benefit of his own employees and for his own protection as well.

*Executive secretary, Conference Board of Physicians in Industrial Practice. This board comprises the staff physicians and surgeons who superintend the medical and surgical activities in the plants of 33 corporations, large and small, engaged in a wide variety of industries. Their exceptionally broad experience in supervising the health of employees who work in many different occupations and under widely varying conditions, is brought together by the board for their mutual benefit and for the good of employers and employees generally.

Morris, Wheeler & Co. to Move

Morris, Wheeler & Co., iron and steel merchants, Philadelphia, contemplate removing their offices and warehouse from Sixteenth and Market streets, which they and their predecessors have occupied for the last 90 years. They have purchased a tract of land in Philadelphia on the west side of the Schuylkill River, in the neighborhood of Thirtieth and Spruce streets, covering about four acres, having railroad connections and sidings. They propose to move to this tract their entire plant, including the structural steel stock yards, which have been heretofore in the northern part of the city. In consolidating the plant they will install modern labor-saving machinery for handling, cutting and fabricating. This move has not been actuated by any desire on the part of the owners of the property to sell the old-established place or from fear that the Government might erect a post office on the site, as has been reported, but is simply because the firm long since outgrew its present quarters and had been looking for the last year or so for a suitable place to locate.

British Steel Exports to France

The statistics dealing with iron ore and iron manufactures for 1915, recently issued by the British Iron and Steel and Allied Trades Federation, show that although the quantity of iron ore mined in Great Britain has declined, the output of steel ingots and castings increased from 7,500,000 tons in 1913 to 8,500,000 tons last year. There was also a considerable increase in the steel produced in electric furnaces. The French iron trade, owing to its raw materials being largely in territory occupied by the enemy, has been obliged to rely on supplies from the Allies and neutrals. It is a tribute to the British iron trade, says the London *Times*

ANNUAL COST OF HEALTH SUPERVISION IN INDUSTRIAL ESTABLISHMENTS

Compiled by the Conference Board of Physicians in Industrial Practice

EXPLANATORY: *The amount of service rendered is greater than shown in the table, because a number of the firms kept no record of certain minor injury cases, redressings, medical cases or physical examinations. The "Total Medical and Surgical Cost" includes the salaries of physicians and nurses, cost of outside medical and surgical service and cost of medical and surgical supplies, whether or not paid for by insurance companies as a part of their contract; it excludes all compensation for injuries, all overhead expenses and any wages paid to employees while off duty to have their injuries treated.*

INDUSTRY	METAL TRADES														
Serial number of establishments	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Average number of employees	385	498	515	520	1,150	1,450	1,730	2,000	2,000	2,700	2,862	3,383	3,475	3,145	
Physicians employed full time	0	0	0	0	0	0	0	0	0	0	0	0	0	4	
Physicians employed part time	0	Semi-weekly	0	Daily	Daily	0	2 hr. daily	0	0	0	4-4 hr. daily	0	0	0	
Physicians engaged for call service	1	0	1	0	0	1	0	1	0	1 phys. 1 oculist	0	1	1	0	
Nurses employed	0	1 male	0	0	1 male	2 part time	1 male	1 male	1 male	1 male 1 female	2 male	1 male 1 female	1 male	0	
Surgical and medical cases treated	104	1,517	1,354	249	480	2,260	2,660	3,000	2,500	2,880	4,596	3,060	5,294	6,029	
Redressings made	Est. 52	0	611	1,245	1,500	3,100	4,872	900	1,000	8,092	17,948	5,718	2,050	12,642	
Home visits made	0	7	No record	0	35	0	144	144	0	1,364	148	57	0	50	
Physical examinations made	0	797	0	300	800	0	2,782	0	0	0	5,516	1,397	0	6,500	
Total cases of all kinds	156	2,321	1,965	1,794	2,815	5,360	10,458	4,044	3,500	12,336	28,208	10,232	7,344	25,221	
Total medical and surgical cost	$206	$2,388	$702	$660	$2,080	$1,500	$3,484	$2,329	$3,000	$6,106	$9,068	$6,074	$3,802	$11,736	
Average cost per employee	$0 53	$4 80	$1.35	$1 85	$1.81	$1 04	$2 02	$1 17	$1 50	$2 26	$3.16	$1 80	$1 11	$2 90	

INDUSTRY	METAL TRADES														
Serial number of establishments	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
Average number of employees	4,600	5,100	4 plants 5,500	5,809	6,415	6,727	6,959	7,500	10,327	3 plants 11,201	13,000	13,420	15,000	15,793	18,521
Physicians employed full time	0	0	0	3	0	0	1	3	2	1	3	2	8	1	2
Physicians employed part time	2 hr. daily	3 hr. daily	0	0	1 hr. daily	2	0	0	0	0	0	0	0	0	0
Physicians engaged for call service	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0
Nurses employed	2 male 3 female	1 male	1 female	1 female	1 male 3 female	1 female	4 female	3 male	1 male 2 female	6 female	8 female	5 male 1 female	1 female	4 male 2 female	6 male 5 female
Surgical and medical cases treated	2,244	2,175	1,109	15,992	17,000	7,380	4,800	95,576	8,308	26,047	4,300	5,740	59,816	32,100	55,728
Redressings made	1,482	3,580	4,671	15,188	21,000	17,200	4,771		16,939	64,854	12,700	14,594	58,374	36,676	83,648
Home visits made	4,644	30	No record	0	0	No record	176	3,500	1,371	0	0	0	No record	1,032	0
Physical examinations made	5,109	Not definite	0	7,864	0	0	3,886	0	6,063	0	6,700	5,494	0	0	0
Total cases of all kinds	13,479	5,785	5,780	39,044	38,000	24,580	13,633	99,076	32,681	90,901	23,700	25,828	118,190	69,808	139,376
Total medical and surgical cost	$11,304	$5,221	$5,156	$8,268	$4,000	$7,713	$12,600	$19,767	$6,547	$22,768	$22,000	$16,267	$24,110	$12,961	$21,605
Average cost per employee	$2.46	$1 02	$0 97	$1 42	$1 40	$1 15	$1 81	$2 63	$0 63	$2 03	$1 69	$1 21	$1 41	$2 08	$1 17

INDUSTRY	Corks	Textiles	Food-stuffs	Leather	Toilet Articles	Paint	Light and Power		Publishers	Transportation		Rubber
Serial number of establishments	30	31	32	33	34	35	36	37	38	39	40	41
Average number of employees	965	1,000	1,500	1,600	1,908	18 plants 2,448	2,800	3,027	3,217	9,420	10,000	13,056
Physicians employed full time	0	0	0	0	2	0	1	4	0	1	1	*13
Physicians employed part time	4 hr. daily	Semi-weekly	2-4 hr. daily	4 hr. daily	0	18	0	0	3 hr. daily	0	0	0
Physicians engaged for call service	0	0	0	0	0	0	4	0	0	43	43	0
Nurses employed	0	1 female	1 female 3 manicurists	1 male	1 female	0	0	0	1 female	0	0	*19
Surgical and medical cases treated	248	241	12,195	1,140	1,466	2,557	350	918	1,648	3,604	6,849	31,792
Redressings made	788	1,359	3,381	2,346	5,200	No record	2,500	2,033	3,232			54,876
Home visits made	8	523	20	50	850	No record	400	1,525	0	392	844	35,148
Physical examinations made	0	1,585	1,871	1,684	885	No record	781	1,245	1,528	11,176	9,040	29,044
Total cases of all kinds	1,044	3,708	17,467	5,220	8,401	No record	4,031	5,721	6,408	15,172	16,733	150,860
Total medical and surgical cost	$3,462	$1,561	$6,359	$2,254	$4,931	$19,040	$5,250	$10,700	3,421	$12,806	$22,367	$51,904
Average cost per employee	$3.60	$1 56	$4 23	$1 41	$2 60	$7.79	$1 88	$3 54	$1 07	$1 36	$2 24	$3 98

*Includes 3 dispensing physicians, 5 examining physicians, 2 surgeons who call daily, 2 dentists, 3 male nurses, 6 female nurses, 10 visiting nurses and 1 visiting physician

SUMMARY

INDUSTRY	Metal Trades	Corks	Textiles	Food	Leather	Toilet Articles	Paint	Light and Power	Publishing	Transportation	Rubber	Totals
Establishments represented	29	1	1	1	1	1	1	2	1	2	1	41
Employees served	163,789	9,651	1,000	1,500	1,600	1,908	2,448	5,827	3,217	19,420	13,056	223,416
Average cost per employee	$1 68	$3 60	$1 56	$4 23	$1 41	$2 60	$7 79	$2 74	$1 07	$1 81	$3 98	$1 88

Engineering Supplement, that notwithstanding the heavy demands upon it by munitions manufacturers it found a way to export to France 700,000 tons of iron and steel. Including the supplies available from the United States and Spain, the French imports amounted to 900,000 tons. This was almost entirely a war trade, as in the year preceding the war French imports of iron and steel represented no more than 60,000 tons.

Joseph T. Ryerson & Son, Chicago, whose practice it has been to give an annual scholarship of $500 for a four-year course in mechanical engineering, has recently substituted a plan providing for two scholarships of $300 each per year. These scholarships are awarded as the result of a competitive examination and will be administered through the American Railway Master Mechanics' Association.

COLORADO FUEL'S FINE YEAR

Report for Past Fiscal Year Shows Net Earnings Increased $2,581,027

The Colorado Fuel & Iron Company reports for the fiscal year ended June 30, 1916, as follows, compared with the previous year:

	1916	1915
Gross earnings	$25,626,804	$16,078,039
Operating expenses	21,280,719	14,812,981
Net earnings	$4,346,085	$1,765,058
Other income	624,990	496,042
Total income	$4,971,075	$2,261,100
Interest, taxes, etc.	2,769,905	2,595,762
Balance	$2,201,170	*$334,662
Preferred dividend	600,000	
Surplus	$1,601,170	*$334,662

*Deficit.

The general balance sheet as of June 30 compares as follows:

Assets

	1916	1915
Property	$62,801,090	$62,684,145
Cash on hand	4,237,278	2,675,324
Stocks and bonds	15,445,170	15,412,070
Accounts and bills receivable	4,162,138	3,409,476
Subsidiary companies	203,135	332,036
Cash in hands of trustees	4,425	4,778
Reserve fund, taxes	98,340	98,340
Manufactured stocks and supplies	3,761,528	3,391,232
Dividends and interest	131,233	235,342
Royalties on leased lands paid in advance	64,937	56,399
Total	$90,909,277	$88,298,945

Liabilities

Common stock	$34,235,500	$34,235,500
Preferred stock	2,000,000	2,000,000
Funded debt	45,005,000	45,005,000
Current liabilities	2,574,562	1,635,310
Provisional accounts	2,172,085	1,978,854
Profit and loss	4,922,127	3,376,280
Total	$90,909,277	$88,298,945

President J. F. Welborn, in his accompanying remarks to stockholders, says in part:

"The improvement in the business and earnings has made possible a program of new construction and additions to equipment, essential to the most profitable operations of the business. A by-product coke plant of 120 ovens is to be built at the Minnequa steel works, and other additions and improvements at various points have been authorized during the year. The estimated cost of these authorizations, all of which are chargeable to capital account, is $3,300,000. The total amount unexpended on all authorized improvements on June 30, 1916, was $3,220,000. It is estimated that about 75 per cent of this amount, which will be taken from accumulated earnings, will be expended during the current fiscal year.

"The publication of quarterly earnings statements has been authorized. The first one covering the operations of the company for the months of July, August and September, 1916, will be issued in October.

"When the annual report of a year ago was written the prospect of steel business with railroads, as well as with other trade, was not encouraging. However, the buying demand which commenced in the East about the middle of 1915 reached us in October and during the last eight months of the fiscal year under review the mills producing wire and nails, merchant bars and other smaller products operated double turn, while the rail mill production was close to its capacity.

"As a result of the greater operations of the steel plant, and a somewhat increased demand for fuel from commercial trade, the coal production increased 912,436 tons or 39 per cent in the fiscal year.

"The orders for steel already booked for forward delivery and the reasonable expectation of business from our regular customers insure practically full operation of all of the mills up to July 1, 1917. Some orders for heavy rails have already been booked for delivery in the last half of 1917.

"From the standpoint of both management and employees, the Industrial Representation Plan has been an unqualified success. The relations between the officials and workmen have become much more friendly and the understanding by each of the point of view of the other far more clear. It is our firm belief that with the continuance of the spirit of co-operation on the part of employees and management that has been the controlling motive of both thus far in the operation of the plan, it will prove increasingly successful as time goes on."

Iron and Industrial Stocks

NEW YORK, Oct. 18, 1916.

After several days of depression, the stock market early in the present week, without apparent reason, suddenly became more active, with sharp advances. Quite a number of industrial stocks displayed decided strength. The range of active iron and industrial stocks from Wednesday of last week to Tuesday of this week were as follows:

Allis-Chal., com.	24 - 26⅛	Ry. Stl. Spring, pref.	100 -101
Allis-Chal., 1st pf.	79 - 80¾	Republic, com.	68⅛ - 76¾
Am. Can, com.	57½ - 61½	Republic, pref.	111½ -112½
Am. Can, pref.	113 -114	Sloss, com.	54¾ - 61
Am. Car & Fdy., com.	63½ - 68⅜	Sloss, pref.	97
Am. Car & Fdy., pref.	118⅛ -118½	Pipe, com.	22¾ - 24⅞
Am. Loco., com.	74½ - 79½	Pipe, pref.	56 - 57
Am. Loco., pref.	103⅝ -105¾	U. S. Steel, com.	108 -114⅞
Am. Steel Fdries.	57½ - 61⅞	U. S. Steel, pref.	120 -120⅝
Bald. Loco., com.	79½ - 85⅞	Va. I. C. & Coke.	44 - 46¾
Bald. Loco., pref.	107 -108½	Westing. Elec.	60½ - 63¼
Beth. Steel, com.	530 -547	Am. Rad., com.	400¼ -400½
Beth. Steel, pref.	133	Am. Ship, com.	55½ - 59
Colorado Fuel	49¾ - 55	Am. Ship, pref.	92⅞ - 94
Distr. & C. pref	95¾	Chic. Pneu. Tool.	72⅞ - 73
Gen. Electric	174¾ -181½	Cambria Steel	97 -135
Gt. No. Ore Cert.	40⅞ - 43¾	Lake Sup. Corp.	13⅜ - 14⅞
Int. Harv. of N. J., com.	115⅝ -116¾	Warwick	9½ - 9¾
Int. Harv. Corp., com.	78	Cruc. Steel, com.	78¾ - 87½
Lackawanna Stl.	82½ - 87	Cruc Steel, pref	118¼ -122
Nat. En. & Stm., com.	26⅝ - 28⅝	Harb-Walk. Refrac., com.	120
Nat. En. & Stm., pref.	95½	Harb-Walk. Refrac., pref	105½
N. Y. Air Brake	121½ -124	La Belle Iron, com	6½ - 7
Pitts. Steel, pref.	104 -105½	Am Brit Mfg., com	16 - 18
Pressed Stl., com	67½ - 68¼	Am. Brit. Mfg., pref.	40 - 45
Pressed Stl., pref.	104 -105	Colonial Stl., com	89 - 92
Ry. Stl. Spring, com	50 - 54⅛	Driggs Seabury	90
		Midvale Steel	65⅝ - 68¾

Dividends

The Kelsey Wheel Company, initial quarterly, 1¾ per cent on the preferred stock, payable Nov. 1

The R. C. Motor Company, regular quarterly, 2½ per cent and extra 7½ per cent, payable Nov. 1.

The Nash Motors Company, quarterly, $1.75 per share on the preferred stock, payable Nov. 1.

The Warwick Iron & Steel Company, regular semi-annual, [illegible] payable Nov. 1.

Farrell Sheet-Bar and Billet Mills to Be Rebuilt

The Carnegie Steel Company states that it will rebuild the sheet-bar and billet mills at its Farrell works, Farrell, Pa. This reconstruction will be virtually the building of two entirely new mills in the same location as the present bar and billet mills. The bar mill will be capable of rolling long or cut sheet bars at the rate of 40,000 tons per month, and the billet mill will have the same capacity in blooms, 4 x 4-in. billets or small billets. The combined capacity will be limited by the capacity of the blooming mill which they follow, and which is estimated at 55,000 tons of ingots per month. Provision will be made for an enlarged billet yard and chipping facilities for the blooming mill. The company denies officially that it will build steel works in the Philadelphia district, as reported in the daily press.

Billet Mills for Sparrows Point

The Morgan Construction Company, Worcester, Mass., has secured a contract from the Bethlehem Steel Company to build the complete equipment for two billet mills at Sparrows Point, Md. The rolls of the larger mill will be 24 in. and its capacity will be 100,000 tons a month. The other will be an 18-in. mill with a capacity of 50,000 tons a month.

Modern Methods of Cleaning Castings

(*Continued from page* 883)

filled and is placed in position on the driving rollers by a crane. Three barrels are used altogether and the cleaning operation is continuous. The barrels are 10 ft. 6 in. long, 5 ft. diameter and are constructed of ½-in. steel plates reinforced inside with removable landings and false heads.

HOW MALLEABLE CASTINGS ARE CLEANED

In malleable foundries, where tumbling mills are used for cleaning purposes, two sets or batteries of mills usually are required. One set is employed for cleaning the hard castings and the other for tumbling the annealed product. The cleaning room in which the annealed castings in an Illinois malleable foundry, with a capacity of 40 tons per day, are handled, includes ten 30½ x 40-in. tumbling mills driven through a line shaft and gearing by a 30-hp. motor. Each tumbler is provided with a friction clutch so that it may be stopped and started individually. An efficient dust-exhaust system draws the dust out of the tumblers and keeps the cleaning room clear. The dust-collecting equipment is located just outside the building and is operated by a 10-hp. motor direct-connected to an exhaust fan. The rapping device for loosening the dust from the cloth screens is actuated by a system of gearing connected to the motor.

Before being delivered to the soft-iron cleaning room, the castings are given a preliminary cleaning in a shaker installed in the annealing room. This device consists simply of an oscillating screen driven through a friction clutch by an electric motor. The annealing pots, two at a time, are picked up by 2-ton floor-operated monorail hoists and suspended over the shaker. While in this position they are hammered with a sledge until the castings and packing fall out. The shaker is then set in motion and the packing sifts out, leaving the partially cleaned castings on the screen. The frame of the shaker is heavily built of steel plate and angles and the screen consists of a ¼-in. plate punched full of ½-in. holes. This screen is 56 in. long and 45 in. wide.

In large malleable foundries the problem of sorting the castings after they have been cleaned is a serious one. In the malleable foundry of the Crane Company, Chicago, a sorting table is used. This is of the endless, motor-driven, pan type. A hopper is provided at the one end of the table in which the castings are dumped as they are received from the tumbling mills. Steel barrels are used for transferring the castings. The table moves slowly and the workmen, who are arranged along both sides, have no difficulty in sorting out the castings. This shop makes pipe fittings exclusively, and the sorting tables are employed for the purpose of assembling the finished fittings according to size.

Locomotive Orders

The American Locomotive Company has just booked 100 locomotives for trench use for the British War Office, 20 large locomotives for the Finland State Railroads and 6 for the Campagnia Espana Colonisation. The Chicago & Northwestern is inquiring for 77 locomotives.

Jellico Foundry, Jellico, Tenn., will resume operations at once, those sections of the foundry plant destroyed by fire two months ago having been rebuilt. The machine shop will be restored later on, and meantime the plant will be restricted to the manufacture of stoves. P. L. and C. H. Johnson are proprietors.

Customs Decisions

STEAM PUMPS FOR SHIPS

The Harlan & Hollingsworth Corporation has been sustained by the Board of United States General Appraisers in a controversy with the collector of customs at Philadelphia, regarding the classification of various articles of equipment for vessels. The testimony showed that the corporation imported steam pumps to be used and become a part of the machinery and equipment of a steamship being built at Wilmington, Del. At the same time there were imported certain valves, guards, springs and studs, piston rods, rings and oil bucket rings, which were duplicates of articles which constituted a part of the pumps. In other words, as shown by the testimony, the articles were repair parts of the pumps.

The collector admitted the pumps free of duty, but took a duty of 20 per cent under the tariff act on the pump parts under the provision reading "manufactures in chief value of metal not specially provided for." The importer claimed free entry under section 5 of the Panama Canal act dealing with materials of foreign manufacture imported for the construction or equipment of vessels built in the United States. Judge Hay said in his decision that the spirit of the Panama Canal act unquestionably covered the parts of the pumps in dispute, and added, "we think the exact letter does also." The decision said it would be unsafe for the vessel to put to sea without the repair parts, and that it was patent that these parts would be used for no other purpose than repairing the pumps concerned in the importation. They were held entitled to duty exemption. The board also expressed the opinion that the articles were free of duty as well under subsection 6, paragraph J, section 4, of the tariff act of 1913. The collector was reversed.

CRUCIBLE STEEL VALUES RAISED

Judge McClelland, sitting as a reappraisement official of the board, handed down a decision in which he approved the action of the customs officials at Chicago, in raising values on crucible steel shipped to Chicago firms by Edgar Allen & Co., Sheffield, England. Imperial special steel, described as "7/16 in. square, 3 ft. long," was entered as having a Sheffield market value of 3s. 9d. per lb., but the general appraiser, after hearing the testimony of the American handlers of the goods, and of the Government witnesses, decided that duty would have to be paid on a basis of 4s. 2½d. per lb. Imperial special annealed steel entered at 3s. 6d., was advanced to 3s. 10d. per lb., while air hardening annealed steel entered at 2s. 3d., was raised to 2s. 10d. per lb.

The construction of six auxiliary schooners for Norwegian interests, involving $1,500,000, is to be undertaken by the Heath Shipbuilding Company, Portland, Ore. Among those identified with the new corporation are George E. Hardy, until Sept. 1 executive secretary of the Chamber of Commerce, and E. W. Heath, for years in the shipbuilding line on Puget Sound and builder of a number of well-known vessels. A site has been selected in South Portland, almost adjoining the yard of the Portland Shipbuilding Company. The vessels will be of the topmast type, 266 ft. long, with beams of 45 ft. Their dead weight capacity will be 3000 tons. Three will have twin oil-burning engines of 240 hp., and three engines of 385 hp., all of the Skandia pattern.

The National Hardware Association of the United States is holding its twenty-second annual convention Oct. 17 to 20 at the Marlborough-Blenheim, Atlantic City, N. J. Meetings of the Metal Branch and the Automobile Accessories Branch will be held at the same time and place.

The trade school at the Indiana Reformatory, Jeffersonville, Ind., has completed an order for 3117 magnetos for Detroit automobile manufacturers.

PERSONAL

Changes affecting the boards of directors of the Youngstown Sheet & Tube Company, Brier Hill Steel Company and Youngstown Iron & Steel Company were made on Saturday, Oct. 14, to conform with the Clayton law. Henry H. Stambaugh leaves the advisory board of the Sheet & Tube Company to continue as chairman of the board of the Brier Hill Steel Company. James A. Campbell leaves the board of the Lackawanna Steel Company to continue as president of the Sheet & Tube Company. Attorney C. D. Hine leaves the Sheet & Tube Company to remain a director of the Youngstown Iron & Steel Company. E. L. Ford leaves the advisory board of the Brier Hill Steel Company to continue a director of the Sheet & Tube Company. J. G. Butler, Jr., vice-president of the Brier Hill Steel Company and a director of the Youngstown Sheet & Tube Company, has not been heard in the matter, being on a French-American industrial commission, now in Europe.

L. V. Blue, Farmers Bank Building, Pittsburgh, vice-president Wheeling Mold & Foundry Company, Wheeling, W. Va., is ill in a hospital in New York City.

A. Dietzel, formerly purchasing agent of Mackintosh, Hemphill & Co., Pittsburgh, has resigned and has connected himself with C. H. Lobsey in the business of lead burning, lead lining agitators and saturators in connection with by-product coke ovens and chemical plants, and offices have been opened in the Fort Pitt Hotel, Pittsburgh.

G. A. White, formerly metallurgist of the American Sheet & Tin Plate Company, is now associated with the Titanium Alloy Mfg. Company, Niagara Falls, in the same capacity. Prior to the connection noted, Mr. White was for a considerable time with the Rock Island Railroad and also with the Eastern Steel Company, Pottsville, Pa., where he was engaged in the manufacture of structural material. It is, however, in the manufacture and treatment of sheet steel that he has done his most notable work.

Marion C. Bias, who joined the Mitchell-Lewis Motor Company, Racine, Wis., in 1909, has been promoted to the position of purchasing agent to fill the vacancy caused by the resignation of Guy W. Morgan, who has taken the position of president and general manager of the Abbott Corporation, Cleveland.

Following the acquisition of the New York & Hagerstown Metal Stamping Company, Hagerstown, Md., by the Poole Engineering & Machine Company, Woodberry, Md., T. Robert Jenkins, recently traveling engineer for the Poole Company, has been made works manager in full charge of operation; S. Procter Brady has been made president, and Frederick Sellar, vice-president in charge of sales.

P. H. Reardon having disposed of his interest in the General Machinery & Supply Company, San Francisco, to his associates, is succeeded by Joseph A. Buckley as president.

Announcement is made by the Commonwealth Steel Company, Granite City, Ill., through H. M. Pflager, senior vice-president, of the following changes: W. E. Hoblitzelle, former vice-president and general manager, having resigned because of ill health, A. T. Morey has been appointed general manager. Mr. Morey has been prominent in the safety and fellowship work of the company. R. A. Bull having resigned, George H. Gibson has been appointed assistant to the general



M. A. NEELAND



JOHN HULST

Marvin A. Neeland, originator of the Neeland blast furnace top, and consulting engineer American International Corporation, sailed on Oct. 18 on the steamship Frederik VIII from New York for Petrograd. His resignation after eleven years as assistant to vice-president, and chief engineer of the United States Steel Corporation, was noted in last week's issue. His successor, John Hulst, has been connected with the Carnegie Steel Company in various capacities since 1901, except for six months, when he was located at Sharon, Pa. Mr. Hulst was chief engineer for some years in the Youngstown, Ohio, district for the Carnegie Steel Company, this district embracing the Ohio steel works and blast furnaces, the Greenville, Pa., mills, the Upper and Lower Union mills and the Niles blast furnace at Niles, Ohio. In November, 1912, upon the resignation of E. E. Slick as chief mechanical engineer of the Carnegie Steel Company, Mr. Hulst was appointed to succeed him, with headquarters in Pittsburgh.

manager, and A. F. Howe has been appointed general superintendent

L. Morris, associated for the past 20 years with S. Morris & Company, scrap dealers, Chicago, has organized the firm of L. Morris & Company, Marquette Building, and will do a brokerage business in iron and steel scrap, as well as dealing in obsolete plants.

E. W. Chadwick, formerly with the Buffalo office of Manning, Maxwell & Moore, Inc., is now associated with the Cleveland office, taking the position vacated by D. A. Hamilton, who has resigned.

H. O. Bernhardt, for two years production manager of the Pierce-Arrow Motor Car Company, Buffalo, has been made factory manager of the Harroun Motors Corporation, Wayne, Mich. He was works manager at Detroit for the Parrish Mfg. Company, manufacturer of pressed steel parts and frames for automobiles and previous to this assistant manager of the Sheldon Axle Company at Wilkes-Barre.

The board of governors of the Machinery Club of the City of New York, at a meeting on Oct. 17, elected James K. Cullen, president Niles-Bement-Pond Company, New York, a member of the board to succeed the late Col. Robert C. McKinney.

The seven men to make up the Advisory Commission to be associated with the Council of National Defense created at the late session of Congress have been chosen by the President. They are Daniel Willard, president Baltimore & Ohio Railroad; Samuel Gompers, president American Federation of Labor; Dr. Franklin H. Martin, a prominent Chicago surgeon; Howard E. Coffin, vice-president Hudson Motor Car Company; Bernard Baruch, Baruch Brothers, New York brokers; Dr. Hollis Godfrey, president Drexel Institute, and Julius Rosenwald, president Sears, Roebuck & Co.

A CIVIC SCIENTIFIC SOCIETY

Preliminary Steps in Organization Planning to Take Part in Government Affairs

Following the movement which was set on foot at a luncheon given in New York on Sept. 28 by William L. Saunders, chairman of the Ingersoll-Rand Company, and reported in THE IRON AGE of Oct. 5, a meeting of the participants in that luncheon was held in the Engineering Societies Building, New York, Oct. 17, to receive the report of a committee of five which had been appointed to consider the various proposals made at the luncheon. A provisional draft of by-laws was discussed at length and the committee was continued to make certain further investigations, but there was no dissent from the twenty-five or so present to the proposed organization.

The new association, which will be given some such name as the Civic Scientific Alliance and will have a paid secretary, is intended to unite the scientific men of the country for the purpose of exerting proper influence in national, state and municipal affairs and to disseminate information to its members on public matters, with suggestions as to their duties. Membership is to be made up of members of national or local societies of engineers or chemists or of other associations devoted to pure or applied science. A council made up of a representative from each state and territory and the District of Columbia is proposed, and under conditions of a vote of the membership the council may be empowered to express its opinion on public matters, but on specially important matters it is expected that the referendum will be required. The dues are to be nominal, say $1 per annum.

The substitution of gas as a fuel, instead of coke, in nickel melting furnaces has resulted in a reduction in the cost of melting from 64 cents per 100 lb. to 34 cents, according to H. J. Yates, in a discussion of a paper on fuel economy before the British Association on Sept. 8. He further stated the labor cost with gas fuel was but 66 per cent of the cost with coke, and the loss of metal with gas was only 33 per cent of what it was with coke.

OBITUARY

MICHAEL HIGGINS, president Higgins Spring & Axle Company, Racine, Wis., died Oct. 9, aged 61 years. He had suffered from an affection of the throat for several years. He was a native of New York State and went to Racine in 1885, at which time he and C. Ansted founded the present spring and axle business. He became sole owner upon Mr. Ansted's death in 1902. For several months the business has been in active charge of his sons, James, George and Frank. Mr. Higgins served as mayor of Racine for eight years.

LEVI LEONARD CONANT, professor of mathematics at Worcester Polytechnic Institute, Worcester, Mass., was killed Oct. 11 by an automobile truck which ran over him. He was born in Middletown, Mass., March 3, 1857, and was graduated from Dartmouth in 1879. He was professor of mathematics in the Dakota School of Mines 1887-90, removing to Worcester in 1891. From 1911 to 1913 he was acting president of Worcester Polytechnic Institute.

UTILLES BAIRD, Pittsburgh, died Oct. 10, aged 83 years. He was engaged in the machinery business until he retired some years ago. For many years he was president of the U. Baird Machinery Company, Pittsburgh.

LYMAN B. BRAINARD, president Hartford Steam Boiler Inspection & Insurance Company, Hartford, Conn., died suddenly Oct. 11 of apoplexy, aged 60 years. He was also a director in a number of large corporations.

CHARLES BUEHNER, president Holbrook-Armstrong Iron Company, Racine, Wis., died at his home in Milwaukee, Oct. 11, aged 54 years. He was born in Oshkosh, Wis.

Weather Test of Steel Sheets

The American Sheet & Tin Plate Company, through Theodore A. Gessler, its New York manager of sales, is distributing an illustrated circular which gives the results of a weather test of sheets conducted by S. D. Hicks & Son, coppersmiths and sheet metal workers, Boston, Mass. This test was made with No. 24 black sheets, 14 x 20 in., marked for identification. The sheets were formed into pans, carefully weighed and placed on the roof of the firm's building in the heart of the city of Boston, where they were exposed to the elements. Nothing else whatever was done to the pans. After approximately 15 months' exposure the pans were taken up and the corners were cut to permit of flattening out. As much rust as possible was then removed and they were carefully weighed with the following results:

	Keystone Copper Steel	So-called "Pure Iron"	Another So-called "Pure Iron"	Standard Soft Steel
Average thickness by micrometer.	0.0248 in.	0.0257 in.	0.0261 in.	0.0274 in.
Weights, Jan. 7, 1915	29.66 oz	31.41 oz	32.09 oz	32.0 oz
Weights, Mar. 31, 1916	19.13 oz	15.54 oz	14.86 oz	5.67 oz
Loss in weight	10.53 oz	15.90 oz	18.23 oz	26.33 oz
Percentage loss..	35.5	50.6	55.0	82.3

Keystone copper steel is the special brand of sheets made by the American Sheet & Tin Plate Company, the steel being an alloy produced by adding a certain amount of copper to well made steel for the purpose of retarding corrosion.

The Business Men's Club, Memphis, Tenn., is making preparations to entertain the joint convention in that city next April of the Southern Supply & Machinery Dealers' Association, the National Supply & Machinery Dealers' Association and the American Supply & Machinery Dealers' Association. An elaborate program is being worked out.

Pittsburgh and Nearby Districts

The George J. Hagan Company, furnace engineer, 401 Peoples Bank Building, Pittsburgh, is undertaking an original and interesting propaganda in connection with type E stokers, which are handled by this company in western Pennsylvania, eastern Ohio and West Virginia. Appreciating the time consumed in order to make personal investigations of these stokers at the various installations around the country, the company is arranging to place on exhibit, in a central location in the downtown district of Pittsburgh, a full sized type E stoker, which will be constantly in operation. It will start with Pittsburgh Smoke Week, on Oct. 23.

The next meeting of the Association of Iron and Steel Electrical Engineers will be held in the Fort Pitt Hotel, Pittsburgh, on Saturday, Oct. 21, and will be a joint meeting with the Pittsburgh Section of the American Institute of Electrical Engineers. The subjects to be discussed are "The Report of the Central Station Power Committee" and "The Advantages of the Modern Types of Direct-Current Machines." At the meeting of the association on Saturday evening, Nov. 18, David Wright will present a paper on "Variable Speed A-C. Motors for Mill Drive," and the meeting on Saturday evening, Dec. 9, will be under the direction of the Standardization Committee, of which F. D. Egan is chairman. The association will have a Christmas party in the German Club, Pittsburgh, on Saturday evening, Dec. 16.

Mackintosh, Hemphill & Co. are now occupying temporary offices at 1227 Liberty Avenue, Pittsburgh, during the construction of their new office building.

Reports that the Westinghouse Machine Company has an inquiry out for 5000 tons of structural steel to be used in making large additions to its plants at East Pittsburgh are incorrect. The report probably arose from the project of the company to build at some time on ground secured at Eddystone, Pa., 13 miles from Philadelphia. No definite plans as to this project have been made, materials and labor being too high. The company does not intend to make any additions in the near future at East Pittsburgh.

The pattern department in the machine shops of the Pittsburgh & Lake Erie Railroad, Pittsburgh, was destroyed by fire last week, causing an estimated loss of $175,000. Besides valuable patterns, some freight and passenger cars and 12 locomotives were burnt.

The plant of the Sligo Iron & Steel Company at South Connellsville, Pa., which has been idle nearly three years, is to be started in about 30 days. It contains 16 single puddling furnaces, a 20-in. muck bar mill, 9-in. guide bar mill, 16-in. bar mill and 24 x 66-in. plate mill. The output will be iron bars and plates. The company will install three 50-ton basic open-hearth furnaces, contract for which it expects to place in a short time. Richard Irvin is president and general manager; J. C. McConell, superintendent, and William Orr, assistant superintendent and master mechanic.

Announcement is made by W. J. Wallis, president Youngstown Foundry & Machine Company, that his company has received an order for heating furnace castings, hawsers and other fittings to go into the construction of the Carnegie Steel Company's new McDonald mills, located between Girard and Niles.

Managers of steel mills at Youngstown declare the coal situation serious. With this statement comes the order that no natural gas can be secured for melting steel after Oct. 31.

The William Tod Company, Youngstown, recently secured from the Allies a large contract for the production of 8-in. shells, comprising 100,000 forgings, at a price of $20 each. This order will run the hydraulic press department well into next year.

Machinery for the new blooming mill of the Trumbull Steel Company, Warren, Ohio, will be made at the Youngstown and Pittsburgh plants of the United Engineering & Foundry Company, which is also turning out equipment for a 16-in. tube mill now being erected for the Youngstown mills of the Republic Iron & Steel Company. The local shops are working overtime.

The Mahoning & Shenango Railway & Light Company, Youngstown, which has just completed a big power house at Lowellsville, Ohio, intends to erect another, to cost approximately $1,000,000. A 20,000-hp. turbo-generator, a battery of Babcock & Wilcox boilers, 600-hp. Taylor-automatic stokers and complementary equipment will be installed under the latest contract awarded to the Stone & Webster Engineering Corporation and General Electric Company. The company supplies electrical power to New Castle, Sharon and Farrell in Pennsylvania, and Youngstown, Warren, Girard and Niles in Ohio.

Labor Notes

Rumors are in circulation in Youngstown, Ohio, that the strike of the machinists will come to a close within a short time. It is stated that the strikers are about willing to surrender providing they receive anything in the way of concessions. With the shops overcrowded with orders, something may result from the overtures now being made by the idle men.

There has been but one strike in New England the past week. The plant of the Sessions Foundry Company, Bristol, Conn., was affected Oct. 10 as the result of a strike of about 30 employees in the molding room. Neither side, up to last Saturday, had taken any steps to bring about a settlement.

The Adamson Machine Company, Akron, Ohio, has granted its machinists, blacksmiths and pattern makers a 15 per cent increase in their hourly rate of wages, and has reduced their week's work to 50 hr.

J. R. Bowles, president Northwest Steel Company, Portland, Ore., announces the voluntary reduction of the working day in that company's plant from 9 to 8 hr., without reduction of pay. There are now 650 men employed, and work now on hand will require 1500 men within a few weeks. The company has always operated as an open shop.

The Carbon Steel Casting Company, Lancaster, Pa., has made an advance of 10 per cent, effective at once, in the wages of its molders, making a total increase of 15 per cent in the last few months. The laborers have also received a substantial advance.

Having filed no articles of incorporation in Kentucky, the United Iron Works, Springfield, Mo., is not entitled to maintain a suit on a contract in the courts of Kentucky, according to a ruling in the Circuit Court at Louisville. The suit was for balance alleged to be due from the Henry Watterson Hotel Company, on a contract for the installation of a refrigerating system. Both claim and counter-claim were dismissed on peremptory instructions. Foreign corporations, in transacting business with Kentucky corporations, should be protected by filing their charters in that State.

The F. Raniville Company, manufacturer of leather belting, Grand Rapids, Mich., has opened a New York branch at 6 Church Street, the rapid development of Eastern and export business having made this step necessary. Complete stocks of the various goods it manufactures in leather belting, etc., will be carried in New York. George S. Baker, formerly secretary-treasurer of the Olmstead-Flint Company, heads the New York selling organization.

The Doehler Die-Casting Company, Court and Ninth streets, Brooklyn, N. Y., has removed its brass-back bearing department from its Brooklyn plant to Toledo, Ohio, where the company now has a new foundry and machine shop.

The Latrobe Electric Steel Company, Latrobe, Pa., is opening an office for the sale of its tool steel products in Cincinnati, Ohio. Edwin M. Ong will be manager and will take charge beginning Nov. 1.

The Snyder Electric Furnace Company has opened an Eastern office in the West End Trust Building, Philadelphia, Pa. F. J. Ryan is in charge.

Machinery Markets and News of the Works

SMALL LOT BUYING LEADS

Canadian War Orders Total $550,000,000

Occasional Buying for Munitions Work Noted in Chicago—Top Speed Production in New England Helping Deliveries

The great bulk of demand, which is keeping up in a satisfactory manner, consists of inquiries for one or two machines from scattered sources. In the East two or three good-sized lists are before the trade, and some notable buying has been done by the Samuel L. Moore & Sons Corporation, Elizabeth, N. J.

In Chicago plant additions are making business in machine tools, and occasionally there are inquiries for large special lathes for munitions work, negotiations in one case involving about 250 lathes for large projectiles.

The Imperial Munitions Board of Canada estimates that since the beginning of the war munitions orders placed in the Dominion aggregate $550,000,000.

Milwaukee continues to suffer from the lack of labor. Some relief is coming from rural workers who, having finished their heavy work for the season on farms, are seeking employment in shops. This, of course, does not swell the ranks of skilled machinists or other expert labor.

Rubber manufacturers in the Central West are buying boring and turning mills in Cincinnati, and there is a good demand for these tools from other directions also. New war orders placed in Dayton, Ohio, have given rise to inquiries for machine tools in Cincinnati.

The Cleveland trade has not received any large lists in the week, but small-lot business is holding up well.

Tool builders in New England are working at top speed, and the high rate of production, together with extended facilities, has made deliveries a little easier.

Export shipments, both to Europe and South America, are more than ever hampered by lack of ocean freight space.

Western Washington and Oregon are suffering from a shortage of cars which is restricting transcontinental shipments, especially of lumber. In the Central South, also, an insufficient number of cars is delaying shipments.

New York

NEW YORK, Oct. 18, 1916.

While most builders of machine tools are slowly catching up on deliveries, several types of machines are scarce for anything like prompt delivery, and, in a number of instances, makers have again advanced their prices. This is true of certain makes of radial drills and planers. One maker of boring mills has withdrawn prices. On the other hand, some recent competitive business developed concessions in prices.

Plenty of lathes of the ordinary sizes are available, although larger machines, ranging from 30-in. up are not so easily obtained. Milling machines, grinders, shapers, radial drills and planers, and some makes of turret lathes are difficult to obtain for prompt delivery. Most of the firms which engaged in tool making since the beginning of the war can ship out of stock. One such company can ship about 35 hand screw turret machines in the course of three weeks.

No large lists are before the trade except those recently issued by the Lehigh Valley Railroad, the General Electric Company and the Watervliet Arsenal, all of which are open. The General Electric Company continues to add to its requirements. Inquiries for one or two machines are numerous, however, and orders are being placed at a satisfactory rate.

The Samuel L. Moore & Sons Corporation, Elizabeth, N. J., a subsidiary of the Bethlehem Steel Company, which is extending its facilities on a large scale, has placed in the past week some very attractive orders for equipment, including lathes, shapers, boring mills, cranes, etc.

Export business is more than ever hampered by the scarcity of ocean freight space, this applying to both European and South American shipments. Russia and Italy are the chief sources of inquiries, according to a dealer who has sold extensively for export. He is particularly pleased by a recent sale for shipment to South America.

The Commercial Electrolytic Corporation, Buffalo, has purchased a site at Colgate Street and the South Buffalo Railroad, on which it will erect a plant for the manufacture of hydrogen dioxide. About 1000 hp. of Niagara electric power has been contracted for from the Buffalo General Electric Company.

The Harvey Top & Body Company, Buffalo, recently incorporated for the manufacture of automobile bodies and tops, has taken over the plant and business of Bosche Brothers, Main and Summer streets, and will make improvements. Henry C. Harvey, 918 Main Street, is secretary and general manager.

The Lumen Bearing Company, Buffalo, is building a brick and tile addition to its plant at Sycamore and Lathrop streets and the New York Central Railroad Belt line.

Contract for the erection of a paper manufacturing plant and machine shop on Saratoga Street, Cohoes, N. Y., for the Frank Gilbert Paper Company, has been secured by the C. P. Boland Company, Troy, N. Y. The cost will be $100,000.

The Rudolph Wurlitzer Mfg. Company, North Tonawanda, N. Y., manufacturer of musical instruments, has given contract to the Turner Construction Company, Buffalo, for the erection of an addition, 80 x 91 ft., to its plant at Sawyers Creek Road and the New York Central Railroad.

The Durolithic Company, Ellicott Square Building, Buffalo, has contract for a four-story factory, 60 x 165 ft., to be erected by the Herschell Spillman Company, Sweeney Street, North Tonawanda, N. Y., manufacturer of gasoline engines and merry-go-rounds. The cost will be $50,000.

The Cortland Corundum Wheel Company, Cortland, N. Y., has completed plans for the erection of a factory addition, 56 x 96 ft.

The Clay Cutlery Company, Andover, N. Y., has let contract for the erection of a factory, 50 x 100 ft., one story.

The New York State Railways, Rochester, N. Y., will build a car shop and heating plant, 60 x 205 ft., one story, at Draper Street and Portland Avenue. The general contract has been let at $35,650.

The Rome Hollow Wire & Tube Company, Rome, N. Y., has let contract for a one-story addition, 76 x 171 ft., to be made to its mill on Railroad Street and also for a storehouse, 32 x 40 ft. Frank DeBishop is manager.

The Transmission Ball Bearing Company, Buffalo, N. Y., which recently increased its capital stock from $100,000 to $250,000, has purchased a site of 3½ acres at Military Road and the New York Central Railroad, and will erect there a building to cost about $50,000.

The Demarest Heating Company, Springfield, Mass., manufacturer of combination hot air and steam heaters, has purchased a site for an assembling plant at Hopkins Street and the South Buffalo Railroad, Buffalo. Later a foundry will be added.

The Niagara Fireworks Company, Buffalo, has purchased a site of four acres at East Delavan Avenue, and the city line, on which it will erect a number of small factory buildings for the manufacture of fireworks, fireworks appliances, novelties and toys.

The VanDenmark Motor Company, Elmira, N. Y., will build a two-story machine shop and garage at Baldwin and Gray streets, 80 x 120 ft. C. VanDenmark is president.

Canton, N. Y., has had plans prepared by Charles E. Perry, Down Building, Albany, for a municipal pumping station.

The American Motors Corporation has completed the initial unit of its new plant at Plainfield, N. J. The structure,

60 x 400 ft., comprises machine shop, assembling department, power plant and administration building; it is situated on 4½ acres of ground to allow for future extensions. The entire plant has been designed to have a capacity of 10,000 finished automobiles a year. Marcus I. Brock is general manager in charge of production.

Fire Oct. 13 destroyed part of the plant of the Egyptian Lacquer Mfg. Company, Lewis Street, Rahway, N. J., with a loss estimated at $25,000. The plant will be rebuilt. Robert Zeller is manager

The Nu-Style Window Sash Company, 15 Exchange Place, Jersey City, N. J., has been incorporated with a capital of $200 000 to manufacture a patented window sash. C. H. Jarvis, P. L. Nieser and J. A. Turner are the incorporators

The Davis-Bournonville Company, Jersey City, manufacturer of acetylene welding apparatus, has awarded contract for the erection of a two-story reinforced-concrete addition, 70 x 200 ft., on Van Wagnen Avenue. John N. Gill & Co., 1215 Filbert Street, Philadelphia, are the contractors.

The Bonnell Motor Car Company, 520 Broad Street, Newark, will build an addition to its machine and repair shop to provide about 10.000 sq. ft. additional floor space.

The Wm. F. Taylor Barrel Company, Newark, will make alterations and extensions in its plant on Thomas Street.

The Radium Aluminum Material Corporation, Newark, will make improvements in its factory on High Street.

Chase & Perlman, Inc., 23 Sussex Avenue, Newark, has been incorporated with a capital of $25,000 to manufacture engines. A. W. Chase and A. L. Davis are the incorporators.

The National Lock Washer Company, 65 Johnson Street, Newark, N. J., will make alterations and extensions in its factory.

The Reuter Puncture-proof Tire & Tube Company, 810 Broad Street, Newark, N. J., has been incorporated with a capital of $125,000 to manufacture tires and tubes. Alfred Strauss, George J. Reuter, Lewis R. Freund, Newark, and A. M. Herman, Pleasantdale, N. J., are the incorporators.

The department of water supply, gas and electricity of the city of New York is having plans prepared for three-story brick and concrete repair shop and garage to be erected at 427 East Eighty-seventh Street, New York.

Lehmaier Schwartz & Co., 207 East Twenty-second Street, New York, tin foil manufacturers, have awarded contract for a six-story brick and steel factory building, 25 x 42 x 100 ft.

Philadelphia

PHILADELPHIA, PA., Oct. 16, 1916.

More than 2000 workmen are reported to have been laid off at the Eddystone plant of the Remington Arms Company, and hundreds are said to have departed for their former homes. The company still has about 10,000 men employed in its plant. This reduction of forces is undoubtedly a discharge of unsuitable workmen, as reports state that more men will be taken on from time to time, until ultimately 20,000 are employed. The company holds contracts for 3,000,000 Enfield rifles, which is considered sufficient to keep the plant in full operation for three years.

Blast furnace, iron and other industries employing men notice a temporary improvement in the labor problem because many rural residents who have finished their heavy work for the season on farms are again taking jobs in industrial plants.

The Abrasive Material Company, Bridesburg, Philadelphia, will take bids Oct. 23 for a crushing plant, 82 x 86 ft., two and three stories, of brick and steel. Stearns & Castor, Girard Building, Philadelphia, are the architects.

Permit has been granted for the erection of a one-story brick foundry, 50 x 144 ft., to be erected at 61st Street and Gibson Avenue for J. C. McEvoy to cost about $6,500. N. P. Enochs, 842 South Golden Street, Philadelphia, is the contractor.

C. W. Miller has purchased the carriage-making business of the Miller Carriage Works, Fredericksburg, Pa., and is said to plan increasing the output.

William R. Thropp Sons Company, Trenton, N. J., manufacturer of rubber mill machinery, has purchased property on East State Street to provide for future extensions to its plant.

The Enterprise Pottery Company, Trenton, N. J., a subsidiary of the Trenton Potteries Company, manufacturer of sanitary earthenware, will build a new plant to cost about $27,000. Burton & Burton, Trenton, have been awarded the contract.

The Philadelphia Pipe Bending Company, Philadelphia, will build a one-story brick addition to its plant on North Fifth Street.

G. F. Bauer, 1409 North Thirteenth Street, Philadelphia, will build an addition to his cooperage factory.

The Richard DeCarr Company, Philadelphia, will make alterations and improvements in its iron foundry at Twelfth and Noble streets.

The Keystone Wire Cloth Company, Hanover, Pa., is adding 100 wire-weaving looms, which will about double its capacity for the manufacture of galvanized and bronze wire mesh.

New England

BOSTON, MASS., Oct. 16, 1916

The machine-tool business in New England is still running at top speed; but deliveries are a little better, due largely to the fact that the producing plants have been able to secure machinery so that their output can be enlarged. This is particularly true among the twist drill makers. Lathes of the common sizes are still hard to secure, the market absorbing them as fast as they are produced.

Building operations which are at the present time a very good indication of business conditions, show a little loss in most cities this September as against September of last year. In Boston, Worcester, Springfield, Hartford, New Haven and Bridgeport the total value of new buildings for which permits were granted in September, 1915, was $8,885,254. The same cities for September, 1916, show an estimated value of $7,250,148. The greatest drop was in New Haven, where, at this time last year, the Winchester Repeating Arms Company was erecting a large number of factory buildings.

The Billings & Spencer Company, Hartford, Conn., will vote at a stockholders' meeting Oct. 19 on the recommendation of the directors that the capital stock of the company be increased from $500,000 to $750,000. The increase in capital is recommended to provide payment for additions now in process of construction and for additional equipment.

The Waterbury Rolling Mills Company, Waterbury, Conn., has secured a permit for the erection of two one-story additions to its plant on East Aurora Street.

The Æoliar. Company, Meriden, Conn., manufacturer of music rolls and motors for phonographs, is to manufacture phonograph records. It is stated that the company will manufacture a new style of record.

The plant of the Fitzgerald Mfg. Company, maker of automobile supplies and accessories, Winsted, Conn., was damaged by fire Oct. 12 to the extent of $4,000. Operations will be immediately resumed in the unburned section of the plant and the company will rebuild at once.

The Derby Mfg. Company, Derby, Conn., has bought the property adjoining its plant, which was formerly owned by the Anatomik Shoe Company, and will remodel the buildings and install new machinery for the manufacture of war munitions. The company recently bought the old Shelton Bolt Works for the same purpose.

The Connecticut Brass Company, Waterbury, Conn., has sold its plant at Mixville to John E. Liggett of New York. It is understood the purchase price was approximately $600,000 and that its products will be absorbed by the corporations with which Mr. Liggett is affiliated. The plant comprises a rolling mill, a casting shop and several other departments and is now running nights, turning out sheet brass.

The New Haven Malleable Iron Company, New Haven, Conn., has bought the plant of the Munson Paper Box Company and will begin operations soon with a force of 50 molders. The new company will be incorporated with a capital stock of $50,000 by Edward P., Charles M., and William F. Brennan.

Landers, Frary & Clark, New Britain, Conn., are tearing down buildings on East Main Street preparatory to the erection of new buildings.

The General Electric Company, it is reported, is considering starting up again the plant at Great Barrington, Mass., which has not been operated to capacity for several years.

The Noble & Westbrook Mfg. Company, Hartford, Conn., has completed its new addition and the equipment of the factory of the vice-president, G. A. Carlson, of Wethersfield, has been moved to the Hartford plant and operations started. The company has also bought the patterns and drawings of the Grundy Polishing Company, Florence, Mass.

The Marlin Arms Corporation, New Haven, Conn., is beginning to turn out Colt rapid fire guns at the rate of 50 per day and expects to increase this number to 100 guns per day by Dec. 1. It is reported that its present contract for 12,000 guns will be completed by June 1, 1917, and that negotiations for another contract are now under way.

The Waterbury Mfg. Company, Waterbury, Conn., has awarded a contract for the erection of a six-story factory building

The Gaynor Mfg. Company, Stratford, Conn., has increased its capital stock from $60,000 to $150,000.

The Waterbury Homes Corporation, Waterbury, Conn., has been organized with capital stock of $100,000 by officers of the American Brass Company, to engage in industrial housing development.

The American Fastener Company, Waterbury, Conn., has purchased a tract of land at Maple Street and Maple Avenue. It is understood that a new factory will be erected.

The J. & G. Mfg. Company, Boston, Mass., has been incorporated with capital stock of $15,000 to manufacture carpenters' tools. The incorporators are Wallace C. Sprague, president; John McGowan, Willow Street, Lynn, treasurer; and George Grevillius.

The Stephens Aeroplane Company, Providence, R. I., has been incorporated with capital stock of $100,000 by Bruneau, Arnold B., and Lorne E. Stephens.

The Union Twist Drill Company, Athol, Mass., is to build two additions, 60 x 100 ft., two stories, and 60 x 100 ft., three stories.

Baltimore

BALTIMORE, MD., Oct. 16, 1916.

The Poole Engineering & Machine Company, Woodberry, Md., has purchased the controlling interest in the New York & Hagerstown Metal Stamping Company, Hagerstown, Md., and is using the plant to make an order of 1,000,000 brass shell cases. The shop organization remains intact. The factory covers an area of several acres.

With $10,000 capital stock the American Piston Expanding Company, Seventh and Gough streets, Highlandtown, Md., has been incorporated to manufacture machinery. The incorporators are Sody Salabes, 675 West Baltimore Street, Henry Castelberg and Gwyllyn R. Holmes.

The Continental Can Company, 1002 Keyser Building, Baltimore, plans to build an additional factory building, 100 x 350 ft., to its plant at Canton, Md.

The Columbia Paper Bag Company, 921 East Fort Avenue, Baltimore, will build a two-story addition, 40 x 51 ft.

The Nev-er-slip Fastener Mfg. Company, 646 West Barre Street, Baltimore, has been incorporated with $40,000 capital stock, by Ferdinand H. Braecklein, Paul D. Strube and Theodore Chilcoat.

With $10,000 capital stock the Bosse-Ford Company, 213 North Calvert Street, Baltimore, has been incorporated to deal in machinery, etc. The incorporators are Howell C. Gwaltney, George Vavrina and John K. Wess.

Improvements at the plant of the Pusey & Jones Company, Wilmington, Del., include a shop in the shipbuilding yard, 70 x 200 ft., which will be equipped with traveling cranes, punches and shears. The building will be two stories with a second floor as a mold loft. Another building, 50 x 300 ft., will be constructed and equipped with machine tools for the manufacture of paper machinery. Two new shipways being built at the plant are nearing completion.

The Bethlehem Steel Company, Sparrows Point, Md., is understood to be planning an addition to the gas engine plant, 90 x 200 ft.

With $1,500,000 capital stock the Virginia Coal Products Corporation, Tacoma, Va., has been incorporated. Plans are being made for the construction of a by-products plant.

The Central Mfg. Co., Roanoke, Va., is seeking prices on boilers and engines.

Prices on machinery for the manufacture of screens are being sought by the Richmond Strip & Screen Company, Richmond, Va.

Detroit

DETROIT, MICH., Oct. 16, 1916.

The machinery market was featureless the past week, with no large orders or inquiries. The demand for small lots is brisk and steady. Deliveries require 7 to 8 months on standard lathes and milling machines, with no indication of improvement. More labor is available than for some time, but building operations are held up because of lack of material.

It is announced that the United Truck & Equipment Company of New York will move to Grand Rapids, Mich., taking over the business of the United Motors Company, whose plant will be largely expanded. The management of the latter company will not be materially changed. Frank T. Hulswit, Grand Rapids, president of the United Light & Railways Company, and the United Motors Company, will retain the main financial interest.

The Holland Furnace Company, Holland, Mich., is doubling its capacity and adding 100 skilled laborers to its payroll by the erection of a foundry, 60 x 230 ft., adjacent to its present building. A. H. Landwehr is manager.

The Manistee Mfg. Company, Manistee, Mich., is installing additional machinery in its plant and working two shifts in an effort to keep up with its orders for furniture.

The Campbell, Wyant & Cannon Foundry Company, Muskegon Heights, Mich., is completing a new foundry building, 300 x 600 ft., at a cost of $100,000. It now employs 1500 men, and recently increased its capitalization to $400,000.

The Michigan Chair Company, Godfrey Avenue, [illegible] Rapids, Mich., is [illegible] to its factory.

The Municipal water board, Hillsdale, Mich., through Chauncey Cook, chairman, will appropriate $18,000 for the purchase and installation of a turbine.

The Reo Motor Car Company, Lansing, Mich., has received materials to rush work on its new three-story addition, 175 x 407 ft. It has a consignment of $30,000 worth of lathes, part of this being reserved for the new machine shop. Other machinery will be installed as soon as the addition is completed.

Wormley, Brimhall & Mead, consulting engineers, Grand Rapids, Mich., are preparing plans for a factory, 104 x 240 ft., at Grand Haven, Mich., for the Keller Pneumatic Tube Company.

The Petoskey paper mill, Petoskey, Mich., operated by the Wheat Paper Company, Elkhart, Ind., will double its output as soon as machinery can be installed. A. B. Mudgett is manager.

The Bates & Edmonds Company, Lansing, Mich., manufacturer of gas engines, is doubling its capacity by an addition, 50 x 225 ft. A new type of gas engine will be turned out. The new plant will be in operation by Jan. 1.

The Superior Foundry Company, Holland, Mich., is extending its present plant to take care of new contracts just secured. Among the improvements will be a new boiler house and a 5-ton traveling crane.

Chicago

CHICAGO, ILL., Oct. 16, 1916.

The construction of machine shops and manufacturing plants is responsible for a very large demand for general shop tools. Buildings are now being erected in anticipation of which machinery orders were placed some time ago, while others less forehanded are forced to buy what might be called second choice equipment, because of inability to secure deliveries of preferred lines. The Western Electric Company at Chicago is making important additions to its plant and the George Gorton Machine Company, Racine, Wis., is enlarging its machine shop. Occasional inquiry for large special lathes for ammunition work continues to appear, the last week bringing to light negotiations for 250 lathes suitable for machining large projectiles and representing a purchase price approximating $1,000,000.

The Boss Nut Company, 1744 North Kolmar Avenue, Chicago, is building a one-story addition, 75 x 150 ft., and 35 x 115 ft., at a cost of approximately $25,000.

The Excelsior Steel Furnace Company, 517 West Monroe Street, Chicago, is proceeding with the preparation of plans for its proposed four-story factory to cost $100,000.

The Kissel Motor Car Company, Chicago, will shortly have erected for it at 4343 Wabash Avenue a one-story garage, 100 x 165 ft., which will cost $20,000. N. Ronneberg, 10 South LaSalle Street, is the engineer.

James S. Kirk Soap Company, Chicago, through its engineers, E. C. & R. M. Shankland, 209 South LaSalle Street, is preparing plans for a power house for its new factory now in process of erection.

The Reliance Electric Company, 15 South Desplaines Street, Chicago, will build a two-story shop, 25 x 90 ft., at a cost of $7,000.

The Pennsylvania Lines West is about to proceed with the erection of a one-story roundhouse at Fifty-ninth Street, Chicago, to cost about $8,000.

The Accurate Engineering Company, 2419 West Fourteenth Street, Chicago, has taken out a permit for a one-story forge shop, 133 x 266 ft., to cost $20,000.

The Regan Can Company, 322 South Michigan Avenue, will build a one-story shop, 60 x 200 ft., at 13,500 Carondelet Avenue, at a cost of $12,000.

The Birch Hintz Mfg. Company, 19 South LaSalle Street, Chicago, will build a one-story light manufacturing building, 50 x 73 ft., at 1108 South Kilbourn Avenue, to cost $4,000.

F. E. Hummel, Ashland Avenue and Fulton Street, Chicago, is about to erect a one-story sheet metal factory,

48 x 100 ft., at 216 North Washtenaw Avenue, at a cost of $6,800.

The Sheffield Foundry Company, Chicago, will build a one-story brick addition to its foundry at 2031 Herndon Avenue at a cost of $3,000.

The Sundstrand Grinder Company, Chicago, has been incorporated with a capital of $15,000, by Charles S. Knudson, 155 North Clark Street, Fred H. Bowen and Louis F. Peifer.

The Raynor-Dalmun Company, 2856 West Lake Street, Chicago, is about to erect a three-story brick shop at a cost of $45,000.

The Wilson Stove & Mfg. Company, Metropolis, Ill., has been organized by James Wilson, James B. Wilson and S. H. Long. The company has a capital of $100,000.

The Union Products Company, Rockford, Ill., recently organized, has secured property in that city upon which a building, 100 x 200 ft., will shortly be erected.

Cleveland

CLEVELAND, OHIO, Oct. 16, 1916.

Although no inquiries for round lots of machines have come out recently, the demand for single machines in lots of two or three is holding up well, making the aggregate sales quite heavy. This business comes from widely scattered sources and embraces about all industries using metal-working machinery. Few machine-tool builders report any improvement in deliveries. Some buyers are shopping around to secure the best shipments possible and other business is not being placed. Some demand is coming from the automobile trade, but all for small lots of machines. Manufacturing plants are as crowded with work as at any time in the past year and are still greatly in need of additional machinery. Old orders are slowly being filled and managers are congratulating themselves that these were placed some time ago for future delivery when it was impossible to secure machinery for early shipment.

The Cromwell Steel Company, Cleveland, which will build a new plant in Lorain, Ohio, has placed a number of its contracts. The mill equipment will be furnished by the Cleveland Machine & Mfg. Company, the cranes by the Alliance Machine Company, Alliance, Ohio, and the engine by the Buckeye Engine Company, Salem, Ohio. The fabricating work for the smaller buildings will be done by the Alliance Structural Company. The main or open-hearth building will be built by the Eastern Steel Company.

The Steel Improvement Company, Cleveland, is increasing the capacity of its heat-treating department by the installation of four heat-treating furnaces with 5 x 10-ft. chambers and is providing additional hammer capacity in its forge department.

The Vitreous Enameling Company, East Ohio Gas Building, Cleveland, recently incorporated with a capital stock of $100,000, has acquired a site along the Belt Railroad on Grant Avenue and plans to commence shortly the erection of a plant. Samuel Weil is president; Edward H. Weil, general manager and secretary, and Walter M. Weil, treasurer.

The Willard Storage Battery Company, Cleveland, will enlarge its plant by the erection of two buildings—135 x 200 ft., two stories, and 90 x 240 ft., one story, respectively.

The S. P. Mfg. Company, Cleveland, has been organized to manufacture wood and metal patterns, special tools and jigs. It will establish a plant in the building of the Properties Company, East Seventy-second Street. P. D. Stafford is president.

The Massillon Foundry & Machine Company, Massillon, Ohio, builder of steam hammers and trimming presses, has outgrown its present quarters and will erect a larger plant near the works of the Massillon Rolling Mill Company. It is in the market for a 40-ton electric traveling crane and will probably require machine-tool equipment.

The Adamson Machine Company, Akron, Ohio, is enlarging its foundry by an extension, 80 x 160 ft., and will manufacture open-hearth steel castings in addition to its present output of Bessemer steel and gray-iron castings. It has just begun the manufacture of mills and calenders used in the automobile tire industry. A large demand for these exists in Akron which has been supplied to a large extent by Eastern machinery manufacturers.

The Burt Mfg. Company, Akron, Ohio, has just completed an addition to its plant, 50 x 100 ft. Besides its present line of oil filters, ventilators, etc., it will engage in special sheet-metal work for plants that furnish blueprints of their required work. The company reports a heavy demand for its oil filters and has recently taken an order for twelve filter units from the Inland Steel Company.

The Akron Steel Company, Akron, Ohio, has been incorporated with a capital stock of $60,000 by V. M. Herrick, C. A. Spencer, and others. It will erect a foundry soon and is in the market for cranes and other steel foundry equipment.

The National Mfg. Company, Ashtabula, Ohio, has been incorporated with a capital stock of $75,000 by Nail P. Fawcett, C. L. Devereaux, and others, to manufacture hardware.

The Canton Auto Parts Company, Canton, Ohio, has been incorporated with a capital stock of $300,000 by S. S. Kurtz, James L. Lynch, M. A. Yeakle, and others, and will erect a plant.

The Henry-Miller Foundry Company, Canton, Ohio, just organized, has purchased the property formerly occupied by the Novelty Iron Company. The plant will be remodeled and used for the manufacture of castings for heating furnaces for the T. E. Henry Furnace Company, Cleveland, an allied interest, and will also do jobbing foundry work. Stockholders in the company are T. E. Henry and E. S. Moncrief of the T. E. Henry Company, and C. J. Miller of the Medina Foundry Company, Medina, Ohio.

The Finkhouser Mfg. Company, Wrenn, Ohio, maker of steel safes, will move its plant to Van Wert, Ohio.

The Western Automatic Machine Screw Company, Elyria, Ohio, will build an addition to its plant to manufacture cold drawn steel used in its other departments. The drawing department will be located in a one-story building, 75 x 250 ft.

Another Ohio company to manufacture cold drawn steel for its own use is the Champion Spark Plug Company, Toledo, Ohio, which has recently placed in operation a department for that purpose.

Indianapolis

INDIANAPOLIS, IND., Oct. 16, 1916.

The General Electric Company has let the contract for a new annealing plant at its works at Fort Wayne, Ind. The Indiana Engineering Company will supervise the construction.

The South Bend Brass & Machine Foundry Company, South Bend, Ind., has taken a lease on a plant at Mishawaka, Ind., which will be remodeled for the earliest possible occupancy. George W. Thayer is president.

The Pilot Motor Car Company, Richmond, Ind., will enlarge its plant and increase its manufacturing capacity.

The Vonnegut Machinery Company, Indianapolis, has bought the property of Hetherington & Berner, manufacturers of structural steel and iron, at 19-27 West South Street. The Vonnegut Company manufactures transmission equipment, metal and wood-working machinery. The property has a frontage of 95 ft. on South Street and a depth of 300 ft. Hetherington & Berner's new plant is at Kentucky Avenue and White River.

The Rumsey Aeroplane Company, Indianapolis, has been incorporated with $10,000 capital stock. The directors are Horace S. Rumsey, Lewis M. Rumsey, Jr., and H. B. Hewitt.

The Holcomb & Hoke Mfg. Company, Indianapolis, manufacturer of popcorn machines, peanut roasters, etc., has increased its capital stock from $2,500 to $150,000.

The Jackson County Transmission Company, Brownstown, Ind., has been incorporated with $15,000 capital stock to supply light, heat and power. The directors are Earl F. Reagan, Frederick G. White and Wilfred Jessup.

The personal property of the Commercial Car Company, Peru, Ind., has been sold. The goodwill has been bought by the Great Western Automobile Company of Peru, of which F. B. Lay is manager.

The Kokomo Steel & Wire Company, Kokomo, Ind., has increased its capital stock from $1,150,000 to $2,150,000.

The White Wood Products Company, Crothersville, Ind., has been incorporated with $50,000 capital stock to manufacture woodenware. The directors are G. W., H. B. and H. C. White.

The General Insulating Company, Alexandria, Ind., is building an addition to its plant.

The Mulloy Scale Company, New Albany, Ind., has increased its capital stock from $2,000 to $27,000.

The Evansville Tool Works, Evansville, Ind., reports an unprecedented volume of business and has had to make special machinery in order to facilitate work. Frank Lehoff is president.

A. D. Tolin, Ottumwa, Iowa, manufacturer of mining tools and button-attaching machines, will move his plant to Anderson, Ind.

The Marion Stoves Company, Marion, Ind., has been incorporated with $100,000 capital stock to manufacture stoves. F. P. Fruchey, Thomas Fruchey and M. Cunningham are the directors.

About $40,000 will be spent in remodeling the plant of the American Carbon Company, Noblesville, Ind., so as to manufacture dry cell batteries. William Hoen is superintendent.

The local factory of the Pioneer Box Company, Crawfordsville, Ind., manufacturer of wire-bound boxes, was destroyed by fire Oct. 12 with a loss of $50,000. Edward E. Ames is president.

The United Refrigerator Company, Richmond, Ind., has been incorporated with a capital stock of $500,000, not the Union Refrigerators Company, as was stated in THE IRON AGE of Oct. 5. Elbert W. Shirk is president.

Milwaukee

MILWAUKEE, WIS., Oct. 16, 1916.

As winter approaches industrial activities are being accentuated and are reaching a still wider range. A disconcerting note is sounded by the continued lack of both skilled and unskilled labor, a condition which seems to be growing worse instead of better. The machine-tool trade sees no relief from the urgent demand, which consists mainly of single machines, with here and there a small lot. Even enlarged capacity has not served to relieve the pressure, although it must be admitted that the shortage of skilled labor is a factor. Domestic business is of such volume that little attention is paid to requirements for export, and practically all of the work now going through the tool shops is on home account.

The Stowell Company, South Milwaukee, Wis., is taking bids for the erection of a core room, 40 x 70 ft., two stories and basement. The plant is being improved and the efficiency increased.

The Milwaukee Chair Company, 3022 Center Street, Milwaukee, will build a third story on its main wood-working shop, 60 x 160 ft., at a cost of $15,000. E. W. Cramer is general manager.

The National Metal Extraction Company, 3015 Walnut Street, Milwaukee, has authorized an increase in the capital stock from $100,000 to $150,000. P. N. Sampson is secretary and treasurer.

The Elsen & Philips Motor Company, La Crosse, Wis., has purchased a site and will spend $25,000 for a garage and service station, 100 x 142 ft., two stories and basement.

Fond du Lac, Wis., will receive bids until Oct. 19 for a municipal garage and general repair shops.

The Co-Operative Orchard Company, Sturgeon Bay, Wis., will erect several buildings, including a general machine and repair shop, 32 x 72 ft., to include forge, blacksmithing and carpenter shops. James Martin is manager.

Frank Brothers, Spring Green, Wis., plan to rebuild their garage and repair shop destroyed by fire last week with a total loss of $20,000.

The P. F. Mork Foundry, Beloit, Wis., is building an addition, 50 x 150 ft., with a new cupola and an additional crane. The improvement is to be completed Nov. 1, when the force of molders will be increased from 20 to 40.

R. Steinert & Co., Washburn, Wis., have reopened their machine shop and will engage in general machinery and repair work, etc.

Klug & Smith, consulting engineers, Mack Block, Milwaukee, are preparing plans for a shop addition for the Ladish-Obenberger Drop Forge Company, Cudahy, Wis., of brick and steel, 50 x 200 ft., one story. Bids will be taken about Oct. 23.

The American Brass Company, Kenosha, Wis., has awarded all contracts for the erection of the first two units of its extensive enlargement scheme, which are an office building, 48 x 100 ft., and a private garage and repair shop, 30 x 120 ft.

The Simmons Company, Kenosha, Wis., manufacturer of metal beds and springs, has purchased from the Allis-Chalmers Mfg. Company, Milwaukee, the property formerly used as its Chicago factory. The building is 264 x 538 ft., four stories and basement, and is located at Wabash Avenue and West Twelfth Street, Chicago. For the present it will be used as a wire and general storage warehouse by the Simmons Company . The transaction, it is said, involved $213,000.

Fay L. Cusick, West Allis, Wis., will erect a repair shop, 30 x 60 ft., for automobile service work.

The Great Northern Railway has announced plans for enlarging its shops at Superior, Wis., to three times the present size and capacity. The ore dock at Allouez will be rebuilt at a cost estimated at $1,000,000.

Articles of incorporation have been filed by the Crown Gas & Electric Fixture Company, Milwaukee. The capital stock is $20,000, and the incorporators are Emil Dietz, Frank A. Lofy and Joseph J. Arnheim.

The Heil Company, Twenty-sixth and Montana Avenues, Milwaukee, is establishing an automobile gas tank and sheet-metal specialty department in connection with its structural steel and iron and boiler business. The new department will be in charge of William H. Gaulke, formerly secretary of the American Brewers' & Bottlers' Specialty Company, Milwaukee.

The Organ Blower Engineering Company, Fond du Lac, Wis., has moved from leased factory quarters to its new machine shop at 19-23 East McWilliams Street, which provides double the former space. Harry Fagan is general manager.

Mayer Brothers, Antigo, Wis., founders and machinists, have increased their force of molders to insure speedy production of a rush order for 200 sets of automatic car pockets for the Langlade Lumber Company, Antigo.

The Downey Automatic Pin Setter Company has been organized at Milwaukee by Richard F. Downey, I. M. Lederer and H. D. Townley to manufacture machines and appliances for bowling alleys. The authorized capital stock is $25,000.

Cincinnati

CINCINNATI, OHIO, Oct. 16, 1916.

The demand for boring and turning mills from rubber tire manufacturers is very heavy and it is difficult to make deliveries on time. A call for this class of machines comes from other sources also. The export trade in machine tools has slackened a little lately, but in view of previous large contracts this was to be expected. The larger sized lathes are hard to get for prompt shipment. Additional orders for war munitions received at Dayton, Ohio, have brought out inquiries for all kinds of machinery. In many cases manufacturers complain that they are unable to get supplies and this causes many delays in making shipments of finished machines.

The foundry business is increasing. Second-hand machinery dealers are also doing a good business. No labor troubles are noted in this immediate vicinity, and while a strike is still on at Dayton the number of men out is so small that little inconvenience is caused.

The Champion Tool Works Company, Cincinnati, H. W. Kreuzburg, president, has acquired a site on Spring Grove Avenue, in Winton Place, and will soon have plans prepared for a plant, approximately 150 x 300 ft., of sawtooth roof construction. It is too early to obtain equipment details.

The Carlton Machine Tool Company, Cincinnati, is reported to be contemplating an addition to its plant in West End, or building an entirely new plant on Spring Grove Avenue.

The Charles Boldt Glass Company, Cincinnati, has secured a five-acre site in Redbank, a suburb, and will soon have plans ready for a large plant. It will move its corrugated paper goods department to the new plant when completed.

The Triumph Mfg. Company, Cincinnati, will construct an addition to its plant to be used almost entirely for warehouse purposes.

Work is progressing rapidly on the concrete addition to the plant of the Huenefeld Company, on Spring Grove Avenue, which is expected to be ready for the installation of the necessary sheet metal machinery before the end of the present year.

The Simplex Machine Tool Company, Hamilton, Ohio, a subsidiary of the Cleveland Machinery & Supply Company, Cleveland, Ohio, will erect an addition to its plant estimated to cost $7,500. Cullen & Vaughn, Hamilton, are the builders.

The Jones Heel Mfg. Company, Dayton, Ohio, has increased its capital stock from $75,000 to $150,000 and has let contract for a new concrete and steel factory that will have 30,000 sq. ft. of floor space. Work will begin at an early date.

The Dayton Rubber Mfg. Company, Dayton, Ohio, has recently received a contract for tires that will total nearly $1,000,000. An extensive addition to its plant is planned.

It is reported that the Davis Sewing Machine Company, Dayton, Ohio, has received an additional order for war munitions and is adding to its shop equipment.

The Kelly-Springfield Motor Truck Company, Springfield, Ohio, has increased its capital stock from $1,740,000 to $7,000,000. Additions to its plant are planned that will nearly double the capacity.

The Buckeye Incubator Company, Springfield, Ohio, recently increased its capital stock from $125,000 to $250,000, and will add to its manufacturing facilities.

The Washington Breweries Company, Columbus, Ohio, intends to install automatic stokers in its boiler room.

The Babcock-Gallagher Company, Columbus, Ohio, has

been incorporated with $5,000 capital stock to manufacture auto parts. Nothing is known as to equipment needs. Vincent L. Gallagher is the principal incorporator.

The Ohio Wax Paper Company, Columbus, Ohio, contemplates an addition to its plant at an early date.

It is reported that the Standard Stamping Company, Marysville, Ohio, has made plans to remove its plant to Huntington, W. Va., where its capacity will be greatly increased.

The Ross Supply Company, Greenville, Ohio, is contemplating extensive foundry additions for which practically all of the equipment has been purchased.

The Central South

LOUISVILLE, KY., Oct. 16, 1916.

The car shortage and delayed shipments are giving local manufacturers a heavier increase of inquiries than has been noted for some time. Cement manufacturers complain that difficulties in obtaining reinforcing steel and high prices are holding back numbers of large building projects. Numerous sales of electrical motors, of all sizes, have been a feature of the week in Louisville, with the demand from all lines of power-using concerns. The coal shortage, which is threatening to become more acute, is stimulating the demand for this type of power, especially in the centers where electricity is cheap and reliable.

E. S. Tachau and J. B. Wilson., Louisville, Ky., and Joe Frankel, R. M. Smith and others, Lagrange, Ky., are organizing a company, capitalized at $60,000, to establish a light, power, water and ice utility at Lagrange.

G. L. Alford and Price Royalty, Salvisa, Ky., are building and equipping a garage, 36 x 70 ft., and will equip a repair shop to cost about $4,000.

The Aller. Motor Car Company, Memphis, Tenn., has been incorporated with capital stock of $5,000, by L. S. Carso, Jesse Edgington, H. J. Homes, R. M. Bennett and D. B. Edgington, and will equip a garage.

The International Harvester Company, Chicago, Ill., has applied for a permit to lay a railroad switch at Nashville, Tenn., and proposes to erect a branch plant there at a cost of $20,000.

Birmingham

BIRMINGHAM, ALA., Oct. 16, 1916.

The machinery houses are doing a brisk business with the prospect of a trade limited only by ability to secure apparatus from manufacturers. Machine tools are apparently as hard to get as ever. The demand for hydroelectric pumping machinery is especially good, owing to large development of graphite mining in Clay County, Ala. The general demand is excellent. No complaint is found in any quarter except of delay in getting equipment.

The Alabama Power Company, Birmingham, Ala., will enlarge its steam power plant at Huntsville, Ala., by adding a 1000-hp. turbine engine, and will also establish a small pumping station.

The United States Cast Iron Pipe & Foundry Company, Birmingham, Ala., will immediately rebuild that portion of its plant at Bessemer, recently burned.

The Satterfield Barytes Company, Cartersville, Ga., will develop additional barytes mines with a daily capacity of 250 tons.

The Clement Veneer & Lumber Company, Pamlico, N. C., has been incorporated with a capital stock of $50,000 by W. L. Clement, Greensboro, and Henry Dargan, Florence, N. C.

Texas

AUSTIN, TEX., Oct. 14, 1916.

The Brush Electric Company, Galveston, plans to install a 500-kw. rotary converter and soot blowers in its electric light plant.

It is announced by Col. H. L. Rogers, chief quartermaster, Department of the South, United States Army, at Fort Sam Houston, Tex., that machine shops for the repairing and overhauling of army motor vehicles will be built there and at Fort Bliss. The improvements will cost about $60,000.

The Board of Trade, Orange, is promoting the organization of a company to build a shipbuilding and repairing plant there to cost about $150,000.

The Whaley, Nichols & Scott Mfg. Company, Gainesville, recently incorporated with a capital stock of $100,000, will build a plant there for manufacturing a patent end-gate and rods for farm wagons. R. E. Brooks, Houston, president of the Producers Oil Company, is one of the stockholders.

The Thomas Mfg. Company, Streator, Ill., manufacturer of a gasoline-saving attachment for automobiles, has been investigating the situation at Wichita Falls with a view of building a branch factory there.

St. Louis

ST. LOUIS, MO., Oct. 16, 1916.

The machine-tool business continues active without special feature. Dealers are principally concerned with volume, the sources of demand being very general and in sufficient quantity to make up satisfactory aggregates. No second-hand tools are appearing in the market and it is evident that all available equipment is being utilized.

The Way-Cleanse Company, St. Louis, has been incorporated with a capital of $20,000 by Abbott E. Smith, Sandusky, Ohio, and W. L. Sturdevant, St. Louis, and others to manufacture pneumatic equipment for cleaning smooth surfaced streets.

The Hoffman Heating Company, St. Louis, has been incorporated with a capital stock of $12,000 by John Grass, Fred Schaaf and Fred E. Harris to manufacture heating apparatus.

The Automatic Table & Mfg. Company, St. Louis, has been incorporated with a capital stock of $12,000 by M. A. Meissner, L. J. Brucker and E. W. Meaney to manufacture tables, refrigerators, etc.

The municipal dock contract to be let by the Board of Public Service at about $187,250 will involve a considerable amount of freight handling equipment and elevators. The Heman Construction Company is low bidder.

J. V. Nevin and others of St. Louis have plans for the equipment of a chemical plant involving an investment of $100,000, which may be increased to $5,000,000 capital.

The Dehlebdon Stove & Heating Company, Kansas City, Mo., has been incorporated with a capital stock of $15,000 by James Dehlebdon, William H. Winslow, E. S. Tucker and others to manufacture oil burners, etc.

The King Motors Company, Kansas City, Mo., has been incorporated with a capital stock of $50,000 by Douglas Andrews, H. P. Berham and A. H. Robinson and will equip a garage and machine shop.

The Kansas City Chandelier Company, Kansas City, Mo., has been incorporated with a capital stock of $12,000 by Albert Jacobson, Jacob Lebrecht and Irvin Jacobson to manufacture electric and gas fixtures.

The Sinclair Oil & Refining Company, Tulsa, Okla., will equip an oil refinery at Kansas City, Mo., with a daily capacity of 10,000 bbl., to cost $1,000,000.

The Maxwell Motor Company will build an assembling plant at Kansas City, Mo., to cost with equipment about $500,000.

The Van Buren Compress Company, Van Buren, Ark., will expend about $15,000 for new equipment.

Sewer District No. 1, Walnut Ridge, Ark., will equip a sewer system, waterworks, etc., requiring a sewage pumping station and other equipment. Two 300-gal. per min. motor-driven triplex pumps, one 50-hp. oil engine, electric generators, etc., will be required for the waterworks. Hiram Phillips, St. Louis, is the engineer.

The cotton gin of Littleton Brothers, Newport, Ark., has been burned with a loss of $15,000.

Mountain View, Okla., has voted $8,000 for electric light plant machinery to be bought under the direction of the mayor.

The Rau Oil & Gas Company, Ardmore, Okla., has been incorporated with a capital stock of $500,000 by Joseph Williford and George N. Otey, Ardmore, Okla., and Max Rau, Los Angeles, Cal. Plans are not yet formulated.

The Catoosa Gas & Gasoline Company, Oklahoma City, Okla., is receiving bids for gas pumping machinery, etc. R. H. Locke, Oklahoma City, Okla., is the engineer.

The Continental Refining Company, Bristow, Okla., has increased its capital stock from $75,000 to $1,300,000 and will increase its operations, adding new plants.

The Blue River Power Company, William Lucas president, Tishomingo, Okla., will construct a hydroelectric plant for which it is preparing plans.

The Sinclair-Cudahy Pipe Line Company, Tulsa, Okla., is receiving bids for its proposed pipe line to Chicago and the necessary equipment, estimated to cost $10,000,000.

Tulsa, Okla., will install sewage disposal equipment. A low-pressure service unit will also be installed at the waterworks pumping station. H. H. Wyss is city engineer.

Potts Camp, Miss., will equip a pumping unit requiring

one 175-gal. per min. triplex pump, one 12-hp. kerosene engine, tank, gate valves, etc. J. A. Potts is mayor.

W. A. Turner's gin and sawmill at Minden, La., which has been burned with a loss of $16,000, will be replaced.

Bogalusa, La., has voted $250,000 bonds for waterworks, sewage disposal plant, etc.

The Pacific Northwest

PORTLAND, ORE., Oct. 10, 1916.

Activity is noted in metal-working equipment, but deliveries continue to lag. Good standard second-hand tools are in especially strong demand by small shops that do not yet feel warranted in buying new machinery at present prices. Among larger manufacturers the present activity has created more interest than ever in special tools and labor-saving devices. The outlook for railroad business is improving. While the approach of winter is retarding outside work in some quarters, a demand for construction equipment continues and the implement trade is especially active. Plans are being developed for many additions to fish and fruit-canning equipment for the next season. Export business continues quite active.

The car shortage in western Washington and western Oregon has restricted transcontinental shipments of lumber, decreased mill production, and as a result has steadied a market which showed serious signs of unhealthy fluctuation. Lumber exports in September amounted to 30,220,798 ft.

The Entente Allies are again in the market for aeroplane stock after having practically quit buying for several months. Statistics show that shipments of spruce for aeroplane purposes in September amounted to 2,353,355 ft., valued at $125,243. This is the heaviest for any one month.

The longshoremen's strike in Seattle that has been in force for four months and has crippled the shipping business there, has been peaceably adjusted. This will mean much to shippers in all lines.

Plans have been completed by Villadsen Brothers, Inc., for new machine shops and a warehouse for the Galigher Machinery Company, Salt Lake City, Utah, to cost about $100,000. A machine and boiler shop, 60 x 330 ft., and an office building, are included in the plans.

The Pacific Chemical Company, represented by J. C. Moore, a New York engineer, is preparing to build an experimental plant to handle chemicals in lakes near Lakeview, Ore.

A. Hironimous is building an addition to his machine shop at Freewater, Ore.

The Huffschmidt & Dugan Iron Works, Bend, Ore., is planning to build a new structural and machine shop.

The Columbia Engineering Works, Portland, is preparing to put up another set of ways for new ship construction at its plant at Linnton.

The H. S. Jeffery Machinery Company, Seattle, has been organized with a capital of $10,000 by H. S. and N. A. Jeffery and J. H. Ballinger.

The Boise Cold Storage Company, Nampa, Idaho, is receiving bids for a new plant of reinforced steel and concrete which will increase the capacity 50 per cent.

John W. Palmer, Hood River, Ore., has purchased from the United States Forestry Department 330,000,000 ft. of timber in the Oregon National Forest near Hood River. The West Fork Lumber Company is in process of incorporation by J. F. Palmer, Henry Carstens and others. A mill with daily capacity of 200,000 ft. will be constructed immediately.

Construction work has been started on the Olympia Shipbuilding Company's plant at Olympia, Wash., which is expected to be in full operation in about two months.

The plant of the Markham Shingle Company, Aberdeen, Wash., was recently destroyed by fire with a loss of $25,000. Alfred Peaulieu is manager.

The plant of the Riverside Brass & Metal Works, Great Falls, Mont., was recently destroyed by fire with a loss of about $10,000. Plans for rebuilding are in preparation by Andrew McLain and Charles Small, owners.

The Palace Meat Company, Great Falls, Mont., states that construction work will begin immediately on its proposed packing plant to cost $20,000.

The Washington Shipping Corporation, Seattle, announces that work will begin in November on its first vessel, and has plans by which one will be launched about every 30 days throughout the winter. The company has several auxiliary power wooden hull schooners nearing completion at its Harbor Island plant.

The plant of the Jeldness & Perry Sawmill Company, Halfway, Ore., was destroyed recently by fire with a loss of $20,000. It is stated the plant will be rebuilt.

The Twohy Brothers Company, Portland, Ore., plans increased activity at its carbuilding plant, where a contract approximating $64,000 will probably be filled for construction of standard all-steel cars for the Copper River & Northwestern Railway Company.

The Crane Company, Chicago, Ill., manufacturer of plumbers' and steamfitters' supplies, plans improvement to its Spokane distributing plant, to cost $20,000, and an additional $5,000 for new equipment.

Canada

TORONTO, Oct. 14, 1916.

Munition orders placed in Canada since the outbreak of the war amount to $550,000,000. An order to the value of $60,000,000 has just been received and contracts to that amount are to be placed among Canadian plants. Since the first of the year orders have been placed amounting to $185,000,000. These figures were given out by the Imperial Munitions Board, Ottawa. In July and August the output from Canadian industries was interrupted by the difficulty in procuring steel and forgings. The board now states that, due to the efforts put forth by manufacturers, the output on most contracts is more satisfactory and increasing in volume each week. Large orders were placed last spring and summer on the larger sizes of shells, especially 8-in. and 9.2-in. shells. This involved complete new installation of machinery and equipment. Deliveries of the equipment were slow, but many of these plants have now started operating, and the output of larger-sized shells is increasing each week, and will continue to increase until about Jan. 1, when the maximum output of these plants should be reached. The personnel of the Imperial Munitions Board is as follows: J. W. Flavelle, chairman; Brig. Gen. Sir Alexander Bertram, vice-chairman; C. B. Gordon, vice-chairman; Col. D. Carnegie, Hon. R. H. Brand, F. Perry, J. A. Vallancourt, E. R. Wood and G. H. Dawson.

The Hamilton Steel Wheel Company has purchased a site and will erect a plant costing $200,000 for making steel wheels, formerly imported from Germany and the United States. This industry will give employment to about 200 men and will turn out about 75 tons of steel wheels per day. C. W. Sherman of the Dominion Steel Foundry Company will be managing director of the new industry.

It is reported from Ottawa that Canada is to go in for the manufacture of aeroplanes. The factory will be established under the direction of the Imperial Munitions Board. The British Government has assured orders which will take care of the output while the war lasts. The plant is to be located in the vicinity of Toronto.

John Inglis & Co., 14 Strachan Avenue, Toronto, have been granted a permit for the erection of an addition to their forge shop at a cost of $7,000.

The Doon Fiber Company, whose plant at Doon, Ont., was recently destroyed by fire, has purchased the old Grundy stove foundry building at Wellington and Walter streets, Guelph, and will start to install machinery. The company has also purchased about ½ acre adjoining the building for plant extensions.

The Canada Metal Company, 29 Fraser Avenue, Toronto, has been granted a permit for the erection of a brick and steel factory to cost $20,000.

Fire completely destroyed the boiler room at the McAlpine Tobacco Company's plant, 2 McAlpine Avenue, Toronto. It will be reconstructed.

The ratepayers of Port Hope, Ont., passed a by-law exempting the Port Hope Sanitary Mfg. Company from taxes for 10 years. The company will establish a plant there for the manufacture of bath tubs, etc. L. M. Wood, Toronto, is president.

Fire caused $30,000 damage at the plant of the Petrolea Wagon Works, Petrolea, Ont., Oct. 8. Wheel stock was destroyed.

The John Bertram & Sons Company, Ltd., Dundas, Ont., has let the contract for the erection of a pattern shop.

The contract for the erection of an addition to the Ford Motor Company's plant at Ford City, Ont., of reinforced concrete and brick, has been awarded. It is to cost $100,000.

Contracts have been awarded for the erection of a galvanizing plant at London, Ont., for the McClary Mfg. Company, to cost $30,000.

The general contract for the erection of an addition to the machine shop of the Buffalo Forge Company, Kitchener, Ont., has been awarded. It will be of brick construction and will cost $100,000.

The American-La France Fire Engine Company, Ltd., Weston Road, Toronto, has begun the erection of an addition to its plant to cost $6,000.

A. D. Gorrie & Co., Ltd., Toronto, has been incorporated with a capital stock of $40,000 by Arthur D. Gorrie, 76 Delisle Street, and others to manufacture motor cars, etc.

The Colleran Spring Bed Company, Ltd., Toronto, has been incorporated with a capital stock of $40,000 by Thomas W. Colleran, 57 Hayter Street, and others.

F. Bull, Collingwood, Ont., will erect a garage to cost $10,000.

The Haynes Motor Company, Albert Street, Ottawa, will build a factory at a cost of $40,000.

The Beach Motor Company, Ottawa, will build a garage at a cost of $30,000.

A repair shop is to be erected at Ottawa for the Ottawa Car Company to cost $10.000.

Blackmore Brothers, Rainy River, Ont., will build a machine shop at a cost of $15,000.

L. Imbleau & Sons are making preparations for the erection of a machine shop and foundry at Renfrew, Ont., to cost $4,000.

The Hamilton Gear & Machine Company, Van Horne Street, Toronto, will build an addition to its plant to cost $5,000.

J. C. Wilson & Co., Glenora, Ont., have let the contract for the erection of a machine shop at Belleville, Ont., to cost $15,000.

The Walker Automobile Supply Company, Ltd., Hamilton, has been incorporated with a capital stock of $40,000 by Frederick J. Walker and others to manufacture automobiles, etc.

The T. W. Capp Company, Ltd., Toronto, has been incorporated with a capital stock of $40,000 by Samuel King, 15 Wellington Street East, and others to manufacture clocks, etc.

Ralph Simpsin will erect a shingle factory at Arrowhead, B. C., and will install three machines.

The Pacific Great Eastern Railway Company will erect machine shops, repair shops and roundhouses at Vancouver, B. C., to cost $150,000.

The National Carbon Company, Toronto, has let a contract for the erection of a factory.

Wells Brothers of Canada, Galt, Ont., manufacturers of taps and dies, will build an addition to their plant to cost $2,000.

The Percival Plow & Stove Company, Ltd., Merrickville, Ont., advises that its plant was not completely destroyed by fire as reported. The only loss suffered was one of the outbuildings which contained some obsolete stove patterns. The plant is now running at its full capacity and the fire in no way interfered with production.

Government Purchases

WASHINGTON, D. C., Oct. 16, 1916.

Sealed proposals will be received by the Purchasing Agent of the Alaska Engineering Commission, Seattle, Wash., until Oct. 25, under circular 226, for furnishing one 40-ton shop crane.

Bids were received at the Bureau of Supplies and Accounts, Navy Department, Washington, Oct. 10, for supplies for the naval service as follows:

Schedule 160, Steam Engineering

Class 191, various deliveries—Sixteen lathes—Bid 3, $28,882.80, $31,962.08 and $29,166.58; 43, $13,978.72; 61, $5,136, item 1 E; 68, $19,436; 76, $20,250; 83, $29,492; 91, $35,025; 128, $16,600; 137, $29,120.

Alternate—F. o. b. works—Four lathes—Bid 3, $1,780; 43, $873.67; 63, $1,495; 68, $1,188; 91, $2,160; 128, $958.50; 137, $1,820.

Schedule 162, Ordnance

Class 205, Charleston—One banding press—Bid 125, $1,567; 137, $1,285 and $1,200.

Schedule 164, Ordnance

Class 207, Washington—One gantry crane and transfer truck—Bid 127, $39,800.

Schedule 165, Ordnance

Class 208, Washington—One internal grinder—Bid 74, $960.

The names of the bidders and the numbers under which they are designated in the above list are as follows:

Bid 3, name missing; 43, Federal Sales & Service Company; 45, Federal Huber Company; 61, Harron, Rickard & McCone; 63, Hallidie Machinery Company; 68, Kemp Machinery Company; 74, Landis Tool Company; 76, Lehmann Machine Company; 83, Manning, Maxwell & Moore, Inc.; 91, Niles-Bement-Pond Company; 109, A. B. Sands & Son Company; 125, Watson-Stillman Company; 127, Wellman-Seaver-Morgan Company; 128, Ward & Co.; 137, D. Nast Machine Company.

NEW TRADE PUBLICATIONS

Hand Squeezer Molding Machine.—H. W. Cooper Saddlery Hardware Mfg. Company, Moline, Ill. Circular. Concerned with a hand squeezer type of molding machine consisting of a steel beam set in the ground and acting as a support for the squeezer head and the molder's bench. One of the special features of the machine, which was illustrated in THE IRON AGE, April 6, 1916, is that the squeezer head may be swung out of the way. A brief description of the machine supplemented by two engravings is given.

Punches and Dies.—Cleveland Punch & Shear Works Company, Cleveland, Ohio. Calendar. Size, 7 x 10 in. Each leaf of the calendar, which runs from Oct. 2, 1916, to March 31, 1917, contains the business days of a week and engravings of various punches and dies which the company is prepared to supply. The back of the leaf contains a specification sheet showing the standard punches and dies carried in stock, together with an order blank for the standard punches and dies and diagrams for special ones.

Water Purification.—American Steel & Wire Company, 208 South La Salle Street, Chicago, Ill. Booklet. Size, 6 x 9 in.; pages, 152. Presents briefly the essential features of the company's process of water purification using sulphate of iron. Diagrams and engravings of plants employing the process are presented, together with a number of tables of useful information. A comprehensive index of 18 pages is included and renders the finding of any subject covered an easy matter.

Pocket Carbon Dioxide Indicator.—Bacharach Industrial Instrument Company, Pittsburgh, Pa. Bulletin No. 4. Gives instructions for determining the amount of carbon dioxide in flue gases by the use of potassium hydroxide. A number of engravings of the instrument in use showing the various stages in the process of making the determination supplement the text description of the apparatus. The advantages of using the apparatus from the standpoints of simplicity and accuracy are touched upon and the advisability of making these determinations is pointed out.

Electric Hoists.—Economy Engineering Company, Willoughby, Ohio. Circular. Describes a line of electric hoists that are made in capacities of from 1000 to 10,000 lb. One of the features upon which special emphasis is laid is that the hoist is totally inclosed, thus making it adaptable for outside service in places where there are dust and acid fumes in the air. Each of the different portions of the hoist is described at some length and an engraving of the complete hoist is presented. An illustrated description of the hoist appeared in THE IRON AGE, April 6, 1916.

Molding Machines.—Mumford Molding Machine Company, Chicago, Ill., Vulcan Engineering Sales Company, 2059 Elston Avenue, Chicago, Ill., sales agent. Pamphlet. Relates to a line of molding machines which includes high and low trunnion squeezing, jolt ramming and pattern drawing machines. Illustrations and brief descriptions of the several machines are given with special emphasis upon the high trunnion squeezer type. A number of engravings of the machines in use are included and mention is made of a pneumatic vibrator.

Gages.—Swedish Gage Company, Inc., 22 West Sixty-first Street, New York City. Catalog. Explains the advantages of the Johansson gaging system in the saving of time, the insuring of greater accuracy and the prevention of mistakes and waste. The various arrangements of gages which consist of steel blocks of various sizes are shown, and mention is made of the accessories used, such as standard plugs and holders. Instructions on the use of these gages in building up odd combinations and a partial list of users of the system grouped alphabetically by products are presented. A number of illustrations showing appliances of the gages are included. Some space is also given to other forms of gages, such as limit snap and plug and tolerance plug styles.

Tool Holder for Lathes.—McCrosky Reamer Company, Meadville, Pa. Folder. Presents illustrations and a brief description of a turret tool holder for lathes, which was illustrated in THE IRON AGE, April 6, 1916. The turret is made for outside work to accommodate either three or four tools and in another form for inside work, such as drilling, boring, reaming, etc., with five holes. Tables of the various sizes of each kind of holder that can be supplied are included.

Electric Hoists.—Franklin Moore Company, Winsted, Conn. Pamphlet. Describes and illustrates an electric hoist for continuous service. The construction of the hoist, which was illustrated in THE IRON AGE, April 13, 1916, is gone into at some length and the illustrations include an exterior view and a sectional elevation, the latter supplementing the text description.

THE IRON AGE

New York, October 26, 1916

ESTABLISHED 1855 VOL. 98 : No. 17

Advertising a Factory to the Employee

How Folders Are Used in Pay Envelopes of the Cleveland Hardware Company to Emphasize Attractiveness of Working Conditions

BY F. L. PRENTISS

Believing that the press agent is fully as important for the manufacturing plant as for a place of amusement, a system of publicity, the function of which is not to advertise its products to the trade but to advertise the plant itself to its employees and prospective employees, was placed in operation a few months ago by the Cleveland Hardware Company in connection with its welfare department. This publicity is obtained through the form of attractive illustrated pay-roll folders containing interesting information about various features of the plant. The folders are designed to improve the welfare and working conditions of the men, and contain health hints, safety advice, talks on the evil effects of liquor and other matters of interest to employees.

The theory back of the publicity scheme is briefly as follows: The company in the operation of its plant requires a certain number of workmen and has created a certain number of jobs. If it were operating a retail store it would advertise its wares and they would be purchased by people desiring them. Instead of advertising its goods for sale at retail, as it would do were it a merchandising company, it has places to be filled, and it follows the publicity method to present its wares in their most attractive form to the workmen, the wares in this case being positions instead of merchandise. This form of publicity is of particular interest at the present time when the demand for labor exceeds the supply and good workmen are particularly scarce. Under these conditions the best managed plant cannot hope to keep all of its good men, but strives to reduce to as low a percentage as possible the number of efficient employees who quit because of offers of higher wages elsewhere or for other reasons, and to add to its ranks other good workmen.

While the pay-roll folders do not go directly to the men not in the company's employ, they are designed to bring before the employees things about the plant that the company thinks the men should know, so that the men will feel it is a good place to work in and they will be less inclined to leave. The company believes that if the men instead of going no deeper into the subject than to know that they are earning so much a day at such a plant come to think that the plant is a very good one to work in and a better one than almost anywhere else because of working conditions and shop convenience, not only will they be more content and less likely to leave to work elsewhere, but they will advertise the fact among their outside acquaintances that the plant is a first-class one. Many of the latter will seek employment in the plant where working conditions are good. An advantage of this form of shop publicity is apparent from the fact that

The Information That Two Different Folders Conveyed to Employees

This advertises the company's mutual benefit insurance association:

When you take a job, you should consider the things offered which are something more than wages.

Among the many things this company has to offer is membership in the Employees' Benefit Association.

One of the best and safest insurance societies in the country.

Workers here get for 25 cents what would cost them one dollar from a regular insurance company.

Nearly Fifty Thousand Dollars paid to members in the last fifteen years.

A careful man will think twice before losing membership in this society.

This was added to the announcement of the sale of 20,000 bottles of milk by the company's stores in one month:

Be careful what you drink during the hot weather.

While hot weather is uncomfortable, it is not unhealthy. This is proved by the fact that we practically never have cases of heat prostration, and in nine cases out of ten, when workers are affected it is on account of something wrong with the stomach.

A bottle of good milk is cheaper and much more healthful than a whole pail of beer.

Take good care of your body and it will take care of you.

conditions may be equally good in another shop that does not advertise itself to its men in this way, but the men in the other shop may not appreciate what is being done for them because it is not brought to their attention in printed form.

A folder entitled "An Eight-Hour Day" reads as follows:

The workers of The Cleveland Hardware Company have the benefit of the eight-hour day. The question is —

Is it a benefit?

The ideal is, eight hours each of WORK, RECREATION and HEALTHFUL SLEEP.

Do your hours of recreation bring you money returns? Recreation may be a benefit or a detriment according to its application.

Some of our workers recreate by gardening farming, keeping stores, and other things which bring in money.

What about you?

A pay-roll folder is placed in each of the pay envelopes every week. The folders are neatly printed on thick paper and on the cover page is a few words in large type indicating the contents. One inner page usually has an illustration of some part of the plant of special interest to the men, such as the hospital, roof garden or an illustration showing the right way to do something in order to avoid accidents. On the opposite page there is timely advice to workmen in simple language about the care of the body, the avoidance of accidents and on various other pertinent topics. On the back cover page is the following, printed in nine languages besides English:

"Take this home and have some one read it for you if you cannot read it yourself."

That the folders are taken home and read is indicated by the fact that very few of them are

One folder bearing the caption "It's Hot and We Have Hot Jobs" was got out in the hot summer months and reads as follows:

A good sweat does more to get the poison out of our systems than anything else. Lots of rich men pay a dollar and more to take a Turkish bath, and it is nothing more than taking a good sweat.

This is the most healthy time to work in the forge shop. It opens the pores, lets out the poisons, and there is no cold draft which brings bad results.

A good sweat, lots of exercise, then a bath and good rest, is the best medicine. When you take medicine, take it regularly.

Eight hours work at the C. H. Co. every day, then a good swim in Lake Erie and a few hours' rest in the parks. Spend some money for a tent to sleep out in your yard, and you will never need a doctor.

thrown away in the shop. While a good many employees have left its employ to take other jobs since the plan has been in operation, the company feels that results have so far been satisfactory, and especially in view of the fact that its force of employees has been increased from about 1500 to 3000 since the plan was inaugurated.

While the company's publicity through its folders is designed to raise the standard of its employees by securing and keeping the best quality of labor and teaching the men right living so that their efficiency will not be impaired, it is not expected that this plan will directly speed up production by arousing the men to do their best. Most of the men are employed on piece work, and in the opinion of the company the increase in earnings offered as a reward for increased output under the piece-work system is not sufficient an incentive to spur a man to his maximum efforts. Other means are resorted to to get this increased production. The one of these that is regarded as the most efficient is the one that appeals to the man's sporting instinct to excel his fellows. Putting this theory in practical operation, various units either small or large are often pitted against each other. It may be one machine against another machine, a night turn against a day turn, one department against another department or the company's No. 1 plant against its No. 2 plant. Again information may come in that a

One folder that relates to the nurse reads as follows:

The workman cannot earn good wages unless he has a strong, healthy body.

The workman cannot earn good wages unless his home conditions are good—unless his mind is at rest concerning those whom he loves.

The Cleveland Hardware Company wants its workmen to earn the highest wages possible. There is nothing gained by having workmen who cannot earn good money.

The Cleveland Hardware Company has employed a trained nurse, who will give advice and attention, not only to the employees, but to their families, if they will but let us know their need.

Consult the nurse, if only for the slightest ailment

competitor turned out a certain amount of forgings in a stated period, and both plants of the company will join hands in an effort to make a larger production record than their competitor.

Iron Ore Deposits of Firmeza District

The iron ore deposits of the Firmeza district, Cuba, are described in a paper to be presented at a meeting of the American Institute of Mining Engineers in February, 1917, by Max Roesler, Santiago de Cuba, from which the following information is abstracted:

The ore bodies of the district form a belt of deposits extending from Sigua, 25 miles east of Santiago, to Sevilla, 5 miles east of the same city. They lie on the eastward slope of the Sierra Maestra Mountains and the elevation of the mines is from 400 to 1000 ft. above sea level. Immediately east of the Firmeza district is the Daiquiri district of the Spanish-American Iron Company.

The ore in the Firmeza district is a mixture, in varying proportions, of magnetite and hematite. It is remarkably pure and contains little foreign matter. The following analysis is given:

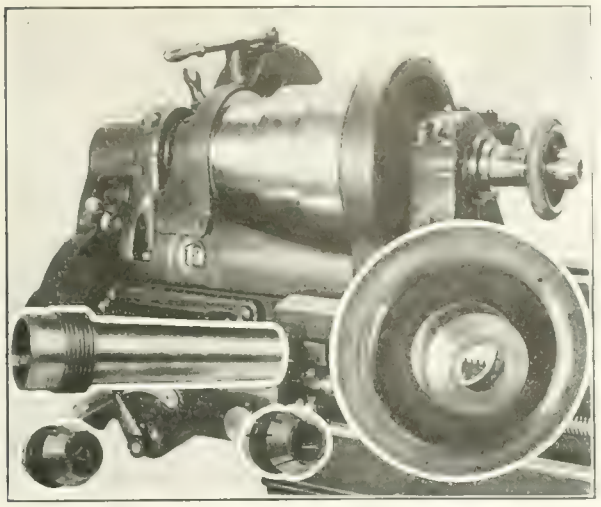
	Per Cent
Moisture (in part hygroscopic)	0.24 - 0.81
Silica and insoluble	5.00 -10.50
Phosphorus	0.009- 0.0065
[illegible]	0.045- 0.248
Iron	61.00 -68.50

The low phosphorus and the absence of appreciable amounts of titanium, Mr. Roesler emphasizes, make the ore valuable for the manufacture of high-grade steel.

In shape the deposits are extremely irregular. All bodies have the common feature of a much greater extension in two dimensions than in the third dimension. They resemble a series of scattered lenses of irregular outline, that lie in every conceivable position. The size of the deposits ranges from pockets containing a few tons to lenses whose larger diameters are some hundreds of feet long and which are from 10 to 50 ft. thick.

Draw-in Collet Chuck for Engine Lathes

As a substitute for the customary draw-in collet chuck made for engine lathes, the Globe Engineering Company, Cincinnati, Ohio, has placed an improved type on the market. This chuck is designed to take the place



A New Draw-In Collet Chuck for Engine Lathes Which Is Opened and Closed by a Knurled Handwheel

of the spindle center and in addition is tightened or released at the nose of the spindle. In this way the operator does not have to leave his regular position and go to the rear of the lathe, which fact, of course, effects a saving in time. A knurled handwheel is the means employed for opening and closing the chuck.

The chuck body and the nose piece are made of heat-treated steel finished by hardening and grinding. The chuck has a No. 3 Morse taper center for small lathes and on tools where the swing ranges from 16 to 20 in. a No. 4 taper is furnished. Oil tempered tool steel is used for the collet, which is split back for about three-quarters of the distance from both ends. A grip on the stock extending the full length of the collet is secured when it is tightened by the handwheel.

The following table gives the principal dimensions and specifications of the chuck, which is made in two sizes:

Number of chuck	0	1
Morse taper of shank	No. 3	No. 4
Capacity in round stock, in.	⅝	¾
Capacity in hexagon stock, in.	½	⅝
Capacity in square stock, in.	7/16	9/16
Diameter of handwheel, in.	5	6
Projects beyond lathe spindle, in.	2¼	2½

To attach the chuck to the lathe the spindle center is removed and the taper end of the chuck pushed into place. The nose piece on which the handwheel is mounted is next removed, and the collet inserted in the opening in the chuck body. After this the nose piece is screwed back in place and the chuck is ready for use.

Swedish Electric Furnace Pig Iron

Considerably over 100,000 tons of iron is produced annually in Swedish electric reduction furnaces, J. O. Boving states in the London *Iron and Coal Trades Review*. The process has now been developed so that molten pig is delivered direct to the open-hearth furnaces which are heated by gases from the reduction furnaces. The liquid charge from the open-hearth furnaces is transferred to an electric refining furnace. The final steel is reported to be of remarkably high quality. Mr. Boving says this is plainly the right method where electric current can be obtained at a reasonable price.

Robert W. Hunt & Co., Chicago, announce that the November issue of their *Employees' Bulletin* will be devoted to rail inspection and will contain several articles of general interest along that line. Those desiring copies may obtain them upon request.

A New Tote Box of the Stacking Type

An improved tote box designed for stacking has been placed on the market by the New Britain Machine Company, New Britain, Conn. As compared with the earlier box of the same company, which was illustrated in THE IRON AGE, April 13, 1916, the sides and ends of the box only slope out slightly. This is designed to support the box above without permitting the latter to interfere with the contents of the lower box. In the earlier box the ends and sides were bent out at a considerable angle, so that the boxes would nest quite closely. Other changes in design include the use of half-round runners on the bottom of the box and lugs on the ends, which assist in stacking and also help the runners to counteract any tendency of the sides to spring in under heavy weights.

The box, which measures 20 in. in length, 12 in. in width and 6 in. in depth, is made of No. 16 gage steel and is electrically welded. The handles are made of No. 14 gage stock folded double and punched to afford a hold for the hook when the box is dragged along the floor. This size of box, it is pointed out, was decided upon as meeting the average requirements of industrial establishments without holding more than one man could handle comfortably. The stiffness of the box is further increased by a ¾-in. selvage around the edge. The ends extend 1 in. above the sides and are folded over on the edge of the sides where the latter lap. These raised ends are bent out slightly to permit the box above to slip into place. This raised end, it is pointed out, gives space above the handle for a card holder in which the card is not so likely to become soiled. The upper corners of the ends are cut off at an angle of 45 deg. and embossed pieces are spot welded to the lower corners



In this Improved Form of Stacking Tote Box the Ends and Sides Slope Outward Sufficiently to Support the Box Above without Reducing the Capacity for Rectangular Pieces

of the ends at the same angle. These are relied upon to act as guides in bringing the box to the stacking position and in conjunction with the runners on the bottom serve to prevent any side shifting of the boxes while they are being trucked.

The National Association of Sheet Metal Products Manufacturers, at its annual meeting at the Hotel La Salle, Chicago, Oct. 17-18, discussed at length the restrictions placed by the mills on the sale of sheets both as to deliveries and terms and also continued the efforts of the association in support of the use of full weight sheets. For the ensuing year the following officers were elected: President, C. C. Crouch, Butler Mfg. Company, Minneapolis; treasurer, C. A. Kramer, Columbia Steel Tank Company, Kansas City, Mo.; secretary, H. B. Kelly, Waterloo, Iowa.

Gases Occluded in Alloy Steels*

Effect of Nickel, Silicon, Chromium and Manganese on the Nature and Volume of the Gases—A Summary of Previous Work

BY J. W. DONALDSON

SINCE Graham in 1865 heated wrought iron in vacuo and found the evolved gases to be a mixture of CO, CO_2, H_2, and N_2, many investigations have been carried out on gases occluded in pig irons and steels. Steels have been dealt with, varying both in carbon content and in method of manufacture. So far, no investigations have been

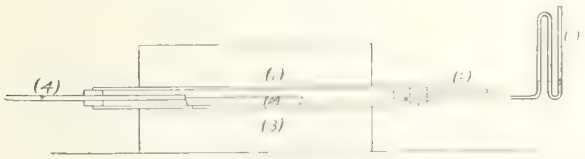


Fig. 1—Diagram of Apparatus Used to Determine Gases in Alloy Steels. (1) Porcelain Tube (2) Boat (3) Furnace (4) Silica Tube for Thermocouple (5) To Three-fall Sprengel Pump. (6) McLeod Gauge

carried out on the alloy steels, and the object of the present research is to deal with those types of steel.

SUMMARY OF PREVIOUS WORK

Before describing the method of carrying out the research and considering the results obtained, a short summary of the work previously done and of the results obtained with ordinary carbon steels is offered. Parry, whose experiments followed those of Graham, worked on a number of commercial irons and steels. He found that the principal gases evolved were carbon monoxide and hydrogen, the hydrogen predominating at low temperatures. The volumes of the evolved gases being high, however, have always caused his results to be adversely criticized.

The researches of Troost and Hautefeuille, published in 1876, followed and confirmed the nature of the dissolved gases, viz. that hydrogen was dissolved in excess of carbon monoxide. They also indicated that cast iron dissolves gases in considerably larger quantity than does steel.

Stead found that a considerable quantity of gas was evolved when a steel was drilled under water or mercury. The volumes of gas obtained varied, and the nature of the gases was slightly different from those obtained by heating steel in vacuo. Müller's work, on the other hand, confirmed that of previous investigations as to the nature of the evolved gases.

Boudouard's researches were conducted on merchant iron and iron wire, while Belloc, dealt with a mild steel (0.12 per cent carbon) in order to ascertain the relationship between the temperature and the rate of evolution of the gas. The rate of evolution was found to agree with the critical points of the steel. The nature of the evolved gases was in accordance with previous results.

The effect of deoxidizers on the dissolved gases was the object of investigations carried out by Goerens, samples of steel taken before and after deoxidation being heated in vacuo and the evolved gas being collected and examined. The results obtained indicated that certain processes of deoxidizing steel increased the volume of dissolved gas.

From 1908 to 1910 Baker carried out researches on gases occluded in mild and high carbon steels. He found that the nature of the evolved gases was similar in each of those steels, the carbon content having apparently no effect on the dissolved gases. The maximum evolution of gas occurred at the critical points; reheating the steel had no appreciable effect on the volume of gas evolved, but mechanical operations such as rolling reduced the volume of gas retained by the steels. The evolved gases were chiefly carbon monoxide and hydrogen, carbon dioxide and nitrogen only occurring in small quantities, and constituting not more than 2.5 per cent of the total gas evolved. Methane was also present in extremely small quantities. Hydrogen was in excess at low temperatures, but diminished in quantity as the temperature rose. The carbon monoxide attained a maximum at 700 deg. C. Above 760 deg. C. carbon monoxide and hydrogen occurred in equal proportions.

The most recent researches on the subject of occluded gases have been the work of Charpy and Bonnerot and of Austin. Charpy and Bonnerot's investigations dealt with the effect of pressure, the quantity of the steel used, and the form (solid or drillings) of the steel, on the volume of the dissolved gases. A number of commercial steels were also examined. Austin heated cast iron and various commercial steels to their melting points in vacuo and collected all the gases evolved from the metal.

In all the above investigations, although many of the results obtained have been at variance and

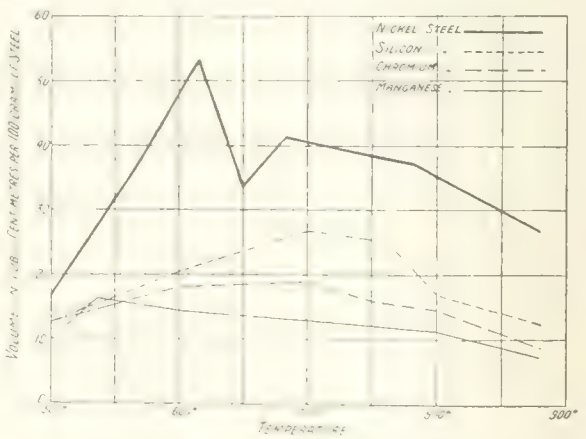


Fig. 2—Chart Showing Amount of Gas Obtained from Nickel, Silicon, Chromium and Manganese Steels

definite conclusions have been difficult to arrive at, one or two points may be taken as more or less generally accepted. These may be summarized as follows:

Wrought iron, cast iron, and steel dissolve gases in varying quantities, those gases being CO, CO_2, H_2, N_2, and CH_4.

In steel the principal dissolved gases are CO and H_2. Hydrogen predominates at low temperature, diminishes to a minimum as the temperature increases, but slightly

*From a paper which was granted a Carnegie Scholarship memoir by the Iron and Steel Institute in May, 1916.

increases on still further heating. CO is at a minimum at low temperatures, increases to a maximum, and then slightly decreases. Both gases are present in more or less equal proportions at high temperatures. CO_2, CH_4, and N_2 only occur in small quantities, and do not as a rule exceed 5 per cent of the total gas evolved.

Cast iron dissolves more gas than steel.

Drilling steel under water or mercury liberates a considerable amount of gas.

Reheating a steel does not affect the volume or nature of the dissolved gas.

Mechanical work such as rolling or forging decreases the volume of dissolved gas.

The rate of evolution of a gas from a steel has a relation with its critical points, the largest amount being evolved at the critical points.

The chief points investigated in this research were:

The nature and volume of the gases evolved when the steels are heated in vacuo.

The relationship, if any, which exists between the percentage of the special element present and the nature and evolution of the gas.

The relationship, if any, which exists between the critical points and the nature and evolution of the gas.

The alloy steels dealt with in the present report are nickel, silicon, chromium, and manganese steels.

APPARATUS USED

The steels, in the form of coarse drillings contained in a porcelain boat, were introduced into a porcelain tube glazed internally and externally. One

Table 1.—Results on Nickel Steel (25 grammes)

Temperature of Heating, Deg. C	Volume of Gas in C.C. (at N.T.P.)	CO_2 per Cent	CO per Cent	H_2 per Cent	CH_4 per Cent	N_2 per Cent	Remarks
500	4.2	1.29	2.22	95.79	0.23	0.47	Very slow evolution of gas. Exhausted in 4 hr.
570	9.3	0.65	37.66	61.17	0.39	0.13	Slow evolution of gas. Exhausted in 5 hr.
616[1]	13.3	1.00	50.33	48.16	0.33	0.18	Rapid evolution of gas. Exhausted in 6 hr.
652[2]	8.4	0.57	74.57	24.52	0.22	0.12	Slow evolution of gas. Exhausted in 5 hr.
684[3]	10.3	0.48	60.72	38.19	0.36	0.25	Rapid evolution of gas. Exhausted in 5 hr.
782	9.3	0.58	47.31	51.41	0.39	0.31	Slow evolution of gas. Exhausted in 5 hr.
880	6.7	0.60	51.31	47.64	0.22	0.23	Very slow evolution of gas. Exhausted in 4 hr.
Average composition		0.74	46.30	52.41	0.31	0.24	

[1]Ar1 maximum. [2]Ar3 maximum [3]Ar2 maximum.

end of the tube was connected to a 3-fall-Sprengel pump and a McLeod gage, while the other end entered a platinum-iridium thermocouple inclosed in a silica tube. The porcelain tube was heated by a gas-fired furnace. Fig. 1 shows a sketch of the apparatus.

The composition of the steels investigated was as follows:

	Nickel, Per Cent	Silicon, Per Cent	Chromium, Per Cent	Manganese, Per Cent
Carbon	0.21	0.21	0.43	0.08
Silicon	0.084	3.46	0.32	0.13
Manganese	0.72	0.29	0.25	3.50
Nickel	3.20	....	....	....
Chromium	....	....	3.28	....

The above steels were obtained having, as nearly as possible, a similar percentage of the special element in order to ascertain what effect, if any, the various special elements had on the nature and evolution of the evolved gases. The carbon content varies. This should have a slight effect on the volume of the gases, but no appreciable effect on the nature of the gases. The nickel steel was rolled, the silicon, chromium, and manganese steels being forged. The samples heated were in the form of coarse drillings, care being taken in the drilling to prevent contamination from oil and other sources.

METHOD OF WORKING

Before proceeding with the examination of the steels, the apparatus was thoroughly tested in order to make quite certain of the impermeability of the

Table 2.—Results on Silicon Steel (40 grammes)

Temperature of Heating, Deg. C	Volume of Gas in C.C. (at N.T.P.)	CO_2 per Cent	CO per Cent	H_2 per Cent	CH_4 per Cent	N_2 per Cent	Remarks
500	5.1	1.46	3.64	94.54	0.24	0.12	Very slow evolution of gas. Exhausted in 4 hr.
600	8.1	0.33	7.96	91.46	0.17	0.08	Slow evolution of gas. Exhausted in 5 hr.
700[1]	10.7	0.26	41.16	58.21	0.26	0.11	Rapid evolution of gas. Exhausted in 6 hr.
750	10.2	0.39	53.13	45.79	0.29	0.20	Rapid evolution of gas. Exhausted in 6 hr.
767[2]	9.6	1.18	54.27	44.10	0.27	0.18	Slow evolution of gas. Exhausted in 5 hr.
800[1]	6.8	1.39	53.87	44.16	0.35	0.23	Slow evolution of gas. Exhausted in 5 hr.
880	5.0	2.11	49.04	48.06	0.30	0.52	Very slow evolution of gas. Exhausted in 4 hr.
Average composition		1.05	37.59	60.90	0.27	0.19	

[1]Critical range. [2]Maximum point of range.

tube to furnace gases, and also to insure the complete removal of any occluded air or gas in the material of the tube. It was found that on heating to 900 deg. C. for seven hours per day, the amount of gas evolved was a constant quantity of 1 c.c. per week. A quantity was collected, and on examination was found to have the following composition:

	Per Cent
CO_2	14.21
CO	9.76
H_2	65.41
CH_4	9.42
N_2	1.20
	100.0

This quantity was so small that it was thought unnecessary to make a correction for it in the analyses.

After the steel was introduced, the tube was exhausted and allowed to stand for 24 hours before beginning to collect the gases. To remove the film of air still clinging to the tube it was necessary

Table 3.—Results on Chromium Steel (40 grammes)

Temperature of Heating, Deg. C	Volume of Gas in C.C. (at N.T.P.)	CO_2 per Cent	CO per Cent	H_2 per Cent	CH_4 per Cent	N_2 per Cent	Remarks
500	5.1	2.11	18.21	78.84	0.32	0.52	Slow evolution of gas. Exhausted in 4 hr.
600	7.3	2.52	27.72	68.78	0.25	0.73	Rapid evolution of gas. Exhausted in 6 hr.
700[1]	7.6	0.91	40.16	58.25	0.15	0.53	Rapid evolution of gas. Exhausted in 6 hr.
750	6.4	1.53	52.69	44.92	0.33	0.53	Slow evolution of gas. Exhausted in 5 hr.
775[2]	6.1	1.38	62.31	35.62	0.23	0.46	Slow evolution of gas. Exhausted in 5 hr.
800[1]	5.9	2.58	62.92	33.58	0.33	0.59	Slow evolution of gas. Exhausted in 4 hr.
880	3.6	2.41	49.96	46.89	0.33	0.41	Very slow evolution of gas. Exhausted in 4 hr.
Average composition		1.92	44.85	52.41	0.28	0.54	

[1]Critical range. [2]Maximum point of range

to heat it to 300 deg. C. The air was rapidly evolved and its composition shown by analysis.

As no appreciable amount of gas was evolved below 500 deg. C., this temperature was taken as the initial temperature of heating. Heating was also maintained at various temperatures covering the critical ranges of the steels. The final temperature of heating in each case was 880 deg. C. In

most cases the gas was completely evolved at each temperature in from five to six hours, but for uniformity a period of seven hours' heating was maintained. The rate of evolution of the gas was observed by the movement of the mercury in the McLeod gage.

CONSIDERATION OF THE RESULTS

In considering the results the first point to be noted is the volumes of the gas evolved from the various steels. Referring to Table 5 or Fig. 2, it is

Table 4.—Results on Manganese Steel (40 grammes)

Temperature of Heating, Deg. C	Volume of Gas in C.C. (at N.T.P.)	CO_2 per Cent	CO per Cent	H per Cent	CH_4 per Cent	N_2 per Cent	Remarks
500	4 6	2.66	10 13	86 31	0 53	0.37	Very slow evolution of gas. Exhausted in 4 hr
537[1]	6 5	1 53	15 42	82 44	0 18	0 25	Slow evolution of gas. Exhausted in 6 hr
600	5 8	2 33	32.17	65.00	0 25	0 25	Slow evolution of gas. Exhausted in 5 hr
700	5 2	0.91	51.09	47.45	0 26	0 29	Slow evolution of gas. Exhausted in 4 hr
800	4 5	1 99	65 63	31 60	0 33	0 45	Very slow evolution of gas. Exhausted in 4 hr
880	3 0	2.21	48.15	48 89	0.37	0 38	Very slow evolution of gas. Exhausted in 3 hr
Average composition		1.94	37 10	60.28	0.35	0 33	

[1] Critical range maximum

seen that the largest amount of gas is obtained from the nickel steel, the volumes obtained from the silicon, chromium, and manganese steels diminishing in the order given. Compared with the results obtained in some previous investigations on ordinary carbon steels, the volumes are high. This may be due to the fact that the steels dealt with were not specially prepared steels, but ordinary commercial steels. The nickel steel is an acid open-hearth steel, the others crucible or side blown converter steels. It would have been interesting and instructive to have compared the results obtained with those which would be obtained from carbon steels prepared by similar processes. Time did not permit this being carried out for the present report, but such material has already been obtained and its examination commenced.

The nature of the gases obtained from the various steels offers some interesting considerations. In general, carbon monoxide and hydrogen predominate in the evolved gases, carbon monoxide at high temperatures and hydrogen at low tempera tures. This is in accordance with previous investigations; carbon dioxide, methane, and nitrogen, in all cases, being less than 2.5 per cent of the total gas.

The average composition of the gas evolved from the nickel and chromium steels is similar to those given by Baker for high and low carbon steels. His results for a mild steel containing 0.13 per cent carbon were 1.17 per cent CO_2, 45.64 per cent CO, 52.12 per cent H_2, 0.72 per cent CH_4, 0.37 per cent N_2. In the silicon and manganese steels the amount of carbon monoxide is decreased by about 8 to 10 per cent and the hydrogen increased correspondingly. This would appear to indicate that silicon and manganese decrease the solubility of steel for carbon monoxide while increasing its solubility for hydrogen. The amount of nitrogen in the chromium steel, although not exceptionally high, is distinctly higher than in the other steels, and shows little variation at the different temperatures.

With regard to the evolution of the carbon monoxide and the hydrogen, each of the steels might be considered separately.

In the nickel steel, carbon monoxide is present in small quantity at 500 deg. C. At 570 deg. C., however, it has increased by 35 per cent, and continues to increase until it attains a maximum at 652 deg. C. It then decreases, reaching a minimum at 782 deg. C., and then again increases slightly. The variation of the hydrogen is the reverse of the carbon monoxide, the maximum points of the former being the minimum points of the latter and vice versa.

The evolution of the carbon monoxide from the silicon steel is different. Although in slightly larger amount at 500 deg. C., it does not show a marked increase at 600 deg. C., 700 deg. C. being the temperature where the increase takes place. The maximum evolution is obtained at 767 deg. C., from which temperature it decreases to a minimum at 880 deg. C. The hydrogen occurs in the reverse manner.

The percentage of carbon monoxide in the chromium steel is much higher at 500 deg., and its increase is gradual, no sudden increases being apparent. In this it differs from the nickel and silicon steels. The carbon monoxide shows a maximum and the hydrogen a minimum at 800 deg. C.

The manganese steel behaves in a manner similar to the chromium steel, the carbon monoxide attaining its maximum and the hydrogen its minimum at 800 deg. C. The increase and decrease of the two gases respectively are regular.

Considering finally the rate of evolution of the gases in the nickel steel, the largest amounts are evolved in the neighborhood of the Ar_1 and Ar_3 points, and similarly in the manganese steel, the largest amount is evolved in the region of the maximum point of the critical range. The silicon and chromium steels yield the largest volumes of gas at

Table 5.—Cubic Centimeters per 100 Grammes of the Different Alloy Steels

Nickel Steel		Silicon Steel		Chromium Steel		Manganese Steel	
0.21 per Cent Carbon, Deg. C	3.20 per Cent Nickel, Cubic Cms.	0.21 per Cent Carbon, Deg. C	3.46 per Cent Silicon, Cubic Cms.	0.43 per Cent Carbon, Deg. C	3.25 per Cent Chromium, Cubic Cms.	0.08 per Cent Carbon, Deg. C	3.50 per Cent Manganese, Cubic Cms.
500	16 8	500	12 7	500	12.7	500	11.5
570	37 2	600	20 3	600	18 3	537	16.3
616	53 2	700	26 7	700	19 0	600	14.5
652	33 6	750	25 5	750	16 0	700	13.0
684	41 2	767	24 0	775	15.2	800	11.2
782	37 2	800	17 6	800	14 8	880	7.5
880	26 8	880	12.5	880	9.0	. .	.
Total.	246 0	Total	138 7	Total..	105.0	Total...	73 9
2.46 c. c. per gramme		1.39 c. c. per gramme		1 05 c. c. per gramme		0.74 c. c. per gramme	

temperatures covering the whole of the critical ranges.

GENERAL CONCLUSIONS

The general conclusions which may be drawn from the above are:

The volume of the gas dissolved in alloy steels diminishes, according as the special element is nickel, silicon, chromium, or manganese.

The nature of the occluded gases is similar to those of ordinary steel, except that silicon and manganese decrease the amount of carbon dioxide present while increasing the amount of hydrogen. Chromium tends slightly to increase the amount of nitrogen. The evolution of the carbon monoxide and hydrogen varies for the different alloy steels.

The largest quantities of gas are evolved in the neighborhood of the critical points or over the critical ranges, agreeing with ordinary carbon steels in this respect.

The investigations were carried out by the author in the metallurgical laboratories of the Royal Technical College, Glasgow.

Cowan Transveyor Now Has Its Own Factory

The growth into an important business from the development of a device primarily intended for use only in the factory of its origin is shown in the case of the Cowan Truck Company, Holyoke, Mass. In 1910, only six years ago, H. W. Cowan, who was then superintendent of the White & Wyckoff Mfg. Company, also of Holyoke, manufacturing writing paper, devised a method of placing piles of paper on portable platforms having an arrangement to elevate them slightly from the floor so that they could readily be moved from one location to another. The idea was worked out in the machinery department of the company and resulted in what is called the Cowan transveyor. This machine, designed for the sole purpose of economizing in the handling of stock in the paper manufacturing plant, rapidly found its way into other establishments. The machines were for a time made in outside machine shops.

The Cowan Truck Company was then formed and a part of the plant of the White & Wyckoff Mfg. Company was used for truck production. The business has since then so expanded that early this month the company moved into a new building in Holyoke erected for the sole purpose of manufacturing the Cowan transveyor. This building is 100 x 200 ft., three stories, and is built of brick and concrete with foundations sufficiently substantial to allow the erection of two more stories when required. The building is of mill type construction, equipped for the manufacture of machinery.

Upon the organization of the Cowan Truck Company, the officers elected were: H. W. Cowan, president; J. L. Wyckoff, vice-president; E. N. White, treasurer. They still occupy these positions. Other officers are R. F. Lyon, general manager, and G. F. Jenks, assistant treasurer. Credit for many of the improvements in the Cowan transveyor is given to D. E. Hennessy, head of the engineering department. John McGeorge, consulting engineer, formerly of Cleveland, is associated with Mr. Hennessy in the engineering department.

Romance tinges the entire situation, says the Holyoke *Telegram*, when mention is made of the various uses to which the transveyor is now put. The old Liberty Bell, which was so carefully conveyed across the continent from Philadelphia, was handled on a Cowan transveyor. A fireproof vault was especially constructed in San Francisco for the bell and twice daily it was moved out and in on a transveyor. Ammunition plants thus handle shrapnel cases now being made all over this country. R. F. Lyon, who has just returned from an extensive tour of France and England in the interest of the Cowan Truck Company, reports that over 2000 Cowan transveyors are in use in those countries, mostly in the handling of shells. Bakers, chewing gum manufacturers, brewers, confectioners, textile manufacturers, leather companies, lumber companies and warehouses are also making general use of them. Different types of machines are naturally required for these various industries.

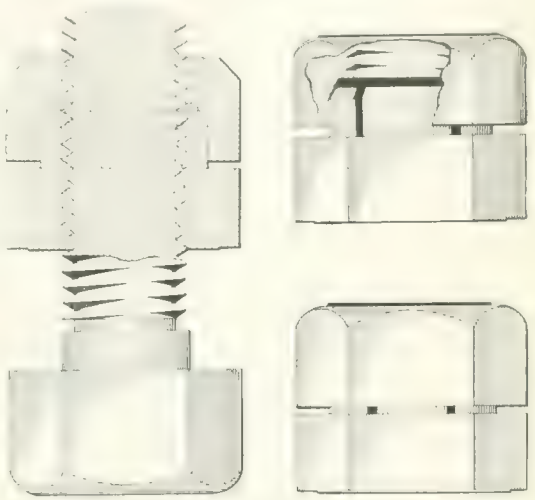
Application of this idea to power machines was the next step and the company is about to place upon the market its own electric transveyor equipped to handle platforms by raising the loads from the floor by motor and lowering them in the same fashion, the same power moving them from place to place. The Cowan transveyor, equipped with a storage battery, was illustrated in THE IRON AGE of Oct. 15, 1914.

Wisconsin industrial accidents thus far this year show an increase of 64 per cent over the same period of 1915, according to figures issued by the Industrial Commission of Wisconsin. The increase is so great that the commission has found it necessary to engage a fourth examiner of cases. The fact that all factories and workshops are overcrowded with business is doubtless responsible for the large increase in accidents. Claims filed in the month of August since the commission was created are as follows: 1912, 258; 1913, 557; 1914, 942; 1915, 1050; 1916, 1717.

A New Lock Nut Without Washers

A lock nut in which the dead and not the moving member is locked has been developed by the Western Screw & Lock Nut Company, 342 Mills Building, San Francisco, Cal. With this nut no washers are required and the nut can be locked at any point on the bolt, an arrangement which makes it possible to take care of oscillating or pulsating movements. The bolt and nut can be used over and over several times, it is explained, without damaging the threads. It is possible also to fit a United States standard nut tightly on a bolt having a V-thread, and it is also possible to make a nut tight on a loose fit bolt.

The lock nut consists of two members. The lower one, which is the nut proper, is similar in form to a regular hexagon nut and has four flexible finger members projecting from its upper surface. When the upper or locking member is screwed down, these fingers are compressed and the nut is frozen, as it is expressed, to the bolt. The locking action is secured by turning the



In This New Lock Nut the Flexible Fingers of the Lower Member Are Compressed and Forced Against the Thread of the Bolt as the Upper Locking Member Is Screwed Down

locking member firmly. When locked in place this member is counted on to help carry the load. One of the features of the lower member is a number of threads which provide capacity to carry the load. The nut is released with an ordinary wrench, and when the locking member is released it will of course move as one of the ordinary type.

A recent test of the holding power of one of these nuts was made by bolting two pieces of ¾ x 1½-in. bar steel together with a ¾-in. lock nut and one of the ordinary type placed 6 in. apart. The steel bars were suspended on heavy springs and an air hammer delivered 500 blows per minute with a force of 25 lb. midway between the two bolts. It is stated that the ordinary nut was jarred off in a short time, thus leaving the strain on the other bolt. After 9 hr. of continuous jarring at this rate the lock nut was still gripping firmly.

British Imports of Steel Ingots

Great Britain is importing large tonnages of steel ingots and always has, though the present rate is not as large as that before the war. In August last these imports were 12,178 gross tons against 14,987 tons in August, 1915. To Sept. 1, 1916, they were 104,224 tons, as compared with 123,547 tons to Sept. 1, 1915. The imports in the full year 1913 were 216,708 tons or 18,059 tons per month; in 1915 they were 199,180 tons, or 16,598 tons per month.

Imports of billets, blooms and slabs were 427,996 gross tons in 1915 against 513,988 tons in 1913, large shipments from Germany figuring in the latter total.

Purchasers of the Trigg furnace property, near Cadiz, Ky., recently noted, were a group headed by George L. Berry of Cadiz. It was owned by the Hillman estate, included the old furnace and 5000 acres, and was sold for $40,000.

The Operating Value of Cost Systems*

Departmental Costs Should Be Open to Subordinates—Special Materials Should Be Avoided Where Possible—Day Work Is a Detriment

BY G. W. MIXTER†

To clearly present a systematic discussion of the subject of this paper it will be necessary to briefly review and illustrate a skeleton of accounting methods. Referring to the accompanying diagram:

A represents productive material which is actually incorporated in the product that is shipped out of the plant.

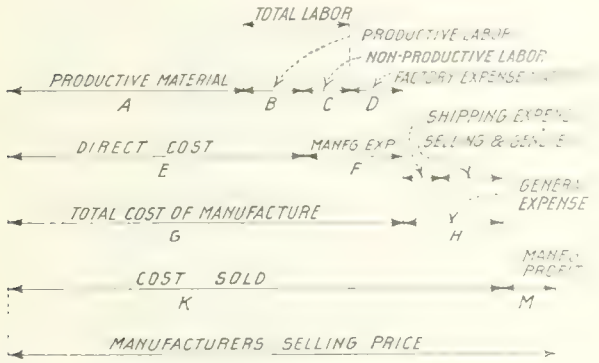
B is productive labor, or that portion of the payroll that represents directly labor which can be charged against individual products.

C, or non-productive labor, is the remainder of the payroll, such as foremen, engineers, toolmakers, etc., superintendents, etc.

D, or factory expense material, is assumed to mean every expense not covered by the above, such as coal, oil, emery wheels, insurance, taxes, workmen's compensation, etc.

F, or manufacturing expense, is the non-productive labor plus the factory expense material.

H, or general expense, is shown as including expense of advertising, selling, shipping and general management.



Cost Diagram Illustrating the Basic Factors which Must Be Considered in Arriving at Manufacturer's Selling Price

The mechanism of keeping the detailed records is infinite in variety, all too often overdone; but underlying all are certain basic principles.

Cost factors must be boiled down to enable simplicity, and then continual comparison and study will point the way to improvement. Nor will this improvement be limited to one element of cost. Real, analytical cost knowledge will lead to well rounded development. Many of the older industries were very one-sided in their development—leading always toward refinement along lines most congenial to the founder or owner. Facing all elements of cost will force attention to all sides of the problem.

Neither are costs of much value if they represent ancient history. The returns must be prompt or the opportunity to profit thereby is lost. In fact, many expense items are much better controlled by working to a budget laid down in detail before the expense is incurred. This is especially true when facing a falling volume, which is the most difficult time to control expense.

It is a most common error for an executive not to take into his confidence his subordinates, or, to use a better word, associates. If the cost facts help the executive, they should help the entire organization. If properly arranged, this can be done without showing a department head figures beyond his department. However it is handled no cost system is getting the maximum result unless it is understood by the organization. Costs are a map of what goes on in the factory. They furnish the means of understanding and controlling, and as such should be freely shown to the men who control the details.

LEDGER A VITAL POINT

Having in mind the general principles and definition of the terms involved, you should realize the vital necessity of a proper classification of the ledger accounts, and a correct distribution of the items to the various accounts.

It is not only necessary that the accounting be correct at this point, but the manager and the operating men must have a clear understanding of the resulting skeleton; especially the class of items included in each account and how the various accounts build up into the cost of the individual implement. It would be far better to carry only five accounts, each representing one of the five sections in the cost diagram, and carry them clearly, not only on the books, but in the mind of the management, than to have a mass of detail intelligible only to a certified accountant.

The underlying principle of distributing expenditures to the various accounts is that all charges to a given account must belong in the same division of our cost diagram. A simple example is found in two kinds of steel—common bars for the typical implement which we are going to discuss must be charged to an account in the raw material (*A*) group. Tool steel must be charged to an account in the factory expense material (*D*) group.

The importance of accurate and honest accounting cannot be overestimated. Accuracy requires proper classification and distribution. Honesty means charging everything to expense that belongs there. Do not deceive yourself by capitalizing expense—do not tamper with the depreciation charge—do not inflate your inventory.

Productive material (*A*) for our purposes has been defined as the material actually incorporated into the product that is shipped out of the plant. This paper has nothing to do with the base price you pay for material. That is the buyer's business, and at present the subject is too disagreeable for discussion.

To figure the cost of material for a given implement we must have a specification or bill of material. You cannot manufacture an implement without knowing of what it is made. You must have proper specifications before you can even order material accurately, and good specifications, prepared by some easy duplicating process, will help every man on the job. In short, the expense of accurate, complete specifications is not chargeable to the expense of a cost system.

SPECIAL MATERIALS SHOULD BE AVOIDED

Rightly used, information of detailed cost of material will save on the material cost, and the time to begin is before the final design of the tool is accepted. Economy of material, assuming the base price already fixed, is obtainable only from efficient use of the material, i. e. the lowest priced material that will do the work—and not too much of it. Right at the start is the time to eliminate steel sections not ordinarily carried, or special sections only obtainable from one or two mills. Teach your designers to use material of commercial specifications.

Theoretically, defective material, scrap and excess cost of material purchased above the contract prices to

*From a paper presented at the convention of the National Implement and Vehicle Association, Atlantic City, N. J., Oct. 19, 1916.

†Vice-president Deere & Co., Moline, Ill.

meet an emergency demand, are charged to expense, and are included in manufacturing expense. Practically this ideal is never reached, and in starting a cost system a flat addition of 5 per cent to the productive material as figured from the specifications is recommended.

Throughout this paper the total cost of either gray iron or malleable castings is considered as productive material (*A*); i. e., as if purchased from an outside source. Good practice requires that foundries be operated as separate business organizations. Time prohibits detailed discussion. Indeed, the subject warrants a separate paper, as knowledge of and comparisons of details are perhaps most profitable in the foundry. From purely a cost finding viewpoint, assuming proper classification and distribution of the ledger accounts, simply dividing the total material, labor and expense for a year by the good castings produced gives a cost, crude in its simple exactness but, of course, of little use as a force to reduce future costs.

DAY WORK VS. PIECE WORK

To apply any cost method two facts must be determined about direct labor:

1. The productive labor on each specific implement whose cost is to be figured.
2. The proportion of productive labor in the total payroll.

The productive labor (*B*) for a specific implement requires that we know the cost of each operation on each piece; and each of the assembling operations must be known.

Where any considerable part of the productive labor is day-work you face a real difficulty, not insurmountable, but requiring special treatment and special expense. The real remedy is to eliminate the day-work. The employee will receive higher wages and the work cost less. Day-work stands for inefficiency and unhappy men. Few realize how absolutely a determined resourceful superintendent can eliminate day-work.

For brevity, we will assume this productive labor is largely on a straight piece-work basis, as is true in most implement plants. The setting of piece-work prices and providing a proper record of these prices for employees and timekeepers is a vital operating matter, but has nothing to do with cost accounting. Given the existing piece-work lists, it is necessary in some way to assemble a list of all the operations on each piece together with price per hundred for each operation. This is clearly chargeable to cost expense. It is easier to carry this on a separate page, or card, rather than in detail on the specification costs, because many pieces appear repeatedly on different specifications.

To do this work rapidly, and to easily transfer the results to the cost sheets, absolutely every different part produced or worked on in the plant must carry a number. This is not only necessary for easy cost accounting but for many obvious reasons.

The second class of information about direct labor, the proportion it bears to the total payroll, is the direct result of a proper payroll distribution, which also gives the nonproductive labor.

IMPORTANCE OF PAYROLL DISTRIBUTION

The subject of payroll distribution opens a most vital, and perhaps a most helpful part of our discussion and warrants close attention. No part of cost accounting is so fruitful of possible economies, nor so generally neglected by the operating men. Promptly available each week by departments, and freely shown to the foremen concerned, it is an invaluable operating asset. Postponed to the middle of the following month and kept hidden by the bookkeeper, it is an accounting relic.

Payrolls are made up from some form of time slip, preferably returned each day filled in by the employee himself. Evidently the expense of checking the time slips and making up the payroll is an expense not chargeable to cost accounting.

Distributing the payroll is a cost expense, just as vital to correct costs as computing the productive material or the productive labor for an individual implement. But this expense also provides a vital money-making necessity to the operating men.

The expense of proper distribution does not add more than 60 per cent to the time-keeping expense. For a complicated plant of 1500 men, the cost of distribution is $1,200 per year. Another plant with 400 men spends $300 per year for this purpose. Properly handled 75c. per year per employee covers this expense.

As a result of distributing the payroll you have—

First, your payroll divided between productive labor and non-productive labor, which gives the basis for the proper distribution on the ledger, and without this you cannot compute costs.

Second, you have the percentage of productive labor to the total payroll. This figure is not directly used in cost accounting, but is of infinite value.

A foreman need not be a bookkeeper to understand the difference between productive labor and the non-productive remainder; and a very little guidance will lead him to examine with interest the weekly distribution for his department. In a sense, you can make him your business partner, and do so without making a cheap clerk of a high-priced foreman.

WHAT SYSTEM MEANS TO DEPARTMENT HEADS

This paper is primarily a plea for clear thinking. We are in the midst of conditions more difficult than ever before faced by the implement industries. We are all learning and the Federal Trade Commission is helping us to understand that often the way to help ourselves is to help others. It has not been my intention to suggest that foremen and superintendents should become bookkeepers, but that they should think clearly; and analyses similar to those suggested make clear thinking possible.

Compare the position of a superintendent with a proper payroll distribution available every week with a man who is going blind with nothing more than the total of the payroll in his mind. Or consider the sales manager who does not know the relative profits derived from the various lines of goods and has no analysis of the money he spends to sell the goods. Then finally consider the position of the manager or owner who knows that things are going wrong and cannot tell why.

Remember that costs do not cost much, and they pay. The McCormick Works use five men on the cost of the product of 8000 men. The Deere & Co. plow department uses one and one-half men on the cost of the product of 1500 men. Not less than 80 per cent of the clerical help and expense often charged against a cost system would be required to properly operate a plant under the old "guess what you are doing" plan. Is not the additional money paid out really a profit rather than an added expense? And is not this profit multiplied many times? Know your business and you can stop the leak before the boat sinks.

Safe Practices in Ladders

A compilation of the best information on what it calls "Safe Practices" is to be undertaken by the National Safety Council. This information is to be published in loose leaf form, so that fresh information can be added from time to time, but apparently the idea is to take up one particular subject at a time and treat it somewhat exhaustively. The first contribution of "Safe Practices" has appeared and has to do with ladders, both stationary and portable. It covers the materials of construction, the methods of testing and certain safety features provided in connection with ladders. The headquarters of the Council, of which W. H. Cameron is secretary, are the Continental and Commercial Bank Building, Chicago, Ill.

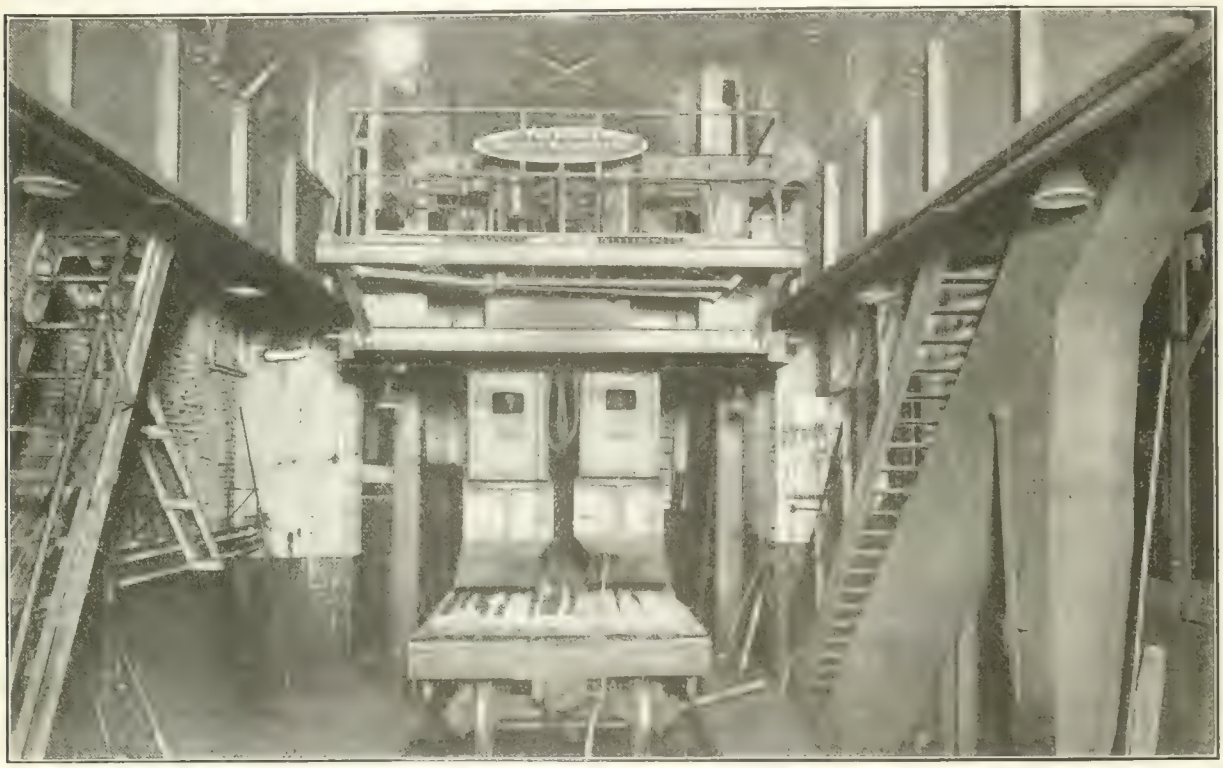
A Steel Treating Research Club is in existence in Detroit, and its name indicates its interests. It meets in the rooms of the Detroit Engineering Society, 46 West Grand River Avenue, Detroit. C. Newman Dawe, Studebaker Corporation, is president, and H. G. Kiefer, Timken Detroit Axle Company, is secretary and treasurer. C. C. Brown, Detroit Engineering Society, is serving the club as assistant secretary.

A COAL UNLOADING MACHINE

Frozen Coal Cleared from Cars by Motor-Driven Scrapers and Air Hammer

A coal breaking and unloading machine designed primarily for unloading cars in which the coal has frozen is being built by the Brown Hoisting Machinery Company, Cleveland, Ohio. It is said to be a very useful machine at any time of the year, as it unloads a 50-ton coal car in 5 or 6 min. by forcing the coal from the car into the track hopper and is useful in steel plants and other establishments using large quantities of coal.

This machine was designed and patented by J. P. Considine, engineer with the Edison Illuminating Company, Detroit, Mich., to speed up the unloading of coal in the plant of that company.



A Coal Breaking and Unloading Machine Designed for Use with Cars Containing Coal That Has Been Frozen or Will Not Flow Through the Bottom Hoppers Readily for Any Other Reason

Considerable difficulty was formerly experienced in unloading a sufficient amount of coal to meet the load demand at its powerhouse during the winter season when the coal had become frozen, often at the top and bottom of the car for a distance of about 2 ft. and frequently throughout the entire depth. In either case the coal would not flow from the car when the doors were opened and it would be necessary to force an opening by driving a small pipe with a hand hammer through the frozen coal at several places, which required from 30 to 90 min. After an opening had been made the coal was loosened by picks, but the whole work of unloading a car would require from 1½ to 4 hr., depending upon the extent to which the fuel was frozen. The coal breaking machine has been in successful use at the Detroit Edison plant over 2 yr. and one of the machines is now being installed at the Youngstown works of the Republic Iron & Steel Company.

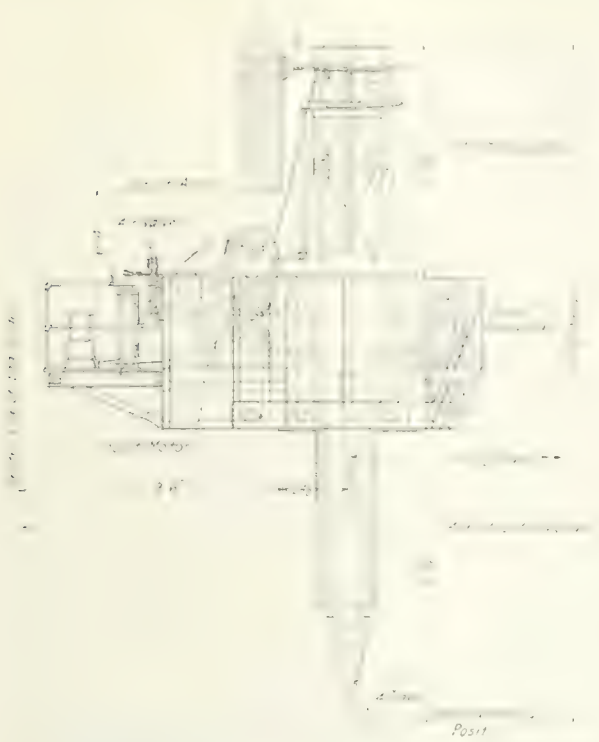
The coal breaking mechanism and scraper consists of a carriage supported by and traveling longitudinally on a girder runway and two spuds with air hammers carried by the carriage. The carriage, weighing 15 tons, is held in position by four doubled-flanged wheels which run on the top of the runway girders and is driven by a 22-hp. adjustable-speed motor through pinions that mesh into racks fastened to the bottom of the girders. Another method for propelling the machine is by cables dead ended at each end of the runway and connected to the traveling motors on the machine. Either of these arrangements is relied upon to afford a positive drive that does not depend upon the tractive effort of the flanged wheels. The travel motor is provided with a solenoid brake for promptly arresting the high-speed parts of the mechanism when the current is shut off. A limit device is also provided for the travel mechanism, to prevent running off the runways.

The carriage carries two spuds, each weighing 4½ tons and hung by a cable. In the spud above the anvil block there is a double-acting air hammer weighing 3400 lb. to which is connected a flexible air hose. The two spuds occupy approximately the full width of the car. One or both may be operated at a time, being raised by one 52-hp. adjustable-speed motor. The hoist motor is provided with a solenoid brake, and there is a limit device to prevent overhoisting.

In the halftone engraving the spuds are shown lowered to a position at which the elevation of the lower ends corresponds to the height of the car floor. When the machine is not operating the spuds are carried at the highest position, the lowest extremity being on a line with the bottom of the carriage. As shown the bottoms of the spuds are cut out at the inner side, thus allowing them to clear the center beam on hopper bottom cars. A small portion of the coal escapes through the opening between the spuds, but this is negligible in amount and can be removed quickly with shovels. Details of the construction are shown in the sectional view of the side elevation.

When a car is to be unloaded it is placed over the hopper and the doors dropped. If necessary, as in the case of frozen coal, the spuds on the machine

can start the coal flowing through the doors. The machine is run to one end of the car and the spuds lowered into the coal and then the machine is run forward, scraping the coal toward the doors and



A Side Elevation Showing the Air Hammer Arrangement Employed to Start the Coal Flow in

forcing it into the hoppers. This is repeated on the other end, from 5 to 6 min. being required to clean the car.

New Non-Metallic Gears and Pinions

As a substitute for gears of steel, cast iron or bronze, the Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa., has developed a non-metallic gear material. It consists of heavy duck bonded together with Bakelite by heating and is known as Bakelite Micarta-D. Besides minimizing noise, the gears are found capable of being used in oil without signs of swelling, and no bushings or shrouds are needed, as the material is self-supporting and free from the influence of atmospheric changes.

The material, it is stated, polishes readily, and may be machined at high speed in any direction and drilled and tapped. When teeth are being cut, the same tools are used as for steel, but an increase of 25 per cent in cutting speed and one of 50 per cent in feed are possible. The material has a tensile strength parallel to laminations of 10,000 lb., and a compression strength of 30,000 lb. perpendicular to the laminations and 17,000 lb. parallel to the laminations. The gears may be used for the main drive of punch presses, boring mills, engine lathes, pumps and crane motors and for general machine shop service and automobile timing gears.

The United States Bureau of Standards has completed a careful determination of the freezing point of mercury and the result of the work gives —38.87 deg. C. (—37.97 deg. Fahr.) for this temperature. The fixing of this freezing point is of great importance to thermometer makers, as it marks the lower limit to which a mercury thermometer may be used and furnishes a method of calibrating or pointing the scale below 32 deg. Fahr. As far back as 1862 the English Government, recognizing the importance of this knowledge, appropriated £150 to have it determined. The value then reached was —38.85 deg. C. (—37.93 deg. Fahr.), and this agrees with that obtained at the Bureau of Standards. Other determinations made before and after this early work threw some doubt on its accuracy.

Changes and Progress in the Malleable Castings Industry

The use of malleable iron castings for trucks, underframe and center sill parts, car bodies, etc., was discussed at length by F. J. Lanahan of the Fort Pitt Malleable Iron Company, Pittsburgh, in a paper before the American Foundrymen's Association at its annual meeting in Cleveland, Ohio, Sept. 14, 1916. The title of the paper was "The Use to Which Malleable Iron Castings Can Be Applied in Car Construction." For castings that are used to join individual sections together the author recommended malleable iron castings because of their superior quality.

The conclusions of the author were as follows:

Malleable iron has been misunderstood and frequently criticized in the past, partly on account of incompetent and careless manufacture, but largely, too, because of the customer's insufficient knowledge concerning it. During the past few years, the industry has undergone a complete change, and the process and practice to-day is far in advance of the haphazard system followed three or more years ago.

As an illustration, each foundryman formerly had his own analysis for the raw materials, and the same idea governed the finished castings. Neither analysis was based on any scientific knowledge, but simply what this or that individual thought was right. In contrast with such practice, the modern method is to follow a standard pig-iron analysis, for a uniform result in the finished product, depending on the purpose for which castings are to be used. The standards so set are the result of a long series of metallurgical, chemical, mechanical and other scientific tests.

Customers can readily understand how necessary it is for a manufacturer to know exactly where the castings are to be used, and under what conditions, so that he may determine what particular feature should be developed as the casting's strongest characteristic.

The malleable industry to-day is divided among specialists, each catering to the production of a definite class of material, such as railroad, automobile, agricultural, stove, pipe-fittings and miscellaneous lines, the main object being to perfect castings for the purposes intended through a careful study of the work they must do, as well as by concentration in one particular line, to effect economies through efficiency, and make the selling price as low as possible. In designing castings, great care should be taken to have the section of metal sufficiently thick to perform the work required, otherwise failure will inevitably follow, not because of any imperfection in the iron itself, but owing to the fact that it is too thin.

Commendable solicitude on the part of engineers in their effort to obtain minimum sections, so as to reduce weight, and consequently cost, has in the past resulted in condemnation of the material, when the real trouble was caused by insufficient metal. In this respect, it is wise to follow good engineering practice, by figuring theoretically and designing practically, bearing in mind the extremely difficult service demanded at times, erring if at all, on the safe side, by having ample metal thickness to meet the requirements.

The engineer knows when preparing a new casting just what is required of it, and if he would make it a practice to utilize the foundryman's experience and knowledge, so that in addition to the proper design, the correct section of metal is designated, to satisfactorily accomplish the task required, it would eliminate many of the pitfalls and troubles of the present day. Unwarranted criticism of the manufacturer, who is blamed for faults he is actually not responsible for, would disappear.

Wisdom dictates the selection of a reliable and progressive malleable manufacturer, since this will insure conscientious attention to every detail of the casting process, and the customer will have confidence in knowing that he will get, in material, service and satisfaction, precisely what has been agreed upon, instead of a slip-shod and imperfect substitute.

The Ames Iron Works has removed its Boston office to the Penn Mutual Building, 24 Milk Street.

Safety Congress at Detroit Last Week

The Special Problems of Foundries, Coke Ovens and Rolling Mills—Employment Departments and Health Supervision and Insurance

A BROADENING of the scope of the organization was shown by the attendance at the fifth annual safety congress of the National Safety Council held at the Statler Hotel, Detroit, Oct. 17-20. While the registration, which was close to 1200, was about the same as that of the Philadelphia Congress a year ago, the aggregate attendance was said to be much larger. At the Philadelphia meeting the local registration was quite large, but it was not conspicuously so at the Detroit meeting. It was stated that the attendance at most of the sections was considerably larger than a year ago.

Fourteen separate sessions were held during the congress and some of these, like the iron and steel section, held meetings on three different days. Three new sections were organized during the congress, one on copper, lead and zinc smelting, one on rubber, and a third covering building contractors. A new feature of the meeting was a creditable exhibit of safety devices, which was inspected by most of those attending the various sessions. It has not yet been decided whether the exhibit will be made a permanent feature of these meetings.

If the recommendations made in papers and discussion in the health section are followed, the plant physician will be made to occupy a much more important position in the plant organization than he has in the past. He will not only thoroughly examine men when they are employed, but will keep them under close inspection and help in placing workmen in places where they are best fitted physically.

OFFICERS ELECTED

The election of officers resulted in the selection of Lew R. Palmer, chief inspector of the Pennsylvania Department of Labor and Industry, Harrisburg, Pa., as president. He has been first vice-president. David Van Schaack, director of publicity of the Aetna Life Insurance Company, was made first vice-president; H. W. Forster, general manager of the Independent Bureau, Philadelphia, second vice-president; M. A. Dow, general safety agent of the New York Central Lines, third vice-president. Secretary-Treasurer W. H. Cameron was re-elected and his title was changed to manager and treasurer. J. J. Lamont was re-elected as assistant secretary.

Among the directors elected were the following: Melville W. Mix, president Dodge Mfg. Company, Mishawaka, Ind.; Arthur T. Morey, general manager, Commonwealth Steel Company, Granite City, Ill., the retiring president; H. H. Robertson, Asbestos Protective Metal Company, Pittsburgh; Francis P. Sinn, New Jersey Zinc Company, Palmerton, Pa.; S. W. Tener, manager, accident and pension department, American Steel & Wire Company, Cleveland; J. M. Woltz, safety director, Youngstown Sheet & Tube Company, Youngstown, Ohio; Earl B. Morgan, safety engineer, Norton Company, Worcester, Mass., and C. L. Close, manager of bureau of safety relief, sanitation and welfare, U. S. Steel Corporation, New York.

Among the new members of the executive committee are Geo. T. Fonda, safety engineer, Bethlehem Steel Company, South Bethlehem, Pa.; L. M. Eaton, director of safety, Cadillac Motor Car Company, Detroit, and S. W. Tener.

NEW UNIVERSAL DANGER SIGN

A new red, black and white universal danger sign was adopted at a special meeting held to consider this subject. This has a large round red center surrounded by a black bordered square with wide black bars reaching from each corner of the square to the red center, leaving conspicuous white spaces between the red center and black portion on each side of the sign.

Safety in the Foundry

The foundry section held only one meeting, but in the time available a great deal of interesting information was brought out in papers and accompanying discussions. Injuries that occur most frequently in foundries, safety education, the protection of eyes, the dangers due to use of alcohol, and welfare were among the topics. The report of Earl B. Morgan, secretary of the section, showed that the membership had increased from 37 to 73 during the year. O. H. Fehling, manager of the National Malleable Castings Company, Chicago, Ill., was chairman of the foundry section.

New officers were elected as follows: Chairman, F. G. Bennett, safety department Buckeye Steel Castings Company, Columbus, Ohio; vice-chairman, F. W. Shepard, safety inspector, American Cast Iron Pipe Company, Birmingham, Ala.; secretary, S. W. Ashe, educational and welfare department, General Electric Company, Pittsfield, Mass.

GENERAL ELECTRIC FOUNDRY AT PITTSFIELD

The first paper was presented by S. W. Ashe, who told of safety work in the Pittsfield, Mass., plant of the General Electric Company. The title of this paper was "Strains, Sprains and Burns." He said that the weight of the ladle is of great importance in eliminating the spill of hot metal in the foundry. In the Pittsfield plant a 45-lb. ladle and a traveling crane ladle are used for handling hot metal. In addition to the use of the usual safety devices, lectures on safety topics are given to employees. Because of the rapid changes in the ranks of the employees, educational work has to be done over and over again, perhaps every four or five months.

The educational campaign, he said, must be made a personal matter with the men. Ordinary safety literature would not accomplish the purpose. The plant is able to get into personal touch with its employees by means of a works paper, 6000 copies of which are distributed monthly. If the men cannot read, they take it home and their children read it to them and it is found that the men quickly become interested in the subject. Illustrations are freely used showing the right way and wrong way of doing things, so that the men can understand the teachings of the photographs without written explanations.

The policy of the General Electric plant is not to hire a man who has a hernia or a tendency to hernia, but this policy cannot be followed when men are as scarce as at present. The next best thing is to hire these men and instruct the foreman to place them where they will not do heavy lifting. Requiring such applicants to sign a release for injury claims was recommended. While these releases are not legally binding, they were found to have a moral effect and to cut down the number of claims for injuries 50 per cent. He said that out of 4000 men hired since January, 156 had hernia. Another foundryman remarked that his experience was that 6 per cent of foundry employees were so afflicted.

In reply to a question as to providing and inspecting

molders' shoes, Mr. Ashe said that at his plant arrangements were made with a local shoe dealer to supply these shoes, as the dealer could furnish them cheaper than the company. The company gives the employee a ticket which entitles him to a 20 per cent discount at the store handling the shoes, making an inducement for the molder to get his shoes at that store and giving him a price advantage over a man not an employee of the company. Attention to the need of molders' shoes is called through lectures and lantern slides. If a man not wearing a regulation shoe comes in with a foot burn, his foreman is taken to task for allowing him to wear other shoes. The matter is also given attention by the safety inspector. The policy, however, is to use persuasion in this matter rather than compulsion.

CRANE CHAINS

F. H. Elam, manager of the casualty department of the American Steel Foundries, Chicago, spoke about crane and chain practices. He pointed out that most chains were of lighter material than they should be for the service required. Annealing chains did not generally remove defects, and the only excuse for annealing in most cases would be to show to the foreman that a chain is too light, this being evidenced by the elongation of the link under a load after annealing.

The annealing of crane chains was also discussed in the steel section where it was declared that safety was not assured by annealing, but that proper annealing would at least do no harm. However, if improperly done it would be of no value. A careful daily inspection of chains was urged. The announcement was made that the council will issue shortly a bulletin giving the latest available information on the annealing of chain.

The use of cable in the place of chain for hoisting was recommended, in the discussion of Mr. Elam's paper, as a safety measure, doing away with the danger of a chain breaking. The use of a cable for sling purposes was favored, but the statement was made that no cable is now made that is satisfactory for this use, because there is none on the market that does not twist.

Secretary Morgan announced that the Safety Council would issue shortly a bulletin on crane brakes.

EYE PROTECTION

F. W. Shepard, in an address on eye protection, declared that ignorance and carelessness were the leading causes of injuries to eyes and characterized abnormal vision as the greatest cause of accidents. He advocated more sunshine in foundries, saying that it would have a psychological effect on the workmen, making them more cheerful and increasing their production. He warned against the use of an unsterilized instrument for the removal of foreign substance from the eyes and declared that with the improved goggles now being made, workmen could no longer complain that they could not see through their goggles.

A dust-collecting system is being installed at the Birmingham pipe plant of the American Cast Iron Pipe Company, with which he is connected, and he expected that the removal of the dust from the foundry would be of great protection to the eyes. In reply to questions he said that in case employees require specially fitted goggles, the company pays for the examination of the eyes. He did not consider glasses in place of goggles safe in the foundry cleaning room.

THE FACTORY RESTAURANT

An address on "Alcohol vs. Safety," by Dr. H. P. Hourigan, Larkin Company, Buffalo, N. Y., brought out some discussion of factory restaurants, the statement being made that to promote temperance, a shop must compete with the corner saloon and supply good food. However, during the discussion some doubt was expressed as to whether it was worth while to maintain such a restaurant, if its operation causes a loss of from $200 to $300 a month.

A representative of the National Cash Register Company, Dayton, Ohio, told how his company handles the restaurant problem and keeps its employees out of saloons during the noon hour. Meals are furnished to the men at 20 cents each, and a motion picture show is provided in an auditorium where men may partake of lunches that they bring from home. He said that about all the employees who did not live near enough to go home for their lunches either patronized the company's restaurant or took their lunch pails to the auditorium.

Iron and Steel Section Meetings

In the papers and discussions in the iron and steel sectional meetings, information was brought out regarding safety methods in mills and coke oven operation, and the relation of the labor problem and welfare work. The report of J. M. Woltz, safety director Youngstown Sheet & Tube Company, chairman of this section, showed a large increase in membership and stated that the standardization committee had done excellent work in preparing rules on standardization of work methods, safety guards, etc.

New officers of the iron and steel section were elected as follows: Chairman, George T. Fonda, safety engineer Bethlehem Steel Company, South Bethlehem; vice-chairman, Earl B. Morgan, safety engineer, Norton Company, Worcester, Mass.; secretary, A. H. Young, supervisor of labor and safety, Illinois Steel Company, South Chicago.

DECLINE IN STEEL MILL ACCIDENTS

The first address before the iron and steel section was by Dr. Lucian W. Chaney, United States Department of Labor, Washington, D. C., who in a talk on progress of safety in the iron and steel industry, showed charts on lantern slides indicating the decline in accidents in steel plants and the effectiveness of the use of safety methods.

In a paper on safety in blast furnace operation, F. H. Wilcox, engineer, United States Bureau of Mines, Pittsburgh, presented an analysis of the cause of blast furnace accidents. Hand labor, with 17.9 per cent, headed the list. From observation in many plants, it appeared that although thoughtlessness and carelessness of the men is the major cause of accidents, the desultory, haphazard and unsystematic manner in which much of the work is done contributes almost as many injuries. It was pointed out that a blast furnace employee has to do a variety of occasional tasks and that these are not always performed in the best way, particularly because these tasks are frequently carried out with insufficient instructions and supervision. Training in effective method of work was advocated as the way to promote safety about a blast furnace plant.

Safety in Bessemer operations was discussed by J. H. Ayres, superintendent of safety, sanitation and welfare, National Tube Company, McKeesport, Pa. He said that there were more accidents in Bessemer plants than in any other branch of the steel industry, as shown from Federal statistics covering 135 plants. Hand rolling mills came second, open-hearth plants third, mechanical mills fourth, and blast furnaces fifth. An analysis of the accidents in Bessemer plants showed that 61 per cent of the injured were laborers, that explosions of hot metal caused one-fourth of the accidents, and falling and flying material one-third of them.

In many steel works attention has been given to systematic work for the elimination of injuries, and there has been a marked improvement in that respect. In one plant instead of 35 per cent of the employees being injured, this number has been reduced to 5.01 per cent. He referred in particular to one means of reducing accidents in Bessemer plants, and that is the use of the open top type of molds, eliminating the danger of explosions of hot metals and spills that occur in plants using closed top molds.

Following a paper on the general subject of safety in open-hearth operation by James Thorpe, superin-

tendent of open-hearth furnaces of the Illinois Steel Company, Gary, Ind., the details of safety in the construction and operation of open-hearth steel plants were discussed by Walter Greenwood, safety inspector, Carnegie Steel Company, Youngstown, Ohio. He said that the first step in safeguarding open-hearth plants is to comply with the standard regulation for covering moving parts, isolating dangerous machinery, etc., supplying necessary appliances for the protection of men doing dangerous work. These include goggles, inhalation devices and asbestos suits.



L. R. PALMER, President National Safety Council

He declared there is a chance for improvement from the safety standpoint in the arrangement of building, lighting, ventilation, walks along crane runways and location of trackage and storage facilities, where they would cause the minimum interference with the workmen. All equipment for mixers should be electrically operated, eliminating many of the dangers present when a mixer is operated by hydraulic pressure. The doors of an open-hearth furnace should be operated with motors set on platforms back of the furnaces. Hinged shields attached to counterweights should be provided for covering tapping holes, while tapping out. Operators of charging machines should be protected with shields.

The fact that the steel industry was the first to take up the safety movement and also to put safety engineering on a permanent basis, was mentioned by Dr. F. L. Hoffman, statistician, Prudential Life Insurance Co., in a paper on the achievements and possibilities of accident prevention in American industry. He presented figures from records of several of the steel companies to show that there has been a large reduction in the percentage of injuries during the past few years. According to his estimate, 25,000 lives were lost and 300,000 were seriously injured in the steel industry three years ago. He said that to-day it is estimated that the number of killed annually in this industry is 22,000, and the number of cases of serious injuries has been reduced to 260,000.

THE MODERN EMPLOYMENT DEPARTMENT

The functions of a modern employment department in the steel plant was discussed at length in an interesting paper by A. H. Young, supervisor of labor and safety, Illinois Steel Company. He declared that the development of the modern employment office is not less interesting than, and is as fully worth while as, the growth of the safety-first movement. The employment bureau of to-day has the responsibilities far outweighing the mere supplying of labor and the maintenance of service records. When properly conducted it will provide an employee for each of the varying occupations. It will discover the worker not fitted for his task and find the task fitted for the worker.

He said that the weaving of health and occupation has never before been so fully discussed as during this congress; but when the questions of medico-occupational fitness are answered, it will remain for the employment bureau to actually work out the solution from the formulas presented. In the maintenance of service records he contended that when a man leaves the plant the true cause of his action must be made a matter of record, in order that the employment agent can conserve desirable workers in a plant. Except for his vigilance, foremen may improperly discharge a man or unfair conditions easily adjusted may cause him to resign.

The superintendent of a modern employment office must be a keen student of human nature, and have a sufficient force of interpreters and clerks so that he will be free to spend all of his time on the larger responsibilities of the office. He must know the location of groups of foreign settlements in the community, and must become personally acquainted with the boarding bosses, steamship agents and others with whom the immigrant maintains a close contact, as these are his supply depots. No less exacting is the duty of keeping closely in touch with all the foremen in the plant, so that he will know the varying character of the duties of each job in each department. He must also be prepared to fill all the demands made on him for skilled men and technical experts, and must establish his line of communication to these centers of supply. In the most progressive of modern business organizations, the manager of the employment department is given very extensive and final authority. In hiring laborers and filling other places of minor importance he passes final judgment and hires or rejects the man directly. In other cases he retains jurisdiction as to eligibility in all details except as to skill.

Physical examination of employees, he said, was properly another item of employment detail. Usually the complete report of the physical examination is kept in the surgeon's file and only a grade symbol is used in the employment office. The first routine of the employment office, when a man is hired, is the preparation of a service record card, which is kept on file in the employment office. At the South Chicago Works, a man is given a permanent number on his card, and if an ex-employee returns he retains his old number. This simple scheme enables the employment department to determine quickly the number of new men hired during any given period, as new employees are assigned consecutive numbers.

In a paper on the origin of safety methods and prevention of infection, Dr. C. C. Booth, chief surgeon of Republic Iron & Steel Company, Youngstown, declared that it is about as essential to examine men physically for employment as it is to make machines safe to operate. Men incompetent mentally are often injured by leaving safety devices on machines misplaced. While he did not believe that a minute physical examination is necessary, he declared that it is unfair to allow a man to work in an industry if he has certain bodily infirmities that would make him liable to further injury, and that it is unfair to other employees to engage a man to work among them who is suffering from tuberculosis or any communicable disease or infection.

SAFETY AT COKE-OVEN PLANTS

In a paper on safety in coke oven operations K. M. Burr, safety inspector, Illinois Steel Company, declared that because of the increase of accidents in coke oven operations it is time to devote more attention to safety in this field. He said that a government report for 1915 shows that in 38 by-product coke plants, 17 per cent of the employees were injured. At the Gary plant the rate was about one-third of that, but it was felt

that even this rate was higher than it should be. At the Gary plant analysis shows that the hand-labor accidents amount to 35.54 per cent of the total, that 22.89 per cent are due to burns and 16.80 per cent are due to falls. He believes that with the exception of injuries to the eyes, due to flying particles, at least 90 per cent of the accidents were due to the carelessness of the injured workman or others.

He mentioned some of the provisions for safety at the Gary plant, among them the following: At the coal unloading station derails are installed to prevent bumping cars on which unloading crews are working. Steel platforms are provided at the sides of the tracks from which much of the work of poking down the coal in the cars is done, and these furnish a safe and easy way for a man to get into the car. Cables are stretched across the hoppers, preventing men from falling into them. Open lights are not allowed in the crusher building or in the coal conveyor enclosure. Push button stops are provided at convenient places for conveyors. On the ovens the larry cars are equipped with fenders and automatic bells. The chutes are so constructed that when charging a hinged extension swings into place, reducing to a minimum the amount of coal still around a charging hole. The coke is not quenched at the ovens, but is taken in transfer cars to a quenching station.

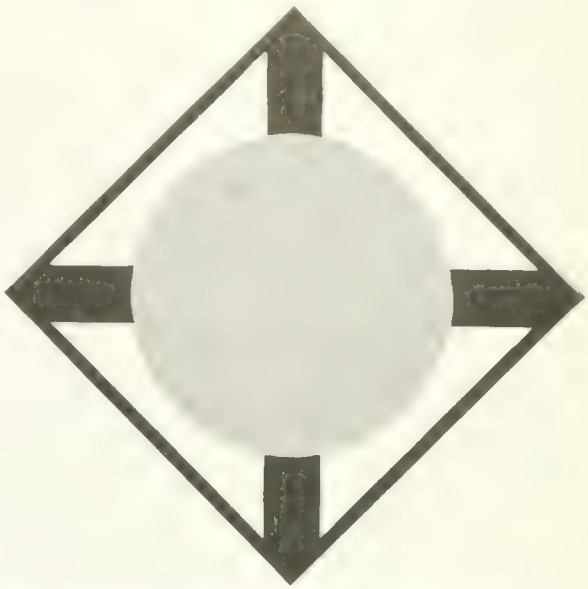
Mr. Burr attributed the high accident rate in coke oven operation to the fact that a large amount of unskilled labor is employed, and the change in operating forces is high, resulting in a large percentage of new men. He held that safety in coke oven operation must begin with the employment of men, care in this respect being a great factor in assuring permanent forces. With the same object in view, conditions should be made as comfortable as possible. In fact, it is impossible to give too much attention to conditions that affect the comfort of the men. Safety committees were effective means of education, but the fact that such committees are active should not relieve the foremen of personal responsibility. Mr. Burr said that agitators are the most dangerous feature of a benzol-recovery plant, and they should by all means be kept out of the still building.

SAFETY IN ROLLING MILLS

In an address on safety in rolling mill operation Charles R. Hook, vice-president of the operating division, American Rolling Mill Company, Middletown, Ohio, declared there are three dominating factors that decide the extent to which the safety movement is successful. They are the company policy, the attitude of superintendents and foremen, and the attitude of the workmen. He found that the policy of companies was favorable to safety work, and they were backing this up with very liberal expenditures for safety devices and safety organizations, but that the results these large expenditures justify have so far not been secured. He believes that without exception the rolling mill companies are furnishing all the mechanical safeguards that can properly be used.

The most important problem in his mind is the building up of an organization of careful men, and he believed some companies have not given this matter sufficient attention. He said that the success of the safety-first movement depends largely on the conditions at home and that the company should interest itself in every problem that will provide men with a sound body, clear eye and brain, and clear standard of morals. Employers should interest themselves in civic movements for better sanitation and better homes.

He did not find the attitude of superintendents and foremen all that could be desired. Too often these heads leave to the safety committee things they should do themselves or think their responsibility is ended



The New Universal Danger Sign—Black Square with Red Center

when they report an unsafe condition. In many cases they violate safety rules and this attitude is reflected in the conduct of the men. If he were a foreman and saw a workman doing something the wrong way he would demonstrate the right way rather than reprimand a man.

Mr. Hook's paper was discussed by P. R. Baker, assistant general superintendent Lukens Iron & Steel Company, Coatesville, Pa., who declared that the problem of safety in rolling mill practice resolves itself into one of carelessness of the lower class of workmen. In his plant by adding safeguards and by safety education, they have reduced accidents about 60 per cent. In spite of safety inspection work, further progress could not be made because of the carelessness of employees. A recent phase growing out of the present labor situation is the constant shifting of low-grade laborers, mostly ignorant of rolling mill work, going from one plant to another and indifferent to safety requirements. The Lukens plan of dealing with this labor is by keeping safety first before the men, with signs, posters, etc., hoping that they will absorb unconsciously some of the teachings.

In an address on electric hazards, D. N. Petty, superintendent of the electric department, Bethlehem Steel Company, thought that plant managers were going too far in placing danger signs on low-voltage apparatus. He believed that the men who had long worked around such equipment without serious injury would show a tendency to ignore similar signs around high-voltage apparatus.

Health Service in Industries

Among the most largely attended meetings were those of the health service section. The industrial surgeon, it was declared, is becoming a specialist in his field and close co-operation was urged between the plant doctor and the employment and production departments. Facts and arguments were presented to show that there has been too much discharging of men. Instead, a man who is not making good on a job because of certain physical defects, or for other reasons, should be put on other work for which he is found to be fitted.

An interesting paper was presented by the chairman of this section, Dr. Otto P. Geier, director of the employees service department, Cincinnati Milling Machine Company, on "A Human Side of Industry or the Scope of an Employee's Service Department." He said that out of the European war and the consideration of our own military preparedness has grown the conviction that industrial preparedness must precede military preparedness, that while lasting peace is supposedly dependent upon a high type of national preparedness, such preparedness is only possible with

a continued constructive industrial peace. Means must be found for the establishment of new points of contact between capital and labor. Many of the finest examples of co-operation between labor and capital are found in personal service departments. Such a department should begin its work along health lines.

In an outline of an employees service department, he included courteous service in the employment department, locker room service, medical service, including physical examinations and education as to the care of the body, sanitation, good toilet room facilities, good drinking fountains, light and ventilation, safety-first work, proper care of injured by plant physicians, an all-day clinic, dental services, sickness and death benefits, lunch-room service with good, clean food at a low cost, banking and loan service to encourage thrift and as a substitute for loan shark, education of the industrial worker and recreational facilities to contribute to the feeling of co-operation and good-will.

Dr. L. G. Shoudy, chief surgeon, Bethlehem Steel Company, in a paper on health education, declared that health education should be the foundation of all safety work and that this education must be started in the home and school. It is as important to protect the human body as it is to place danger signals around dangerous machinery. Employees should be taught to guard the human machine. The foremen should be taught to look after the men's health and to send them to the physician when they need attention. The superintendent should be taught to look after the heat and ventilation. Physicians and nurses should teach personal hygiene and use pamphlets, bulletins and the movies to promote good health.

A very complete system for the physical examination of employees used by the Peoples Gas Light & Coke Company, Chicago, was explained by Dr. Wilber E. Post, chief medical adviser of that company. Dr. E. R. Hayhurst, director of the division of industrial hygiene of the Ohio State Board of Health, in a talk on occupational diseases, said that such diseases should not exist. However, of health complaints, the occupational health complaints, such as strains, aches and pains were most frequent. He said that health conditions must be improved so that American plants would be in a better condition to meet foreign competition.

COMPULSORY HEALTH INSURANCE

A subject that attracted a great deal of attention was that of health insurance, which was discussed by A. W. Whitney, general manager, National Workmen's Compensation Service Bureau, New York City. He said that following the general establishment of workmen's compensation, health insurance comes before a public that is open-minded and ready to believe in it. However, various problems will have to be solved in placing health insurance in effect, such as whether it should be voluntary or compulsory and how the burden should be divided. A voluntary system has not been successful in Europe and he believes that a compulsory health insurance is warranted, as health is a matter of public concern. However, health insurance should not be adopted out of a public conscience but should have the approval of both capital and labor.

Various occupational diseases should be charged to the industries that cause them in the same way as industrial accidents are charged to the industries. Charging health insurance to the employer would cause him to take an interest in the health of his employees. Both employer and employees must co-operate in the matter. He opposed the health insurance plan of the American Association for Labor Legislation for dividing the cost of health insurance among employer and employee and the State and having it administered by local mutuals. He believed that industries should bear the burden of health insurance, the cost being divided between capital and labor, with none or little of the burden thrown upon the State, and that the State machinery used in connection with workmen's compensation should be used to administer health insurance laws. In the discussion S. W. Tener expressed the opinion that before health insurance is provided the State should go much further in eliminating occupational diseases. The statement was also brought out that the average worker is not getting adequate medical and surgical attention and that the price is prohibitive.

HIRING AND FIRING AT FORD PLANT

Some startling figures relating to the employment department of the Ford Motor Company was presented by Samuel S. Marquis of the department of education of that company in a paper on "The Company Doctor." Formerly at the Ford plant men were hired and discharged by the superintendent and foremen. Under this system 52,445 were hired in 1913 to keep up a force of 14,000 men. About 50,000 left, over 14,000 of these being discharged, the company's force of employees not being materially increased during that year. During the past fourteen months with an average of 30,000 men employed, only 5 men have been discharged and 5,680 left voluntarily. This remarkable change has resulted from the present system of taking the hiring and firing of men from the superintendent and foremen and transferring men from one department to another, or to different work in the same department. Often a man is transferred several times before work is found for which he is fitted.

L. A. Phelps, superintendent of insurance and maintenance, Avery Company, Peoria, Ill., gave a talk on employment, medical supervision and safety, advocating medical supervision of workmen so that they may be kept in good physical condition. He urged that the plant doctor keep in touch with the men. If one kind of work affected a man's health, he should be put on a different job. He advocated close co-operation between the doctor and the employment department and foremen. That his company has had little labor trouble during the present scarcity of labor he attributed to the system of employment, medical inspection and safety methods followed.

SUPERVISING OTHER THAN OCCUPATIONAL DISEASES

In a talk on industrial hospitals and dispensaries, Dr. R. C. Cabot, Boston, Mass., discussed the question of giving medical attention to workmen for other than occupational diseases. He thought that an admirable solution of this problem was for the family doctor to attend to cases of this kind and have the factory nurse visit the patient and make reports on his case to the plant surgeon so that the latter would know that the man was securing proper attention.

A further contribution to the subject of medical supervision of workmen was made in a paper by Dr. Harry E. Mock, chief surgeon, Sears, Roebuck & Co., Chicago. He presented in a diagram a plan for a health of employees or human maintenance department, which included a sanitary engineer, safety engineer, medical staff, visiting nurses and employees' advisers, all under the general manager. He said that this system could be employed in a plant employing all the way from 300 to 50,000 men. In the case of a small plant an employee could be taught to fulfill the duties of a sanitary and safety engineer and a physician devoting a small portion of his time to the plant could take the place of the medical staff. S. W. Ashe, General Electric Company, urged that plant managers come in closer contact with surgeons, as by so doing the latter would give very good advice regarding improving plant conditions. He thought if plant surgeons were given more authority much more would be accomplished in health work. In this connection the statement was also made that plant physicians and surgeons would be able to accomplish much more if they become familiar with plant departments and manufacturing methods. While both medical supervision and physical examination were favored, the statement was made that physical examination in many plants is only a farce and that it should be made more thorough.

The Exhibition of Safety Devices

The commercial exhibit of safety devices was held in the Detroit Armory and was in charge of C. E. Hoyt, who has charge of the exhibits in connection with the convention of the American Foundrymen's Association, and E. C. Hall, who has long been his assistant in foundry exhibition work. Pictures of welfare and accident prevention work in and around Detroit were

shown by the Detroit Board of Commerce and a large educational exhibit was shown by the National Safety Congress. A model of its Detroit plant shown by the Ford Motor Company attracted considerable interest. Among the exhibits of interest in the iron and steel industry were the following:

Allen Mfg. Company, Hartford, Conn., set screws; Chicago Eye Shield Company, Chicago, goggles; Detroit Fuse & Mfg. Company, safety switches; Commonwealth Steel Company, Granite City, Ill., safety devices; The DeVilbiss Mfg. Company, Toledo, Ohio, air system of painting and varnishing; F. A. Hardy & Co., Chicago, Julius King Optical Company, New York, and Strong Kennard & Nutt Company, Cleveland, safety goggles, etc.; Krantz Mfg. Company, Brooklyn, N. Y., safety devices for electrical equipment; Mine Safety Appliances Company, Pittsburgh, safety appliances; Multi-Metal Separator Screen Company, New York City, sand blast helmets, etc.; New Jersey Zinc Company, safety devices; Norton Company, Worcester, Mass., protected grinding wheels; Oliver Machinery Company, Grand Rapids, Mich., guards for saws and other machines; Joseph T. Ryerson & Sons, Chicago, models of safe stairs; R. P. Smith & Sons Co., Chicago, molders' shoes; Surty Guard Company, Chicago, guards for presses and saws; Thompson Electric Company, Cleveland, cut-out hangers for electric lights; Walsh Press & Die Company, Chicago, punch press guard.

A Record Car Shortage

The *Railway Age Gazette*, in an editorial in its current issue, publishes statistics showing that the shortage of freight cars on the first of October of this year was the greatest that ever existed on that date; but from an analysis of the reports of the American Railway Association for the last 10 years it finds that the peculiar conditions existing this year are such as to warrant an optimistic view of the situation. The net shortage as reported for Sept. 30 is 61,030 cars, distributed about proportionately to their numbers among all classes. The *Gazette* says:

"It is, of course, well understood that the reason for shortages occurring in October or early in November, if they occur at all, is that that month generally represents the period of heaviest grain movement. Somewhat paradoxically, this year it is the grain movement that has in part occasioned the shortage and at the same time kept the shortage from being worse than it is. On account of abnormal conditions prevailing in other countries there was a large early movement of grain by rail. There has also been a special demand for cars for other purposes, especially coal cars and gondolas. This created a demand for cars which afforded premonitions of a shortage earlier in the season than symptoms of shortage ordinarily appear. The net result of the early grain movement, however, was to afford relief for the condition of which it was a symptom. The extraordinary demands for equipment to carry other material would not have existed but for abnormal conditions abroad.

"But an outgrowth of the same cause that brought about the earlier movement of grain in 1916 reacted to slow down the movement later. The demand for grain for export coupled with a partial deficiency in the crop resulted in prices for some grains, particularly wheat, soaring to an unprecedented height. Many farmers are only now marketing their wheat at $1.50 a bushel and many of them are still holding their supply for $2.

"On the whole, then, this incipient shortage may be regarded with mixed feelings, notwithstanding the necessity of putting forth every effort to prevent it from growing to more serious proportions. It has been said before by the *Railway Age Gazette* that a car shortage is not all bad, because it is an unmistakable evidence of transportation prosperity. It is particularly so when by reason of unusual conditions the body of traffic that tends to cause a shortage is spread over such a period that the maximum of business may be handled with the minimum of disturbance. And under these conditions the precautions that are to be taken to prevent a threatened shortage from becoming a serious matter can be taken effectively with but little effort upon the part of each responsible individual."

POWER FOR STEEL MILLS

Analysis of Conditions Affecting the Purchase of Electrical Energy

From a report of the central station power committee of the Association of Iron and Steel Electrical Engineers, submitted at the recent meeting in Chicago, the following has been taken:

The rate schedule of 20 power companies furnishing power to steel mills has been obtained. To permit comparisons the net resultant rates for 1000-kw. and 5000-kw. loads at 50 per cent load factor were calculated, which calculations gave the following results:

Net Rates per Kw.-Hr. at 50 Per Cent Load Factor

	Maximum	Minimum	Average
1000-kw. demand	1.246c.	0.700c.	0.9417c
5000-kw. demand	1.060c	0.667c	0.8454c

The demand, including the effect of power factor upon it, is just as important a part of a proper rate schedule as is the energy charge. A mill with a load factor of 70 per cent and a power factor of 80 per cent or better can be served at much less cost than a mill having a load factor of 35 per cent and a power factor of 50 to 70 per cent.

Rate schedules should be as simple as possible and avoid complicated systems of rates and discounts for varied load factors and consumptions. Where the mill can so adjust its operations as to permit keeping off the central station peak there should be a lower rate than for peak service. Some of the power companies reporting charge only 50 per cent of the peak demand rates for off-peak service only.

We recommend that in negotiations for central station power service, and in order to obtain most favorable rates to the purchaser, it be insisted that the rate schedule be divided into demand charges and energy charges; that the demand be the average or integrated peak of 15 to 30 min. duration; that the power factor be 80 per cent, with decrease or increase in the demand to be charged for accordingly as the power factor is above or below 80 per cent; that the demand charges per kilowatt be in two or more steps; that the energy charges per kilowatt-hour be in two or more steps; that any excess demand occurring at other than the peak period of the power company's plant be charged at only one-half the demand charge normally applying for such excess if occurring on the power company's peak period. With rate schedules on the basis recommended, the mill engineer will obtain the benefits due to good operating conditions and not be obliged to pay for the poor conditions of another consumer's load.

The user of electric power is enabled to collect engineering data, such as capacity of machines, load curves, power requirements, maximum demands and power consumption, and, in addition, to provide a means of analyzing the cycles of operation throughout the plant. With such records, the central station can accurately determine the requirements of steel mills and negotiations for the sale of power are greatly facilitated.

The power requirements in steel mills range from 1000 to 10,000 kw. or more. A fair average is about 4000 kw. The load is characterized by large peaks. Where alternating-current service is used the power factor will vary from approximately 65 to 80 per cent. Large generating capacity is required to provide service of the proper regulation.

Table No. 1 has been compiled from data obtained from a number of steel mills, and shows the generating capacity actually installed, together with the connected load in motors and lighting.

APPLICATION OF CENTRAL-STATION POWER

In all large modern central stations the power is generated and transmitted as alternating current at a voltage considerably higher than is permissible for use around a plant. At the receiving end of the transmission line this power must be retransformed to at least two and generally three lower alternating-current voltages, namely: 6600 or 2200, 440 or 220, and 110; and where direct-current power is used further transforma-

tion is required from alternating current to direct current.

The 6600-volt or 2200-volt current is used for driving the synchronous motor of the motor-generator sets, the large motors driving the mills and some of the larger auxiliaries, say from 100 hp. up for the 6600-volt and 50 hp. up for the 2200-volt for driving pumps, fans, blowers, etc., in those locations where these voltages can be used without endangering life and property.

direct-current power is used, the exceptions being where variable speed and dynamic braking are required. The direct-current motors are so much better adapted for this class of service that the disadvantage of greater conversion loss is more than compensated for by their flexibility and adaptability.

The ratio of alternating current to direct current used will vary greatly in different plants, depending on so many factors that no standard can be set. In general,

TABLE 1.—GENERATING CAPACITY ACTUALLY INSTALLED WITH CONNECTED LOAD

Generating Capacity			Connected Load			Kw. Connected per Kw. Generating	Kw.-Hrs. per Year	
		Largest	Motors		Light			Per Kw.
Total Kw.	No. Unit	Unit	No.	Total Hp.	Kw.	Total Kw.	Total	Connected
10,400	8	3,500	950	49,700	750	44,565	4.28	27,072,000	607
1,650	3	550	202	6,870	125	6,171	3.74	4,325,000	700
9,500	8	2,500	730	26,570	490	23,871	2.51	38,725,000	1,622
10,650	8	2,000	464	20,640	490	18,653	1.75	30,548,000	1,638
6,450	8	3,000	1,280	37,790	750	34,005	5.28	18,950,000	558
15,400	11	2,500	252	9,787	146	8,759	0.568	73,117,000	8,350
400	1	400	72	1,654	125	1,580	3.95	68,000	43
2,000	5	400	400	11,525	268	10,705	5.35	9,970,000	931
500	2	250	90	1,947	84	1,747	3.59	980,000	545
2,200	4	550	264	4,531	120	4,106	1.87	5,432,000	1,323
475	3	225	66	1,131	56	1,051	2.21	1,219,000	1,159
250	2	200	8	135		174	0.697	.....	...
2,150	4	550	398	13,117	220	11,763	5.46	7,594,000	646

For the remaining auxiliaries the alternating-current voltage is further reduced to 440 or 220 volts. Motors wound for these voltages have a wide range of application, covering almost all classes of service in the mill, especially where constant-speed characteristics are required.

For lighting 110-volt is generally used and transformed from either of the above voltages. In all of the above transformations a certain percentage of the initial purchased power is lost, the magnitude of the losses being in the order of the motor-generator sets first, the rotary converter second, and transformers third and least.

In some contracts for central-station power the power paid for is that which is delivered to the high-tension side of the transformers connected to the transmission lines, the power being measured on the low side of the transformers, the wattmeter readings on the low side being multiplied by a constant or multiplier which takes into account the transformer losses. In contracts of this class the purchaser pays for transformation losses. In other contracts the power paid for is that which is delivered on the low side of the stepdown

in those plants where power is purchased and where there are many cranes and variable speed drives direct current will probably predominate for auxiliaries about in the ratio of 60 per cent direct current to 40 per cent alternating current for voltages of 440 alternating current or less and 250 direct current.

The alternating current is suitable for driving fans, pumps, hot saws, cold saws, conveyors, straightners, drill presses and possibly some mill tables. Alternating-current motors are not favored for table drives, for the majority of them require a wound rotor type of motor, which, as a rule, is more difficult to repair than a direct-current armature, and the direct current is better adapted to heavy table work.

Direct current will be used for cranes, tables, charging storage batteries, electrolytic work and variable speed motors, especially those used for driving machine tools. The type of winding to use will depend on the nature of the load and the results sought. This subject was discussed in a paper read before this association by R. B. Treat in Milwaukee in 1912.

In general, the use of alternating-current motors is recommended where constant-speed, non-reversing

TABLE 2.—PERCENTAGE LOSSES INCURRED IN DISTRIBUTING CENTRAL-STATION POWER FROM RECEIVING STATION TO PLANT FEEDER STATION BUSBARS

	Original Power Delivered by Transmission Line	Transformer Losses from 11,000 Volts to 6600, 2200 Volts	Transmission Losses from 11,000 Volt Transformer to Feeder Station	Transformer Losses 6600 or 2200 Volts to 110 Volts	Transformer Losses 2200 to 110 Volts to 110 Volts	Rotary Losses	Motor-Generator Set Losses	Net Power Delivered to Feeder Station Bus Bars	Increase in Initial Cost of Power
Mill drives	100	2.5	2.5					90.2	11.9
Alternating-current auxiliaries	100	2.5	2.5	2.5				87.9	13.8
Lighting	100	2.5	2.5	2.5	3			85.2	17.4
Rotary converters	100	2.5	2.5	2.5		12		83.1	20.3
Motor-generator sets	100	2.5	2.5	2.5			12	79.4	26

transformers, the power company paying the losses of the first transformation, the purchaser paying for all others.

A summary of the losses is given in Table No. 1. A study of Table No. 2 would indicate that in deciding on the motor equipment that that equipment should be selected which would entail the least losses to the power delivered to the motors. If this was followed out without regard to other conditions we would select 6600 or 2200 volt apparatus; but physical and safety considerations limit the use of those voltages, and consequently only a relatively small number of the total motor equipment can use them.

Our next choice, so far as efficiency goes, would be for the 440 or 220 volt alternating-current auxiliaries. These can be used in almost all applications where

conditions obtain, and the direct current where large starting torque, quick-reversing and acceleration, variable speed or dynamic braking are required.

Aluminum powder has been added to the list of British import prohibitions under a proclamation of Oct. 3. The following articles have been removed from the list of prohibited exports to all destinations, according to a cablegram to *Commerce Reports* from the American consul general at London dated Sept. 30: Iron and steel plates and sheets, steel flats, rounds and squares, except carbon steel for tools and steel for mining purposes. From prohibitions to all non-British destinations the following have been dropped: Steel and steel articles containing chrome, cobalt, nickel or vanadium.

Structure and Properties of Steel Ingots*

Analogy Between Stearine and Steel—Crystalline Structure and Its Effects —Shrinkage and Contraction Cavities

BY A. W. AND H. BREARLEY

WHEN steel, or any other crystalline substance, is cast into a mold the freezing commences from the inner surfaces, supposing the substance is quite fluid to begin with. Assuming the mold to be made from cast iron, and its cross section a square, then freezing in any plane occurs more rapidly at each of the four corners than elsewhere; and the crystals lying in and about the corners, in consequence of the rapid cooling, are comparatively small ones. Crystals grow also from the sides of the mold, but as their growth sideways is hindered by the adjacent crystals, and their growth forward into the fluid mass is less restrained, they become long and narrow in shape. A boundary to the cooling effect of each side of the mold is visible on a polished and etched specimen, or on a fractured surface, as junction lines lying diagonally on the square.

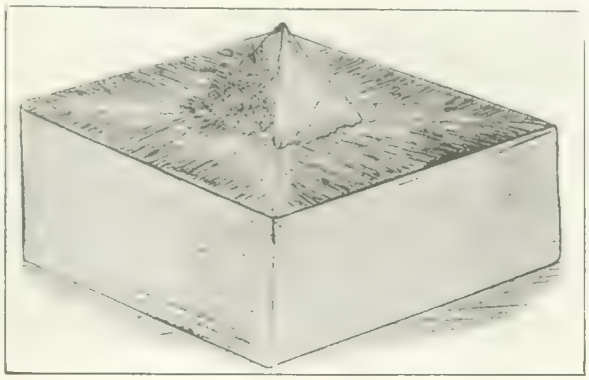


Fig. 1—Partly Exposed Base Pyramid of a Stearine Ingot

In the same way from the bottom of the mold, which is assumed to be flat, crystals grow also upwards until they meet those crystals growing from the sides of the lower part of the mold. In the same way the cooling effect of the atmosphere on the free upper surface would cause crystals of the same narrow kind to grow downwards until they also terminated on the surfaces of a four-sided pyramid, assuming, of course, that the fluid material froze quickly, and was not disturbed at the upper end by shrinkage cavities or segregation effects. The influence of segregate plus contraction cavities would account for a great deal of the observed weakness along the diagonal planes, and it is not possible, apart from this influence, to determine how much of the observed weakness is due only to the crystalline arrangement.

INGOTS CAST WITH MOLTEN STEARINE

These general observations can readily be verified and illustrated by means of ingots cast with molten stearine. As we have formed a very high opinion of the use of stearine for this and other similar purposes it is desirable at this stage to refer to the very natural prejudice against applying to steel ingots deductions drawn from the behavior of stearine. To make experiments with steel is no doubt the most reliable way of learning about the changes which occur during the casting and solidifying of steel ingots; but it entails a costly plant. There is also no method of determining the temperature of molten steel with satisfying accuracy.

With a few pounds of stearine, a pan of water, a beaker, a bunsen burner, a few tin molds, and considerable patience, a great number of observations can be made to illustrate, extend, and also, in some respect, to correct prevailing notions about steel ingots. To increase respect for observations along these lines and cautious interpretations thereof I need refer only to the very striking operation of removing the base pyramid.

Those engaged in making ingots for the manufacture of ordnance are aware that for some years it was usual in many works to cut discs from the ends of ingots or billets and after polishing to etch them. On many such discs the etching revealed a ring of white spots which were really ferrite areas segregated about slag globules. The nearer the base the disc was cut the larger the ring of white spots. Though the white ring appeared frequently during the few years such observations were being made, no steelmaker, within our experience, would admit that a well-formed cone, such as could be dislodged from a stearine ingot, Fig. 1, could ever exist in a steel ingot. Eventually, however, a steel ingot weighing about 8 cwt. was cast in such a way that it was held fast at each extreme end. When cooled under such conditions the ingot naturally cracked across the weakest part, and produced the cleanly separated cone reproduced in Fig. 2.

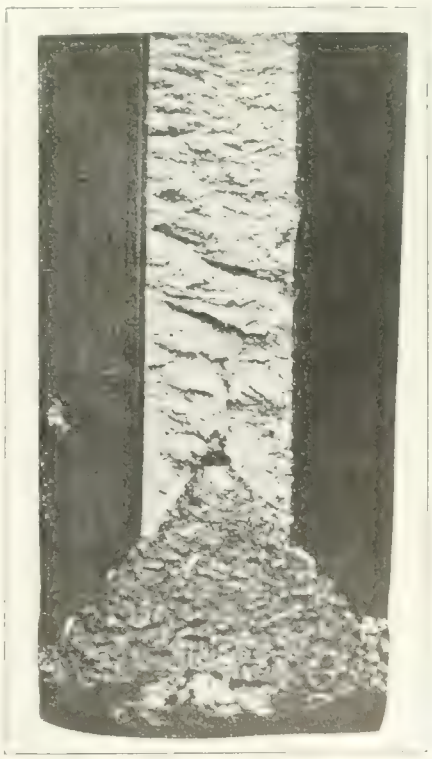


Fig. 2—Exposed Pyramid in the Base of a Steel Ingot

In a round ingot the crystals growing from the bottom of the mold are formed into a cone, and in an octagon ingot they form an eight-sided pyramid. In each case the base pyramid is longer or shorter, depending on the cooling effect of the bottom in relation to the cooling effect of the sides.

THE GROWTH OF CRYSTALS

The growth of the elongated crystals originating at the surface of an ingot mold depends on circumstances, which appear to be somewhat contradictory, *i.e.*, they are favored sometimes by slow cooling and sometimes by rapid cooling. So long as the fluid in the interior of the partly solidified ingot remains quite liquid, the crystals already growing from the sides of the mold increase in length as the temperature of the liquid about their extreme ends falls to freezing point. The act of freezing liberates heat, which is either stored up in the fluid or dissipated *via* the solid crystals, through the sides of the ingot mold. If the crystals are

*First portion of an abstract of a paper presented at the autumn meeting of the Iron and Steel Institute, in London, Sept. 22, 1916.

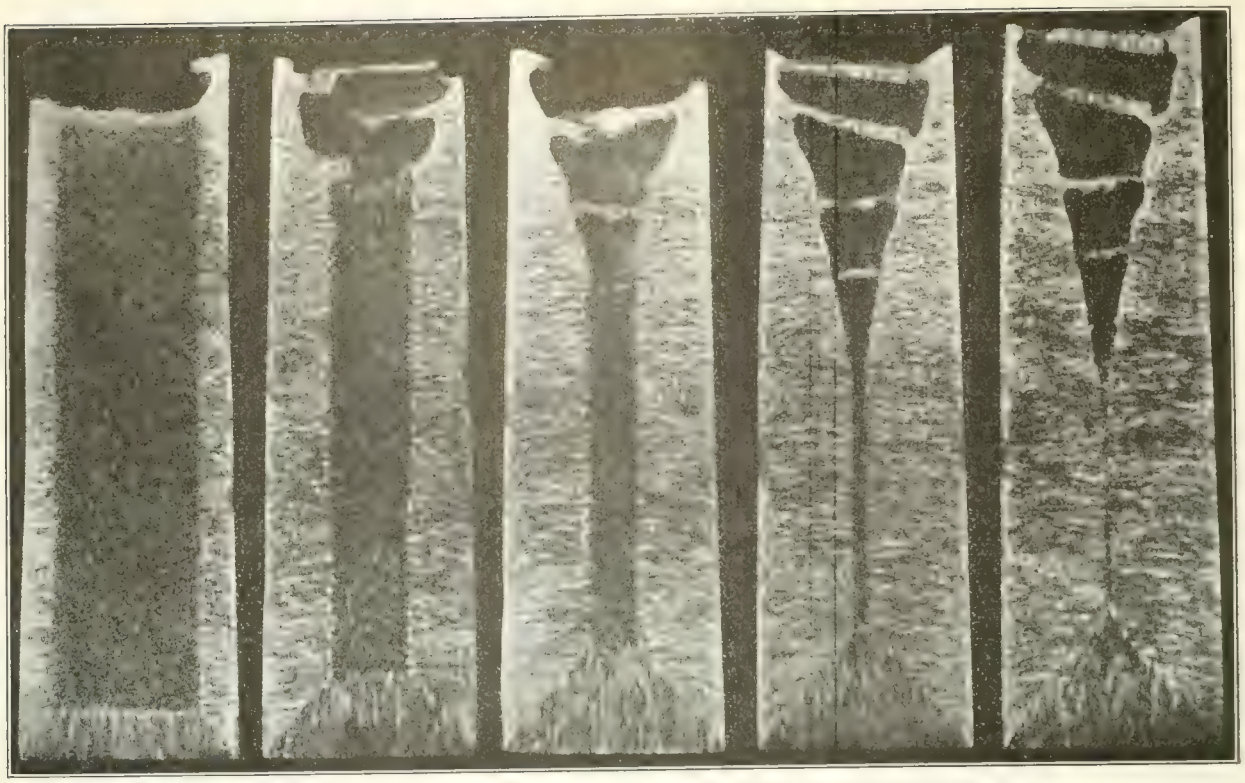


Fig. 4.—The Symmetrical Freezing of Steel Ingots Illustrated by Stearine Ingots

bad conductors of heat the cooling is necessarily slow, whatever the properties of the ingot mold may be, and the fluid in the center of the ingot remains clear almost to the last drop, while needle-like crystals extend to the center.

But if the crystals themselves are good conductors of heat, then the heat liberated as they form and also the heat from the fluid interior is rapidly dissipated through them. In this way the temperature of a large volume of fluid may reach its freezing point in many places simultaneously, before the crystals growing from the sides can extend to the center, and thus the interior of an ingot would consist of crystals which had grown from independent centers and were developed in haphazard ways in all directions.

Of crystallizable substances, therefore, which are clearly liquid when cast, those that are very poor conductors of heat will form crystals of the same kind from the surface inwards if allowed to cool undisturbed. But steel, on the other hand, which is a good conductor of heat, will form crystals of the same kind from the surface to the center of the ingot, only if the cooling takes place very quickly or very slowly. In the former case the crystals grow into the clear liquid and extend themselves rapidly as its temperature falls to freezing point. In the latter case, however, the cooling is so slow that, owing to its high thermal conductivity, the temperature of the fluid mass becomes practically uniform throughout, and then a crystal is as likely to start growing in one place as in another, the result being irregular and approximately equiaxial crystals.

Elongated crystals occur most frequently in steel cast in chill molds of narrow section, and the equiaxial crystals in steel cast in dry sand molds. Obviously there exists a great number of instances where both kinds of crystals occur in the same ingot, the exterior crystals being needle-shaped while the interior ones are equiaxial.

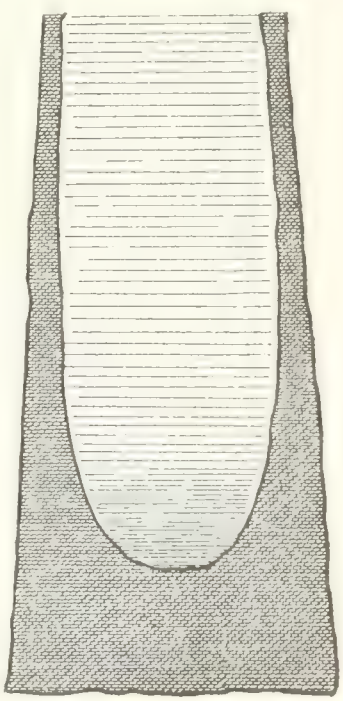


Fig. 3.—An Accepted Representation of the Freezing of Steel Ingots

SHRINKAGE AND CONTRACTION CAVITIES

If we imagine an ingot mold filled with fluid material that could be cooled with perfect uniformity down to its freezing point, we should find that the level of the fluid would gradually sink as the fluid cooled and shrank. If at this point the fluid were to solidify instantaneously without change of volume we should have a solid ingot. But neither stearine nor steel behave in this manner, and cavities due both to shrinkage of the fluid and contraction of the solid materials exert a great influence on the economic production of ingots, and have to be reckoned with.

That the freezing of an ingot takes place by a continuous thickening of the solid envelope in planes parallel to the cooling surfaces of the solid is not unanimously admitted. The illustration given in Fig. 3 has been reproduced and approved as a representation of the freezing of steel ingots. It is, however, so far as the authors' observations go, a misleading representation of steel ingots and an inaccurate representation of the freezing of any crystalline substance, metallic or otherwise.

If a series of stearine ingots are cast simultaneously from, say, 65 deg. C. in square molds, in all respects identical and widely spaced apart so that each cools freely, then on piercing the top and inverting one of them after 15 minutes and a further one after each additional 15 minutes, we are left with a series of shells of gradually increasing thickness, but in each case the shape of the cavity out of which the fluid wax was emptied corresponds to that made by the inner walls of the mold.

The same fact can be demonstrated in a more elegant manner by gradually planing down a single ingot parallel to one of its faces. After a few strokes with the plane the sectioned surface exhibits an envelope lying around it. The thickness of the envelope increases as the planing proceeds just as it did when the ingot was freezing, but it remains quite

symmetrical in all parts, as may be seen from the series of photographs reproduced in Fig. 4. Also it thickens parallel to the cooling surfaces and forms where the bottom and sides intersect a sharp corner, and not the conventional curve seen in Fig. 3.

That steel behaves in a precisely similar manner is known to those furnacemen who have opportunities now and again of seeing ingots broken up that have been upset or otherwise accidentally and completely bled. Photographs are shown in Fig. 5 representing a crucible steel ingot that was intentionally inverted, and a much larger ingot from a series prepared by Talbot. When freezing takes place in the interior of the fluid mass, and not merely by direct thickening of the walls, the above conditions do not apply.

INGOTS CAST IN STRAIGHT MOLD

An interesting feature is exhibited by many ingots cast in straight-sided molds as distinct from taper molds used with either the narrow or wide end up.

When sufficiently removed from the cooling influence of the closed bottom and the open top of an ingot mold the freezing of any horizontal section of the fluid ingot may be regarded as due to loss of heat through the sides of the mold. When the mold has the same cross-sectional dimensions from top to bottom the crystals growing from the sides in any one plane are as likely to meet in the center as soon as those growing in any other plane.

In both commercial stearine wax and in steel a plane of the material may be all but rigid, quite too rigid at the center to flow downwards, but requiring still to contract over its entire area. The material next the ingot mold is coldest and most rigid, and if the unavoidable contraction cannot pull the flat outer surfaces inwards, the assumed plane must split at the center where the material, all but set, offers little resistance.

The result is a small central cavity with no material above it fluid enough to flow downwards, and the net effect in an ingot of this kind is a number of cavities roughly spherical in shape, lying in the axis of the ingot. For shrinkage or contraction cavities of this kind an increased length or breadth of feeder head is a doubtful remedy.

An ingot which has quite set and is still hot contracts in volume on cooling, but as the outer surface of the ingot is hard, and will not yield much, the stress of contraction will be satisfied, wholly or partly, by the formation of internal cracks or cavities in those positions where the resistance is least. In a solid ingot there are certain planes of weakness, due to the arrangement of crystals, which converge from the corners of the mold toward the axis of the ingot. An ingot is therefore easily split along its axis by tensional forces acting at right angles to its length; and it is further induced to yield to such forces by the fact that the ingot is hotter in the center and weaker also on that account. This explanation accounts equally well for axial cavities and cracks formed just before or just after complete solidification.

From the moment that a solid envelope is formed about the liquid the crystals growing from the sides of the mold form planes of weakness where they meet each other obliquely, and it is along these planes that contraction cavities are located. They are easily seen when a stearine ingot, cast under favorable conditions, is split diagonally along its length, as reproduced in Fig. 6, after planing an ingot down until a diagonal section is exposed. These cavities all converge to the center of the ingot, and appear to depend on and originate from an axial cavity. But in addition to cavities that are obvious to the naked eye it is not unusual in steel ingots to find cracks running between the crystals at right angles to the surfaces of the ingot mold.

Radial cracks may occur in steel ingots which do not exhibit elongated crystals on a fractured surface. When a disc cut from a large steel ingot weighing 40 or 60 tons, or from a circular billet which has been forged from such an ingot, is polished and etched with a very dilute solution of nitric acid in alcohol, the intercrystalline cracks are located by the evolution from them of small gaseous bubbles. That the gaseous bubbles may escape more easily it is advisable to arrange the disc with the polished face in a vertical position and wash it over by means of a broad camel-hair brush with the etching fluid; small strings of bubbles then run with the solution down the face of the disc from one or two or maybe a score or more cracks. The objectionable features of contraction cracks are emphasized by segregation or slag occlusions, and these as well as the amount of hot work done in the forging determine whether or not the crack will weld up. Fig. 7 represents the kind of radial crack we are speaking of as it existed in a 30-in. billet. The light-colored spot is a transverse section of a miniature ghost, and when these occur in groups the cracks will generally pass from one to the other, as in the other photomicrograph, Fig. 8, as the small slag globules or streaks of slag, around which the ghost forms, have already broken the continuity of the metal.

If the material in which the cracks appear is not weldable, then it is also not forgeable, and will crumble under the hammer. This explains why some alloy steel ingots may not be forged, whereas others of the same composition, but melted and cast under different conditions, forge fairly well. The number and magnitude of the cracks would obviously be increased if the steel had air-hardening properties.

CASTING TEMPERATURES AND SCORCHING

When a crucible steel ingot breaks with a needle-like fracture it is said to be "scorched," and scorching is said to be due to the molten steel having "had too much fire." A furnaceman does not generally commit himself by saying whether the steel has been for too long a time in the furnace or at too high a temperature. He may not know; but he does know a scorched ingot can be broken across with remarkable ease, and that he will very likely get into trouble if he makes many such ingots.

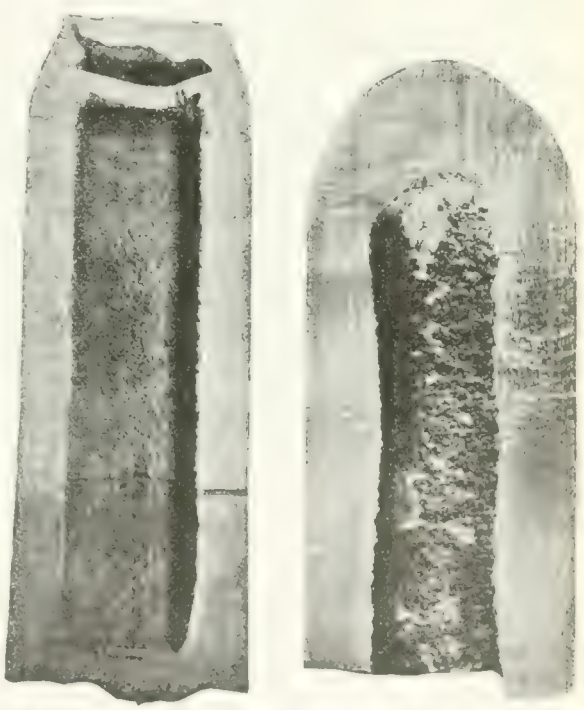


Fig. [illegible] Appearance of a Large Steel Ingot After Bleeding and a Crucible Steel Ingot Intentionally Inverted

Scorched ingots are objectionable only on account of their fragility, due to arrangement of the crystals in definite directions, and the extended contraction cavities which may arise. This is, of course, a serious objection, because unless the scorched ingot, after reheating, is very carefully, and, to begin with, very gently forged the weakness between the well-developed crystals will cause cracks to form at the corners of the forged bar.

The internal structure of a "cold cast" ingot is unlike that of a hot cast ingot, because in the former case the centers of crystallization are dispersed throughout the entire ingot instead of being confined to the

inner surfaces of the mold or the solid metal envelope already formed from it. The crystals therefore do not grow in planes but in all directions, and form spherical clusters floating in the fluid like seed-pods of a dandelion floating in still air. The clusters of solid crystals are heavier than the fluid steel and tend to sink to the bottom of the mold.

To express in definite figures the influence of varied casting temperature on the mechanical properties of steel would involve an enormous amount of labor and require great experimental skill. It would, for example, not suffice to machine test pieces out of an ingot, because the defects to be looked for would sometimes be in the test piece and at other times not; and even if it were practicable to machine always a test piece containing a typical defect it would be quite impossible to arrange for the defect to occupy the same relative position in every test piece, and therefore the tensile properties of the test pieces would vary among themselves without indicating any corresponding variation in the ingots from which they had been prepared.

The least objectionable form of test piece is the ingot itself. But as commercial ingots are not amenable to the requirements of testing methods and machines, and as, further, there is no handy means whereby the casting temperature of steel can be accurately measured, we are obliged to content ourselves with ingots cast respectively at 56 and 54 deg. C., the latter being alost twice as strong, and this is confirmed by the appearance of the fractures, which show a marked difference within this short range of casting temperature. The ingots cast at 54 deg. C. have a granular or finely crystalline structure, while those cast at 56 deg. C. and over show scorch. This observation is quite in line with the behavior of small steel ingots, both as regards appearance of fractured surfaces and mechanical strength.

Table of Net Breaking Loads on Stearine Ingots Cast at Different Temperatures

Casting Temperature. Degrees C.	Breaking Load in Grammes— 1	2	3	4	5	Average
[illegible]	1618	..	..	..	..	..
75	1671	..	..	..	..	..
[illegible]	1551	..	..	..	..	..
[illegible]	1220	..	..	..	..	..
64	1292	1155	1208	..	..	1218
[illegible]	1048	1009	..	..	..	1029
60	1224	1274	1185	..	..	1222
58	982	1069	1088	..	..	1026
56	1[illegible]	1155	1[illegible]	1[illegible]	..	1512
54	27[illegible]	29[illegible]	2783	3193	3127	2938

	Gram.
One minute after reaching 54 deg. C.	3250
Two minutes after reaching 54 deg. C.	3224
Three minutes after reaching 54 deg. C.	3021
Four minutes after reaching 54 deg. C.	2995
Five minutes after reaching 54 deg. C.	3101
Six minutes after reaching 54 deg. C.	2929



Fig. 6—Diagonal Contraction Cavities in a Stearine Ingot



Fig. [illegible] Between Slag Inclusions

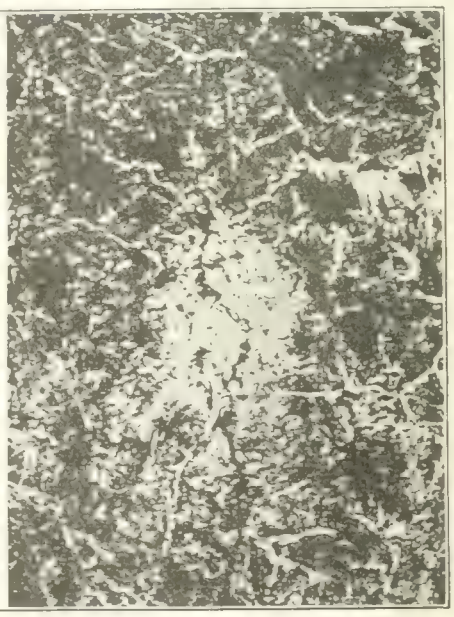


Fig. 7—Radial Crack in a 30-Ton Steel Ingot

general statements to the effect that the casting temperature of steel may be too high or too low to produce the best results. When it is remembered that the correct, *i.e.*, the best casting temperature, differs from one material to another, and for the same material according to the weight and dimensions of the ingots, to say nothing of foundry castings, there appears to be ample room for the exercise of the art as distinguished from the science of steel making.

STEEL AND STEARINE TEMPERATURES CONTRASTED

But in making wax ingots the variable conditions are controllable with that degree of accuracy which yields confirmatory results from duplicated tests, and as the behavior of stearine wax in so many respects is comparable to that of steel it may be possible by its aid to confirm the general statements alluded to in the preceding paragraph, and also, by analogies carefully drawn, to add something to it.

[The author describes his ingenious method and apparatus by which he made stearine ingots at definite temperatures and tested their strength. His comments and table of results follow.]

The most noticeable feature in this series of results is the great increase in strength between those

The increase in strength when the casting temperature reaches 65 deg. C. is also notable and not especially difficult to understand. It is to be expected that, all other conditions being equal, a rise in the casting temperature alone would cause the ingots to become gradually weaker, but a rise in casting temperature disturbs the other conditions, and more especially the rate of cooling, so that an ingot cast with wax at 58 deg. C. into a thin mold might at once have a solid envelope formed around it by the cooling action of the mold; whereas when cast from a higher temperature the heat lost in cooling the mold might depress the temperature of the fluid wax to 58 deg. C. without causing a solid envelope to form around it. The rate of cooling in the two cases would then vary, and the latter would be more or less disposed to form the stronger equiaxial crystals depending on the thermal conductivity, specific heat and mass of the ingot mold, and on the relative thermal conductivity of the fluid and solid ingot material. It is therefore likely that at some temperature well above the freezing temperature a wax ingot or a steel casting would become stronger, but the rise in strength would not occur at the same temperature of course except under identical experimental conditions.

(*To be Continued*)

IRON CARWHEEL MAKERS MEET

Manufacturers Hold Annual Meeting—Interesting Address by President Lyndon

The Association of Manufacturers of Chilled Carwheels held its annual meeting in New York City, Oct. 17. Following are extracts from the address of the president, George W. Lyndon:

President's Address

"The work of our association the past year has been based upon the recommendations made to the Master Carbuilders' Wheel Committee during 1914, at which time we not only outlined a plan of procedure for the improvement of the chilled iron carwheel by which the safety element stood out prominently, but accompanied our recommendation with full data pointing out the weaknesses of the present Master Carbuilders' standards and gave our reasons for recommended changes based upon the knowledge acquired from service records and the lifelong experience of the manufacture and service of the chilled iron wheel. Our recommendations were substantially as follows:

WHEEL WEIGHTS SHOULD BE INCREASED

1. An increase in the weights of the 625 and 725-lb. M. C. B. wheel.
2. An 850-lb. wheel for cars of 140,000 lb. capacity.
3. A flange for the 850-lb. wheel for use under the 70-ton cars, with as much of an increase as would be acceptable to the American Railway Engineering Association.

"Since our organization in the year 1909, we have steadfastly maintained that the varied service in the 60,000-lb. class of cars made it imperative that the weight of the wheel should either be increased to meet the maximum conditions of service or that we should have two standards in this class.

"The variation in service arises from the variations in the light weight of the car in the 60,000-lb. capacity class, and as the standard of operation is to brake the cars 60 per cent of their light weight, it must follow that any class of cars in which there is 100 per cent variation in light weight (which is common in the 60,000-lb. class) cannot with safety carry the same weight of wheel, and this is what the manufacturers have been required to do.

"The standard wheel specified for the 60,000-lb. class weighs 625 lb. and the light weights of the cars vary from 20,000 to 53,000 lb.

PURELY FROM STANDPOINT OF SAFETY

"Our association recommended that the weight of the wheel be increased to 675 lb., which would provide a standard wheel that would meet the maximum conditions of service as to load and brake, and in asking for an increase in weight of the two standards 625 and 725 M. C. B. wheels we were not actuated by commercial considerations, but purely from the standpoint of safety.

"It is estimated that there are 2,500,000 chilled iron wheel renewals annually, and if the weights should be increased 50 lb. each the additional metal to be purchased would approximate 62,500 tons, providing all the renewals required an increase, which is by no means the case, because many of the prominent railroads in the country, representing over a fourth of all the cars in use, are already introducing advanced standards and are using wheels much heavier than the present Master Carbuilders' standards.

"The heaviest 725-lb. M. C. B. standard chilled iron wheel for 50-ton cars is lighter than the rolled steel wheel, and there is no good reason why the chilled iron wheel should be so limited in weight, particularly when the increase involves the nominal expenditure of $10 per ton, which is the difference between the scrap value of the old wheel as accepted in part payment for the new. The reduction in accident hazards would more than absorb the increased expense due to the nominal increase in weight.

INCREASE IN FLANGE AT GAGING POINT

"Ever since the introduction of the 50-ton car, our association has recommended an increase in the metal of the flange at the gaging point. A committee of the American Railway Engineering Association appointed for the purpose has reported that the manufacturers could increase this flange width 3/16 in. without any change in the present flange ways of track.

"The Master Carbuilders' Wheel Committee has reported in convention 'that there be no changes in the dimensions and contour of flanges of carwheels as adopted in the year 1909.' The flange adopted in 1909 was an improvement over the M. C. B. design, and through the recommendation of our association we succeeded in reducing its height from 1⅛ in. to 1 in., which gave it greater strength, and we know that we can make further improvements, and it needs no argument to prove that a stronger flange is required for the 70-ton cars than for the 30-ton cars.

ILLINOIS UNIVERSITY TO INVESTIGATE STRESSES

"Our association has made a very satisfactory arrangement with the University of Illinois through Dean W. F. N. Goss, in which it is agreed, that the University Experiment Station will undertake an investigation concerning the stresses and behavior of chilled iron car wheels. In submitting a draft of this arrangement to the president of the University of Illinois, Dean Goss made the following statement:

> Progress in the art of railroading is continually developing new questions affecting the weight and contour of chilled iron carwheels. The importance of securing proper design and proper methods of manufacture for such wheels may be judged by the fact that there are now in operation in the country approximately 20,000,000 freight carwheels, and the demand for renewals alone involves the manufacture of 2,500,000 chilled iron carwheels per year.
>
> With these facts in mind, the Association of Manufacturers of Chilled Iron Wheels has agreed to co-operate with the Engineering Experiment Station in a study of the questions fundamental to the design of such wheel. The co-operation proposed guarantees to the station the strongest possible assistance in the development of an investigation of great importance to the public weal.

"All of the work of our association is constructive and our recommendations are based upon solid grounds which must receive favorable consideration, and while we have not as yet secured all the improvements outlined, we feel sure that a close analysis of our recommendations will demonstrate the reasonableness of our claims.

"The chilled iron wheel remains in the forefront, not only in this country but in Europe, where the old European standards are seriously menaced. No other type of wheel has ever made serious inroads on the chilled iron wheel and never will, providing we are all alive to the increased demands of service, and for two-thirds of a century the chilled iron carwheel has remained the standard for the nation's commerce."

Officers Elected

The officers elected for the ensuing year are the following: George W. Lyndon, president-treasurer; E. F. Carry and J. A. Kilpatrick, vice-presidents; George F. Griffin, secretary; F. K. Vial, consulting engineer. The board of directors is as follows: E. F. Carry, president Haskell & Barker Car Company; J. A. Kilpatrick, president Albany Carwheel Company; W. S. Atwood, chief engineer, Canadian Car & Foundry Company; Charles A. Lindstrom, assistant to president Central Carwheel Company; F. K. Vial, chief engineer Griffin Wheel Company; A. G. Wellington, president Maryland Carwheel Works; W. C. Arthurs, president Mount Vernon Car Mfg. Company; J. D. Rhodes, president National Carwheel Company; F. B. Cooley, president New York Carwheel Company; A. J. Miller, general manager Ramapo Foundry & Wheel Works, and William F. Cutler, vice-president Southern Wheel Company.

Contracts for furnishing 6-in. projectiles for the United States Navy, under bids opened Aug. 23, have been awarded to the Cleveland Crane & Engineering Company, Cleveland, and for furnishing 1-lb. common projectiles to the Edwards Valve & Mfg. Company, Chicago.

ESTABLISHED 1855

THE IRON AGE

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An Armor-Plate Contract Problem

The Navy Department announces that it will receive proposals Nov. 1 for furnishing 45,583 tons of armor plate for battleships Nos. 45, 46, 47 and 48 and battle cruisers Nos. 1, 2, 3 and 4, authorized by the naval appropriation act of Aug. 29, 1916. This armor plate is divided into five classes, namely, A-1, A-2 (turret), B, C-1 and C-2. Manufacturers submitting proposals are required to make an agreement to enter into contracts within seven days after the receipt of notice of acceptance of their bids and to give bonds in a penal sum equal to 10 per cent of the total amount of the contract for the faithful performance thereof.

The amount of armor plate called for by the department's advertisement is the largest for which bids have been solicited at one time in the history of the United States Navy. It is estimated that it will keep the three existing armor-plate plants busy for a year and a half, a fact which is the basis for no little speculation among naval experts as to the policy that will be pursued by the department in awarding contracts on the basis of the bids that will be received. Throughout the discussion of the projected Government armor-plate factory the Secretary of the Navy has criticised several of his predecessors in the harshest terms for accepting practically identical bids from the several armor-plate manufacturing concerns and dividing the contracts among them. A situation has now developed that will probably give him an opportunity of dealing with a similar problem under circumstances that will render it especially difficult for him to depart from the policy pursued by those of his predecessors whom he has so severely attacked.

As the result of the threshing out of the question of factory costs and reasonable profit on armor plate during the recent Government factory investigation, both the officials of the Naval Ordnance Bureau and the managers of the private plants are in position to estimate with a considerable degree of accuracy the cost of manufacturing armor plate on any given basis of raw-material cost. It is therefore to be expected that even without the slightest collusion the armor-plate manufacturers will submit bids so nearly identical that the difference will be negligible. Assuming, however, that one bid should be lower than the others by a margin sufficient to command consideration, will the Secretary of the Navy decide that it is for the best interests of the Government to place the entire contract with a single manufacturer, who would require from three to four years for deliveries, or will he do exactly what several of his predecessors, against whom he has inveighed so bitterly, found it for the best interests of the Government to do, namely, to call in representatives of all the bidders and divide the contract with approximate equality on the basis of the lowest bid?

In assailing the course pursued by his predecessors in similar cases, Secretary Daniels was free to heap his criticisms without stint, as there was nothing before him. To-day, however, he is confronted by a concrete proposition, and the manner in which he meets it will be awaited with a very lively interest in many quarters.

The importance to the Government of private armor-plate plants in any emergency that might arise is clearly demonstrated by the necessities of the Navy Department at this time. The largest Government armor-plate factory contemplated at any time has had a capacity limited to 20,000 tons per annum, so that should the private factories be closed down as the result of the establishment of a Government plant it would require more than two years and three months to provide the armor which the Government now wishes to have produced at the earliest possible moment. Practical armor-plate makers are convinced that such a factory as can be built within the next two or three years for $11,000,000, the limit of cost fixed by Congress, would not be equipped for an output exceeding 12,000 tons per annum, and it is an open question as to how many years would elapse before such an institution could be brought up to its maximum producing capacity.

Outrunning Our Labor Supply

Overprosperity is leading to embarrassments and perplexities which are peculiarly of its own generation. The root of the troubles now annoying the iron trade is the scarcity of labor. At the very time when immigration from Europe is checked, and the human stream is more inclined to flow in that direction than this, our activities are stimulated by a world-wide demand for our products, and we need, say, three men where two were ample before. Old works are being enlarged and

new ones built, mines are being developed on a larger scale, transportation facilities are being expanded as rapidly as conditions will permit, additional communities are being transformed from rural to urban conditions, with a steady increase in all the demands that accompany vigorous growth, and constantly on all sides the complaint is heard of scarcity of labor. This is not because we are actually short of men, as the number of workmen in the country, through natural increase, must be greater than a year or two years ago, despite the return of European reserves to army service, but it is because our industrial expansion is proceeding at a greater rate than our human labor supply increases.

We complain of shortage of cars, but if cars were abundant there would still be the complaint of lack of men to load and unload them. We are suffering from a scarcity of coke, but this is not for lack of coking coal or of coke ovens, but because the supply of men is not great enough to enable all the coke to be made that we have facilities to produce. Thus one occupation after another may be taken up, and all will tell the same story—inability to attain full growth or development because of the scarcity of labor.

For this state of affairs there appears to be no immediate remedy. Our supply of men such as we need cannot be quickly increased as long as European nations are drawing every available subject into their armies. It is a condition which will have to be borne philosophically. The employer who chooses to do so, can, of course, win men from other employers by paying higher wages. But there is a limit to this, as eventually the cost of production eats up all profits. We need to slacken our pace and lessen our efforts to grasp more and more of the business coming in sight, recognizing that even prosperity may have its bounds.

Results from the Trade Balance

Of the past 22 months no less than ten have established successive new high records for the favorable balance in our foreign trade in merchandise. The $131,000,000 favorable balance in December, 1914, was regarded as altogether phenomenal, but last month's fresh record was $348,719,353, far surpassing the remarkable record of $310,531,289 made in the preceding month. The new record was made through an increase of $3,000,000 in exports and a decrease of $35,000,000 in imports.

While the September exports were the largest on record, the September imports were the smallest since October, 1915, while they were smaller than in three months in the early part of 1914, before the war. The August imports were smaller than in four of the months earlier in the year. The record high imports fell as long ago as last June. Hence, it is clear that in recent months our imports of merchandise have displayed no tendency to increase, whereas in the past twelvemonth there have been seven months in which exports broke all records.

Thus the prospect is that however remarkable have been the results of our foreign trade thus far in the war, the prospect promises still more stupendous favorable balances and the results in the future must prove of literally overpowering importance.

Up to date the settlement of these balances has been readily accomplished. Those who have bought from us have indeed even anticipated the balances. As between nation and nation they have really paid in advance to an extent, and it is well known that individuals and corporations in the United States have in many cases received advance payment in part when contracts for the supply of goods have been accepted. As a rule, furthermore, they have been paid in full for delivery f. a. s., so that days or weeks elapsed before the merchandise was entered for the familiar export statistics published monthly by the Government. A brief summary of what has occurred may be of interest.

It is understood, of course, that the apparent balance in the merchandise trade is not the real balance by which the country grows richer or poorer, as there are various items in what is for convenience called the unseen balance, including freights paid to foreign vessel owners on imports (which are valued at the foreign port for statistical purposes), interest and dividends paid on American securities held abroad, expenditures abroad of American tourists, etc. Various attempts have been made to estimate the unseen balance, but it is perfectly obvious that no estimate could be made in the premises that could be depended upon as being within 10 per cent, or possibly 25 per cent, of the fact, and there is always the suspicion that the estimator is endeavoring to arrive at a total which will fit with the facts of the merchandise balance, in which case the estimate would be useless. It is more pertinent to observe that from 1898, the first year in which there was a really large balance, to 1913, the year before the war, the average merchandise balance was $505,000,000 a year, and the balance was a trifle smaller in the second eight years than in the first. In the circumstances the unseen balance made up of the common items cannot be regarded as liquidating year by year the merchandising balance, because this unseen balance must undoubtedly have increased very considerably.

The only explanation is that there was a large movement of American securities out of the country in recent years. At the opening of the war all that was known was that there was a large volume abroad and there must have been a time when they got there. Lately some information as to the volume existing abroad has been gathered, as will be considered later. Since the war started the unseen balance has probably been less, so that half a billion a year may be taken as unlikely to disturb the calculation sensibly. In the calendar year 1914 the merchandise balance was only $324,348,049, so that we had become a debtor, and the proper comparison is made by starting with Jan. 1, 1914. The accumulated merchandise balance from that date to Oct. 1, 1916, is $4,211,000,000.

To ascertain the amount chargeable against this sum various items must be summed. There is the gold movement, net exports of $165,228,415 in 1914 and heavy imports since then. There is the unseen balance, comprising various items, to be taken at $500,000,000 a year. The return of American railroad securities, according to Mr. Loree's figures, involved a reduction in face value held abroad from $2,704,402,364 on Jan. 31, 1915, to $1,415,628,563 on July 31, 1916. Allowance must be made for the

difference between face value and market value, for the movement in August and September, and for securities other than railroad, which some authorities have guessed at one-fourth in addition. Finally there must be considered the flotation of foreign loans in the United States. These items may be taken as follows:

Unseen balance	$1,375,000,000
Gold	543,758,263
Return of securities	1,500,000,000
Foreign securities bought	1,600,000,000
Total, about	$5,000,000,000

It appears thus that up to Oct. 1 the merchandise trade balance has been settled and with $800,000,000 to spare. Of course, the figures are not precise, but in the circumstances it is reasonable to assume that the general showing is substantially accurate.

As to the future, there was left on July 31 American railroad securities held abroad to the extent of $1,415,000,000 face value or $1,111,000,000 market value, and assuming a return during August and September at the rate obtaining in the six months previous, there would be left $900,000,000 market value on Oct. 1, while eight and one-half months more at the same rate would complete the return. Including industrial and other securities there might be from a billion to a billion and a half. These will not all come back in any event, however, as a start has already been made at using them as collateral for loans made in the United States.

Not much more gold will come to the United States, as compared with our rate of import of $35,000,000 a month in 1915, or the rate of $32,000,000 a month thus far this year. The London *Statist*, which virtually speaks for the Bank of England, has just made the startling prediction that if the war lasts through next year England cannot maintain specie payments.

From the viewpoint that the merchandise trade balance has been increasing steadily and rapidly and stood at $348,719,353 for September, while imports show a decreasing rather than an increasing tendency, the volume of securities still to be returned is relatively small, and no very large amount of gold can be furnished, it is evident that there are to be enormous flotations of foreign loans in the United States. When the representatives of the British government came to American bankers last year with a proposition for a loan of one billion dollars the bankers were aghast and when a compromise was made on half a billion they probably felt that the British were really getting about what they had expected. In future such sums will appear relatively small.

It is rather easy to surmise roughly what is about to occur with the United States as a nation. We can consider our exporting of merchandise at a great profit, buying back our securities and taking part in foreign loans. But the real question as to our future industrially and financially is not answered, for we are thinking in terms of a nation, whereas our industrial activity is a question of individuals. The wealth that comes to the country is not, in the act, distributed. The matter of distribution is a wholly different question. We have had "undigested securities" and now we may have undigested wealth. There has been fear that after the war the foreign countries would begin getting the wealth back from us, but the individuals and corporations then holding such a large part of the accumulation will have something to say about that. It is a well-known fact that many concerns which have already made large profits find it a physical impossibility to spend on improvements and extensions, as rapidly as they would like, the money they have already made, and still the profits are coming in at an increasing rate. To make a rough draft of the country's accumulating wealth is relatively easy, compared with the problem of the effect the wealth will have upon our financial, our industrial and even our social life.

CORRESPONDENCE

Sales Contracts That Are Binding

To the Editor: Fortified in whatever position they might care to take, by the flood of orders placed at their own terms, sellers of steel have naturally used the opportunity to put a literal construction on agreements to buy definite quantities of material at definite prices, an interpretation heretofore regularly contended for but rarely insisted upon. The long acquiescence of the mills in the treatment of so-called contracts as options of the buyer is well known. The buyer was to all intents and purposes invited to protect himself for his maximum needs against any advance in price, with the tacit understanding that he need take out only as much as he felt like and in a declining market that he settle at the best price obtainable below his contract figure.

It is not a criticism of the buyer that he has used the implied liberty of his contract to his greatest advantage, though the mills apparently have not failed to keep a record of those who habitually and conspicuously fail to take out their contract tonnage. In fact, a large number of buyers have not hesitated to condemn this loose manner of doing business. Not only have they found that the mills, discounting the value of their contracts, are prone to oversell, with resultant delays in delivery in times of good business, but they have seen the injustice of the consumer who makes a wild guess as to his requirements or the course of the market, being as well protected as the good buyer who carefully and correctly analyzes his purchases. Steel contracts, as they have been regarded, reduce purchasing departments to a common level. Binding contracts will put a premium upon intelligent buying.

It is not surprising, therefore, that the recent action of the National Association of Sheet and Tin Plate Manufacturers, in offering to customers a mutually binding form of contract which contemplates a sale and purchase not subject to cancellation, postponement or price revision because of market conditions, has met a favorable response from many buyers. But criticism was not lacking from others who consider that such a contract is put forward by sellers because present conditions give them an unusual advantage.

Admitting that circumstances now favor the manufacturers in the matter of contract terms, it must also be pointed out that their purchases of raw materials have been, under the circumstances of the past year, even more beset with uncertainty than those of finished material. It should be realized that the maker of sheets, tin plate, plate and bar steel, copper and brass, is under the necessity of protecting his sales by outright purchases of pig iron, raw steel, copper, spelter or other raw materials, entering into firm contracts to take the materials bought, yet at the same time is forced to accept the usual list of clauses regarding unavoidable delays. Without a guarantee that the purchases of his product would be followed by the positive taking out of the material at the price named, the manufacturer would find himself facing impossible risk.

These general circumstances, together with the large

accumulations of unfilled orders which are subject to all the uncertainties of production, make promises of definite deliveries impossible; yet to preserve the mutually binding character of their sales agreements some companies are giving to the customer the right to cancel if his order is not filled in four months. Mills which are selling with absolutely no promise of delivery, but are trying to serve customers at much lower prices than they are able easily to get for export, may fairly claim that they too are not only making a maximum effort but a real sacrifice to care for their trade. Without the guarantee that the buyer of steel products will take the material purchased, even though he has no assurance as to when it will be delivered, the manufacturer working with high-priced raw materials purchased against these orders would face the possibility of a staggering loss in the event of a sharp break in the market.

If the binding agreement be continued, in periods of poor as well as good business, and is made effective without exception, the wise purchaser will yet find that it has advantages far outweighing the liberty of a loose contract. STEEL.

American Steel Trade with Europe

To the Editor: It has occurred to the writer lately that American manufacturers do not entirely appreciate some of the facts connected with selling methods in Europe. American methods are undoubtedly more efficient in that there is less time lost in the actual negotiations between seller and customer, due to fewer formalities and fewer seemingly needless courtesies.

However, these conventions and ceremonies are based on very old traditions, and cannot be overridden with scant respect without offending the foreign customer. This is especially the case in Russia, where diplomacy enters into trade relations almost as much as into international affairs. Supreme patience and never failing politeness are essential to the would-be seller in Russia. Should an energetic American salesman attempt to overwhelm a Russian customer with vigorous arguments bristling with his best talking points, as he is accustomed to doing at home, he would stand a very small chance of success as against a polite and diplomatic French competitor.

The field now opening in Russia is so enormous that it is worthy of the best talent and ability that Americans can possibly find. Knowledge of the Russian language is not essential, but the ability to talk French will be found to be of very material assistance, as all well educated Russians speak French and generally one or two other languages. It will be a revelation to many people to see the extent to which Russia has been benefited by this war, and the building programs now under consideration are such as even the United States has seldom seen. Russia, more than any of the other Allied countries, will merit the greatest efforts of American manufacturers to export steel to her, and if properly approached will be found to be an exceedingly profitable customer.

In France the greatest difficulty to be overcome is incredulity. This is unfortunately due to the many cases in the past where American "bluff" has succeeded in the negotiation of business, but where the actual results in practice have not fulfilled the brilliant promises made. This unfortunate condition is now in all probability offset by the excellent impression made by American manufacturers supplying France with all manner of materials since the beginning of the war. French engineers have remarked frequently to the writer that the steel and brass products of this country are superior to those produced in their own country. The French came to this country for supplies because they had to, but they came prepared to suspect every one, as witnessed by the rigidity of their inspection and the placing of an inspector in every plant delivering material to them. They have now realized that by far the greater proportion of American manufacturers are doing their utmost to please their customers and that their business methods are absolutely honest. This will all go a long way toward re-establishing the lost confidence. Nevertheless, it would seem to the writer as though some means should be employed whereby the salesman can prove his statement to the customer. It is suggested, for example, that the [illegible] salesman be provided with sample test bars from different heats, and tables showing the chemical analyses of these heats. Then let the foreign customer pull the bars himself or make whatever tests and analyses he desires. It will, of course, be argued that these test pieces might be taken from special heats or previously annealed and treated, thus nullifying their utility. But this is merely a suggestion and something more satisfactory may ultimately be worked out.

The feeling in Germany against America at the present time seems to be very bitter; that it is very uncertain whether the United States will be able to export much to that country for some time after peace is declared. The American who goes to Germany to sell steel, however, must have a very good knowledge of its chemistry and manufacture. In fact, this knowledge is almost more important than good salesmanship and skillful approach.

It is absolutely essential that steel producers in this country be allowed to enter into some combination with one another for the purpose of increasing their export trade, as is provided for in the Webb bill. It has just been made known that the lumbermen of this country have entered into such a combination, and they believe that they will not be found guilty of overstepping the Sherman law, which by the way should not be applied to international trade at all.

It cannot be too strongly impressed on the administration at Washington, how necessary this is and efforts to this end should be unceasing until permission is obtained to form such an export agreement between steel manufacturers. This is more especially the case now, since not only have all the European countries their own export syndicates, but now the Allied countries have actually made trade agreements among themselves in order to push Germany to the wall. Whether this will be successful or not, it most certainly will not be without its effect on the foreign trade of this country also.

A good knowledge of the French language is very essential to the success of an export salesman, both in Russia and in France. A well known engineer in Paris told the writer before the war that he did not like to do business with Americans, because none of them talk French and because they always seem to take it for granted that every one talks English. The English used to have the same characteristic, but the men they were sending to France just before the war all had to know French.

It is hoped that these remarks may not be taken amiss. The opportunity now offered to this country is so stupendous, that no effort should seem too great to assure the success most certainly due the wonderful industries of the United States.

ALBERT KAPTEYN, JR.

Auburn, Pa., Oct. 19, 1916.

[In a note accompanying his communication the writer of the above says that he is a Hollander and has been in the United States for six years, with two trips to Europe in between.—EDITOR.]

How Advertisers May Help Buyers

To the Editor: H. B. Twyford in his article on "Two Fundamentals in Purchasing," in THE IRON AGE of Sept. 21, very properly calls attention to the waste of time on the part of both buyer and seller in answering superfluous inquiries. It is hard to see how all these inquiries can be eliminated, however, as the manufacturer must advertise and new prospects will approach him as a result thereof. But repeated requests for quotations from the same source can be avoided. Where it is impossible to accommodate a customer for some time to come, we always advise him just how far ahead we are sold, or just how long certain types of machines will be occupied on orders already received.

The advertiser can help matters also by being a little more explicit. It is rather disconcerting, for

instance, to forward an inquiry to a manufacturer who advertises springs (either of all kinds or else with no limitation expressed) only to receive a reply that he is not equipped for that particular style. Yet such has recently been our experience.

Buyers' indexes of sources of supply can easily be made from information received in reply to inquiries sent out, but the starting point must be the reading of the advertisement. Naturally the advertiser wants as much new business as he can get, and what at the time might be considered superfluous requests may be only forerunners of others leading to profitable orders.

H. D. MURPHY.

No Customs Decision on Embroidery Machines

To the Editor: My attention has been called to an article in THE IRON AGE of Oct. 12 in reference to a customs decision, which you head "Embroidery Machines." I would call your attention to the fact that there has been no decision on embroidery machines. The question of embroidery machines was not before the Board of General Appraisers. There is no dispute at the present time, between us and the Government, as to what embroidery machines are. The dispute is over the classification of shuttles, which are admitted by us to be used in embroidery machines.

Our contention is, and the fact is, that the shuttles are sewing machine shuttles, which are used in an embroidery machine. It is also our contention, and it is a fact, that the embroidery machines in which these shuttles are used are nothing more than gang sewing machines, with a mechanism for producing a pattern on the goods embroidered, and herein lies, in the writer's estimation, the only possible means of distinguishing an embroidery machine from a sewing machine.

The term "embroidery machine" means nothing in itself, without a qualification. That Congress did not make a clear definition is not the fault of the writer. As a matter of fact, he appeared before the Senate Committee, and tried to get it to make the definition clear.

Now the fact is, that the sewing machine existed before the so-called embroidery machine. In speaking of embroidery machines in this article, I have reference always to the large gang machines, which use anywhere from 500 to 1000 shuttles, and no doubt this is the machine which Congress intended to define, but it didn't do it.

Sewing machine parts are distinctly mentioned in paragraph 441 of the tariff act, which reads: "Sewing machines . . . whether imported in whole or in part, including repair parts." Our contention, therefore, is simply that the law has defined sewing machine parts, and the mere fact that they are used in a certain type of embroidery machine has no influence on the fact that they are sewing machine shuttles to start with. A comparison, we think, would help matters out. If the tariff act were to say that wagon wheels were free, and the International Harvester Company imported a lot of wagon wheels, and used them, as it does, on a certain type of automobile that it makes, we do not think this would change them from being wagon wheels.

The reasoning which contends that the chief use of these shuttles in this country covers their classification is not sound. The question is, What is the article, and not what its chief use is in any one particular place, under certain conditions. For instance, although the type of embroidery machines in which these shuttles are used does use from 500 to 1000 shuttles, yet the number of embroidery machines of this type in use is extremely small. There are probably in the neighborhood of 10,000 in use in the whole world. On the other hand, although the ordinary sewing machine, so-called, uses only one shuttle, yet there are a great many millions in use, so that the aggregate number of sewing machine shuttles in use is tremendously in excess of the others.

ROBERT J. HEARNE,
Secretary and Treasurer Durbrow & Hearne Mfg. Co.

New York, Oct. 17, 1916.

Protection for Auction Buyers

We are in receipt of a communication from a machinery dealer setting forth a genuine grievance. A sale of machinery, advertised by a receiver, recently occurred in a Western city. This sale was attended by a large number of buyers from Chicago and elsewhere, who took a lively interest in the proceedings. The machines were auctioned off one by one in regular form, but, after everything had apparently been disposed of, announcement was made by the receiver that bids would be entertained for the entire lot. Everything was then sold as a lot to a new participant in the transaction who had not previously bid on the individual lots. All the machinery dealers present had thus been put to the expense of attending the sale and lost the day from their business without being able to secure any part of the machinery sold.

The question was laid before the members of the National Supply and Machinery Dealers' Association, holding its fall meeting at the Hotel Astor, New York, Oct. 24, and in the resultant discussion no surprise was expressed over the circumstances of which complaint was made. Advisory-Secretary-Treasurer T. J. Fernley said that in Philadelphia it has been a practice for years for receivers to take individual bids and then sell as a whole, the justification being that a receiver, as an officer of the court, was duty bound to get as much as he could for the property he sold. He thought the only recourse for the would-be buyer was to ascertain in advance the terms under which the sale would be made.

Members said that with most auction sales it was the custom to advertise the terms of sale. It was conceded that where bids were taken on individual tools and on the lot, the fair way was to take bids on the entire lot first, as otherwise one could total the separate bids and then obtain the property by simply adding a dollar or two to their sum. To the statement that the practice was one which buyers would like to amend general assent was given by those who expressed themselves.

Transcontinental Rate Case Hearings

WASHINGTON, D. C., Oct. 24, 1916.—The Interstate Commerce Commission announces a reopening of the intermountain or transcontinental freight rate case, the new proceeding involving an investigation of the proposal of the carriers to make a blanket rate on manufactured iron and steel from New York, Pittsburgh and Chicago points of 94c. per 100 lb., instead of the present scale of 75, 65 and 55c. respectively. The commission will give hearings in the proceeding in Chicago on Nov. 20, in Salt Lake Nov. 29, in San Francisco Dec. 4, in Portland, Ore., Dec. 11, and in Spokane Dec. 14. Testimony will also be taken in Washington at later dates not yet determined.

The adjustment of these rates has been one of the most difficult tasks the commission has ever undertaken. About a year ago the carriers, following an order of the commission, made an adjustment of the rates, and it was believed that they would remain in force for at least two years. Early last spring, however, the Merchants' Association of Spokane filed a petition declaring that, by reason of the closing of the Panama Canal because of slides and the increased demands for ships for conveyance of traffic between the United States and various European countries, the service by water between the Atlantic and Pacific coasts of the United States had been in large part discontinued. It was, therefore, contended that, water competition having been practically eliminated, the orders of the commission approving rates to the Pacific Coast and intermediate points should no longer remain in effect.

The commission upon investigation sustained the complaint and directed the railroads to make a readjustment. The carriers, therefore, prepared tariffs and submitted them to the commission, but shippers generally protested, and the commission suspended the rates, notwithstanding it had ordered them instituted.

The commission now proposes to reopen the whole case and take comprehensive testimony. It is understood that all the leading iron and steel producers lo-

cated east of Chicago will make strenuous protest against the proposal of the carriers to eliminate the differentials and put New York, Pittsburgh and Chicago on the same basis by wiping out the graduated scale and substituting a 94c. blanket rate. W. L. C.

WIRE COMPANY LITIGATION

Suit Against American Steel & Wire Company Under the Sherman Act

In the United States District Court at Boston, Oct. 17, Judge James M. Morton overruled one demurrer and sustained another in the suit for $750,000 damages brought under the Sherman act by the American Steel Company, Pittsburgh, which has a wire nail plant at Ellwood City, Pa., against the American Steel & Wire Company. The court overruled the demurrer to the account charging monopoly or attempted monopoly in the manufacture and sale of coated wire nails and sustained the demurrer to the second count, charging a combination in restraint of trade in coated nails. The opinion states that the wire company secured control of 75 per cent of the entire output of wire mills in the United States and then determined to acquire a monopoly in the manufacture and sale of coated wire nails. The plan, it was charged, was to create such difficulties of competition as to drive out of business all with whom the company was unable to come to terms. This was accomplished chiefly, it is charged, by subsidizing various persons, firms and corporations and by underselling competitors.

Judge Morton said: "The defendant had a perfect right, so far as the Sherman act goes, to undersell the plaintiff in ordinary business competition, or for the purpose of putting the plaintiff out of business. It had no right to do so as part of a plan to drive everybody out of the trade in order to obtain a monopoly for itself, which is what is alleged."

As to the second count, Judge Morton stated that many important allegations in the first count were omitted. It contained no description of the trade or business situation to which the alleged conspiracy or combination applied, nor is there any allegation, he declared, that the defendant's acts were intended to affect anybody but the plaintiff.

Other defendants in the suit are Frank Baackes, Chicago, vice-president and a director of the wire company; J. C. Pearson Company and J. C. Pearson Company, Inc., and Frank Ayers, Brooklyn, an officer of the two latter companies. Regarding the liability of these defendants, the court said: "There were not successive attempts of the wire company to secure a monopoly; there was a single continuing one, in which different parties joined successively, and by which the plaintiff was injured. Everybody who joined in the unlawful attempt became liable for whatever injury resulted from the tortious act in which he participated. Whether this fact can be supported, as the plaintiff contends, as alleging a conspiracy in restraint of trade without an explicit allegation to that effect, is doubtful; but upon the grounds stated it seems to me good against all the defendants."

Rathbone & Sard to Build Electric Ranges

The Rathbone-Sard Electric Company, Inc., has been organized to take over the property of the Interstate Storage Company, on Rathbone and Thacher streets, Albany, N. Y., just north of the plant of Rathbone, Sard & Co. This property has buildings on it now containing over 50,000 sq. ft. of floor space, and the new company is planning to put up an additional building. The present Rathbone-Sard plant will continue the manufacture of Acorn gas stoves and the new plant will be devoted entirely to the manufacture of Acorn electric ranges and bake ovens. At present the factory has an output capacity of between 15,000 and 20,000 ranges a year, and this is to be materially increased when the electric range factory is in running order. The new Albany industry, it is estimated, will give employment to 500 men, and, it is stated, will be the largest electric stove plant in the world.

The new company will be entirely independent of Rathbone, Sard & Co. The following directors have been elected: Ellery A. Baker, Arthur M. Blanchard, H. P. G. Norstrand, Russell E. Sard and W. H. Webster. Officers were elected as follows: Russell E. Sard, president; H. P. G. Nostrand, vice-president and general manager; W. H. Webster, vice-president; Arthur M. Blanchard, secretary and treasurer. Mr. Norstrand, the general manager of the new company, has been identified with Rathbone, Sard & Co. for 11 years in the capacity of general superintendent.

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PERSONAL

J. M. Nelson has been appointed superintendent of the Bethlehem Steel Company's open-hearth department No. 2, Saucon plant, succeeding W. H. Bischoff, who resigned to become superintendent of coke ovens, blast furnaces and open-hearth furnaces of the Dominion Iron & Steel Company, Sydney, Nova Scotia. Mr. Nelson was formerly with the Algoma Steel Company, Sault Ste. Marie, Ontario. Mr. Bischoff leaves for Nova Scotia this week.

O. F. Luckenbach, formerly connected with the Oil Well Supply Company, Oil City, Pa., has been appointed superintendent of the drop forge department of the Bethlehem Steel Company's Lehigh plant, succeeding William Hunziker, deceased.

Harry C. Baughman, formerly of the Bethlehem Steel Company and the Braddock (Pa.) open-hearth and duplex departments, has been appointed assistant superintendent of the open-hearth and duplex departments of the Algoma Steel Company's plant at Sault Ste. Marie, Ontario.

Charles S. Kinnison, formerly Western advertising manager for the *Blast Furnace and Steel Plant*, has been appointed general sales manager for the Flota Mica Sales Company, 1201-3 Kresge Building, Detroit.

Frank H. Johnson, room 603, 208 South La Salle Street, Chicago, has been appointed Western sales agent for the Peerless Drawn Steel Company, Massillon, Ohio, manufacturer of cold finished steel. He also represents the Laclede Steel Company, St. Louis, and the Hess Steel Corporation, Baltimore.

Fred W. O'Neil, sales manager of the Nordberg Mfg. Company, Milwaukee, for many years, resigned Oct. 15 to accept an executive position with the Ingersoll-Rand Company, at 11 Broadway, New York. Herbert W. Dow, assistant sales engineer, has been promoted to sales manager of the Nordberg Company. Heads of departments tendered Mr. O'Neil a farewell banquet.

At a meeting of the board of directors of the Internations Commercial Corporation, 44 Whitehall Street, New York, Oct. 6, H. A. Runge was elected vice-president in charge of machinery and heavy hardware. He was for a number of years connected with the export department of Manning, Maxwell & Moore, specializing on machinery, machine tools, railroad materials and sugar plantation machinery and supplies.

A. M. Hirsch has been appointed assistant district manager of the Vanadium Alloys Steel Company at Cincinnati, with offices in the Mercantile Library Building. Charles M. Bigger is general manager of sales of that office.

Robert C. Miller has been appointed purchasing agent of the Staten Island Shipbuilding Company, New York, to succeed W. H. Moore, who has retired from active business.

M. Morino, engineer Imperial Steel Works, Japan, is now in this country to spend a few weeks visiting steel mills and other industrial establishments. He is on his way from London to Tokio, and leaves for Japan from the Pacific coast on Nov. 24.

New Open-Hearth Furnace at Washington

The Washington Steel & Ordnance Company, Washington, D. C., is building an additional basic open-hearth furnace of 35 tons capacity. The present equipment consists of two 15-ton basic furnaces and one 1-ton Stassano electric furnace.

J. K. Larkin & Co., 34 Reade Street, New York City, have recently added black and galvanized pipe to the line of products of the Jones & Laughlin Steel Company which they are already handling. Stocks of pipe fittings, valves, etc., and other material incidental to the pipe business, will be carried in the Larkin warehouses in New York and Brooklyn.

Pittsburgh and Nearby Districts

The National Association of Sheet and Tin Plate Manufacturers, whose headquarters are in the Oliver Building, Pittsburgh, will apply Nov. 8 for a charter under the laws of Pennsylvania.

The Youngstown Foundry & Machine Company, Youngstown, Ohio, has been awarded a large contract for pinion housings for the 8, 10, 12 and 14 in. bar mills to be erected by the Carnegie Steel Company at McDonald, near Youngstown. Inquiries are out from the Carnegie Company for a large amount of other equipment for these new mills, work on which is going on steadily, largely owing to the favorable weather.

The Westinghouse Electric & Mfg. Company, East Pittsburgh, has received an order for installing electrical equipment in 11 thread mills of Marshall Field & Co., Spray, N. C.

At the annual meeting of stockholders of the Westinghouse Air Brake Company held in Wilmerding, Pa., last week, H. H. Westinghouse was re-elected president and the board of directors was also re-elected as follows: Cyrus S. Gray, E. M. Herr, A. L. Humphrey, John R. McGinley, Charles McKnight, John F. Miller, Morris S. Rosenwald, W. D. Uptegraff and H. H. Westinghouse. Amendments to the by-laws were unanimously adopted by which, at the instance of Mr. Westinghouse, the office of chairman of the board was created and the election of all officers, including the president, hereafter vested in the board of directors. At the meeting of the new board for organization immediately after the adjournment of the stockholders, the resignation of Mr. Westinghouse as president was accepted, and he was unanimously chosen chairman of the board, which, under the amended by-laws, now becomes the ranking office of the company. The organization was completed by the election of John F. Miller, president; A. L. Humphrey, vice-president and general manager; S. C. McConahey, acting vice-president; R. F. Emery, secretary and treasurer; Charles A. Rowan, controller.

The annual meeting of stockholders of the Crucible Steel Company of America, Pittsburgh, will be held Nov. 17, at Jersey City, N. J. It is stated unofficially that the earnings of the company for the year ended Aug. 31 were $13,000,000.

Toluol is now being produced by the Koppers by-product coke ovens of the Youngstown Sheet & Tube Company, Youngstown.

The Fairmont Mining Machinery Company, Fairmont, W. Va., has placed a contract with the McClintic-Marshall Company, Pittsburgh, for a new factory building, 90 x 120 ft., and a pattern storage building, 40 x 60 ft.

The Wheeling Steel & Iron Company, Wheeling, W. Va., is now operating 18 hot tin mills at its plant at Yorkville, Ohio, and has under construction six more mills, which will be ready for operation about May 1. Some very creditable records for output have been made recently at this plant.

The Republic Rubber Company, Youngstown, Ohio, will issue common stock to the amount of $1,047,500, the proceeds to be used in making large additions to its plant.

The report that the Republic Iron & Steel Company, Youngstown, Ohio, will build additional by-product coke ovens is officially denied.

The city of Alliance, Ohio, has awarded contracts for new pumping machinery for its waterworks system. A 6,000,000-gal. horizontal, cross-compound, pumping engine goes to the Snow Steam Pump Company, Buffalo, N. Y., and a motor-driven triplex booster pump to the Deming Pump Company, Salem, Ohio.

On Saturday afternoon, Oct. 21, members of the Engineers' Society of Western Pennsylvania made an inspection trip to the plant of the American Zinc & Chemical Company at Langeloth, Pa., about 30 miles from Pittsburgh. A full description of this plant, with illustrations, appeared in THE IRON AGE of May 13, 1915.

The Marietta Chain & Forging Company, Marietta, Ohio, which has let contracts for the erection of several

buildings, all of steel construction, advises that the equipment has all been purchased.

The Sharpsville Boiler Works Company, Sharpsville, Pa., is erecting a new steel building, 100 x 150 ft. It will be equipped with a 10-ton electric crane, the contract for which has been placed with the Euclid Crane & Hoist Company. The new building will be occupied about Dec. 15.

The Valley Forging Company, Verona, Pa., near Pittsburgh, maker of car and special forgings and rail benders, has bought a plot, 120 x 312 ft., in the rear of its present plant, and expects in the near future to erect new buildings and greatly increase its output.

The Erie Foundry Company, Erie, Pa., maker of steam drop hammers, galvanizing equipment, etc., is building an addition, 40 x 200 ft., to its machine shop. The company has purchased some new equipment, including planers, boring mills and drill presses.

The Standard Screw Company, Corry, Pa., has purchased the plant of the Corry Novelty Company, which will be equipped for the manufacture of turnbuckles, bolts, nuts and aeronautical accessories. L. T. McElroy is manager.

Return of American Industrial Commission from France

The American Industrial Commission, organized under the auspices of the American Manufacturers' Export Association and which sailed from New York on Aug. 26, as noted in these columns on Aug. 24, is expected to return to this country on Oct. 29. A report from the commission through W. W. Nichols, its chairman, is expected at the meeting of the American Manufacturers' Export Association to be held at the Hotel Biltmore, New York, on Oct. 31.

Information thus far received indicates that everywhere in France the commission was given a warmer welcome than was expected. On the going journey the party was met at sea by M. Damour, French deputy and leader of the French Industrial Commission which visited the United States in the winter of 1915 and 1916, and he was accompanied by the mayor of Bordeaux and a delegation of the Chamber of Commerce of that city. In Paris the program was arranged by the National Association for Economic Expansion, the president of which is M. David-Merret, head of the French Chamber of Commerce.

The personnel of the commission as finally constituted, according to the latest bulletin of the association, is as follows:

W. W. Nichols, assistant chairman, Allis-Chalmers Mfg. Company, Inc., New York; J. G. Butler, Jr., vice-president, Brier Hill Steel Company, Youngstown, Ohio; A. B. Farquhar, president, A. B. Farquhar & Co., Ltd., York, Pa.; G. B. Ford, Geo. B. Post & Sons, New York; Noble Foster Hoggson, president, Hoggson Brothers, builders, New York; F. J. Lemaistre, consulting chemical engineer, E. I. duPont de Nemours & Co., Wilmington, Del.; J. R. MacArthur, president, MacArthur Brothers' Company, New York; Dr. C. O. Mailloux, electrical engineer, New York; Curt G. Pfeiffer, vice-president, George Borgfeldt & Co., importers and exporters of general merchandise; J. I. Sague, official delegate, American Society of Mechanical Engineers; E. A. Warren, vice-president, Universal Winding Company, Boston; E. V. Douglass, secretary, American Manufacturers Export Association.

Haynes Stellite Company Service

The manager of each branch office of the Haynes Stellite Company, Kokomo, Ind., has supervision over four to eight expert demonstrators, mechanics and sales, men whose province it is to work out mechanical problems, and show where and how Stellite should be used. The branches, of which there are five, carry a complete stock of standard size standard Stellite tools and arc-welded Stellite tools. The managers and the offices of which they are in charge are located as follows: Roe L. Johnson, 120 Broadway, New York; A. F. Young, 900 Lytton Building, Chicago; G. O. Litt, 910 First National Bank Building, Cincinnati; J. T. Plummer, 911 Citizens Building, Cleveland, and J. J. Cruice, 318 Telegraph Building, Detroit.

OBITUARY

CHARLES J. HEALY, long identified with the cutlery manufacturing industry of this country, died Oct. 21 at his home in New York City, aged 74 years. He was born in Dublin and came to this country when nine years old. He was a member of the firm of Wiebusch & Hilger until about 25 years ago, when he founded the Bridgeport Knife Company, Bridgeport, Conn. At that time Mr. Healy brought 50 expert workmen with their entire families from the Sheffield plants in England to make cutlery in the English fashion. He retired a few years ago. He leaves his widow and three sons.

PROF. DAVID NELSON CAMP, president Skinner Chuck Company, died Oct. 19 at his home in New Britain, Conn., aged 96 years. He was one of the most prominent educators in Connecticut, having been State superintendent of schools from 1856 to 1866, one of the first principals of the New Britain Normal School and a former professor at St. John's College, Annapolis, Md. He was second mayor of the city of New Britain. He was also a director of the New Britain National Bank.

PROF. F. H. ROBINSON, for more than a quarter of a century head of the civil engineering department of Delaware College, died Oct. 17 at his home in Wilmington, Del., aged 66 years. He resigned last spring and in June was elected professor emeritus. Some years ago he was connected with the Edge Moor Iron Works and was also at one time engaged in the engineering business in Wilmington, being a member of the firm of Canby & Robinson.

ROBERT HASTWELL, superintendent of the International Malleable Iron Works, Guelph, Ont., Canada, died Oct. 18 in a local hospital from pleurisy. He was for 25 years in the employ of the Illinois Malleable Iron Company, Chicago, and went to Guelph three years ago as treasurer and sales manager of the International Works, affiliated with the Illinois Malleable Company.

Railroad Car Buying

It is estimated that about 25,000 cars will be bought in the next 30 days, and this follows pretty active purchasing in the last two weeks. Early buying is expected from the New York Central and from the Baltimore & Ohio, and the Atlantic Coast Line appears to be quietly sounding the market.

Among the late purchases may be mentioned the following: Chesapeake & Ohio, 2000 hopper cars; 1000 to the Standard Steel Car Company and 500 each to the Ralston Car Company and the Pressed Steel Car Company, and 1000 car repairs to the Pressed Steel Car Company. Union Tank Line, 2000 cars; 1000 to the American Car & Foundry Company and 500 each to the Standard and the Pressed Steel car companies. The last named has been awarded 1500 gondolas and hopper cars for the Louisville & Nashville. It now appears that the Missouri Pacific has increased its order of 1000 gondolas to 2500, all placed with the American Car & Foundry Company. The Chicago & Northwestern's latest purchases cover 1500 box cars to the American Car & Foundry Company and 500 ore cars to be built by the Pullman Company, and it is still on the market for 500 stock cars. The Carolina, Clinchfield & Ohio has bought 500 hopper cars from the Pressed Steel Car Company, which company is to provide the repairs on 300 cars for the Erie.

The Findlay Steel Castings Company, Findlay, Ohio, recently incorporated with a capital stock of $200,000, will build a plant for the manufacture of open-hearth and electric steel castings. Considerable foundry equipment will be required. The officers are E. J. Edwards, president and general manager; E. T. Pelton, vice-president and secretary, and Harry A. Tilden, treasurer.

Iron and Steel Markets

LARGE WAR STEEL NEEDS

Pig Iron Up $1 to $2 with Excited Buying

Advances in Finished Steel, with Higher Prices Indicated

Iron and steel markets are advancing with little semblance of restraint, and no week of the year has brought so many evidences of demand outrunning supply and of the projection of that condition far into next year.

With prices of semi-finished steel $15 to $20 higher than one year ago, and of finished materials $20 to $30 higher, there is even more expectation of further advances than existed in October, 1915.

Pig-iron prices, after months of restraint that has been the puzzle of the whole market, have taken leaps of $1 to $2 a ton this week, and in some centers buying has been heavy and excited.

Allied buyers of shell steel are making no effort at finesse on the price for delivery in the second half of 1917, as they were doing four months ago on first half delivery. It is a case of getting the mills to book the steel, and 4¼c. and 4½c. will be paid on several hundred thousand tons now being negotiated, against 3½c. on the last contracts. It is said unreservedly that France and Italy will take all the war steel our manufacturers can furnish for the second half of next year. One steel company is asked to quote on 100,000 to 300,000 tons.

France's needs are very large. In the case of 20,000 tons of ⅜ to ⅝-in. rounds, for which soft steel was wanted, the buyers now offer to take rollings from shell steel discards. France also asks for 30,000 tons of annealed, galvanized and varnished wire, for fourth and first quarters. Barb wire could not be had and it is not certain that the modified inquiry can be considered.

Whether export buying amounts to 20 or 25 per cent of productive capacity, its big unit purchases stand out in contrast with the conservative buying for domestic use. Home consumers are not losing sight of possible after-the-war changes. Except for clearly needed products like ship steel makers do not encourage far-future contracts, but consumers show increasing concern to get places on mill books. Steel famine talk is not warranted, for manufacturers try to make full allowance for home needs in all their refusals of export business.

The advance in coke has had no parallel. As high as $7.70 has been paid for prompt furnace coke, and coal and coke are still going up. Car shortage is a large factor in fuel prices and is likely to prove more menacing as winter comes on.

It is estimated that 25,000 railroad cars will be bought in the next thirty days, following the closing of over 10,000 cars in ten days. Such is the call for plates for cars that 4c. is talked of as the 1917 price. This is not out of line with marine steel at 5c. and 6c. in lots of several hundred tons, while 4½c. was done on more than 4000 tons of ship plates for first quarter.

There is more rail inquiry for 1918, the M. K. & T. having placed 50,000 tons for that delivery with the Colorado mill, while the Illinois Central has asked for 25,000 tons. The St. Paul, New York Central and Union Pacific still want rails for this year.

Bookings by Chicago mills in October have approached the record of 1912, when 600,000 tons was entered for the month, and the sales have been double the shipments.

It is more difficult to keep up with price advances. Sheet sales have been very large, and on galvanized prices have gone up $3 to $5 a ton. Most of the tin-plate production of the first half of next year is now under contract.

The Steel Corporation has announced advances in the leading tonnage materials for forward delivery, or to 2.70c. for bars, 2.85c. for shapes, and 3.75c. for plates.

Boiler tubes are unusually active both for home and foreign consumption. A late inquiry is for 6000 tons for South Africa. On 500 tons for domestic delivery over seven months, 30 per cent advance over late quotations was paid.

The pig-iron market has cut loose remarkably after months of lagging. Chicago reports a scramble for iron, and some makers have advanced quotations $3 in the week, or to $22 for No. 2 foundry. Buffalo furnaces, after a week's sales of 100,000 tons, have put No. 2 iron to $22. The Southern market has been excited, and $16 is now minimum for No. 2 at Birmingham. Bessemer iron is up $1 to $24, Valley furnace, and some sales of basic have been made at $21. Export demand had taken so large a tonnage that important buyers of foundry and other grades came into the market precipitately.

Pittsburgh

PITTSBURGH, PA., Oct. 24, 1916.

Prices on nearly everything that the makers can possibly sell have gone up the past week from $1 to as much as $5 per ton. Bessemer pig iron is up fully $1, with some sellers asking $2 and $3 advance. Galvanized sheets are up $3 to $5. The minimum on base sizes and base carbons of Bessemer and open-hearth steel has been fixed for the remainder of this year and first quarter at $50 per ton by sales. Prompt furnace coke has sold in small lots as high as $7.70 per net ton at oven. Soft Bessemer wire rods have been taken for export at $63 per ton. The market seems to be going still higher. It is admitted that prices have reached a dangerous level, but the enormous demand keeps coming in, and the mills are asked to name their own prices if they will agree to furnish the material. It is almost impossible to keep up with advances in prices; quotations made to-day that fairly represent the market are too low before a week has passed. Scrap is the only material that is not responding in price advances.

Pig Iron.—Bessemer has advanced squarely in actual sales of fair sized lots to $24 at Valley furnace, with small sales reported for prompt shipment at $25 and $26. Basic iron has remained at $20, with some sellers asking $21 and $22 at furnace. No. 2 foundry iron has advanced to $21, minimum, at Valley furnace, with some sellers asking higher prices. Sales of pig iron in the past week have been light, but there is a fair amount of new inquiry. One lot of 18,000 tons of

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton	Oct. 25, 1916	Oct. 18, 1916	Sept. 27, 1916	Oct. 27, 1915.
No. 2 X, Philadelphia...	**$21.00**	$20.50	$19.50	$16.25
No. 2, Valley furnace....	**21.00**	20.00	18.50	15.00
No. 2 Southern, Cin'ti...	**18.90**	18.40	17.40	15.40
No. 2, Birmingham, Ala.	**16.00**	15.50	14.50	12.50
No. 2, furnace, Chicago*	**22.00**	19.00	18.00	15.25
Basic, del'd, eastern Pa..	**21.50**	20.00	19.00	17.00
Basic, Valley furnace....	20.00	20.00	19.00	15.00
Bessemer, Pittsburgh....	**24.95**	23.95	22.95	16.95
Malleable Bess., Ch'go*..	**21.50**	19.00	19.00	15.50
Gray forge, Pittsburgh..	**20.95**	20.45	19.20	14.75
L. S. charcoal, Chicago..	20.25	20.25	19.75	15.75
Rails, Billets, etc., Per Gross Ton				
Bess. rails, heavy, at mill	33.00	33.00	33.00	28.00
O.-h. rails, heavy, at mill	35.00	35.00	35.00	30.00
Bess. billets, Pittsburgh..	**50.00**	45.00	45.00	25.00
O.-h. billets, Pittsburgh..	**50.00**	45.00	45.00	26.00
O.-h. sheet bars, P'gh....	**50.00**	45.00	45.00	27.00
Forging billets, base, P'gh	**73.00**	69.00	69.00	40.00
O.-h. billets, Phila.....	50.00	50.00	48.00	32.00
Wire rods, Pittsburgh...	45.00	45.00	45.00	33.00
Finished Iron and Steel,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Iron bars, Philadelphia	2.659	2.659	2.659	1.659
Iron bars, Pittsburgh....	2.75	2.75	2.60	1.45
Iron bars, Chicago....	2.35	2.35	2.35	1.45
Steel bars, Pittsburgh...	2.75	2.75	2.60	1.50
Steel bars, New York....	2.919	2.919	2.769	1.669
Tank plates, Pittsburgh.	4.00	4.00	4.00	1.50
Tank plates, New York..	4.169	4.169	4.169	1.669
Beams, etc., Pittsburgh..	2.75	2.75	2.75	1.50
Beams, etc., New York..	2.869	2.869	2.769	1.669
Skelp, grooved steel, P'gh	2.50	2.50	2.35	1.45
Skelp, sheared steel, P'gh.	2.60	2.60	2.45	1.50
Steel hoops, Pittsburgh...	3.00	3.00	3.00	1.75

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire,	Oct. 25, 1916.	Oct. 18, 1916.	Sept. 27, 1916.	Oct. 27, 1915.
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh	**3.40**	3.30	3.00	2.10
Sheets, galv., No. 28, P'gh	**4.75**	4.40	4.25	3.50
Wire nails, Pittsburgh...	2.70	2.70	2.60	1.85
Cut nails, Pittsburgh	**2.70**	2.60	2.60	1.80
Fence wire, base, P'gh	2.65	2.65	2.55	1.70
Barb wire, galv., P'gh.	3.00	3.00	2.90	2.70
Old Material, Per Gross Ton:				
Iron rails, Chicago.	**22.00**	20.00	19.25	15.50
Iron rails, Philadelphia..	21.00	21.00	20.00	17.50
Carwheels, Chicago	**14.50**	13.00	11.75	12.00
Carwheels, Philadelphia..	**16.00**	15.50	15.50	13.50
Heavy steel scrap, P'gh..	**19.00**	18.50	16.50	15.00
Heavy steel scrap, Phila..	16.00	16.00	14.75	14.50
Heavy steel scrap, Ch'go	**17.75**	16.75	16.25	11.75
No. 1 cast, Pittsburgh...	16.00	16.00	15.00	13.50
No. 1 cast, Philadelphia..	16.00	16.00	16.00	14.00
No. 1 cast, Ch'go (net ton)	**14.75**	13.50	12.75	10.50
No. 1 RR. wrot, Phila...	**22.50**	22.00	20.00	16.00
No. 1 RR. wrot, Ch'go (net)	**18.00**	17.75	16.50	11.75
Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt...	**$7.00**	$5.00	$3.00	$2.50
Furnace coke, future....	**3.75**	3.50	2.85	2.35
Foundry coke, prompt...	**5.00**	3.75	3.25	2.75
Foundry coke, future	**4.50**	4.00	3.50	2.60
Metals,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York.	28.50	28.50	28.00	17.87½
Electrolytic copper, N. Y.	28.50	28.50	28.75	17.87½
Spelter, St. Louis....	**10.00**	9.70	8.75	14.60
Spelter, New York....	**10.25**	9.92½	9.00	14.75
Lead, St. Louis.....	**6.92½**	6.85	6.85	4.62½
Lead, New York.....	7.00	7.00	7.00	4.75
Tin, New York.....	**41.25**	40.75	38.62½	33.50
Antimony (Asiatic), N. Y.	13.00	13.00	11.00	34.25
Tin plate, 100-lb. box, P'gh	$5.75	$5.75	$5.75	$3.15

Bessemer iron is wanted for export and the inquirer states he has sounded all the more prominent Bessemer making centers, but so far has not been able to get it. It is not unlikely this iron would bring $25 or higher at Valley furnace if any sellers could furnish it, the iron being wanted for fairly prompt shipment. The American Iron & Steel Mfg. Company, Lebanon, Pa., has an inquiry in this market for 10,000 tons of basic iron and the Ohio Mold & Foundry Company, a new interest that proposes to make ingot molds at Cincinnati, has an inquiry out for 10,000 to 12,000 tons of Bessemer. Prices on all grades of pig iron show every sign of going higher. We quote standard Bessemer iron at $24 to $25; basic, $20 to $21; malleable Bessemer, $21 to $22; gray forge, $20 to $21, and No. 2 foundry, $21 to $22, all at Valley furnace, the freight rate for delivery in the Pittsburgh and Cleveland districts being 95c. per ton.

Billets and Sheet Bars.—The nominal price of $45, Pittsburgh or Youngstown, on soft Bessemer and open-hearth billets and sheet bars has disappeared. Fairly heavy sales of base sizes and base carbons of billets and sheet bars for delivery over the remainder of this year and in first quarter of 1917 have been made at $50, maker's mill. One leading steel mill has been offered in the last few days $55 for all the surplus Bessemer and open-hearth steel that it can furnish up to July 1, but replied that it had no steel to spare. Fairly large quantities of small ingots are being bought by steel mills and also by consumers from numerous steel casting plants, prices on this steel ranging from $50 up to probably $60 at point of shipment. Prices on forging billets are higher and the new demand is active. We note a sale of 100 tons of base sizes and base carbons of forging billets at $72.50, and also 500 tons for delivery in first quarter of next year at $74, Pittsburgh. We now quote base sizes and base carbons of open-hearth billets and sheet bars at $50 to $55 at mill, Youngstown or Pittsburgh, and forging billets at $73 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take $1 extra.

Ferroalloys.—Prices on Bessemer ferrosilicon have been advanced $2 per ton at furnace, but before this advance was made most consumers had covered their needs over the first half and in some cases over all of 1917. One is reported to have bought 8000 to 9000 tons of 10 per cent; another about 4000 tons, and a third about 3000 tons. We note a sale of 750 tons of 10 per cent for delivery in the first half at $33 per gross ton at furnace. One furnace that makes this product is reported to be sold up to July. We now quote 9 per cent at $32; 10 per cent, $33; 11 per cent, $34; 12 per cent, $35; 13 per cent, $36.50; 14 per cent, $38.50; 15 per cent, $40.50, and 16 per cent, $43. We quote 7 per cent silvery at $26.50; 8 per cent, $27; 9 per cent, $27.50; 10 per cent, $28; 11 per cent, $29, and 12 per cent, $30. These prices are f.o.b. furnace, Jackson or New Straitsville, Ohio, and Ashland, Ky., all of which have a freight rate of $2 per gross ton to the Pittsburgh district. Prices on 50 per cent ferrosilicon for delivery next year have been advanced about $10 per ton, and is now quoted in lots up to 100 tons at $100; 100 tons to 600 tons, $99; over 600 tons, $98, all per gross ton, f.o.b. Pittsburgh. The new inquiry for ferromanganese is not active and prices are only fairly strong. English 80 per cent is held at about $164, seaboard, while domestic 80 per cent is offered at $163, or less, delivered. We quote 18 to 22 per cent spiegeleisen at $45 to $50, and 25 to 30 per cent at $60 to $70, delivered.

Steel Rails.—Quite large orders for standard sections are being placed by railroads for delivery late in 1917, and the local mill reports specifications against contracts coming in freely. The new demand for light rails is more active than for some time, the coal interests buying heavily, while the lumber trade is also sending in fair-sized orders. Several of the rerolling rail mills have lately made good sales of light rails for export, for which higher than domestic prices were obtained. We quote 25 to 45 lb. sections at $47; 16 and 20 lb., $48;

12 and 14 lb., $49, and 8 and 10 lb., $50, in carload lots, f.o.b. at mill, the usual extras being charged for less than carload lots. We quote standard section rails of Bessemer stock at $33 and of open-hearth $35, per gross ton, Pittsburgh.

Plates.—Orders for steel cars continue to come out quite freely. The Pennsylvania Lines West have placed 4000 steel underframes with the Cambria Steel Company and the Lines East have asked bids on 4000 to 6000 steel underframes. It is said inquiries are in the market for about 10,000 cars. The Carnegie Steel Company has taken 14,000 tons of plates for delivery late next year for boats to be built at Seattle, Wash. All kinds of prices are ruling on plates. The Carnegie Steel Company is quoting ¼-in. and heavier sheared plates at 3c. at mill for such deliveries as it can make, which would not be inside of a year or more, while another leading mill is quoting 3.50c. minimum for delivery in the second half of 1917. For delivery in two to four months, prices range from 4.50c. to 5c. at mill. It is said small lots for shipment in six to eight weeks have been sold above 5c. at mill. Several mills can make deliveries on universal plates in two to three months, on which they quote 3.25c. to 3.50c. at mill.

Structural Material.—In spite of the high prices ruling and the greatly delayed deliveries from the mills, the new inquiry is quite active. The Jones & Laughlin Steel Company has taken 1000 tons for an extension to the Euclid Building, Cleveland, Ohio, and 1200 tons of furnace bindings for the new open-hearth steel plant of the Trumbull Steel Company, Warren, Ohio. The McClintic-Marshall Company has taken 800 tons for extensions to the plant of the Aluminum Ore Company, East St. Louis, 1200 tons for new steel buildings for the same interest, also 2000 tons of bridge work for the Pennsylvania Railroad and 1000 tons for the Manasquan River bridge on the New York & Long Branch Railroad. The American Bridge Company has taken 900 tons for the new Masonic Temple, Cleveland, Ohio. The minimum price on beams and channels up to 15 in. is now 2.70c. at mill for delivery in second and third quarters of next year. Small lots from stock for reasonably prompt shipment bring 3c. to 3.25c., Pittsburgh.

Sheets.—The demand for all grades of sheets is enormously heavy, and prices are steadily advancing, particularly on galvanized, which are up this week from $3 to $5 per ton. The American Sheet & Tin Plate Company has changed its method of quoting on galvanized sheets, and is now holding Nos. 3 to 8 at 3.50c. and 10 to 12 at 3.25c., the other gages being on the same basis as Bessemer black. The export demand is also heavy and the mills are simply swamped with business. Every indication points to prices going still higher. There is an insistent demand for sheets from the carbuilders, but none of the mills can make deliveries as promptly as wanted by this class of the trade. The American Sheet & Tin Plate Company is still quoting 4.50c. on No. 28 galvanized sheets, but its entire output for the first quarter has been allotted. We quote: Blue annealed sheets, Nos. 3 to 8, 3.40c. to 3.50c.; Bessemer black, No. 28, 3.40c. to 3.50c.; No. 28 galvanized, 4.75c. to 4.85c.; tin-mill black plate, No. 28, 3.30c. to 3.40c., all f.o.b. Pittsburgh. We note sales of about 1500 tons of galvanized sheets for delivery in the first quarter at 4.75c. to 4.85c. at mill.

Tin Plate.—Most of the output of the mills has been sold for the first half and there have been large contracts for delivery in the second half with no fixed price, this to be whatever may be arranged hereafter. Consumers seem to fully realize the tense situation in tin plate and have importuned the mills to put them on their books for second half delivery. It is said that, with the possible exception of one interest, no tin plate has been sold for first half at less than $5.75 per base box, and a good deal has been placed at $6. It is estimated that export inquiries at present total close to 3,000,000 boxes, but on these nearly all the larger mills are refusing to quote. Some in the trade predict that if present conditions continue, and no peace proposals are started in the meantime, tin plate for second half delivery may be as high as $7 per base box. We quote tin plate at $5.75 to $6 per base box, f.o.b. Pittsburgh, for first half of the year delivery. We quote terne plate, 200-lb. package, carrying 8 lb. of coating, at $9.50 per package; I.C., $9.80; 12-lb., I.C., $10.75; 15-lb., I.C., $11.15; 20-lb., I.C., $11.85; 25-lb., I.C., $12.65; 30-lb., I.C., $13.45; 35-lb., I.C., $14.30; 40-lb., I.C., $15.10, all f.o.b. Pittsburgh.

Shafting.—Very large contracts for shafting for delivery in the first quarter and first half of next year have been placed, the more desirable and larger contracts going at 20 per cent off and the smaller at 15. It is said that purchases of shafting by the automobile trade are fully 50 per cent larger than at this time last year, and the screw stock machine people and implement makers are also buying more heavily. However, makers of shafting are catching up to some extent on back orders and earlier deliveries can be had. One prominent maker is said to be in position to promise deliveries on new orders in eight to ten weeks. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots for delivery in the last quarter of this year and first quarter of 1917, and 10 per cent off in less than carload lots, f.o.b. Pittsburgh, freight added to point of delivery.

Wire Products.—All prices on wire products have been advanced $2 per ton, effective from Thursday morning, Oct. 19. This has been expected for some time and was made because of the heavy demand. Local makers say that they have their output sold up for two or three months and are turning down business nearly every day. The French Government is inquiring through J. P. Morgan & Co. for 30,000 to 35,000 tons of plain, galvanized, annealed and varnished wire for delivery this year, but it is doubtful whether any of the wire mills is in shape to make the delivery. Local mills need their entire output for their domestic trade. It is asserted that there will not be enough wire nails to satisfy the trade the next three or four months. Prices are as follows: Wire nails, $2.70, base, per keg; galvanized, 1 in. and longer, including large head barbed roofing nails, taking an advance over this price of $2, and shorter than 1 in., $2.50. Bright basic wire is $2.75 per 100 lb.; annealed fence wire, Nos. 6 to 9, $2.65; galvanized wire, $3.35; galvanized barb wire and fence staples, $3.55; painted barb wire, $2.85; polished fence staples, $2.85; cement-coated nails, $2.60, base, these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing are 59 per cent off list for carload lots, 58 per cent for 1000-rod lots and 57 per cent for small lots, f.o.b. Pittsburgh.

Railroad Spikes and Track Bolts.—It is reported that the Baltimore & Ohio Railroad has closed for upward of 25,000 kegs of spikes for delivery in 1917 for new track construction and also for 10,000 to 15,000 kegs for maintenance of way for delivery in the first half. Inquiries are in the market for 15,000 to 20,000 kegs, and indications are that buying for delivery in 1917 will soon be quite heavy. The price of $2.65 per 100 lb. is regarded as low, and some makers strongly insist on an early advance. Makers of track bolts say that the demand is heavy for first half and prices are firm. We quote track bolts with square nuts at 4.50c. to 4.75c. to railroads and 5c. to 5.25c. in small lots to jobbers, base. Track bolts with hexagon nuts take the usual advance of 15c. per 100 lb. Prices on spikes are as follows:

Standard railroad spikes, ⅜ x ½ 16 in. and larger, $2.65 to $2.75; railroad spikes, ⅜ to ⅞ 16 in., $2.75 base; railroad spikes, ⅝ in. and 16 in., $2.85 base; boat spikes, $2.80 base, all per 100 lb. f.o.b. Pittsburgh.

Rivets.—The steadily higher prices on steel, together with the heavy demand, will likely result in an early advance in prices of rivets. Some makers say that for fairly prompt delivery they can get from $1 to $2 per ton advance over present prices. The export and domestic demand are both very active, and makers have their output well sold up for the next three or four months. Makers' prices are firm and are as follows: Buttonhead structural rivets, ½ in. in diameter and

larger, $4 per 100 lb., base, and conehead boiler rivets, same sizes, $4.10 per 100 lb., base, f.o.b. Pittsburgh. Terms are 30 days net, or one-half of 1 per cent for cash in 10 days.

Iron and Steel Bars. Mill prices on steel bars for delivery in the last half of 1917 range from 2.70c. to 2.75c. at mill. It is said one maker is quoting in some cases as low as 2.60c., but for very indefinite delivery. The implement trade is reported as buying bars freely on contracts for deliveries running through the first half. The carbuilders are also buying steel bars more freely than for some months, most of this business being placed at 2.60c. at mill, the buyers having had options on a sufficient quantity to take care of the cars on which they were bidding, and for which they have since secured orders. The new demand for reinforcing steel bars is heavy, and prices are very strong. Some inquiry is still in the market for steel rounds, and it is said the leading interest recently took a very large contract for the Allies for delivery late in 1917. We quote steel bars at 2.70c. to 2.75c. at mill for delivery in the first quarter and first half of 1917, while for shipment from warehouse stocks prices rule as high as 3.25c. We quote refined iron bars at 2.75c. to 2.85c., and railroad test bars at 2.85c. to 2.90c., f.o.b. Pittsburgh.

Cold-Rolled Strip Steel.—Reports are that some large contracts for cold-rolled strip steel for delivery in the first half have been placed at $6.25 to $6.50 per 100 lb., f.o.b. Pittsburgh. The foreign demand is active, but some makers are not bidding, as, with obligations already on their books and in sight, their entire output for the first half is practically under contract. We quote cold-rolled strip steel on contracts for first quarter delivery at $6.25 to $6.50 and on small lots for shipment this year from $6.75 to $7. Terms are 30 days net, less 2 per cent off for cash in 10 days, delivered in quantities of 300 lb. or more when specified for at one time.

Nuts and Bolts.—Large consumers are now trying to cover their needs for the first half, but some makers are not willing as yet to sell for delivery so far ahead, owing to the uncertainty as to prices of steel bars and shortage in labor. Deliveries of steel by the mills are backward, restricting the output of nuts and bolts considerably. Prices are very firm and an early advance is looked for. Discounts are as follows, delivered in lots of 300 lb. or more, where the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days.

Carriage bolts, small, rolled thread, 50 and 5 per cent.; small, cut thread, 40, 10 and 5 per cent; large, 35 and 5 per cent.

Machine bolts, h. p. nuts, small, rolled thread, 50 and 10 per cent; small, cut thread, 50 per cent; large, 40 and 5 per cent.

Machine bolts, c. p. c. and t. nuts, small, 40 and 10 per cent; large, 35 per cent. Blank bolts, 40 and 5 per cent. Bolt ends, h. p. nuts, 40 and 5 per cent; with c. p. nuts, 35 per cent. Rough stud bolts, 15 per cent. Lag screws (cone or gimlet point), 50 and 5 per cent.

Forged set screws and tap bolts, 10 per cent. Cup and round point set screws, case-hardened, 60 per cent. Square or hexagon head cap screws, 55 per cent. Flat, button, round or fillister head cap screws, 30 per cent.

Nuts, h. p. sq., tapped or blank, $2.70 off list; hex., $2.70 off. Nuts, c. p. c. and t. sq., tapped or blank, $2.40 off; hex., $2.80 off. Semi-finished hex. nuts, 60 and 5 per cent. Finished and case-hardened nuts, 60 and 5 per cent.

Rivets, 7/16 in. in diameter and smaller, 45, 10 and 5 per cent.

Wire Rods.—There is almost a famine in rods. Most makers are refusing to quote except to their regular trade, and in some cases are turning down inquiries from customers, stating they cannot possibly spare the rods. We note a sale of 1000 tons of soft Bessemer or open-hearth rods at $63 and one of 1500 tons at $62, f.o.b. Pittsburgh, for export. Some consumers have not yet covered their rod needs for first quarter, and will likely have trouble in finding mills that will supply them. There is a wide range in prices, soft Bessemer and open-hearth rods being quoted from $55 to $65 per ton, f.o.b. Pittsburgh.

Merchant Steel.—Consumers are importuning the mills to cover their needs for the first half, but the mills either refuse to do this or else quote prices much higher than are now ruling. There is a scarcity in supply and the mills are back in shipments eight to ten weeks or longer. Prices are very strong and likely to be higher. We quote: Iron-finished tire, ½ x 1½ in. and larger, 2.75c., base; under ½ x 1½ in., 2.85c.; planished tire, 2.90c.; smooth channel tire, ¾ to ⅞ and 1 in., 3c. to 3.10c.; 1⅛ in. and larger, 3.10c.; toe calk, 3.25c. to 3.50c., base; flat sleigh shoe, 2.75c.; concave and convex, 2.85c.; cutter shoes, tapered or bent, 3.50c. to 3.75c.; spring steel, 4c. to 4.10c.; machinery steel, smooth finished, 3.10c. to 3.25c., all f.o.b. at mill.

Hoops and Bands.—The nominal price of a leading maker of steel bands remains at 2.70c. and on hoops at 3c. for such deliveries as it can make, which would not be before the second half. Other makers that can deliver about the second quarter are quoting steel bands as high as 3c. and steel hoops at 3.25c. at mill. We therefore quote steel bands at 2.70c. to 3c., with extras as per the steel bar card, and steel hoops at 3c. to 3.25c., f.o.b. Pittsburgh, prices depending largely on the deliveries wanted.

Wrought Pipe.—A local mill has taken a contract for 85 miles of 10-in. pipe for delivery over the next three or four months. New inquiry for oil-country goods and also for pipe for gas and oil lines is heavy. Several leading pipe mills have already booked up to this time practically double the amount of business they took in all of 1915, and have more than two months to go on. On lap-weld and oil-country goods local mills say they are sold up for five to six months, but on butt-weld pipe can make delivery in six to eight weeks. Another advance in pipe is said to be under consideration by the leading makers and may be announced at any time. Discounts are very firmly held, and any mill that can make fairly prompt deliveries is able to get premiums over regular prices. Discounts are given on another page.

Boiler Tubes.—Local mills are sold up on locomotive and merchant tubes for practically an entire year, this applying to both iron and steel tubes. On seamless steel tubing the two local makers are practically sold up for all of 1917 and are not actively seeking new business. An advance in prices on boiler tubes is looked to come at any time. Discounts are given on another page.

Coke.—The coke market is running wild, sales of prompt furnace coke having been made at as high as $7.70 per net ton at oven. In some quarters there is a suspicion that brokers are selling coke to each other, but this is not verified. In any event, there is a fairly active demand for furnace coke, and producers who can furnish the best grades can practically name their own prices. Ordinary run-of-mine coal has sold as high as $3.50 per net ton. We can report that two contracts for high-grade furnace coke, one for 18,000 tons and another for about 12,000 tons a month, for delivery in first half, have been closed at $3.75 per net ton at oven. Prices on foundry coke have also advanced, but not to the extent of furnace coke. We quote best grades of blast-furnace coke for prompt shipment at $7 to $7.50 and on contracts $3.75 to $4 per net ton at oven. It is predicted that blast-furnace coke will sell on contracts before the end of this year at $5 per net ton at oven or higher. We quote 72-hr. foundry coke of best grades at $5 to $6 per ton and on contracts $4 to $4.50 per net ton at oven. The Connellsville *Courier* reports the output of coke in the upper and lower Connellsville regions for the week ended Oct. 14 as 404,806 net tons, a decrease over the previous week of 11,320 tons.

Old Material.—The market on old material is the only one identified with the iron and steel trades that is lagging. Prices do not move up in spite of the fact that Bessemer and basic pig iron have advanced $3 to $4 per ton in the past month. Large consumers seem to be covered for the time being and are not actively buying, while, on the other hand, dealers are certain the market will advance and are not trying to push sales. It is claimed that heavy melting steel scrap has sold in fairly large quantities at $19, but at the same time it is available at about $18.50, delivered. There

is a fair demand for low phosphorus melting stock, which has sold at $22 per gross ton, delivered. Prices quoted by dealers for delivery in Pittsburgh and points that take the same rates of freight, per gross ton, are as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	$18.00 to $19.00
No. 1 foundry cast	16.00 to 16.25
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	19.00 to 19.25
Hydraulic compressed sheet scrap	14.50 to 14.75
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	11.50 to 11.75
Bundled sheet stamping scrap	11.00 to 11.25
No. 1 railroad malleable stock	15.25 to 15.50
Railroad grate bars	11.25 to 11.50
Low phosphorus melting stock	21.50 to 22.00
Iron car axles	35.00 to 36.00
Steel car axles	36.00 to 37.00
Locomotive axles, steel	38.00 to 39.00
No. 1 busheling scrap	14.00 to 14.25
Machine-shop turnings	7.50 to 7.75
Old carwheels	14.50 to 14.75
Cast-iron borings	9.00 to 9.25
*Sheet-bar crop ends	19.00 to 19.25
No. 1 railroad wrought scrap	19.00 to 19.25
Heavy steel axle turnings	10.50 to 11.00
Heavy breakable cast scrap	13.00 to 13.50

*Shipping point.

O. W. Mason, formerly manager of sales for the Fownes Brothers interests at Pittsburgh, has become affiliated with Hickman, Williams & Co. as Eastern manager, and will have charge of their business in all territory east of Johnstown, Pa. W. L. Hoffman, resident manager of Hickman, Williams & Co. at Philadelphia, will continue in that capacity.

Chicago

CHICAGO, ILL., Oct. 25, 1916.—(*By Wire.*)

Within a week, foundry, malleable Bessemer and basic pig iron have advanced from $19.50 to $22 at Chicago furnace. This spectacular rise has been coincident with the making of numerous and large sales of iron and the melter now sees confronting him the converging circumstances of threatened ore shortage, higher prices for ore and coke, competition from abroad for all the iron that the furnaces have left to sell and one of the most serious car shortages that has ever hampered shippers. The market is headed, in the opinion of both buyers and sellers, for record-breaking price levels. In respect of prices and limitations upon supply, the scrap iron and steel situation is a close parallel and quotations are jumping. For steel scrap, $18 has been paid, for wrought scrap $18.25, for cast scrap $15, and for other grades relatively higher prices. The market is awaiting a general advance in the prices of the heavier rolled steel products, particularly shapes, bars and plates, one large interest having already put its quotation for Bessemer bars for delivery this year at 2.85c., Pittsburgh, following sales of a round tonnage. Sales of steel by Chicago mills in October closely approached the record months of 1912, when over 600,000 tons was booked and were more than double shipments. It is safe to say that 75 per cent of the expected output of the local mills for 1917 has been sold. The Illinois Central is in the market for 1918 rails, and three other lines are asking for 5000 to 15,000 tons of rails to be delivered this year. The Missouri, Kansas & Texas is reported to have placed 50,000 tons of 1918 rails with the Pueblo mill. An advance in prices of steel out of store is being made this week.

(*By Mail*)

Pig Iron.—The buying movement, instead of working itself out as consumers gradually covered for their expected requirements, has suddenly developed into a scramble for iron, and quotations have been advanced as much as $3 per ton within the week. Not since 1907 have prices been so high nor the market so closely verging upon a runaway situation. For malleable and basic iron, $22 per ton at Chicago furnace has been asked, sales having been made in rapid succession at $20, $21 and $21.50. The influence of at least four factors having a bearing upon pig-iron prices has been gradually growing in definiteness and appears now to have made itself felt in concrete form. There is the fear of raw material shortage, with a certainty of higher prices; the furnaces have taken up all of the slack in their production through sales of iron for export at high prices; the export market continues to compete for a large part of the available tonnage, and the shortage of cars, as it has begun to be felt, is seen as a problem of utmost seriousness through the winter. Among those in the market are some of the largest consuming interests. A large user of malleable, having out an inquiry for 6000 tons, bought largely last week of charcoal iron at a price equivalent to $19.25, Chicago, buying also malleable iron from Ohio and about 2000 tons of foundry iron at Chicago. Other buyers of quantities up to 2000 tons included those who had made no previous purchases, as well as others who increased contracts made but a few weeks ago. The rapid advance in prices has accentuated the eagerness of consumers to get under cover rather than checked the activity. The awakening of demand for iron for prompt shipment has been augmented by numerous requests for the anticipation of first half contracts by liberal shipments in November and December. The furnace situation in the South presents a close parallel to that in the North. While there is some iron of standard grade still available on the basis of $16, Birmingham, the greater part of producing capacity is out of the market and some makers ask as high as $17. Quotations of competitive high phosphorus Northern iron are being made on the basis of $17, Birmingham, and it seems probable that the fear of car shortage will place a premium on iron from local furnaces as against the long-haul iron from the South. Southern silvery irons, which have been weak, are now being held, particularly by the Tennessee furnaces, at prices equivalent to those asked for Ohio silvery. A sale of 10,000 tons of basic is reported at St. Louis and, in this market, quotations are out on a round tonnage for first half with some inquiry for second half. For the latter delivery producers are asking such premiums as are intended to discourage inquiry. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of $1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

[illegible] Nos. 1 to 3	$20.25 to $20.75
Lake Superior charcoal, No. 1	20.75 to 21.25
[illegible] No. 1 mild Scotch	21.25 to 21.75
Northern coke foundry, No. 1	22.50 to 23.00
Northern coke foundry, No. 2	22.00 to 22.50
Northern coke foundry, No. 3	21.00 to 21.50
[illegible] No. 1 dry and 2 soft	21.00 to 21.50
Southern coke, No. 2 f'dry and 2 soft	20.00 to 21.00
Malleable Bessemer	21.50 to 22.00
Basic	21.50 to 22.00
[illegible]	40.00
Silvery, 8 per cent	34.50 to 35.50
Bessemer ferrosilicon, 10 per cent	35.50

Rails and Track Supplies.—Several inquiries for rails for prompt shipment are in the market for quantities ranging from 5000 to 15,000 tons. The Chicago, Milwaukee & St. Paul, the New York Central and the Union Pacific are among those asking for rails to be delivered this year. For 1918 delivery, inquiry is out from the Illinois Central for an indefinite tonnage, and the Missouri, Kansas & Texas is reported to have placed 50,000 tons with the Colorado mill. An inquiry received from the Illinois Central by some of the mills calls for 25,000 tons. With the inquiry for rails has come a corresponding inquiry for track fastenings and some sales, in which connection the weakness in the price of spikes is still apparent. Quotations are as follows: Standard railroad spikes, 2.75c., base; track bolts with square nuts, 3.25c. to 3.50c., base, all in carload lots, Chicago; tie-plates, $52 to $54, f.o.b. mill, net ton; standard section Bessemer rails, Chicago, $33, base; open-hearth, $35; light rails, 25 to 45 lb., $40; 16 to 20 lb., $41; 12 lb., $42; 8 lb., $43; angle bars, 2c., Chicago.

Structural Material.—Higher prices for steel, while not yet announced, appear certain to be named, some of the independent mills having already advanced their

quotation. The buying of railroad equipment grows in volume and inquiry yet to be closed covers several thousand cars. The Chicago & Northwestern has bought 1000 gondolas from the Pullman Company and 1500 wood box cars from the American Car & Foundry Company. The Missouri Pacific has ordered 1500 cars, the Northern Pacific will build 500, the Union Pacific is in the market for 1000 box and 1500 automobile cars and the Duluth, South Shore & Atlantic wants 500 of miscellaneous types. Contract awards for fabricated steel last week were individually of limited size. In all, about 2000 tons is reported, of which the Minneapolis Steel & Machinery Company took 600 tons. The Pacific Rolling Mill will supply 500 tons for a Union Iron Works building at San Francisco and the South Halsted Street Iron Works and the Vierling Steel Company each took an order for about 200 tons. The award of the 5000 tons for the new Burlington freight house at Chicago has not yet been made. We quote for Chicago delivery of structural steel from mill 2.889c.

We quote for Chicago delivery of structural steel out of jobbers' stocks, 3.25c.

Plates.—The selling of plates continues on about the same basis as has been reported for some weeks, though the minimum quotations, at which mills have been contracting for deliveries at their convenience, seem unlikely to hold much longer. Sales of plates for Japan, among which one transaction covering 900 tons at 4c., Pittsburgh, is illustrative, continue to be made. Prices for prompt shipment, whether of narrow or wide plates, are firm beyond the power of any purchaser to win concessions and the large jobber and the small manufacturer are paying alike. We quote for Chicago delivery of plates from mill, at its convenience, 3.189c. For prompt shipment we quote 3.439c. to 3.689c. in widths up to 72 in., and for wide plates 4.189c. to 4.689c.

We quote for Chicago delivery of plates from jobbers' stocks, 3.75c.

Sheets.—The demand for both black and galvanized sheets is absorbing every offering of the mills. One independent mill representative sold in two days his quota of his mill's first half tonnage of galvanized sheets, for which prices as high as 4.75c., Pittsburgh, were obtained. At the present level of prices sheets are more nearly on a basis of equity with other finished products, and for the second half larger mills will doubtless be more willing to put a normal portion of their steel into sheets, whereas there has been for some time a diverting of steel to other forms of finished products. We quote, for Chicago delivery, blue annealed, No. 16 and heavier, 3.289c. to 3.439c.; box annealed, No. 17 and lighter, 3.589c. to 3.689c.; No. 28 galvanized, 4.689c. to 5c.

Prices for black and galvanized sheets out of stock have been advanced from $2 to $4 per ton and we quote for Chicago delivery of sheets out of stock, minimum prices applying on bundles of 25 or more, as follows: No. 10 blue annealed, [illegible] No. 28 black, [illegible] No. 28 galvanized, 5.00 to 5.25c.

Bars.—Local bar-iron mills have closed a large amount of business for first half delivery on the basis of 2.35c., and the asking price has now been advanced $2 per ton. Sales thus made leave a limited amount unsold and available for first quarter delivery. There has also been considerable activity in steel bars, one independent mill having booked a round tonnage for early delivery, following which its price has been advanced to 2.85c., Pittsburgh. The continuance of the 2.60c., Pittsburgh, quotation seems likely to be terminated very shortly. For rail-carbon steel there is a less consistent demand, the requirements of reinforcing bars for fall construction work having been largely placed. We quote mill shipment, Chicago, as follows: Bar iron, 2.35c.; soft steel bars, 2.789c.; hard steel bars, 2.50c.; shafting, in carloads, 20 per cent off; less than carloads, 15 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 3.25c.; bar iron, 3.25c.; reinforcing bars, base, with 5c. extra for twisting in sizes [illegible] in. and over, and usual card extras for smaller sizes; shafting, list.

Rivets and Bolts.—There has been some recent buying of rivets, in which connection the weakness in prices for early shipment was further confirmed, a large part of the sales being on the basis of 3.75c., Pittsburgh. For contracts 4c. still prevails. In a similar manner, recent inquiry from the railroads for bolts and nuts has brought out more favorable discounts than are quoted below, despite the fact that the larger makers have little to offer the buyer. We quote as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 50-5; cut thread, 40-10-2½; larger sizes, 35-2½; machine bolts up to ⅜ x 4 in., rolled thread, with hot pressed square nuts, 50-10; cut thread, 50; large size, 40-5; gimlet-point coach screws, 50-5; hot pressed nuts, square, $2.70 off per 100 lb.; hexagon, $2.70 off. Structural rivets, ¾ to 1¼ in., 4c. to 4.15c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

Store prices for [illegible] are quoted as follows: Structural rivets, 4.25c.; boiler rivets, 4.35c.; machine bolts up to [illegible] carriage bolts up to [illegible] hot pressed nuts, square [illegible] 53 off per 100 lb.; lag screws, 70 [illegible]

Wire Products.—The advance in prices announced last week was coincident with the usual gathering in of orders and contracts on the basis of outstanding quotations. There is no let-up in the pressure on the wire mills. We quote as follows per 100 lb.: Plain wire, Nos. 6 to 9, base, $2.939; wire nails, $2.889; painted barb wire, $3.039; galvanized barb wire, $3.739; polished staples, $3.039; galvanized staples, $3.739; all Chicago.

Cast-Iron Pipe.—The only inquiry of size for pipe for municipal purposes is that for Lake Crystal, Minn., amounting to 500 tons. Aside from this, pipe companies report only a scattering of routine business. We quote as follows, per net ton, Chicago:, Water pipe, 4 in., $34.50; 6 in. and larger, $31.50, with $1 extra for Class A water pipe and gas pipe.

Old Material.—Further sharp advances in the prices of scrap mark the very positive trend of the market. There is not in progress a condition of marked activity attended with purchases of large quantities of scrap, but a desire on the part of most buyers to secure whatever is offered at prices the least bit favorable is readily apparent. The purchase of 1000 tons of heavy melting steel scrap at $18 is noted. The limited quantity of scrap being offered stands in the way of any large buying without precipitating even greater advances than have been recorded. The only railroad offerings last week were 4000 tons by the Rock Island, 2300 tons by the Burlington and 800 tons by the Chicago & Eastern Illinois. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	$22.00 to $22.50
Relaying rails	19.50 to 20.50
Old carwheels	14.50 to 15.00
Old steel rails, rerolling	19.50 to 20.00
Old steel rails, less than 3 ft.	19.50 to 20.00
Heavy melting steel scrap	17.75 to 18.25
Frogs, switches and guards, cut apart	17.75 to 18.25
Shoveling steel	16.50 to 17.00
Steel axle turnings	9.50 to 10.00

Per Net Ton

Iron angles and splice bars	$22.50 to $23.00
Iron arch bars and transoms	21.00 to 22.00
Steel angle bars	20.00 to 20.50
Iron car axles	33.00 to 34.00
Steel car axles	33.50 to 34.00
No. 1 railroad wrought	18.00 to 18.50
No. 2 railroad wrought	17.00 to 17.50
Cut forge	17.00 to 17.50
Pipes and flues	12.75 to 13.25
No. 1 busheling	15.00 to 15.50
No. 2 busheling	10.50 to 11.00
Steel knuckles and couplers	15.75 to 16.25
Steel springs	16.50 to 16.75
No. 1 boilers, cut to sheets and rings	11.75 to 12.25
Boiler punchings	15.00 to 15.50
Locomotive tires, smooth	22.75 to 23.25
Machine shop turnings	11.00 to 11.50
Cast borings	11.00 to 11.50
No. 1 cast scrap	14.00 to 14.50
Stove plate and light cast scrap	10.75 to 11.25
Grate bars	11.25 to 11.75
Brake shoes	11.25 to 11.75
Railroad malleable	12.00 to 12.50
Agricultural malleable	11.00 to 11.50

The Minneapolis, St. Paul & Sault Ste. Marie Railroad (Soo Line) has awarded a contract to the P[illegible] & Fulton Company, Minneapolis, for extending its ore dock in St. Louis Bay, Superior-Duluth, at $332,000. The extension will be 564 ft. long, 65 ft. wide, and 75 ft. high, and will have 94 pockets, each of 50 tons capacity.

Philadelphia

PHILADELPHIA, PA., Oct. 24, 1916.

Uniformity in pig iron prices has been dissipated by the high cost of spot coke which furnace managers have been obliged to seek because of the failure of deliveries on contract. Foundry coke, for spot shipment, is correspondingly scarce and high, and this has alarmed the foundry trade by suggesting that it may not be able to obtain deliveries of iron. In their anxiety some foundrymen have not hesitated to pay $22.79, Philadelphia, for their favored brand. So far as there is a market level it may be said to be somewhere between $21 and $22, Philadelphia. Basic continues nominally around $21.50, and there is one inquiry for 15,000 tons. The coke situation is regarded as temporary by conservatives, inasmuch as the trouble seems entirely due to the shortage of cars, and this probably will be relieved with the close of navigation on the Lakes. A large maker of steel bars has put its price at 2.85c., Pittsburgh. Structural shapes are firm at 2.85c., Pittsburgh base, some of the large jobbers buying for stock at this figure. Billets are tighter than ever. Heavy sheets are stronger, No. 10 blue annealed being quoted at 2.409c., Philadelphia. The old material market has taken on a much better tone owing to strength at Pittsburgh, with active inquiry on the part of Eastern mills.

Pig Iron.—The extent to which coke producers are falling behind on contract shipments and the scarcity and high cost of spot coke, all due to the shortage of freight cars, conditions which caused some producers of pig iron to sharply advance their quotations, have created great anxiety on the part of foundrymen as to deliveries of iron. One result is that spot iron promises to become more active than it has been in the past two years. Meanwhile iron prices have grown stronger, and the situation is made more acute by a reported shortage of iron, despite the fact that stocks, though low, are no more so than they were a few weeks ago. Quotations show a much wider spread than is normal. The minimum for one brand of eastern Pennsylvania No. 2 X is unchanged at $22, furnace, or $22.79, Philadelphia; for another $21.50 is the minimum, and it is questionable how much of this could be procured. One maker of Virginia iron has withdrawn from the market after failing to curtail business by advancing prices. Except for a moderate reserve he is sold up to July 1. The largest producer of Virginia iron, for delivery over the remainder of the year and first quarter, or over the first half of 1917, quotes, at furnace, as follows, all sales being subject to confirmation: No. 1 soft, $19; No. 1 foundry, $18.75; No. 2 X, $18.50; No. 2 plain, $18.25, and No. 3 foundry, $18. These prices take a freight rate of $2.75. Southern iron is quoted at $16 to $16.50, Birmingham, the minimum being equal to $20.53, Philadelphia, but getting the iron north is a problem. Lake Superior charcoal iron is $2 to $2.50 higher with some makers. The minimum is about $20.84, Buffalo, and upward according to grade. Buffalo furnaces have but little foundry to sell. The volume of business has been good, most of the buyers wanting lots of 500 tons or under, although a few blocks of 1000 to 1500 tons have been placed. The Pennsylvania Railroad has closed against its recent inquiry, which called for 1000 to 2000 tons of coke iron and 500 to 1000 tons of charcoal iron. Consumers are anxious to contract for first half. Quotations are also out for the third quarter. No sales of basic are reported, but a Lebanon steel company is in the market for a lot said to be 15,000 tons. The price of basic can only be considered nominal, and by deduction fixed at about $21.50, delivered. Low phosphorus is quoted at $40 to $42, delivered. Eastern Bessemer ranges from $25 to $26, delivered. Quotations for standard brands delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa. No. 2 X foundry	$21.00 to $22.00
Eastern Pa. No. 2 plain	20.50 to 21.00
Virginia No. 2 X foundry	21.50
Virginia No. 2 plain	21.00
Gray forge	19.50 to 20.00
Basic (nominal)	21.50
Standard low phosphorus	40.00 to 42.00

Iron Ore.—Arrivals of foreign ore at this port in the week ended Oct. 21 consisted of 5000 tons from Cuba, 6150 tons from Spain and 4150 tons from Chile. Western Bessemer was recently sold in this district on the basis of $5.45, Lake Erie port, an advance of 25c. over the previous price.

Ferroalloys.—Agents of English makers continue to ask $165, seaboard, for 80 per cent ferromanganese, but domestic makers have done business at $162, and $160 is intimated as being possible. For prompt 50 per cent ferrosilicon, $110 to $115 is asked, with 11 per cent material quoted at $36.44 to $37.44.

Plates.—Quotations for tank plates range from 3.659c. to 4.159c., Philadelphia; for ship plates, up to 4.659c., and for marine boiler plates 6.159c. to 10.159c. Eastern shipyards are inquiring for several thousand tons, and the demand from every direction is heavy, with no prospect of early deliveries.

Bars.—A large producer has advanced its quotation for steel bars to 2.85c., Pittsburgh, or 3.009c., Philadelphia, although other interests continue to ask 2.70c., Pittsburgh, or 2.859c., Philadelphia. Despite the fact that its requirements were supposed to be covered, the Pennsylvania Railroad is in the market for 1500 to 2000 tons of steel bars for delivery over the remainder of the year. The general demand continues good. Iron bars are unchanged at 2.659c., Philadelphia, carload lots.

Structural Material.—The quotation for structural shapes is established at 2.85c., Pittsburgh, or 3.009c., Philadelphia. For one lot of 1200 tons for Western shipment, 2.85c., Eastern mill, was paid. Jobbers are stocking up, and one in New York has taken 1500 tons at the 2.85c., Pittsburgh, base. Bids will be opened to-day on 300 tons required for a building for the Packard Motor Car Company, this city. Eastern mills say that not a little tonnage on the books for fourth quarter delivery will run over into 1917. Ship shapes are quoted at 3.659c., Philadelphia.

Billets.—Even the makers of billets who have had steel to sell now announce themselves sold up well into next year. They have taken business lately at $50 and upward for open-hearth rerolling billets, and $65 to $75 for forging steel.

Sheets.—The heavier gages are stronger, Eastern makers asking 3.409c., Philadelphia, for No. 10 blue annealed. The makers are not sold as far ahead in sheets as they are in other products. Export requirements form a growing part of the increased demand.

Coke.—Spot furnace coke is quoted at $6.50 to $7 per net ton at oven, and sales have been made at both figures. Contract furnace is nominal at $3.75. The spot market has moved upward with startling rapidity and created what is everywhere pronounced a serious situation. The tonnage sold at the prevailing high figures is not large, but means much to furnace managers whose contract deliveries are short. One was quoted $5.25 one day last week. He hesitated a couple of days and then had to pay $6.50. By many the situation is declared temporary in view of the approaching close of Lake navigation. This will release a great many cars which are now engaged in carrying coal to lower Lake ports and bringing ore from them. The shortage of cars is not uniformly on all roads, some being able to find enough to carry shipments on contracts. Consumers are inclined to be bitter over the fact that they are not getting satisfactory deliveries on contracts while the coke producers are getting big prices for spot material. They declare that the production of coke has not lessened. Prompt foundry is quoted at $6 to $6.50 per net ton at oven also, and foundrymen are thoroughly alarmed. Contract foundry is nominal at $3.50 to $3.75. Freight rates from the principal producing districts follow: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Old Material.—The entire market shows a better tendency based on a more active inquiry from the mills. It is noted that this market follows the Pittsburgh market more closely than formerly, and the outlook there is good. A number of items have been advanced. Quotations for delivery in buyers' yards in this district,

covering eastern Pennsylvania and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$17.00 to $18.00
Old iron rails	20.00 to 21.00
Low phos. heavy melting steel scrap..	23.00 to 24.00
Old steel axles (for export)	35.00 to 36.00
Old iron axles (for export)	30.00 to 31.00
Old iron rails	21.00 to 22.00
Old carwheels	16.00 to 16.50
No. 1 railroad wrought	14.00 to 14.50
Wrought-iron pipe	10.00 to 10.50
No. 1 forge fire	14.00 to 14.50
Bushelling	12.00 to 12.50
No. 1 busheling	13.00 to 13.50
No. 1 machinery cast	16.00 to 16.50
Cast borings	11.00 to 11.50
No. 1 cast	16.00 to 16.50
Grate bars, railroad	13.00 to 13.50
Stove plate	14.00 to 14.50
Railroad malleable	14.00 to 14.50

Cincinnati

CINCINNATI, OHIO, Oct. 25, 1916.—(*By Wire.*)

Pig Iron.—The Virginia irons were advanced $1 to-day, making the furnace price on No. 2 X $19.50. More Virginia iron has been sold in this territory lately than in any previous period. As the Watts furnace has withdrawn from the market, this makes the delivered price at Cincinnati $21.96. Makers in southern Ohio are unable to take care of prompt orders, and quite a number of Southern furnaces have been compelled to close their order books. A runaway market is not anticipated, but the supply of iron is said by good authorities to be much below the present need of consumers. This applies to basic, foundry and malleable, and lately the Lake Superior charcoal-iron makers have withdrawn quotations. Southern No. 2 foundry is quoted at $16, Birmingham basis, and this is now considered the minimum at which such iron can be bought. There are no quotable prices on southern Ohio foundry, malleable or basic, and the only transactions made this week were to take care of old customers. The resale iron in that district has practically been eliminated. Quite a number of near-by foundry melters who were unprotected have placed orders for lots ranging all the way from 100 to 2000 tons for first half shipment. Other users of silvery iron have bought heavily, and included in purchases are two 500-ton lots by Ohio manufacturers and one sale of 800 tons to a Michigan firm. The minimum on 8 per cent Northern silicon iron is to-day $28 at furnace, but the Jackson County producers are asking $30. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft.	$19.40 to $19.90
Southern coke, No. 2 f'dry and 2 soft.	18.90 to 19.40
Southern coke, No. 3 foundry	18.40 to 18.90
Southern coke, No. 4 foundry	17.90 to 18.40
Southern gray forge	17.40 to 17.90
Ohio silvery, 8 per cent silicon	29.26 to 31.26
Southern Ohio coke, No. 1	22.76 to 23.26
Southern Ohio coke, No. 2	21.76 to 22.26
Southern Ohio coke, No. 3	21.26 to 21.76
Southern Ohio malleable Bessemer	21.76 to 22.26
Basic, Northern	21.76 to 22.26
Lake Superior charcoal	21.20 to 22.20
Standard Southern carwheel	24.90 to 25.40

(*By Mail*)

Coke.—Some 48-hr. coke, where urgently needed, has been sold as high as $5.25 at oven in both the Connellsville and the Wise County districts, and one quotation has come to light on foundry coke as high as $7 for this year's movement. These figures are only named to illustrate the abnormal condition now existing. Contract Connellsville 48-hr. coke ranges from $3.25 to $3.75 per net ton at oven, and contract foundry coke in all districts is quoted from $3.50 to $4, except New River, which is held around $4.

Finished Material.—The question of good deliveries on old contracts is still a matter of great concern because of the car shortage. The local mill is quoting No. 28 black sheets at 3.90c. to 4c., and galvanized at 5.05c. to 5.15c. f.o.b. Cincinnati or Newport, Ky. While the Pittsburgh price is lower, the matter of delivery is said to be rather uncertain from several mills where prompt shipment is required. The principal effort of the nearby manufacturers is to take care of their old customers. The base price to-day quoted by mill agencies is 3.50c., Pittsburgh, on hoops and 2.85c. for bands. Local warehouse prices are firmer and we quote wire nails at $2.85 per keg base and barb wire at $3.70 per 100 lb.; steel bars and small structural shapes, 3.[illegible] to 3.40c.; twisted steel bars, [illegible]; cold-rolled shafting, 2-in. and larger, 3.90c.; cold-rolled shafting, 10 per cent plus the list price; No. 10 blue annealed sheets, 3.60c.

Old Material.—The market is not quite so active but prices have been advanced uniformly about 25c. per ton. The only two classes of scrap not in demand are cast borings and steel turnings, the supply of which is larger than at any time in the history of the trade and former users are not disposed to substitute this class of scrap for the heavier grades that are more easily handled. The rolling mills have lately bought heavily and the foundries have also been good purchasers. The following are dealers' prices, f.o.b. at yards, southern Ohio and Cincinnati:

Railroad steel rails	$15.[illegible] to $16.[illegible]
Steel rails for rolling	14.[illegible] to 14.[illegible]
Heavy melting steel scrap	14.[illegible] to 14.[illegible]
Steel rails for melting	14.[illegible] to 14.[illegible]

No. 1 railroad wrought	$14.75 to $15.25
Cast borings	4.75 to 5.25
Steel turnings	[illegible] to [illegible]
Railroad cast	12.75 to 13.25
No. 1 machinery cast	14.75 to 15.25
Burnt scrap	9.50 to 10.00
Iron axles	28.00 to 29.00
Locomotive tires (smooth inside)	22.75 to 23.25
Pipes and flues	10.75 to 11.25
Malleable and steel	12.50 to 13.00
Railroad tank and sheet	10.00 to 10.50

Birmingham

BIRMINGHAM, ALA., Oct. 23, 1916.

Pig Iron.—Early last week the price of $15.50 for Birmingham pig iron practically disappeared and $16 iron began to take its place. Several interests made sales at $16. A large amount of domestic and some foreign business offered at $15.50 were turned down. Only one producer in the district has much capacity remaining open for the general trade, the remainder being well sold up for the rest of the year at least. Consumers are finding stocks running dangerously low and are clamoring for delivery. A leading pig-iron maker says the car shortage is cutting shipments about 35 per cent below the iron offered for movement. Exports are heavy, taking place largely through Mobile, New Orleans and Galveston. One interest alone is due to ship about 20,000 tons of basic for export per month. Extreme effort is being made by railroads to relieve the car shortage and shippers are co-operating. Some relief early in November ought to become noticeable. By that time the heavy movement of Texas crops should be over and more cars available for this district. The offerings of warrant iron under $15.50 were withdrawn early in the week and they were placed practically upon a level with furnace metal. The trend is to still higher prices. Spot iron bids fair to command a premium. Total sales for the week were from 30,000 to 50,000 tons, mostly foundry. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	$16.50
No. 2 foundry and soft	16.00
No. 3 foundry	15.50
No. 4 foundry	15.00
Gray forge	15.00
Basic	15.00
Charcoal	$22.00 to 25.00

Coal and Coke.—Coal consumers for several years have bought from hand to mouth, but, with the car shortage, they have been caught napping. They are paying higher prices and are on the anxious seat as to shipments. Steam coal easily brings $2 as compared with contract averages of $1.20. Contract standard beehive coke brings $4 per net ton f.o.b. oven, and spot coke $4.25 to $4.50. The market is extremely active. Furnace coke is also active at $3.25 to $3.50.

Cast-Iron Pipe.—An order for 300 tons of pipe for an Alabama municipality is among the largest reported by the leading interest. Immediate delivery sales foot up a volume sufficient to keep production at the level

of the past six months. A shipment of 1200 tons was recently made to Chile, and the leading interest is reported as seeking a portion at least of the big Buenos Ayres specifications for 65,000 tons. The South American representative of another Birmingham pipe company is also in Latin-America looking up business. Sanitary shops are doing only fairly well. We quote, per net ton, f.o.b. dealers yards, as follows: 4-in., $29; 6-in. and upward, $26, with $1 added for gas pipe and special lengths.

Old Material.—The market is strong. The supply is scarcely equal to the demand, especially from small foundries and rolling mills. Dealings in cast scrap have been in heavy volume. Yard men are exerting special efforts to find material with which to meet the demand. Steel axles are eagerly sought; they bring from $25 to $30, and even more, if to be had in quantities. Prices are firm. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old steel axles	$25.00 to $30.00
Old steel rails	12.25 to 12.75
No. 1 wrought	13.50 to 14.00
No. 1 machinery	11.00 to 11.50
Carwheels	11.00 to 11.50
Tram carwheels	10.50 to 11.00
Stove plate and light	9.25 to 9.75

Cleveland

CLEVELAND, OHIO, Oct. 24, 1916.

Iron Ore.—No change has occurred in the situation regarding next season's prices except the development of a more general sentiment among ore firms that the advance should be at least $1 per ton. The question hinges, to a large extent, on the carrying charges, and ore firms are not inclined to name prices until these charges are established. They contend that should the carrying charges be advanced to $1 per ton, the rate wanted by vesselmen, and ore prices are advanced $1 per ton the ore interests will not be faring nearly so well as the vesselmen, as the net increase on ore would be only about 20c. per ton, it being estimated that the increased cost of mining due to the higher cost of labor and supplies will be 30c. per ton next season. Several small lot sales are reported for this season's delivery at a net advance of 25c. per ton over the regular price, the consumers paying the additional 50c. per ton cost for transportation charges, making the cost 75c. per ton above the regular prices for the season. However, the report is confirmed that the sale of 50,000 tons made recently directly by a mining company was at a net advance of 50c. per ton over this season's price. The severe storm on the Lakes last Friday caused the loss of four vessels and 54 lives and a serious delay in vessel schedules and will cut down the movement for the month. Ore boats were bunched at all Lake Erie ports early this week and some were tied up 48 hours waiting for a chance to unload their cargoes. The car shortage is more acute, and this is adding to delays. There is some demand for small lots of ore from the docks and furnaces are having a great deal of trouble in getting this ore as ore-handling equipment is kept busy unloading boats. All dock space has been taken, and to provide some additional space ore is being placed on the old Carnegie dock at Erie which has not been used for several years. Some vessel capacity is being offered for wild ore cargoes late in November for which there is a good demand. The barges of the Pittsburgh Steamship Company will not be sent up the Lakes after this week and many boats will take on their last contract cargoes before Nov. 20. We quote 1916 prices as follows, delivered lower Lake ports: Old range Bessemer, $4.45; Mesaba Bessemer, $4.20; old range non-Bessemer, $3.75; Mesaba non-Bessemer, $3.55.

Pig Iron.—Prices are higher on all grades and the market is fairly active, particularly in foundry iron. Some producers, however, have not kept pace with the rapid advances in prices and as a result there is a wide spread in quotations. One Cleveland interest has advanced its price to $22 for foundry iron and reports a number of sales at $21 and some at $21.50, while another interest is still quoting foundry iron at $20 at furnace and considerable business has been placed in northern Ohio territory the past few days at that price. Some inquiry has developed for foundry iron for the last half of next year, on which $20 has been quoted by one interest, but no sales for that delivery are reported. Sales of basic are reported at $21, Valley furnace, and one Cleveland producer declined an offer of $20.95 for a round lot. The sale of 1700 tons of Bessemer iron is reported at $26, but it is still being generally quoted at $24. Valley quotations on foundry iron range from $21 to $22. The Valley price on gray forge has been advanced 50c. to $20. A new Canton consumer has taken 3000 tons of Northern foundry iron and 1000 tons of Southern for first half delivery. Southern iron is quite active. Several sales have been made at $15.50, Birmingham, for No. 2, but some producers that have been quoting this price have advanced their price to $16. However, there is still some Southern iron to be had at $15.50. Ohio silvery iron is scarce and two southern Ohio producers have advanced their price to $30 for 8 per cent silicon. We quote, delivered Cleveland, as follows:

Bessemer	$24.95
Basic	$20.95 to 21.95
Northern No. 2 foundry	20.30 to 21.30
Southern No. 2 foundry	19.50 to 20.00
Gray forge	20.95
Jackson Co., silvery, 8 per cent silicon	31.62
Standard low phos., Valley furnace	35.00

Coke.—Prices continue to advance, and standard Connellsville foundry coke is quoted at $7 to $8 per net ton at oven. No prices are being quoted for contracts. Connellsville furnace coke is held at $6.50 to $7 for prompt shipment. The sale of some Indianapolis by-product coke is reported to a Cleveland consumer at $6 at oven or $7.70 delivered.

Finished Iron and Steel.—Considerable new inquiry is coming out for steel for specific work and the volume of business for early shipment is heavy. One mill has advanced its price for steel bars to 2.85c., Pittsburgh, for any delivery. An Eastern mill able to make fairly early shipments on structural material has advanced its price to 3c. Plates are very firm at 3.50c. to 4.50c., Pittsburgh. There is considerable inquiry from Lake shipyards for plates for boats of the Welland Canal size for the seaboard. Steel is wanted for these boats for second quarter delivery, but mills cannot promise shipment before the third or fourth quarter. The demand for light rails from coal mines has become quite active. The sale of 3000 tons of slabs is reported by a Cleveland mill for shipment to eastern Pennsylvania at $50. The Illinois Steel Company has taken 1500 tons of rails for the Ann Arbor Railroad. The Nickel Plate has placed the spikes and track bolts for 10,000 tons of rails. The Lima Locomotive Corporation has taken 10 locomotives for the Western Maryland Railroad, and inquiries are pending for 77 locomotives for the Northwestern and 28 locomotives for the New York, New Haven & Hartford. High-speed tool steel, which has been somewhat irregular, is now generally quoted at $2.50 per pound, a decline of 25c. from the price long prevailing. Hard steel bars for reinforcing purposes are in heavy demand, with the price unchanged at about 2.40c., delivered. The demand for sheets is heavy, consumers being anxious to cover either for their first quarter requirements or to secure the best deliveries possible. Black sheets have sold as high as 3.75c., Ohio mill, for No. 28 and galvanized at 5.20c. for immediate delivery. We quote sheets at 3.40c. to 3.50c. for No. 28 black, 3.25c. to 3.50c. for No. 10 blue annealed, and 4.75c. to 5c. for No. 28 galvanized. Inquiry for bar iron for the last half of 1917 has come out, but local mills refuse to quote that far ahead. We quote bar iron at 2.50c. to 2.65c., Pittsburgh. Warehouse prices are 3.40c. for steel bars and structural material, 3.75c. for plates and 3.20c. for iron bars.

Bolts, Nuts and Rivets.—Railroads and implement manufacturers have come into the market with large inquiries for their bolt and nut requirements for the first half of next year, and considerable of this business is being placed at regular prices. The current demand is also active. The demand for rivets continues fairly heavy, with prices unchanged at 4c., Pittsburgh, for structural and 4.10c. for boiler rivets, for delivery in

the first quarter. Bolt and nut discounts are as follows:

Common carriage bolts, ⅜ x 6 in., smaller or shorter, rolled thread, 50 and 5; cut thread, 40; ⅜ x 6 in. and longer, 40 and 5; machine bolts within ½ p. nuts, ⅜ x 4 in., smaller and shorter, rolled thread, 50 and 10; cut thread, 50; larger sizes, 40 and 5; lag bolts, gimlet or coach point, [illegible]; cap h. p. nuts, blank or tapped, \$2.70 off; c. p. c. and t. sq. nuts, blank or tapped, \$2.40; hexagon nuts, all sizes, \$2.[illegible] off; cold pressed semi-finished hexagon nuts, all sizes, 60 and 5.

Old Material.—Sharp advances have been made on most grades in spite of the rather inactive market, and little material is being offered by dealers except at high prices. Sales of heavy melting steel scrap have been made at \$19.50 by Cleveland dealers for shipment to Youngstown and at \$19.20 for Canton delivery, and as high as \$19 is being asked for this grade for Cleveland delivery. Railroad malleable scrap has advanced nearly \$2 per ton. The demand from foundries for cast scrap has improved and prices on this grade and stove plate are higher. Borings and turnings continue weak. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton

Steel rails	\$16.[illegible] to \$17.25
Iron rails	19.00 to 20.00
Steel car axles	39.00 to 40.00
Heavy melting steel scrap	17.50 to 17.75
Carwheels	14.50 to 15.00
Relaying rails, 50 lb. and over	25.00
Agricultural malleable	12.75 to 13.00
Railroad malleable	16.00 to 16.[illegible]
Steel axle turnings	12.00 to 12.50
Light bundled sheet scrap	12.00 to 12.25

Per Net Ton

Iron car axles	\$[illegible] to \$[illegible]
Cast borings	6.25 to 6.50
Iron and steel turnings and drillings	5.50 to 5.75
No. 1 busheling	14.00 to 14.25
No. 1 railroad wrought	17.75 to 18.00
No. 1 cast	14.00 to 14.25
Railroad grate bars	11.00 to 11.50
Stove plate	11.00 to 11.50

St. Louis

ST. LOUIS, MO., Oct. 23, 1916.

Pig Iron.—The inquiry for 10,000 tons of basic iron reported last week went to Southern furnaces and another inquiry from the same source for 10,000 tons of Northern basic is pending this week, with some difficulties anticipated as to the placing of the contract, in the light of the fact that the furnaces are at present evidencing an unwillingness, according to their St. Louis representatives, to accept a large tonnage for the delivery sought on this last inquiry. The evidence seems to show that practically all of the requirements of consumers in the St. Louis territory have been well covered for the remainder of this year, and at least the first quarter of next, if not the first half. Practically no books have been opened for the last half of 1917.

Coke.—No business of importance appeared. By-product coke is held on a parity with Connellsville and Virginia quotations, but the local plant is well sold ahead.

Finished Iron and Steel.—There has been no activity because of the marked unwillingness of the mills to accept orders for the necessarily extended deliveries. Movement out of warehouse has been active and prices have been very firmly held at these quotations. Soft steel bars, 3.30c.; iron bars, 3.25c.; structural material, 3.30c.; tank plate, 3.80c.; No. 10 blue annealed sheets, 3.55c.; No. 28 black sheets, cold rolled, one pass, 3.80c.; No. 28 galvanized sheets, black sheet gage, 5.40c.; the last named an advance, as a result of the stiffer feeling in the zinc market.

Old Material.—The scrap market has been strong with dealers taking freely all offerings from railroads and other sources. These, however, have been limited and give evidence of a rapidly decreasing supply. Dealers are not buying to hold for future sales but this is largely due to the fact that all the material which they can get is required to fill the orders on hand. The steel mills, foundries and rolling mills are all taking materials on their contracts and are also buying in a way to indicate that their needs are becoming more acute. This is helping to hold prices and even to advance them beyond the present high figures which have resulted chiefly from the local situation, making the St. Louis market for the present decidedly independent and free from the effects of conditions in other scrap centers. Relaying rails are wanted and more difficult than ever to get. The only railroad list coming out during the week was one for 2500 tons from the Chicago, Burlington & Quincy. We quote dealers' prices f.o.b. customers' works to St. Louis industrial district as follows:

[illegible]	\$[illegible] to \$[illegible]
[illegible]	[illegible] to [illegible]
[illegible]	[illegible] to [illegible]
Relaying rails, standard section, subject to [illegible]	[illegible] to [illegible]
Old carwheels	12.50 to 13.00
[illegible]	[illegible] to [illegible]
Heavy shoveling steel	15.25 to [illegible]
[illegible]	[illegible] to 15.00
[illegible]	[illegible] to 9.75

Per Net Ton

[illegible]	\$15.[illegible] to \$15.75
[illegible]	[illegible] to 19.[illegible]
Iron car axles	21.00 to 21.50
[illegible]	[illegible] to 24.00
Wrought [illegible]	[illegible] to 24.00
No. 1 railroad wrought	17.00 to 17.50
No. 1 railroad [illegible]	16.00 to 17.00
Railroad grates	16.00 to 16.50
Steel couplers and knuckles	16.25 to 16.50
Locomotive tires, 42 in. and over, smooth inside	22.00 to 22.50
No. 1 dealers' forge	15.00 to 15.50
Cast-iron borings	6.50 to 7.00
No. 1 busheling	14.00 to 15.25
No. 1 boilers, cut to sheets and rings	10.75 to 11.25
No. 1 railroad cast scrap	12.00 to 13.00
Stove plate and light cast scrap	9.25 to 9.50
Railroad malleable	11.00 to 12.00
Agricultural malleable	10.00 to 11.00
Pipes and flues	12.50 to 13.00
Heavy railroad sheet and tank scrap	12.00 to 12.25
Railroad grate bars	10.25 to 10.75
Machine shop turnings	7.75 to 8.25

New York

NEW YORK, Oct. 25, 1916.

Pig Iron.—Price advances are now the feature of the market and all grades and districts are participating. On Virginia iron \$19.50 was announced on Oct. 24 as the price of the leading producer for No. 2 X. Virginia irons have figured in a number of transactions, including 1000 tons to a New Jersey point. The same New Jersey foundry bought 1000 tons of 2.75 to 3.25 silicon Pennsylvania iron at a delivered price somewhat under \$21.50, which is exceptionally low. However, other sales from Pennsylvania furnaces have been made at \$21 at furnace and this also is the minimum price quoted by Buffalo furnaces for early delivery. The Buffalo group are generally well sold for the first half of 1917 and on some business recently offered have refused to quote. The Alabama market shows excitement. Warrants were quoted at \$15.75 in the latter part of last week and at \$16 early in the present week. Most of the warrant iron is in strong hands and is not freely offered. New England has figured in foundry iron buying. One Connecticut interest bought about 4000 tons for first half and another 4000 to 5000 tons. Virginia iron made up a part of one of these purchases. A 1000-ton inquiry is reported from Connecticut for the last half of 1917, but few furnaces are willing to look that far forward. The export demand still has a prominent place. For export, No. 2 soft Alabama iron has sold as high as \$16 at furnace for early shipment. In the East a sale of 1000 tons of standard Bessemer for November and December delivery was made at \$24, furnace. One Eastern furnace, which it was expected would make ferromanganese, will continue on pig iron until after Jan. 1. The coke situation is more sensational, foundry coke having brought \$8 to \$8.50 at the oven, with deliveries uncertain on account of labor shortage. We quote at tidewater for early delivery: No. 1 foundry, \$22.50 to \$23; No. 2 X, \$21.50 to \$22.50; No. 2 plain, \$21 to \$21.50; Southern iron at tidewater, \$21.50 to \$22.00 for No. 1 and \$21 [illegible] for No. 2 foundry and No. 2 soft.

Ferroalloys.—Sales of ferromanganese are still very few and inquiries by consumers are scarce. The opinion is expressed that buyers are holding off, expecting prices as low as [illegible]. The [illegible]

quotation for British alloy is $164, seaboard, with the domestic product obtainable at $160 to $165, delivered. Reports are quite general that both the leading interest and a large Pennsylvania steel company are offering their own product at $160, delivered, but the extent of their sales is not definitely known. While receipts from Great Britain in September were above the 1916 average, amounting to over 9000 tons, reports indicate that arrivals in October are considerably less, in all probability because of government restrictions. Spiegeleisen is quiet, with inquiries for about 1000 tons before the market. Quotations are $43 to $45, furnace. Ferrosilicon, 50 per cent, is still very strong, with deliveries on contract insistent and hard to meet. Dealers are not making contracts yet for 1917, but the expectation is strong that the quotation will be at $100 or more, Pittsburgh, instead of the previous quotation of $86 to $88, Pittsburgh.

Finished Iron and Steel.—The week has shown no change. The principal offerings in structural steel come from the railroads, the Pennsylvania, for example, being now in the market for about 3000 tons, mainly for five bridges, with some small work in Buffalo. The insistent bombardment of inquiries for ship plates has not diminished. And generally the export demand for all lines of finished steel continues as the conspicuous factor. A lot of over 300 tons of ship plates for early delivery was closed at no less than 5c., Pittsburgh; some 4000 tons of tank plates for a domestic user, largely for the first quarter, went at 4.50c., and over 150 tons of marine steel went at 6c., Pittsburgh. As noted elsewhere, it is estimated that 25,000 railroad cars will be bought in the next 30 days, and in some quarters it is believed that car builders will pay 4c. for plates next year. One of the latest inquiries is for 10,000 tons of ship plates for Norway, as soon as they can be obtained, but few mills, if any, have such plates for delivery before the second half of next year, and they are declining to quote at this time for second-half delivery. Boiler tubes are unusually active. Some 500 tons for delivery over seven months were sold for domestic use at about 30 per cent higher than THE IRON AGE quotation, and a late inquiry is for 6000 tons for South Africa. On the 19,300 tons of 10, 12 and 15 mm. Bessemer bars for France it is expected that 3c. will be the common price. The new shipbuilding development at Staten Island is still desirous of closing for 20,000 tons of ship plates, which it is willing to take in the second half, and it is desirous of having some protection for 1918, the requirements of which are put at 80,000 tons. We quote plain structural material at 2.70c., Pittsburgh, or 2.869, New York, for the largest lots for this year, with the price range up to 3.019c., New York, from some mills and 3.35c. from New York district warehouse. We quote wide plates at 4.25c. to 4.50c. for what may be obtained prior to the third quarter of 1917; for sheared plates up to 7 ft. in width 4c. in about three months and universal plates in several weeks at 3.25c. to 3.50c., Pittsburgh, the New York prices taking 0.169c. additional per pound for freight. Plates from warehouse range from 4c. to 4.50c. We quote steel bars at 2.60c. to 2.75c., Pittsburgh, the higher price for Bessemer steel and for rollings from shell steel discards, both of which are obtainable for relatively early shipment. We quote iron bars at 2.669c., New York. From warehouse steel bars are 3.35c. to 3.50c., New York, and iron bars, 3.25c.

Cast-Iron Pipe.—The city of Newark, N. J., will open bids Nov. 2 on about 2100 net tons of 6 to 36 in. pipe. This the only public letting of importance that has come to light in this vicinity. Private buying keeps up well. Some large consumers of pipe are now contracting for spring delivery. Prices are very strong. Carload lots of 6-in., class B and heavier, are quoted at $31.50 per net ton, with $1 per ton extra for class A and gas pipe.

Old Material.—Conditions continue to improve, except as to steel scrap for eastern Pennsylvania; another embargo against Coatesville has been in force for several days. A steady market is being found for steel scrap in western Pennsylvania and the iron rolling mills are frequent buyers, although not contracting far into the future. A considerably better market than has recently been the case is now being experienced for nearly all kinds of old material. The export demand for old steel rails and axles continues good. Brokers quote buying prices about as follows to local dealers and producers, per gross ton, New York:

Heavy melting steel scrap (or steel [illegible] specifications)	$12.25 to $12.50
Old steel rails (short lengths) or equivalent	15.25 to 15.50
[illegible]	28.50 to 29.00
Relaying rails	19.00 to 19.50
Rerolling rails (for export)	22.00 to 22.50
[illegible] axles (for export)	39.00 to 39.50
Steel car axles (for export)	40.00 to 40.50
No. 1 railroad wrought	20.25 to 20.50
Wrought-iron track scrap	17.50 to 17.75
No. 1 yard wrought, long	15.00 to 15.25
Light, iron (nominal)	3.50 to 4.00
[illegible] (nominal)	8.00 to 8.25
Machine shop turnings (nominal)	6.25 to 6.50
Mixed borings and turnings (nominal)	6.25 to 6.50
[illegible]	14.00 to 14.25

Certain foundries appear to have a better run of business than others and are buying in somewhat larger quantities. The general foundry trade, however, is steadily buying in small lots. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

No. 1 cast (machinery)	$17.00 to $17.50
No. 2 cast (heavy)	14.50 to 15.00
Stove plate	12.00 to 12.50
Locomotive grate bars	11.50 to 12.00
Old carwheels (nominal)	15.00 to 15.25
Malleable cast (railroad)	12.00 to 12.50

Buffalo

BUFFALO, N. Y., Oct. 24, 1916.

Pig Iron.—The total of sales for the week exceeded 100,000 tons of all grades, for last quarter of 1916 and first half and last half of 1917 deliveries. Prices are rising daily. The minimum for iron in this district on the basis of No. 2 X is now $22 at furnace, while one furnace interest is holding the remainder of its unsold product at $25 at furnace, and is not making any effort to dispose of it. Some moderate tonnages of special grade high silicon iron have been sold at $25, and one furnace has sold high silicon grades at $26, which is the highest price reached since 1907-8. An official of one of the largest producing interests stated to-day that he would not be surprised at almost any price being attained, owing to the unprecedented situation in coke, labor, and the other elements entering into cost of production. The shortage of coke has become so pronounced that there is no telling what furnace may be liable to be put out of commission by inability to obtain an adequate supply. The margin of stocks of iron has been entirely wiped out, and melters are therefore dependent upon the current production, so that if anything should happen to cause the stoppage of their regular source of supply it would create a strained and serious situation. Some producers are so completely sold up that they are obliged to turn down large tonnages offered, owing to the impossibility of taking on the business. A large electrical concern has this week sent out inquiries for 15,000 tons of regular grades. The quotations given below are purely nominal, although approximating the market for the different grades as closely as possible, and are for last quarter 1916 delivery and for the first half and last half of 1917, f.o.b. furnace, Buffalo:

High silicon iron	$25.00
No. 1 foundry	23.00
No. 2 X foundry	22.00
No. 2 plain	22.00
No. 2 foundry	22.00
Gray forge	21.00 to 22.00
Malleable	22.00
Basic	22.00 to 23.00
Bessemer	24.00 to 24.00

Finished Iron and Steel.—Business placed is almost entirely from contract customers, with no definite deliveries promised by the mills. In order to secure delivery some users are substituting iron bars for steel. Several inquiries have appeared for steel bars and shapes for shipment over the last half of 1917 and the first quarter of 1918, but mills are averse to selling so far ahead, even against specific contracts. Most of the jobbers seem to be pretty well stocked on nails; but

there is a great scarcity of wire for manufacturing purposes. It is understood there has been very heavy covering on tin plate; mills are prorating available tonnage and it is becoming more thoroughly established that it is going to be a question of ability to supply from now on, rather than a question of price.

Old Material.—A number of good sized sales of heavy melting steel scrap have been made at above market prices, a portion being transactions between dealers to cover short orders. Indications point to an advance in the price of this commodity. Labor conditions constitute an important factor, as it is difficult for yard dealers to put material in shape on account of labor shortage. Low phosphorus billet and bloom ends show additional strength, and prices on them have advanced 50c. per ton. The entire list shows strength. Inquiries are out for large tonnages of steel, wrought and cast scrap. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	$18 00 to $18 50
Low phosphorus billet and bloom ends	20 00 to 21 00
No. 1 railroad wrought scrap	19 00 to 19 50
No. 1 railroad and machinery cast scrap	16 50 to 17 00
Steel axles	32 00 to 33 00
Iron axles	32 00 to 33 00
Carwheels	15 50 to 16 00
Railroad malleable	15 00 to 16 00
Machine shop turnings	6 00 to 7 00
Heavy axle turnings	14 00
Clean cast borings	8 00 to 8 25
Iron rails	18 00 to 18 50
Locomotive grate bars	14 00 to 15 00
Stove plate (net ton)	11 50 to 12 00
Wrought pipe	13 00 to 13 50
No. 1 busheling	13 00 to 14 00
No. 2 busheling	11 50 to 12 00
Bundled sheet scrap	11 50 to 12 00
Bundled tin scrap	14 00 to 15 50

British Steel Market

American Billets Irregular and Lower—Pig Iron Firmer

(By Cable)

LONDON, ENGLAND, Oct. 25, 1916.

Pig iron is firm, with the output of foundry and hematite fully absorbed. Black sheets are quoted at £20 and American billets are irregular, with occasional lots of 4-in. for November shipment sold at $63 c.i.f., while $65 is asked for first quarter. Two-inch billets have sold at £15 10s. and special soft wire rods at £20 5s., both c.i.f. France, for immediate shipment. Tin plates are slow and stock plates are irregular at 32s. We quote as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 33s. to 36s.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £20 against £20 5s. last week.

Steel ship plates, Scotch, delivered local yards, £13 17s. 6d.

Steel rails, export, f.o.b. works, £10 17s. 6d.

Hematite pig iron, f.o.b. Tees, about 140s.

Sheet bars (Welsh) delivered at works in Swansea Valley, £10 7s. 6d.

Steel bars, export, f.o.b. Clyde, £18.

Ferromanganese (nominal), £35.

Ferrosilicon, 50 per cent, c.i.f., £27.

Permit Difficulties in Ferromanganese Shipments —Pig-Iron Exports Less

(By Mail)

LONDON, ENGLAND, Oct. 10, 1916.—There is not much change in the general outlook. The utmost is being made of the present iron and steel capacity in order to cope with the abnormally heavy requirements. Progress is satisfactory. Transport conditions have improved, as indicated by the relaxation of railroad congestion. This has facilitated the working off of some orders, but the pressure of national needs is as intense as ever.

Pig-iron continues tight, current output being quickly absorbed, with no chance of an accumulation of surplus supplies, owing to the quantities required to keep pace with running contracts for home and export account. New business in Cleveland foundry iron has fallen off because of reduced supplies available for this and next month.

The scarcity of hematite is as pronounced as ever owing to large orders for several months ahead. The output is unequal to the demand, and the deliveries are closely supervised by the authorities. Some attempts have been made lately to secure a revision of the domestic maximum price, but in vain.

The total shipments of pig iron from the East Coast during September were only 44,969 gross tons, a decrease of about 19,000 tons from the previous month, making the aggregate for the nine months 506,365 tons, of which 490,287 tons went abroad, and only 16,078 tons coastwise. The Board of Trade returns give the total exports for September as 72,683 tons, including 7573 tons of spiegeleisen, ferromanganese and ferrosilicon, the total for the nine months at 746,681 tons being more than double the returns for the same period last year.

The scarcity of semi-finished steel is acute with Welsh bars hard to get, though the official price remains unchanged at £10 7s. 6d. Manufacturers are seriously handicapped, while importations of American material are more and more difficult. The recent expectations that the improving supply of freight room would assist the development of new business have not been fulfilled, owing to the further restriction of offers. Only a limited tonnage of 2 to 4 in. billets is now offering for November shipment at about £14, c.i.f. Liverpool, while stiff terms are quoted for January-March delivery, at about $68 for 4-in. material. The placing of new orders for finished iron and steel for ordinary use is extremely difficult at any price, the current output being earmarked for special requirements.

Tin plates are quiet and prices have sagged further. Owing to the seriously reduced output because of the steel famine, there is no real pressure to liquidate stock plates, which remain at a big premium as compared with the terms accepted by the works against "A" certificates on the basis of about 24s. 6d. for 20 by 14. The works are required to give full details weekly of the plates rolled. Exports have decreased further.

Galvanized corrugated sheet exports fell to a new low level, only 6878 gross tons for September, making a total of 110,330 tons for the nine months, a decrease of 128,000 tons for the same period in 1915. There is no prospect of any recovery owing to the severely curtailed supply of sheet bars. Export business in black sheets is similarly hampered through steel restrictions, and American black sheets have been sold at £21 for November shipment, c.i.f. Liverpool, for standard specifications.

Ferromanganese rules quiet, shipments being for the time being restrained by permit difficulties. Indian manganese ores have ruled firm at 2s. 6d. to 2s. 8d. per unit, a little more business being reported at the higher figure c.i.f. French or United Kingdom ports.

September Imports of Ferromanganese

Imports of ferromanganese into the United States in September were 9237 gross tons, as compared with 8515 tons in August and with a monthly average of 6086 tons for the first eight months of this year. The September import statistics collected by THE IRON AGE include all ports except that of New York and it is understood that none of the alloy was received through that port. Of the September imports 5972 tons came through Baltimore, 1819 tons through Philadelphia, 938 tons through New Orleans and 508 tons through Norfolk, Va.

Improvements are being made by the Anniston Steel Company, Anniston, Ala., in its 19-in. and 10-in. mills. They will be equipped with electric motor drives and when the necessary machinery has been installed the 19-in. mill will have an output of about 200 tons per day. It will shortly be ready to roll rounds for delivery to the company's forge shop where shell blanks will be forged both for the market and for the connected ordnance company. The 10-in. mill will be operated on merchant material.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c. Denver, pipe, 76.1c., minimum carload 46,000 lb.; structural steel and steel bars, 83.6c., minimum carload 36,000 lb. Pacific coast (by rail only), pipe, 65c.; structural steel and steel bars, 75c., minimum carload 50,000 lb.; structural steel and steel bars, 80c., minimum carload 40,000 lb. No freight rates are being published via the Panama Canal, as the boats are being used in transatlantic trade.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 2.60c. to 2.75c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.20
Angles over 6 in., on one or both legs	.20
Angles, 6 in. on one or both legs, less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and coupler tees)	.60
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.50 to .80
Deck beams and bulb angles	.40
Handrail tees	.75
Cutting to lengths, over 1 ft. to 2 ft. inclusive	.75
Cutting to lengths, under 2 ft. to 1 ft. inclusive	1.15
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Plates.—Tank plates, ¼ in. thick, 6 in. up to 100 in. wide, 3.50c. to 4c., base, net cash, 30 days, or ½ of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras

	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers)	.10
Boiler and flange steel plates	.15
"A. B. M. A." and ordinary firebox steel plates	.20
Still bottom steel	.30
Locomotive firebox steel	.30

Marine steel, special extras and prices on application.

Gage Extras

Rectangular, ¼ in. thick, over 6 in. wide to 100 in. wide	Base
Lighter than ¼ in., to 3/16 in., up to 72 in. wide	.10
*Lighter than ¼ in., including 3/16 in., over 72 in. to 84 in.	.20
*Lighter than ¼ in., including 3/16 in., over 84 in. to 96 in.	.20
*Lighter than ¼ in., including 3/16 in., over 96 in. to 100 in.	.40
*Lighter than ¼ in., including 3/16 in., over 100 in. to 102 in.	.45
Lighter than 3/16 in., including No. 8, up to 72 in. wide	Base
*Lighter than 3/16 in., including No. 8, over 72 in. to 84 in.	.30
*Lighter than 3/16 in., including No. 8, over 84 in. to 96 in.	.35
Lighter than No. 8, including No. 10, up to 60 in. wide	.30
Lighter than No. 8, including No. 10, over 60 in. to 64 in.	.35

Up to 72 in. and not less than 10.2 lb. per sq. ft. will be considered ¼ in.
Over 72 in. must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.
Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.
Over 72 in., ordered weight 3/16 in., take No. 8 price.
Over 72 in., ordered weight No. 8, take No. 10 price.

Width Extras

Over 100 in. to 110 in. inclusive	.05
Over 110 in. to 115 in. inclusive	.10
Over 115 in. to 120 in. inclusive	.15
Over 120 in. to 125 in. inclusive	.20
Over 125 in. to 130 in. inclusive	.25
Over 130 in.	1.00

Length Extras

Universal plates 86 ft. long up to 90 ft. long	.10
Universal plates 90 ft. long up to 100 ft. long	.15
Universal plates 100 ft. long up to 110 ft. long	.20

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over.

Lengths under 3 ft. to 2 ft. inclusive	.25
Lengths under 2 ft. to 1 ft. inclusive	.50
Lengths under 1 ft.	1
Circles 3 ft. in diameter to 100 in.	.30
Circles over 100 to 110 in. (width extra)	.35
Circles over 110 to 115 in. (width extra)	.40
Circles over 115 to 120 in. (width extra)	.45
Circles over 120 to 125 in. (width extra)	.50
Circles over 125 to 130 in. (width extra)	.55
Circles over 130 in. (width extra)	1
Circles under 3 ft., to 2 ft., inclusive	.60
Circles under 2 ft., to 1 ft., inclusive	.80
Circles under 1 ft.	1

Half circles take circle extras.
Sketches not over four straight cuts, inc. straight taper .10
Sketches having more than four straight cuts .20
Plates sheared to a radius take complete circle extras.

*Including extra for width.

Wire Rods.—Including chain rods, $55 to $60.

Wire Products.—Prices to jobbers effective Oct. 19: Fence wire Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, $2.65; galvanized, $3.35. Galvanized barb wire and staples, $3.55; painted, $2.85. Wire nails, $2.70. Galvanized nails, 1 in. and longer, $2 advance over base price; shorter than 1 in., $2.50 advance over base price. Cement-coated nails, $2.60. Woven wire fencing, 50 per cent off list for carloads, 58 off for 1000-rod lots, 57 off for less than 1000-rod lots.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect on black pipe from Sept. 7, 1916, and on galvanized pipe from July 24, 1916, all full weight:

Butt Weld

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
⅛ to ¼ and ⅜	62	35½	⅛ and ¼	51	24
½	66	51½	⅜	52	25
¾ to 3	69	55½	½	56	38
			¾ to 1½	59	43

Lap Weld

2	63	46½	1¼	46	31
2½ to 6	66	51½	1½	52	38
7 to 12	63	49½	2	53	39
13 and 14	62½		2½ to 4	55	42
15	51		4½ to 6	55	42
			7 to 12	54	41

Reamed and Drifted

1 to 3, butt	67	50½	¾ to 1½, butt	54	37
2, lap	61	48½	1¼, lap	41	25
2½ to 6, lap	64	51½	1½, lap	47	32
			2, lap	48	33
			2½ to 4, lap	51	36

Butt Weld, extra strong, plain ends

⅛ to ¼ and ⅜	58	40½	⅛ to ¼ and ⅜	51	34
½	63	50½	½	56	43
¾ to 1	67	54½	¾ to 1½	60	45
1¼ to 3	68	55½			

Lap Weld, extra strong, plain ends

2	61	43½	1¼	48	33
2½ to 4	64	51½	1½	53	39
4½ to 6	63	51½	2	53	42
7 to 8	59	45½	2½ to 4	57	45
9 to 12	54	40½	4½ to 6	56	44
			7 to 8	50	38
			9 to 12	45	33

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts on less than carloads, freight to destination added, effective from Sept. 7, 1916, are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1¼ in.	33	1½ in.	25
1½ and 1¾ in.	42	1¾ and 2 in.	37
2¼ in.	42	2¼ in.	34
2½ and 2¾ in.	48	2½ and 2¾ in.	40
3 and 3½ in.	48	3 and 3½ in.	45
3¾ to 4½ in.	48	3¾ to 4½ in.	46
5 and 6 in.	48	5 and 6 in.	39
7 to 13 in.	44	7 to 13 in.	36

Locomotive and steamship special charcoal grades bring higher prices.
1¾ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.
2 in. and larger, over 22 ft., 10 per cent net extra.

Sheets.—Makers' prices for mill shipments on sheets of U. S. standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Nos. 3 to 8	3.40 to 3.50
Nos. 9 to 12	3.50 to 3.60
Nos. 13 and 14	3.00 to 3.10
Nos. 15 to 18	3.10 to 3.15

Box Annealed Sheets, Cold Rolled

Nos. 7 to 21	3.20 to 3.30
Nos. 22 to 24	3.25 to 3.35
Nos. 25 to 27	3.30 to 3.40
Nos. 28 to 30	3.40 to 3.50
No. 31	3.50 to 3.60

Nos. 3 to 8	3.80 to 3.85
Nos. 9 to 12	3.90 to 3.95
Nos. 13 and 14	4.00 to 4.10
Nos. 15 to 18	4.10 to 4.25
Nos. 19 to 21	4.25 to 4.40
Nos. 22 to 24	4.40 to 4.55
Nos. 25 to 27	4.55 to 4.70
No. 28	4.75 to 4.85
No. 29	4.90 to 5.00
No. 30	5.00 to 5.15
No. 31	5.15 to 5.25

Nos. 7 to 16	3.10 to 3.20
Nos. 17 to 21	3.15 to 3.25
Nos. 22 to 24	3.20 to 3.30
Nos. 25 to 27	3.25 to 3.35
No. 28	3.30 to 3.40
No. 29	3.35 to 3.45
No. 30	3.35 to 3.45
No. 31	3.40 to 3.50

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin,	Lead		Spelter	
	Electro-		New	New	St	New	St.
Oct.	Lake	lytic	York	York	Louis	York	Louis
18	28.50	28.50	40 75	7.00	6.87½	9.85	9.35
19	28.50	28.50	41.00	7.00	6.92½	9.65	9.00
20	28.25	28.25	41.00	7.00	6.87½	9.65	9.00
21	28.25	28.25		7.00	6.92½	10.00	9.75
23	28.25	28.25	41 12½	7.00	6.92½	to 25	10.00
24	28.50	28.50	41.25	7.00	6.92½	to 75	10.00

NEW YORK, Oct. 25, 1916.

Copper is quiet, but its undertone shows a stronger tendency. Lead has been active and the St. Louis quotation is stronger. Spelter has advanced during active buying of galvanizing grades. Tin has been quiet, but nevertheless the market is higher. Antimony is dull again.

New York

Copper.—Not much business is reported, but the undertone of the market is stronger. There is a persistent rumor that a large lot for export shipment is under negotiation, and it is believed that Italy is the prospective buyer. November electrolytic can be had at 28.50c., December at 28c., January at 27.50c., first quarter at 27.25c. to 27.37½c., and first half at 27c. A sale involving special considerations was made for first quarter at 28c. The Lake producers are reported to be sold up to next March, for which delivery they quote 27.37½c. Some small foreign inquiry has come to light in the past few days, but most of it is for prompt deliveries and it therefore does not greatly interest the producers, as practically the only spot metal to be had is in second hands. The products business, both brass and copper, is heavier than at any time heretofore. Copper rings for shells are in great demand, but none of the mills can take any further orders. Were it possible for them to do so they could get orders for millions of rings. The London market for spot yesterday was £144, against £143 a week ago. The exports this month, including yesterday, total 21,681 tons. Those of nine months of this year total 245,002 tons, against 186,663 tons in the same period of 1915.

Tin.—The market is strong, notwithstanding the fact that business has not been heavy since last report. Quotations yesterday were higher at 41.25c. for spot Straits, with spot Banca at 40.87½c. to 41c. In the latter part of last week buying was steady, though moderate. On Monday the market was dull, with second-hands inclined to grant concessions. Yesterday the market was fairly active, with most of the demand for futures. Sales of Banca have been confined to small lots. The arrivals this month total 2005 tons, and in this connection it is noted that permits to ship from London are again tighter. Afloat there is 2025 tons.

Lead.—Throughout the week lead for delivery at Eastern points was obtainable at 7c., New York, which is the quotation of the leading interest. Until about the middle of last week independents quoted 6.85c., St. Louis, but this price was withdrawn following sales of large quantities of chemical lead, after which the Western quotation went to 6.92½c., the level at which the principal producer quotes. Chemical lead, it is explained, is not suitable to many purposes, but is used for acid tanks, pipes, cable coverings, etc. It is not used in solder and other alloys. A good business has been done in all grades, much of it for export to Canada and other countries. For strictly spot lead, dealers have asked up to 7.20c., New York. The trade is puzzled over a report that the leading producer has also been a buyer in the past week. The London quotation of yesterday was unchanged at £30 10s., as compared with a week previous. The exports this month, including yesterday, total 2871 tons.

Spelter.—In the past four or five days a heavy business has been done, principally in galvanizing grades, and prices have advanced. The quotation for spot yesterday was 10.25c., New York, and 10c., St. Louis. Sellers were disappointed because the advancing tendency appeared to have halted yesterday, although the market was left strong. November is quoted at 10.12½c., New York, and first quarter at 9.87½c. to 10c. The London spot quotation yesterday was £1 higher than a week ago, at £54. Exports continue extremely large, amounting this month, including yesterday, to 7027 tons.

Antimony.—After good buying, especially by Canadian interests, the market has turned quiet again. Business was placed around 11.75c. in bond and 13c. to 13.50c. duty paid.

Aluminum.—No. 1 virgin metal, 98 to 99 per cent pure, ranges from 64c. to 66c.

Old Metals.—The market is again advancing. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and wire	[illegible]
Copper, light and bottoms	[illegible]
Brass pipe	[illegible]
Brass, heavy	[illegible]
Brass, light	[illegible]
Heavy machine composition	[illegible]
No. 1 yellow rod brass turnings	[illegible]
No. 1 red brass or composition turnings	16 00 to 17 00
Lead, heavy	[illegible]
Lead, tea	[illegible]
Zinc	[illegible]

Chicago

OCT. 23.—The strength of the copper market is shown in the stiffer quotations for spot shipment and the scarcity of metal, particularly electrolytic, for early delivery. Tin prices have recovered from a temporary slump and spelter is again above 10c. We quote: Casting copper, 27.50c.; Lake copper, 28.50c. to 29c.; tin, carloads, 42c. and small lots, 44c.; lead, 6.95c.; spelter, 10.15c.; sheet zinc, 15c.; Cookson's antimony, 50c.; other grades, 14.50c. to 15c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 24c.; copper bottoms, 21c.; copper clips, 23c.; red brass, 19¼c.; yellow brass, 15c.; lead pipe, 6c.; zinc, 7¼c.; pewter, No. 1, 25c.; tinfoil, 30c.; block tin pipe, 35c.

St. Louis

OCT. 23.—Metals were firmly held all the week, with lead in especially good demand. Closing quotations on carload lots to-day were: Lead, 6.90c. bid, with no sellers; spelter, 9.50c. to 9.75c., with no sellers at those prices; tin, 42c.; Lake copper, 29c.; electrolytic copper, 28.75c.; antimony, 14c. In the Joplin ore district $70 remained the top price per ton for choice zinc blende, while for basic ore the range was $65 to $70, with the average for the week $67.50. Calamine was steady at $35 to $45, with an average for the district of $41. Lead ore, in good demand, brought as high as $87, with the average for the week $85. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 9c.; heavy yellow brass, 12c.; heavy red brass and light copper, 17c.; heavy copper and copper wire, 19c.; zinc, 6c.; lead, 5c.; tea lead, 3.50c.; pewter, 25c.; tinfoil, 31c.

Our foreign trade statistics for September show that both exports of merchandise and the excess of exports over imports have surpassed all previous monthly figures. The total of merchandise exports for September was $512,847,957, about $3,000,000 more than in August. Imports of merchandise, on the contrary, fell off considerably, being $164,128,604, which was $35,000,000 less than in August and $82,000,000 less than in June, which was the record month of this year. The excess of exports over imports was $348,719,343, which is $200,000,000 larger than in the same month last year. For the 12 months ended with September the trade balance in our favor was $2,664,179,316. Net receipts of gold for the month amounted to $85,713,799, and for the 12 months reached a total of $456,032,344.

The Reliance Iron & Coke Company, Cincinnati, has opened an office in room 1742, Frick Annex, Pittsburgh, in charge of R. S. Fox, who has been connected with its Cincinnati offices for about three years and prior to that was with Walter-Wallingford & Co. in their Chicago and Pittsburgh offices.

Farm Implement Manufacturers Meet

Industry Suffering from War Conditions But Great Opportunities for the Future Are Forecasted — Government Attitude Reassuring

The twenty-third annual convention of the National Implement and Vehicle Association, Atlantic City, Oct. 18, 19 and 20, was attended by about 250 manufacturers and others connected with the agricultural machinery and equipment industry and representatives of firms which serve the industry. It was accounted one of the largest and most successful conventions the association has held. The farm implement industry has been hard hit by the war, and naturally there was not the amount of optimism over immediate prospects that has been in evidence at recent trade gatherings in other lines, but that great opportunities will present themselves when peace comes was conceded. The high cost of materials was a delicate subject with most of the manufacturers; as one speaker expressed it—a subject too disagreeable for discussion.

The convention was called to order in the Hotel Traymore by J. F. Donahue, Russell, Burdsall & Ward Bolt & Nut Company, Chicago, president of the auxiliary membership of the association, who made the address of welcome, to which Capt. C. F. Huhlein, Louisville, Ky., responded.

FARMERS STILL WANT HUGE CREDIT

A. J. Brosseau, Gale Mfg. Company, Albion, Mich., president of the association, in his address, laid stress on the fact that implement manufacturers extend enormous credit to the farmers of the country, probably $100,000,000 of which is unnecessary. In contradistinction to this condition he declared that the average farmer is willing and anxious to pay cash for his automobile. He declared that the terms prevailing to-day in many cases were those of the pioneer days of the industry, 30 or 40 years ago. The experience of the past year with the implement manufacturers has been directly opposite to that of most industries, but he saw hope for the future in the co-operation of the Federal Trade Commission, legislation like the Webb bill and the growing tendency of the Government to allow manufacturers to co-operate, especially with regard to export trade.

Secretary and General Manager E. W. McCullough reported that forty meetings of committees and departments of the association had been held in the year, most of them at the home office at Chicago. Early in the year departments had been created, each composed of members in one line or commodity, and great benefit had resulted.

Referring to educational books and pamphlets, Mr. McCullough said that the association had in the year printed and circulated 100,000 copies. He said: "One of these, 'Turning Your Capital,' explaining the law, the methods and the use of the note-discounting privilege, given under a special ruling of the Federal Reserve Board, and relating to paper taken for 'agricultural purposes' is a masterpiece of simplicity, and distribution to the banks, dealers, traveling salesmen and others interested is and will continue to be an invaluable aid to the shortening of terms and the improving of the retailer's business methods."

MAIL-ORDER COMPETITION AGGRESSIVE

He said the association was in good standing with all Government agencies with which it came in contact. He suggested that the members should take the retailers in their confidence and explain to them the difficulties encountered in manufacturing and distributing. He also said that several forms of selling competition should be given more attention. Of mail order distribution, he said: "While we have believed our line to be immune to a very great extent, the fallacy of this conclusion will be revealed by even a casual investigation."

In conclusion, he said: "Government agencies and commissions are realizing that there can be no collusion or detrimental co-operation in such an organization as ours, comprehending a membership so strongly competitive. They are also appreciating that great economic waste which has been going on for many years, through the unintelligent competition of manufacturers in various lines, and to-day they are viewing with a sympathetic eye the efforts being made toward better conditions."

C. E. More, Chicago, attorney to the association, urged the necessity for closely watching legislation. He said:

"There are now pending before the Federal Supreme Court many important cases which must be disposed of at an early date. The decision of these cases, one way or the other, might materially affect business. However, one gathers a very strong impression from reading the decisions of the higher courts that it is not their disposition to tear down any legitimate business, but so to construe the law that no violence will be done. The rule of reason is becoming more and more applicable."

W. H. Stackhouse, French & Hecht, Springfield, Ohio, chairman of the Committee on National Legislation, in his report, soundly rapped the Adamson 8-hr. law.

HOW COSTS ARE GOING UP

The Thursday morning session opened with an address by G. W. Mixter, Deere & Co., Moline, Ill., entitled "Operating Value of Cost Systems," a part of which appears in another part of this issue of THE IRON AGE. Mr. Mixter and his company were highly praised for his frank exposition of the subject, which was illustrated by numerous lantern slides. An interesting diagram, projected on the screen, illustrated the comparative total cost of manufacturing of a typical farm implement with steel at 1.20c., 1.90c. and 2.60c., with business normal and reduced 25 per cent, the figures being based on actual facts. They follow:

	Steel at 1.20c. Normal Volume	Steel at 1.90c. Normal Volume	Steel at 1.90c. Volume Reduced 25 Per Cent	Steel at 2.60c. Normal Volume	Steel at 2.60c. Volume Reduced 25 Per Cent
Total cost of manufacturing	$2 01	$2 72	$2 85	$3.24	$3 37
Productive material	1 17	1 85	1.82	2.34	2 34
Labor	0 33	0 33	0 33	0 33	0 33
Increase	..	0 71	0 84	1.23	1 36
Per cent	.	..	41	61	68

H. J. Hirshheimer, La Crosse Plow Company, La Crosse, Wis., chairman of the Committee on Manufacturing Costs with Uniform Cost System, presented a lengthy report on a uniform accounting system which the committee had devised, and to which informal approval had been given by a member of the Federal Trade Commission. Several members urged the adoption of a uniform system, and it was maintained that there was no potent reason why manufacturers should not compare costs. The question was one, however, on which the legal department of the Government has yet to give a ruling. A majority of those present expressed a willingness to co-operate, and the report was referred to the executive committee of the association with power to act.

At the Thursday afternoon session Dr. E. E. Pratt, chief of the Bureau of Foreign and Domestic Commerce, gave an address, beginning with an analysis of export figures, and dwelling in particular on the enormous recent growth in exports. He believed that implement manufacturers could profitably turn their attention to the manufacture of machinery for the harvesting of crops not raised in this country, such as

rubber, cocoa, rice, coffee, tea, etc. He believed that a substitute for the Webb bill, which did not get through the Senate, and which proposed that manufacturers could combine to promote export trade, is inevitable. It is his belief that when the war comes to an end the great producing countries of the world will find themselves without an adequate supply of farm-operating equipment.

The remainder of the Thursday afternoon session, and all of Friday morning, were devoted to topics of special interest to the agricultural implement trade. The annual banquet was held Friday evening.

The following resolution, indorsing the settlement of industrial disputes by arbitration was adopted:

In consideration of the welfare of the country at large, as well as of the best interests of the vast number of our citizens who are engaged in agricultural, commercial and industrial pursuits in whatsoever capacity, the prosperity of which is so largely contingent upon the continued successful operation of the railroads and other great public utilities, we hereby unqualifiedly indorse the eminently practical American method of referring for settlement all industrial disputes involving such utilities to a non-political board of arbitration.

The following resolution dealing with the subject of an American merchant marine was passed:

We recommend and urge the Congress of the United States to enact such legislation as will encourage and assist private capital to build and successfully operate and maintain an American merchant marine to the end that American manufacturers may maintain and increase their present foreign trade free from restrictions and limitations that the great commercial nations of Europe may impose upon their respective merchant marines in their commerce with the present neutral and belligerent countries.

At the final business session the following were elected officers for 1916-1917:

OFFICERS FOR 1916-1917

President, Joseph Dain, Deere & Co., Moline, Ill.

Chairman of Executive Committee, C. S. Brantingham, Emerson-Brantingham Company, Rockford, Ill.

Secretary and general manager, E. W. McCullough, 76 West Monroe Street, Chicago.

Executive Committee: H. M. Wallis, J. I. Case Plow Works, Racine, Wis.; G. A. Ranney, International Harvester Company, Chicago; P. E. Herschel, R. Herschel Mfg. Company, Peoria, Ill.; G. R. James, James & Graham Wagon Company, Memphis, Tenn.; W. H. Stackhouse, French & Hecht, Springfield, Ohio; A. B. McLean, Roderick Lean Mfg. Company, Mansfield, Ohio; William Black, B. F. Avery & Sons, Louisville, Ky.; H. N. Wade, U. S. Wind Engine & Pump Company, Batavia, Ill.; J. B. Bartholomew, Avery Company, Peoria, Ill.; H. J. Hirschheimer, La Crosse Plow Company, La Crosse, Wis., and George N. Peek, Deere & Co., Moline, Ill.

The vice-presidents are as follows: A. B. Thielens, Studebaker Corporation, South Bend, Ind.; G. P. Alexander, Aultman & Taylor Machinery Company, Mansfield, Ohio; Bradford Brenton, Grand Detour Plow Company, Dixon, Ill.; Clyde L. King, Atlanta Plow Company, Atlanta, Ga.; C. M. Burdette, Sharples Separator Company, West Chester, Pa.; H. C. McCartney, Bull Tractor Company, Minneapolis, Minn.; W. D. James, James Mfg. Company, Fort Atkinson, Wis.; E. A. Maytag, Maytag Company, Newton, Iowa; H. W. Hudson, Walter A. Wood Mowing & Reaping Machine Company, Hoosick Falls, N. Y.; Frank Bateman, Bateman Mfg. Company, Grenloch, N. J.; C. B. Dempster, Dempster Mill Mfg. Company, Beatrice, Neb., and James R. Ranken, Henderson Wagon Works, Henderson, Ky.

The American Rolling Mill Company, Middletown, Ohio, has let a contract for extensive additions to its East Side plant. Four open-hearth furnaces will be installed, and the building housing this department will be more than doubled in size. All the auxiliaries, such as cranes, ingot buggies, charging machines, etc., will be added. An additional soaking pit is also under construction. In the power plant a new 4500-kw. Westinghouse mixed flow turbine will be installed.

MACHINE TOOL BUILDERS

Opening Session of Convention at Hotel Astor, New York, Tuesday, Oct. 24

"We might picture business in America as a great forge made white hot, as the demand from Europe has blown upon it like a mighty bellows. The anvils have rung, the workers have toiled, and still the cry has been for more, more. But this Hercules of war will grow weary. The giant bellows will lose its force. Will there then be a sufficient demand to keep all busy? America wants and needs all the prosperity it can get, so in the midst of unprecedented prosperity let us not forget to prepare for other days. We represent an industry that is fundamental in the world—more fundamental to-day than ever before. We manufacture the mechanism which keeps men always at the topmost point of civilized development. It is an honor to be a machine-tool builder. It is more than an honor—it is a national responsibility, as it never was before, that the machine-tool builders of America should be the builders of the best machine tools."

In these words President J. B. Doan sounded the keynote of the annual meeting of the National Machine Tool Builders' Association at the Hotel Astor, New York, Oct. 24 and 25. The registration for the first day was 140, thoroughly representative of the machine-tool industry. The work of that day consisted largely in the appointment of committees and in sectional committee meetings. A nominating committee consisting of P. G. March, F. H. Brown and O. B. Illes was appointed to bring in the names of officers to be voted upon in the closing session of the convention. Other committees appointed were an auditing committee composed of Wallace Carroll, Fred Eberhardt and George High; a resolutions committee—William Lodge, C. H. Norton and J. N. Heald; a convention committee to select the next meeting place—Fred Geier, B. B. Quiller and E. T. Clary. One of the most interesting features of the day was an address by Frank F. Dresser, Worcester, Mass., on the subject of "Health Insurance." This address and the president's address will be reviewed more fully in the next issue of THE IRON AGE.

Standard Shipbuilding Corporation to Expand

Jose Marimon, president Banco Espanol, Havana, Cuba, has acquired control of the Standard Shipbuilding Corporation, 44 Whitehall Street, New York City. It is the intention of the new management to expend about $2,000,000 in developing the plant at Shooters Island, N. Y. New slips and power houses will be built to increase the capacity of the yard to 16 ships. A considerable portion of this expenditure will be for equipment, including machine and pneumatic tools, cranes, plate bending rolls, punching and shearing machines, hydraulic presses, etc. Orders for a portion of this equipment have already been placed. At the present time six steamers for foreign delivery are being built at the plant, each of which requires approximately 3000 tons of steel. The first of these steamers is to be delivered about December. The officers of the company are Jose Marimon, president; Wallace Downey, first vice-president and general manager; W. R. Bush, second vice-president, and Henry W. Baird, secretary and treasurer.

The first meeting of the season of the Providence Engineering Society took the form of a house warming of its new quarters at 29 Waterman Street, Providence, R. I. It has leased the entire second floor of the building and has had the rooms remodeled to suit its needs.

The Gage Structural Steel Company, Chicago, announces that its new plant at 3123 South Hoyne Avenue has been completed. With the much larger equipment installed, the company now has facilities for a much larger business.

Machinery Dealers Meet in New York

Danger of Second-hand Offerings — Builders Must Give the Dealers Right Prices to Combat New and Cheap Tools

MANY questions owing their existence to present abnormal conditions were discussed at the fall meeting of the National Supply and Machinery Dealers' Association, Oct. 24, at the Hotel Astor, New York. Throughout the two sessions there was expressed a strong sense of the need of being alert to changes that will come with the end of the war. Those in attendance were members of the association who sell machine tools, and their gathering was the one usual with the convention of the National Machine Tool Builders' Association. The dealers were called to order by President H. W. Strong, Strong, Carlisle & Hammond Company, Cleveland, Ohio, who gave way to Vice-president W. J. Radcliffe, E. A. Kinsey Company, Cincinnati, Ohio, in charge of the association's machine tool interests.

Mr. Radcliffe said that there now exist probably 100 more manufacturers of machine tools than there were two years ago. Many who are making lathes and tools especially for the manufacture of war munitions will discontinue when the emergency passes.

George Cherrington, Brown & Zortman Machinery Company, Pittsburgh, asked if it were not time for plans for curtailing operating expenses, in view of their increase of the past two years, provided there can be reduction without impairment of efficiency. Incidentally he noted that some manufacturers have reduced their cash discount from 2 to 1 per cent, while others have eliminated the discount.

HENRY PRENTISS ON GENERAL SITUATION

Henry Prentiss, Henry Prentiss Company, Inc., said:

It is now nearly two years since we commenced to feel the impetus of the demand for machine tools growing out of the needs of the European war, which continued in increasing volume until we felt the culmination had been reached a year ago; yet in spite of the seeming insurmountable obstacles, abnormal prices and long deferred deliveries, orders are still coming in in unabated volume and are likely to continue until the end of the war, a problem no one now is able to solve. It is true the earlier demand for certain single purpose tools required for the manufacture of shells, largely supplied by manufacturers not regularly in the machine tool line, has abated so that some of these manufacturers have stopped operations. This situation also applies to the cheaper grade of tools not so well known as the standard makes. The market for standard tools, however, has not been affected and is not likely to be under prevailing conditions. The demand for such tools is still strong, well distributed and shows no signs of falling off. We find that well established representative concerns are frequent buyers, and, while orders are not so large, they are keeping a market to cover a more varied line with the total volume undiminished.

In this connection, it would seem wise to urge upon the attention of our manufacturers the necessity of great care to maintain the former standard of high quality in their products, which is no easy task in view of the scarcity of good materials and efficient labor. We should bear in mind that the most important and valuable commodity we can offer our patrons is service under present conditions intelligent thought and tireless effort are required to keep a stock of service on tap; expanding prices, far off deliveries and scant equivalent in values because of inferior materials and workmanship render this most difficult.

Many competent judges made at the convention [illegible] the end of the war will be followed by a sharp depression resulting in receding prices, for a longer or shorter period, but that a readjustment of financial, commercial and manufacturing conditions must precede a return to general conditions. As our country has accumulated vast resources, the fruitage of the great prosperity of the past two years, the consequent demand upon them, together with the growing needs of our railroads and shipbuilding plants to supply adequate transit facilities on land and water, for our expanding domestic and foreign trade, should be important factors in restoring prosperity, should this prediction prove true.

While the great volume of munitions business will cease, it is reasonable to believe that it will be succeeded by increased trade with South America and the war ravaged countries of Europe. The latter will require our labor saving machines to replace cheap hand labor, which will be scarce because of the war's destructive activities.

Conservative Policy Suggested

In view of the possibility of an early peace it is incumbent upon us to pursue a conservative policy in our business operations, that we may neither be embarrassed nor burdened by a sudden adverse change in the business situation. Let us remember the basis of our present business activities [illegible] the shifting sands of adversity. This is not a note of discouragement but rather of warning to be mindful of the causes underlying our present [illegible]

In discussing the question as to the problems which will confront the machinery dealers after business conditions become normal the statement was made that $750,000 worth of second-hand machinery will be placed on the market within 30 days in the Pittsburgh district by firms which are now completing munitions contracts. The member said that under these conditions "safety first" was a good slogan, and that under these circumstances he would go slowly in acquiring stock.

Another member said that about eight months ago there was a temporary lull in the Cleveland market which was a source of worriment because of the stock on hand, but that it quickly disappeared with the revival in demand. With regard to the future this member thought that dealers should not buy heavily into the future unless the manufacturers agree to stand back of them in the matter of prices. He pointed out that many manufacturers will have to run fully a year before they can assemble the stock they had on hand in August, 1914. The statement was made that practically all consumers would prefer new machines to second-hand, and that the movement of the former was largely up to the manufacturer inasmuch as it was largely a question of price.

PATH OF NEW MAKERS NOT EASY

L. J. Hammond, Strong, Carlisle & Hammond Company, Cleveland, in a letter, gave it as his opinion that a great many of the machinery dealers are unnecessarily annoyed by the unusual conditions now existing. He wrote: "It is true that there are several new manufacturers of machine tools, but it is equally true that there are a number of new selling agencies. * * * The unusual conditions referred to are in themselves working a hardship on the new companies. They find it very difficult to get satisfactory equipment, and even more difficult to work up a satisfactory organization, with the result that they have so far, very few of them, been able to turn out a satisfactory product or one that could actually be regarded as competitive. Some few of them will continue to improve and ultimately be a success, but it is my opinion that the majority of them will fall by the wayside."

On the question as to what are the real relations between the manufacturer and the dealer, the consensus of opinion was that the dealer is at once both general merchant and manufacturer's agent, the latter when he controlled a product in a given territory. Charles S. Farquhar, Chandler & Farquhar, Boston, Mass., said that the agent should practice loyalty to the fullest extent.

Discussion was had on the question as to whether the dealer's position was weakened by the entrance of his customers into large corporations which might consolidate the purchasing of a number of companies in the hands of a few purchasing agents, with a consequent possibility of the machine-tool builder seeking to sell to the large company through special representa-

tives. In speaking to the question, W. T. Todd, Somers, Fitler & Todd Company, Pittsburgh, said he knew of no district which could boast of more consolidations of the kind referred to than Pittsburgh, but that it had simply enabled the dealers to receive orders heretofore unmatched as to size. They had the further effect of raising some concerns from the retail into the jobbing class.

President Strong said he believed the consolidations worked both ways. They had increased sales in some directions, but other business had been lost because of the removal of purchasing offices. Ten years ago the automobile industry was new and unorganized with the result that its buying was loosely done, a fault which had been corrected.

The statement was made that most large concerns were willing to do business with the dealer, but Vice-president Radcliffe said he had heard of some large corporations which showed a tendency to deal directly with the manufacturer. Henry Prentiss said that the latter contingency showed the wisdom of having exclusive agency arrangements with the manufacturer, in which event the dealer was protected.

The question was raised as to how far manufacturers might have disregarded the dealers' position and given preference in deliveries to other purchasers, because of bonuses or other consideration, but it was agreed that little or none of this unfair preference had been shown. One case was mentioned where a manufacturer had favored a customer, but it was solely on the plea of the customer that he was in dire need and no bonus was involved.

BUT LITTLE HARM FROM CANCELLATIONS

It was brought out that, as a rule, there had been adherence to the practice of taking orders not subject to cancellation, but most of the members said that where cancellation had been allowed the machines taken back had been resold at an increased profit. George Vonnegut, Vonnegut Hardware Company, Indianapolis, Ind., said that in one case his firm had found it necessary to accept cancellation because their customer was likely to become a competitor by selling the tools. He said that conditions differed, and that fairness should rule. Henry Prentiss said his company had had no trouble with cancellations and that where the necessity arose they were granted, as it was better to avoid friction, although where large orders were involved his company made it extremely emphatic that the contracts could not be cancelled, and in cases had exacted a deposit as evidence of good faith.

At this point the question was raised as to what course should be followed when peace is declared—whether cancellations should be permitted or some form of contract devised which would impose a penalty for non-performance. The danger of carrying an overstock at that time was referred to also.

President Strong spoke of a letter which had been sent to customers of his house, which reviewed conditions, referred to the machines which the customer had on order and stated that if cancelled at a later date a charge of 25 per cent would be imposed. Of those addressed only two sent discordant replies. Mr. Strong said that the 25 per cent clause was placed in the letter more to obtain earnest consideration of the letter and the customers' actual requirements than with any idea of enforcement. In this connection another part of Mr. Hammond's letter was read, in which he said:

> It is not many years ago that even a formal stock order was not considered as even a firm order or as having any true value, being subject to cancellation with hesitation at the will of the dealer or even the manufacturer. The wholesale cancelling of orders in 1908 created a good deal of feeling and a number of the manufacturers repeatedly expressed regret that such a condition was permissible. I am confident, however, that if the non-cancellation clause had been rigidly enforced in 1908 it would have more than doubled the number of failures both with the dealers and with the manufacturers who were the dealers' heavy customers.
>
> It has always been my opinion that the non-cancellation clause should not become effective until the work in the factory has advanced to such a point that the fact of cancelling would cause a loss to the manufacturer.

Plea for the Honest Buyer

[illegible] put to toward the completion of any order, but I also think [illegible] manufacturer regards the agent as an actual part of his organization. When the contract has been completed, the manufacturer in extending the [illegible] small degree simply extending it to himself or to his own interests. In a lesser degree the same condition may exist between the dealer and his customer.

Mr. Hammond's views were given hearty applause.

Mr. Farquhar again raised the question of post bellum possibilities, with particular reference to the attitude of manufacturers and dealers. What, he asked, will become of the special tools which have come on the market since the war started, some of the manufacturers of which have fitted themselves to turn out machines in large numbers and on good terms. He asked if they would become competitors of the older manufacturers. They exist because the regular manufacturers cannot supply the demand.

Vice-president Radcliffe believed that the situation will eventually get back to its old status, largely because standard makes of tools are well known and need no missionary work. One member said he knew of companies in Cincinnati, now engaged in war business, who already were figuring on what they would build in the tool line after the declaration of peace, and that it was not improbable that they would be competitors of those for whom they are now making machines. Another member said that under such conditions it was incumbent on manufacturers to see that their prices were not too high when the crisis comes, and that it was the disposition of dealers to meet the views of manufacturers provided the prices fixed by the latter are right. That the manufacturers are giving serious thought to the subject was admitted.

PRICES PLAY A LARGE PART

Reference was made to the advisability of a cut in prices at the psychological moment with a view of starting buying, but the point was made that when the builders of standard machines lowered their prices there would be cutting also by the makers of newer and cheaper machines. Incidentally it was brought out that at least one manufacturer was contemplating a further advance. A member said he knew of four new lathe builders, but only one intended to remain in the business permanently.

Secretary-Treasurer Thomas A. Fernley, in his report, touched on matters which had occupied the attention of the officers in the year, and in part said:

> One of the interesting questions discussed during the year was that of whether the dealer's contract with the manufacturer should be an oral or written one. The preponderance of opinion seems to be in favor of a definite written contract clearly setting forth the various terms upon which the dealer assumes the work of distributing. You are aware of the fact that the association adopted a uniform contract some years ago.

The Republic Iron & Steel Company has opened an office in Boston in the John Hancock Building, Devonshire Street. William H. Hunter, who has been traveling in the Boston territory for the New York office, will remain as the Boston representative of the company.

Iron and Industrial Stocks

NEW YORK, Oct. 25, 1916.

The strength of the stock market has been well sustained, with some securities realizing new high records. United States Steel common sold up to 121¾, selling higher than the preferred for a brief period. Practically every stock in the list showed a marked advance during the week. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com..	25 - 26¾	Int. Harv. of N. J., com	115 - 115½
Allis-Chal., pref	80½ - 81¼	Int. Harv. Corp., com	78 - 80
Am. Can, com...	60¼ - 63¾	Lt. Belle Iron., com	76½ - 77½
Am. Can, pref...	113 - 11[illegible]	Lackawanna Stl	41[illegible] - 42
Am. Car & Fdy., com	69¾ - 70½	Lake Sup. Corp..	14 - 14⅞
Am. Car & Fdy., pref.	117½ - 119	Midvale Steel...	66¼ - 68
Am. Loco., com..	78¾ - 83¼	Nat. En. & Stm., com	48 - 50
Am. Loco., pref..	105¾ - 107	Nat. En. & Stm., pref	95 - 95½
Am. Rad., com..	400 - 404	N. Y. Air Brake.	157 - 162
Am. Ship, com..	57 - 59	Pitts. Steel, pref.....	105
Am. Ship, pref..	92 - 92½	Pressed Steel, com	67¼ - 74
Am. Steel Fdries.	61 - 64½	Pressed Steel, pref.	104 - 105
Bald. Loco., com.	83½ - 87¾	Ry. Stl Spring, com	528 - 551
Bald. Loco., pref.	108 - 109	Ry. Stl Spring, pref	100¾ - 101
Beth. Steel, com.	549 - 629	Republic, com ..	74 - 80¼
Beth. Steel, pref...	126¼	Republic, pref .	112 - 112½
Cambria Steel..	124¾ - 13[illegible]	Sloss, com ..	62½ - 64
Carbon Stl., com.	92 - 92¾	Sloss, pref .	96½ - 98½
Carbon Stl., 1st pref.....	93 - 94	U S Pipe, com .	24½ - 26½
Case (J. I.), pref..	86	U S Pipe, pref.	56½ - 58
Central Fdry., com	13 - 15½	U S Steel, com	119¾ - 121¾
Central Fdry., pref.	28 - 29¾	U S Steel, pref	120½ - 122
Chic. Pneu. Tool.	72½ - 73¾	Va. I., C. & Coke	47 - 49½
Colo. Fuel	53¾ - 56½	Warwick	9½
Cruc. Steel, com	84½ - 90¼	Westing. Elec	62½ - 64¾
Cruc. Steel, pref.	121 - 123		
Deere & Co., pref.	95 - 96		
Driggs-Seabury	87 - 90		
Gen. Electric....	180¾ - 187¼		
Gt. No. Ore Cert	42½ - 45½		

Dividends Declared

The Crucible Steel Company of America, 2 per cent on account of back dividends on the preferred stock, payable Nov. 19.

The De Long Hook & Eye Company, regular quarterly 2 per cent, payable Nov. 1.

The National Lead Company, regular quarterly, 1¾ per cent on the preferred stock, payable Dec. 15.

The Penn Seaboard Steel Corporation, regular quarterly, 3%, payable Nov. 1.

The Atlantic Steel Company, regular semi-annual, 3½ per cent on preferred stock, payable Nov. 1.

The Stewart-Warner Speedometer Company, regular quarterly, 1½ per cent on the common stock, payable Nov. 15.

The American Window Glass Machine Company, 1¾ per cent on the preferred stock, payable Nov. 3.

The Cambria Steel Company, regular quarterly, 1¼ per cent, payable Nov. 15.

The Crocker-Wheeler Company, regular quarterly, 1½ per cent on the common and 1¾ per cent on the preferred stock, payable Oct. 16.

The Dominion Bridge Company, Ltd., regular quarterly, 2 per cent and extra 3 per cent, payable Nov. 15.

The Grant Motor Car Corporation, regular quarterly, 1¾ per cent on the preferred stock, payable Nov. 1.

The Mitchell Motors Company, regular quarterly, $1.50, payable Nov. 24.

The Packard Motor Car Company, regular quarterly, 1¾ per cent on the common stock, payable Nov. 1.

The Willys-Overland Company, regular quarterly, 75c. on the common stock, payable Nov. 2.

The J. G. Brill Company, regular quarterly, 1 per cent on the preferred stock, payable Nov. 1.

Locomotive Orders

Locomotive orders in the last week were 67. The Paris Orleans Railway has ordered 50 Mikado locomotives from the American Locomotive Company. The Lima Locomotive Corporation will build 10 Mallet locomotives for the Western Maryland, equipped with Jacobs-Shupert fireboxes. Inquiries were 15.

The Lincoln Steel & Forge Works, St. Louis, of which Frank S. Barks is president, has under construction a structural steel fabricating plant, which is expected to be ready for operation in about six weeks. The principal building is 90 x 200 ft., with a long crane extension. The plant will employ about 50 men at the beginning, and will increase the force as rapidly as men can be obtained and trained. A large acreage of unoccupied land adjoins the plant, enabling extension as the business requires.

Steel Ingots from Steel Foundries

Steel ingots are absorbing the attention of steel foundries in the Chester, Pa., district. Three large plants there are about to manufacture acid open-hearth ingots on a considerable scale. Every such foundry has normally more melting capacity than floor capacity to absorb it and the excess is to be taken up by ingots. In addition one foundry is building an extra furnace, probably of 25 tons; another is starting up its third 25-ton furnace and a third one is to operate to full capacity its complete open-hearth equipment. All metal not necessary for steel castings will go into ingots.

The molds used are of cast iron, 9.2 in. in diameter, and are poured large end up with a hot top. It is understood that 20 per cent is cropped by nicking and breaking, after which the ingots are individually inspected and accepted if the fracture is satisfactory. One ingot from each heat is machined before acceptance of the entire melt. Each heat will pour about 125 ingots. After acceptance the ingots are shipped to shell makers. The general practice there is to forge the pieces under hydraulic presses after which they are annealed and machined. No other heat treatment than ordinary annealing is permitted.

The specifications call for 0.45 to 0.55 per cent carbon, about 0.60 per cent manganese, 0.30 per cent as maximum for silicon, and 0.045 per cent as maximum for sulphur and phosphorus. Some foundries are having difficulty in meeting the sulphur specifications for these as well as for railroad castings, because of the abnormal sulphur content of some pig iron now being made.

One large foundry has recently made a considerable number of small sand-cast ingots for forging into shanks for anchors. So great is the demand for cast steel anchors of all sizes that this method has been resorted to in some cases instead of waiting for the usual cast shank.

All of the six open-hearth foundries and the one converter foundry at Chester are booked far ahead. The labor problem has been and is a serious one. There has been some slight relief recently by the discharge of over 2000 men by the Remington Arms Company at Eddystone. Many of these were formerly molders, mechanics and laborers, attracted to clean work on automatic machines at nearly double former wages.

The converter steel foundry near Chester using the Stoughton oil-burning process reports excellent results, especially as to sulphur, the steel running as low as 0.04 per cent when oil is used as a fuel.

Industrial Apprenticeship for High School Students

As the result of a conference between W. F. Roberts, vice-president Bethlehem Steel Company, and the superintendent of public schools of South Bethlehem, Pa., it has been decided to add a four-year industrial course to the regular high school curriculum. Students will study part of the day in the steel company's various departments so as to gain practical knowledge. Henceforth boys can stay in school and simultaneously serve an apprenticeship in any department of the steel works for which they have a bent, receiving wages at the same time.

Important copper deposits at Little Bay, about 200 miles north of St. John's, Newfoundland, are reported by the Canadian press. The lode is claimed to be 300 ft. wide with veins 1 to 2 ft. wide, containing nearly pure cupro-pyrites running as high as 29.50 per cent copper. The deposit, it is believed, promises to be one of the richest in British North America.

The Chamber of Commerce of Massillon, Ohio, which has been active in inviting industries to that city, recently carried through successfully, with less than six weeks for organization, the Massillon Industrial Exposition and Efficiency Show. It is estimated that more than 50,000 visitors came to the city in the week of this exposition.

Machinery Markets and News of the Works

CONDITIONS NEAR NORMAL

New York Shipyard Needs Equipment

Requirements Total $2,000,000—Markets Are Brisk Despite General Absence of Large Lists—Labor Conditions Improve

The Standard Shipbuilding Company, Shooters Island, New York, which was lately acquired by interests headed by Jose Marimon, president Bank Espanol of Havana, announces that it will require equipment valued in the neighborhood of $2,000,000, the purchase of some of which has already been arranged.

Throughout the entire country the machine-tool trade appears to be on a more nearly normal basis than at any time since the war started, although this, of course, does not apply to prices. Sales of one or two tools, or small groups, and enough of them to make trade brisk, are characteristic of all the markets. For the most part deliveries are slowly becoming better.

On the Atlantic seaboard shop managers are inclined to ask in some cases why they should buy additional tools when they cannot find skilled mechanics to operate them.

In Chicago the trade welcomes the more normal basis of sales which now prevails. Railroads are doing a little spotty buying in that city and in some others.

In Cincinnati the belief is held that the railroads will eventually take up the slack when war buying and that tributary to it subside. The jobbing machine shops of Cincinnati are busy.

In Detroit an improvement in labor conditions is noticed, and while there are no large orders for machinery, there are enough small ones to make the market brisk.

The demand in Milwaukee continues insistent. A good indication in that city is an increase in the volume of building.

In San Francisco buying is general, but large orders are few. The lumber interests in the Pacific Northwest are hard hit by the shortage of freight cars, but the shipbuilding industry continues to thrive, it being estimated that steel and wooden ships valued at $30,000,000 are under construction.

New York

NEW YORK, Oct. 25, 1916.

Deliveries are slowly catching up, but they are still far enough behind to cause orders to be lost because prospective buyers do not want to wait the required time, even for tools of favored makes.

Salesmen find the great dearth of mechanics to be a detriment to their business, in that shop managers ask why they should buy tools when they cannot get men to operate them. Meanwhile there is an excellent volume of inquiries coming from scattered sources for one or a few tools. Here and there the railroads are buying a machine or two, but they cannot be called active.

Several manufacturers outside of the machine tool line are still turning out machines, and it yet remains to be seen what will be the ultimate effect of this activity. Meanwhile regular builders of tools are planning to refine and improve their machines, and in some cases to extend their line.

The Kellogg Mfg. Company, Rochester, manufacturer of pumps, has let contract for the erection of an addition to its factory.

The Standard Shipbuilding Company, Shooters Island, New York, has been taken over by interests headed by Jose Marimon, president Bank Espanol of Havana, Cuba, with offices at 14 Whitehall Street, New York. Mr. Marimon has been made president of the shipbuilding company. At his office it is announced that the company is in the market for equipment valued at about $2,000,000, part of which has been placed. Included is the following:

Pneumatic tools, 500.
Locomotive cranes, 10
One large planing machine.
Six shaping machines
Five drill presses
Twelve engine lathes, also turret lathes
Shearing and punching machines
One 75-ton bridge crane, 60-ft. span.
One 50-ton bridge crane, 60-ft. span.
One 30-ft. plate planing machine.
One 2-head bolt cutter.
One set vertical bending rolls, 14 ft.
One set horizontal bending rolls, 14 ft.
Two slotters.
Two flat-top turret lathes.
Nine hydraulic jacks and miscellaneous tools

Henry Wray & Sons, Inc., Rochester, N. Y., have made application for a permit to erect an addition to the plant at No. 193 Mill Street, at a cost of $20,000. The addition will have a frontage of 50 x 62 ft., and 60 ft. in height. It will be built of steel and reinforced concrete and will be used as a brass foundry and machine shop.

The Empire Products Company, Elmira, N. Y., will erect a three-story cold storage building at Gray Street and Railroad Avenue. T. W. Cleveland is president.

The No-Glar-On Company, Watertown, N. Y., has been incorporated with a capital stock of $100,000 to manufacture electric light bulbs. The incorporators are F. M. and A. B. Williams and C. G. Willis, Watertown.

The Gleason Works, Rochester, N. Y., has taken out a building permit issued for the erection of a one-story reinforced concrete addition to its factory on University Avenue.

The International Yachting Amusement Company, Syracuse, N. Y., has been incorporated with a capital stock of $250,000 to manufacture amusement devices. O. J. S. Cassidy, 302 Onandaga Bank Building, Syracuse; W. E. Miller, Providence, R. I., and W. H. Kendall, Altmar, N. Y., are the incorporators.

The John H. Meyer Fire Brick Company, Newark, N. J., has had plans prepared for a three-story reinforced-concrete plant, about 110 x 250 ft.

Albert Mertz, Newark, N. J., has had plans prepared for a commercial garage, to be erected at 582 South Twentieth Street, at a cost of about $7,000.

W. Ames & Co., Jersey City, N. J., manufacturers of railroad spikes and bolts, will build a one-story addition on Communipaw Avenue.

The Gerleit Auto Spring Wheel Company, 723 East 135th Street, New York, has acquired property on Fourteenth Street, Jersey City, N. J., and will establish a plant for the manufacture of a patented flexible steel wheel with solid rubber tires. Vanadium steel is used for the spokes. August Gerleit is president.

The M. W. Kellogg Company, Jersey City, N. J., manufacturer of piping material, will build a new one-story generator plant on West Side Avenue.

The Gibson Mon-Auto Company, 234 First Street, Union Hill, N. J., has been incorporated with a capital of $1,000,000 to manufacture automobiles. H. C. Gibson, A. Wyse and A. Kumpa are the incorporators.

The Simplex Automobile Company, New Brunswick, N. J., is planning the erection of a new plant for the manufacture of automobile bodies. A new factory for the manufacture of aeroplanes is also under consideration.

The Belt-Grip Company, 126 Market Street, Paterson, N. J., J. H. Auburn, agent, has been incorporated with a capital of $50,000 to manufacture adhesive products. J. H. Auburn, I. D. Ashley and J. E. Glasser are the incorporators.

Philadelphia

PHILADELPHIA, PA., Oct. 23, 1916.

The Potter-Mackie Company and the North American Motor Company, of Pottstown, have incorporated as the North American Motors Company. Involved in the formation of the new corporation are S. Cary Potter and Norman S. Mackie, owners of the Potter-Mackie plant; George R. Bidwell, manager of the North American Motor Company, and George C. Lees, superintendent of the Potter-Mackie Company. It is reported the Potter-Mackie plant's output has heretofore been shrapnel and shells for the Italian Government. The North American Company has been making motors. The idea is to have the Potter-Mackie plant continue making war munitions as long as the demand exists. The motor manufacturing works is said to have recently received an order for 50,000 motors.

The Buckley-White Engineering Company, a Philadelphia corporation, has purchased the Cheyney property, in Chester, Pa., and will remodel it for the manufacture of a feed-water regulator. Martin L. White, Lansdowne, president of the Fuel Economy Engineering Company, Harrison Building, Philadelphia, is associated with John J. Buckley in the new company.

A plant for the manufacture of paper pulp is to be equipped at New Iberia, La., by the Sugar Cane By-products Company, Widener Building, Philadelphia, Pa.

The idle plant known as the Supplee foundry, at Fourth and Manor streets, Columbia, Pa., recently operated by the Keystone Boiler Works, now at Landisville, has been purchased by J. A. Constantine, of Columbia, who will immediately put the plant in order. It is intended to start operations at once and orders have already been placed for material. Operations will begin with a small number of men, but will be increased as needs may require. Foundry work of all descriptions will be done, and also a general line of machine work. Mr. Constantine has been associated with the Keystone Boiler & Foundry Works, now the Monitor Works, at Landisville.

The plant of the Henry H. Jackson estate, rope manufacturer, has been conveyed by the executors, Edward H. Jackson and John B. Stevens, to a new corporation chartered at Harrisburg, known as the Thomas Jackson & Son Company, for a nominal consideration. The plant is valued at several hundred thousand dollars, and covers a narrow stretch of land four blocks long.

The Mac-It Parts Company, Lancaster, Pa., is erecting a new factory building, 60 x 178 ft., and a hardening room, 24 x 50 ft., tripling its present capacity. They expect to occupy the new building in December. Henry E. Warren is general manager.

Fire, Oct. 20, completely destroyed the phosphate manufacturing plant of the I. P. Thomas & Sons Company, Billingsport, near Paulsboro, N. J., with loss of $100,000. The plant will be rebuilt. H. H. Lippincott, Riverton, N. J., is president.

The Jonathan Bartley Crucible Company, Oxford Street, Trenton, N. J., will build a new three-story brick addition for the manufacture of crucibles and retorts, to cost about $40,000. Lewis Lawton & Son are the contractors.

The H. B. Smith Company, Philadelphia, manufacturer of heating apparatus, has acquired property on Seventeenth Street as a site for a new factory.

The Hess Machine Works, Philadelphia, has filed plans for a one-story machine shop, 50 x 110 ft., on Lancaster Avenue, to cost $13,500.

The Ridge Avenue Iron & Metal Company, 1016 Susquehanna Avenue, Philadelphia, will build a one-story machine shop, 68 x 160 ft., on Twenty-ninth Street.

The Electric Storage Battery Company, Philadelphia, has awarded a contract to the William Steele & Sons Company, 1600 Arch Street, Philadelphia, for the erection of a new two-story factory, 90 x 130 ft., on Nineteenth Street, at a cost of $20,000.

The Barrett Company, Philadelphia, manufacturer of roofing materials, will build a one-story brick and concrete boiler plant on Bermuda Street. The A. R. Raff Construction Company, Philadelphia, has the contract for erection.

The Belmont Packing & Rubber Company, Philadelphia, will build an addition to its plant on Butler Street.

The Enamel Mfg. Company, Philadelphia, has had plans prepared for a one-story addition, 120 x 200 ft., to be erected on Bartram Avenue.

The Church Lane Garage Company, Philadelphia, recently incorporated, has had plans prepared for a one and two-story commercial garage, 76 x 110 ft., to be erected at Germantown.

Baltimore

BALTIMORE, MD., Oct. 23, 1916.

The Jones & McComas Box Company, Baltimore, will build a plant for the manufacture of wooden boxes at 1816 Lancaster Street. Walter P. McComas, 901 South Caroline Street, is secretary and treasurer.

The Williamsburg Power Company, Williamsburg, Va., has been incorporated with $50,000 capital stock. William M. Mulligan, Richmond, Va., is secretary.

The Lynchburg Foundry Company, Lynchburg, Va., will make improvements to its plant at Anniston, Ala., which include remodeling old pits and increasing its daily capacity to 100 tons of high-pressure pipe. C. C. Moore is resident manager and W. G. Hammerstrom, chief engineer.

New England

BOSTON, MASS., Oct. 23, 1916.

There has been but little change in market or labor conditions in New England the past week.

The trouble with the bench molders at the Sessions Foundry Company, Bristol, Conn., has been settled, and the plant is running at full capacity again.

At the plant of the Rhode Island Tool Company, Providence, R. I., a notice announcing that department E would be shut down temporarily caused about 60 men to walk out as soon as the notice had been posted. The company states that the men were laid off pending a reorganization of the department, and that a certain number of the men would be taken back later. The men claim that the move was the result of the presentation of grievances some time ago, and was an attempt to forestall action on their part. The majority of the men called for their pay the afternoon of the trouble and were at once discharged.

The General Electric Company will build a steel foundry, 100 x 190 ft., and a factory building, 60 x 310 ft., at its plant in West Lynn, Mass.

The Union Twist Drill Company has awarded the contract for the erection of an addition, 68 x 90 ft., three stories, and 60 x 92 ft., two stories.

The Thomas Smith Company, manufacturer of bolts and nuts, 13 Cypress Street, Worcester, Mass., which has been operated by the estate of Frank W. Foye since his death two years ago, has been incorporated with a capital stock of $15,000 to do a general machine shop business. E. M. Foye is president and treasurer, M. E. Foye, clerk, and J. M. Foye completes the board of directors. Frank H. Howard has been appointed general manager.

The New Haven Malleable Iron Company, New Haven, Conn., has been incorporated with capital stock of $50,000, by Edward P. Brennan, Charles M. Brennan, both of New Haven, and William F. Brennan of Naugatuck.

The Raybestos Company, Bridgeport, Conn., maker of automobiles and accessories, has been incorporated with capital stock of $1,500,000. The incorporators are S. Simpson, L. V. Simpson and H. G. Farwell, all of Bridgeport.

The General Mfg. Company, 66 North Elm Street, Waterbury, Conn., has ready for estimates plans for a factory, 40 x 98 ft., four stories, with wing, 25 x 60 ft., one story, to be erected at Maple Street and Maple Avenue.

The Billings & Spencer Company, Hartford, Conn., has secured permit for the erection of a factory, 69 x 115 ft., two stories, at the corner of Laurel and Park streets.

The Fisk Rubber Company, Chicopee Falls, Mass., has begun the erection of a boiler plant, 125 x 300 ft., which will include, besides the boiler house, a railroad trestle, coal crusher, automatic conveyors and feeders, with other auxiliary apparatus. The first installation will consist of five 760-hp. boilers. The building will provide steam and hot water for manufacturing purposes throughout the 20 buildings of the company. The entire project will represent an investment of over $200,000.

The Bridgeport Projectile Company, Bridgeport, Conn., is reported to have received an order from the United States Government for material which will total about $1,750,000 in value. It is understood the contract calls for 146 5-in. naval guns and for shrapnel cases, and will take over two years to complete.

The machine shop addition to the plant of the Gilbert & Barker Mfg. Company, Springfield, Mass., is well under way and work has been begun upon the addition to the tank shop. It is expected that production will begin in the new additions about the end of the year.

The Karn Terminal Company, Bridgeport, Conn., recently incorporated with a capital stock of $200,000, will erect a coke plant, and proposes to build a water front terminal

for the storage of coal. The incorporators are R. C. McNeil, Charles J. Mercer and John T. Cooper.

The Improved Paper Machinery Company, Nashua, N. H., has awarded a contract for a three-story machine shop, 48 x 50 ft.

The Flathers Foundry Company, 29 Crown Street, Nashua, N. H., has awarded a contract for an addition to its foundry, 20 x 100 ft., one story.

The Woburn Gear Works, Woburn, Mass., expects to move into its new concrete factory on Nov. 3. This will give the company greatly increased facilities.

Chicago

CHICAGO, ILL., Oct. 23, 1916.

Machine-tool dealers generally are welcoming the return of their business to the more normal basis of sales to the general manufacturing trade. It is the common report of the past few weeks that the bulk of business has been made up of small lots of standard purpose tools, largely for new shops erected to promote the manufacture of new devices. A substantial inquiry is also noted for special power equipment, such as bulldozers, punch presses and hydraulic machinery. Railroad buying is still of a scattering kind with no lists of importance except that of the Illinois Central Railroad, which it is understood has not yet been closed. For export an occasional order appears from time to time, one sale of 18 special lathes from Chicago stock was closed last week. Dealers who have bought or contracted to buy special lathes are now beginning to evidence a desire to dispose of these lines and prices are reported to be more attractive.

The American Brake Shoe & Foundry Company, 322 South Michigan Avenue, Chicago, has been purchasing property which it is understood will be used for the enlargement of its plant at Burnside.

The Railway Motor Car Company of America, 110 South Dearborn Street, Chicago, has purchased the plant formerly occupied by the Fitz-Hugh Luther Company, Hammond, Ind., and will use it for the manufacture of railway cars and oil fuel locomotives.

The J. P. Seeburg Piano Company, Chicago, has had plans prepared for a four-story mill-type factory, 82 x 285 ft., and a one-story power plant, the cost estimated to be $90,000. The plant will be operated by electric power.

H. C. Evans & Co., 75 West Van Buren Street, Chicago, is having plans prepared for a two-story factory which will cost $40,000 and will involve the purchase of electric power equipment, blowers, etc.

George C. Nimmons, architect, 122 South Michigan Avenue, Chicago, has completed plans for a two-story stove factory, to be erected at Kankakee, Ill., for Sears Roebuck & Co., Chicago.

The Metal Specialties Mfg. Company, now located at 730 West Monroe Street, Chicago, manufacturer of automobile accessories, has had plans prepared by Davidson & Weiss for a four-story brick factory building to cost approximately $100,000, to be located on the northwest corner of Carroll and Ledzie avenues, Chicago.

Robert Glenginning, Forty-ninth Street and Oakley Avenue, Chicago, will build a one-story brick factory at 4812 South Campbell Avenue, to cost $25,000.

The Simmons Company, Kenosha, Wis., manufacturer of beds, has purchased a part of the property and plant formerly occupied by the Allis-Chalmers Mfg. Company at Twelfth Street and Washtenaw Avenue, Chicago, where it will locate a branch manufacturing plant.

The Standard Spiral Pipe Works, Chicago, is desirous of purchasing a second-hand 350-ton hydraulic press, together with pump and accumulator.

The Smurr & Kamen Machine Company, 313 North Whipple Street, Chicago, will erect an addition to its machine shop, 41 x 110 ft.

The McLernan Kitchen Cabinet Company, North Chicago, Ill., will erect a new factory to cost $35,000. The company manufactures enameled pressed steel cabinets.

The R. & R. Mfg. Company, Elgin, Ill., manufacturer of shock absorbers, has leased a new plant and expects to double its output.

The Ghent Motor Car Company, Chicago, has purchased a plant at Ottawa, Ill., which will be remodeled for its use.

Rockford, Ill., is considering the installation of an electric light plant, estimated to cost $425,000. D. H. Maury, 53 West Jackson Boulevard, Chicago, is the engineer.

The Weaver Mfg. Company, Springfield, Ill., manufacturer of power jacks and other equipment, will build a one-story addition to its plant, 96 x 100 ft.

The Wilson Stove & Mfg. Company, Metropolis, Ill., has [illegible] and S. H. Long.

The American Mfg. Company, 613 Jefferson Street, Waterloo, Iowa, will build a four-story plant, 70 x 140 ft.

The Iowa Culvert Sheet Metal Company, Muscatine, Iowa, has [illegible] to its plant.

The Pressed Steel Mfg. Company, Cedar Rapids, Iowa, has been [illegible] with a capital of [illegible] H. C. Hampton is president.

The Grinnell Electric & Heating Company, Grinnell, Iowa, has let the contract for its new plant and work will begin at once. The [illegible] will cost about $20,000.

The National Iron Company, Duluth, Minn., advises that it has purchased the [illegible] for its new plant.

The C. J. Johnson Mfg. Company, St. Paul, Minn., manufacturer of planet [illegible] and machinery, is about to erect a factory to cost $50,000.

The Megow Traction Company, St. Paul, Minn., is having plans prepared by the Foltz Engineering Company for a tractor-building plant for which an expenditure of $100,000 is contemplated.

K. E. Alexander, purchasing agent, Minneapolis, Minn., is receiving tenders covering a motor-driven pump of 30,000,000 gal. per min. capacity for the municipal waterworks.

C. L. Pillsbury, Metropolitan Life Building, Minneapolis, Minn., has prepared plans for a power plant for the city of Hibbing, Minn., the installation to cost $200,000.

Milwaukee

MILWAUKEE, WIS., Oct. 23, 1916.

Machine-tool builders in this district again appear to be getting behind on deliveries, due to the insistent demand and the small opportunity afforded for increases of capacity, attributable for one thing to the shortage of competent help. A steady run of new orders comes in from many sources, but principally for the gradual equipment of plant extensions. Buyers appear inclined to put in requirements for one, two or three tools at a time rather than placing round lots, although several inquiries for large lots for proposed new works have been put out. Building operations are growing in volume after a temporary decline in September.

The last vestige of the machinists' strike for an eight-hour day in the Milwaukee district has disappeared. The 52½-hour working week, voluntarily instituted by the employers on July 1, is now the rule in all shops.

The Wisconsin Iron & Wire Company, 186 East Water Street, Milwaukee, expects to move into its new plant at Becher and Booth streets before Dec. 1. Work on the powerhouse was started last week.

The Pressed Steel Tank Company, Milwaukee, is making preliminary plans for important extensions of its plant in West Allis. Details are still indefinite, but land at Fifty-seventh and National avenues is being graded for the work. Richard H. Hackney is general manager.

The Four Wheel Drive Auto Company, Clintonville, Wis., is advertising in the Milwaukee and Chicago papers for fifty turret and engine lathe, miller and drill-press operators, ten assemblers and two inspectors, but is meeting with considerable difficulty in filling its requirements.

The new works of the Joliet Bridge & Iron Company, Joliet, Ill., at De Pere, Wis., are now in operation. A shipment of steel was received last week and is now being fabricated, principally into railroad coaling stations, bunkers and water tanks. The De Pere plant formerly was the Lyons Boiler Works.

The Kissel Motor Car Company, Hartford, Wis., is building an auxiliary assembly shop, 40 x 100 ft., of concrete and brick, one story.

Huibregtse & Stokdyk, Oostburg, Wis., are building a fireproof addition, 40 x 50 ft., to their garage for machine shop purposes.

John H. Kaiser & Son, Eau Claire, Wis., have awarded contract to R. L. Rickman for erecting a wooden box and package factory, 80 x 150 ft., one-story and basement. Additional equipment is being contracted for.

Bangor, Wis., is preparing to ask for bids for the erection of a high school, with manual training department, 90 x 150 ft., to cost $30,000. Plans have been prepared by Chandler & Park, Racine, Wis.

The Superior Ice & Cold Storage Company is being organized at Superior, Wis., to build an artificial ice and cold storage warehouse, 75 x 140 ft., four stories and basement, costing $125,000.

The Maynard Steel Foundry Company, 716 Reed Street, Milwaukee, is preparing to enlarge its plant. The addition

will be 80 x 85 ft., of brick. Plans are being completed by Charles J. Keller & Son, architects, 521 Germania Building.

The Flambeau Paper Company, Park Falls, Wis., has engaged T. W. Orbison, architect and engineer, Appleton, Wis., to prepare plans for a power dam, hydroelectric plant and paper mill on the Flambeau River near by. The project involves $125,000. Guy Waddo is secretary.

The Milwaukee-Western Malt Company, 163 South Water Street, Milwaukee, will rebuild its elevator B, of 500,000-bu. capacity, almost totally destroyed by fire Oct. 15, with a loss of $190,000. Albert Zinn is president.

The F. J. Greene Engineering Works, Racine, Wis., has been awarded the contract for erecting a machine shop for the George Gorton Machine Company, Racine.

The Johnson & Field Mfg. Company, manufacturer of agricultural implements, Racine, Wis., whose plant was recently destroyed by fire, has leased the three-story building near by, at one time occupied by the American Seating Company. This plant is already equipped with machinery, and has suitable facilities for a continuance of the company's operations on an enlarged scale.

Cleveland

CLEVELAND, OHIO, Oct. 23, 1916.

The Vitreous Enameling Company, Cleveland, recently incorporated, has commenced the erection of a brick and steel plant, 138 x 180 ft., on Harvard Avenue. The Austin Company, Cleveland, has the contract.

The William McClellan Company, Thirty-fourth Street and Hamilton Avenue, Cleveland, also known as the Cleveland File Works, is erecting an addition to its grinding and cutting department.

The Colburn Machine Tool Company, Franklin, Pa., builder of vertical boring and turning mills and vertical drilling machines, has acquired a six-acre site on Ivanhoe Road, Cleveland, adjoining the plant of the Reliance Electric & Engineering Company, and will erect a plant next spring.

Plans for a foundry building to be erected by the Cleveland Co-operative Stove Company, Cleveland, are being prepared by George S. Ryder & Co. Contracts will be placed shortly.

The Buckeye Machine Company, Lima, Ohio, manufacturer of internal combustion engines, will shortly erect a foundry, 60 x 60 ft., of steel construction. Plans are being prepared.

The Canton Auto Parts Company, Canton, Ohio, recently incorporated with a capital stock of $300,000, will erect a gray iron foundry, 40 x 100 ft., and a machine shop for the manufacture of piston rings. Contracts for the plant and equipment will be placed shortly. S. S. Kurtz is president.

The American Forge & Machine Company, Canton, is enlarging its capacity by the installation of new forging machinery. Several extensions were recently completed.

It is announced that a new plant will be established in Canal Dover, Ohio, by the Dover Foundry Company, to be incorporated shortly to manufacture steel ingot molds. It is planned to secure the supply of hot metal from the Dover blast furnace of M. A. Hanna & Co. in Canal Dover.

The Lewis Company, Chicago, will erect a tar by-product plant in Canal Dover to refine coal tar from the coke plant recently placed in operation by the Dover By-Products Company.

The Dover Mfg. Company, Canal Dover, is erecting a temporary plant for the manufacture of sadirons to replace the one recently burned. It is the intention of the company to erect a permanent plant later.

Detroit

DETROIT, MICH., Oct. 23, 1916.

While no large orders for machinery were placed last week, numerous small orders kept the market brisk. Deliveries are still slow on standard machines. The labor market has improved and building operations are increasing. As a result, wood-working machinery has been in increasing demand.

The General Motors Truck Company, Pontiac, Mich., announces plans for doubling its factory capacity during the year. A track system of assembling will be immediately installed.

The Manistee Iron Works, Manistee, Mich., has authorized the expenditure of $25,000 for new machinery and equipment. The company is pouring between 10 and 12 tons of iron daily.

The Veit Mfg. Company, Grand Rapids, Mich., will move to Holland, Mich. It manufactures bank, library and office furniture.

The National Tire Chain Company, Grand Rapids, Mich., will increase its capital from $25,000 to $100,000. C. W. Hodges is president.

The Globe Motor Truck Company, Detroit, has been incorporated by Spencer Clark, Robert C. Yerkes and Charles A. Dolph.

The Detroit Electric Welding Company, manufacturer of electric welders and self-starters for automobiles, formerly of Detroit, has moved to Lansing, Mich., and occupies the building formerly owned by the American Cut Glass Company. Frank E. Fisher is president.

The Anderson Electric Car Company, Detroit, is building an addition to its main building, 80 x 200 ft., two stories.

Construction work on the plant of the Superior Steel Castings Company at Benton Harbor, Mich., is being rushed, and it will begin operations Dec. 1.

The Standard Foundry & Mfg. Company has moved its equipment from Alma, Mich., to the new plant erected at St. Louis, Mich.

The Automobile Crank Shaft Corporation, maker of ground crankshafts, 192 Piquette Avenue, Detroit, Mich., has been incorporated under the laws of New York for $1,000,000 to manufacture crank shafts for automobiles, aeroplanes, tractors, etc., and contemplates manufacturing nothing but crank shafts. The incorporators are J. M. Hibbard, E. E. MacCrone and W. C. Roche. It takes over all the assets and will continue the business of the Auto Crank Shaft Company. J. M. Hibbard, who has been secretary, treasurer and general manager since the business was incorporated in 1906, will continue in the same capacity, and there will be no changes in any of the other officials. Contracts have already been let for additional buildings and equipment that will double its capacity, all of which will be completed and in operation by Feb. 1, 1917.

The correct address of the Monroe Binder Board Company is Monroe, Mich., not Detroit, as stated in the IRON AGE of Oct. 12.

The Kalamazoo Malleable Iron Company, Kalamazoo, Mich., has had plans prepared by D. J. Albertson for a foundry, 250 x 300 ft., estimated to cost $125,000.

Indianapolis

INDIANAPOLIS, IND., Oct. 23, 1916.

The Letz Mfg. Company, Crown Point, Ind., manufacturer of feed grinders, is building a two-story addition to cost $15,000.

The Gary Foundry & Machine Company, Gary, Ind., whose plant was placed in operation this year, is about to increase its plant capacity with an addition, 60 x 300 ft.

The American Metal Furniture Company, successor to the Clark & Roberts Company, Indianapolis, Ind., manufacturer of aseptic steel furniture, advises that the acquisition of the plant and equipment of the latter company, while it provides for an enlargement of the company's business, will not for the time being involve the purchase of additional equipment.

The Hoosier Iron Works Company, Kokomo, Ind., has been organized by J. W. Johnson, C. T. Byrne, George Kingston, J. P. Grace and A. G. Seiberling. It has a capital of $200,000, and will immediately construct a foundry building, pattern shop and other buildings.

The Atkins Mfg. Company, Indianapolis, has been incorporated with $50,000 capital stock to manufacture heating equipment. The directors are D. W. Atkins, A. O. Atkins and Leslie Genung.

The Coulter Shoe Brace Company, Indianapolis, has been incorporated with $50,000 capital stock to manufacture shoe braces. Boone D. Coulter, J. D. Ellison and N. R. Coulter are the directors.

The United States Corrugated Fiber Box Company, Indianapolis, has increased its capital stock from $40,000 to $50,000.

The Chamber of Commerce, Indianapolis, has completed negotiations with Barnett's, Inc., for the removal of its plant from Seattle, Wash., to Indianapolis. It manufactures a full line of cutlery with interchangeable blades. Machinery is on the way from Seattle to a temporary plant in Indianapolis, pending the selection of a permanent factory site. The company has $200,000 capital. Harley Jackson is president, A. R. Barnett, secretary and treasurer, and Charles Maynard superintendent.

The Bell Mfg. Company, Fairmount, Ind., has been incorporated with $50,000 capital stock to manufacture metal and wood-working machinery. The directors are Henry Abrams, William J. Henley, Jr., and Jackiel W. Joseph.

The Cannelton Clay Products Company, Cannelton, Ind., has been incorporated with $50,000 capital stock to manu-

facture fire and face brick, building tile, etc. Two 30-ft. kilns are to be erected. Leo J. Brenner is manager.

The R. H. Humphrey Company, which has wood-working factories at Corydon and Depauw, Ind., has bought a site for a similar factory at Fairmount Park, New Albany, Ind.

The Newcastle Auto Parts Company, Newcastle, Ind., has been incorporated with $20,000 capital stock to manufacture automobile parts. The directors are John E. Burns, P. J. Kennedy and W. M. Sample.

The Roberts Veneer Company, New Albany, Ind., has increased its capital stock from $55,000 to $72,000.

The Weidely Motors Company, Indianapolis, has increased its capital stock from $250,000 to $500,000.

Cincinnati

CINCINNATI, OHIO, Oct. 23, 1916.

A prominent local machine-tool builder is authority for the statement that he is somewhat pleased to note that the railroads are buying so few machine tools. His idea, which is held by other manufacturers, is that the railroads will aid materially in taking up the slack when the demand for machines from Europe and domestic munition makers ceases. Automobile manufacturers are still buying heavily, but no large lists are issued. Tire makers are purchasing more machine tools than ever in the history of their business.

The jobbing machine shops have all the work they can take care of, but the scarcity of material is causing considerable trouble. Mill supply houses and manufacturers' agents state that the delays are unavoidable and in many instances they are compelled to cut orders in half to make an even distribution.

In spite of high prices and the scarcity of building material a number of new factories are under construction and contemplated. It is currently reported that an industrial center is to be established at Winton Place and that several large plants will remove to that suburb. Plans are yet in an embryonic state.

The Oesterlein Machine Tool Company, Cincinnati, has decided to go ahead with its plans for constructing a new factory in the Camp Washington district.

The Fisher Special Mfg. Company, Cincinnati, maker of screw machine products, has let contract for an addition to its plant on Reading Road, estimated to cost $12,000.

P. T. Baker & Son, Cincinnati, box manufacturers, will construct a plant at Liberty Street and McLean Avenue, 75 x 250 ft., one story, of brick and steel. Some extra woodworking equipment will be required later.

The Burton Stove & Range Company, Cincinnati, will remove its plant at Walnut Street to Seventh and Sycamore Streets. No new equipment will be needed.

The Niles Tool Works Company, Hamilton, Ohio, has decided to go ahead with the construction of a new brick brass foundry, 75 x 175 ft., one story.

The McCormick Laboratories Company, Dayton, Ohio, has been incorporated with $50,000 capital stock by F. J. McCormick, Jr., H. A. Estabrook, and others.

The Goldie Mfg. Company, Dayton, Ohio, has been incorporated with $15,000 capital stock to manufacture novelties. E. C. Merkle is one of the incorporators.

The Concrete Steel Construction Company, Springfield, Ohio, has been awarded contract by Dr. G. A. Greenawalt for the construction of a five-story manufacturing building. It will be used by several companies whose names have not yet been given out.

The wood-working plant of the L. C. Grandall Company, Circleville, Ohio, was almost completely destroyed by fire last week. No information has been given out as to rebuilding.

The Central South

LOUISVILLE, KY., Oct. 23, 1916

High prices in the steel and machinery field are having a tendency to discourage orders, according to reports of local manufacturers. Inquirers are replying in considerable proportion that they will find it desirable to postpone improvements or extensions until steel is cheaper. This applies to boilers, plates, forgings and ice and refrigerating machinery. In the machinery and supplies field local dealers report a disposition on the part of industrial companies to postpone purchases until after election time. The pinch of the car, coal and labor shortage is a further deterrent to the volume of business.

The Fruin-Colnon Contracting Company and the Missouri Valley Bridge & Iron Company, both of St. Louis, Mo. have been awarded the contract for construction of the additional pumping station for the Louisville Water Company, Louisville, Ky., for $353,000. A pump of 30,000,000 gal. per day capacity will be installed.

The Danville Motor Company, Danville, Ky., has been incorporated with capital stock of $5000, by T. F. Durham, D. W. Mahan and J. W. Mitchell.

J. H. Black & Co., Barbourville, Ky., is in the market for machinery for manufacturing slack-barrel headings.

Work has begun on construction of the plant of R. H. Reynolds & Co., New Albany, Ind., in which will be consolidated two woodworking plants which the company has been operating at Corydon and DePauw, Ind. The company will manufacture woodstock for automobiles.

The Mulloy Scale Company, New Albany, Ind., which will manufacture an automatic weighing machine, has increased its capital from $2000 to $27,000. Bernard F. Mulloy is president.

The Volunteer Stave Company, Kingston Springs, Tenn., has been incorporated with $2500 capital stock, by William and J. E. Nesbit, Isaac T. Robertson and others and will establish a mill.

A hydroelectric power plant and pumping station is proposed by the Bearden Welfare Association, Bearden, Tenn. It is estimated to cost $5000. Dr. M. H. Lee is president.

The Smith County Electric Company, Carthage, Tenn., will construct a power plant at a cost of $20,000, to include a transmission system to cost $5000. The plant is to develop 200 hp. T. B. Read is secretary-treasurer; R. S. Seese is engineer.

C. D. Wailes, Memphis, Tenn., will erect a garage at 883 Poplar Street at an estimated cost of $3000.

The Kelsey Wheel Company, North Memphis, Tenn., and Detroit, Mich., will consolidate its factories, bringing the Detroit plant to Tennessee. This will increase the capacity of the Memphis plant, which is now producing 2000 complete automobile wheels daily.

The Shelby County Industrial & Training School, near Ellendale, Tenn., will construct an electric light plant. The county court, at Clarksville, Tenn., has appropriated $1500.

St. Louis

ST. LOUIS, MO., Oct. 23, 1916

The machine-tool business continues active with a slight improvement in deliveries. Purchases are still made by shopping about rather than by putting out lists, and most of the buying seems to be on the single tool basis. New industries are being established, but some plans are being held in abeyance.

The Bytanic Metal Company, St. Louis, has increased its capital stock by $20,000 to extend its operations.

The General Explosives Company, St. Louis, has increased its capital stock from $50,000 to $100,000 and will build a larger plant than first intended.

The Hoffman Heating Company, St. Louis, has been incorporated with a capital stock of $12,000 by John G. Ross, Fred Schmidt and Fred E. Harris to manufacture heating apparatus.

The Continental Auto Top Mfg. Company, St. Louis, has doubled its capital stock and will extend its manufacturing plant.

The Marshfield Electric Company, Marshfield, Mo., is in the market for one 50-hp. oil engine.

Slater, Mo., will install new boilers in its electric plant. L. E. Shepherd is superintendent.

The Nourse Oil Company, 1315 West Eighth Street, Kansas City, Mo., will install machinery costing $20,000 in a factory to be built for the manufacture of oil specialties.

The Powersville Electric Light & Power Company, Powersville, Mo., has been incorporated with a capital of $15,000 by I. O. Pollock, G. H. Scott and J. W. Rowan to equip an electric power plant.

The C. A. Spaulding Electrical Company, Kansas City Mo., has been incorporated with a capital stock of $13,000 by W. L. Fowler, A. H. North and M. C. Spaulding to manufacture electrical equipment.

The Fort Smith Refrigerating Company's plant, Fort Smith, Ark., has been burned with a loss of $17,000. It will be rebuilt at once.

The Consumers' Pipe Line Company, Magnolia, Ark., will build a pipe line and establish a pumping system to supply water tanks, etc., in and about Magnolia.

The Oklahoma Refining Company, 908 Herskowitz Building, Oklahoma City, Okla., will remodel its plant for the manufacture of lubricants and will install

ing $3,000 for mixing and compounding greases. Bids will be opened Dec. 10.

Marlow, Okla., will improve its electric light and waterworks plants, erecting a power house and installing equipment to cost $50,000.

The Sharpe-French Electric & Machine Company, Henryetta, Okla., has been incorporated with a capital stock of $15,000 by J. H. and C. S. Sharpe and E. H. French to manufacture electrical equipment.

The Electric Oil Well Cleaning Company, Muskogee, Okla., has been incorporated with a capital stock of $25,000 by Vin Truman, William Hough and others and will purchase machinery for cleaning oil well pipes, casings, etc.

The Oklahoma Refining Company, Oklahoma City, Okla., will build six new warehouses and 12 oil storage tanks with pumping equipment. It is also in the market for mixers, pumps, tanks, coopers' machines and supplies.

The Lula Light & Water Company, Lula, Miss., will equip an electric light plant, including a 30-hp oil engine, a 25-kw, 2200-volt, 60-cycle generator, etc. C. S. Swann, Clarksdale, Miss., is purchasing agent.

Sumrall, Miss., will equip a waterworks plant, the machinery to cost $20,000. X. A. Kramer, Magnolia, Miss., is engineer in charge.

J. D. Kennedy, Columbus, Miss., is reported in the market for a centrifugal pump with 4-in suction and 4-in discharge.

Welsh, La., will install additional engines and generating equipment in its electric plant at a cost of $15,000.

The Great Southern Lumber Company, Bogalusa, La., W. H. Sullivan, general manager, will construct a 60-ton pulp mill and a 100-ton container liner plant, manufacturing the product from the company's saw mill waste. The machinery will cost $600,000.

Lafayette, La., has appropriated $20,000 for an oil engine and generating apparatus at its waterworks plant.

The Lincoln Steel & Forge Works is erecting a plant at St. Louis, the principal building of which is nearly completed, and is expected to be opened in about five weeks. The works will turn out structural steel for buildings.

The Universal Seat Company, New Orleans, La., will equip a factory for making a seating specialty. Robert T. Small is manager.

Birmingham

BIRMINGHAM, ALA., Oct. 23, 1916.

Hydroelectric apparatus remains the most active trading element in wholesale machinery, the changes from steam to electricity in manufacturing plants taking place steadily and rapidly. The car shortage, which has delayed coal shipments and raised the price, is held responsible for some of the movement, in addition to which are attractive offers by the power companies. Machine tools are very active, but hard to get. General business continues strong.

W. G. Mitchell, of the W. G. Mitchell Lumber Company, Shortleaf, Ala., has obtained control of the properties of the Alabama Portland Cement & Lime Company at Demopolis, and proposes to organize a new company to operate it.

M. E. Henry, Tifton, Ga., and associates are organizing a company with a capital of $150,000 to build a meat-packing plant.

The Dowling-Shands Lumber Company, Green Cove Springs, Fla., will rebuild its mill recently burned at a loss of $150,000.

The Clement Veneer & Lumber Company, Pamlico, S. C., capitalized at $50,000, will build a plant to manufacture veneer.

Texas

AUSTIN, TEX., Oct. 21, 1916.

Trade conditions continue exceptionally good. Money from the sale of the cotton crop is rapidly finding its way into industrial circles, and many improvements which require the use of machinery and tools are in progress and under consideration.

Frank Hall, San Saba, and associates will install a new engine and make other improvements to their electric light plant.

H. A. Coleman, 819 Bourban Street, Dallas, will rebuild his planing mill which was recently destroyed by fire.

The Washington Iron Works, Sherman, has been incorporated with a capital stock of $30,000, by Solon, Harry L. and Jess M. Totten.

The Mission Light & Water Company, Mission, has increased its capital stock from $20,000 to $40,000 and will enlarge its works.

San Francisco

SAN FRANCISCO, CAL., Oct. 17, 1916.

While large orders for machine tools are rather scattering, practically all metal-working plants are buying some new equipment, and in many cases obsolete tools are being replaced with modern high-speed machinery. Boilers, engines, motors and special machinery are in good demand. Implement manufacturers are still operating practically to capacity with tractors in especially good call. The mining, smelting and oil industries are also fairly active buyers.

Many foundries are financially handicapped as to new purchases, owing to heavy buying of raw material before Sept. 1.

The Richmond Machine & Boiler Works has been incorporated at Martinez, Cal., by A. J. Timmons, E. Ott and Fred Reichert.

The Pacific Portable Construction Company, Los Angeles, manufacturer of knockdown houses, has acquired a site for a larger plant.

Arrangements are being made for the completion of the Old Mission Portland Cement Company's plant, San Juan, Cal., to have an annual capacity of 600,000 bbl.

A new machine shop is included in plans for the completion of the local army supply station at Fort Mason.

J. W. Turrentine of the United States Department of Agriculture is in California to arrange for the establishment of a Government plant at Long Beach or San Diego for experimental work in the manufacture of potash, etc., from kelp.

J. M. Benham, president Standard Steel Wheel Company, announces the purchase of a site near Stockton, Cal., where the company proposes to build a plant to manufacture pressed steel wheels. Galvanizing and spot-welding equipment will be installed.

J. K. Kinsman is figuring on the establishment of a general machine shop at Los Banos, Cal.

Bids are being taken for a logging engine for San Francisco's Hetch Hetchy water project.

A contract has been placed with Dyer & Co., Cleveland, Ohio, for the construction of a beet-sugar mill near Tracy, Cal.

The Warman Steel Casting Company, Los Angeles, Cal., will erect three foundry buildings at Huntington Park at a cost of $100,000. The plant at Redondo Beach will be moved to the new location.

The Pacific Northwest

SEATTLE, WASH., Oct. 17, 1916.

The continued car shortage in Washington and Oregon is inflicting extremely serious damage to the lumber interests. The mills engaged in railroad tie work that have not closed down are operating merely to hold the men, and at present more than 80 per cent of the lumber that usually goes direct from the mill to the car is now being piled up awaiting shipment. The car shortage is also acutely felt by farmers in the Willamette Valley along the Southern Pacific lines. The Pacific Northwest lumber exports amounted to 30,220,798 ft. for the month of September, as compared with 13,386,573 ft. for August.

The remarkable prosperity in the shipbuilding industry continues in this section, where, according to figures recently compiled, more than $30,000,000 worth of steel and wooden ships is now under construction.

The Moore Mill & Lumber Company, Bandon, Ore., according to George W. Moore, president, plans the construction of a lumber steamer with a capacity of 900,000 ft. to replace two vessels sunk the past year.

The Kilbourne-Clarke Mfg. Company, Seattle, Wash., manufacturer of radio apparatus, announces that it has completed arrangements to increase its capital stock to $2,000,000 and enlarge its plant to a capacity of 200 radio machines per year. C. A. Kilbourne is president.

The McCraken Motor Company, Portland, Ore., local dealer for the Moreland Truck Company, announces that an assembling plant will be constructed in Portland.

The Tacoma Lime Products & Fertilizer Company, Tacoma, Wash., has been incorporated for $50,000 by J. B. Agner, I. Carpenter and L. Y. Staton.

The Columbia Engineering Works, Portland, Ore., plans the construction of another lumber schooner. Ways are now being constructed.

Fred A. Ballin, J. B. C. Lockwood, and the Smith & Watson Iron & Steel Works, all of Portland, are interested in a shipbuilding company in process of organization, which will construct a plant in Portland. The Smith & Watson

Company will construct the boilers, auxiliary engines and machinery for the vessels.

The Automatic Window Screen Mfg. Company, Seattle, Wash., has been incorporated for $100,000 by J. K. Schenck and O. D. McMillan.

The Burbank Machinery Company, Seattle, has been incorporated for $10,000 by F. S. Burbank, L. A. Nutter and C. E. Mack.

The Veddar River Shingle Company, Chilliwack, B. C., has recently purchased cedar holdings in West Vancouver, B. C., amounting to 100,000,000 ft., and will construct a shingle mill with capacity of 350,000 shingles daily. Its plant in Chilliwack will be moved to West Vancouver, and six large upright shingle machines and other equipment will be installed.

The Standard Chemical Company, Tacoma, Wash., has recently acquired a site in Tacoma on which it plans to double its plant. Paul Van Horst is president.

The Galbraith-Bacon Company's Dock No. 12, Seattle, Wash., was recently destroyed by fire, with loss of about $120,000. The machinery was a total loss. It will be rebuilt at once.

The Morrison Mill Company, Bellingham, Wash., will erect a two-story box factory, 50 x 150 ft., to replace its present structure. New motor-driven machinery will be required. The improvements will cost $20,000. Arch Morrison is general manager.

O. P. Graham, Portland, plans the establishment of a shipbuilding plant in or near Portland. He is at present operating a plant for the construction of motor boats.

The Oregon Short Line Railroad will expend not less than $100,000 in the construction of its new roundhouse and shops now in progress at Nampa, Idaho.

Canada

TORONTO, Oct. 23, 1916.

The Pacific Steel Products, Ltd., Lulu Island, B. C., will erect a new steel plant to replace the one recently destroyed by fire with a loss of about $150,000.

Beatty Bros., Ltd., are making extensive additions to their plant at Fergus, Ont. A new building is being erected parallel to the present factory on Hill Street. The company will take all its metal-working machinery from its Grand River factory and install it in this building. A three-story addition is also being made to its Grand River plant, in which wood-working machinery will be installed.

Henry Schaake of the Schaake Machine Works, New Westminster, B. C., plans the erection of a foundry and machine shop to cost $50,000.

The Weir Machinery Company, Ltd., Vancouver, B. C., has been incorporated for $25,000, to take over the business of J. B. Weir & Co.

The Dominion Abrasive Wheel Company, Mimico, Ont., has let contract for a plant, 170 x 220 ft., to cost $65,000.

H. Guess, Bridgeburg, Ont., has commenced the erection of a garage to cost $20,000.

The Pacific Great Eastern Railway Company, Vancouver, B. C., will build its proposed roundhouse at East Lillooet, B. C., at a cost of $50,000, and a machine shop and roundhouse at Squamish, B. C., at a cost of $100,000. Contracts will be let shortly. A. H. Sperry is general manager.

Plans are being prepared for a brick factory on Beverley Street, Galt., Ont., for the Dodge Metal Hose Company. J. Evans, 30 Water Street, is the architect. It will cost $50,000.

In connection with its proposed plant at Port Colborne, Ont., the International Nickel Company, 43 Exchange Place, New York, is taking tentative prices for generators and motors.

Tenders will shortly be called for the erection of a pumping station for the St. John Railway at St. John, N. B. G. G. Murdock, 73 Camarthen Street, is the engineer.

Bids will be received until Nov. 15 by J. W. Pugsley, Department of Railways and Canals, Ottawa, for the erection of a reinforced concrete elevator of 500,000 bu. capacity at St. John, N. B. Plans and specifications are available at the office of the chief engineer, Moncton, N. B., or the J. S. Metcalfe Company, Ltd., Montreal.

M. J. O'Brien, Renfrew, Ont., has commenced the development of a site and the erection of a power plant at Calabogie, Ont., estimated to cost in all $150,000.

In connection with the power development scheme at Wahnapitae, Ont., for the British Nickel Corporation, Excelsior Life Building, Toronto, the construction of a concrete dam has been started. The work is under the supervision of A. J. Felio and will cost about $1,250,000.

Anderson Brothers, Market House, London, Ont., are in the market for a 12 or 15-hp. motor.

Robert Dollar, president of the Robert Dollar Company, San Francisco, Cal., proposes to build a sawmill on Burrard Inlet, B. C.

The Tillsonburg Foundry & Machine Company, Ltd., Tillsonburg, Ont., has been incorporated with a capital stock of $25,000 by Sydney E. Dykeman, David J. Downs, Frederick J. Bushnell, and others to manufacture machinery, engines, motors, tractors, etc.

The James McKay Company, a Pennsylvania corporation, has been granted a license to manufacture iron, steel, bolts, hooks, forgings, etc., in Ontario, with a capital stock of $40,000 and has appointed Franklin W. Wedgeast, Room 901, 67 Yonge Street, Toronto, to be its attorney.

The Pressed Metals, Ltd., Toronto, has been incorporated with a capital stock of $60,000 by John W. Leighton, 67 Walker Avenue, Owen J. P. Crick, James H. Chewett, and others.

The White Company, Ltd., Toronto, has been incorporated with a capital stock of $40,000 by Wilfrid M. Cox, 801 Dominion Bank Building; Howard A. Harrison, William J. Beattie, and others, to manufacture automobiles, etc.

Fire gutted the office and plant of the Machine Automatic Telephone Company at Lindsay on Oct. 17. The loss will amountto $30,000. D. E. H. Lee is local manager.

The Canadian Lamp & Stamping Company, Ltd., Ford City, Ont., has been incorporated with a capital stock of $100,000 by George E. Edmunds, William T. Jones and Lawrence H. Bedford of Detroit, Mich., and others.

Government Purchases

WASHINGTON, D. C., Oct. 23, 1916

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until date not set, schedule 294, for six 220-volt alternating current motors for Puget Sound; schedule 312, for three pipe-threading machines for Brooklyn; schedule 316, for one steam-driven air compressor for Charleston.

Sealed proposals will be received at the Bureau of Yards and Docks, Navy Department, Washington, until 11 a. m., Nov. 20, for furnishing one locomotive crane at the naval coal depot, San Diego, Cal.

Bids were received by the Bureau of Supplies and Accounts, Navy Department, Washington, Oct. 17, for supplies for the naval service as follows:

Schedule 169, Ordnance

Class 131, Washington—One straightening and forcing press—Bid 105, $990.

Schedule 170, Construction and Repair

Class 141, Pensacola—One electric spot welder and one motor generator—Bid 38, $1,100 and $1,410; 126, units; 183, $775, $750, $800, $900 and $975; 199, $780.

Schedule 171, Steam Engineering

Class 151, Portsmouth—One belt driven turret lathe—Bid 135, $2,025; 136, $1,100; 180, $1,630.65.

Class 152, Portsmouth—One universal turret lathe—Bid 118, $1,045; 180, $1,472.95; 196, $1,145.

Class 153, Portsmouth—Two engine lathes—Bid 67, $940; 98, $598; 128, $1,032; 136, $1,100; 187, $1,050; 196, $1,017, $1,090 and $835.

Class 154, Portsmouth—One engine lathe—Bid 118, $1,765; 135, $2,135; 136, $1,850; 196, $1,675

Class 155, Portsmouth—One boring and turning mill—Bid 128, $4,534; 196, $3,280.

Class 156, Portsmouth—One motor driven horizontal borer, driller and miller—Bid 128, $6,150; 136, $7,500.

Class 157, Portsmouth—One milling machine—Bid 21, $1,657.13; 136, $1,450 and $1,500.

Class 158, Portsmouth—Automatic screw machine—Bid 127, $2,528.

Class 159, Portsmouth—One turret lathe—Bid 135, $942; 136, $640; 180, $844.40; 196, $1,085.

Class 160, Portsmouth—Two bench lathes—Bid 98, $445; 136, $1,032; 196, $535.

Class 161, Portsmouth—One screw slotting machine—Bid 21, $132.50.

Class 162, Portsmouth—One involute gear cutter—Bid 21, $641.50; 111, $1,047; 196, $692.

Class 163, Portsmouth—One motor driven disk grinder—No bids.

Class 164, Portsmouth—Two drill presses—Bid 98, $148; 103, $167; 128, $365; 196, $162.

Class 165, Portsmouth—One profiling machine—Bid 103, $900; 118, $900; 122, $1,050; 135, $975.

Schedule 208, Ordnance

Class 221, Newport—Counterbores—Bid 62, $1,147.20.

The names of the bidders and the numbers under which they are designated in the above list are as follows:

Bid 21, Brown & Sharpe Mfg. Company; 38, W. Irwin Cheyney; 62, Eclipse Interchangeable Counterbore Company; 67, Federal Sales & Service Company; 98, Kemp Machinery Company; 103, Leland-Gifford Company; 105, Lucas Machine Tool Company; 111, Manhattan Supply Company; 118, Manning, Maxwell & Moore, Inc.; 126, National Electrical Supply Company; 127, National Acme Mfg. Company; 128, Niles-Bement-Pond Company; 135, Pratt & Whitney Company; 136, Henry Prentiss & Co.; 180, Warner & Swasey Company; 183, Winfield Electric Welding Machine Company; 187, Ward & Co.; 196, D. Nast Machinery Company; 199, Toledo Electric Welder Company.

The following bids were opened by the commanding officer, Frankford Arsenal, Philadelphia, under proposal 121, on Oct. 13, for furnishing 205,800 3-in. steel shells, finished, machined, banded and tested:

Item 1, price-prescribed hydraulic test to be made by contractor under supervision of government inspector; 2, price-prescribed hydraulic test to be made by the government.

The Harrisburg Pipe & Pipe Bending Company, item 1, $3.44 each; item 2, $3.99 each. Accept not less than 100,000 at an advance of 25c. each.

The E. W. Bliss Company, item 1, $3.73 each.

The American & British Mfg. Company, item 1, $3.95 each; item 2, $3.87 each, for 50,000 or more.

The Metal Products Company and the Hydraulic Pressed Steel Company, item 2, $3.89 each.

The Bethlehem Steel Company, item 1, $4.20 each.

The Bridgeport Projectile Company, item 2, $4.50 each. Water testing by contractor 5c. per shell additional.

The South Brooklyn Machine Corporation, item 2, $5.66 each.

The Consolidated Car Heating Company, item 1, $5.40 each for 25,000, $4.89 each for 75,000, $4.66 each for 150,000, $4.56 each for 205,800; item 2, $5.34 each for 25,000, $4.84 each for 75,000, $4.63 each for 150,000, $4.53 each for 205,800.

NEW TRADE PUBLICATIONS

Taps and Dies.—Greenfield Tap & Die Corporation, Greenfield, Mass. Catalog No. 37. Size, 4¾ x 7¼ in., pages, 270. Relates to the entire line of this company and supersedes catalogs No. 34 of the Wells Bros. Company, No. 36 of the Wiley & Russell Mfg. Company and No. 3 of the A. J. Smart Mfg. Company. The combination of the tools of the various subsidiaries has resulted in a simplification of the line. The old trademarks "Little Giant," "Lightning," "Green River" and "Smart" are retained and in addition a new line bearing the trademark "GTD" has been added. The lines covered by the catalog include taps, dies, screw plates, reamers, gages, tap and die holders, pipe threading tools, a self-opening die, a friction tap chuck and the new "Gun" tap which was illustrated in THE IRON AGE, Aug. 3, 1916. The various tools are illustrated and briefly described and tables of the different sizes that can be furnished of each are presented. A glossary of terms used in connection with the cutting and measuring of screw threads and a number of tables of useful information are included.

Fans and Heaters.—B. F. Sturtevant Company, Hyde Park, Boston, Mass. Bulletin No. 228 and two catalogs. The first illustrates a line of multivane volume fans which are made with either the fan or the driving pulley overhung. Diagrams showing the various discharge arrangements that can be supplied are presented together with dimension and capacity tables. Catalog No. 230 pertains to the heating apparatus which the company is prepared to furnish for buildings of various sizes and classes. After briefly describing the various heaters and their accessories and showing methods of installation, a number of tables and other data of interest to engineers are presented. Catalog No. 240 lists a line of fans which includes small miscellaneous units for special uses, together with the larger types. Illustrations and dimension tables of the various fans are presented, and a number of views of installations are included.

Electric Furnaces.—Electric Furnace Company of America, Alliance, Ohio. Booklet. Calls attention to electric furnaces of the resistor type for heating or heat treating steel and for heating or melting copper and other non-ferrous metals. The greater part of the booklet is devoted to views of installations, including the car type furnace for annealing steel castings, automatic heat treating furnaces for steel castings and forgings, automatic carbonizing furnaces, annealing furnaces of the continuous type and bronze melting furnaces.

Door Hangers.—National Mfg. Company, Sterling, Ill. Bulletin. Treats of a storm-proof garage door hanger and rail equipped with roller bearings. Views of the hanger in use and sectional drawings showing the methods of installation possible are included.

Gears and Pinions.—General Electric Company, Schenectady, N. Y. Bulletin No. 44,419. Shows the various types of gears that can be furnished as steel forgings or castings, a composite type consisting of a forged rim shrunk on a cast steel hub and a special spring type. The various grades are briefly described and instructions for the inspection, lubrication and mounting are included. A number of dimension tables and diagrams of comparative sizes of teeth are presented.

Jacks.—Templeton, Kenly & Co., 1020 South Central Avenue, Chicago, Ill. Catalog No. 216. Contains illustrations and brief descriptions of an extensive line of jacks for use in industrial plants, on railroads and in garages. A number of views of the different jacks in use are included, together with a number of testimonial letters.

Sand Cutting Machines.—Sand Mixing Machine Company, 52 Vanderbilt Avenue, New York City. Pamphlet. Shows by a series of views the use of a machine for cutting and piling sand on the floor of a foundry where heavy work is done and by way of contrast views in a foundry where light work is handled are included. In connection with the first series of views the time at which each was taken is indicated with a caption descriptive of the condition of the floor at that time.

Bench Grinding Machine.—Grayson Tool & Mfg. Company, Indianapolis, Ind. Circular. Points out the advantages of using a bench grinding machine, which was illustrated in THE IRON AGE, April 20, 1916, for finishing dies, punches, blocks, gages and ordinary work. The construction of the machine is gone into at some length and the text is supplemented by an engraving of the machine. Mention is also made of accessories for the machine which include a vise, an emery wheel dresser and a wall countershaft. Illustrations and brief descriptions of all three are presented.

Air Compressors and Sensitive Drilling Stand.—Chicago Pneumatic Tool Company, Fisher Building, Chicago, Ill. Bulletins Nos. 34-Z and E-44. The first gives general description and specifications for a single steam-driven air compressor having a balanced steam valve and automatic flywheel governor. After a brief general description of the compressor, the construction is gone into at some length, the text being supplemented by numerous engravings of the different parts, as well as views of the complete compressor. A table of sizes and capacities is included. The other bulletin, which supersedes No. E-31, is devoted to an electric sensitive drilling stand, which is built in five sizes to take the company's standard Duntley side spindle machine. A brief description of the stand is presented supplemented by a table giving the general dimensions of the stand. A brief mention is made of the drilling machine intended for use with the stand.

Conveying Machinery.—Gifford-Wood Company, Hudson, N. Y. Bulletin No. 24. Refers to a line of coal conveying machinery. A number of views of installations of the equipment are included. A line of ice equipment is covered. views, brief descriptions and condensed specification tables of the various tools being presented.

Grinding Machine Pumps.—Cincinnati Lubricant Pump Company, 126 Opera Place, Cincinnati, Ohio. Pamphlet. Calls attention to a circulating pump for grinding machines which was illustrated in THE IRON AGE, July 6, 1916. A description of the pump, which is centrifugal in its action is given and exterior and sectional views supplement the text. The special features of the pump are the absence of bearings in the pump proper, gears or other close-fitting parts.

Crude Oil Engine.—De La Vergne Machine Company, foot of East 138th Street, New York City. Bulletin No. 154. Refers to the new sizes of the company's type FH crude oil engine. The special features of the new sizes, which range from 150 to 1200 hp., are given and a number of views of a 300-hp. engine are included.

Small Tools.—Pratt & Whitney Company, Hartford, Conn. Catalog No. 9. Size, 4½ x 7⅜ in.; pages, 316. This catalog, which supersedes all previous editions, illustrates and describes a line of small tools, including taps, dies, milling cutters, reamers, punches, drills and miscellaneous tools. It is divided into seven sections, one being devoted to each class of tool mentioned. In each division illustrations, brief descriptions and tables of sizes are given for the various types of tools and an index by list numbers appears on the first page of each section. A number of tables of useful information and a complete alphabetical index are included.

THE IRON AGE

New York, November 2, 1916

ESTABLISHED 1855 VOL. 98 : No. 18

A Successful Shop Suggestion System

How a Large Agricultural Implement Manufacturer Has Secured Ideas for Improvements in Product and Working Conditions

BY H. A. RUSSELL

IT has been wisely said that "the proof of the pudding is in the eating." A suggestion system cannot very well be eaten, but if it is well digested and the patient seems to receive benefit from the treatment, it is an indication that the prescription had some merit. The system which will be described in this article has been in actual use for about three years. It is being conducted to-day in the same manner as originally planned.

The suggestions are gathered in twice a month, on the first and fifteenth. Naturally as time goes on the number of suggestions becomes less each time the collections are made, but the quality improves. At first we got suggestions on everything in this world and beyond, interspersed with good ideas, however. Sometimes the ideas are very vague; the meaning is hidden. We have found that it is a paying proposition to talk the matter over with the person sending in the suggestion when the meaning is not clear. When the meaning cannot be mistaken the questions of adaptability and the amount of the payment are decided without the Suggestion Committee knowing the name of the employee who sent in the suggestion. In other words, the matter is decided entirely on its own merits.

At the inception of the system the following printed leaflet was put in each employee's pay envelope. This, however, did not include the office force, foremen or assistant foremen. It is certainly the duty of these employees to make suggestions without extra payment for so doing. The printed instructions read as follows:

Suggestions from our employees will be welcomed, and will be paid for if of value and put into use.

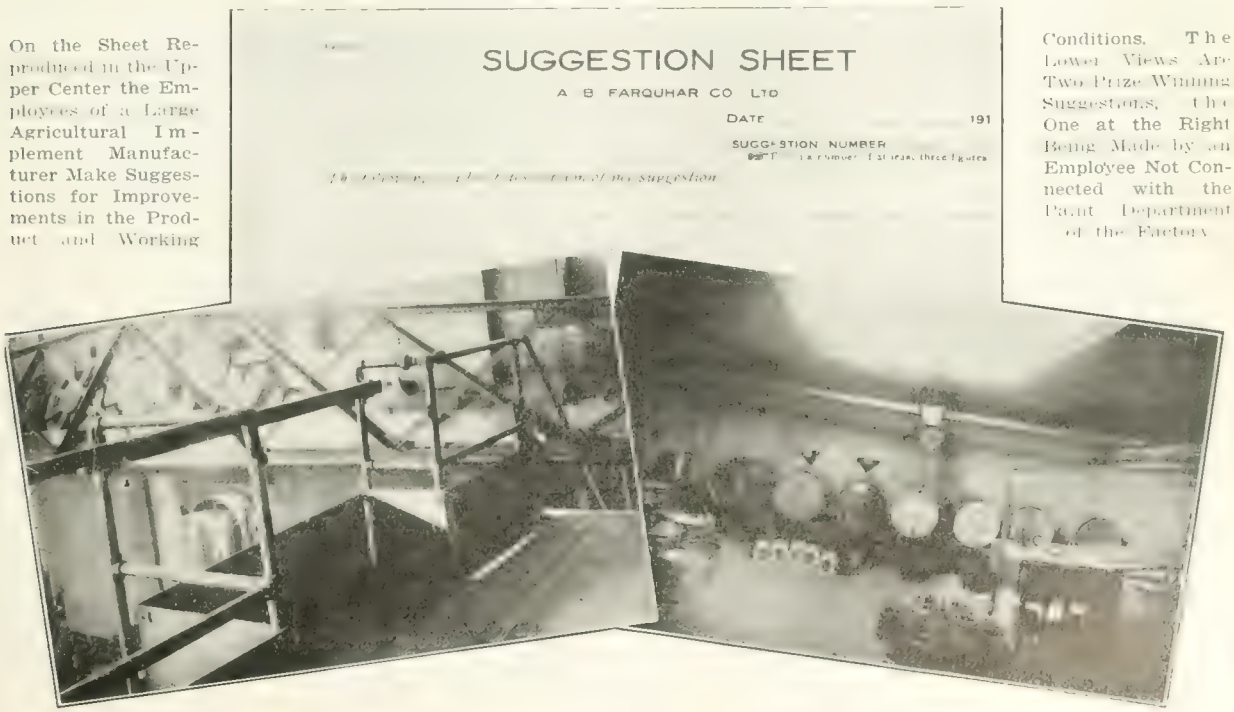
No particular forms are necessary, but we hereby explain our plans devised for the purpose of obtaining the best results.

1. It is requested that the person making the suggestion does not sign his name; we wish the merits of the suggestion to be passed upon without any regard to the position of the person making them.

2. A method is provided whereby the author of the suggestion can identify himself in case it is accepted; if not accepted he need not disclose his name.

3. The names of those whose suggestions are accepted will be posted upon the bulletin boards from time

On the Sheet Reproduced in the Upper Center the Employees of a Large Agricultural Implement Manufacturer Make Suggestions for Improvements in the Product and Working Conditions. The Lower Views Are Two Prize Winning Suggestions, the One at the Right Being Made by an Employee Not Connected with the Paint Department of the Factory



to time, together with a brief statement of the merit of the improvement or other valuable idea accepted. (Where, however, the winner does not desire his name disclosed, the name will be omitted.)

4. Payment for the suggestions accepted will be made promptly after acceptance, in accordance with a schedule of amounts fixed beforehand and depending upon the nature and value of the suggestion.

5. Details as to how the suggestions may be handed in, what subjects they may cover, and other necessary information, are given beyond.

To briefly summarize the additional details that were a part of the printed leaflet, certain parts will be quoted:

Please use the printed form of suggestion sheet.

Suggestion boxes are located close to the time-slip boxes, in each department. Place your unsigned suggestions in these boxes at any time.

There is a space provided at the top of the suggestion sheet for the number you choose. The number should have at least three figures (326, for instance).

The number is for the purpose of letting you know whether your suggestion has been successful, or not. The Suggestion Committee will post the winning numbers upon the bulletin boards. If one of these numbers is yours, you are requested to notify your foreman or assistant foreman or one of the time clerks. This will enable the committee to see that you get proper payment for your suggestion, and to give you proper recognition and credit for it by posting your name (unless you request that your name be not posted), together with a brief description of your valuable idea.

If anyone whose suggestion is not adopted will communicate with the committee the reason for its rejection will be explained to him.

All suggestion boxes are locked. Collections will be made about the first and fifteenth of each month. Each suggestion will be carefully considered by the committee upon its merits. No suggestion will be rejected except after being found to be of no value, or of insignificant value, by at least three-fourths of the committee.

Suggestions may include the following subjects:

Our Product	Improvements In Factory and Office Conditions	Miscellaneous
Quality	Health	Machines
Cost	Cleanliness	Tools
Quantity	Sanitation	Operations
Simplicity	Ventilation	Jigs and templates
Reliability	Order	Dies and forms
Packing	Prevention of fire	Transportation of materials
Shipping	Prevention of accident	Storage of supplies
Handling	Lighting	Complaints of existing conditions, coupled with suggested remedy for same
Routing	Power	
Finish	Economy	
Design		
Workmanship		
Material		

Awards will be entirely at the discretion of the committee. The committee will, however, consider themselves bound to distribute awards somewhat in accordance with the following classifications of suggestions, values and amounts.

Classes of Suggestions

Suggestions which are neither original, nor of appreciable money value, but which should be adopted, perhaps being modified before adoption.

Suggestions which, while having no appreciable money value, may be the means of avoiding an accident.

Suggestions which are not original, but of real money value.

Suggestions which are original and have some money value.

The awards range from $1 up to $10. This higher amount will be increased whenever the suggestion contains unusual merit. It is sometimes necessary to trace back the origin of a suggestion. It is quite possible for an employee to overhear a conversation between two foremen who may be discussing some particular improvement. A suggestion will be turned in by the employee. If it contains the expression of a better idea than developed from the foremen's talk, the employee is, of course, entitled to an award.

The percentage of suggestions that have been accepted and paid for has averaged, in three years, almost 30 per cent. The average would be higher were it not for the fact that duplicates and triplicates of the same suggestion are turned in. The suggestion with the prior date receives the award. If a suggestion is turned in that may refer to some matter that has been discussed at the weekly meeting of department heads, the employee is given an award, if his suggestion is the cause of bringing the matter to a head and the change or improvement is to be made. While the employee has no opportunity of learning what has been discussed at the meeting, he would naturally feel that his suggestion must have had merit or it would not have been adopted. At least he feels that it is his suggestion that has been carried into effect.

Many good suggestions have been turned in. A number of them have covered subjects with which the suggestor would have but little acquaintance, and yet the germ of the right idea was there. In some of the implements manufactured here there will be but a very small difference in the diameter of the cold-rolled shafts. Possibly for years the difference in the diameter of the shafts in two styles of corn shellers may have been only 1/16 in. Nobody paid any attention to the matter until the suggestion system started. Then a suggestion came in, the shafts were made of a uniform size and the required stock of cold-rolled steel was reduced, and instead of having to machine two sizes of shaft boxes the one size would do for both styles of corn shellers.

To mention one or two awards that were given, and which indicated a certain amount of thought on the part of the suggestor, the following will serve as examples of a great many more that have been received:

> Place a window in the door of the room used by the outside carpenters for the storage of tools. This will permit the watchman detecting a fire in this room before it gets much headway.

Investigation showed that a fire could have had a good start before the watchman could have seen it, unless he had made a practice of going off his usual route. The window has been put in and the watchman can see the reflection of a flame a considerable distance away and on his regular route.

Another suggestion was as follows:

> Put a chain hoist on an overhead movable carriage in the paint vault for raising the heavy barrels of paint from the floor to the bucks.

This latter suggestion came from a man who did not work in the paint department, but who had been sent there one day by his foreman with a message. Before this suggestion was adopted it had been necessary to gather three or four men together and by hard work roll the barrels, weighing 700 to 800 lb., up the skidway. There was, of course, the chance of an accident, while with the hoist there is hardly a possibility that the operator can get hurt.

Another suggestion resulted in the landing platform shown being built. The stockroom is close to this landing, and a 15-ton traveling crane passes overhead. When a heavy box or barrel was to be brought up from the first floor to the stockroom, a small chain was passed around the box or barrel and hooked into the rings on the crane chain. When the gallery was reached it was necessary to

start swinging the crane chain so as to bring the package in past the railing. The heavier the package, the more danger was there connected with the operation. Now, with the new platform, it is not necessary to swing the chain out of the perpendicular, and the danger is eliminated.

We have a separate Safety Committee,* or rather committees, whose duty it is to make all the suggestions they can, so as to avoid the possibility of accidents of any nature. If an employee not on the safety committees turns in a suggestion covering the matter of prevention of accidents he is given an award. There is a factory fire department, well equipped and interested. The members make suggestions regarding equipment, placement of ladders and fire escapes, etc., but even with the manifest interest the members have shown, occasionally some other employee will turn in a suggestion that pertains directly to the prevention of fire or the method of fighting a fire that makes the fire department kick itself, individually and collectively.

If I were to summarize the good points of a properly planned suggestion system, it would be necessary to state that it not only develops new ideas among the workers, but brings out the old ideas. Have you never had a man in the shop say to you: "I often wondered why you did not make that improvement before"? If that man had known that it was worth money to him to have called some one's attention to the improvement, he would not have waited until the improvement went into effect before expressing his opinion.

New Thrust Bearing of the Ball Type

A line of ball thrust bearings distinguished by the use of a solid brass ball retaining ring has been placed on the market by the Rochester Ball Bearing Company, Inc., Rochester, N. Y. This arrangement has been adopted in place of sheet metal retainers which sometimes wear rapidly and permit particles of steel to fall into the races. This subjects the balls, as they run over these particles, to shock and extra wear which will eventually ruin the bearing.

Ordinarily these bearings are made with either round grooves for general use or a V-groove for high-speed, light-duty conditions, but special bearings can also be



In This Recently Developed Ball Thrust Bearing a Solid Brass Ring Is Employed as a Ball Retainer

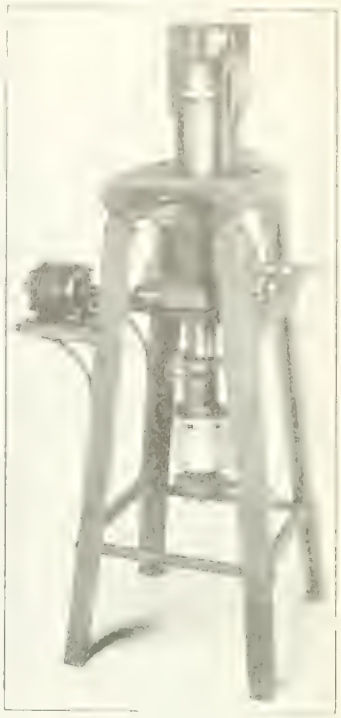
made to order. Self-aligning spherical seat washers are provided on the thrust bearings intended for heavy work. In the larger sizes of bearings the retainers are scalloped as shown, but are not in the smaller ones.

The Clarage Fan Company, Kalamazoo, Mich., now has a branch office in Chicago to care for local inquiries for fan equipment. The office is in charge of L. O. Monroe, and is located at 123 West Madison Street.

*The method of organizing these committees and the way in which they perform their duties was the subject of an illustrated article in THE IRON AGE, July 8, 1915. A description of the factory fire department also mentioned and the work it is doing to reduce the fire hazard in the plant appeared in THE IRON AGE, Sept. 30, 1915.

An Internal Cylinder Grinding Machine

The Reno-Kaetker Electric Company, Cincinnati, Ohio, has recently perfected an internal grinding machine primarily intended for grinding automobile cylinders. Its use in general machine shop-work is said to be very satisfactory, especially where accuracy is an important proposition. The machine only weighs 400 lb., and as a consequence it is easily transported, and its cost is within the reach of the smaller jobbing machine shops.



An Internal Type of Grinding Machine for Automobile Cylinders and also for General Machine Shop Work in Which the Work Holding Table Can Be Tilted to Any Angle for Convenience in Grinding

As will be noted, the machine consists of a vertical bar with a circular rack which is fed around and down at the same time by the horizontal motor operating through gearing. Inside the main bar is a sleeve which contains the grinding spindle. This sleeve is eccentric to the main bar, which permits grinding cylinders of different sizes. Flexibly coupled to the grinding spindle is a vertical motor which revolves the grinding wheel at a high speed. A hand-wheel is provided for increasing or decreasing the throw of the grinding wheel for various sized cylinders and for regulating the depth of cut to be made. The whole operation of setting up and grinding takes very little time, and after a little experience with the machine a good mechanic, it is emphasized, can produce rapid and accurate work.

The capacity of the machine is for cylinders from 3¼ to 5½ in. in diameter with a cut 10¼ in. long. The machine is 45 in. from the floor line to top of bed plate and takes a floor space of only 2 sq. ft. The bed of the machine is 12 in. wide by 20 in. long. The face plate is 12 in. wide by 15 in. long with an elongated hole.

The main bar is raised by hand and a shifting rod is provided for automatically feeding this bar up or down. The hand adjustment for revolving the main bar and for tilting the face plate is also a feature of the machine so that the cylinders can be placed at the proper angle for grinding.

The Electrical Alloy Company, Morristown, N. J., recently purchased a tract of land for the purpose of considerably increasing its manufacturing facilities. The first new building, 101 x 160 ft., is under way and will be ready for occupancy by Dec. 1. The company is doubling its annealing capacity and adding extensively to its machinery to take care of its increasing business. Its products are round, flat and shape wire and strips in special alloys and pure metals, its specialty being resistance wire extensively used for motor-starting boxes, field rheostats, electrical instruments, heating devices, etc. The new plant is located along the Erie Railroad, with a siding entering the factory.

The Carbo Corporation, manufacturer of steel poles and fence posts, has moved its main office from Chicago to the factory at Chicago Heights, Ill., in order to be able to fill orders more promptly.

Structure and Properties of Steel Ingots*

Advantages of Casting Wide End Up—Use of the Hot Top—Segregation and Ghost Lines—Effect of High Casting Temperature

BY A. W. AND H. BREARLEY

NOTHING can be done to prevent the shrinking of fluid steel as it passes from the liquid to the solid state; and the only means of providing against the inconvenience of it is to arrange for fluid metal to be kept at a higher level ready and able to flow into what otherwise would be a shrinkage cavity. This means that an ingot must always solidify from the bottom upward, which it does naturally when cast into a taper mold with the wide end up; or in general terms, the metal in any plane must solidify earlier

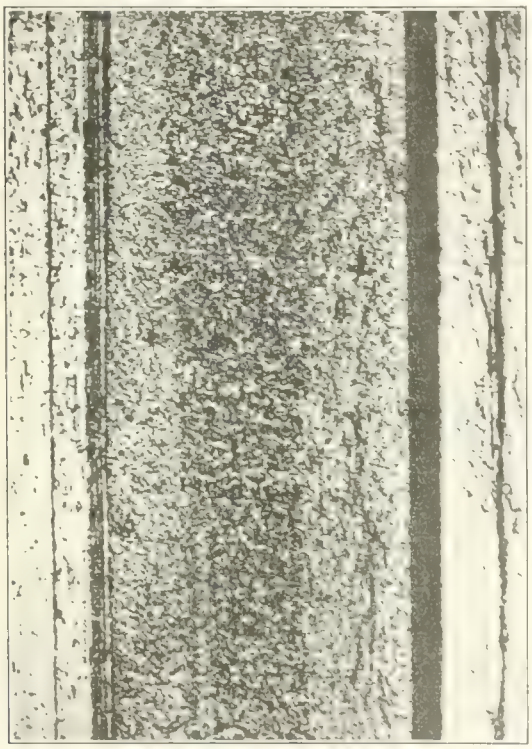


Fig. 9.—A Bar Split Longitudinally, Disclosing the Soft Center

than the metal in any higher plane if shrinking cavities are to be avoided.

ADVANTAGES OF WIDE END UP

A fluid ingot cast with the wide end up shortens less rapidly than one cast with the narrow end up, and it is therefore more likely that the upper crust of frozen metal will resist the pressure of the atmosphere when the fluid underneath ceases to support it. This to some not very great extent will help to keep the upper and interior part of the steel fluid; it is more valuable, however, because it may prevent oxidation of the interior of the pipe and thus facilitate its welding when it comes later to be rolled or forged. It may also be observed that the pipe in one case takes the form of a long pointed cavity and in the other a short cavity with rounded end. Apart from the relative volumes of material thus made unsound, and likely to be scrapped, the former, occurring in ingots cast with the narrow end up, is more likely to cause ingots to clink in the reheating furnaces.

These are all points of minor importance in themselves, but experience shows that they lead sometimes to grave consequences, and it is therefore worth while to note that in these minor respects the soundness and reliability of the ingot are improved by casting with the wide end up.

The disadvantage of a shrinkage cavity whose surface has been oxidized by exposure to the atmosphere is recognized no matter in what kind of steel it occurs; but it is widely believed that other kinds of shrinkage cavities will weld up without the steel being any the worse. Such a view is not quite in harmony with actual experience, and it may be said that the question is not and cannot be quite settled, as has been inferred, by boring holes into ingots or cogged bars, and then, after sealing hermetically, observing their behavior on forging.

The central and unoxidized shrinkage cavities lying in straight-sided ingots below the feeder head were at one time during the progress of setting filled with liquid steel which fed the crystallites of purer metal growing from the walls of the cavity. But while the fluid metal sank downward the crystallites remained, and when the ingot becomes a billet or bar that part of it formed by the free-standing crystallites is purer, *i. e.*, contains less carbon and other segregating elements than the surrounding material.

This means, of course, that some part of the bar or bars will have a soft center and cause disappointment if made into chisels or drills, or if made into accurately drilled objects, such as rifle barrels. This kind of defect is most clearly visible to the naked eye in the fracture of steels containing between 0.90 and 1.1 per cent of carbon, but it can also be detected in lower and higher carbon steels by polishing and etching. The position of a soft center in a steel bar is the same as that of a hard center, and the one may occur not far behind the other. Fig. 9 is a photograph of a bar which has been split longitudinally in order to disclose the soft center.

The harder the steel the more important it becomes that the ingot should be free from these axial cavities, and that not only because the danger of clinking is greater and the chances of welding up the cavities are less, but because the harder material at forging or rolling temperatures is less ductile, and under distortion the cavities may actually extend.

CASTING HIGH-SPEED STEEL INGOTS

This observation is notably verified by the behavior of high-speed steel, and on that account ingots of high-speed steel ought always to be cast in taper molds with

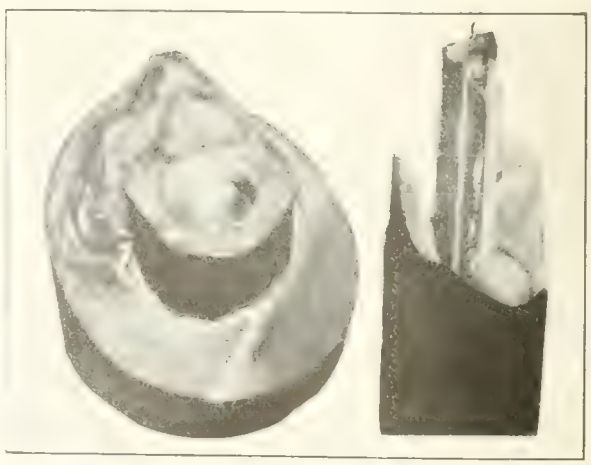


Fig. 10.—Defects in Hard Steel Bars, Unweldable and Originating from Cavities Existing Near the Axis of the Ingot

*Concluding portion of abstract of a paper presented at the autumn meeting of the Iron and Steel Institute in London, England, Sept. 22, 1916. The preceding portion appeared in THE IRON AGE, Oct. 26, 1916.

the wide end up and fed by means of a white hot sleeve or dozzle. The neglect of this precaution is one of the contributory causes to which the well-known splitting along their length of high-speed steel tools may be ascribed. Fig. 10 shows examples of defects in self-hard steel bars, unweldable at any temperature, which originate from cavities existing near the axis of the ingot.

The inverted taper mold is not generally used for ingots whose wider end is less than 4 in. across; the reason being that, with the usual taper, the narrower end becomes too small to be struck directly by the molten stream without fear of its having previously impinged on the side of the mold. When a stream of molten steel strikes the side of the mold the ingots are said to be "catched." A catched ingot is regarded as objectionable because it scars the surface of the ingot and may lead either to a lamination, akin to a lap, or a roak on the surface of the bar. On the surface of very hard steel, notably on self-hard steel ingots, a "catch" may lead to deep transverse cracks in the forged bar.

In many cases part of the fluid steel which strikes the side of the ingot mold adheres to it, and is not only solidified but comparatively cold before the steel rising in the mold reaches up to and covers it. The cold strip of steel then adheres and becomes part of the ingot, and may be regarded as an inlaid strip of metal whose inner surface is more or less in contact with the ingot. The strip, however, never melts, and its temperature does not become equal to that part of the ingot in which it lies.

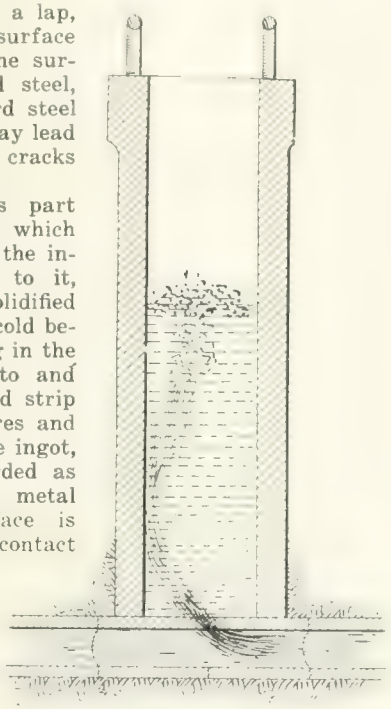


Fig. 11—Effect of Sloped Opening in a Runner Brick

It may also be observed that the material immediately beneath a catch is spongy. The sponginess is caused by oxidation of the surfaces of the strip of steel before the metal rising in the ingot mold covers it. The oxide film reacts with the carbon of the fluid metal, as soon as the two come into contact, and small quantities of carbon monoxide or dioxide gases are liberated just as though that part of the ingot mold were rusted.

SOUND INGOTS

One speaks of sound ingots in a comparative sense. Absolute soundness is never attained, but the imperfections which give rise to no blemish or defect in the intermediate or final stages of manufacture are disregarded; and if they are also equally unobjectionable in the use of the article they are commercially negligible. It may happen, however, that apparent trifles arising in the course of manufacture grow into serious defects or causes of defects in service, and to trace their origin and fix the responsibility becomes a lengthy and delicate matter.

Thousands of tons of ingots known definitely to be unsound in the absolute sense are rolled into girders, plates, rails, and other forms, and appear to yield no worse service on that account. Some others break and involve loss of life and other misfortunes as a set-off to the lower costs of manufacture arising from the use of material which is thought to be good enough, but not so good as it could possibly be made. In respect to piping and shrinkage cavities this is accomplished by cropping the top end of an ingot, or by avoiding oxidation of the surfaces of the cavities in order to increase their chances of welding up. To a certain extent this latter aim is [illegible] by [illegible] casting, but direct attempts to secure its success have been made in other ways, *e. g.*, inverting the partly solidified ingot.

Individual steelmakers are to be found who contend that bottom-cast ingots can be made perfectly sound in the usual mold by using a long trumpet and feeding it with hot metal. This, on the face of it, is highly improbable, however long the trumpet is made, as the steel in some parts of the runner brick will certainly freeze across, and thus hermetically seal up the ingot before the interior parts of the ingot have solidified. As to volume of shrinkage cavity, there is not a great deal to choose between a bottom-cast and top-cast ingot which have been poured at the same rate; the advantage enjoyed by the former is that its cavities are likely to be sealed from atmospheric oxidation.

If the feeding of a bottom-cast ingot through the trumpet be left out of account and we imagine the mold to have been instantly filled with fluid metal, then it does not matter whether the filling took place from the top or the bottom. The position and size of the shrinkage cavity would be the same in either case, except that with a closed top mold a thicker upper crust would form and there would be small chances of bridges forming beneath it. The first advantage then of bottom-cast ingots is that shrinkage cavities are more likely to be clean and weld up.

The metal rises in the mold more slowly on bottom-casting both on account of the mass of grouped ingots and also because each mold is filled against the pressure of the column of metal in it. The steel freezes through contact with the mold while it is being cast, and at the end of the casting period the solid shell would be thicker, if bled, than the shell of a top-cast ingot of the same size; this is all to the good so far as volume of shrinkage is concerned. Moreover, the ingot is fed under pressure by metal from the trumpet so long as the runner bricks remain open, and this again lessens the volume of shrinkage cavity.

The clean skin expected on ingots cast from the bottom is not always realized. When cast too slowly the ingots are folded on the surface, and when steel is run down the trumpet too quickly to begin with it rises like a fountain through the bottom and splashes the sides of the molds. When cast at average speed the molten metal runs rather sluggishly to begin with along the cold runner bricks, and when first sighted, at the bottom of the mold, appears as a nodule of pasty metal. By pressure from the increasing head of fluid in the trumpet pipe the nodule is forced out of the hole and the metal enters more or less quietly.

Runner bricks are made and laid in the casting plate by human agencies; and sometimes the opening is sloped and sometimes it is chipped or has a fash on one side. Either incident will cause the metal delivered under pressure to be diverted from the vertical, and that part of the mold in direct line with the sloped opening in the runner bricks will be washed by the incoming steel, and may have a cavity melted out of it. This is represented diagrammatically in Fig. 11. The mold is attacked in this manner at varying heights, sometimes as much as 16 in. from its base.

Deflection of hot metal to one side of the mold favors the formation of cracked ingots. This remark ought to be decorated like a recurring decimal when applied to the casting of hard steel ingots. If the

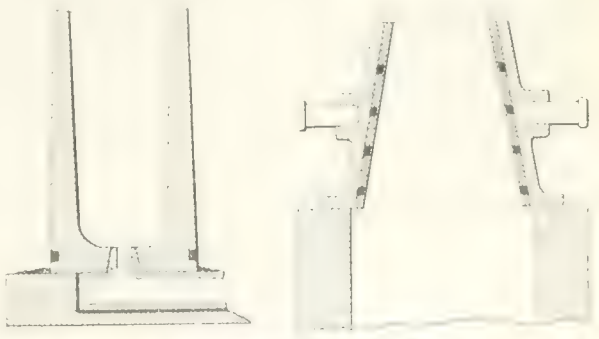


Fig. 12—Detail of Mold [illegible] and for the Superimpose[illegible]

runner brick does not open in the axis of the mold the incoming streams cannot possibly form an ingot whose temperature is uniform, and the chances of the surface of the mold being cut are increased.

THE MOST ADVANTAGEOUS METHOD

The most advantageous arrangement, within the authors' experience, for casting groups of ingots is a solid-bottom mold having a central hole provided with a small taper fireclay sleeve as shown in Fig. 12. This arrangement insures the formation and feeding of the

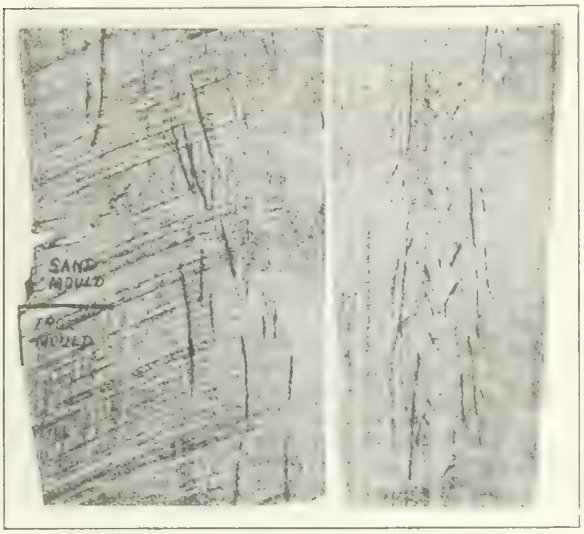


Fig. 13—Sulphur Print (Right) of An Ingot Illustrating Segregates and Ghosts Result (Left) of casting partly in steel and partly in a sand mold

ingot by a stream of fluid steel entering on and passing up the axis of the mold. The fireclay sleeve is also long enough to give direction to the incoming fluid, and both damaged ingot molds and longitudinal cracks in ingots are practically eliminated. When cast in this manner the mold must necessarily stand with the wide end uppermost.

If we assume a mold to be full of fluid steel at a uniform temperature, then the solid ingot could be sound only if it had been cast with its wide end uppermost. But in all top-cast ingots the fluid occupying the lower part of the mold is colder at the moment casting is finished than is the metal occupying the upper part of the mold, and this to a certain extent depending on the dimensions of the ingot and the speed of casting, is favorable to sound ingots independent of the direction of taper of the mold.

For these and similar reasons it is not permissible to apply rigidly the results of observations made on small ingots with ample taper to much larger ingots cast with so small a taper that they can be stripped only with a machine. Much variation of opinion and a great deal of the recent controversy about sound ingots arise from neglect of this important difference. The difference, however, is one of detail, not one of principle, and the inverted mold should be adopted as the safest means of securing freezing of the ingot from the bottom upwards, whatever may be the size of the ingot.

USE OF THE HOT TOP

As a means of feeding the unavoidable shrinkage cavities in the upper part of an ingot, the simplest and most effective device is the white-hot fireclay head or dozzle used by the crucible steel maker. No feeder-head and no system of producing really sound ingots involve so small a percentage of waste. But the device has not been applied to very large ingots, nor to groups of ingots cast through the bottom from a common runner. A refractory head in the form of a brick lining in the upper part of the mold or, more economically in some cases, as a superimposed piece as indicated in Fig. 12, can be operated with a discard of 10 to 15 per cent of unsound and segregated material.

Apart from shrinkage cavities the inverted mold is advantageous in another important respect. When steel is cast on the cold side, as certain kinds should be to facilitate cogging in the forge or mill without cracking, there forms on the upper surface of the fluid steel a crust of crystals which may be broken and thrown back on the sides of the mold, or pieces thereof may be washed into the ingot and form blowholes and other centers of weakness. In the ordinary form of mold this frozen surface is being pushed, as the steel rises, into a constantly decreasing area, and it must ultimately break up or allow the steel to flow over it. In the inverted mold, on the other hand, the frozen crust is rising always into a larger area, which keeps its edges free and permits it to grow without becoming thicker and stronger; consequently there is less danger of the crust being broken, and it is possible to produce groups of ingots at a lower casting temperature.

SEGREGATION AND GHOST LINES

The principles of ingot-making already briefly described are applied in the following pages to a few of the problems arising in ordinary works practice. One of the most difficult of these is segregation and the occurrence of ghost lines in large ingots.

If an ingot can be made to consist entirely of long narrow crystals, the segregates are crowded into the center and toward the top of the ingot. But a large ingot could not be made to consist entirely of such crystals, and somewhere between the outside and center of a cross-section there is a more or less clearly defined boundary between crystals growing inward from the outer shell of solid steel, owing to heat conduction, and crystals deposited from the mother liquor whose temperature has fallen to freezing point. This boundary line can often be seen on a well-made sulphur print of common steel.

Talbot has shown, and Neu also at an earlier date, that when the sides of a partially solidified ingot are squeezed together to form a rough bloom, the cross-section of such a bloom shows purer material in the center and outside than on a median area.

By reasoning along similar lines we observe that in very large ingots (such, for example, as are used

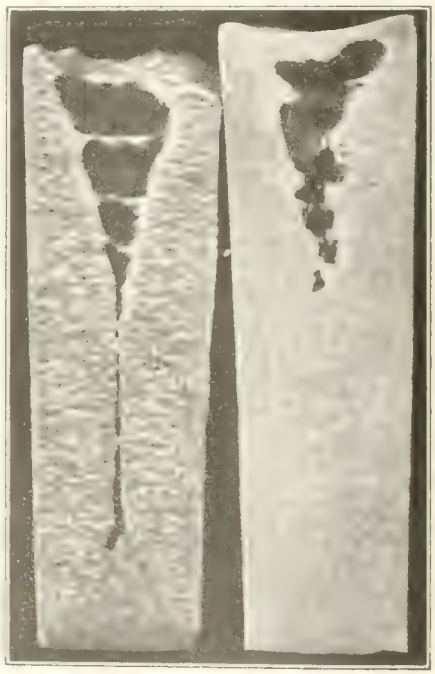


Fig. 14—Relative Shrinkage and Contraction in Hot and Cold Cast Ingots

in making gun tubes) the wall of compact crystals starting from the interior of the mold drives before it, as it thickens, a fluid envelope of impure metal which diffuses readily with the hotter metal nearer the center

as long as both remain quite liquid. When this interior liquid reaches the upper limit of its freezing temperature the more flocculent kind of crystal begins to adhere to the compact walls, and thus restrains somewhat the free movement of the liquid segregate which at that moment occupies the same position.

Unless we are prepared to assume a somewhat violent movement of the interior liquid it must happen that the segregated fluid becomes imprisoned and solidified where the two kinds of crystals meet, and as a matter of fact it is from that position inward that ghosts are found.

By the kindness of Sir William Beardmore we are able to exhibit the sulphur print of a portion of an ingot clearly illustrating segregates or ghosts of the kind referred to (Fig. 13). The explanation given may be confirmed both deductively and by actual observation, but before applying these methods it should be said that the maker of gun tubes first trepans a core from the center of the ingot or from the center of a large billet made from the ingot. He does not care very much whether the discarded core contains ghosts or not, but it is very important commercially to have no ghosts, or as few as possible, on that part of the ingot which will lie ultimately near the bore of the gun.

In a large ingot cast in a loam mold the ghosts were found to be distributed almost to its edge, and it was not possible from any part of the tube to secure test-pieces which would pass inspection. This condition arose obviously from the fact that circumstances were unfavorable to the formation of chill crystals.

As the result of extensive experiment it has been affirmed that much better results are obtained, *i.e.*, there is less trouble with transverse test-pieces cut from a gun forging, when the casting temperature is high. This arises from the fact that a high casting temperature is favorable to the growth of chill crystals; but it may arise also because non-metallic impurities, not strictly due to segregation, have a better chance of escaping to the center and top of the ingot when the casting temperature is high.

Mr. Ashdown has permitted us to refer to a direct experiment made on this subject. He prepared a longitudinal section through a large ingot which was cast partly in an iron mold and partly in a loam mold. The result is shown very clearly in Fig. 13. Mr. Ashdown has allowed us to examine also the results of his many large scale experiments along similar lines, and we were gratified to find them in agreement with our own observations and deduced conclusions.

Other makers of large ingots have been known to affirm that cracks on the corners of such ingots (generally due to high casting temperature) may be taken as a sure sign that the ingot is a good one, *i.e.*, good in respect to freedom from ghosts outside the trepanned core. The effects of high casting temperature in the direction indicated may be admitted, but the remedy is a desperate one, and it may well be asked whether it were not better "to bear the ills we have than fly to those we know not of." If we bear in mind the difficulty of controlling casting temperatures these remarks will suggest, without further comment, why gun ingots made under apparently identical conditions are diversely satisfactory.

EFFECT OF HIGH CASTING TEMPERATURE

The net effect of a high cast temperature is harmful, and it is doubtful whether an exception should be made of gun ingots. It increases the amount of total shrinkage; it increases the number of contraction cavities and intercrystalline cracks (Fig. 14); it adds to the weakness of the ingot along planes which lie between the corners and center of the ingot, and it heightens the danger of clinking in the reheating furnace.

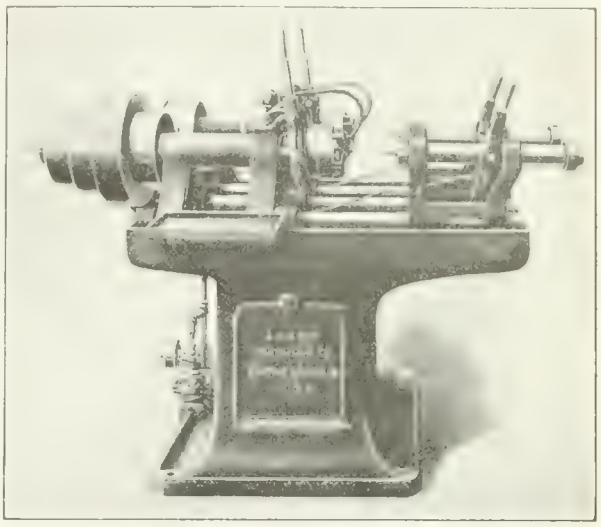
Owing to the higher coefficient of shrinkage of stearine as compared with steel, and its smaller resistance to tensile stresses, it is possible to exaggerate the defects likely to occur in steel ingots. In Fig. 14, for example, a stearine ingot cast in an inverted mold from an unfavorably high temperature is seen to be defective almost to its base. Nothing so visually discomforting as this is likely to occur in a steel ingot, but it is surely an advantage rather than otherwise to have tendencies in the steel we make widened into visible defects in the material used for experimental purposes.

Stearine can be used also to illustrate the general principles of segregation, and to demonstrate some of the causes of spongy and blown ingots. Its value for teaching purposes can hardly be over-estimated.

Hollow Set Screw Threading Machine

The ½-in. double-head bolt cutting machine of the Landis Machine Company, Waynesboro, Pa., is now equipped with special carriages and holding devices for threading hollow safety set screws. While this is the work for which the fixtures were primarily developed, they can also be employed with other stock which can be held in a similar way and has a continuous thread.

The carriages proper are stationary and support two spindles that are free to move in a horizontal plane. Weights attached by chains to the spindle operating levers are relied upon to bring the spindles to the threading die, which is of the builder's standard type, and also to exert a continuous force in that direction, thus making it unnecessary for the operator to advance the stock for the threading operation. The spindle heads are bored and fitted with mandrels to hold the set screws. A collar, which is adjustable for cutting



A Standard Double-Head Threading Machine Equipped with Special Carriages to Produce Hollow Safety Set Screws

any desired length of thread, is located on the rear of each spindle.

In operation the set screw to be threaded is placed upon the mandrel and is automatically forced into the die head by the spindle. When the threading operation is completed, the screw remains in a tube extending through the spindle from the face of the threading die head to the rear of the machine. As subsequent pieces are threaded they pass into the tube and force the previously finished pieces along. When the screw threaded first reaches the end of the tube it is ejected by this action and dropped into a receptacle placed at the rear of the machine.

If desired the machines can also be used for threading standard bolts. When this work is being done, automatic opening and closing attachments are employed for the die heads and the spindle heads are fitted with bolt sockets for the different diameters within the range of the machine.

Large Foreign Demand for Ferrovanadium

Ferrovanadium exports from the United States have reached a total of 1,062,932 lb. for the first eight months of this year and are constantly expanding, as the following table, compiled from Government data, shows:

Period	Total, Pounds	Per Month, Pounds
To Sept. 1, 1916 (eight months)..	1,062,932	132,866
Fiscal year ended June 30, 1916..	1,113,076	92,756
Fiscal year ended June 30, 1915..	755,905	62,992
Fiscal year ended June 30, 1914..	626,641	52,220
Calendar year, 1915	[illegible]	[illegible]
Calendar year, 1914	[illegible]	[illegible]
Calendar year, 1913.....	604,287	50,357

While the exports reached over 1,000,000 lb. for the 12 months ended June 30, 1916, they will amount to 1,594,396 lb. for 1916 if maintained at the present rate.

BIDS FOR NEW WARSHIPS

Navy Department Receives Bids for 4 Battleships and 20 Torpedo Boat Destroyers

WASHINGTON, D. C., Oct. 30, 1916.—Notwithstanding the abnormal conditions in the shipbuilding and iron and steel industries, bids within the limits set by Congress in the naval appropriation act were submitted to the Secretary of the Navy Oct. 25 for four battleships, Colorado, Maryland, Washington and West Virginia, and for 20 torpedo boat destroyers, Nos. 75 to 94. The presentation of bids was marked by some novel proposals on the part of two of the shipbuilders, the William Cramp & Sons Ship & Engine Building Company declining to submit a figure, but offering to build a battleship at cost plus a commission of 10 per cent, while the Fore River Shipbuilding Corporation submitted alternate proposals, one conditioned upon the assumption by the Government of any increase in cost due to advances in the price of materials or labor, while in the other the bidder proposed to carry that risk.

The numerous conditions with which the proposals were hedged about, including a unanimous demand from all bidders for a modified form of contract, the changes to be suggested hereafter, and the fact that the proposals submitted will barely take care of the construction offered by the Government, suggests that difficulties may be encountered in placing contracts for the remaining vessels of the big naval program, bids for some of which will be opened Nov. 1 and the remainder in December.

BATTLESHIP BIDS FROM FOUR BUILDERS

Four builders competed for the construction of the four battleships—the New York Shipbuilding Company, Camden, N. J.; Fore River Shipbuilding Corporation, Quincy, Mass.; William Cramp & Sons Ship & Engine Building Company, Philadelphia; and Newport News Shipbuilding & Dry Dock Company, Newport News, Va. The bids ranged from $10,060,000 to $11,475,000, as against the Government's limit for hull and machinery of $11,500,000. In view of the numerous stipulations made by the bidders, it is not practicable to present a reliable forecast of the action of the Secretary of the Navy. Surface indications, however, point to the awarding of one vessel each to the New York Shipbuilding Company, Fore River Shipbuilding Corporation, and Newport News Shipbuilding & Dry Dock Company. The assignment of the fourth vessel is altogether uncertain. The Navy Department cannot entertain the Cramp Company's offer to build one ship on a commission basis, but under the terms of the naval appropriation act it may do so should the proposition be repeated in connection with bids for the four battle cruisers to be opened in December.

Naval experts express disappointment that none of the bidders offered figures for the steam-electric drive system of propulsion preferred by the Department, all offers in this connection providing only for the construction of the ship, the Government to supply the drive machinery and to assume all responsibility for its performance. These offers were approximately $500,000 lower than the figures for all steam drive. In view of the fact that the Department has funds available to complete vessels under the bids submitted, the impression is strong that the electrically driven ships will be ordered.

While regret is expressed by Department officials that none of the bidders was willing to comply with the condition that deliveries be made in 36 months, this was fully anticipated, and the increased time allowance of three or four months is therefore accepted as unavoidable.

THE FORE RIVER'S LETTER WITH ITS BIDS

Present conditions in the shipbuilding industry were impressively described in a letter of the Fore River Shipbuilding Corporation in reference to its minimum bids conditioned upon the assumption by the Government of any increase in the present prices of material labor. This was in part as follows:

[illegible] to proposals A, both these propositions are made [illegible] following terms:

[illegible] based on current prices for labor and material at the yards of the Fore River Shipbuilding Corporation. [illegible] will, upon request, submit them in detail to the Navy Department and to the Federal Trade Commission. [illegible] that costs of labor and material remain unchanged during the execution of this contract, the exact price for which we are prepared to build any of these ships is [illegible]. If the costs are exceeded it is proposed that the contract price for the vessels be increased to a corresponding extent. If these costs decrease it is proposed that the Government shall have the benefit of the reduction and that the contract price for the vessels be reduced to a corresponding extent.

The Federal Trade Commission is recognized as the department of the Government organized to deal with all questions relating to commercial operations and costs, and it is proposed that the commission shall adjudicate the increases or decreases as above indicated. It is proposed that at the expiration of a year from the date of this contract, and regularly one year thereafter, the commission shall determine the increased or decreased costs of material and labor entering into the construction of the vessels as compared with the original estimates and that the payments for the year under review shall be then adjusted in accordance with the commission's finding. Under this proposal the Government, should it so elect, will be informed in advance of the signing of the contract precisely how the company arrives at its costs and as to the amount of the profit the company expects to earn.

The conditions existing to-day in the shipbuilding industry are unique. In the entire industrial history of the country it has never before been so difficult to forecast the probable cost of labor and material over a period of years. It has been this country's custom to obtain proposals for the maximum amount of materials entering into a vessel, these being held at its option, and available in case it is awarded the contract. Because of the present unprecedented activity in all lines of business, it has not been feasible to cover by option or provisional contract more than 50 per cent of the total material required. The balance must be purchased at different times during the succeeding three or four years. Should prices for material increase during this period as they have in the last 12 months, the cost of the material required for these vessels would be more than double what it is to-day. We do not contemplate such an increase, but the contingency cannot be disregarded.

The second of the two primary elements entering into cost to-day is of an even more unstable character. As we are prepared to show the Department, the total cost of labor that would enter into the building of these battleships has been estimated on the basis of present wages. In ordinary periods of the past, improved methods of construction and additional facilities have offset normal increases in wages, but within the last 12 months wages have risen at such a rate as to show costs in connection with vessels now completing above [illegible] figures which could have been expected at the date the contracts were made.

The contemplated profit included in these estimates represents but a fractional part of the margin obtainable to-day in all contracts for the building of merchant ships. Every [illegible] private yard is working at full capacity, and many new companies which are [illegible] in existence have closed orders at unprecedented prices for all the ships that they hope to build over a period of several years.

Notwithstanding the opportunity for the construction of merchant vessels, the Fore River Shipbuilding Corporation, fully recognizing the [illegible] confronting the United States, has [illegible] models [illegible] and has reserved a [illegible] capacity for such work as the Navy Department may [illegible] to allot [illegible].

The proposals for the battleships were as follows:

BIDS FOR BATTLESHIPS

[illegible] Hull, [illegible] and equipment, [illegible] plans and specifications.

[illegible] hull and equipment [illegible] in accordance with Department [illegible], machinery per [illegible].

New York [illegible]

[illegible] geared type of machinery:

[illegible] $11,3[illegible]

[illegible] 11,3[illegible]

[illegible] one vessel is fitted as flagship add $37,500; if electric propelling apparatus be furnished by Department, deduct $[illegible]

[illegible] Fore River [illegible]

Proposal A. [illegible] electrical propelling [illegible] contracted to [illegible] but not guarantee performance.

Class 1:
1 vessel, 42 months, with pine decking $10,360,000
2 vessels, 42 and 48 months, with pine decking, each 10,060,000
Class 2—Curtis type steam turbine machinery.
1 vessel, 42 months, with pine decking 11,016,000
2 vessels, 42 and 48 months, each 10,716,000
If one vessel is fitted as flagship add $50,000, both bid conditional and modified form of contract required. Government to assume risk of increased cost.
Proposal B—Contractor to assume risk of increased cost.
Class 1—Government to furnish electrical propelling machinery, contractor to install it but not to guarantee performance.
2 vessels, 42 and 48 months, pine decking, each $10,875,000
Class 2—Curtis type steam turbine machinery.
2 vessels, 42 and 48 months, pine decking, each 11,175,000
If one vessel is fitted as flagship add $50,000, modified form of contract required.

William Cramp & Sons Ship & Engine Building Company

No formal bid owing to abnormal conditions of labor and material market, but will build one battleship on cost and commission basis, Government paying all expense in connection with such construction, including overhead charges, and allowing company additional 10 per cent commission.

Newport News Shipbuilding & Dry Dock Company

Proposal A. Electric propelling machinery furnished by Department and installed by contractor, Department to run all trials after dock trial.
Class 2:
1 vessel, 39 months $10,170,000
2 vessels, 39 and 45 months, each 10,375,000
For pine decking deduct $35,000; if one vessel is fitted as flagship add $50,000; certain changes and conditions required.
Proposal B.—Machinery of Parsons or Curtis turbine type of bidder's design furnished and installed by contractor, other conditions as proposal A.
Class 2:
1 vessel, 39 months $10,990,000
2 vessels, 39 and 45 months, each 10,890,000
For pine decking deduct $35,000, if vessel is fitted as flagship add $50,000, certain changes and conditions required, including modified form of contract, a per cent basis for overtime work submitted with a view to expediting construction.

DESTROYER BIDS FROM FIVE BUILDERS

Competition for the 20 torpedo boat destroyers was limited to five builders—the Bath Iron Works, Bath, Me.; Union Iron Works, San Francisco, Cal.; Fore River Shipbuilding Corporation, Quincy, Mass.; William Cramp & Sons Ship & Engine Building Company, Philadelphia, and Seattle Construction & Dry Dock Company, Seattle, Wash. The bid of the last named was disqualified, being in excess of the appropriation. The bids submitted by the four yards within the limit covered 22 vessels, and awards will therefore be made to all of them.

Class 1.—Department's design.

Class 2.—Hull and equipment Department's design; machinery bidder's design.

Bath Iron Works

Class 2.
2 vessels, 35 knots, 22 and 23 months, each $1,185,000
3 vessels, 35 knots, 22, 23 and 24 months, each 1,160,000
4 vessels, 35 knots, 22, 23, 24 and 25 months, each 1,150,000
Guarantees of fuel oil consumption at maximum speed instead of horsepower, modified form of contract required.

Fore River Shipbuilding Corporation

Class 1, 27,000 shaft hp.:
4 vessels, 1 in 24 and others in 27 months, each $1,175,000
6 vessels, 1 in 24 and others in 28½ months, each 1,165,000
8 vessels 1 in 24 and others in 30 months, each 1,160,000
Modified form of contract required.

Union Iron Works

Class 1, to be built at San Francisco or Alameda, Cal., 27,000 shaft hp.:
2 vessels, 22 and 23 months, each $1,195,000
4 vessels, 22, 23, 24 and 25 months, each 1,190,000
6 vessels, 22 to 25 months, each 1,190,000
8 vessels 22 to 26 months, each 1,185,000
These vessels to be duplicates of those covered by Fore River Shipbuilding Corporation proposals, with conditions and data submitted by that company attaching to these bids, modified form of contract required.

William Cramp & Sons Ship & Engine Building Company

Class 1, 27,000 shaft hp.
2 vessels, 27 and 28 months, each $1,195,000
4 vessels, 27, 28, 29 and 30 months, each 1,190,000

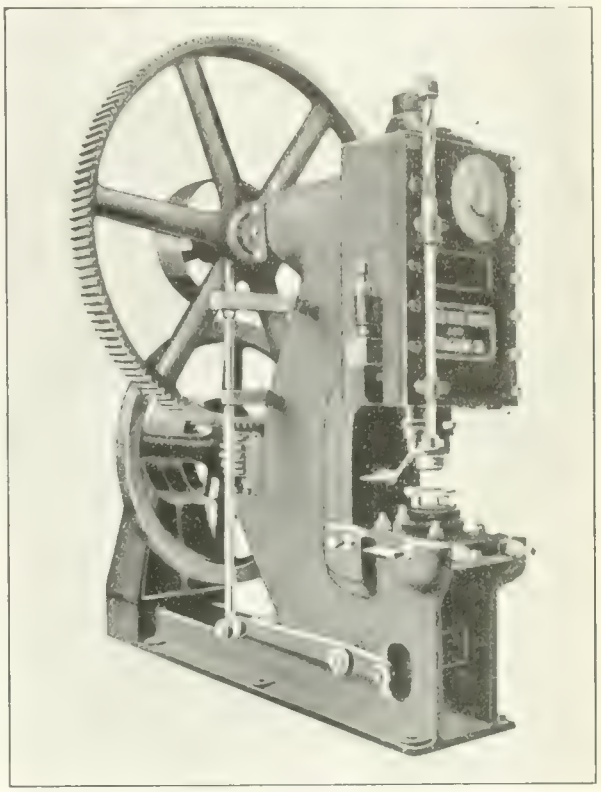
Class 2.
1 vessel, 22 months 1,385,000
2 vessels, 22 and 22 months, each 1,370,000
Modified form of contract required.

On Nov. 1 the Department will open bids for four 35-knot scout cruisers and 20 submarines.

W. L. C.

Press for Stamping Washers from Sheets

For making washers and other stamped specialties from either scrap or new sheet and plate material, the Southwark Foundry & Machine Company, Philadelphia, Pa., has developed a line of presses. With this machine it is possible to utilize waste material, which would bring only a small amount



This Press for Making Washers from Scrap Plate Up to 2-in. Bolt Sizes is Equipped with an Arrangement for Throwing the Washers to One Side as Fast as They Are Made

when sold as scrap, by converting it into washers of either standard or special types. A complete washer is made at each stroke of the ram and the punched washer is thrown out automatically by a special arrangement. As the ram operates continuously, only one man is needed to attend to the machine as he can use both hands to hold the material. In addition to punching out washers the machine can also be used for different classes of stamping, punching, shearing, etc. Various forms of specialty stampings may be turned out, and if desired the press can be equipped with roller feed for automatically handling washer stock in bands or bars.

A single solid casting of the open-gap type is used for the frame and supports the gearing, which is of the single-reduction type except in the case of a motor-driven machine, the plunger, camshafts, dies, etc. The plunger has broad wearing surfaces and is equipped with a bronze taper gib to take up wear. The die for cutting the outside of the washer and the piercer for punching the center hole simultaneously are fastened at the bottom of the plunger. The punch is on the bottom, and is held in a sub-

stantial punch holder block on the lower jaw of the frame. A stripper ring, which is operated from a cam on the back of the main shaft through connecting rods and a lever, surrounds the punch. A series of knockout pins for forcing down the washer, which sticks in the upper part of the die mechanism and ascends with the plunger on its upward stroke, are located in an annular space between the piercer and the die. A bar passing through the ram and stopping against a pair of set screws located in lugs cast on the frame operates the pins.

A vertical shaft having a steep pitch thread at its upper end is located in front and to the left of the ram. The threaded portion passes through a nut at the top of the plunger, which, as it ascends and descends, imparts a rotary motion to the shaft. As the ram ascends, a hand or cup on the lower end of the shaft swings in under the plunger to receive the washer, which has been pulled loose by the action of the knockout pins between the piercer and the die. As the ram descends to make the next washer the cup swings out of the way and throws the washer into a pile or some receptacle that has been provided.

The machine is equipped with a pulley or belt drive or a bracket and the gearing for electric motor drive as may be specified. The back of the main shaft is ordinarily equipped with a tight pulley, which is driven from a belt connection on the lower or flywheel shaft. In this case the machine is operated the same as a flywheel non-geared press for light work, and the flywheel, pinion, shaft and the large gear are removed. When operating in this way it is pointed out that the speed of the press is limited only by the skill of the operator in handling the material.

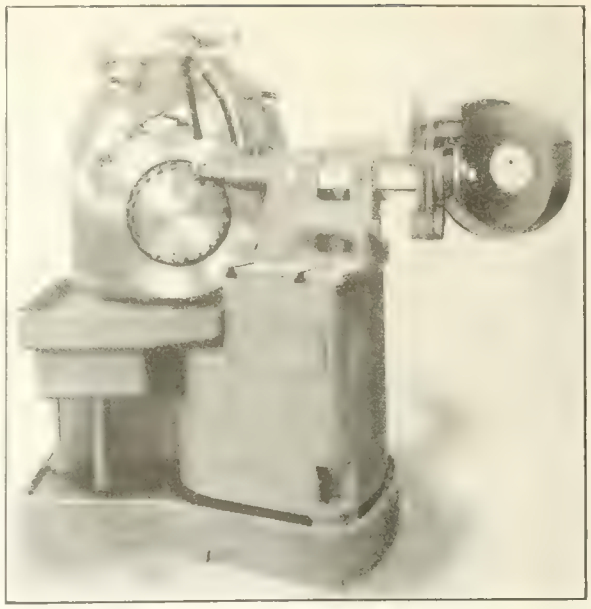
Roughing Machine for Bevel Pinions

The Gleason Works, Rochester, N. Y., has recently developed a machine for roughing spiral type bevel pinions. It is explained that while the builder's standard spiral type bevel gear generating machines will either rough or finish the pinions, it is possible by using the new machine to perform the roughing operation cheaper and faster. The cutter operates at a speed of 130 ft. per minute and one tooth can be cut in as short a time as 19 sec. The pinions, after being roughed on the new machine, are finished on the regular generating machine.

The machine is entirely automatic and will rough either right or left hand spirals. The generating roll of the work spindle actuates a positive indexing mechanism, and for spacing teeth a notched dial with the required number of divisions is employed. The feed, which is of the positive type, is driven by a cam mounted directly on the cutter sleeve. The machine is driven from the countershaft by a belt. The driving pinion for the internal gear drive to the cutter is mounted on this shaft and all the other drives, including that for the pump, are taken from it.

The cutters and the mandrels used with this machine are of the same type as those employed on the finishing machine and, of course, are interchangeable. The adjustments for setting to the spiral angle can be easily and quickly made. The cutter is permanently set to the root angle and, it is pointed out, requires adjustment only as it wears or a new cutter is required. All parts are easily accessible and can be readily oiled and adjusted.

The attachments furnished with the machine include one index dial, a set of feed change gears, a cutter gage, an oil pump and connections, a set of wrenches and a countershaft.



A Universal Machine for Roughing Either Right or Left Hand Bevel Pinions Preliminary to Finishing on a Standard Spiral Type Bevel Gear Generating Machine

The following table gives the principal dimensions and specifications of the machine:

Maximum [illegible] distance of any gear that can be cut, in.	7⅝
Minimum [illegible] distance of any gear that can be cut, in.	0
Largest face in terms of [illegible] diameter	⅓
Maximum ratio of pinion	8 to 1
Largest pitch diameter of 8 to 1 ratio, in.	1⅞
Largest pitch diameter of 2 to 1 ratio, in.	6½
Maximum [illegible] pitch	24
Maximum distance from center of machine to spindle base, in.	12 15 16
Cutter speed per minute, ft.	130
Minimum time for cutting tooth, sec.	19
Maximum time for cutting tooth, sec.	90
Diameter of driving pulley, in.	16
Width of driving belt, in.	4
Diameter of tight and loose pulleys, in.	12
Speed of countershaft, r.p.m.	300
Brown & Sharpe taper of hole in spindle	No 14
Power required, hp.	5
Floor space, in.	53 x 58
Height, in.	60¾
Net weight, lb.	5,000

New 30-In. Heavy-Duty Engine Lathe

The Houston, Stanwood & Gamble Company, Inc., Cincinnati, Ohio, has placed a 30-in. heavy-duty standard engine lathe on the market. It is of the double back geared type and has a three-step cone pulley. Eighteen spindle speeds, ranging from 8.3 to 300 r.p.m., are available and 24 rates of feed are secured with the regular change gears. By employing additional gears, practically any U. S. standard or metric thread can be obtained, as well as any rate of feed. The tailstock, which is of the set-over type, is clamped by four bolts and is also held in position by a pawl fitting a rack cast in the bed midway between the V's. The lead screw is splined to act as a feed rod, and the apron is of the double-wall type. Any length of bed up to 30 ft. can be supplied, and if desired a housing covering the entire headstock can be furnished to receive the motor for motor drive.

The New York sections of the American Electrochemical Society and the Illuminating Engineering Society have arranged for a joint session to be held at the Engineering Societies Building, 29 West Thirty-ninth Street, New York, on Thursday evening, Nov. 9. An attractive program has been prepared, including papers on "High Pressure Gas Installations," "The Chemistry of Gas Lighting," and "The New Flexible Mantle."

Iron and Steel Institute Honors Judge Gary

The Testimonial a Notable Feature of the St. Louis Meeting—Papers on Duplexing, Iron Ore, Blast Furnace Work and Powdered Coal

Distinction was added to the eleventh general meeting of the American Iron and Steel Institute at St. Louis, Oct. 27, by the paying of a notable tribute to Elbert H. Gary, president of the Institute since its inception, and to the business ethics of which he has been a conspicuous advocate. Important and interesting as was the technical program, the anticipations of the 500 members in attendance focussed in a special way upon Judge Gary, upon the message he had for the Institute in these abnormal times, and upon the testimonial in the tendering of which the entire membership had participated.

The technical sessions of the day were held morning and afternoon at the Planters Hotel. The customary address of the president, to which a particular importance has come to be given, dealt largely with his recent trip to the Orient, printed at length in this issue. Judge Gary gave his impressions of the Philippines, China, Korea and Japan from the standpoint of one seeking with an open mind to interpret all that might interest the American man of business. Prominent among the convictions at which he had arrived was the need in the Philippines for the investment of a large amount of capital which could only be attracted with the islands under the control of a permanent and unassailable government such as he felt circumstances obligated this country to maintain. In China he found a government honest and capable, though as yet lacking the confidence of the whole people; resources of wonderful magnitude promising one day a rich and powerful nation. From Japan he carried away the belief that the controlling influences are as hopeful as are the responsible forces in this country that the relations between the United States and Japan will always be peaceful.

Concerning business conditions, Judge Gary had only a brief comment. He laid emphasis upon the need of a proper tariff to meet conditions that will arise following the war and also upon the necessity that in these abnormal conditions business should be preserved upon a solid foundation, in anticipation of less prosperous times. He spoke as follows:

President Elbert H. Gary's Address

At the last directors' meeting of the Institute, before the summer vacation, a member suggested that at the October meeting I give some account of my proposed visit to the Orient, and therefore he properly may be charged with the responsibility of the president's remarks on this occasion.

I left New York July 3 for Toronto and thence proceeded, via the Canadian Pacific Railroad, to Vancouver; sailed on the Empress of Asia July 13; arrived at Yokohama July 24, and from there went on same steamer to Manila, arriving July 31. I left Manila on another ship (Japanese) Aug. 7 for Hong Kong, overtaking the Empress of Asia, which had preceded the Japanese ship, and sailed for Shanghai. From there I went through portions of China to Mukden, in Manchuria; Seoul, in Korea, and then to Shimonoseki, in Japan, arriving Aug. 29. I remained in Japan until Sept. 14, when I embarked on the Empress of Russia for Victoria, B. C., arriving Sept. 23. I visited the principal cities in Japan and motored considerably through the country, as I also did in China and the Philippines, wherever practicable.

This brief outline has been given because I am hoping many of my hearers will be inclined to inquire into the details and then to personally inspect this fascinating portion of the earth situated on the opposite side of the globe from your habitation. I will later suggest reasons for my wish.

There are many phases of Oriental life and customs, of natural and artificial beauty, of contrasts between the old and new civilizations, all of which attract and interest the student and charm the traveler; but it is not my purpose to attempt at this time to do more than glance at some of the general features of the different countries mentioned, in which, it seems to me, you as business men are especially concerned. Posing only as a member of the business fraternity, I received from foreigners everywhere the most hospitable and generous treatment and the frankest expression of sentiment toward the people of the United States. Also our diplomatic representatives, without exception, were courteous, helpful and hospitable; they are rendering faithful and efficient service.

THE PHILIPPINES

The Philippine Islands, with proper development and modern practice, are capable of supporting comfortably 10 times, or more, the number of people now living within their territory. There can be produced everything indigenous to semi-tropical latitudes and many things to better advantage than on any other lands within the same proximity to the equator. The natural requisites, including moisture, water-power and particularly richness of soil, are all sufficient. The climate is equable and excellent. In the summer it is warm during the middle of the day, but the nights are agreeable. The Filipinos, as a race, are a fine people, intelligent, of good disposition and possessed of capacity for success. I met large numbers of them, confined perhaps to the better educated classes but nevertheless representative. With opportunity, example and precept, they will take a desirable place in the ranks of progressive and worthy citizens.

When the United States, by mere chance, or as the result of an overruling Providence, became responsible for the future welfare of the inhabitants of the islands and for the conditions which might directly and seriously affect other countries, especially those in proximity, there was much in the condition of the people to be deplored. The masses were ignorant; perhaps purposely deprived of education; and they were subjected to tyranny and cruelty. They were poor, unhealthy, diseased, overtaxed and wretched. They were more or less at war with each other and with their government. Every influence, every tendency, was bad. They had no hope for the future.

The United States was a good Samaritan. The splendid men who were duly appointed by our country, including both military and civil representatives, with fortitude and judgment and human instincts took up

and carried on the work of renovating and rejuvenating this conglomerate of physical and moral corruption which had developed without the fault or the understanding of the people themselves. The results of their efforts will stand for all time as a monument to the generous, humane and intelligent policy of an enlightened and unselfish nation, unless something shall be done in the future to counteract or neutralize the results of the course which has been pursued.

Good Work Done by Americans

There has been established a sound and exemplary government. The laws are wisely and justly administered by able and impartial judges; modern and commodious hospitals have been built and are in charge of competent, practical and humane doctors and nurses; plagues and dreadful contagious and infectious diseases have been largely stamped out; model schools, special and common, have been established, and they are filled with eager and industrious Filipinos taught in the English language. Good roads have been built; agriculture, horticulture and forestry have been improved; means and methods for civilization and for modern practical results have been taught, though, of course, much remains to be done.

All this has cost and is costing large sums of money, but emphasis should be given to the fact that, with the exception of the money paid for maintaining the army and navy, which is no more than it would be if stationed elsewhere, the total expense of making the improvements and changes adverted to and maintaining the same, as well as the expenses of administration, including the civil government, courts of law, salaries of appointees of the United States Government, schools, hospitals and everything else of the kind, are, and from the start have been, paid from the treasury of the Philippine Government.

Without the protection and assistance of the United States; without the experienced talent of representatives sent from here; without the added energy, skill and invested capital of Americans; if the Filipinos were again left to themselves they would be unable to make the progress in the development of the resources of the country which is possible and desirable; and the future of the islands would be uncertain. They would not long be permitted to drift toward old conditions so as to be a menace to the health of neighboring nations particularly interested, for the latter would interfere and probably take possession and control.

The United States assumed a moral obligation to the Filipinos and to other nations when she took charge of these islands. She could not shirk it if she wished to do so.

Moreover, if the Filipinos desire it, as I believe they do, and if the United States, as I think a majority of the citizens wish, shall decide to have the Philippine Islands remain permanently a part of the territory of the United States, it would result in great financial benefit to the islands and their inhabitants and also to the United States; and all other nations would approve. Considering the interests of the Filipinos and the Americans both, it would be a grave mistake to sever the relations now existing between them.

CHINA

During the last few decades, at least, China has not kept pace with others in the progressive march of nations. Possessed by nature with extraordinary opportunities, she has nevertheless been retroactive in disposition and, to some extent, has been exploited for the benefit of others. With a population of 400,000,000 and a territory almost as large as Russia, containing the richest and most productive soil, a variety of climate which permits the growth and maturity of the principal grains and fruits, and with an abundance of the richest minerals, she has, notwithstanding, become poor in cash resources; and the normal and necessary development of the country for the proper utilization of the national assets has been neglected, if not ignored.

Apparently, the leading Chinese statesmen, the most intelligent and most influential citizens and the best thinkers are keenly alive to the situation and are earnestly solicitous for the immediate future of China. The present governmental administration and the Parliament as well are devoting their talent and energy to ascertain and apply a solution for the problems which interfere with the growth and strength of their country. They realize that there is needed a new constitution which will establish a concentrated, unified, though democratic, government; a new and modern financial system which will be satisfactory to the financiers throughout the world; an adequate, thoroughly trained and fully equipped military force for defensive purposes; and the adoption of a systematic plan for the development of the whole country for the benefit and for the promotion of the welfare of the whole population. The leaders are frank and outspoken in declaring the desirability of a government such as I have indicated; and they appreciate also the necessity of having the friendship and assistance of all other nations. They know that, under these conditions and with this attitude on their part, and not otherwise, they may expect to establish a credit which will secure the loans necessary to reorganize the affairs of government, and will put to practical use the instrumentalities for providing the money which is now lacking.

Railroads Needed

One of the principal things needed in China is first-class railroads. We know by experience what they are and do for a new country. There are provinces with immense acreages of the most fertile soil and a population of scores of millions that have no pretension of reasonable facilities for getting to purchasing or consuming markets. If there can be established the basis of credit as already suggested, and as now seems probable, it is to be hoped American capitalists will participate in further loans which will permit the rapid extension of railroad lines, for this will tend to correspondingly increase the volume of general business between the two countries.

The people are becoming familiar with the habits and methods of other peoples. They are entering educational institutions in other countries and they are learning the English language. True it is that large numbers in outlying provinces are ignorant concerning the language or ways or even existence of foreigners, but all those in control of national or provincial affairs are well advised and they welcome every opportunity to learn and to assimilate. Especially does China need and desire the sympathy and neighborly support of the people of the United States. Here is a great field for operation on the part of American business men which can be cultivated without injury or objection on the part of any other nation and with decided benefit to China herself. I could wish that in some respects the conditions in the United States which now exist, resulting, I think, from political agitation, might be modified.

The Chinaman is naturally strong, diligent, industrious, economical, honest and intelligent. He is a good farmer and a shrewd merchant. He would like to be a good and loyal citizen, and it is only because he has been imposed upon or has misunderstood the facts that he appears to have been at times unreasonable or disloyal. He is a force in the world that must be considered, and it is wise to influence him honestly and practically in the right direction whenever the opportunity is afforded. Where Chinese blood is mixed with the Hawaiian or Filipino it has raised the standard of intelligent manhood, so far as I have observed.

There are men listening to me who will live to see China a great and prosperous nation; rich, powerful and progressive; better than she ever was in her palmiest days; one of the best creditors of and debtors to other countries; and at peace with all the world. I hope and trust she is just now making a successful start in this direction. I have for her the same kindly feeling which so many of her best people undoubtedly entertain toward the United States. She will some time have the power to do harm, but instead she may be a force for international peace, progress and prosperity.

JAPAN

Japan is a vigorous, progressive, prosperous nation. Representatives have temporarily resided in foreign

countries, including England, Germany and the United States, for the purpose of studying the languages, customs, methods, improvements and facilities for advancement and for defense; and on their reports, from time to time, the Japanese people have adopted and assimilated what they consider to be the best features of enlightened civilization shown in the different countries. They are highly intelligent, determined, adaptable, very industrious and, above everything else, superbly loyal to their emperor and to their nation. The ordinary citizen lives for his country and is just as willing to die for it. There are no internal strifes; on the contrary, there is a harmonious whole. They present to the outside world a united front. This is as it ought to be in every nation. It gives a solidarity of power that is invincible.

It may therefore be seen why Japan has taken a leading position among the nations of the world, contrasting in a striking manner with her place 60 years ago. She has, with Korea, Formosa and other island territory recently acquired, 259,671 square miles and a population of 72,000,000, as compared with 37,000,000 in 1872. Besides all this, she is now increasing in wealth and in the near future will, I believe, be considered rich, unless her present policy shall be abandoned. Her financiers, her business men and her statesmen deservedly rank high. They are farseeing and they are conservative.

I am disposed just now to discuss briefly before you questions which, as a business man, I was free to speak about in my intercourse with Japanese acquaintances. Because I was open and sincere, and especially as I was an American, independent of any political obligation to consider questions of diplomacy, I met willing and attentive listeners and cordial greetings.

Japanese and American Relations

For some time there have been suggestions, in public and in private, in the United States and in Japan as well, that for numerous reasons not necessary to recall there was possibility, if not likelihood, of active hostility between these two countries. Whenever either government has decided to provide an additional warship some one in the other country has been prompt in charging that this meant preparation for war between these two nations.

I said repeatedly, on my own responsibility, making no claim except that I believed I could accurately represent public sentiment, that a large majority of the people of the United States did not desire but would deplore and stubbornly oppose war with Japan, except in self-defense, and that they were of the opinion there is not now, nor will be, any cause for serious trouble or disagreement; that there need be no conflict of opinion which could not be finally and satisfactorily settled by mutual negotiation and consideration. I also expressed the belief that our governmental administration is and would be inclined toward this most desirable exercise of authority. To all this I am sure this large company of representative business men will heartily subscribe.

And now, gentlemen, I am here to say to you in words just as emphatic, and in a belief no less absolute, that the leading and controlling men of Japan are equally anxious to have a continuance, permanently, of the peaceable and friendly relations now existing between these two countries. That there may be exceptions may go without saying; it would be usual, and need excite no surprise nor fear if such is the fact. Still, I have no positive information on which to base this conjecture. I had good opportunity to ascertain the real situation, though my visit to Japan was comparatively short. The most prominent and influential men in Japan are outspoken in their profession of friendship for the United States and her citizens. They refer with satisfaction to the large and increasing trade relations. And, without stopping to enumerate, they speak of our people as their friends and advisers, now and always, as fair and generous and pacificatory in policy and practice; as a model government, whose friendly interest they court.

If you suggest these men may have dealt simply in diplomacy, so called, or in diplomatic language, I answer, they gave me no reason to think so; I secured their confidence as I gave them mine. They do not hesitate to advance the reasons for peace and the objections to trouble. They realize that the geographical locations of these two countries should make them practically allies although acting independently and in their individual capacities and interests. And, from the business standpoint, the Japanese manufacturers, merchants and financiers are desirous of co-operating with those in the United States, to the fullest extent, in protecting and promoting the welfare of both and at the same time benefiting those in other countries with whom both of us may be conducting business. They understand and appreciate the spirit of co-operation which has actuated the men engaged in our lines of business and they would be pleased to consider with us all legitimate plans for the application of this principle. While it is a difficult problem, requiring patience, skill and tact, still I believe we may be able to work out methods which will benefit all concerned. It is well worth trying. International conditions are peculiar. They are complicated and will be worse. Every one interested in international commerce should make careful survey of existing facts for purposes of future explorations and developments. There are many practical problems to consider and their solution will require time and thought; but we will find the Japanese business men ready to take them up in a fair, reasonable and intelligent manner.

BUSINESS MEN SHOULD VISIT THE ORIENT

Now, I would urge all of you, who find it practicable, to visit the Far East. Go during the autumn or early spring months, if convenient, but do not hesitate to make the journey during the summer time. You owe it to yourselves, to the business interests you represent and to your country to come into close relations with the people of these far distant lands.

More and more of our business men should come into close contact with the people of Japan, China and the Philippines. It will be of benefit to all. There is much to see and to learn. Many misunderstandings have arisen and some still exist. They can and should be removed. It is as true as it is old that human nature is about the same the world over. We in the United States are not possessed of all the virtues. We are just as likely to be wrong in judgment and conclusion as others. Indeed, we have often been wrong. If some of our leaders in Congress had been better posted, it is possible that many ill-advised speeches would not have been delivered. At any rate, I strongly urge that as many of our citizens as find it possible take the time to personally and impartially inquire into the facts which bear upon the relations of the United States with other countries. There is always danger of unsettled disagreements if parties conduct their communications at arm's length. If they converse "eye to eye and face to face" even nations are much more likely to avoid conflict and to settle disputes without doing an injustice to any. If we are looking for trouble we can usually find it; and if we are looking for harmony it is, as a rule, equally easy to procure.

If any one connected with our government will spend a few months, or less time, in Japan, with an honest intention and effort to ascertain the sentiment of the large majority of the controlling elements, I verily believe such a one will be convinced Japan is not desirous of trouble with the United States, but, on the contrary, earnestly desires our friendship and co-operation in every worthy ambition.

BUSINESS CONDITIONS

Following my usual custom, I will conclude with a few words regarding business conditions.

It is well known that the steel business in this country is better than ever before. Our concern is only for the future. Many believe there will be a continuance of large business for many months or years after the war closes; others think there will be a material recession. No one can certainly foretell. I have heretofore expressed opinions on the subject which have been published. Obviously the wise man will husband his resources, keep within safe limits and avoid overextension. It is better to be prudent and make less profits than to become reckless or extravagant at the

risk of calamity. With large bank balances we are independent and secure; with large indebtedness to the banks which we could not readily pay we would be in danger of bankruptcy, depending upon future business conditions. All this we know by the experience of the past. As we cannot read the future we should exercise caution and be prepared for unfavorable changes.

Whenever the war shall close, the business of this country will be confronted with new conditions. The purchasing power of the whole world will have been very greatly reduced. Foreign countries that are now buying our products, because compelled, will withdraw their patronage in a large measure. Other non-producing countries will find their financial resources and credits lessened. More than this, foreign producers, in great need, will strive more diligently than ever to supply the countries that are financially able to pay and at prices based upon cheap labor and low cost, as they have a perfect right to do.

Our producers, including our wage earners, will find themselves in commercial antagonism with the most persistent and difficult competition ever experienced, unless this shall be prevented by laws that are reasonable and sufficient. Most of the foreign producing countries, and quite likely all of them, will be thoroughly protected by tariff provisions and we should be on a parity with them in this respect.

I firmly believe, if the present unprotective tariff laws remain unchanged, we shall probably meet with competition from foreign sources after the war closes which will adversely, and perhaps disastrously, affect American industry and American labor. Conditions will be even worse than they were between Oct. 1, 1913, and the beginning of the war.

If the laws shall be amended and adequate protection to American producers and their workmen is afforded, we may expect satisfactory business conditions for some time to come.

Clarence H. Howard's Address of Welcome

Following the presidential address, Clarence E. Howard, president Commonwealth Steel Company, Granite City, Ill., who in large measure was responsible for securing this meeting of the Institute for St. Louis, read a paper descriptive of St. Louis commercially, industrially, socially and in relation to its historical place in the development of iron and steel. Something of the vision Mr. Howard has for St. Louis is indicated in his paper, which is as follows:

My subject, "St. Louis and Its Industries," is an inspiring one, not only because of the present status of our city, but also because of its remarkable opportunities and resources, industrially and otherwise. It seems that the country has come to realize that industrial growth and improvement are inseparable from civic excellence. The investment of some of the fruit of industry in better homes and living conditions, parks, public recreation, etc., is a guarantee of the growth and success of a community, for it indicates recognition of the human element; and, other things being equal, industries will locate where these conditions are the best.

Perhaps no other American city has a more romantic history than St. Louis. It was settled as a trading post in 1764, by Pierre Laclede Liguest, under a grant from the King of France, and was chartered as a city in 1823. It was subsequently under Spanish rule, and on a March day in 1803, when Spain ceded Louisiana back to France, three flags floated over St. Louis: the Spanish colors were lowered in favor of the French, which were immediately replaced by Old Glory. In commemoration of the Louisiana Purchase, which was afterward divided into thirteen States, St. Louis, in 1904, successfully conducted an international exposition which was probably the greatest ever produced. The exposition site covered 1240 acres, partly in beautiful Forest Park, and 250 acres of its area were under roof. The cost, not including individual exhibits, was $42,500,000.

Going further back in our history, it is interesting to know that the forgotten race of Mound Builders chose this community for their remarkable earthworks, which have given St. Louis its side name of Mound City. Archæologists have pronounced these mounds among the very interesting and most ancient works of man.

One of our esteemed fellow members from Rochester recently presented me with a most interesting old volume regarding St. Louis in the early fifties. It sets forth most forcibly the advantages and immense possibilities of St. Louis as the great manufacturing and distributing center of the country. An article regarding railroads indicates some concern in the fifties as to the extent this comparatively new means of transportation would affect the traffic of the waterways. The problem of the country in this respect now seems to be reversed.

ST. LOUIS RANKS FOURTH IN MANUFACTURES

You are probably aware that St. Louis, the metropolis of the Mississippi Valley, ranks fourth in the United States in manufactures, fourth in population, and is located near the center of the country geographically and as to population.

Considering St. Louis from the standpoint of its iron and steel interests, I wish to say that our citizens deeply appreciate the recognition evidenced by the Institute deciding to meet here, this being the first time you have come as far west as the Mississippi River. You will be interested to know that 35 years ago a convention assembling here was welcomed to the City of the Iron Crown, which title was well merited. Iron ore in Missouri was found so pure that much of it was not melted, but was forged directly from the ore. Eighty years ago, in 1836, Featherstonbaugh, the mineral expert of that generation, reported to Congress that Missouri ore was 70 per cent iron, and he stated that a single locality in this State offered iron ore equal to all the resources of Sweden. Another expert, C. A. Zietz, reported in 1837 that horseshoes, knife blades and hatchets were made in blacksmith shops directly from Missouri ore.

Sixty-five years ago you could have seen a man named Palm in a St. Louis foundry building locomotives for use on a railroad west of the Mississippi before there was railroad connection eastward to the Atlantic coast.

Forty years ago the iron-ore production of Missouri was $10,000,000 a year, and it was said and believed that this State had enough ore "to run 100 furnaces 1000 years." To-day the various iron and steel industries in the St. Louis district, which includes both sides of the river, use more than 350,000 tons of pig iron annually, only a small percentage of which is made here. There are still vast mineral resources in Missouri, and within easy reach are the great coal fields of Illinois, and we also have direct connection with the electric power furnished by the great hydroelectric plant at Keokuk dam. At present 60,000 hp. from Keokuk is consumed in St. Louis.

Recognizing the wisdom of diversifying its industries rather than depending upon a few of Missouri's natural resources, St. Louis branched out in various manufacturing lines, of which one result was that while our iron-ore production has decreased in the last few years, our manufacture, consumption and distribution of iron and steel products have enormously increased.

The 26 railroads centering at St. Louis include most of the transcontinental trunk lines, and St. Louis is the headquarters of several of the large systems, such as the Missouri Pacific-Iron Mountain, Wabash, Missouri, Kansas & Texas, St. Louis Southwestern, St. Louis & San Francisco, etc.

St. Louis Union Station and terminals have been pronounced models of efficiency by terminal commis-

sions from other large cities. The tracks of the passenger-train shed accommodate 32 trains side by side, and those tracks have a capacity of 360 80-ft. passenger-train cars. During the year ended June 30, 1916, the Terminal Association handled in and out of Union Station over 105,000 passenger trains and 561,000 passenger cars, and it handled across the Mississippi River 1,216,000 freight cars and interchanged with connections 3,518,000 freight cars. The association employs 4427 people and owns 154 locomotives. Its electro-pneumatic interlocking system, with 344 levers, is the largest in the world.

SOME FIGURES REGARDING ST. LOUIS INDUSTRIES

The iron and steel and allied products of the St. Louis district, based upon official reports, are annually about $80,000,000, including such items as boilers, foundry and machine-shop products, structural iron, stoves, ranges, wire goods, cutlery and tools, agricultural implements, etc. The capacity of the carbuilding plants in St. Louis and adjoining districts makes this the largest railroad and street-car manufacturing center in the country.

The City of the Iron Crown of a third of a century ago has learned to diversify its industries, and has become the center of cheap fuel and of prosperous agriculture. St. Louis iron and steel products are only a part of the total yearly output of its industries. According to Government figures, St. Louis has invested $407,000,000 in 3500 industries, employing 150,000 people, and our total manufactured product is valued at $550,000,000 annually.

SOME THINGS IN WHICH ST. LOUIS LEADS

St. Louis manufactures $65,000,000 worth of shoes annually.

Is the largest shoe distributing center.

Has the largest woodenware house in America.

Is the largest horse and mule market in the world.

Makes more street and railroad cars than any other place.

Leads in the manufacture of stoves, ranges and furnaces.

Holds first place in the output of American-made chemicals.

Is the largest hardwood lumber market of America.

Has the largest hardware house in this country.

Is the largest inland coffee distributing center.

Is the largest fur market in the world.

Another item which will particularly interest the American Iron and Steel Institute is that the St. Louis district's five large cast-steel plants make it the largest open-hearth cast-steel market of its kind in the country. These foundries have a capacity of about 300,000 tons a year of finished product, and consume 1,500,000 tons of raw material.

Technical Papers and Discussions

The program of papers having to do with the practical side of plant operation began with a description of "The Duplex Process of the Lackawanna Steel Company," presented by George B. Waterhouse, metallographist of that company. The paper describes in detail the construction of the plant, the practice in accordance with which the steel is made, and the results that were obtained in the course of 8073 heats. This paper and the discussions presented by Quincy Bent of the Bethlehem Steel Company and Theodore W. Robinson, first vice-president of the Illinois Steel Company, appear on another page.

The afternoon session was opened with a comprehensive paper covering the use of "Pulverized Coal as a Fuel for Metallurgical Furnaces," presented by James W. Fuller, president Fuller Engineering Company, Allentown, Pa. It will be found elsewhere. It was discussed by W. A. James, chief engineer of the Lackawanna Steel Company; N. C. Harrison, general superintendent of the Atlantic Steel Company, and J. P. Kittridge, general manager of the National Malleable Castings Company at Sharon, Pa.

An interesting historical and descriptive paper prepared by Frank S. Witherbee, president of Witherbee, Sherman & Co., regarding "The Iron Ores of the Adirondack Region," was read by L. W. Francis. The extent and nature of the ores of that district were described and the equipment and practice of the mining companies for the treatment of the ore. The paper was illustrated by means of lantern slides. An extended discussion of this ore field was received from J. L. W. Birkinbine of Philadelphia and read by Secretary McCleary. There was also a discussion by F. E. Bachman, of the MacIntyre Iron Company.

Hot-Blast Stove Design

A notable contribution to the literature of the Institute having to do with the blast furnace unit was presented in the paper entitled "Progress in Hot-Blast Stove Design" by Arthur J. Boynton, superintendent of blast furnaces at the National Tube Company, Lorain, Ohio. The factor, as pointed out in Mr. Boynton's paper, which has recently been most influential in directing the progress of hot-blast stove design, is economy of blast furnace gas. Time was when the only conception of the hot-blast stove function was the heating of the air to be introduced into the furnace, without special regard to the amount of gas consumed. The use of gas for power purposes, for the heating of boilers and as a fuel in heating furnaces, places a value upon it which necessitates the most economical operation of the hot-blast stove possible. The general problem now is the securing of high-blast temperatures with a minimum consumption of gas through the more efficient preliminary washing of the gas and the more effective arrangement of the stove checkerwork. As illustrative of the kind of progress that is best serving this end, the paper cites the four-pass hot-blast stove now in operation at the Joliet works of the Illinois Steel Company with its small checkers, and predicts that a reduction in the number of stoves to three promises to be the usual and a very practicable practice. The publication of this paper in detail will come at a later date. The valuable discussion of it, written by R. J. Wysor, blast furnace superintendent at South Bethlehem, Pa., is given below in full:

DISCUSSION BY R. J. WYSOR

Until very recently, as indicated in Mr. Boynton's paper, improvement in hot blast stove design lagged behind progress in construction of the furnace itself. Especially in modern blast furnace plants directly connected with steel works, there is a dual problem confronting the hot blast stove. On the one hand, improved furnace lines and better conditioned stock have permitted the use of higher blast heats. While on the other, the demand for gas for engines and boilers has become increasingly insistent. In brief, the present desired function of the stove is to produce more heat with less gas consumption. To meet this demand, the active co-operation of the combustion engineer and the mechanical engineer is required, the solution requiring both expert theoretical and practical knowledge.

The first half of the problem was solved at Bethlehem years ago by the construction of a battery of five standard three-pass stoves, using washed gas. The hard Eastern and foreign magnetite ores which have always constituted the bulk of our ore mixtures permit the use of the highest blast heats which, practically,

can be attained. Our "straight line" hot blast temperature in normal practice will average well up to 1400 deg. Fahr.

Insulation of Stoves and Blast Mains

The question of insulation of stoves and hot blast system, almost unheard of until about two years ago, is now receiving the attention it deserves. Preventing the loss of 5 to 10 per cent of the heat developed, or what is more to the point, conserving the peaks of the temperature curves, is a strike for efficiency of no small moment. About four years ago we began experimenting at Bethlehem with various materials for hot blast main and stove insulation. At the first opportunity a section of a hot blast main was insulated internally with a special brick, this being one of the earliest, if not the first experiment of the kind, in the country. At a new furnace now being built, the four stoves, stove necks, hot blast main and bustle pipe are being insulated throughout, the stoves, in part with packed diatomaceous earth alone, and in part with insulating brick and insulating earth in the packing space, for direct comparison. The remainder of the hot blast system is insulated with manufactured kieselguhr brick.

Size of Checkers

We are building four of these new stoves of the same three-pass type, with small radial checkers, the minimum checker openings being approximately 4½ in. The heating surface of these stoves will be about 81,000 sq. ft., an increase of over 50 per cent over the old stoves of the same external dimensions. One reason for not attempting still smaller checker openings is the fear of possible clogging of the openings or destruction of the small brick by flue dust in spite of good, primary washers. In our practice, an unusual quantity of fine fume, low in iron oxide but rich in alkali content, is produced, which is imperfectly removed by ordinary wet washers. No comparative amount of such fume is produced anywhere in the West, except in the manufacture of ferromanganese or spiegel. The alkalies in this dust will flux the surface or honeycomb the entire brick, causing its disintegration. The fire clay joints are especially susceptible to attack. The combustion chamber, lower surface of the dome and upper checkers naturally bear the brunt of the action. To prevent this evil as far as possible in the new small checkered stoves, we are installing an improved type of washer, and are using several high temperature alkaline resisting cements instead of fire clay in the hotter parts of the stove.

Air Leakage

Considerable attention is also being paid to the prevention of air leakage in old and new stoves. The vulnerable points in a stove and connections for escape of air blast are many and likely to be forgotten. Too much attention cannot be given to the bottom construction, as leakage there is of an insidious nature and may not be discovered for a long time. The blast may escape through a crack or burnt bottom plate if not water-cooled, or around the outer edge of the angles, riveted to the bottom plate, and around the lower ring of the shell, if weak, or if the calking has been improperly done. Stove-riveting should be a fine art, as leakage can often be detected around the rivet heads and good calking or lapped edges is necessary. Clean-out doors require occasional attention. Blast leakage through cold blast, hot blast and chimney valves at times may be of unbelievable magnitude. Improvements in the construction of these valves, especially the chimney valve for the three-pass stove, which will insure perfect heating at all times, will be a boon to the blast-furnace fraternity.

Mr. Boynton states that there is as yet no general tendency toward the use of forced draft for air or gas. It is my present opinion that for our conditions at least, it is equally satisfactory and much less expensive to have an expert continually to look after stove efficiencies, and who will supervise the stove tenders, than it is to employ more or less self-regulating induced pressure burners. We are now practising this belief.

The Banquet and Testimonial to Judge Gary

In the attractive banquet room of the Missouri Athletic Association about 700 members and guests gathered for the usual banquet. It took its character almost wholly from the acknowledgment of the services of Judge Gary in making co-operation and fair dealing a part of the business practice in the American iron and steel industry and from paying a personal tribute to him as the force that had made the Institute so great a success. Following the manner of previous banquets, the chairman called for impromptu talks from various members. George W. Simmons, vice-president of the Simmons Hardware Company, St. Louis, spoke concerning the greatness of St. Louis's future; W. A. Rogers of Rogers, Brown & Co., gave a reminiscence of his early pig-iron selling experiences at St. Louis, and E. F. Kearney, president of the Wabash Railroad, spoke eloquently of the need of appreciating one of the great truths of industry—the dignity of honest toil. Judge Gary also called upon John C. Schmidt, president of the Standard Chain Company, who spoke at length regarding industrial preparedness. George B. Early, of the American Sheet & Tin Plate Company, injected a humorous debate as to the relative importance of the heart and liver in the affairs of man, and James H. Hoyt indicated some of the unsuspected virtues of the legal profession in its relation to business.

THE PRESENTATION

President Schwab of the Bethlehem Steel Company, to whom had been accorded the distinction of representing the Institute in the presentation of its testimonial to Judge Gary, then spoke briefly, saying that no other man in the association or in the iron and steel business could have carried through the Institute project as Judge Gary has done and that no one could admire the spirit of fairness and co-operation in which Judge Gary had always acted more than did he. The gift presented to Judge Gary was a solid gold inkstand and pens.

The nature of the gift had been a secret with the committee appointed for its selection and not until just before the banquet was Judge Gary made aware that some form of testimonial was on the program. In rising to accept the gift, he acknowledged that he was not entirely unaware that this expression of regard was to be made, and that without such warning he could not have trusted himself to make reply. There was much he had in his heart to say, but he had felt constrained to set down in prepared form some of the things for which the occasion called. He then said:

I realize your sentiment extends beyond and above personalities. I happen to be prominently connected with the endeavor to apply the principle of co-operation, in the highest sense, to our practical, everyday business life.

BEGINNING OF THE CO-OPERATIVE MOVEMENT

In the autumn of 1907 the clouds of uncertainty loomed big and black on the business horizon. We were all more or less dependent and this feeling was not confined to our industry. The experiences of the past had been a forceful teacher. Leading men in financial and commercial circles implored those connected with the "barometer of trade" to use their influence and efforts toward diverting and dissipating the impending financial typhoon.

I take this opportunity to emphasize the fact that

no one directly connected with the Gary dinners, so-called, ever did or ever would do or say or approve anything concerning our business that is opposed to the spirit of the law or to the general public sentiment.

Now, what is this principle of co-operation? It is an honest, earnest effort to secure and maintain among business rivals a fair, healthy, vigorous competition and at the same time to oppose and to prevent an unfair, oppressive, cut-throat and destructive competition. It is calculated to establish on the one hand and to avoid on the other hand the very things so clearly and emphatically directed in the discussions of the Supreme Court of the United States. Summed up, it is described in the old expression: "Live and Let Live."

In 1907 and the months following, our conservative, open, neighborly attitude no doubt acted as a stabilizer and aided in the prevention of sudden and extreme fluctuations that would have disorganized and demoralized business to the prejudice of large numbers of both employees and employers; and purchasers, with large stocks on hand, as well. We have an abundance of testimony to this effect from our customers. It also created and fixed in our minds the sentiment that rivals in trade may at all times be considerate and solicitous concerning each other. That there is something substantial in the idea of mutual confidence and regard, even in competitive business circles, we see abundance of proof on this occasion.

SUPERVISION OF FEDERAL TRADE COMMISSION

It is probable the Federal Trade Commission may be of much benefit to business men, depending upon the disposition of its members. So far as we have had opportunity to observe, this commission is favorable to business success. I would like to have its authority enlarged so as to permit it to advise in advance if inquiry should be made as to a contemplated action; but even under present conditions the commission should be of real service. I do not believe in governmental paternalism or management; but I do approve of governmental supervision and I favor patriotic, intelligent, generous operations by private individuals—in co-operation between officials and private interests.

Continuing to preside, Mr. Schwab called upon Robert Hobson, president Steel Company of Canada; James A. Farrell; Cameron C. Smith, president Union Steel Casting Company, Pittsburgh, and Willis King, all of whom voiced their admiration of the qualities and the policies which had made Judge Gary so essential to the iron and steel industry in the past ten years.

More effective perhaps than anything else that was said, were the closing extemporaneous words of Judge Gary himself. With great feeling he spoke of the way in which both the testimonial and the expressions of regard would be cherished, not because he had deserved them, but to mark the fact that one man could so win the confidence of his associates.

Excursion in St. Louis District

Saturday was spent by the officers and members of the Institute in a tour of inspection of the railroad yards and terminals on both sides of the Mississippi and of the St. Louis industrial district, particularly those sections devoted to or eligible for iron and steel operations. Boarding a special train at the Union Station at 10 a. m., the party which filled ten coaches spent four hours on the trip and in a luncheon stop at the Commonwealth Steel Company's plant at Granite City, Ill. At all the iron and steel plants passed by the train the employees "dressed out" in the yards to salute the party, while flag decorations and continuous whistle salutes added to the evidence of interest in the inspection. At the St. Louis Screw Company's plant on the west side of the river, which was reached after lunch the employees remained two hours over time to greet the visitors. This plant, too, was handsomely decorated in the national colors.

At the Commonwealth Steel Company's plant the visitors were conducted through every department by special escort committees of employees after which lunch was had in the restaurant which the company maintains for its force. Following the lunch Judge Gary made a short talk to the assembled force, complimenting the men as well as the conditions under which they work. He referred particularly to the Commonwealth Fellowship Club of officers and employees and the safety-first work done in the plant, which has reduced its annual accident costs by $30,000 to $50,000.

Arriving at the detraining point on the west side of the river at 2 p. m. the party was taken on an automobile tour of the residence and park districts of St. Louis and also into the country suburban district which included a stop for refreshments at the old Grant farm, now the suburban residence of August A. Busch.

Most of the members of the Institute departed from St. Louis on the Saturday evening trains and the remainder on Sunday.

Duplex Process of Lackawanna Steel Company

BY GEORGE B. WATERHOUSE*

THE duplex process is commonly understood as a combination of the acid Bessemer and the basic open-hearth processes. The tonnage of steel ingots made by this process has very rapidly increased during the last five or six years.

DESCRIPTION OF PLANT

The acid Bessemer department was already in existence when duplexing was decided upon by the Lackawanna Steel Company. It contained two mixers of 250 and 300 tons capacity respectively, four 12-ton converters and 12 cupolas. Eight of these were for melting iron, and four smaller ones for melting the spiegel mixture used when making rail or high-carbon steel. After careful consideration of the various possible locations, the open-hearth was placed directly north of the old Bessemer plant. Two large tilting furnaces were built. This arrangement makes a comparatively short haul for the blown metal between the converters and the open-hearth furnaces. The iron cupolas Nos. 1, 2 and 3, nearest to the open-hearth, were remodeled for the melting of spiegel mixture, and a scale was installed opposite No. 2. Since then cupola No. 4 has also been altered for the same purpose, and, like the other three, it taps into a ladle standing on the same scale. The transfer track for the blown metal extends far enough into the Bessemer plant so that all four vessels can be used to blow metal for duplexing.

The open-hearth plant is very massive and strong. Extremely heavy construction has been used for the building, furnaces, and machinery, in order to insure as far as possible against delays or shut downs due to breakage. The building, housing the two tilting furnaces, is of steel throughout and is 352 ft. long by 124 ft. wide. It has since been enlarged to take care of eight stationary 100-ton furnaces, and is now 1038 ft. 2 in. long by 124 ft. wide. The massive construction is particularly noticeable in the case of the crane runway girders, which have a length of 110 ft., a depth

*Metallographist of the Lackawanna Steel Company, Buffalo, N. Y.

of 12 ft., and weigh about 115 tons each. The extreme length is necessary in order to span the tilting furnaces, which are themselves very long and which are placed along the line of the center columns of the building. The crane runway girders are protected, over the furnace proper, by steel shields suspended below the bottom chords.

The metal from the Bessemer plant is brought in the transfer ladle to the open-hearth plant. It is hoisted to the charging floor level by a crane of 75 tons capacity, having an auxiliary trolley of 25 tons. The span is 55 ft. 10 in. For handling the cold material there is a high-type charging machine. The pit side is served by two 165-ton cranes of 58 ft. 8 in. span, each with an auxiliary trolley of 35 tons capacity. These 35-ton trolleys are also equipped with a 5-ton auxiliary hoist, which is used for tilting the spiegel ladle.

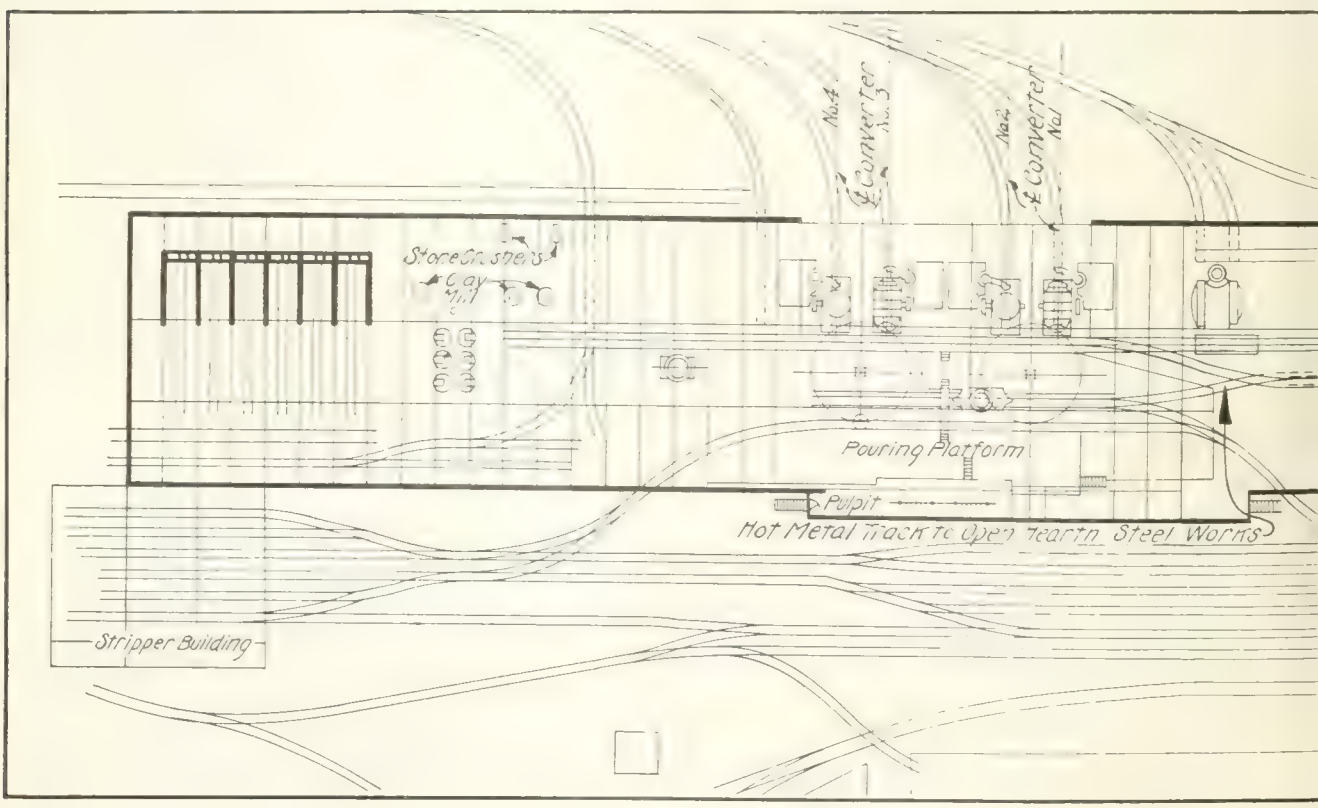
Above the pouring platform is the track along which the spiegel ladle comes from the cupolas. The elevation of this track above the floor level saves valuable floor space. The roof trusses span the entire width of the building, so that no roof load is carried on the center columns or the crane girders, and vibration is not communicated to the roof. A platform for the convenience and safety of the crane operators is provided along the entire side of the building. This platform is level with the floor of the operator's cage, so that he can step directly from the cage to the platform at any point along the runway. The ventilation feature is rather simple, consisting of the usual louvre type of monitor so frequent on mill buildings. Its size is greater than the average. The width is 41 ft. and the height 12 ft. from the base of the posts to the bottom chord of the truss.

In common with the rest of the plant the furnaces were designed and built by the Lackawanna Steel Company, and are of massive construction. The framework consists of heavy beams and channels, suitably tied together and braced. This framework rests upon two heavy box girders, and extending from one rocker casting to the other. These castings are set 30 ft. 6 in., center to center, and rest on heavy I-beam girders, which support the entire weight of the tilting portion of the furnace, including the bath of metal. The girders also form a part of the tilting mechanism and are supported on a series of steel rollers mounted in a massive base casting.

The tilting or rotation of the furnace is accomplished by means of a rack bolted on the I-beam girders, which meshes with a gear segment bolted to the rocker castings. The rack is moved by a steel screw journaled between the I-beams, and held by self-aligning thrust bearings of the ball-type, so that no lengthwise motion of the screw can take place. The screws, one for each I-beam girder, are each driven by a 50 hp. motor, and are cross connected by shafting below the floor level in order to insure equal movement of each rocker casting, and avoid harmful twisting stresses in the structure and brickwork of the furnace. The furnace may be tilted in either direction, the extremes being 38 deg. travel from the vertical when pouring, and 15 deg. travel toward the charging side when removing slag. The center line of the ports has been made the center of rotation of the furnace, which results in the stationary ports and those in the tilting portion of the furnace always maintaining their proper relation to each other. Cold air is prevented from striking the ports or entering the furnace.

Each furnace has a hearth 13 ft. wide by 40 ft. long, and is 50 ft. long over the chill plates. On the charging side there are seven doors. At the center of the furnace there is a door 2 ft. 6 in. by 2 ft. 11 in. On each side are two doors 3 ft. by 3 ft. 6 in., those next to the center being equipped with a tapping spout. Also on each side there is a smaller door, near the ports, 2 ft. by 2 ft. 4 in. Blair water-cooled ports are used, and great care has been used in the construction of the ports so that when the furnace is heated up there is a minimum of clearance between the stationary ports and the tilting part of the furnace, greatly reducing the amount of cold air entering the furnace. The slag pockets and regenerator chambers are of ample proportions, and the binding is unusually heavy and well tied together. The checker volume for each end of the furnace is 5388 and 3084 cu. ft. for air and gas, respectively.

For each furnace there is a self-supporting steel stack, 180 ft. high, and 7 ft. diameter inside the lining. The gas and air reversing valves are water-cooled and water-sealed, and of the same design as used on all the Lackawanna Steel Company furnaces. They are



RELATION OF THE BESSEMER CONVERTERS AND OPEN-HEARTH

36-in. diameter for the gas, and 48-in. diameter for the air. The fuel for the furnaces is furnished by Hughes self-cleansing mechanical producers, four for each furnace.

DESCRIPTION OF PROCESS

The process may be said to last for a week, for each week-end the tilting furnace is thoroughly drained, the bottom and slag line made up, the ports cleaned and repaired, and everything made ready for the week's campaign. About 6 p. m. Sunday, the gas being once more on the furnace after burning out the flues, the work of preparing the slag is begun. Four boxes of burnt lime and three of roll scale are charged and melted down. These amounts are then repeated, and when again molten the same amounts are again charged, the total being 12 boxes of lime, and 8 to 9 boxes of roll scale. The average weight of a box of burnt lime is 2000 lb. and of a box of roll scale 3000 lb. Considerable care is given by the melter to the preparation of a good slag, for the success of the process (as in all open-hearth work) depends on the slag. At midnight, or shortly afterwards, the metal is ordered from the Bessemer department. An average analysis of the mixer metal is:

	Per Cent
Total carbon	0.370
Silicon	1.00
Manganese	0.65
Sulphur	0.045
Phosphorus	0.060

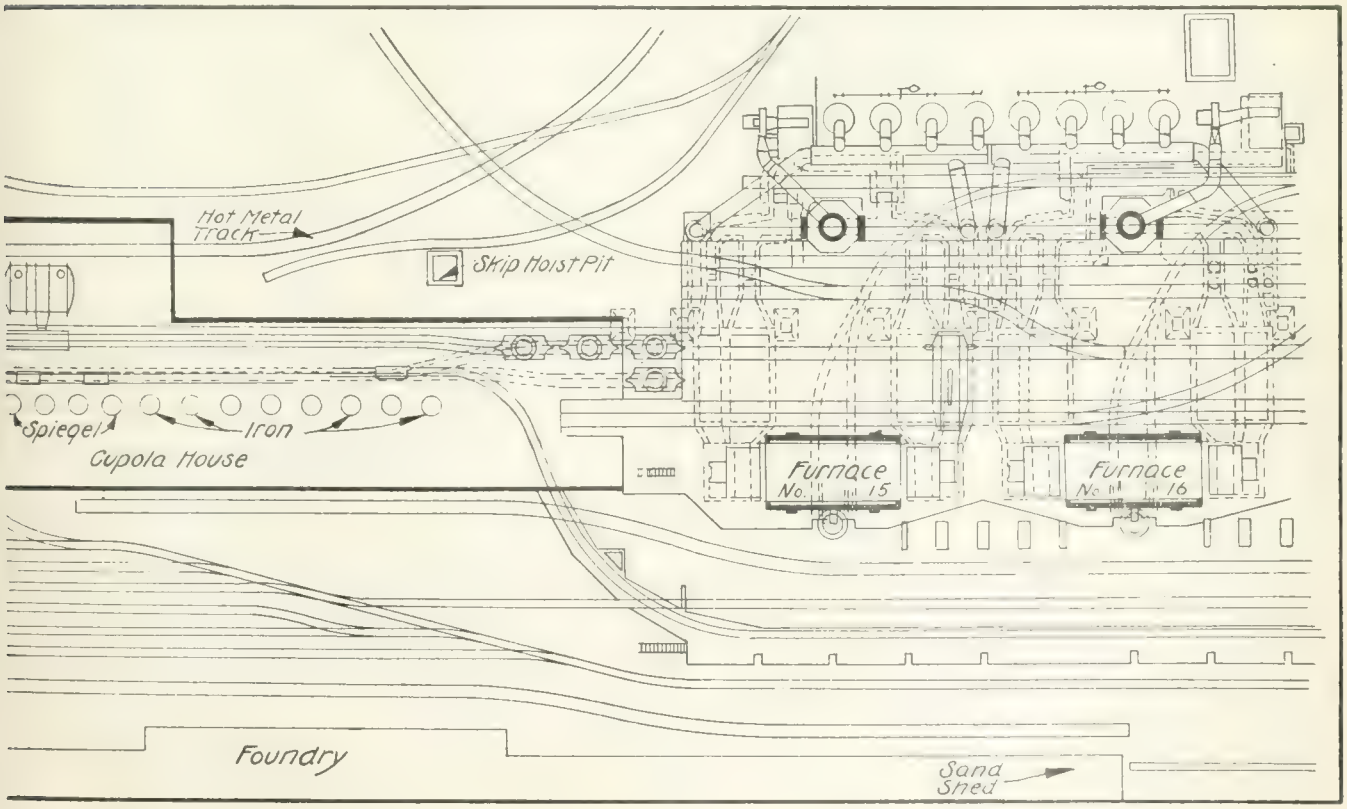
The weight of this metal taken for a Bessemer heat is 28,200 lb., less the weight of scrap used in the converter. Two Bessemer heats, blown in different vessels, are poured into the transfer ladle and taken to the tilting furnaces. When starting up, the first ladle contains metal blown down to about 0.40 per cent. carbon, to give a little action in the furnace. This first ladle is poured into the open-hearth furnace about 12.45 a. m. It is followed by two ladles of "soft" metal, that is metal blown down to 0.05 per cent to 0.07 per cent carbon, and then by a "high" ladle, or a "kicker." This ladle contains metal blown down to 1.5 per cent to 2.0 per cent carbon, and when it is charged into the open-hearth there is a vigorous reaction. The metal and slag are thoroughly mixed together, and during this reaction the phosphorus is largely removed from the metal bath to the slag. When this reaction has subsided, two more "soft" ladles and a "high" are charged. Then, if the bath is found to be low in carbon, another "high" ladle is given; while if high in carbon another "soft" ladle is charged. In this way a bath of metal of 190 to 200 tons is produced. The charge is then worked down like an ordinary basic open-hearth heat until ready for tapping, which is usually at about 3.30 a. m.

After the heat is tapped there is a bath of about 100 tons of metal with 0.15 per cent carbon still in the furnace, covered with the tapping slag. Two boxes of lime and two boxes of scale are charged, and burnt dolomite used along the slag line, around the doors, etc., as found necessary. Then three "soft" ladles of blown metal are charged, and two more boxes of lime, followed by the "high" ladle or "kicker." During the reaction the furnace is tilted slightly forward and slag allowed to flow from the front of the furnace through the slag spouts. As mentioned before, these are under the doors directly on each side of the center door. The slag falls into the slag cars standing on the tracks. Practically all the slag taken from the furnace is removed in this way, for when tapping a heat only enough is taken to properly cover the metal in the ladle. When the reaction is over, another box of lime is generally charged and the bath worked in the usual way. Very often another box of lime is spread over the slag shortly before tapping, so that five to six boxes of lime are used per heat, but as a rule only the two boxes of scale.

After the heat is tapped this procedure is repeated, enough slag being taken from the front of the furnace, at the time of the reaction, to maintain a constant and proper volume of slag in the furnace. A typical analysis of this slag, together with that of the other materials is given in Tables 1 and 2. The average time from tapping one heat to tapping the next, for 8073 heats, was 2 hr. 53 min.

About 80 per cent of the steel made in the tilting furnaces is recarburized in the ladle with molten spiegel mixture. The rest is made with the usual additions of ferromanganese, ferrosilicon, etc. When the bath is ready for tapping the tap hole is opened and plugged

(*Continued on page* 1035)



FURNACES IN DUPLEXING AT LACKAWANNA STEEL PLANT

ESTABLISHED 1855

THE IRON AGE

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The Fuel Famine

The supply of coal for domestic consumption is menaced in two ways—by the extremely high prices certain consumers are able and willing to bid for spot shipment and the delays in transit in the case of long hauls. The country is made up chiefly of common people, as Abraham Lincoln once suggested, and even when coal is cheap the majority of them are forced to economize more or less in its consumption. When steel mills making $25 to $50 a ton on their product find themselves short they can and naturally will bid prices for coal which the common people cannot consider. They are simply outbid. The distribution of coal to the ordinary consumer requires when everything is working smoothly that a very large tonnage be in transit and in storage. When there is any slowing down in the movement, the volume in transit must be increased or the receipts at final destination fall off. The current requirements of the country in coal amount to about 2,000,000 net tons per working day. Much is consumed at or near the place of production. If we assume for one-half the tonnage an average haul of ten days, when the railroads are working smoothly, then there is normally 10,000,000 tons in transit. If the average movement lengthens to 20 days a shortage is produced at destination of 10,000,000 tons, even though precisely the same tonnage may be shipped day by day, as could not be the case with a decreasing return of cars to mines. Thus the supply to the consumer is menaced in two ways—by the high bids made by some consumers and the extra coal locked up in transit.

There has been a shortage in coal production for some time. The ultimate consumer has not felt the shortage as he will later unless conditions are relieved; for it is normal for stocks to be accumulated at this time at distribution points and those stocks are much below what they should be. The pinch is not felt by the consumer as much now as it will be when the normal time arrives for the stocks to be distributed and it is found that they are not there.

Some relief is expected when the season of Lake navigation closes, because normally coal becomes plentiful at that time. These are abnormal times and the supplies released will not make the usual impress upon the situation. There is, furthermore, such congestion at lower Lake ports that the amount of coal yet to be shipped from mine, in hope of its being shipped up the Lakes, is much smaller than usual at this time. Such a shortage is predicted for the Northwest, moreover, that all-rail shipments will probably have to be made in the winter from Illinois and Indiana mines, thus further restricting the relief that the end of the Lake shipping season should bring. Altogether the situation as to coal is a very serious one.

Machine Tools and the Future

Efforts to peer into the future and arrive at some conclusion as to conditions which the builders and sellers of machine tools must face after the war are naturally growing more intensive as time wears on. Several speakers and contributors of papers at the recent meeting in New York of the machine-tool dealers devoted attention to this subject.

Despite the oft-made assertion that the tools ultimately to be discarded from temporary munitions plants will be worthless, or nearly so, because of the forcing and rough handling they have received, it was admitted that large numbers of usable tools will find their way to the second-hand market, one dealer asserting that he knew of $750,000 worth of such machinery. A list of miscellaneous new tools valued at approximately $1,500,000 is being circulated in the New York market. An advertisement offers for sale a complete plant for manufacturing 3.3-in. British high explosive shells—tools, motors, line shafting and all accessories, and it is well-known that many munitions makers have been offering for some weeks tools which they no longer need.

Not only will the manufacturers have to contend, when peace conditions arrive, with the certainty of an abnormal volume of used machines, but also with the offerings by new makers, not a few of whom will fight vigorously to remain in the business. The statement was made at the meeting that probably 100 firms are building machine tools who were not doing so two years ago. Some of these, undoubtedly a majority, will not stick. Many lathe makers, who engaged in the line when the demand was at full flood, admit their pursuit in this direction is but passing. The frenzied search for such machines no longer exists, yet not a few new makers are still in the field, and experience is teaching them to build better machines than they built at first. Some of these newcomers not only intend to compete with the older manufacturers in lines already entered, but are seeking other types of tools

to build. In a few cases they probably will compete with builders for whom they are now manufacturing.

When the question has arisen as to how far the German manufacturer will suffer from prejudice and clinging animosities after the war, German business men marooned in this country have found much solace in the contention that they will get business in satisfactory volume if they make their prices attractive. At the dealers' meeting something of the same sentiment with regard to the domestic situation was manifest in the discussion as to how sellers of new and standard tools can successfully compete with new tools of cheap construction, as well as with second-hand machines. A favorable factor in overcoming the latter is that most buyers prefer a new machine tool, as they do a new automobile, if the difference in price is not too great. An unnamed manufacturer of tools was quoted as saying that he contemplated, at the psychological moment, a cut in prices which would be stimulating to the domestic buyer. How he would determine the propitious moment was not stated. The consensus of opinion among dealers seemed to be that the future will revolve around the prices of new machines. These at present are strong; in fact, advances are comparatively recent, and prices are not likely to recede soon, in view of the high and advancing cost of raw material and the higher wages which the times demand.

So far, the trade has suffered but little from cancellations, because of the genuine nature of the demand, the abundance of money and careful selling, substantial deposits being exacted with the order in many cases. At the same time the generous sentiments of leading dealers with regard to cancellations will commend themselves to broad-minded manufacturers. Without any suggestion of letting down the bars, the thought was expressed that the ties between manufacturer and dealer and between dealer and buyer are more or less continuous. Their interests are interdependent, and a share of the courtesy passed to the dealer by the builder must go to the buyer. It was pointed out that "if an extreme and unusual change in business occurs" it is not reasonable to expect that no orders for new equipment would be canceled, nor would it be for the best interests of all concerned if orders were made absolutely non-cancelable. The remedy would seem to be in continued careful inspection of orders in their incipiency, with early pains taken to learn how earnestly the buyer wants the machine he has ordered, as one member suggested. Tempering justice with mercy still holds good.

It is certain that a most careful and studious diagnosis of the trend of trade from now on is indicated as a vital policy, also that each member of the industry should pilot his business even more carefully than heretofore, to be prepared for possible shocks to the prosperity still to come.

Need of Fatigue Studies

Industrial fatigue is a problem in shop management which has not been given the serious attention it deserves. Now and then a bit of evidence is produced, commonly not much more than an observation, to prove the wisdom of a periodic rest interval, but beyond such bolstering of the wide belief that there is something in the claim of overfatigue no specific method of relief is forthcoming ready for application in a given plant. So far it is tacitly assumed that the college or the private laboratory should do the investigating. Without specially provided funds, with many other lines of research offering, the laboratory does not pursue a thorough and conclusive study. It remains for the endowed institution to do it, such as the Engineering Foundation, perhaps, or one concerning itself with health conservation, or a manufacturers' association covering a single industry, which may find recompense for raising the money through increased output per unit of wages.

It is not that industry, under present conditions, jeopardizes health, but that continuous employment, especially under piecework and bonus incentives, is not conducive to maximum production. Neither the industry nor the worker gets what is due under conditions that do not properly allow for the fatigue factor. Rates based on time studies make such an allowance, but ordinarily the operating régime does not, and this latter fact makes the allowance not much more than an arbitrary factor of safety.

In Great Britain, the subject has been studied ever since so many of its establishments—4319 at this writing—were put under government control. There the necessity grew out of the lengthened workday and the intensive production war demands entailed. So-called monotonous repetition operations and jobs requiring varied applications of handicraft and headwork are differentiated. So far, two reports have been published, and from brief summaries of their findings it is clear they will prove notable additions to the meager literature now available. Whether it will be possible, for example, to deduce from the results what is the best interval to be taken between rest periods for different classes of machine operators, and what is the proper time limit of the rest period itself, or, indeed, how such rest periods can be provided for, cannot yet be known, but what does come out ought to be a good guide for the investigations needed in this country.

Contracts and Deliveries

Never have producers of iron and steel had so many delicate questions to settle as to what is right in allotting deliveries to their customers. In ordinary affairs the distinction between what is right and what is wrong is supposed to be quite clearly defined, but when mills are behind in deliveries there is simply a choice of evils. The ambition of the average steel maker is to allot the deliveries so that all customers will be equally served, that such inconvenience as must be suffered shall be equally distributed. The steel maker, however, is not omniscient, and some consumers of steel can paint a more lurid picture of their sufferings than can others. Even if the steel maker were a mind reader he would not be able to arrange a distribution of his products that would cause the least total inconvenience among his customers, for hardships make a more serious impression upon the minds of some buyers than upon the minds of others.

Nor would a distribution of steel that minimized the sum total inconvenience of the group of

customers be satisfactory to all. Among the customers are naturally some whose material is more overdue than is the case with others and those customers are indisposed to consider the inconveniences of others. Their contracts call for the delivery of the material and they stand squarely on their contracts, no matter what may happen to others. It is among such buyers that the charge usually arises that the mill is delivering the high-priced material at the expense of the lower-priced contracts.

One cause of the difficulties that arise at a time like this is the looseness that has obtained in the making of many contracts, whereby some buyers long ago placed contracts for larger quantities of steel than they could possibly consume, or even accept delivery upon, within the contract period. As the mill fell behind in deliveries it could not effect the usual cancellation of unspecified tonnages because the buyer was secure in furnishing the specifications, knowing that the delivery would be delayed. It is a delicate matter for the mill to determine the precise rights of such a buyer, for the essence of the contract was protection to the buyer for a specified period, to permit him to conduct his business during the period with an adequate supply of material, while the letter of the contract is that a much larger tonnage is to be furnished. The buyer naturally contends that the question of his ability to accept the material does not arise, because the mill did not test his ability by offering him delivery of the additional material.

A question of an entirely different nature, but also one of the moral obligation of the seller, is arising in the pig-iron trade. The typical blast furnaceman has his current output sold at practically uniform prices, for until the recent advance the pig-iron market stood at a practically unchanged level for months. The furnaceman has sold his pig iron on contract, while he has contracted for a supply of coke. Now, in many instances the supply of coke is insufficient for the full operation of the furnace. A conventional case may be stated, probably typical of many actual cases. The pig iron has been sold at $18 and coke has been contracted for at $2.50 at Connellsville ovens. The profit in the pig iron at these prices is $2.50 per ton. The furnace receives an insufficient supply of coke, and with it must slow down operations by, let us say, 15 per cent. Shipments of pig iron are reduced and the consumer is inconvenienced. The furnaceman, perhaps, could buy coke in the open market at $7.50 and thereby operate at capacity. Not to make the calculation too fine, there would be 85 tons of coke at $2.50 and 15 tons at $7.50, to produce 100 tons of pig iron. The extra cost of coke on the 100 tons would be $75, whereby the furnaceman's average profit would be reduced from $2.50 to $1.75 per ton. The buyer might assert that the furnaceman should be quite ready to stand this slight reduction in his profits. The furnaceman might rejoin, however, that the extra 15 tons of pig iron was made at a loss of $5 a ton, and he did not care to incur that loss. He would make the 85 tons at the expected profit and the failure to make the other 15 tons was due to "causes beyond his control." He had made a contract to deliver pig iron and he had made a contract whereby he was to receive coke, and he would stand on the basis that those two contracts were of equally binding force.

The case may be simply one of right and wrong when it is between one furnace and one consumer, but if there were many such cases the question of right or wrong would quickly be dispelled by physical conditions. When spot coke advances to $7.50 many furnaces cannot buy at that price. The payment of the price does not increase the production of coke, and the higher the price bid the more temptation there is for the coke producer to "fall down" on his contract and sell spot coke. The attempt of many furnaces to augment their supplies by open market purchases would tend to undermine the morals of the coke producer instead of causing more coke to be made. If on the other hand many furnaces curtailed their production of pig iron, the consumers might be forced into the spot market for pig iron, causing fancy premiums to obtain on spot iron, thus tending to undermine the morals of the furnacemen. Once the suspicion arises in the mind of a producer, whether of coke, of pig iron or what not, that his competitors are profiting by a high spot market at the expense of contract obligations, he is tempted to do likewise, and eventually many may be doing so, each blaming the condition upon whomever it was that started it. Each consumer, then, is to a large extent buying his own material at an advanced price. It would be well for every buyer and seller to consider seriously these possibilities, for the trade stands in danger of unpleasant developments.

Charles M. Schwab on the Situation

On Thursday of last week, while in St. Louis to attend the meeting of the American Iron and Steel Institute, Charles M. Schwab spoke at a luncheon given him by the Members' Conference of the Business Men's League. He said that the Bethlehem Steel Company has sold all its product for 1916 and that practically all the steel it could make in 1917 was under contract. Referring to the new construction of his company he said: "In the face of a certain amount of opposition on the part of the directors of the corporation with which I am affiliated, I have insisted upon spending $90,000,000 within the next two years for improvements, beginning immediately." Mr. Schwab predicted that following the present unprecedented prosperity a period of financial depression would come upon the United States in the next five or ten years, and that this would bring an entire commercial and financial readjustment which would serve to teach the people of this country economy.

One View of the Pace in Pig Iron

In the pig iron market report from their Cincinnati office, under date of Oct. 28, Rogers, Brown & Co. say: "The pig-iron market is so active that it is difficult to keep up with the procession. All quotations are being made subject to confirmation and by the time the buyer receives a price and hurries in his order he finds that he is behind so far that he can't even hear the band, and negotiations have to be again opened."

Installations of Heroult Electric Furnaces

The Halcomb Steel Company, Syracuse, N. Y., has contracted with the United States Steel Corporation for two more 6-ton Heroult electric furnaces. These are in addition to the two Heroult furnaces and the one Snyder furnace now operating. The number of Heroult furnaces operating or contracted for in the United States and Canada is now 80, while on Jan. 1, 1916, it was 43.

STEEL CORPORATION EARNINGS

Net Earnings for the September Quarter $85,817,067, Making a New High Record

The United States Steel Corporation has issued its statement of earnings, covering its subsidiary companies, for the quarter ended Sept. 30, 1916. The amount of the earnings is $4,691,019 in excess of the brilliant showing for the second quarter. It compares as follows with the corresponding quarter of 1915:

	1916	1915
July earnings	$25,650,006	$12,048,218
August earnings	[illegible]	12,869,099
September earnings	[illegible]	13,793,327
Total earnings after deducting all expenses incident to operations including those for ordinary repairs and maintenance of plants and interest on bonds of subsidiary companies	85,817,067	38,710,644
Less charges and allowances for depreciation, viz.:		
Sinking funds on bonds of subsidiary companies and depreciation and extraordinary replacement funds	8,867,392	7,028,034
Sinking funds on U. S. Steel Corporation bonds	1,747,267	1,636,819
Net income	75,202,408	30,045,791
Deduct interest for the quarter on U. S. Steel Corporation bonds outstanding and premium payable on bonds redeemable under sinking funds	5,601,233	5,703,631
Balance	69,601,175	24,342,160
Dividends for the quarter on stocks of the U. S. Steel Corporation, viz.:		
Preferred, regular, 1¾ per cent	6,304,919	6,304,919
Common, regular, 1¼ per cent	[illegible]	
Common, extra, 1 per cent	[illegible]	
Surplus for the quarter	$51,859,450	$18,037,241

The directors have again favored the common stockholders with an extra dividend, making a total return of 7 per cent this year on the common stock. A year ago the dividend on the common stock was passed.

Total net earnings for the first nine months of this year were $227,656,739, against $79,118,508 in the corresponding period of 1915. The total surplus for the nine months, after dividends, was $132,678,157, against $20,915,025 in the same months of 1915.

Bids for Navy Shells

Bids opened Oct. 25, at the Frankford Arsenal, Philadelphia, for furnishing the navy with 93,333 4.7-in. shells, were as follows:

American-British Mfg. Company, entire quantity at $10.20; final delivery July 31, 1917.

Harrisburg Pipe & Pipe Bending Company, entire quantity, $11.34; final delivery July 31, 1917.

E. W. Bliss Company, entire quantity at $12.97; final delivery July 31, 1917.

Edwards Valve & Mfg. Company, to commence in 130 days, delivery 500 per day until completed, $15, entire quantity.

Bridgeport Projectile Company, entire quantity, $11.30; commence in 120 days, complete delivery July 31, 1917.

Ingersoll-Rand Company, entire quantity, at $14.50, complete delivery Sept. 30 next; $15.50, complete delivery Aug. 31 next; $16, complete delivery July 31 next.

Union Switch & Signal Company, entire quantity at $11.95; final delivery July 31 next.

Crucible Steel Company of America, 30,000 shells at $20.54; deliver 1000 in eight months and afterward 4000 per month.

Bethlehem Steel Company, entire quantity at $12.75; commence in six months and deliver at rate of 10,000 per month.

At a meeting of directors of the Brier Hill Steel Company, Youngstown, held last week, it was decided to retire all outstanding bonds at the next interest period, which comes on Feb. 1, 1917, and thus clear all obligations of this kind against the company. The bonds were issued to liquidate floating debt and for other corporate purposes, and were sold at the close of 1914, when trade conditions were extremely depressed. An issue of $3,000,000 had been authorized, but only $2,051,000 were sold.

Wharton Steel Company Acquired by Replogle Interests

Ernest Hillman, of J. H. Hillman & Sons Company, Pittsburgh, is understood to have concluded negotiations in the past week by which the Wharton Steel Company and its properties passed to J. Leonard Replogle, vice-president of the American Vanadium Company. Mr. Replogle has associates in the undertaking but details on this point have not been given out. One report has pointed to a connection of the Crucible Steel Company of America with the project. It is understood that coke ovens will be built and other considerable improvements made. The new owners of the property made an inspection of the blast furnaces and the Wharton iron mines this week.

It will be recalled that N. L. C. Kachelmacher and others took an option in the latter part of 1915 on the Wharton Steel Company properties at $1,500,000. These promoters exercised their option in January, 1916, but owing to complications no actual transfer of the property ensued. Before the last deal was put through it is understood that a trust company secured a release of any claim that Kachelmacher and his associates had by virtue of their option. The negotiations were then directly between the Wharton executors and the new owners. The properties include two large blast furnaces and a smaller one, also the Hibernia mine near Wharton, N. J., and smaller mines in the same group, including the Allen-Teabo, Orchard, Scrub Oaks and Mount Pleasant—in all about 5000 acres of iron ore lands. The Hibernia, which is the largest mine, has reserves estimated at 4,000,000 to 5,000,000 tons of ore. The Kachelmacher syndicate at one time had plans for by-product ovens and an open-hearth steel plant.

Large Argentina Pipe Contract

The manufacturing interests of this country should feel much gratification at the success of a cast-iron pipe company in securing a large foreign contract. At various times strong but generally unsuccessful efforts have been made by our pipe manufacturers to secure some of the important orders which are being placed by users in foreign countries. South America has long been a section in which European pipe manufacturers have ruled supreme. They have hitherto been able to control the South American pipe trade partly by making more attractive prices and partly by reason of the better shipping facilities from European to South American ports than from ports in the United States.

It is therefore a matter of no little exultation to record the booking by the United States Cast Iron Pipe & Foundry Company of a contract with a department of the government of Argentina for 60,000 metric tons, or about 66,000 net tons, of cast-iron pipe. This tonnage would be of major importance even for steel rails or other steel products frequently contracted for in large quantities, but it is exceptionally large for such a product as cast-iron pipe. The sizes run up to 44 in in diameter and will all be based on the metric system, the sizes from 12 in. up being 4 metres long, while the smaller sizes will be of the standard length used in this country. The price realized in this transaction is a shade under $60 per metric ton. The pipe will be produced subject to the inspection of engineers designated by the purchaser, and shipments to Buenos Aires will begin early in the coming year. The pipe purchased is not for use in only one municipality, but will be distributed by the government to various localities in Argentina.

It is interesting to note that the contract came to the United States as the result of sharp competition with foreign manufacturers and not because the pipe makers of other countries were not in position to take the business. It is more than twice as large as the Argentina pipe contract placed with a British company a few months ago, but which would have been taken by the United States Company if it had been able to meet the delivery requirements then insisted upon.

September's Phenomenal Export Record

Tonnage Exports of Iron and Steel Make New High Record, Exceeding August Figures by Over 45,000 Gross Tons

WASHINGTON, D. C., Oct. 31, 1916.—The great record of exports of iron and steel made in August was surpassed by a substantial margin in September, according to the official figures compiled by the Bureau of Foreign and Domestic Commerce. In both total values for the entire group and aggregate of tonnage commodities gains were made, but shipments of machinery showed a decline, which is attributed in part to the fact that the fitting up of new munitions plants in the belligerent countries has been nearly completed, current orders being chiefly for replacements and extensions. But for embargoes, a car shortage that is being acutely felt in the iron and steel trade, and the fact that September embraced but 25 official working days, the gain in total exports over August would have been much greater.

Exports of Iron and Steel

	September		Nine Months	
	1915 Gross Tons	1916 Gross Tons	1915 Gross Tons	1916 Gross Tons
Pig iron	29,222	64,122	156,929	302,504
Scrap	10,290	36,219	40,383	158,352
Bar iron	6,560	6,948	26,603	59,193
Wire rods	17,909	10,793	121,981	118,877
Steel bars	37,637	64,169	298,355	588,753
Billets, ingots and blooms, n.e.s.	54,782	163,104	407,901	1,051,669
Bolts and nuts	2,514	2,565	15,401	21,916
Hoops and bands	3,145	4,556	19,033	34,146
Horseshoes	671	837	13,973	7,043
Cut nails	649	877	3,134	3,672
Railroad spikes	600	1,579	4,838	20,140
Wire nails	9,558	15,369	66,434	114,710
All other nails, including tacks	938	1,686	6,134	7,764
Cast-iron pipes and fittings	6,319	7,558	36,769	49,931
Wrought pipes and fittings	8,615	17,724	92,230	111,238
Radiators and cast-iron house heating boilers	327	226	1,650	1,858
Steel rails	41,060	86,676	219,494	391,449
Galvanized iron sheets and plates	6,222	7,652	64,018	62,775
All other iron sheets and plates	4,524	2,869	16,101	34,305
Steel plates	26,235	24,385	161,995	196,194
Steel sheets	10,069	9,677	72,857	77,787
Structural iron and steel	26,714	29,336	165,905	211,869
Tin and terne plates	22,271	18,769	105,065	179,126
Barb wire	32,827	42,404	172,974	341,919
All other wire	21,659	23,363	168,061	211,566
Total	381,317	643,763	2,461,198	4,358,189

The total shipments of iron and steel products in September on a basis of values rose 138 per cent as compared with the same month of 1915 and gained 5.3 per cent over the record figures of August of this year. Tonnage commodities gained 70 per cent over September, 1915, and rose 7.5 per cent above the high-water mark of August. Shipments of machinery in September scored a gain of 68 per cent over the same month of 1915 but declined 17 per cent as compared with August of this year. Shipments of machine tools exceeded those of September, 1915, by 141 per cent but decreased 20 per cent as compared with the record, which was made in May of this year.

For the nine months ended September the total exports of iron and steel surpassed the high record of 1915 by no less than 147 per cent. Tonnage commodities gained 76 per cent over the corresponding months of 1915, while exports of machinery rose 83 per cent over 1915 and 74 per cent over the record total of the same period in 1913.

The value of all shipments of iron and steel products in September, 1916, was $90,895,592 as compared with $38,415,180 for the same month of 1915 and $12,531,102 for September, 1914. The previous high record for exports of iron and steel was made in August of this year, when the total was $86,297,703. For the nine months of 1916 the total was $619,853,667 as compared with $251,112,482 for the same period of 1915, which, in turn, exceeded any previous nine months' figures by $25,000,000.

EXPORTS OF TONNAGE IRON AND STEEL

The exports of iron and steel for which quantities are given aggregated 643,763 gross tons in September, 1916, as compared with 381,317 tons in the same month of 1915. The record for these exports was made in August of this year, when the total was 598,192 tons. The total for the nine months of 1916 was 4,358,189 gross tons, as against 2,461,198 tons for the same period of 1915.

An accompanying table shows the exports of tonnage iron and steel for September and for the nine months ended September, 1916, as compared with 1915.

Exports of Machinery

	September		Nine Months	
	1915	1916	1915	1916
Adding machines	$107,038	$83,617	$420,758	$1,040,486
Air-compressing machinery	66,186	119,178	351,075	632,733
Brewers' machinery	1,468	404	55,408	11,729
Cash registers	111,379	83,154	976,263	1,254,263
Parts of	4,908	5,176	75,643	108,886
Cotton gins	[illegible]	[illegible]	48,526	73,704
Cream separators	[illegible]	24,087	219,290	307,449
Elevators and elevator machinery	84,839	245,650	[illegible]	1,374,419
Electric locomotives	3,293	18,831	199,270	395,873
Gas engines, stationary	[illegible]	[illegible]	357,536	274,494
Gasoline engines	[illegible]	[illegible]	4,106,252	12,165,657
Steam engines	1,551,669	[illegible]	4,054,341	8,278,243
All other engines	54,746	471,654	[illegible]	3,926,284
Parts of	437,939	1,548,693	3,233,649	7,859,717
Laundry machinery, power	29,706	29,118	245,651	241,523
All other	[illegible]	51,998	186,884	198,459
Lawn mowers	[illegible]	[illegible]	255,274	182,182
Metal-working machinery (including metal-working tools)	3,256,973	7,901,328	[illegible]	63,218,202
Meters, gas and water	7,153	[illegible]	[illegible]	[illegible]
Milling machinery (flour and grist)	335,493	109,134	1,826,060	1,807,979
Mining machinery, oil well	[illegible]	[illegible]	1,004,264	[illegible]
All other	550,137	680,240	[illegible]	4,949,977
Paper-mill machinery	[illegible]	[illegible]	[illegible]	607,013
Printing presses	90,138	[illegible]	1,065,529	1,430,045
Pumps and pumping machinery	392,138	549,121	2,298,447	4,072,779
Refrigerating machinery (including ice-making machinery)	25,302	[illegible]	[illegible]	544,615
Sewing machines	[illegible]	[illegible]	4,469,366	4,209,705
Shoe machinery	[illegible]	119,721	[illegible]	[illegible]
Sugar-mill machinery	[illegible]	1,173,993	2,379,134	4,202,165
Textile machinery	183,120	[illegible]	[illegible]	2,609,985
Typesetting machines	44,313	[illegible]	[illegible]	[illegible]
Typewriting machines	[illegible]	905,932	5,121,475	8,243,380
Windmills	[illegible]	[illegible]	[illegible]	808,577
Woodworking machinery, saw-mill	[illegible]	30,637	[illegible]	321,352
All other	[illegible]	[illegible]	[illegible]	[illegible]
All other machinery and parts of	2,194,616	3,317,911	16,523,967	28,981,718
Total	$12,277,389	[illegible]	$91,674,277	[illegible]

EXPORTS OF MACHINERY

Exports of machinery in September, 1916, were valued at $20,508,555 as compared with $12,277,389 for the same month of 1915. August, 1916, still holds the record with a total of $24,657,597. Shipments of metal-working machinery aggregated $7,901,328 in September compared with $3,256,973 for the same month a year ago and $9,935,806, the high record of May of the present year. Exports of machinery of all kinds for the nine months ended September, 1916, were valued at $168,570,287 as compared with $91,674,277 in 1915 and $97,222,090 for the same period in 1913.

Details of the exports of machinery for September, 1915 and 1916, and for the two nine months' periods are given in an accompanying table.

IMPORTS OF IRON AND STEEL

Imports of tonnage iron and steel in September amounted to 28,557 gross tons as compared with 31,814 tons for the same month of 1915. The imports for the nine months of 1916 were 203,025 tons as against 392,518 tons in 1914.

The following table shows the imports of tonnage commodities for September, 1916, and for the nine months ended September as compared with 1915:

Imports of Iron and Steel

	—September—		—Nine Months—	
	1915 Gross Tons	1916 Gross Tons	1915 Gross Tons	1916 Gross Tons
Ferromanganese		9,787		58,474
Ferrosilicon	9,395	0	220,848	3,071
All other pig iron	5,273	5,394	57,117	34,251
Scrap	9,229	6,240	29,918	47,472
Bar iron	813	953	6,595	6,745
Structural iron and steel	49	13	1,202	1,081
Steel billets without alloys	2	163	1,118	8,298
All other steel billets	769	4,055	8,061	11,474
Steel rails	6,273	862	60,646	24,438
Sheets and plates	66	94	923	1,311
Tin and terne plates	31	51	2,220	826
Wire rods	614	296	3,870	3,284
Total	31,814	28,557	392,518	203,025

The failure of iron and steel imports to share in the upward movement that has marked the imports of many important classes of merchandise has been a notable feature of these statistics throughout the current calendar year to date, but merely reflects the enormous demand in the belligerent countries for these commodities for the manufacture of war material. W. L. C.

At a meeting of the New York Section of the American Chemical Society, which will be held Nov. 10 at the Chemists' Club, 50 East Forty-first Street, New York, the papers to be presented will bring out very forcibly the relation of the chemist to our public welfare. They are "The General Problem of Public Service Training," by Prof. Charles A. Beard, of Columbia University and of the Training School for Public Service; "The Status and Compensation of the Chemist in Public Service," by Prof. Frederick E. Breithut, of the College of the City of New York; "The Chemist in Public Service," by Dr. Harvey W. Wiley, formerly chief chemist, Bureau of Chemistry, United States Department of Agriculture; "The Chemist in the Service of New York City," by Dr. Otto H. Klein, director of the Central Testing Laboratory. The public is invited.

The Nagle Steel Company, Pottstown, Pa., has acquired the plant of the New Jersey Steel Company, Rahway, N. J., which has for some time been idle and in the hands of a receiver. The plant is equipped for the manufacture of steel castings and has a 25-ton open-hearth furnace and three Tropenas converters—two 2-ton and one 4-ton. The purchaser will probably operate the plant in the production of steel ingots and will ship them to Pottstown to be finished into plates.

The Stamford Rolling Mills Company, whose sales office is at 25 Broad Street, New York, is having additions built to its plants in Springdale and Stamford, Conn. These additions include an office building, another casting shop, storehouse extension and several small buildings to house the recovery plant and other departments.

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Transue & Williams to Be Expanded

The Transue & Williams Steel Forging Corporation has been formed, with an issued capitalization of 100,000 shares, to take over the business of the Transue & Williams Company, Alliance, Ohio, which was established in 1898, and has a capacity of 40,000 tons of drop forgings and 4000 tons of stampings per annum. A syndicate, composed of Hornblower & Weeks, Dominick & Dominick, and Kissel, Kinnicutt & Company, is taking subscriptions privately for 70,000 shares which are being offered at $45.50.

The net earnings for the first seven months of 1916 are said to have been $648,026, or at the rate of $12 per share per annum. Net earnings in 1915 were $671,251. Current net earnings are running at better than $100,000 a month. Unfilled orders on hand total over $3,600,000, which will keep the plants of the company in operation to capacity well into 1917. With the additional funds made available by the new financing the facilities of the company will be doubled. The management of the new company will be substantially the same as that of the old company.

The French Steel Industry in War Time

Report of Joseph G. Butler, Jr., as a Member of the American Commission Indicates a Doubling of the 1915 Output

Joseph G. Butler, Jr., Youngstown, Ohio, who represented the steel trade of the country on the American Industrial Commission to France, arrived at New York on the return journey of the commission on Oct. 29. While the general report of the commission, which went out under the auspices of the American Manufacturers' Export Association, will not be published until late in the year, THE IRON AGE is able to give to its readers below Mr. Butler's report of his investigations into the war status of the iron and steel industry of France:

W. W. NICHOLS,
Chairman American Industrial Commission to France.

My dear Sir: In accordance with your request, I beg to submit the following report, which is the result of observations and information obtained, regarding the particular industry represented by me.

Quite unfortunately, there were only a few visits to steel plants of any importance and the information gained is rather superficial. I noticed a dearth of labor-saving devices, and quite prominently the absence of safety appliances. I also observed that notices to the employees calling attention to probable dangers were not as plentiful as in any model plant in the United States. It is quite probable that there are many plants in France that are more up-to-date than those we visited.

I have information in regard to the condition of the iron and steel business in France at the outbreak of the war, but we are only concerned with its present condition and its probable condition when the war is ended.

The acquisition by Germany at the close of the so-called Franco-Prussian war resulted, as is well known, in Germany taking over the tremendous fields of iron ore and coal located in Alsace-Lorraine. It is my belief that this absorption is largely responsible for the prosperous condition of the iron and steel business in Germany and its being in second place in the world's production. I am assured by men prominent in the iron and steel trade in France, and by others connected with the government, that the war will not end until these valuable mineral deposits have been restored to France. It is remarkable that with this serious handicap, France has been able to accomplish so much in the way of steel supplies for its munition plants and other plants making war material accessories.

From my observations, nearly all the iron and steel now produced in France is being turned into war material and materials required for other purposes have been furnished in a minimum and scanty way. In other words, the whole of the iron and steel interests in France have been mobilized by the French Government.

PRODUCTION IN FREE TERRITORY DOUBLED

The last report I have seen on steel and iron production in France is dated May, 1915, but I am told on good authority that since that date the production has been doubled.

With the reacquisition of the Alsace-Lorraine iron and coal deposits and possibly the acquirement of other fields which our French friends seem to have in mind there will still be a shortage of coal. However, it is expected that after the war closes, France will necessarily be obliged to export a good portion of its production of iron and steel, by reason of the increased productive capacity of its iron and steel plants.

Incidentally I might mention that, when we were in Marseilles my attention was called by the Chamber of Commerce to the fact that France would be in a condition to export large quantities of iron ore from Algeria to the United States, and if this project could be worked out and return cargoes of American coal brought to France it would be very desirable, meeting the shortage of coal, which is inevitable. The analysis of this Algerian ore shows the quality to be such as would produce high-grade steel materials. A detailed analysis will be furnished to any one who may be interested.

It is interesting to note that in the departments of Calvados, Manche and Orne, there are rich deposits of iron ore yielding in some cases 45 to 50 per cent metallic iron. These deposits before the war were leased by the Thyssen group of German steel manufacturers, but are now in the hands of the French sequestrators. I understand that quantities of this ore also were in great demand, and frequently shipped to the iron works of South Wales.

I examined the steel plant making steel by the electrical process, but the examination was very brief. I have assurance, however, that the manufacture of steel by electricity in France has been very successful not only mechanically but financially and is sure to grow. There seems to be a large area in the eastern part of France, where water-power is available, and I think that many new plants, and much activity will prevail in this particular region, when affairs again become settled. The use of water-power will overcome to a large extent the shortage of coal.

LITTLE STEEL FROM THE UNITED STATES AFTER THE WAR

I think that when the war ends, the imports to France from the United States of iron and steel will be confined to special forms and that France will be able to compete not only with the United States, but also with other countries in the matter of exports of general iron and steel products.

With the port improvements contemplated at Bordeaux and Marseilles, world-wide markets will be opened for France. The contemplated improvements at both these places will, no doubt, be fully cared for in other special reports, or perhaps in the general body of the report which the commission may issue. The canal at Marseilles should receive special mention in the general report.

The tariff question in France is in about the same condition as in the United States, with the exception that in France customs duties are handled quickly and settled expeditiously by the government. Duties may be raised or lowered over night to meet contingencies.

WOMEN WORKERS

The labor in French iron and steel plants is paid very much less than in the United States; in many instances one-half and even less. There are very few disturbances, and dictatorial labor unions such as we have in the United States are unknown in France.

A large number of women are employed in France doing men's work, which keeps wages at a lower level than would otherwise be possible. All the members of the commission have seen in their travels women doing men's work, and performing manual labor which in our country would not be thought of for a moment. Em-

ployment of women in steel and munition plants has, of course, increased the number of women workers since the war commenced. This, I think, is largely brought about by the patriotic feeling which prevails all over France. "Working for France" is a slogan rooted and imbedded in the minds of the people, whether they are soldiers, or engaged in any other occupation which may tend to end the war and save France.

CO-OPERATION AMONG MANUFACTURERS

Co-operation in France among all manufacturers of iron and steel and in fact all other industrial works is marvelous, and could well be imitated in our own country. The various special branches of metal trades have both local and national syndicate organizations for the discussion of their trade problems, and means of voicing the particular needs of their trade, on which a majority sentiment has been expressed. These chamber syndicates are in turn combined into a National Union. These national unions are members of the Comite des Forges de France, which is the cap stone of the trade organizations of the steel and iron industries. The most striking fact to an American regarding the personnel of the governing board and general committee of the Comite des Forges de France is that a considerable number of its members are in one or the other of the legislative bodies, and practically hold positions at the head of the Government Committees, organized to look after the very business in which they are engaged.

In spite of the fact that at the beginning of trench warfare, France had lost behind the German line 80 per cent of her normal pig-iron production, and 70 per cent of her steel production, it has been possible by the utilization of lower grade ore in other districts of France, and which were not exploited to any extent previously, to increase the steel production of the country 100 per cent over that of last year. The interesting fact regarding this is that of the production which has been cut off the larger part in pig iron is of so-called Thomas iron (non-Bessemer), and in the case of steel, mostly "Martin" or acid open hearth. Neither of these products enters to any considerable extent into the manufacture of projectiles. The plants in the center and southern part of France were already producing the special qualities of steel required for artillery use, hence the amount of special quality steel brought in from foreign countries, in both the raw and semi-manufactured state, was an immediate necessity for the country at the outbreak of hostilities. It is also noticeable, and based on information obtained from leading steel manufacturers, that many idle and in some cases abandoned plants have been rehabilitated and utilized as far as possible. As a matter of fact, I am told that there is not a single idle plant of any kind formerly engaged in the manufacture of fabrication of steel that is not now in full operation, either in its original form or by being transformed into a munitions plant.

COMMERCIAL CO-OPERATION WITH GREAT BRITAIN

It is only too evident that the present pre-occupation of steel manufacturers is to bend every effort to assist in the final military victory of the Allies. However, I met steel manufacturers, conversing with them freely, and their mental attitude is that when the military victory has been achieved and France has again entered into possession of her own, they are determined to succeed in producing a close union with the British producers and thus prevent a rapid return of German industrial prosperity. With this fact in mind, it seems clear to me that the United States will have to make up its mind in which field it will choose to work. It certainly will be impossible to continue to hold a position of theoretical neutrality.

Welfare work in Le Creusot is in a high state of efficiency. Comfortable modern dwellings are furnished the employees at low rental. Hospital facilities are of the best and everything is done to bring the workman in close and harmonious relations with his employer.

It has been suggested that I embody in this report something with reference to the mines in France, but as the data concerning them have been printed in public documents of the French Minister of Mines, I will omit this detail with the single word that these reports include minerals of all kinds.

I am indebted to John Weare, representative of the United States Steel Products Company in France, for valuable information in the preparation of this brief report. JOSEPH G. BUTLER, JR.

REPORT OF CHAIRMAN OF COMMISSION

The preliminary report of the commissioner general of the American Industrial Commission to France, W. W. Nichols, assistant to chairman of the Allis-Chalmers Mfg. Company, Inc., and first vice-president of the American Manufacturers' Export Association, was made at the afternoon session of the annual meeting of the association at the Hotel Biltmore, New York, Oct. 31. It was in part as follows:

"France is ready, indeed eager, for a commercial reciprocity with the United States. We encouraged a belief that the United States could not have the remotest intention to exploit industrial France for the sole benefit of industrial United States; that to establish a permanent prosperity in its relations with France it must consult France's every need in order to cater to them.

"The Commission discovered a strong disposition on the part of industrial France to acquire the best in our American practice which with high efficiency has developed labor-saving devices for the very lines of endeavor to which the needs of France are now addressing themselves. This was found not only in the factories requiring machine and other tools, but in agricultural districts, ship and railroad terminals, etc. While France is in a receptive mood and prepared to weigh the merits of anything that will compensate for the losses sustained in the manual labor that has been in the past her mainstay it behooves us to consider well her invitation. The report which the Commission is preparing will be full of suggestion in a technical treatment under twenty-four heads which will be printed for distribution as soon as possible.

"The tour in France of about 3000 miles occupied about 45 days; half the distance was made in automobiles. Important enterprises were examined in the best manner in the limited time; discussions were held with chambers of commerce and other economical associations; government and statistical authorities were consulted in an earnest endeavor and by constant application to learn all that could be learned by aid of unusual facilities freely offered."

At the banquet held Tuesday evening Dr. E. E. Pratt, chief of the Bureau of Foreign and Domestic Commerce, made an address on "Where Do We Stand," which was much in line with his recent utterances on the subject before various trade bodies. He does not hold that the United States will be flooded by low-priced European products after the war.

Edward N. Hurley, chairman Federal Trade Commission, in talking of "The Exporter and the Nation," closely followed a prepared address in which he expressed the hope that the restraint which manufacturers had met in their efforts to build up the necessary organization for export trade would be removed by the passage of the Webb bill, with some essential amendments, at the coming session of Congress.

Mark Sullivan, editor-in-chief of *Collier's Weekly*, said that this country has suffered greatly from the cutting off of 1,000,000 immigrants a year. His guess was that it would be long before the old basis was restored. Exporting goods means making them cheaply, and this requires ample labor. He said it would not be surprising to see a labor famine in the United States in the next few months, and that the question of admitting Japanese and Hindoos would be raised.

Iron and Steel Markets

PIG IRON FOLLOWS STEEL

Prices Advance in an Unprecedented Way

Export Inquiry for Steel Nearly Half of Production—Pipe Prices Up

The pig-iron market of the past two weeks is practically without a parallel in the experience of present-day producers. Following advances of $1 to $2 a ton recorded a week ago, prices in all Northern selling centers have gone up $2 to $3 more, with every indication that higher levels will be reached.

The advances are unprecedented in being due, not to a clamorous demand for iron for quick shipment, as in all previous excited markets, but to a simultaneous effort of buyers to cover far forward requirements—in many cases through the second half of 1917.

The situation is, in a word, that the pig-iron market, after months of lagging, has cut loose and is now for the first time showing likeness to the war market for steel.

Merchant furnaces in all sections made heavy sales last week and many have now only a fraction of their 1917 output to offer. The movement was sudden. Less than two weeks ago foundries refused to consider iron for the second half of next year. A few days later they found the output for that period being rapidly taken up. At Buffalo the announcement that the Lackawanna Steel Company had contracted for the output of two Susquehanna furnaces for the second half of next year tightened that market appreciably.

In Southern iron excitement was caused by the report, now known to be incorrect, that in addition to the 200,000 tons recently bought from two companies for shipment to Great Britain and its Allies, a new order had been received for an equal amount. From $16 last week Alabama No. 2 iron has advanced to $17, and sales have been made in the past few days at this figure, for both first and last half of next year.

No. 2 Northern foundry iron has advanced to $23 at Ohio and western Pennsylvania furnace, to $24 at Chicago furnace and to $25 at Buffalo. A good many furnaces are now refusing to quote, expecting to get more money for the small part of their 1917 output that is unsold.

Steel-making irons have advanced $2 a ton, Bessemer now selling at $26 at Valley furnace and basic at $22, these prices being established by a 10,000-ton sale in each case. A 50,000-ton transaction in basic, shipments through all of 1917, involves monthly settlements at market prices. The great demand for Bessemer iron from abroad is felt as a factor in the Lake Superior ore situation, Bessemer ores being rapidly taken up for next year. Even more than $1 a ton advance for such ores is now talked of.

Lake ore reservations of a leading Eastern steel company are now fully 1,000,000 tons.

Export business declined by domestic steel manufacturers continues to mount up. For a time such offerings have been at the rate of nearly half our total steel output. While war steel contracts for the second half of 1917 have not been signed, the amount figured on is very large and 4c. to 4½c. will be paid on much of it, though a leading seller is asking less.

An interesting inquiry just received is for 27,000 tons of 6-in., 7-in. and 8-in. beams and 17,000 tons of ¾-in. to 2-in. angles for France.

Advances announced by the Carnegie Steel Company and Illinois Steel Company put plates for delivery at the convenience of the mill at 3.25c., Pittsburgh, shapes at 2.80c. and bars at 2.70c., Pittsburgh.

Effective Nov. 1 new discounts on lap weld iron and steel pipe, including line pipe, represent an advance of $2 a ton for black and galvanized. Iron and steel boiler tubes were advanced $4 a ton.

In woven wire fencing a shortened discount became effective this week—58 per cent as against 59 per cent previously.

October outputs have been the largest the industry has known. But car shortages are now a serious menace. Fuel and other costs are running up and delivery troubles promise to be worse as winter comes on. Spot coke prices have relaxed a trifle. Thus far $3.75 has been the basis of contract blast-furnace coke for the first half.

Estimates of the Steel Corporation's loss in ingot production in July, August and September due to hot weather and workmen under par run from 550,000 to 650,000 tons.

Pittsburgh

PITTSBURGH, PA., Oct. 31, 1916.

The past week has been an eventful one. Prices on Bessemer, basic and foundry pig iron have advanced fully $2 per ton, with indications that a much higher level will be reached. In semi-finished steel in the forms of billets and sheet bars prices are anything the mills care to quote if they will agree to furnish the steel. There probably would not be any trouble in getting $55 a ton at mill for soft Bessemer or open-hearth billets or sheet bars, while for export $60 would likely be paid and on high carbon billets for forging purposes practically $90 a ton at mill has been done. It is a runaway market in pig iron, semi-finished steel and on most lines of finished material. All in the trade admit that prices are dangerous and that a violent reaction is bound to come, but when this will happen is a question. Should peace negotiations suddenly start, the effect would probably be a quick and sharp decline. The export demand for pig iron and steel is so heavy that it is more than sufficient to take up any surplus producers can offer, and at better prices than they get from the domestic trade. The serious trouble now in the steel trade is the shortage in cars and labor, and this is holding back shipments and restricting output. No relief can be expected, but the situation is liable to get worse before it gets better. Some of the railroads are refusing to allow their cars to be loaded when they are routed to pass over other lines, claiming that these lines hold up their cars longer than

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton.	Nov. 1, 1916	Oct. 25, 1916	Oct. 4, 1916	Nov. 3, 1915.
No. 2 X, Philadelphia...	**$22.50**	$21.00	$19.75	$16.75
No. 2, Valley furnace...	**23.00**	21.00	19.00	15.00
No. 2 Southern, Cin'ti...	**19.90**	18.90	17.40	15.00
No. 2, Birmingham, Ala.	**17.00**	16.00	14.50	13.00
No. 2, furnace, Chicago*	**21.00**	22.00	18.50	16.50
Basic, del'd, eastern Pa.	21.50	21.50	20.00	17.00
Basic, Valley furnace....	**22.00**	20.00	19.50	15.50
Bessemer, Pittsburgh ...	**26.95**	24.95	23.45	16.95
Malleable Bess., Ch'go*.	**24.00**	21.50	19.00	16.50
Gray forge, Pittsburgh.	**22.95**	20.95	19.95	15.20
L. S. charcoal, Chicago.	20.25	20.25	19.75	16.75

Rails, Billets, etc., Per Gross Ton.				
Bess. rails, heavy, at mill	33.00	33.00	33.00	28.00
O.-h. rails, heavy, at mill	35.00	35.00	35.00	30.00
Bess. billets, Pittsburgh.	50.00	50.00	45.00	25.00
O.-h. billets, Pittsburgh..	50.00	50.00	45.00	26.00
O.-h. sheet bars, P'gh....	50.00	50.00	45.00	27.00
Forging billets, base, P'gh	**75.00**	73.00	69.00	42.00
O.-h. billets, Phila.....	50.00	50.00	48.00	32.00
Wire rods, Pittsburgh....	**60.00**	55.00	55.00	35.00

Finished Iron and Steel, Per Lb. to Large Buyers:	Cents.	Cents	Cents.	Cents.
Iron bars, Philadelphia..	2.659	2.659	2.659	1.659
Iron bars, Pittsburgh....	**2.85**	2.75	2.60	1.50
Iron bars, Chicago.....	**2.40**	2.35	2.25	1.45
Steel bars, Pittsburgh....	2.75	2.75	2.75	1.50
Steel bars, New York....	2.919	2.919	2.919	1.669
Tank plates, Pittsburgh..	4.00	4.00	4.00	1.50
Tank plates, New York..	4.169	4.169	4.169	1.769
Beams, etc., Pittsburgh..	2.75	2.75	2.75	1.50
Beams, etc., New York..	2.869	2.869	2.869	1.669
Skelp, grooved steel, P'gh.	**2.70**	2.50	2.35	1.45
Skelp, sheared steel, P'gh.	**2.80**	2.60	2.45	1.50
Steel hoops, Pittsburgh..	3.00	3.00	3.00	1.75

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire, Per Lb to Large Buyers:	Nov. 1, 1916 Cents.	Oct. 25, 1916 Cents	Oct. 4, 1916 Cents.	Nov. 5, 1915 Cents
Sheets, black, No. 28, P'gh	3.40	3.40	3.10	2.15
Sheets, galv., No. 28, P'gh	**4.00**	4.00	3.60	3.60
Wire nails, Pittsburgh.	2.70	2.70	2.60	1.85
Cut nails, Pittsburgh....	2.70	2.70	2.60	1.80
Fence wire, base, P'gh	2.65	2.65	2.55	1.75
Barb wire, galv., P'gh..	3.55	3.55	3.45	2.70

Old Material, Per Gross Ton				
Iron rails, Chicago ...	22.00	22.00	19.75	14.25
Iron rails, Philadelphia .	21.00	21.00	20.00	15.50
Carwheels, Chicago	**16.00**	14.50	11.75	12.50
Carwheels, Philadelphia..	**16.50**	16.00	14.50	13.50
Heavy steel scrap, P'gh.	19.00	19.00	17.50	15.00
Heavy steel scrap, Phila.	**16.50**	16.00	15.00	14.50
Heavy steel scrap, Ch'go.	**18.75**	17.75	16.25	12.50
No. 1 cast, Pittsburgh....	16.00	16.00	15.00	13.50
No. 1 cast, Philadelphia..	**16.75**	16.00	16.00	14.00
No. 1 cast, Ch'go (net ton)	14.75	14.75	12.50	11.75
No. 1 RR. wrot, Phila....	**23.00**	22.50	20.00	16.00
No. 1 RR. wrot, Ch'go (net)	**19.00**	18.00	16.75	14.25

Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt..	**$7.50**	$7.00	$3.25	$2.25
Furnace coke, future....	**4.00**	3.75	3.00	2.25
Foundry coke, prompt...	**7.00**	5.00	3.25	2.75
Foundry coke, future	4.50	4.50	3.75	2.60

Metals, Per Lb to Large Buyers	Cents.	Cents	Cents.	Cents.
Lake copper, New York.	**29.00**	28.50	28.25	17.87½
Electrolytic copper, N. Y.	28.50	28.50	28.50	17.87½
Spelter, St. Louis.....	**10.37½**	10.00	9.50	14.75
Spelter, New York.....	**10.62½**	10.25	9.70	15.00
Lead, St. Louis.....	*6.90*	6.92½	6.85	4.80
Lead, New York.....	7.00	7.00	7.05	4.90
Tin, New York.....	**41.87½**	41.25	39.25	35.87½
Antimony (Asiatic), N. Y.	13.00	13.00	10.00	35.50
Tin plate, 100-lb. box, P'gh.	$5.75	$5.75	$5.75	$3.15

necessary, thus adding to their troubles in trying to supply cars to shippers.

Pig Iron.—Prices advanced sharply the past week, with predictions that Bessemer will reach $30 or higher; basic, $27 to $28, and No. 2 foundry, $25 to $26. Early last week, Bessemer iron sold rather freely at $24 to $25, and basic at $20, Valley furnace. In the last two or three days, there have been bona fide sales of Bessemer at $26 and even $26.50; basic at $22, with reports that $23 has been done, while No. 2 foundry has sold at $23 in fairly large lots and $24 in small lots, all at Valley furnace. The new demand for Bessemer and basic iron is heavy, and the available supply is light. There are export inquiries in this market for 40,000 to 50,000 tons of Bessemer iron, mostly for France, but some for Italy. Domestic buyers are rushing to cover before the market gets higher. We note a sale of 10,000 tons of Bessemer iron at $26, Valley furnace, for first half delivery, 2000 tons for first quarter, 1500 tons at $26.50 for first half and other smaller sales aggregating probably 4000 to 5000 tons, at $26 to $26.50, Valley furnace. We also note a sale of 50,000 tons of basic iron for delivery over all of 1917 at the prevailing market prices each month; that is, the average price of basic iron each month as determined by quotations in THE IRON AGE are to apply on each month's shipments. We also note a sale of 5000 to 6000 tons of basic at $22, Valley furnace, and there are quite reliable reports that $23, Valley, has been done on basic iron for first half. Two or three furnaces have had to close down for lack of coke, and this is increasing the shortage in supply of iron. There have been moderate sales of No. 2 foundry at $23, Valley furnace, one concern taking 2000 tons for first four months of next year, and there have been some smaller sales at $24. We now quote standard Bessemer iron at $26 to $26.50; basic, $22 to $23; malleable Bessemer, $23 to $24; gray forge, $22 to $23, and No. 2 foundry, $23 to $24, all at Valley furnace, the freight rate for delivery in the Pittsburgh and Cleveland districts being 95c.

[*By Telegraph, Nov.* 1.—W. P. Snyder & Co. report the average price of Bessemer pig iron in October, made up from sales of 1000 tons or more, was $23.65, Valley furnace, an advance over the September average of $1.72. On basic iron the October average was $20.31 Valley furnace, an advance over the September average of $1.68.]

Billets and Sheet Bars.—It is still a question of where to find steel, the price being of minor importance in transactions. Reports are that an inquiry from the Allies has reached this country for an almost unbelievable amount of forging billets, and steel plants that make this grade of steel are being importuned to take as much of the order as they possibly can, and practically at their own price. Nothing official regarding this reported inquiry can be learned here, but it is the subject of a good deal of gossip in the local trade. It is not believed that any outside soft Bessemer or open-hearth billets or sheet bars could be picked up to-day at less than $55 per ton, and reports are that $60 has been done. All the steel mills are falling down badly on deliveries of steel, and the sheet and tin-plate mills are having their output cut down materially on account of not getting steel as fast as they need it. The export demand is still heavy, but local mills are not paying much attention to this, as they cannot take care of the domestic demand. Prices on forging billets are steadily going up, and we note a sale of 200 tons of high carbon billets at 4c. per pound, or practically $90 per ton, f.o.b., maker's mill. We have not changed our quotations this week, but it is doubtful if any soft Bessemer or open-hearth steel could be bought from any source to-day for reasonably early delivery at less than $55, at maker's mill. We quote base sizes and base carbons of open-hearth billets and sheet bars at $50 to $55 at mill, Youngstown or Pittsburgh, and forging billets at $75 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25.

Ferroalloys.—The new demand for ferromanganese is only fair, consumers evidently being covered for some time ahead and, in fact, it is said that some of the large steel mills are offering now and then small lots of 80 per cent ferromanganese for reasonably prompt shipment, desiring to take advantage of the very high

prices ruling. The local producer is also offering ferromanganese in the open market to some extent. We quote 80 per cent English at about $164, seaboard, but domestic 80 per cent is offered as low as $160 at furnace. We quote 18 to 22 per cent spiegeleisen at $50 to $55, and 25 to 30 per cent at $65 to $75, delivered. Nearly all consumers of ferrosilicon are covered for first half of 1917 and some for the entire year, so that the new demand is only fair. We quote 50 per cent ferrosilicon for delivery next year in lots up to 100 tons at $100; 100 tons to 600 tons, $99, and over 600 tons, $98, all per gross ton, f.o.b., Pittsburgh. We quote 9 per cent at $32; 10 per cent, $33; 11 per cent, $34; 12 per cent, $35; 13 per cent, $36.50; 14 per cent, $38.50; 15 per cent, $40.50, and 16 per cent, $43. We quote 7 per cent silvery at $26.50; 8 per cent, $27; 9 per cent, $27.50; 10 per cent, $28; 11 per cent, $29, and 12 per cent, $30. These prices are f.o.b., furnace, Jackson or New Straitsville, Ohio, and Ashland, Ky., all of which have a freight rate of $2 per gross ton to the Pittsburgh district.

Steel Rails.—Some fairly large orders for standard sections are being placed with the local producer for delivery at its convenience, which probably would not be before the last quarter of 1917. Occasionally a small order for 80, 90 or 100 lb. rails can be slipped in when the mill is rolling these sections, so that on some of these orders probably earlier delivery than second half of next year will be made. It is claimed that two or three of the leading railroads will have to buy considerably more quantities of standard sections for next year delivery, and are now trying to get on the rolling schedules of the mills with these orders. The demand for light rails is more active than for some time, running from 4000 to 5000 tons per week for new light rails. The demand for rerolled rails is also heavy and considerable export shipments are being made. We quote 25 to 45 lb. sections at $47; 16 and 20 lb., $48; 12 and 14 lb., $49, and 8 and 10 lb., $50, in carload lots, f.o.b. at mill, the usual extras being charged for less than carload lots. We quote standard section rails of Bessemer stock at $33 and of open-hearth $35, per gross ton, Pittsburgh.

Plates.—Mills that can make deliveries in second and third quarters of next year are quoting as high as 4.50c. on sheared plates and have taken orders at this price. It is said active inquiries are in the market for 20,000 to 25,000 steel cars and that more are coming. The Erie has placed 500 steel gondolas with the Pressed Steel Car Company. The Southern is in the market for 1000 to 1500 and the Burlington for 1500 box cars. Under present conditions it is difficult to quote the plate market, but in a general way it can be said the prices on ¼-in. and heavier sheared plates range all the way from 3.25c. at mill, which is the Carnegie Steel Company's new price with no promise whatever of delivery, up to 4.50c. quoted by mills that promise deliveries in second or third quarter of 1917. On plates for delivery in two to four months, prices range from 5c. to 5.50c., depending on the size of the order and the promise of deliveries that the buyer is willing to accept from the mill.

Structural Material.—The new inquiry continues fairly active. The McClintic-Marshall Company has taken 5000 tons for extensions to the open-hearth buildings of the Youngstown Sheet & Tube Company, and the American Bridge Company has taken 250 tons for a steel building for a pulverizing coal plant for the American Steel & Wire Company, Donora, Pa. The Carnegie Steel Company's price on plain material is 2.80c. at mill, with no promise as to deliveries, while another leading maker is quoting 2.85c. up to 3c. at mill for delivery in second and third quarters of 1917. We quote beams and channels up to 15 in. at 2.80c. to 3c. at mill, depending on deliveries, while small lots from stock for fairly prompt shipment are quoted at 3.25c. to 3.50c., Pittsburgh.

Sheets.—Effective Thursday, Oct. 26, the American Sheet & Tin Plate Company advanced its price on galvanized sheets to the basis of 5c. at mill for No. 28. This company is confining its sales to first quarter delivery, and has but limited amount to sell, all of which has been allotted to its district sales offices. The new demand for all grades of sheets is enormously heavy, while the acute car shortage is interfering, not only with shipments but also with production, the sheet mills having trouble in getting deliveries of steel promptly. The export demand is also heavy, and in sheets, as in tin plate, it is now beginning to look as though there may possibly be a shortage in the supply in the first half of 1917. One leading sheet mill in the Youngstown district was down nearly a whole week recently waiting for sheet bars to arrive. The fact that nearly all the mills are now quoting 5c. for galvanized sheets will probably prevent some litigation over former contracts for galvanized sheets made at 5c., against which certain buyers refused to specify when prices went considerably lower. Minimum prices now ruling are as follows: Blue annealed sheets, Nos. 3 to 8, 3.40c. to 3.50c.; box annealed, one pass cold-rolled sheets, 3.40c. to 3.50c.; No. 28 galvanized, 4.90c. to 5c., and tin-mill black plate No. 28, 3.30c. to 3.40c., all f.o.b. Pittsburgh.

Tin Plate.—The market continues very strong. Practically the entire output of the mills for the first half of 1917 is now under contract, and a very large quantity has been sold for shipment in the second half, the price to be as agreed upon hereafter. The export demand continues heavy, but some domestic mills are refusing to quote on export inquiries, stating they will not have enough tin plate to supply their domestic trade. With the constant advances in prices of raw materials and the growing shortage in supply of labor, it would not be surprising if prices on tin plate for the second half of 1917 would be $1 a box or more higher than for the first half. We quote bright plate, 14 x 20, at $5.75 to $6 per base box, f.o.b. Pittsburgh, for delivery in the first half of 1917. We quote terne plate, 200-lb. package, carrying 8 lb. of coating, at $9.50 per package; 10-lb. I.C., $9.80; 12-lb. I.C., $10.75; 15-lb. I.C., $11.15; 20-lb. I.C., $11.85; 25-lb. I.C., $12.65; 30-lb. I.C., $13.45; 35-lb. I.C., $14.30; 40-lb. I.C., $15.10, all f.o.b. Pittsburgh

Shafting.—Additional contracts for large quantities of shafting for delivery in the first quarter and first half of 1917 are still being made, mostly with automobile builders whose purchases for first half delivery are much larger than for any previous six months' shipments The implement makers and screw stock machine trade are also buying heavily, and a very large quantity of shafting is now on the books of the mills for first half delivery. Makers are catching up on shipments to some extent, and from one or two mills deliveries in eight to ten weeks can now be obtained. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots for delivery in the last quarter of this year and first quarter of 1917, and 10 per cent off in less than carload lots, f.o.b. Pittsburgh, freight added to point of delivery.

Wire Products.—Mills report that both the export and domestic demand for wire and wire nails is extremely heavy and the entire output for the remainder of this year is sold up, with some contracts placed for delivery in the first quarter. There is a decided scarcity in the supply of wire nails, and the car shortage is holding back shipments to a considerable extent. If present conditions continue, it is very probable there will shortly be another advance in prices. It is said the inquiry from France for 30,000 to 35,000 tons of plain, galvanized and varnished wire has not yet been placed. Premiums of 10c. to 15c. per keg on prompt shipments of wire nails could likely be obtained. Prices are as follows: Wire nails, $2.70, base, per keg; galvanized, 1 in. and longer, including large head barbed roofing nails, taking an advance over this price of $2, and shorter than 1 in., $2.50. Bright basic wire is $2.75 per 100 lb.; annealed fence wire, Nos. 6 to 9, $2.65; galvanized wire, $3.35; galvanized barb wire and fence staples, $3.55; painted barb wire, $2.85; polished fence staples, $2.85; cement-coated nails, $2.60, base, these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing are 58 per cent off list for carload lots, 57 per cent for 1000-rod lots and 56 per cent for small lots, f.o.b. Pittsburgh.

Railroad Spikes and Track Bolts.—The new demand for railroad spikes is dull and several makers are think-

ing seriously of shutting down their spike departments and diverting their steel to other products. The Nickel Plate is reported to have placed an order for 2000 kegs. The new demand for track bolts is only fair, but prices are firm. We quote track bolts with square nuts at 4.50c. to 4.75c. to railroads and 5c. to 5.25c. in small lots to jobbers, base. Track bolts with hexagon nuts take the usual advance of 15c. per 100 lb. Prices on spikes are as follows:

Standard railroad spikes, 4½ x 9/16 in. and larger, $2.65 to $2.75; railroad spikes, ½ to 7/16 in., $2.75 base; railroad spikes, ⅜ in. and 5/16 in., $3.05 base; boat spikes, $2.80 base, all per 100 lb., f.o.b. Pittsburgh.

Rivets.—Consumers are covering their needs in rivets for first quarter and first half of 1917, and it is said at full prices. The export demand is heavy, one local maker shipping out recently several carloads for India and one for South America. Makers are sold up over the next three or four months, but say they are having much trouble in getting deliveries of steel, and this is holding down their output. Makers' prices are firm and are as follows: Buttonhead structural rivets, ½ in. in diameter and larger, $4 per 100 lb., base, and conehead boiler rivets, same sizes, $4.10 per 100 lb., base, f.o.b. Pittsburgh. Terms are 30 days net, or one-half of 1 per cent for cash in 10 days.

Iron and Steel Bars.—The Carnegie Steel Company's price on steel bars is 2.70c. at mill, with no promise as to delivery. The implement trade is now reported to be well covered over the first haif of next year, and specifications against contracts for steel bars are heavy. The demand from carbuilders is more active than for a long time, and for reinforcing steel bars is especially heavy. Reports are that active export inquiries are in the market for 200,000 tons or more of steel rounds for the Allies for delivery late in 1917. One leading maker that can promise delivery in second and third quarters of 1917 is quoting steel bars at 2.75c. to 2.85c. at mill. We therefore quote steel bars at 2.70c. at mill, for very indefinite delivery, and 2.75c. to 2.85c. for specified delivery in second or third quarters. Iron bars have advanced, and we now quote refined iron bars at 2.85c. to 2.90c., and railroad test bars at 2.90c. to 3c., f.o.b. Pittsburgh.

Cold-Rolled Strip Steel.—A very large quantity of this material has been placed under contract with the makers for delivery in first quarter and first half of 1917 at $6.25 to $6.50 per 100 lb., f.o.b. Pittsburgh. The export demand continues heavy, but local makers say they are not paying much attention to export inquiry, as it will require their entire output the next six or eight months to take care of their domestic trade. We quote on contracts for first quarter delivery at $6.25 to $6.50 and on small lots for shipment this year from $6.75 to $7. Terms are 30 days net, less 2 per cent off for cash in 10 days, delivered in quantities of 300 lb. or more when specified for at one time.

Merchant Steel.—Prices are likely to be much higher in the very near future, and in fact one leading mill is said to have advanced all its prices 10 per cent or more. The market on semi-finished steel is steadily going up, and in addition deliveries by the mills are very slow. Prices in effect at this writing for small lots, but which may be advanced at any time, are as follows: Iron-finished tire, ½ x 1½ in. and larger, 2.75c., base; under ½ x 1½ in., 2.85c.; planished tire, 2.90c.; smooth channel tire, ¾ to ⅞ and 1 in., 3c. to 3.10c.; 1⅛ in. and larger, 3.10c.; toe calk, 3.25c. to 3.50c., base; flat sleigh shoe, 2.75c.; concave and convex, 2.85c.; cutter shoes, tapered or bent, 3.50c. to 3.75c.; spring steel, 4c. to 4.10c.; machinery steel, smooth finished, 3.10c. to 3.25c., all f.o.b. at mill.

Nuts and Bolts.—With the recent advance in prices of steel bars, an advance in prices of nuts and bolts is expected at any time. Makers report the new demand active and large contracts have been placed by consumers for delivery over first half of next year at full prices. The deliveries of steel by the mills are still slow and there is a keen shortage in labor supply, keeping down the output to a considerable extent. Discounts are as follows, delivered in lots of 300 lb. or more, where the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days.

Carriage bolts, small, rolled thread, 50 and 5 per cent; small, cut thread, 40, 10 and 5 per cent, large, 35 and 5 per cent.

Machine bolts, h. p. nuts, small, rolled thread, 50 and 10 per cent, small, cut thread, 40 per cent, large, 40 and 5 per cent.

Machine bolts, c. p. c. and t. nuts, small, 40 and 10 per cent, large, 35 per cent. Blank bolts, 40 and 5 per cent. Bolt ends, h. p. nuts, 40 and 5 per cent, with c. p. nuts, 35 per cent. Rough stud bolts, 35 per cent. Lag screws (cone or gimlet point), 50 and 5 per cent.

Forged set screws and tap bolts, 10 per cent. Cup and round point set screws, case hardened, 60 per cent. Square or hexagon head cap screws, 35 per cent. Flat, button, round or fillister head cap screws, 30 per cent.

Nuts, h. p. sq., tapped or blank, $2.70 off list; hex., $2.70 off. Nuts, c. p. c. and t. sq., tapped or blank, $2.40 off; hex., $2.80 off. Semi-finished hex. nuts, 60 and 5 per cent. Finished and case-hardened nuts, 60 and 5 per cent.

Rivets, 7/16 in. in diameter and smaller, 45, 10 and 5 per cent.

Wire Rods.—Consumers are having trouble in finding mills that will take their orders for wire rods, the supply not being large enough to meet the demand. Recently a sale of 500 tons of soft Bessemer No. 5 rods for export to Canada was made at $63, maker's mill. It is said that high carbon rods of special quality have sold at $75 to $80 at mill. We quote soft Bessemer, open-hearth and chain rods from $60 to $65 per gross ton, f.o.b. Pittsburgh.

Hoops and Bands.—The nominal price of the Carnegie Steel Company on steel hoops is 3c. and on steel bands, carrying steel bar extras, 2.70c., but with no promises as to delivery. Other makers are quoting steel hoops as high as 3.25c. and steel bands at 3c. for specified delivery.

Wrought Pipe.—Several of the leading pipe mills state that up to Nov. 1 orders entered on their books for tubular goods were more than double those of the entire year of 1915. The mills report that on lap-weld pipe and oil-country goods they are booked up solidly to July 1 or longer, but on butt-weld sizes can make deliveries in four to six weeks. Inquiries are in the market for large quantities of line pipe, some of which are likely to be placed in the near future. Discounts given on another page are firmly held, and a general advance in prices on black iron and steel pipe, and possibly also on galvanized, may be announced at any time.

Boiler Tubes.—The demand for locomotive and merchant tubes is still very heavy and local mills report they are booked up for their entire output for the next 10 to 12 months. On seamless steel tubing the two local producers say their entire output for all of 1917 is under contract. Prices under these conditions are naturally very strong and may be advanced at any time. Discounts are given on another page.

Coke.—The local market on prompt coke is much stronger. High-grade furnace coke for prompt shipment has sold in the last day or two at $7.50 per net ton at oven, while some makers are quoting as high as $8. Large contracts for next year have been closed, some consumers having covered their entire needs for first half, or all of 1917. Others have only partly covered, and a few consumers have not bought at all. We note one contract for 22,500 tons of high-grade Connellsville coke per month for first half at $3.75; another for 10,000 tons per month for all of 1917 at the same price; an Eastern contract for 9500 tons per month at $3.75, and a fourth contract for 7000 tons per month at the same figure. Some sellers are asking $4 and higher on contracts, but so far this price has not been paid, $3.75 per net ton at oven having been top of the market. The high price of coal and the shortage in labor and cars are mainly responsible for the very high prices ruling on coke. Some former producers of coke are shipping their coal, while the shortage in cars is holding back shipments of coke, and the scarcity of labor is keeping down output materially. At some large coke plants in the Connellsville region where pay day falls on Saturday, it is usually about Wednesday of the next week before the full force of men returns to work. Foundry coke is active. We quote best grades of Connellsville furnace coke for prompt shipment at

$7 to $7.50 per net ton at oven, and on contracts at $3.75 to $4. We quote 72-hr. foundry coke of best grades all the way from $6 to $7 per net ton for spot shipment, and on contracts from $4 to $4.50, while some makers are asking $5 at oven. The Connellsville *Courier* gives the output of coke in the upper and lower Connellsville regions for the week ended Oct. 21 as 398,096 net tons, a decrease over the previous week of 6750 tons.

Old Material.—The scrap market is stronger in tone. While new buying by consumers is not heavy, indications point to higher prices in the near future. Two items that are lagging are turnings and borings. Ordinarily blast furnaces would be buying large quantities of turnings for charging purposes, but just now it is a question of getting out as large an output as possible, and the matter of saving $1 to $2 a ton on the raw material is not considered. There is a scarcity in the supply of rerolling rails and low phosphorus melting stock, and prices are up fully $1 a ton. Some large consumers that have not bought any scrap to speak of for several months are expected to be in the market in the near future. In the Youngstown district one leading consumer has bought quite heavily of steel scrap recently, and another has been buying large quantities of special grade melting scrap to go into high carbon billets, and has paid as high as $20 or more for it. The minimum of the market on selected heavy steel scrap is $19, but some dealers are asking higher prices. We note sales of 200 tons of turnings at $7.50; 400 tons of borings at $9.25 to $9.50; 1500 tons of heavy steel scrap, in the Youngstown district early last week at $18.50; 2000 tons sold later at $19, and 1200 to 1500 tons of low phosphorus melting stock at about $22.50, delivered. Prices now being quoted by dealers for delivery in Pittsburgh and points that take the same rates of freight, per gross ton, are as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	$19.00 to $19.50
No. 1 foundry cast	16.00 to 16.25
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	20.50 to 21.00
Hydraulic compressed sheet scrap	15.00 to 15.25
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	12.00 to 12.25
Bundled sheet stamping scrap	11.00 to 11.25
No. 1 railroad malleable stock	15.75 to 16.00
Railroad grate bars	11.50 to 11.75
Low phosphorus melting stock	22.00 to 22.50
Iron car axles	38.00 to 39.00
Steel car axles	38.00 to 39.00
Locomotive axles, steel	39.00 to 40.00
No. 1 busheling scrap	14.50 to 15.00
Machine-shop turnings	7.50 to 7.75
Old carwheels	15.00 to 16.00
Cast-iron borings	9.00 to 9.25
*Sheet bar crop ends	19.00 to 19.50
No. 1 railroad wrought scrap	19.50 to 20.00
Heavy steel axle turnings	11.00 to 11.50
Heavy breakable cast scrap	14.00 to 14.50

*Shipping point.

Chicago

CHICAGO, ILL., Oct. 31, 1916.—(*By Wire.*)

The advance in pig-iron prices has not yet been checked nor is there evidence as to when it will be. At Chicago $24 is being asked for foundry malleable and basic irons and $30 for standard Bessemer. The minimum quotation of Southern furnaces is up another dollar to the basis of $17, Birmingham. The buying of malleable Bessemer and of steel-making iron last week included several large lots, and the leading interest reports that it is very close to the time when it will have no iron to sell. Some of the charcoal producers are withdrawing from the market. The buying of equipment by the railroads included orders last week for more than 5500 cars, for which at least 50,000 tons of steel has been booked by the mills; several small lots of rails and between 11,000 and 12,000 tons of tie-plates, of which the largest order—8000 tons—was placed by the Atlantic Coast Line at Chicago. In addition to the cars bought there is on the eve of being placed an additional 10,000. There is also a very general inquiry from the railroads for fastenings for delivery in the latter part of next year. In connection with the booking of railroad orders, it is of interest to note that the recent large Russian order for cars has been canceled. The spectacular advance in the prices of some of the products which had lagged is spreading over the entire list of materials and on Monday the leading interest announced an increase of $2 per ton in the price of bars and shapes and $5 per ton for plates. The prices of old material are continuing their advance, increases of from 50c. to $1.50 per ton being reported for nearly all classes of scrap. A large interest came into the market for steel scrap and bought practically all that sellers were willing to undertake to deliver.

Rails and Track Supplies.—The inquiry of the Great Northern for 30,000 to 40,000 tons of rails for 1918 delivery has not been closed and remains the most important now open for consideration. There is also a general inquiry for track fastenings, while sales of tie-plates last week were important. Among these the purchase of 8000 tons of steel tie-plates by the Atlantic Coast Line at Chicago is particularly significant of the abnormal conditions existing. Quotations are as follows: Standard railroad spikes, 2.75c., base; track bolts with square nuts, 3.25c. to 3.50c., base, all in carload lots, Chicago; tie-plates, $52 to $54, f.o.b., mill, net ton; standard section Bessemer rails, Chicago, $33, base; open-hearth, $35; light rails, 25 to 45 lb., $40; 16 to 20 lb., $41; 12 lb., $42; 8 lb., $43; angle bars, 2c., Chicago.

(*By Mail*)

Pig Iron.—The price of standard No. 2 Northern foundry iron, malleable Bessemer and basic has been advanced to $24 at Chicago furnace and quotations are out on high phosphorus Northern foundry iron, silicon 1.75 to 2.25 per cent, on the basis of $18.50, Birmingham. The advance in the price of Southern iron has not been so rapid, as $17, Birmingham, can still be done for No. 2, while iron running 3 per cent in silicon has been sold at the equivalent of $18, Birmingham. Other sales of Southern high silicon iron have been made, however, at prices relatively higher, one quotation for 6 per cent silicon iron approximating $30, Chicago. For standard Bessemer iron, as high as $30, Chicago, is being asked, sales last week being at prices ranging upward from $26. There has been very little abatement of the demand for iron, though the interest in spot iron has not materialized to the extent forecast by the inquiry of a week ago. There is, however, a disposition on the part of a number of melters within the Chicago switching district to anticipate first quarter contracts and the total of advanced shipments is reported as steadily increasing. New inquiry for malleable Bessemer is noted and the local malleable foundry which was in the market for several thousand tons is reported to have closed for a large part, if not all, of the iron desired. The principal seller in this market is rapidly reducing the amount of iron it has remaining for sale in the first half in both foundry and steel-making grades. In other hands there is a round tonnage of standard Bessemer still available. Sales of charcoal iron have been sufficiently heavy to cause at least two of the principal producers practically to withdraw from the market. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of $1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5	$20.25 to $20.75
Lake Superior charcoal, No. 1	20.75 to 21.25
Lake Superior charcoal, No. 6 and Scotch	21.25 to 21.75
Northern coke foundry, No. 1	24.50
Northern coke foundry, No. 2	24.00
Northern coke foundry, No. 3	23.50
Northern high phosphorus foundry	22.50 to 23.00
Southern coke, No. 1 f'dry and 1 soft	21.50 to 22.00
Southern coke, No. 2 f'dry and 2 soft	21.00 to 21.50
Malleable Bessemer	24.00
Basic	24.00
Low phosphorus	40.00
Silvery, 8 per cent	34.50 to 35.50
Bessemer ferrosilicon, 10 per cent	35.50

Plates.—The leading mill to-day advanced its price for plates, for such delivery as it may be able to make in 1917, to 3.25c., Pittsburgh, an advance of $5 per ton.

The demand for prompt shipment plates is unceasing and sales at prices ranging from 3.50c. to 4.50c., depending upon the widths of the plates desired, are being regularly made. The demand for plates for both commercial and naval shipbuilding is so great as to bring a steady stream of inquiry from the East to Western mills. We quote for Chicago delivery of plates from mill, at its convenience, 3.439c. For prompt shipment we quote 3.539c. to 3.939c. in widths up to 72 in., and for wide plates 4.189c. to 4.689c.

We quote for Chicago delivery of plates from jobbers' stocks, 3.75c.

Sheets.—Sellers of sheets do not report a large and insistent volume of inquiry as uniformly as a week ago. Some of the mills still have under negotiation more business than can be taken care of within the delivery period required, while other mills, after the heavy selling of the past few weeks, report some falling off in demand. We quote, for Chicago delivery, blue annealed, No. 16 and heavier, 3.289c. to 3.439c.; box annealed, No. 17 and lighter, 3.589c. to 3.689c.; No. 28 galvanized, 4.689c. to 5c.

We quote for Chicago delivery of sheets out of stock, minimum prices applying on bundles of 25 or more, as follows: No. 10 blue annealed, 3.40c.; No. 28 black, 3.80c. to 3.90c.; No. 28 galvanized, 5.15c. to 5.25c.

Structural Material.—The large number of orders for equipment which the railroads are placing suggests that better delivery promises are being made than the raw material situation would seem to warrant, but it is well known that the car shops have for some time been in a position to build a much larger number of cars than they have been able to secure. Last week orders for some 5500 cars were placed, in which were included 2000 box for the Baltimore & Ohio, 1000 box for the Erie, 1000 gondolas for the New York Central Lines, 500 refrigerator for Armour & Co., 500 box for the San Pedro, Los Angeles & Salt Lake City, and 250 refrigerators each for Morris & Co. and Wilson & Co., Chicago packers. Inquiry embraces an even larger number, including 2000 hoppers for the Chesapeake & Ohio, 1500 box for the Chicago, Burlington & Quincy, 1000 hoppers for the Baltimore & Ohio, 2000 gondolas, 600 ballast and 400 general service box for the Illinois Central, 1000 stock for the Missouri, Kansas & Texas and 1000 box for the Pere Marquette. Among the contracts for fabricated steel placed last week only one exceeded 300 tons, that being for 370 tons to be furnished by the Virginia Bridge & Iron Company for an approach to the Memphis bridge. Other contracts placed aggregated about 700 tons. The price of structural steel from mill for future delivery contracts has been advanced $2 per ton and we quote for Chicago delivery 2.989c.

We quote for Chicago delivery of structural steel out of jobbers' stocks, 3.25c.

Bars.—The minimum price of 2.60c., Pittsburgh, for mild steel bars has been advanced $2 per ton. This is still $3 per ton below the prices being asked for prompt shipment bars, for which there is a continuous but not large demand. There is a limited selling of iron bars, with prices ranging from 2.40c. to 2.50c., Chicago, but most of the users of this material are now under contract for the first quarter and first half. We quote mill shipment, Chicago, as follows: Bar iron, 2.40c. to 2.50c.; soft steel bars, 2.889c.; hard steel bars, 2.50c.; shafting, in carloads, 20 per cent off; less than carloads, 15 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 3.25c.; bar iron, 3.25c.; reinforcing bars, 3.25c. base with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting net list.

Rivets and Bolts.—There is a fair aggregate of inquiry for bolts and nuts in the market, largely from the railroads, but also from the hardware jobbing trade. In connection with current rivet sales, irregularities in price are still reported. We quote as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 50-5; cut thread, 40-10-2½; larger sizes, 35-2½, machine bolts up to ⅜ x 4 in., rolled thread, with hot pressed square nuts, 50-10; cut thread, 50; large size, 40-5; gimlet-point coach screws, 50-5; hot pressed nuts, square, $2.70 off per 100 lb.; hexagon, $2.70 off. Structural rivets, ¾ to 1¼ in., 4c. to 4.15c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

Store prices for rivets have been advanced and we quote as follows: Structural rivets, 4.25c.; boiler rivets, 4.35c.; machine bolts up to ⅞ x 4 in., or larger sizes, 10c.; carriage bolts up to ⅞ x 6 in., or larger sizes, etc. Hot pressed nuts, square, $3 and hexagon, $3 off per 100 lb. lag screws, 50-5.

Cast-Iron Pipe.—Business in the West is of minor importance, the only letting of any size being the division of 1400 tons at Kansas City, Mo., equally to the leading interest and the American Cast Iron Pipe Company. We quote as follows, per net ton, Chicago: Water pipe, 4 in., $34.50; 6 in. and larger, $31.50, with $1 extra for Class A water pipe and gas pipe.

Wire Products.—An advance in the discount on fence to the basis of 58 per cent has been announced. Floating inquiry for barb wire for export runs into extravagant quantities, but is bringing out few quotations. Many domestic manufacturers are still in need of wire in excess of what they are able to secure and many interesting pledges of future orders are being made in the endeavor to secure accommodation at the present time. We quote as follows per 100 lb.: Plain wire, Nos. 6 to 9, base, $2.939; wire nails, $2.889; painted barb wire, $3.039; galvanized barb wire, $3.739; polished staples, $3.039; galvanized staples, $3.739; all Chicago.

Old Material.—Prices of scrap have advanced by leaps and bounds in the last week, following heavy buying of steel scrap by a large local consumer. In connection with this buying, a price of $17.50 was established for shoveling steel and $18.75 for heavy melting steel. There has also been very general buying of all other grades of old material, though the limited amount of scrap available in the market has restricted the quantities purchased. Low phosphorus scrap in particular has advanced sharply and steel knuckles, couplers and springs are roughly quoted as worth a cent per pound. Reports are current of sales of steel car axles at prices as high as $40, and carwheels are being quoted by some of the dealers on the basis of $16 to $16.50, Chicago. The railroads are still admittedly making little effort to gather up scrap for the reason that every available car is needed for other service, and railroad offerings continue light. Lists issued last week include 3500 tons from the Chicago & Northwestern, 4000 tons from the Santa Fe, 1100 tons from George W. Jennings, and small lists from the Chicago & Alton and Monon railroads. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	$22.00 to $22.50
Relaying rails	21.00 to 22.00
Old carwheels	16.00 to 16.50
Old steel rails, rerolling	21.00 to 21.50
Old steel rails, less than 3 ft	20.50 to 21.00
Heavy melting steel scrap	18.75 to 19.00
Frogs, switches and guards, cut apart	18.75 to 19.00
Shoveling steel	17.50 to 17.75
Steel axle turnings	10.00 to 10.50

Per Net Ton

Iron angles and splice bars	$22.50 to $23.00
Iron arch bars and transoms	24.50 to 25.00
Steel angle bars	18.50 to 19.00
Iron car axles	33.00 to 34.00
Steel car axles	37.50 to 38.00
No. 1 railroad wrought	19.00 to 19.50
No. 2 railroad wrought	18.00 to 18.50
Cut forge	18.00 to 18.50
Pipes and flues	13.50 to 14.00
No. 1 busheling	15.50 to 16.00
No. 2 busheling	11.00 to 11.50
Steel knuckles and couplers	18.50 to 19.00
Steel springs	19.00 to 19.50
No. 1 boilers, cut to sheets and rings	12.25 to 12.75
Boiler punchings	15.50 to 16.00
Locomotive tires, smooth	22.75 to 23.25
Machine-shop turnings	6.50 to 7.00
Cast borings	7.25 to 7.75
No. 1 cast scrap	14.75 to 14.25
Stove plate and light cast scrap	11.25 to 11.75
Grate bars	11.25 to 11.75
Brake shoes	11.25 to 11.75
Railroad malleable	13.00 to 13.50
Agricultural malleable	12.00 to 12.50

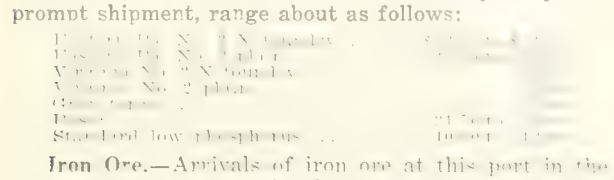
The Bilrowe Alloys Company, Tacoma, Wash., manufacturer of ferrotungsten, ferromanganese and other alloys, plans immediate extensions to its plant to care for increasing business. It has recently closed contracts with Eastern steel manufacturers which call for prompt delivery.

Philadelphia

PHILADELPHIA, PA., Oct. 31, 1916.

Early this week the leading producer of Virginia pig iron withdrew from the market, but prior thereto booked an enormous tonnage at around $21.25, delivered. Eastern Pennsylvania makers have advanced their quotations, but even at the higher levels are reluctant to sell while the coke market is in its present upset condition. Several thousand tons of Virginia basic have been taken by a Lebanon interest at $19, furnace, or $21.50, delivered. An equal tonnage is understood to have commanded $22, delivered. Railroads and car and ship builders are seeking to cover their future needs of plates, the quotations for which are unchanged. Billets and sheets are stronger. The coke situation continues a source of worriment and uncertainty, with prices higher or at least undiminished. Rolling-mill grades of old material are in active demand and stronger. The entire scrap market has a better tone, in large part because Western points are drawing on the East for material. So far, local mills have not shown interest in heavy melting steel; meanwhile it is gaining strength.

Pig Iron.—The leading producer of Virginia iron has withdrawn from the market for any delivery, making the second Virginia maker which is not selling. Eastern Pennsylvania furnaces are asking higher prices, and most of them are not anxious to sell at the advances. The situation caused great activity in Virginia iron last week, but the withdrawal of the principal maker on Monday of this week called a halt in buying. The extent to which the purchasing referred to exceeded that for the products of other districts is illustrated by the case of one seller who in the week placed 11,000 tons, all but 1000 tons of which will be shipped from Virginia furnaces. Most of the buying was on the basis of $18.50, furnace, or $21.25, Philadelphia, for deliveries running well into next year. Virginia producers who still have iron to offer are quoting $20 to $20.50, furnace, for No. 2 X, to which must be added a freight rate of $2.75 for Philadelphia delivery. A moderate-sized lot of eastern Pennsylvania No. 2 plain was taken at $22.75, furnace, or $23.96, delivered. For one brand of Pennsylvania No. 2 X, $23.50, furnace, is quoted, making the delivered price $24.35. Another eastern Pennsylvania brand is held at $23, furnace, but quotations are given most reluctantly. The delivered price in this case is $23.79. Buffalo No. 2 X is quoted at $25, which, with a freight rate of $2.58, removes it as a factor in this market. Lake Superior charcoal iron is higher at about $23.84, Buffalo, for the less expensive grades. The subsidiary of a shipbuilding company is taking bids on 3000 tons of foundry iron for first half delivery. The Pennsylvania Railroad's total purchases in the past 10 days aggregate 8000 to 9000 tons of miscellaneous grades, including charcoal iron, for delivery at Altoona in the first half. A Lebanon steel company closed for 15,000 tons of basic, for about half of which it paid $21.50, delivered, or $19, furnace, for Virginia iron. Standard low phosphorus is unchanged at $40 to $42, delivered, but is less active, both because of the high price and the fact that the producers have comparatively little to sell for the next six months. Southern iron is quoted at $16, Birmingham, but the car shortage practically precludes any coming here. Quotations for standard brands delivered in buyers' yards, prompt shipment, range about as follows:



Iron Ore.—Arrivals of iron ore at this port in the week ended Oct. 28 consisted of 6474 tons from Sweden and 7600 tons from Cuba.

Ferroalloys.—English 80 per cent ferromanganese, first half delivery, is quoted at $165, seaboard. The report is persistent that domestic makers have stiffened their quotation, but on the other hand the sellers of imported material continue to encounter concessions. Last week 500 tons of English ferromanganese arrived here. The quotation for 50 per cent ferrosilicon is $100, Pittsburgh, with premiums asked for prompt deliveries or small quantities. Bessemer, 11 per cent, is quoted at $38.44. A large steel company is in the market for 3000 to 4000 tons of Bessemer and non-Bessemer ferrosilicon. Spiegeleisen, 20 per cent, is quoted at $45.50, furnace.

Fluorspar.—There is a good demand for this material, with some of the sellers not in a position to quote. For washed gravel, $10, mine, is asked, and for No. 1 lump, $12.50.

Plates.—Atlantic coast shipyards are seeking to protect themselves on plates, and the railroads and car-builders are busily endeavoring to locate material and assure deliveries. The growing inquiry for freight car material will strengthen the demand for universal rolled plates, the call for which has been comparatively easy. A prominent mill has its output sold or promised for the next six months and counsels caution on the part of its representatives. Tank plates are unchanged at 4.159c., Philadelphia, and ship plates at 4.409c. to 4.659c. For marine steel and boiler steel 10c. is quoted. An isolated quotation of 3.659c. to 4.409c., Philadelphia, is still made by one mill, which is, however, pretty well sold up.

Bars.—While the nominal quotation on steel bars is 2.859c., Philadelphia, important makers in the East quote 3.009c. At the lower price only regular and preferred customers are being cared for. Iron bars are unchanged at 2.659c., Philadelphia.

Structural Material.—The only new fabricating job in this territory is one calling for 500 tons for a building for the Crown Cork & Seal Company, Baltimore. The Lenoir City Car Works (Southern Railway) is in the market for several thousand tons of shapes, plates and bars, including 2000 to 3000 tons of shapes. Pressure is being brought on Eastern mills to induce them to go beyond the second quarter, but at least one is not desirous of entering the first, although it has done so in some cases. The quotation is strong at 2.85c., Pittsburgh, or 3.009c., Philadelphia.

Billets.—A manufacturer making war munitions in this State is asking for quotations on 4900 tons of 8 x 8-in. billets, conforming to British specifications for shell steel, delivery to be at the rate of 700 tons per month, beginning at once. Makers of billets have few to sell, to the end of the first quarter, aside from those they have reserved for regular customers. Open-hearth rerolling billets are quoted at $50 to $55, and high carbon billets at $65 to $75.

Sheets.—The market is more active and stronger. Large quantities of sheets are being sought for export, and the exporters in some cases have to content themselves with smaller tonnages than they inquire for. No. 10 blue annealed sheets are quoted at 3.409c. to 3.659c., Philadelphia.

Coke.—The situation is a mixed one as to prices, but all interests are quoting higher than a week ago for both furnace and foundry for prompt delivery. The coke operators are not interested in contracting, with spot prices where they are. Spot furnace ranges from $7 to $7.50 per net ton at oven, with some interests asking up to $7.75. Contract furnace is nominal at $3.75 to $4. Spot foundry mostly ranges from $7.50 to $8 per net ton at oven, although in some quarters $8.50 is quoted. A contract for the first half is reported, in which $6 was paid for foundry coke, and the sellers thereafter wanted $6.25 per net ton at oven. The seriousness of the situation is being emphasized by all concerned. Freight rates from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Old Material.—Local mills have not shown much interest in heavy melting steel, but rolling-mill grades are active and strong. The better conditions are largely due to the fact that Pittsburgh and other Western points are taking material from the East, in consequence of which nearby mills will have to pay more for material when they want it. Quotations for delivery in buyers' yards in this district, covering eastern

Pennsylvania and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$16.50 to $17.00
Old steel rails, rerolling	20.00 to 21.00
Low phos. heavy melting steel scrap	23.00 to 24.00
Old steel axles (not export)	30.00 to 35.00
Old iron axles (not export)	45.00 to 50.00
Old iron rails	21.00 to 22.00
Old car wheels	16.00 to 17.00
No. 1 railroad wrought	25.00 to 26.00
Wrought-iron pipe	10.25 to 10.75
No. 1 forged	12.00 to 13.00
Bundled sheets	12.00 to 13.00
No. 2 busheling	10.00 to 11.00
Machine-shop turnings	9.00 to 10.00
Cast borings	10.00 to 11.00
No. 1 cast	16.00 to 17.00
Grate bars, railroad	12.00 to 13.50
Stove plate	11.00 to 11.50
Railroad malleable	13.00 to 14.00

A. M. Wood & Co., Inc., dealers in iron and steel and residues specialties, have been compelled to take larger quarters on account of rapidly increasing business, and are now occupying suite 305-7 Commercial Trust Building, Philadelphia.

Cincinnati

CINCINNATI, OHIO, Oct. 31, 1916.—(*By Wire.*)

Pig Iron.—Southern prices have again been advanced and $17, Birmingham basis, for either this year or the first half of next, is now the minimum, but few furnaces are willing to take business at this figure. The resale iron in the South appears now to be mostly in the hands of consumers who are not willing to parcel it out, although a few of them have overbought. Some Southern iron has been sold as high as $18, but this was special analysis iron and does not represent the market unless it involves a case where prompt shipment is desired. Nearby business is somewhat limited, but the order books of different sales agencies show that last week was one of the busiest periods experienced for some time. Sales of Southern iron include 2000 tons of No. 2 to a northern Ohio melter, 1000 tons of mixed grades to a southern Ohio melter and a number of orders ranging from 100 to 700 tons distributed through southern Ohio and Indiana. An Indiana melter bought 600 tons of malleable for first half shipment. Northern prices are uncertain and only a limited tonnage would be accepted from former customers at $21, Ironton, for shipment either this year or the first half of 1917. No open quotations for nearby delivery are out, as producers in that district have sold too far ahead. Virginia irons have been withdrawn from the market and no quotations are available. It was thought that Virginia production would relieve the situation here, but this does not seem to be correct. Ohio silvery irons have been advanced to $29 to $30 at furnace for an 8 per cent analysis, while 10 per cent Bessemer ferrosilicon is $34 to $35. Some business has been done at the maximum figures given. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b., Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	$20.50 to $20.90
Southern coke, No. 2 f'dry and 2 soft	19.90 to 20.10
Southern coke, No. 3 foundry	19.40 to 19.90
Southern coke, No. 4 foundry	18.90 to 19.10
Southern gray forge	18.40 to 18.90
Ohio silvery, 8 per cent silicon	29.50 to 31.00
Southern Ohio coke, No. 1	20.50 to 20.90
Southern Ohio coke, No. 2	19.90 to 20.50
Southern Ohio coke, No. 3	19.40 to 19.90
Southern Ohio malleable Bessemer	20.50 to 21.00
Basic, Northern	20.50 to 21.00
Lake Superior charcoal	23.50 to 24.00
Standard Southern carwheel	25.40 to 25.90

(*By Mail*)

Coke.—In the Wise County, Connellsville and Pocahontas districts furnace coke for prompt shipment has been sold lately all the way from $4.50 to $7.50 per net ton at oven and 72-hr. coke at $5 to $8. The price depends almost entirely on the ability of the producers to make shipments. The same condition, as far as foundry coke is concerned, exists in the New River district. It is not possible to name any contract price that would hold 24 hours. It is probable that some business could be taken for furnace coke for shipment in the first half of next year around $4 at oven with about a 50c. advance for foundry coke, but to-day no producers are willing to take on business even at this figure. The advance in pig-iron prices has enabled oven operators who make their quotations on a sliding scale basis to make corresponding advances.

Finished Material.—The local rolling mill is quoting No. 28 galvanized sheets at 5.40c.; No. 28 black, 4.15c. and No. 10 blue annealed at 3.90c., f.o.b. Cincinnati or Newport, Ky. Local warehouses are receiving shipments on material ordered some time ago and are able to fill rush orders, but they will not accept any contracts for shipments far in advance. Local store prices on steel bars and small structural shapes are 3.35c. to 3.40c.; reinforcing concrete bars, 3.55c.; cold-rolled steel, 2-in. and larger, 3.90c.; cold-rolled shafting, 10 per cent plus the list price; No. 10 blue annealed sheets, 3.60c; wire nails, $3 per keg, base, and barb wire, $3.85 per 100 lb. It is stated that nail stocks of hardware merchants are running low and it is a matter of much concern as to getting further supplies on time.

Old Material.—Advances have been made all along the line, except on bundled sheet scrap, cast borings and steel turnings. Rerolling steel rails are quoted around $18.75 per gross ton, which is about $2 above last week's figure. The demand is very good from all sources, and the enhanced cost of pig iron is causing the substitution of scrap material possible. The following are dealers' prices, f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton

Bundled sheet scrap	$12.00 to $12.50
Old iron rails	19.25 to 19.75
Relaying rails, 50 lb. and up	24.25 to 24.75
Rerolling steel rails	18.75 to 19.25
Heavy melting steel scrap	16.75 to 17.25
Steel rails for melting	16.25 to 16.75

Per Net Ton

No. 1 railroad wrought	$16.75 to $17.25
Cast borings	5.00 to 5.50
Steel turnings	5.00 to 5.50
Railroad cast	13.25 to 13.75
No. 1 machinery cast	15.25 to 15.75
Burnt scrap	9.50 to 10.00
Iron axles	29.50 to 30.50
Locomotive tires (smooth inside)	23.25 to 24.00
Pipes and flues	11.25 to 11.75
Malleable and steel	13.00 to 13.50
Railroad tank and sheet	10.25 to 10.75

The offices of Crocker Brothers, pig-iron merchants, in Cincinnati, have been enlarged by the lease of an adjoining suite of rooms in the First National Bank Building. Herbert F. Topp is manager of sales at Cincinnati.

Birmingham

BIRMINGHAM, ALA., Oct. 30, 1916.

Pig Iron.—That the price of pig iron may reach $20 is the belief of even conservative iron men. Friday, Oct. 27, was a spectacular day. Up to that morning, and for a week, bookings had been made at $16. During the forenoon, order books filled rapidly through telegrams at $16.50. Before night $17 had been asked and one or two sales made at that price. On Saturday $16.50 was the minimum with two interests asking $17 and the largest foundry-iron maker quoting $17.50, with another well-booked seller going up to the same notch. One of the Friday bookings at $16.50 was 1000 tons for Middle Western delivery. The leading interest on that day advanced to $16.50 for desirable tonnages and to $17 for small lots. A feature of the market has been the appearance of consumers whose plants are contiguous to Northern furnaces and who have never sought Birmingham iron before. A considerable quantity of very desirable iron was sold for foreign delivery at a premium of $2 to $3. The shipping agent of the British Government while here last Friday looking after deliveries on the 200,000 tons of basic it had ordered of the Sloss-Sheffield and the Woodward companies, received a telegram saying that 200,000 tons additional had been ordered, the two companies sharing equally. The Woodward Company denied receiving any such order and is reported not to be in a position to accept additional foreign basic in the light of present obligations. The local officials of the Sloss-Sheffield Company had no information in the matter. If the additional basic is placed, it will be at advanced prices, as no concessions are being made either

in export or warrant metal. Additional foreign basic orders will be taken only if quite desirable. The Republic Company will soon blow in its third stack. Car shortage is a twice-told tale, but iron men admit that it might be worse. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	$17.50
No. 2 foundry and soft	17.00
No. 3 foundry	16.50
No. 4 foundry	16.25
Gray forge	16.00
Basic	17.00
Charcoal	$22.50 to 23.00

Cast-Iron Pipe.—Water and gas pipe are not so active as they have been, owing to the slackening in outdoor work with the approach of winter, but Southern points have sent in orders sufficient to keep plants going at existing productive rate for some time to come. Prices will probably advance in consonance with pig iron on new specifications. We quote, per net ton, f.o.b. yards, as follows: 4-in., $29; 6-in. and upward, $26, with $1 added for gas pipe and 16-ft. lengths.

Coal and Coke.—The car shortage has sent steam coal up to as high as $3 per ton, compared with a normal of $1.25. In a few instances oil mills and other plants have shut down for lack of coal. Coke bids fair to rise to still higher levels, owing to the bids coming for supplies from fields heretofore supplied by Virginia coke. For the present, prices remain at $4.25 to $4.50 per net ton at oven for standard beehive coke and at $3.25 to $3.50 for foundry coke.

Old Material.—The market is very active. Some steel axles have been sold at $30. Wrought scrap has advanced. Southern rolling mills and steel works are taking all the scrap available, on account of advancing prices of pig iron. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old steel axles	$25.00 to $30.00
Old steel rails	12.50 to 13.00
No. 1 wrought	15.00 to 15.50
Heavy melting steel	12.00 to 12.50
No. 1 machinery	11.50 to 12.00
Carwheels	11.50 to 12.00
Tram carwheels	11.00 to 11.50
Stove plate and light	9.50 to 10.00

St. Louis

ST. LOUIS, MO., Oct. 30, 1916.

Pig Iron.—The state of the pig-iron market in this district is such as to make quotations practically unavailable except upon the submission of specific propositions to the furnaces by the representatives. Southern furnaces will not permit the representatives to close contracts until all details are confirmed by the management. Chicago makers show just as little disposition to accept business. No Ohio iron is to be had in the market at any price prior to July 1 delivery. The sales made during the week aggregated possibly 10,000 tons, ranging from 1000 tons down. The inquiry for 10,000 tons of Northern basic reported last week remains unfilled, largely because of the unwillingness of furnaces to accept the business and make deliveries as desired.

Coke.—The coke market is in an even more erratic state than pig iron, with a total unwillingness on the part of oven representatives to accept business, even if it were possible to make deliveries. As high as $8.50 per ton, Connellsville, for best selected foundry coke, has been offered and not taken. It is also known that as high as $7.75 has been offered for 48-hr. coke and refused. Local by-product coke remains undisturbed, largely because of the fact that the output of the local ovens has been contracted ahead to July 1 at least.

Finished Iron and Steel.—The duties of finished product representatives have been largely confined the past week to the diplomatic handling of would-be buyers whose requirements they cannot meet, particularly as to delivery, as buyers are willing to pay almost any price which the mills might make. Movement out of warehouse has continued as active as ever, with buyers still willing to pay the prices asked. We quote for stock out of warehouses as follows: Soft steel bars, 3.30c.; iron bars, 3.20c. to 3.25c.; structural material, 3.30c.; tank plate, 3.80c.; No. 10 blue annealed sheets, 3.55c.; No. 28 black sheets, cold rolled, one pass, 4c.; No. 28 galvanized sheets, 5.40c.

Old Material.—The scrap market continues more than extremely strong with dealers buying everything available for delivery on their orders and mills and foundries apparently well aware that a shortage in old material is threatening. In consequence, quotations are largely nominal and transactions are subject to the needs of the buyer and the willingness of the seller to let material go. At least 15,000 tons of old material has recently been taken out of this market through quietly conducted negotiations carried on by the Colorado Fuel & Iron Company, and most of it has already been shipped. Still further advances in scrap are anticipated by the dealers, particularly in the light of the present conditions in the pig-iron market, the foreign demand and the actual shortage of supplies. Relaying rails are difficult to get, and are firmly held at the quotations made. No lists appeared during the week, except 200 tons from the Missouri & North Arkansas, but the railroads are expected to make offerings within the next few days, as is their custom at the first of the month. We quote dealers' prices f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton

Old iron rails	$20.00 to $20.50
Old steel rails, rerolling	20.50 to 21.00
Old steel rails, less than 3 ft.	20.00 to 20.50
Relaying rails, standard section, subject to inspection	24.00 to 26.00
Old carwheels	14.50 to 15.00
No. 1 railroad heavy melting steel scrap	19.00 to 19.50
Heavy shoveling steel	15.50 to 16.00
Frogs, switches and guards cut apart	19.00 to 19.50
Bundled sheet scrap	9.50 to 10.00

Per Net Ton

Iron angle bars	$19.50 to $20.00
Steel angle bars	17.50 to 18.00
Iron car axles	31.50 to 32.00
Steel car axles	34.00 to 34.50
Wrought arch bars and transoms	23.50 to 24.00
No. 1 railroad wrought	18.50 to 19.00
No. 2 railroad wrought	17.50 to 18.00
Railroad springs	17.50 to 18.00
Steel couplers and knuckles	19.50 to 20.00
Locomotive tires, 42 in. and over, smooth inside	23.50 to 24.00
No. 1 dealers' forge	16.50 to 17.00
Cast-iron borings	7.00 to 7.50
No. 1 busheling	16.00 to 16.50
No. 1 boilers, cut to sheets and rings	13.00 to 13.50
No. 1 railroad cast scrap	13.50 to 14.00
Stove plate and light cast scrap	10.00 to 10.50
Railroad malleable	12.50 to 13.00
Agricultural malleable	11.00 to 11.50
Pipes and flues	13.50 to 14.00
Heavy railroad sheet and tank scrap	12.75 to 13.25
Railroad grate bars	10.50 to 11.00
Machine shop turnings	8.00 to 8.50

New York

NEW YORK, Nov. 1, 1916.

Pig Iron.—Price advances have come on so fast that it is not easy to know what is the market, though it is well known that the bulk of the business put through in the past 10 days—and there has been a good deal of it—was done at figures $2 to $3 below to-day's asking prices. The buying for the second half of 1917 took on a fast pace ten days to two weeks ago. Starting at $19 to $19.50, Buffalo, for No. 2 X on such business, there was a gradual advance to $22, Buffalo, early last week; then $23 appeared, and this week $24 and $25 is asked by two sellers in that district for what is still available for that delivery, while a third is out of the market. One eastern Pennsylvania maker has advanced from $22 to $23 at furnace for No. 2 X. It became evident some time ago that a good deal of iron bought for delivery this year would carry over into 1917, and that the sales for that period were more than had been generally known. Virginia furnaces have been heavy sellers in all markets, taking a larger share of the total than in a long time. With freights of $3.25 to $3.50, Virginia iron went freely into Buffalo in competition with local furnace iron. It went in large blocks into New England. Last week, while sales of No. 2 X were made at $19.50, Virginia furnace, for the first half of 1917, $1 a ton lower was done on second half contracts. Later, second half Virginia iron went up to a parity with first half at $19.50, and then the leading maker withdrew from the market altogether. The General Electric Company bought 14,000 to 15,000

tons, chiefly foundry iron, for its five plants, for the second half, including 3800 tons for Schenectady, 2500 tons each for Lynn and Pittsfield, and low phosphorus iron for Everett. Southern iron has sold in the week at $16 and $16.50 for No. 2 at Birmingham for first half delivery and later at $17 for the second half. A sale of 1500 tons for this year was made at $17.50, Birmingham. Some Southern sellers are not offering iron for the second half of 1917. A sale of 10,000 tons of basic unusually low in phosphorus was made to a New Jersey foundry for delivery from February to June, and 5000 to 7500 tons more will be taken, while a considerable basic inquiry has come from western New York. New England foundries, which less than two weeks ago would not consider second half iron, came into the market in a hurry three or four days later and covered freely. Naturally at to-day's prices business is less, but furnaces are so well sold that they want a good price now and look for still higher levels. Foundry coke on contract for first half has been offered at $5, while $8 to $8.50 has been the price for spot. We quote at tidewater for early delivery: No. 1 foundry, $23 to $23.50; No. 2 X, $22.50 to $23; No. 2 plain, $22 to $22.50; Southern iron at tidewater, $22.50 to $23 for No. 1 and $22 to $22.50 for No. 2 foundry and No. 2 soft.

Ferroalloys.—The ferromanganese market is devoid of orders or inquiries except for a few small lots. Some quiet buying of domestic alloy at $160 to $165, delivered, has bridged over the needs of some consumers. Specifications on contracts are urgent and receipts from England are at about the same rate as has obtained all this year. Spiegeleisen is quiet at $40 to $45, furnace, for the 20 per cent grade. Ferrosilicon, 50 per cent, is in strong demand, with specifications on contract insistent. Inquiries for 1917 are appearing in volume, but one large importer has thus far not opened his books for these orders. It is expected that next year's quotation will be not less than $100, Pittsburgh. Bessemer ferrosilicon is active. The last quotation was $34 per ton, furnace, for the 10 to 11 per cent grade, $35 for the 11 to 12 per cent grade and $36 for the 12 to 13 per cent. Ferrotungsten is obtainable at $2.60 to $2.75 per pound of contained tungsten, New York, with the ore at $17 per unit. The exports in August were 47,966 lb. Ferrovanadium is quoted at $2.75 to $3, Pittsburgh, per pound of contained vanadium. Ferrocarbon-titanium is selling at 8c. per pound, in carload lots, 10c. per pound in ton lots and 12½c. per pound in lots less than a ton. Ferrochrome, 60 to 70 per cent, is unchanged at 16c. to 20c., New York, per pound of contained chromium.

Structural Material.—While conspicuous structural projects are not individually large or numerous, an enumeration of them does not give a fair index of the present demand, as there are very many small plant and building extensions, each involving 50 to 100 tons, and these are sustaining the fabricating shops. Plain material is stiffer in that only from a very few mills can better than 2.80c., Pittsburgh, be done, and then only for the largest tonnages. Among fresh inquiries not heretofore mentioned may be noted the Broad No. 2 Telephone Exchange, 3000 tons; building for the Joseph Dixon Crucible Company, Jersey City, 1200 tons; the General Electric Company, Lynn, Mass., 800 tons; post office at Birmingham, Ala., 500 tons; Daniel Henry Building, New Haven, 600 tons; department store, Richmond, Va., 500 tons; factory at Paulsboro, N. J., 700 tons; Carpenter apartment, Eighty-second Street and Park Avenue, 500 tons; garage, Fordham Road and Grand Avenue, 400 tons, and Kenyon piershed, Fifty-seventh Street, Brooklyn, 600 tons. Recent awards embrace 1300 tons for the McAlpin Hotel addition, to the Bethlehem Steel Company; 500 tons for towers for the Duquesne Light Company, to the American Bridge Company; 360 tons of shapes and 160 tons of castings for the American Rolling Mill Company, to the American Bridge Company; 300 tons for the Consolidated Gas Company, New York, to the National Bridge Company; 300 tons for the New Departure Manufacturing Company, Bristol, Conn., to the Levering & Garrigues Company, and the following to the Hinkle Iron Company; 1200 tons for the Nameloc loft, West Thirty-sixth Street; 500 tons for a Brickner, West Seventieth Street, and 400 tons for a Brickner apartment, East Sixty-sixth Street. We quote plain material from 2.869c. to 3.169c., New York, for mill shipments, depending more on the mill selling than on the delivery, and 3.35c., New York, out of warehouse.

Steel Plates.—The cost of coal, coke, refractories, labor and other items is now being considered, in addition to a demand which, seemingly inconceivable, is greater than ever, as a primary cause for likely further price advances. As it is, one mill has fixed 4c. as minimum for universal plates and 4½c. for ship plates, while the Steel Corporation has put its minimum at 3.25c. A lot of nearly 10,000 tons for a domestic shipbuilder has just been closed at 4c. under an option of a few weeks, and one mill was obliged to refuse one lot of 10,000 tons and another of 20,000 tons. We quote universal plates at 3.419c. to 4.169c., New York, with 3.669c. minimum for earliest shipment, and sheared plates up to 84 in. and in about three months at 4.169c., New York, and the widest plates at 4.419c. to 4.669c. for what may be obtained in the first half of 1917. Plates from warehouse range from 4c. to 4.50c., New York.

Iron and Steel Bars.—The rate at which business for foreign account is being declined has lately, covering general forms of finished steel, amounted to over half the normal producing rate of the country. The minimum on steel bars for any delivery now appears to be 2.70c., Pittsburgh, with 2.85c., Pittsburgh, the best obtainable price for shipments which may be obtained in the next few months. Meanwhile bar iron is enjoying a good demand and promises to strengthen in price. We quote steel bars at 2.869c. to 3.019c., New York, the higher price for the earlier shipments. We quote mill shipments of iron bars at 2.669c., New York. From warehouse steel bars are 3.35c. to 3.50c., New York, and iron bars, 3.25c.

Old Material.—About the only consumers of scrap who are not now interested in the market are the steel companies of eastern Pennsylvania. An embargo is still in effect at Coatesville, but steel companies located at other points in that section appear to be well supplied with stock. The iron rolling mills are buying wrought scrap, wrought pipe and borings and turnings quite freely. Blast furnaces have also been taking larger quantities of mixed borings and turnings, and this has caused prices to stiffen. The demand in this market for heavy melting steel scrap is mainly coming from Sharon, Youngstown and other points in the Shenango and Mahoning valleys, causing an advance of about 75c. per ton on material suitable for such shipments. Brokers quote buying prices about as follows to local dealers and producers, per gross ton, New York:

Heavy melting steel scrap (for eastern Pennsylvania shipment)	$12.50 to $12.75
Old steel rails (short lengths) or equivalent	16.00 to 16.25
Relaying rails	28.50 to 29.00
Rerolling rails	20.50 to 21.00
Rerolling rails (for export)	22.00 to 22.50
Iron car axles (for export)	39.50 to 40.00
Steel car axles (for export)	41.00 to 41.50
No. 1 railroad wrought	20.75 to 21.00
Wrought-iron track scrap	18.00 to 18.25
No. 1 yard wrought, long	15.75 to 16.00
Light iron (nominal)	3.50 to 4.00
Cast borings (clean)	8.25 to 8.50
Machine shop turnings	7.00 to 7.25
Mixed borings and turnings	7.00 to 7.25
Wrought pipe	14.25 to 14.50

A somewhat better demand is noted for old carwheels. Foundries generally are buying scrap a little more freely, probably because of the advance in pig iron. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

No. 1 cast (machinery)	$15.00 to $15.50
No. 2 cast (heavy)	15.50 to 16.00
Stove plate	13.50 to 14.00
Locomotive grate bars	12.00 to 12.50
Old carwheels	14.00 to 14.50
Malleable cast (railroad)	15.00 to 15.50

Cast-Iron Pipe.—No new public lettings of any size have made their appearance. Private buying, however, is quite brisk. A feature of the current market is that

practically all the large gas companies are negotiating for their next year's supplies of pipe. These purchases will foot up a heavy tonnage. The export trade is assuming much greater importance, and it is expected that considerably more business will be done with foreign countries now that such a sensational achievement has been effected as the securing of a contract for about 66 000 net tons for shipment to Argentina by the United States Cast Iron Pipe & Foundry Company. This contract is referred to elsewhere in some detail. Export inquiries are quite numerous. On Wednesday of last week an advance of $1 per ton was made and the upward movement of pig iron seems likely to cause another early advance in the price of pipe. Carload lots of 6 in., class B and heavier, are quoted at $32.50 per net ton, with $1 per ton extra for class A and gas pipe.

Cleveland

CLEVELAND, OHIO, Oct. 31, 1916.

Iron Ore.—The delay in the ore movement because of the car shortage at the lower Lake docks is becoming more serious, boats having been held as long as five days waiting for cars. Considerable ore is being placed on the docks that would otherwise go at once to the furnace yards. The delay has cut October shipments down materially, some estimates being that the movement for the month will be 1,000,000 tons less than it would have been without the delays caused by the lack of cars. Shippers are much behind on their schedules and most of them will find it necessary to keep their boats in operation as long as the weather permits. Considerable vessel chartering for ore for 1917 delivery has been done. No rates have yet been named for next season. However, it is believed that the rate will be 90c. or $1 per ton free from the head of the Lakes. Some chartering for last cargoes of the season was done during the week at the $1 rate. There are no new developments in next season's ore prices. We quote 1916 prices as follows, delivered lower Lake ports: Old range Bessemer, $4.45; Mesaba Bessemer, $4.20; old range non-Bessemer, $3.75; Mesaba non-Bessemer, $3.55.

Pig Iron.—Prices continue to advance on all grades. Local furnaces have marked up their quotations on foundry, malleable and basic to $23 at furnace. In the Valley, foundry and malleable iron have been quoted for several days at $23, and one interest has advanced its price to $24 and reports the sale of a small tonnage at that price. As high as $27 is being asked for Bessemer. Gray forge has sold at $22, Valley. A fair volume of inquiry is coming out, mostly for the second half. Cleveland sellers report considerable first half inquiry for foundry and malleable grades from consumers in other territories who have apparently been unable to cover for their requirements from nearby furnaces. The present high prices have resulted in sales of Virginia iron in the northern Ohio territory. This iron, at $19.50, furnace, can be brought to Cleveland at $22.70, or at a lower price than is being quoted by local furnaces. Southern iron has been advanced $1 per ton to $17, Birmingham, for No. 2 and several small lot sales have been made for first half delivery at that price. Quite a tonnage of Southern iron has also been booked for the last half delivery. There is considerable inquiry for low phosphorus iron, which is scarce for early delivery. The price has been advanced to $40, Valley furnace, and several sales for delivery over the remainder of the year have been made at this price. A small lot has been sold at $40 for first quarter. We quote, delivered Cleveland, as follows:

Bessemer	[illegible]
Basic	$22.00 to [illegible]
Northern No. 2 foundry	[illegible]
Southern No. 2 foundry	[illegible]
Gray forge	[illegible]
Jackson County silvery, 8 per cent silicon	[illegible]
Standard low phos., Valley furnace	[illegible]

Coke.—No relief is expected from the present high coke prices until the car supply becomes more adequate. Connellsville furnace coke is quoted at $7 to $7.50 per net ton at oven and standard Connellsville foundry coke at $8 to $8.25 for prompt shipment. Foundries generally have anticipated their requirements and appear to be well supplied with contract coke.

Finished Iron and Steel.—The demand in finished lines has become heavier and October specifications will show a good increase over September. Many consumers are anxious to get orders entered on the books, the price and time of delivery being a secondary consideration. One mill able to make fairly early delivery reports a heavy demand in current orders for bars, plates and structural material. Bars and shapes are quoted at 2.85c., Pittsburgh, for delivery within about two months. Local prices on plates range from 3.50c. to 4.50c., Pittsburgh. An Ohio mill that has become quite active in the semi-finished steel market has taken a contract for a round tonnage of forging billets for first half delivery from a Cleveland consumer at $55, Pittsburgh, or considerably lower than the quotations made by other mills. The demand for bar iron has become heavier and prices are firm at 2.50c. to 2.65c., Pittsburgh. The demand for hard steel bars for reinforcing purposes continues quite active and prices, which have been somewhat irregular, some business having gone as low as 2.40c., delivered, have stiffened up. The demand for sheets is heavy and prices are higher. One Ohio mill came in the market a few days ago as a buyer of galvanized sheets to replenish its Cleveland warehouse stock and the lowest quotation it secured was 4.90c. Black sheets have sold as high as 3.75c. We quote sheets at 3.50c. to 3.75c., Ohio mill, for No. 28 black; 3.25c. to 3.50c. for No. 10 and 4.90c. to 5c. for No. 28 galvanized. Warehouse business continues heavy and there is talk of advancing warehouse prices this week. Present warehouse prices are 3.40c. for steel bars and structural material; 3.75c. for plates and 3.20c. for iron bars.

Bolts, Nuts and Rivets.—An active buying movement in bolts and nuts for first quarter and first half delivery is in progress. Railroad and other large consumers are placing contracts. Prices are firm. Manufacturers will not open their books for contracts with jobbers until about Nov. 15. Some contracts for rivets for first quarter are being placed at current prices which are 4c., Pittsburgh, for structural and 4.10c. for boiler rivets. Bolt and nut discounts are as follows:

Common carriage bolts, ⅜ x 6 in., smaller or shorter, rolled thread, 50 and 5; cut thread, 40, 10 and 2½; larger or longer, 35 and 2½. machine bolts within h. p. nuts, ⅜ x 4 in., smaller and shorter, rolled thread, 50 and 10; cut thread, 50; larger and longer, 40 and 5; lag bolts, gimlet or cone point, 50 and 5. square h. p. nuts, blank or tapped, $2.70 off the list; hexagon h. p. nuts, blank or tapped, $2.70 off; c. p. c. and t. sq. nuts, blank or tapped, $2.40; hexagon nuts, all sizes, $2.80 off; cold pressed semi-finished hexagon nuts, all sizes, 60 and 5.

Old Material.—Further advances have been made on several grades. The local demand is inactive, but there has been additional buying for shipment to Youngstown and Canton. With the rapid advance in prices the past two weeks, dealers are not inclined to sell with the exception of material that must be moved, believing that prices may go higher. Consumers are unwilling to pay the price asked and, accordingly, sales are largely to dealers who are covering short orders. Cast scrap has again advanced, local sales being made as high as $15. Steel axles have become scarce, because of the heavy demand that has cleaned up all the available supply, and few axles are now being offered by railroads. Borings, turnings and bushelings are dull. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton

Steel rails	$18.00 to $18.25
Low rails	[illegible]
Steel car axles	39.00 to 40.00
Heavy melting steel scrap	18.00 to 18.50
Carwheels	14.50 to 15.00
Relaying rails, 60 lb. and over	[illegible]
Agricultural malleable	13.00 to 13.50
Railroad malleable	16.50 to 17.00
Steel axle turnings	12.00 to 12.50
Light bundled sheet scrap	12.00 to 12.25

Per Net Ton

Iron car axles	$34.00 to $35.00
Cast borings	6.25 to 6.50
Iron and steel turnings and drillings	5.50 to 5.75
No. 1 busheling	14.00 to 14.25
No. 1 railroad wrought	18.25 to 18.50
No. 1 cast	14.50 to 15.00
Railroad grate bars	11.00 to 11.50
Stove plate	11.00 to 11.50

Buffalo

BUFFALO, N. Y., Oct. 31, 1916.

Pig Iron.—Approximately 50,000 tons of pig iron, of all grades, has been sold in this market the past week, of which perhaps one-fourth was basic. Since these sales were reported the market has continued to advance rapidly. Some furnace interests announce they are now maintaining a $25 minimum for any grade. Furnacemen state that for the first time in years stocks are practically nil; that furnaces are sold up solidly for months ahead, and iron is now almost unobtainable. The situation has become such that iron produced anywhere can find a market irrespective of freight rates. The contract between the Rogers-Brown Iron Company and the Lackawanna Steel Company has been continued to cover the year 1917 for the hot metal output of two of the Rogers-Brown furnaces. We quote as follows, f.o.b. furnace, Buffalo, for last quarter of 1916 and for first half and last half of 1917:

High silicon irons	$26 00 to $28 00
No. 1 foundry	26 00
No. 2 X foundry	25 00
No. 2 plain	24 00 to 25 00
No. 3 foundry	24 00 to 25 00
Gray forge	24 00 to 25 00
Malleable	25 00
Basic	26 00
Bessemer	27 00 to 28 00
Charcoal, according to brand and analysis	27 00 to 27 00

Finished Iron and Steel.—The price upheaval in coal, coke and pig iron and the rapid increase in the cost of manufacturing steel products have created a peculiar situation, with a strong buying movement under way, and practically every distributer has a different set of prices to fit the occasion. A number of selling agencies report that they have been offered three times as much business, which they have been obliged to turn down without quotation, as their normal sales would total. The pressure for delivery of steel is more severe than it has been at any time during the year, showing that the actual consumer is short of his requirements. In the tin-plate market the shortage of product is perhaps more pronounced than for any other steel product, because of the determination by the mills not to permit themselves to be oversold for next season as they were this.

Old Material.—The market the past week has been in a very excited condition. Dealers found with short orders, and unable to cover, have been obliged to pay much beyond the usual market prices. Inquiries are out for practically all grades of scrap. Indications point to a shortage of steel and cast scrap, so that prices in these commodities are likely to advance steadily. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	$18.25 to $18.75
Low phosphorus billet and bloom ends	21 00 to 22 00
No. 1 railroad wrought scrap	20 50 to 21 00
No. 1 railroad and machinery cast scrap	17 00 to 18 00
Steel axles	34 00
Iron axles	34 00
Carwheels	15 00 to 16 00
Railroad malleable	15.50 to 16.00
Machine shop turnings	7 00 to 7 50
Heavy axle turnings	12 00
Clean cast borings	8 00 to 8 25
Iron rails	20 50 to 21 00
Locomotive grate bars	13 00 to 13.50
Stove plate (net ton)	12 00 to 12 50
Wrought pipe	13 00 to 14 00
No. 1 busheling	14 50 to 15 00
No. 2 busheling	11 50 to 12 00
Bundled sheet scrap	11 00 to 12 00
Bundled tin scrap	15 00 to 15 50

British Steel Market

American Billets Dull and Irregular—Sheet Bars Weaker

(By Cable)

LONDON, ENGLAND, Nov. 1, 1916.

There is a heavy forward demand for Cleveland pig iron but sales are more restricted. Hematite pig iron is quoted at 142s. 6d. and makers are selling somewhat more freely. American billets are dull and irregular with 4 in. for January-March delivery at $63. Sheet bars are weaker and quoted nominally at £15 5s. Wire rods are worth £19 for November-December delivery. All quotations are c.i.f. Liverpool. We quote as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 22s 6d.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £20.

Steel ship plates, Scotch, delivered local yards, £13 17s. 6d.

Steel rails, export, f.o.b. works, £10 17s. 6d.

Hematite pig iron, f.o.b. Tees, 142s. 6d., compared with about 140s. a week ago.

Sheet bars (Welsh) delivered at works in Swansea Valley, £15 5s. nominal.

Steel bars, export, f.o.b. Clyde, £18.

Ferromanganese (nominal), £33.

Ferrosilicon, 50 per cent, c.i.f., £27.

Iron and Industrial Stocks

NEW YORK, Nov. 1, 1916.

The movements of securities in the past week have not shown wide fluctuations. The general characteristic of the stock market has been sustained strength, which has been manifested by the resistance of values to sales made for the purpose of taking profits. A few securities have shown marked advances. Notable among these have been Bethlehem Steel common, which sold up to 655, and United States Cast Iron Pipe preferred, which touched 63⅞. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week has been as follows:

Allis-Chal., com..	25	- 26⅜	
Allis-Chal., pref.	81¾	- 83¾	
Am. Can, com...	61¼	- 64⅞	
Am. Can, pref...	113¾	-113⅞	
Am. Car & Fdy., com	67	- 68¾	
Am. Car & Fdy., pref		-118½	
Am. Loco., com..	79	- 80⅞	
Am. Loco., pref..	106⅞	-107	
Am. Rad. com.	410	-415	
Am. Ship, com...	59	- 63½	
Am. Ship, pref.		93	
Am. Steel Fdrys.	61¼	- 63	
Bald. Loco., com.	82	- 83¾	
Bald. Loco., pref.	106	-107½	
Beth. Steel, com.	603	-655	
Beth. Steel, pref.	138	-155	
Cambria Steel...	125	-139¾	
Case (J. I.), pref.	86	- 86½	
Central Fdry., com	15	- 18¾	
Central Fdry., pref	29	- 35	
Chic. Pneu. Tool.	72½	- 73¾	
Colo. Fuel	52	- 54¾	
Crucible Steel, com	85	- 91	
Crucible Steel, pref	121	-125	
Deere & Co., pref.	96	- 96¼	
Driggs-Seabury	80	- 87	
Gen. Electric	181	-183⅞	
Gt. No. Ore Cert.	42¾	- 44½	
Int. Harv. of N. J., com	116	-118	
Int. Harv. of N. J., pref.		120	
Int. Harv. Corp., com.		78	
La Belle Iron, com.	75	- 78¾	
Lacka. Steel	86⅝	- 90	
Lake Sup. Corp..	14	- 19⅝	
Midvale Steel....	66½	- 70⅞	
Nat. En. & Stm., com	27	- 28½	
Nat. En. & Stm., pref.		96	
N. Y. Air Brake.	137¾	-159	
Pitts. Steel, pref.	104½	-104⅝	
Pressed Stl., com	71	- 73¾	
Pressed Stl., pref.	105	-106	
Ry. Steel Spring, com	51⅛	- 54¼	
Ry. Steel Spring, pref	101½	-101¾	
Republic, com...	77	- 79½	
Republic, pref...	113	-114	
Sloss, com	61	- 62⅞	
Un. Steel Alloys.	47½	- 50¼	
U. S. Pipe, com.	24⅞	- 26⅛	
U. S. Pipe, pref.	57¾	- 63⅞	
U. S. Steel, com	117⅛	-120	
U. S. Steel, pref.	121⅛	-121⅞	
Va. I. C. & Coke	48	- 57	
Warwick		9¾	
Westing. Elec...	63¼	- 65¼	

Dividends

The American Beet Sugar Company, regular quarterly, 1½ per cent, an extra of ½ per cent, payable Nov. 15, and a further extra of ½ per cent, payable Dec. 20. This distribution of 10 per cent, together with 15 per cent paid during three previous quarters, makes a return of 25 per cent for the year.

The Taylor-Wharton Iron & Steel Company, regular quarterly, 1¾ per cent on the preferred stock, payable Nov. 1.

The Pressed Steel Car Company, 1½ per cent on the common stock, and regular quarterly, 1¾ per cent on the preferred stock, payable Nov. 25. The common disbursement represents an increase of ½ of 1 per cent on the dividend declared July 25.

The Scovil Mfg. Company, extra, 10 per cent, payable Nov. 1, making the seventh successive month in which the company declared an extra 10 per cent dividend. The extra dividends paid so far this year amount to 93 per cent, and, with three regular quarterly payments of 2 per cent each, brings the total dividends this year up to 99 per cent.

The United States Cast Iron Pipe & Foundry Company, extra, 2 per cent on the preferred stock, payable Nov. 15. The net earnings for the nine months ended Sept. 30 amounted to $1,040,970, which is at the rate of more than 10 per cent on the preferred stock. The resolution adopted by the board of directors states that the extra dividend was declared because there remained $318,805 of previous earnings unappropriated from the net profits of the seven months ended Dec. 31, 1915, and points out that the extra 2 per cent brings the returns for the year up to 4 per cent, the dividend being payable on the same date as the last installment of ½ of 1 per cent of the 2 per cent dividend declared last January for the year 1916.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c. Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c. Denver, pipe, 76.1c., minimum carload 46,000 lb.; structural steel and steel bars, 83.6c., minimum carload 36,000 lb. Pacific coast (by rail only), pipe, 65c.; structural steel and steel bars, 75c., minimum carload 50,000 lb.; structural steel and steel bars, 80c., minimum carload 40,000 lb. No freight rates are being published via the Panama Canal, as the boats are being used in transatlantic trade.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 2.75c. to 2.85c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs	.10
Angles, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .30
Deck beams and bulb angles	.30
Handrail tees	.25
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Plates.—Tank plates, ¼ in. thick, 6 in. up to 100 in. wide, 3.50c. to 4c. base, net cash, 30 days, or ½ of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras

	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers)	.10
Boiler and flange steel plates	.15
"A. B. M. A." and ordinary firebox steel plates	.20
Still bottom steel	.30
Locomotive firebox steel	.30

Marine steel, special extras and prices on application.

Gage Extras

Rectangular, ¼ in. thick, over 6 in. wide to 100 in. wide	Base
Lighter than ¼ in., to 3/16 in., up to 72 in. wide	.10
*Lighter than ¼ in., including 3/16 in., over 72 in. to 84	.20
*Lighter than ¼ in., including 3/16 in., over 84 in. to 96	.30
*Lighter than ¼ in., including 3/16 in., over 96 in. to 100	.40
*Lighter than ¼ in., including 3/16 in., over 100 in. to 102	.50
Lighter than 3/16 in., including No. 8, up to 72 in. wide	.15
*Lighter than 3/16 in., including No. 8, over 72 in. to 84	.25
*Lighter than 3/16 in., including No. 8, over 84 in. to 96	.35
Lighter than No. 8, including No. 10, up to 60 in. wide	.30
Lighter than No. 8, including No. 10, over 60 in. to 84	.50

Up to 72 in. and not less than 10.2 lb. per sq. ft. will be considered ¼ in.
Over 72 in. must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.
Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.
Over 72 in., ordered weight 3/16 in., take No. 8 price
Over 72 in., ordered weight No. 8, take No. 10 price.

Width Extras

Over 100 in. to 110 in. inclusive	.05
Over 110 in. to 115 in. inclusive	.10
Over 115 in. to 120 in. inclusive	.15
Over 120 in. to 125 in. inclusive	.25
Over 125 in. to 130 in. inclusive	.50
Over 130 in.	1.00

Length Extras

Universal plates 80 ft. long up to 90 ft. long	.05
Universal plates 90 ft. long up to 100 ft. long	.10
Universal plates 100 ft. long up to 110 ft. long	.20

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over.

Lengths under 3 ft. to 2 ft. inclusive	.25
Lengths under 2 ft. to 1 ft. inclusive	.50
Lengths under 1 ft.	1.55
Circles 3 ft. in diameter to 100 in.	.30
Circles over 100 to 110 in. (width extra)	.35
Circles over 110 to 115 in. (width extra)	.40
Circles over 115 to 120 in. (width extra)	.45
Circles over 120 to 125 in. (width extra)	.55
Circles over 125 to 130 in. (width extra)	.70
Circles over 130 in. (width extra)	1.00
Circles under 3 ft., to 2 ft., inclusive	.55
Circles under 2 ft., to 1 ft., inclusive	.80
Circles under 1 ft.	1.85

Half circles take circle extras.
Sketches not over four straight cuts, inc. straight taper .10
Sketches having more than four straight cuts .20
Plates sheared to a radius take complete circle extras.

*Including extra for width.

Wire Rods.—Including chain rods, $60 to $65.

Wire Products.—Prices to jobbers effective Oct. 19: Fence wire Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, $2.65; galvanized, $3.35. Galvanized barb wire and staples, $3.55; painted, $2.85. Wire nails, $2.70. Galvanized nails, 1 in. and longer, $2 advance over base price; shorter than 1 in., $2.50 advance over base price. Cement-coated nails, $2.60. Woven wire fencing, 58 per cent off list for carloads, 57 off for 1000-rod lots, 56 off for less than 1000-rod lots.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from Nov. 1, 1916, all full weight:

Butt Weld

Steel Inches	Black	Galv.	Iron Inches	Black	Galv.
⅛, ¼ and ⅜	62	51½	⅛ and ¼	51	24
½	66	51½	⅜	52	25
¾ to 3	69	55½	½	56	38
			¾ to 1½	59	43

Lap Weld

2	62	49½	1¼	45	30
2½ to 6	65	52½	1½	51	37
7 to 12	62	48½	2	52	38
13 and 14	62½	..	2½ to 4	54	41
15	50	..	4½ to 6	54	41
			7 to 12	53	40

Reamed and Drifted

1 to 3, butt	67	53½	¾ to 1½, butt	54	37
2, lap	60	47½	1¼, lap	40	24
2½ to 6, lap	63	50½	1½, lap	46	31
			2, lap	47	32
			2½ to 4, lap	50	35

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	58	40½	⅛, ¼ and ⅜	51	34
	63	50½	½	56	43
¾ to 1½	67	54½	¾ to 1½	60	45
2 to 3	68	55½			

Lap Weld, extra strong, plain ends

2	60	48½	1¼	47	32
2½ to 4	63	51½	1½	52	38
4½ to 6	62	50½	2	54	41
7 to 8	58	44½	2½ to 4	56	44
9 to 12	53	39½	4½ to 6	55	43
			7 to 8	49	37
			9 to 12	44	32

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts on less than carloads, freight to destination added, effective from Nov. 1, 1916, are as follows:

Lap Welded Sheel		*Standard Charcoal Iron*	
1½ in.	.31	1½ in.	.23
1¾ and 2 in.	.43	1¾ and 2 in.	.35
2½ in.	.40	2¼ in.	.32
2½ and 2¾ in.	.46	2½ and 2¾ in.	.38
3 and 3½ in.	.51	3 and 3½ in.	.43
3½ to 4½ in.	.52	3½ to 4½ in.	.44
5 and 6 in.	.45	5 and 6 in.	.37
7 to 13 in.	.42	7 to 13 in.	.34

Locomotive and steamship special charcoal grades bring higher prices.
1¾ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.
2 in. and larger, over 22 ft., 10 per cent net extra.

Sheets.—Makers' prices for mill shipments on sheets of U. S. standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Blue Annealed Sheets

Nos. 3 to 8	3.40 to 3.50
Nos. 9 to 12	3.15 to 3.25
Nos. 13 and 14	3.00 to 3.10
Nos. 15 and 16	3.05 to 3.15

Box Annealed Sheets, Cold Rolled

Nos. 17 to 21	3.20 to 3.30
Nos. 22 and 24	3.25 to 3.35
Nos. 25 and 26	3.30 to 3.40
No. 27	3.35 to 3.45
No. 28	3.40 to 3.50
No. 29	3.45 to 3.55
No. 30	3.50 to 3.60

Galvanized Sheets of Black Sheet Gage

Nos. 10 and 11	3.90 to 4.00
Nos. 12 to 14	4.00 to 4.10
Nos. 15 and 16	4.15 to 4.25
Nos. 17 to 21	4.30 to 4.40
Nos. 22 and 24	4.45 to 4.55
Nos. 25 and 26	4.60 to 4.70
No. 27	4.75 to 4.85
No. 28	4.90 to 5.00
No. 29	5.05 to 5.15
No. 30	5.20 to 5.30

Two-Way Black Plate

Nos. 10 and 11	3.10 to 3.20
Nos. 17 to 21	3.15 to 3.25
Nos. 22 and 24	3.20 to 3.30
Nos. 25 and 26	3.25 to 3.35
No. 27	3.30 to 3.40
No. 28	3.35 to 3.45
No. 29	3.40 to 3.50
Nos. 30 and 31	3.40 to 3.50

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin,	Lead		Spelter	
		Electro-	New	New	St	New	St
Oct.	Lake	lytic	York	York	Louis	York	Louis
25	28.50	28.50	41.62½	7.00	6.92½	10.25	10.00
26	28.50	28.50	42.00	7.00	6.92½	10.25	10.00
27	28.50	28.50	41.95	7.00	6.92½	10.25	10.00
28	28.50	28.50	.....	7.00	6.90	10.25	10.00
30	28.75	28.50	42.00	7.00	6.90	10.37½	10.12½
31	29.00	28.50	41.87½	7.00	6.90	10.62½	10.37½

NEW YORK, Nov. 1, 1916.

Copper is strong, domestic consumers having bought heavily. The week has been a busy one in tin and quotations are slightly higher. Lead has been continuously dull and quotations are unchanged. Buying by both consumers and dealers has strengthened the spelter market. Antimony is dull and prices are unchanged.

New York

Copper.—Domestic consumers bought heavily of electrolytic this week, mostly for first quarter delivery, and the available supply is rapidly dwindling. Some of the buyers wanted November and December metal, but had to be content with later deliveries. Probably 25,000,000 lb. was taken in the movement. Last week a foreign inquiry for 100,000,000 lb. was rumored, but, if genuine, it has not yet culminated in business. New England brass interests have been in the market to cover new business in brass products, the demand for which seems to be without limit. Prompt electrolytic is quoted at 28.50c. to 29c., December at 28.25c. to 28.75c., and first quarter at 27.50c. to 28c. Prices higher than these are frequently reported. A sale of prompt Lake was made this week at 29c. The London quotation for spot electrolytic is easier at £142 10s., against £144 a week ago. The October exports totaled 29,180 tons.

Copper Average.—The average price of Lake copper for the month of October, based on daily quotations in THE IRON AGE, was 28.48c., and for electrolytic 28.49½c.

Tin.—Taken as a whole, the week has been active in the tin market. On Oct. 25, probably 400 tons, mostly of future deliveries from the Straits, was dealt in, while on Oct. 27 another 400 tons changed hands, most of it metal soon to arrive or for which licenses to ship from England have been granted. The supply of spot Banca, the price of which has been near that for Straits, is pretty nearly exhausted, but more is expected to arrive this month. Total deliveries into consumption in October totaled 4556 tons, 4000 tons of which arrived at Atlantic ports, and the remainder at Pacific ports. In stocks and landing at the end of the month was 3419 tons. The arrivals of the month amounted to 2655 tons. The quantity afloat is 2025 tons, which is under normal, and tends to strengthen the situation. Spot Straits was quoted yesterday at 41.87½c., with Banca at 41.25c.

Lead.—This metal has been continuously dull in New York. At Eastern points the independent producers are meeting the price of the leading interest, and in the West they are underquoting. The big producer continues to quote 7c., New York, and 6.92½c., St. Louis. It is learned that Japan was a notable buyer last week. Nearby lead is not plentiful, and the general aspect of the market is one of strength despite the inactivity. The spot quotation at London yesterday was £30 10s., and unchanged from a week previous. The exports of October totaled 4535 tons.

Spelter.—The market is stronger, with producers not actively looking for business. They are hopeful of a higher level of prices, and the trend already is in that direction. A feature of the week has been the activity of dealers in contracting for future deliveries, indicating that their judgment coincides with that of the producers. The brass mills have been buyers, and are still in the market. Late last week the galvanizers made a number of inquiries, many of which were not closed. A slight cold snap in the West interfered with the operation of gas-fired furnaces and also gave a stimulus to prices, and set in motion conjecture as to what will happen when the winter comes. Spot prime Western was quoted yesterday at 10.62½c., New York, and 10.37½c., St. Louis; November at 10.25c., St. Louis, December at 10.12½c., and first quarter at 10c. The exports in October totaled 12,180 tons. The spot quotation at London yesterday was £52 15s., against £54 a week ago.

Antimony.—All interest has disappeared and the market is dull at 13c. to 13.50c., duty paid.

Aluminum.—No. 1 virgin aluminum, 98 to 99 per cent pure, is easier at 64c. to 65c. per lb.

Old Metals.—The market continues firm but unchanged. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible	27.00 to 27.25
Copper, heavy and wire	25.00 to 26.00
Copper, light and bottoms	22.00 to 23.00
Brass, heavy	14.00 to 14.75
Brass, light	12.00 to 12.50
Heavy machine composition	21.00 to 21.50
No. 1 yellow rod brass turnings	14.00 to 15.50
No. 1 red brass or composition turnings	16.00 to 17.00
Lead, heavy	6.625
Lead, tea	6.125
Zinc	7.50 to 8.00

Chicago

OCT. 30.—Further inquiry from abroad for a large quantity of copper sustains the price of the metal. Tin has not been the object of very active buying, but prices have been firmly held. Spelter is quoted somewhat higher, but the lead market is reported quiet. We quote: Casting copper, 27.50c.; Lake copper, 28.50c. to 29c.; tin, carloads, 42.50c., and small lots, 44.50c.; lead, 6.95c.; spelter, 10.25c.; sheet zinc, 15c.; Cookson's antimony, 50c.; other grades, 14.50c. to 15c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 24c.; copper bottoms, 21c.; copper clips, 23c.; red brass, 19¼c.; yellow brass, 15c.; lead pipe, 6c.; zinc, 7¼c.; pewter, No. 1, 25c.; tinfoil, 30c.; block tin pipe, 35c.

St. Louis

OCT. 30.—The metal market has been firmer. Quotations to-day for carload lots are: Lead, 6.90c. to 6.92½c.; spelter, 9.75c. to 10c. On less than carload lots: Lead, 7.25c.; spelter, 11.50c.; tin, 45c.; Lake copper, 29c.; electrolytic copper, 28.75c.; antimony, Asiatic, 15c. In the Joplin district zinc blende was stronger, with the average $68 per ton for the week's sales; lead ore, average, $85. On miscellaneous scrap metals, we quote dealers' buying prices as follows: Light brass, 9c.; heavy yellow brass, 12c.; heavy red brass and light copper, 17c.; heavy copper and copper wire, 19c.; zinc, 6c.; lead, 5c.; tea lead, 3.50c.; pewter, 25c.; tinfoil, 31c.

Bethlehem Enlargements at Sparrows Point

Pittsburgh advices state that the Bethlehem Steel Company has awarded a $2,000,000 contract to the Dravo Contracting Company for foundations for four blast furnaces, an open-hearth plant and blooming, slabbing and plate mills at Sparrows Point, Md., for the Maryland Steel Company.

A New York dealer in metals has sent the following announcement to consumers: "In view of the car shortage condition existing throughout this country, and the movement on the part of the various railroad companies to increase the minimum carload lot from 50,000 to 60,000 lb. for spelter, and presumably for copper and lead, we will in future make sales in 30-ton lots instead of 25 as heretofore. However, we are perfectly willing to sell you 25-ton lots with the understanding that in the event of the railroads charging any additional freight on account of our shipping less than the minimum of 60,000 lb. you will assume this extra freight charge."

OBITUARY

Arthur C. Eastwood

Arthur C. Eastwood, president Electric Controller & Mfg. Company, Cleveland, died Oct. 17, at Battle Creek, Mich. He received his early education in the public schools of Louisville, Ky., and his technical education at the Rose Polytechnic Institute. Shortly after graduation from college, in 1898, he entered the electrical department of the Homestead Steel Works, and was associated with A. C. Dinkey in the first extensive applications of electrical power in the manufacture of steel. He left Homestead to accept the position of electrical engineer in the mills of the Tennessee Coal, Iron & Railroad Company, then being built at Ensley, Ala. While at Ensley his work attracted the attention of S. T. Wellman, who persuaded him to go to Cleveland to accept the positions of electrical engineer for the Wellman-Seaver Engineering Company and chief engineer for the newly formed Electric Controller & Supply Company. As a result of Mr. Eastwood's inventive ability, the growth of the latter company was so rapid that he was soon forced to give the business his entire attention under the title of general manager and chief engineer. About 1905 Mr. Eastwood and his associates reorganized the company, and the name was changed to the Electric Controller & Mfg. Company, with Mr. Eastwood as active head of both the financial and engineering ends of the business. He was the patentee of nearly one hundred inventions, covering all phases of electrical control and power generation. His greatest pride, however, was the lifting magnet, the development of which was entirely his own work, and the perfection of which has saved the steel industry many millions of dollars. His inventive ability, however, was probably one of the less important factors in his success. His personality was of such a winning nature that he was enabled to build up an organization of devoted and loyal assistants. He was a member of the Union Club and Mayfield Country Club of Cleveland, and the Engineers' Club of New York, a fellow of the American Institute of Electrical Engineers, and a member of the New York Railroad Club and numerous other commercial and scientific organizations. He leaves his widow and three children.

James C. Wallace

James C. Wallace, president of the American Shipbuilding Company from 1905 to 1914, died at his home in Cleveland, Oct. 31, in his 52d year. Since his resignation from the company he had devoted himself to his vessel interests on the Great Lakes. His name had been linked closely with Lake vessel building for more than 20 years, as that of his father, Robert Wallace, had been for a generation. After passing through the public schools of Cleveland, the younger Wallace entered the employ of the Globe Iron Works as a machinist, learning the trade in every detail. In 1887 he went into the drafting room of the Cleveland Shipbuilding Company, of which his father was general manager and later president, and at length was given full charge of the drafting department. Five years later he was advanced to vice-president and general manager. In 1899, when the Cleveland Shipbuilding Company was absorbed by the American Shipbuilding Company, Mr. Wallace became general manager, and in 1904 was elected president. He was a director of the First National Bank, the National City Bank, Superior Savings & Trust Company, the People's Savings Bank, the Pioneer Steamship Company and other corporations.

JOSEPH LUMLEY, one of the oldest manufacturers of mining machinery in the United States, died Oct. 21 at his home in Philadelphia, following an illness of three months. He was born in Dublin, Ireland, and came to this country with his parents when he was five years old. Forty years ago he started the manufacture of engines, boilers and mining machinery, at Third and Cherry Streets, Philadelphia. He installed some of the largest mining plants in this country and in South America. He leaves his widow, a daughter and a son.

JOHN W. KISER, president Phoenix Horseshoe Company, with plants at Poughkeepsie, N. Y., and Joliet, Ill., died Oct. 31 at the Blackstone Hotel, Chicago, after a lingering illness, aged 58 years. He went to Chicago from St. Paris, Ohio, in 1889, and prior to his connection with the horseshoe business organized the Monarch Bicycle Mfg. Company, which proved exceedingly profitable. He leaves his widow and one son, John W., Jr., who is active in the management of the Phoenix Horseshoe Company at Chicago.

NAPOLEON DUBRUL, president Miller, DuBrul & Peters Company, Cincinnati, died at his residence in that city after a short illness, Oct. 26, aged 70 years. He was the inventor of a number of machines, chief among which was an automatic machine for making cigarettes. His company also manufactures hardware specialties. He leaves his widow and four sons. All the sons are connected with the company.

CAPT. THOMAS S. MARVEL died at Newburgh, N. Y., Oct. 25, aged 82 years. He was a noted builder of steamboats, having built a number of the finest vessels plying on the Hudson River. He served in the army through the Civil War.

HENRY P. SNYDER, for many years editor of the Connellsville *Courier*, making a specialty of coke news, died at his home in Connellsville, Pa., Oct. 27, from heart failure, aged 60 years.

BARTHOLOMEW F. SHAW, general superintendent of the American Brake Shoe & Foundry Company, Mahwah, N. J., died Oct. 27, at his home in Suffern, N. J., aged 44 years.

JOHN F. SCOTT, connected with the Pittsburgh Plate Glass Company and the Mansfield Coal & Coke Company, died at his home in Pittsburgh, Oct. 27.

Merrimac Foundry & Machine Auction Sale

J. E. Conant & Co., auctioneers, Lowell, Mass., state that the public sale of the properties of the Merrimac Foundry & Machine Company at Lawrence, Mass., Oct. 26, as a whole was in excess of the general expectations. The steel and glass structure, sold to be removed, was purchased by E. A. Peabody & Sons, Lawrence, at $13,100. The name, good will, patterns, etc., were purchased by A. Russell & Sons, Newburyport, for $270. The principal boiler room equipment was sold to A. Lee & Co. and E. A. Peabody & Son, Lawrence, for $723. The power unit was sold to Joseph Myerson of Boston for $550. The traveling crane equipments were sold to the McCoy-Brandt Machinery Company, Pittsburgh, for $3,550. These, with the real estate, realized $70,573.12. The equipment in detail was sold in 247 catalogued lots to purchasers more than covering New England, New York, Pennsylvania and New Jersey. The principal purchasers of this equipment were the Mansfield Foundry Company, Mansfield; Thomas H. Stewart, Graniteville; Boston Gear Works, Quincy; Improved Paper Machinery Company of Nashua; Alexander & Garsed, Charlotte, N. C.; John Quinn, Philadelphia; Sweet & Doyle Foundry & Machine Company, Green Island, N. Y.; Stockbridge Machine Company and Wright Wire Company, Worcester; E. Le Barron Foundry Company, Brockton; American & British Mfg. Company, Providence; Hopkins Machine Works, Bridgeton, R. I.; George G. McLauchlin Mfg. Company and Morey & Co., Boston; A. Russell & Sons Company, Newburyport; N. C. Bartlett, Haverhill; Scannell Boiler Works, Lowell; Lee & Smith, Lawrence Lumber Company, Samuel Smith Machinery Company, Davis Foundry Company, Hamblett Machine Company, John Shea, E. McCabe & Co., and Hart Foundry Company, all of Lawrence. The total sale, covering the real estate, machinery, mechanical equipment, and other personal property amounted to $76,600.

PERSONAL

K. W. Zimmerschied, chief metallurgist, General Motors Company, addressed the Steel Treating Research Club on Friday evening, Oct. 27, at the Detroit Engineering Society's rooms, 46 West Grand River Avenue, Detroit, on "Cause and Mechanism of Steel Failures."

P. J. Mundie, superintendent of the merchant mills of the Pittsburgh Crucible Steel Company, Midland, Pa., has resigned to accept a more lucrative position in the South.

J. J. Callahan, who was formerly connected for several years with the Union Drawn Steel Company at its New York office, has been appointed Eastern sales agent for the Moltrup Steel Products Company, Beaver Falls, Pa., and has located his office in the Tribune Building, New York City.

M. William Nolan, formerly of the United States Navy engineering department, Washington, D. C., has been appointed field engineer for the Huessener Engineering Company, 1405 Oliver Building, Pittsburgh.

Harvey M. Clymer, for a number of years assistant to H. C. Gable, sales manager for the American Iron & Steel Mfg. Company, Lebanon, Pa., has resigned to accept the post of sales manager for the Lebanon Valley Iron & Steel Mfg. Company.

Emmett L. Adams, organizer for the International Machinists' Union, who promoted the unsuccessful strike for an 8-hr. day in the Milwaukee district, has gone to St. Louis to engage in similar work. He went to Milwaukee in September, 1915, and on July 18, 1916, called the first walkout. By Sept. 30, practically every striker was back at work, and no shop had granted a single concession.

Charles W. Stoup, former assistant manager of the Norwalk, Ohio, plant of the Crucible Steel Company of America, and recently in the general offices at Midland, Pa., has become manager of the Norwalk plant, succeeding H. E. Frazier, who has returned to the Midland plant.

B. Dyer has resigned as advertising manager of the National Carbon Company, Cleveland, and has taken a similar position with the Aluminum Castings Company, also of Cleveland.

W. J. Parker recently severed his connection with the sales department of the Standard Tool Company, Cleveland, to devote his whole attention to the Cleveland Power Transmission Company, in the ownership of which he and others are associated. This company is located at 828 Garfield Building, Cleveland, and is doing a jobbing business in twist drills, reamers, milling cutters and other small tools.

William P. Anderson, general superintendent of the Dayton Engineering Laboratories, Dayton, Ohio, has resigned to accept the presidency of the new Dayton Screw Company.

Howard See, formerly with the American Rolling Mill Company, Middletown, Ohio, has been appointed vice-president and general manager of the Dixie Culvert & Metal Company, Atlanta, Ga.

W. C. McCain, superintendent of the blooming mill of the Pittsburgh Crucible Steel Company, Midland, Pa., resigned his position Nov. 1.

George A. Cragin, formerly assistant general sales agent of the American Steel & Wire Company, and for seven years in charge of its Worcester territory, has been appointed sales manager of the wire department of the National India Rubber Company, Bristol, R. I. He had been connected with the American Steel & Wire Company and its predecessors for 35 years.

Dr. W. H. Hatfield has been made head of the Brown-Firth research laboratory, Sheffield, England, succeeding Harry Brearley.

Prof. J. O. Arnold has been elected a member of the council of the British Iron and Steel Institute.

Morris Knowles, consulting engineer, Pittsburgh, has been appointed transit commissioner by the mayor. This is a newly created position for the purpose of preparing plans for a subway, which is badly needed to handle the congested traffic. It is proposed to build a subway from the lower end of the city to the East End, a distance of about five miles, with probably two or three branches diverging from the main line to handle traffic to populous centers.

L. S. Devos, formerly purchasing agent for R. Martens & Co., 24 State Street, has joined the selling force of the Selson Engineering Company, 78 Broad Street, New York.

Joseph Esherick has resigned as manager of the valve and specialty department of the Yarnall-Waring Company, Philadelphia, to become the Philadelphia representative of the D. Connelly Boiler Company, National Steam Pump Company and the Foxboro Company.

A. W. Foote, president Foote-Burt Company, Cleveland, builder of drilling machinery, has been elected president of the H. A. Lozier Company, automobile maker, Cleveland.

Ross Anderson, manager of production of the Poole Engineering Machine Company, Baltimore, Md., has been made works manager.

Robert E. Hall, vice-president Goulds Mfg. Company, is now in charge of the Chicago office and Northwestern territory, with offices at 12 South Clinton Street, Chicago.

Andrew Glass, vice-president and general manager Whitaker-Glessner Company, Portsmouth, Ohio, is reported convalescing from an attack of typhoid fever.

United Alloy Steel Corporation's Officers

Organization of the United Alloy Steel Corporation, which has taken over the United Steel Company, Canton, Ohio, has been effected by the election of following officers and directors: Chairman of board of directors, Edward A. Langenbach, president Berger Mfg. Company; president, Harry R. Jones; first vice-president in charge of sales, E. D. Rogers; secretary and treasurer, E. L. Hang. The board of directors consists of the above and William H. Woodin, president American Car & Foundry Company; E. H. Wells, president Babcock & Wilcox Company; H. Coulby of Pickands, Mather & Co.; Bayard Dominick, Dominick & Dominick; and John W. Prentiss, Hornblower & Weeks.

Mr. Langenbach was the principal stockholder in the United Steel Company, and has reinvested in United Alloy Steel stock most of the money he received for his interest in the old company. The Berger Mfg. Company is a heavy buyer of steel from the United Company, and under its contract will take up to 10,000 tons a month. The association of the American Car & Foundry Company and the Babcock & Wilcox Company with the United Company is understood to indicate that these companies will become important purchasers of alloy steel. Pickands, Mather & Co., Cleveland, are half owners with the United Alloy Steel Corporation in the United Furnace Company, and will furnish this company with its iron ore. Mr. Coulby will represent this interest in the company.

United States Ordnance Bids

The Midvale Steel & Ordnance Company was the lowest bidder on 40 16-in. guns for the navy and two 16-in. for the army. Its only other competitor was the Bethlehem Steel Corporation. For 20 of the guns for the navy, the Midvale Company made a bid of $174,000 each, the first gun to be delivered in 23 months, and the remainder in 43 months. The Bethlehem Steel Company's bid on 22 guns for the navy was $176,100 each, the first to be delivered in 21 months, and the remainder in 43 months.

On the two army guns the Bethlehem Company bid $225,000 each, with breech mechanism according to the department's design, and $215,000 each without breech mechanism. For guns of the company's design, with breech mechanism, the bid was $220,000 each; or, without breech mechanism, $205,000 each; the first gun to be delivered in 30 months, and the second in 36 months. The Midvale Company bid $209,000 for each of the guns on its own design, without breech, or $220,000 each complete, delivery to be made in 38 and 43 months.

Pittsburgh and Nearby Districts

The former plant of the Best Mfg. Company at Twenty-fifth and Railroad streets, Pittsburgh, has been sold to Hausman & Wimmer, scrap dealers, who will utilize the building for offices and the vacant ground for a scrap yard.

The next meeting of the National Association of Sheet and Tin Plate Manufacturers will be held in its rooms in the Oliver Building, Pittsburgh, on Thursday, Nov. 9.

The Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa., is asking for bids on two 20-ton cranes.

E. W. Pittman, manager of the Rankin plant of the McClintic-Marshall Company, Pittsburgh, and George H. Danforth, structural engineer of the Jones & Laughlin Steel Company, Pittsburgh, gave a joint paper on "Factors Affecting Costs of Structural Steel Shop Work" on Oct. 31, before the Engineers' Society of Western Pennsylvania at Pittsburgh.

The Farrar Advertising Agency, Empire Building, Pittsburgh, will shortly apply for a charter of incorporation under the name of the Farrar Advertising Company. G. Benjamin Martin will be president; William F. Born, secretary, and Morgan W. Eckley, treasurer. Wallace H. Russell will be one of the incorporators. The death of David C. Farrar, which occurred in August, has brought about a reorganization.

The Manufacturers' Light & Heat Company, Pittsburgh, has advanced the price of natural gas to manufacturers in the East Liverpool, Ohio, district 1c. per 1000 cu. ft., effective Nov. 1.

The William B. Pollock Company, Youngstown, recently made a shipment of three steel slag cars to Sweden.

Stockholders of the Federal Radiator Company, New Castle, Pa., will shortly be asked to authorize an increase in the company's capital stock from $600,000 to $1,000,000. Of the increase, $200,000 will be common stock and $200,000 will be 7 per cent preferred. The funds provided will be used for plant extensions.

The Phoenix Iron Works Company, Meadville, Pa., is erecting a four-story brick and steel pattern shop and pattern storage building, of fireproof construction, and is also building a new power plant, which will provide an increase of about 500 hp. Three horizontal return tubular boilers, an engine and a generator are to be installed. The company recently placed an order for a 6-ton cage-operated monorail traveling hoist with the Sprague works of the General Electric Company. The runway for the hoist will extend through the greater part of the plant and over the yard. The company is also adding an open side planer, 72 x 84 in. x 16 ft. It recently completed an addition to its steel-plate shop and installed an additional overhead electric traveling crane and a 96-in. cupola, built by the Whiting Foundry & Equipment Company, Harvey, Ill. It is in the market for a 30 or 35 ton electric traveling crane with an auxiliary hoist.

The Beaver Refrigerator Mfg. Company, New Brighton, Pa., maker of Tettenborn porcelain refrigerators and porcelain ware specialties, has contracted for the erection of a one-story factory to cost about $75,000.

The American Steel Foundries will build two more 40-ton open-hearth furnaces at its plant at Sharon, Pa. It recently completed two furnaces of the same size, one of which was started a month ago and the other last week. The two furnaces now to be built will give the plant a total of seven 40-ton furnaces, making 600 tons or more per day of open-hearth steel.

The North East Foundry & Machine Company, North East, Pa., whose plant was badly damaged by fire last July, has rebuilt its works and is now making a line of gray-iron and semi-steel castings. A steel frame building, 80 x 100 ft., has been erected, in which a 54-in. cupola, built by the Whiting Foundry Equipment Company, Harvey, Ill., has been installed. The company has been incorporated. Dr. J. J. Finerty, 429 Franklin Street, Buffalo, N. Y., is president; W. G. O'Malley, vice-president; E. A. Finerty, secretary, and F. G. Pottmeyer, general manager. Mr. Pottmeyer was formerly assistant general superintendent of the plant of the Pittsburgh Iron & Steel Foundries Company, Midland, Pa.

The Engineers' Society of Western Pennsylvania, with headquarters in the Oliver Building, Pittsburgh, is planning to purchase Solitude, the home of the late George Westinghouse, at Homewood Station, on the Pennsylvania Railroad a few miles from Pittsburgh, and establish a memorial in his memory. The property comprises 10 acres, and it is proposed to make it a public park.

The blooming-mill department of the open-hearth steel plant of the Brier Hill Steel Company, Youngstown, Ohio, recently turned out 1954 tons of rolled steel in 24 hours. About Jan. 1 the company expects to have ready for operation two more 100-ton open-hearth furnaces which will increase its output of open-hearth steel from 400 to 450 tons per day.

The Arbogast Machine Company, Pittsburgh, has been incorporated with a capital of $5,000 by R. S. Geise, C. V. Arbogast and F. W. Stonecipher.

The Ball Engine Company, Erie, Pa., is seeking a second-hand power punch in good condition to punch a 1-in. hole in ¼-in. plate. The throat must be from 24 to 28 in.

Large Orders for Locomotives

Orders for 127 locomotives have been taken in the last week by the American Locomotive Company. The largest among these are 77 for the Chicago & Northwestern, 15 for the Buffalo, Rochester & Pittsburgh, 15 for the Erie, 9 for the Chicago, St. Paul, Minneapolis & Omaha, and 5 for the Hocking Valley. The Baldwin Locomotive Works will build 4 locomotives for miscellaneous companies, bringing the total orders for the week to 131. A conservative estimate puts the orders for October, including these, at 386, of which 173 are foreign. The largest month this year was 565 in February, with 473 in May and 453 in March. The total for the first half of 1916 was 2124, with 878 for the first four months, to Nov. 1, of the second half.

Site Secured for Worth Steel Plant

The Worths, formerly engaged in the manufacture of steel at Coatesville, Pa., but who sold out to the Midvale Steel & Ordnance Company, have taken over about 500 acres of land on the Delaware River between Marcus Hook, Pa., and Claymont, Del., upon which a large steel plant will be erected. It is stated that Norman R. Entrekin, associated with the Worths for a number of years, will be the general manager. The members of the Worth family interested in the project are J. Sharpless, William P., E. H. and William A. The site is situated ideally for shipments both by water and rail. The Worths have had the property under observation for several months. They have opened offices in suite 622, Commercial Trust Building, Philadelphia.

The Morgan Engineering Company, Alliance, Ohio, is building another erection shop, which is 80 x 404 ft., clear span inside. From the ground to the bottom of the truss is 38 ft.; from grade to girder rail, 29 ft. The building is of steel frame, brick walls 5 ft. high and steel sash on one side. On the other side, the new building adjoins a present building. The siding is Asbestos Protected Metal. The roof is wood purlin supported on steel trusses with 2 x 6 in. sheeting, and a slate roof on top of that. A skylight coming down 14 ft. from the ridge on each side extends the entire length of the building. The floor is asphalt block. The building will be equipped with two 25-ton cranes. It is being erected by the Austin Company, Cleveland.

The California Foundrymen's Association held a banquet at Hotel Oakland, Oakland, Cal., on the evening of Oct. 14, with over 100 present. C. M. Henderson of Berkeley presided, and A. B. C. Dohrmann of San Francisco was the principal speaker. John Hedley is president of the association.

RESALE TOOLS PLENTIFUL

Demand for New Equipment Unimpaired

United States Government Munitions Activity Creating Business in Machinery — Seattle's Shipments to the Orient Breaking Records

Second-hand and resale machine tools appear to be coming on the market in larger numbers, but they have not interfered with business in new equipment to any appreciable degree, in fact, the demand for standard tools is growing better in some cities, Detroit being one of these. In New York the trade is somewhat mystified by the circulation of a list of tools, the aggregate value of which is about $1,500,000, with which goes an unusual story. Those offering the tools say they were bought and paid for by a man since deceased and that his estate desires to realize on the property. The opinion is held by some that the machines probably are owned by persons who are under the ban of the British black-list.

Inquiries now before the trade in New York specify 150 24-in. lathes and a few very large ones for big rifles. Government orders for guns and ammunition are giving a considerable stimulus to the equipment used in such work. The Frankford Arsenal is planning the purchase of additional machinery, and it is not long since the Watervliet Arsenal was in the market.

The Bethlehem Steel Company has placed orders for about 35 cranes to be installed at its Sparrows Point plant.

New demand is fairly active in Cleveland, with milling and grinding machines difficult to procure.

The demand for mill and factory supplies is so great in Cincinnati that buyers cannot have all they want, the sellers deeming it best to distribute supplies so far as they can.

October is expected to prove the heaviest month in Milwaukee since the same month in 1915. All that hampers manufacturers is the continued shortage of labor.

From many directions come complaints of car shortages, but nowhere is it more acute than in the Pacific Northwest. In nine months of this year Seattle did an export business of $302,213,297, or $44,420,904 more than in all 1915. Of the nine months' total, $149,233,095 was with China, Japan and Vladivostok.

New York

NEW YORK, Nov. 1, 1916.

Members of the trade have been approached by parties who offer a large number of new machine tools, the total value of which would approximate $1,500,000, on most of which it is declared prompt delivery can be made. Lathes, shaping, planing and drilling machines are included, as well as a large number of small tools. The story told by those offering the tools is that they were bought and paid for by a man now deceased and that his estate desires to dispose of the equipment. The number of tools offered and the surrounding unusual circumstances has given rise to conjecture as to the actual facts involved, and the suggestion is made that the machines may have been purchased by some exporter, speculator or group of speculators whom the British have placed under the ban of their black-list. Beyond the statement that a shipping firm is concerned the name of the seller or sellers has not been disclosed.

The Baldwin Locomotive Works has placed on the market about 300 single-purpose lathes which have been used on small shells.

Gaston, Williams & Wigmore, 140 Broadway, New York, have made inquiry for 10 engine tenders, 2 flat cars and upward, for shipment to France.

The American & British Manufacturing Company, Bridgeport, Conn., is in the market for six large lathes, each valued at $6,000 to $7,000, required for turning out a United States Government order for cannon. The company has also obtained a Government contract for shells.

The Bethlehem Steel Company has awarded contracts for the large number of cranes required at its Maryland Steel Company plant, Sparrows Point, Md. The inquiry called for 35 cranes ranging in capacity from 5-ton to 175-ton. The Morgan Engineering Company and the Alliance Machine Company, both of Alliance, Ohio, were the successful bidders.

The General Electric Company, Schenectady, N. Y., and the Samuel L. Moore & Sons Corporation, Elizabeth, N. J., continue good buyers of various tools. The latter company has men working overtime on its new shops at Elizabethport.

The general trade in machine tools continues satisfactory. The list of the Standard Shipbuilding Corporation, New York, is receiving attention.

The officers of the Frankford Arsenal, Philadelphia, Pa., have under consideration the addition of equipment to enable the arsenal to increase its output of munitions.

The Taylor-Wharton Iron & Steel Company, High Bridge, N. J., has had plans prepared for large machine shop extensions. Bids are being taken on the concrete foundations and the steel superstructure.

The Moline Plow Company, in order to meet increased business, is building an addition at its Adriance-Platt branch at Poughkeepsie, N. Y., including an extension to its forge shop, 100 x 125 ft., and to its foundry, 63 x 165 ft. Plans are being prepared for another foundry addition, including a cupola, core room and brass foundry, as well as an addition to its warehouse, all of which are delayed until next spring, owing to the scarcity of building material.

The Phoenix Foundry Company, Voorheesville, N. Y., manufacturer of gray-iron castings, lost its plant by fire recently. The pattern house and office were undamaged. Ledyard Cogswell, Jr., Albany, N. Y., is manager.

The Radium Luminous Material Corporation, 55 Liberty Street, New York, will make improvements to its factory at High and Alden streets, Orange, N. J., not at Newark, as has been stated. P. M. Willis is secretary and treasurer.

Brewster & Co., Long Island City, N. Y., have increased their capital stock from $2,000,000 to $2,500,000 to provide funds for the manufacture of a chassis for its automobiles, formerly imported from England and France.

The Transmission Ball Bearing Company, manufacturer of ball bearings and elevating transfer trucks, 32 Wells Street, Buffalo, N. Y., has increased its capital stock from $100,000 to $250,000 and has let contract for a brick and steel building, 90 x 220 ft., one story, which will enable it to increase its output from 300 to 400 per cent. It is planned to have the structure, which will be erected on Military Road, Buffalo, on the New York Central Lines, ready for occupancy Jan. 1.

The H. Barcroft White Corporation, 701 South Helena Street, Syracuse, N. Y., has been incorporated with a capital stock of $5,000 by H. Barcroft White, Hans J. Bickman, and others, and is erecting a building at West Genesee and Plum streets and will act as distributor for Chevrolet automobiles for that district. H. B. White is president.

The Newburgh Ship Building Company, Newburgh, N. Y., F. N. Bain, president, has awarded contracts for a plant, 60 x 100 x 200 ft., one and two stories, to cost $30,000.

The Norwich Wire Basket Company, Norwich, N. Y., has let contract for a one-story addition, 75 x 192 ft., to its factory. M. Fermald is manager.

The Hilliard Clutch & Machine Company, Elmira, N. Y., will build an addition to its machine shop, 40 x 50 ft. Plans are in preparation.

The Harrison Mfg. Company, Lockport, N. Y., Herbert

C. Harrison, president, will build an extensive addition to its plant, which will more than double its capacity, and increase the number of men employed from 250 to 1000. The company is now a subsidiary of the United Motors Corporation.

The American Can Company, 120 Broadway, New York, has let contract to the Turner Construction Company for a factory and warehouse, 75 x 180 ft., three stories, at Fairport, N. Y., to cost $50,000.

The C. W. Prichard Company, 50 Church Street, New York, will buy one 8-ft. heavy-duty planing machine, one 10-ft. heavy-duty planing machine and one 60 to 72-in. heavy type lathe with 25 to 35 ft. bed, all of massive type.

The American P. I. Company, 48 East Eighth Street, New York, is in the market for electric motors.

The Sperry Gyroscope Company, Manhattan Bridge Plaza, Brooklyn, N. Y., is in the market for a 6-ft. heavy type plain radial drill press.

The Oscar Barnett Foundry Company, Irvington, N. J., is seeking a second-hand 10-ton standard gage locomotive crane in good condition.

The Estate of Adolph Starke, 575 Columbia Street, Brooklyn, N. Y., wants a bolt-heading machine of Acme or equivalent type and a roll spike pointer.

The Strong Machinery & Supply Company, 21 Walker Street, New York, will purchase a second-hand boiler in good condition of from 75 to 150 hp., for a working pressure of 125 lb. per sq. in.

The Atlantic Stamping Company, manufacturer of wash boilers, etc., Rochester, N. Y., has let contract for three additions to its factory, each 26 x 30 ft.

Contract has been let to the Forest City Steel & Iron Company, Cleveland, Ohio, for the construction on the Buffalo River and Buffalo Creek Terminal Railroad, Buffalo, of a stone-crushing and storage plant for the Kelly Island Lime & Transport Company. J. A. Kling, Cleveland, is president. The principal building will be 50 x 188 ft., one story. The cost of the plant, including unloading, conveying and crushing machinery, will be approximately $250,000.

The King Sewing Machine Company, Buffalo, has plans in progress for a further addition to its plant at Rano Street and the Lackawanna Railroad.

The Nedrew Mfg. Company, Caledonia, N. Y., will build a one-story boiler house, for which plans have just been completed.

The Buffalo Foundry & Machine Company, H. D. Miles, president, has plans completed for a one-story machine shop, 34 x 110 ft., to be erected at once.

The Peerless Marine Motor Company, 10 Lock Street, Buffalo, has let contract for a two-story factory, 50 x 70 ft., at 2150 Niagara Street.

The Salyer Tool Works, 57 Park Street, Newark, N. J., has commenced the erection of a machine shop, 85 x 194 ft., to specialize in automobile repair work at Washington and Pearl streets. It is estimated to cost $35,000. H. M. Salyer is president.

H. Louis Weiss, 255 Fabyan Place, Newark, N. J., will build a one-story machine shop.

The Valley Forge Cutlery Company, 28 South Sixth Street, Newark, N. J., manufacturer of pocket knives, will make alterations in its plant.

The Kotten Machine Company, West Side Avenue and Pennsylvania Railroad, Jersey City, N. J., has been incorporated with a capital of $100,000 to manufacture tools and machinery. Henry G. Kotten and Sidney H. Alexander, Englewood, N. J., and George W. Knappmann, 722 Chauncey Street, Brooklyn, N. Y., are the incorporators.

The American Type Founders Company, Jersey City, N. J., will build a two-story brick type building, and two-story brick and gas producer plant to its works on Garrabrant Street.

The Standard Tool & Mfg. Company, 237 Laurel Avenue, Arlington, N. J., has been incorporated with a capital of $25,000 by John Stranberg and Bernard Keating, Arlington, and Fred Roach, 59 Howard Street, Newark.

The Roessler & Hasslacher Chemical Company, Perth Amboy, N. J., has acquired extensive properties near Charleston, W. Va., and plans for the erection of a new plant to cost about $1,000,000.

The Union Bag & Paper Company, Bakers Falls, N. Y., has plans in preparation for a four-story paper mill. E. C. Barrett is president.

The International Paper Company will build a hydro-electric power station at Glens Falls, N. Y., and has awarded contract for its construction to the H. P. Cummings Construction Company, Ware, Mass.

The Dahlstrom Metallic Door Company, Jamestown, N. Y., has let contract for erection of two buildings, 40 x 120 ft. and 100 x 100 ft., respectively, each one story, to cost $20,000.

New England

BOSTON, Oct. 30, 1916.

The Bridgeport Projectile Company, Bridgeport, Conn., which has secured a contract for guns and ammunition from the United States Government amounting to $2,000,000, has awarded a contract for a two-story gun plant, 120 x 300 ft. This addition will make it the third largest plant of its kind, it is said, in the United States.

The Robertson-Northrop Company, Cambridge, Mass., has been incorporated with capital stock of $50,000 to manufacture telephone appliances, etc. The directors are H. B. Northrop, president; Edward F. Robertson, 15 Haviland Street, Boston, treasurer; and George H. Mellen.

The American Tool & Machine Company, 1417 Hyde Park Avenue, Hyde Park, Mass., is to build a blacksmith shop, 50 x 60 ft., two stories.

The American Ammunition Company, formerly controlled by the R. B. Phillips Mfg. Company, which occupied two stories of the Critchley factory on Grand Street Court, Worcester, Mass., is being moved to Ste. Catherines, Ont., Canada, where it is reported that the British Government is to establish one of the largest ammunition plants on this continent. The space vacated will be taken over by the Critchley Machine Screw Company, which has orders ahead for many months of work in the manufacture of screw machine products.

The Leland-Gifford Company, 1025 Southbridge Street, Worcester, Mass., has awarded a contract for the construction of an addition, 62 x 102 ft., four stories. A wing will also be added, 62 x 124 ft., of the same height. This addition will permit the company to increase its working force from the present number of about 450 to 700 or 800 hands. The company manufactures drilling machines and particularizes in the grinding of crankshafts.

The Perkins Appliance Company, Springfield, Mass., has been incorporated with capital stock of $50,000 to manufacture steel, iron and other metals. The directors are J. L. Perkins, president; Harry R. Elder, 423 Main Street, Springfield, treasurer; and R. S. Miles.

The Offset Tool Company, Bridgeport, Conn., has been organized with D. J. Trivers, president; W. J. Buckley, secretary and Cyrus Barker, treasurer.

Philadelphia

PHILADELPHIA, PA., Oct. 30, 1916.

The Ontario Machine Screw Company, Ontario and Rorer streets, Philadelphia, is completing a two-story machine shop adjoining its present location, at a cost of $10 000, and will take possession early next month. J. Hugh Mackay is secretary. The company manufactures screw machine products and light metal stampings.

The Vulcan Iron Works, Wilkes-Barre, Pa., has purchased property adjoining its foundry which it will use for the present for storage purposes. No construction work is contemplated.

The Pennsylvania Equipment Company, Coleman Building, Philadelphia, is in the market for a standard gage four-wheel saddle tank locomotive weighing 25 to 45 tons, to pass Massachusetts boiler law requirements, preferably American Locomotive Company type.

Fred Pearson & Co., plush manufacturers, Manayunk, Pa., have awarded contract to A. L. Fretz & Son, contractors, 1213 Filbert Street, Philadelphia, for the construction of a one-story brick engine and power house, 37 x 100 ft., to cost about $7,500.

L. B. Hilliard, Wilkes-Barre, Pa.; R. W. Archibald, Scranton, Pa., and W. L. Foster, West Pittston, Pa., trustees, succeeding the receivers of the Exeter Machine Works, manufacturer of steam engines, etc., Pittston, Pa., have authorized E. Foster Hellar, Wilkes-Barre, Pa., referee in bankruptcy, to receive applications to sell the plant during the week of Oct. 29.

The Trenton Spring Mattress Company, Trenton, N. J., manufacturer of bed springs, will build a one-story addition to its plant on Parker Avenue. Joseph D. Smith & Sons Company is the contractor.

The Co-operative Safeguarding Company, Trenton, N. J., recently organized, has acquired property on Lincoln Avenue, and will establish a plant for the manufacture of machinery safety appliances. J. Albert Homan, Trenton, is a stockholder in the company.

The Commercial Body Company, Trenton, N. J., manufacturer of bodies for automobiles, has acquired property at 809 South Broad Street for an addition to its plant.

John McKay, Bordentown, N. J., has leased property on

Park Street, and will establish a plant for the manufacture of incubators and brooders.

The Warren Foundry & Machine Company, Phillipsburg, N. J., is in the market for a 15-ton crane with 52-ft. span of the three-motor type for a 220-volt direct current.

The Kutztown Foundry & Machine Company, 1421 Chestnut Street, Philadelphia, is in the market for a 10-ton three-motor electric traveling crane for a 220-volt direct current for a 66-ft. 11-in. runway.

The Sterling Iron & Steel Company, Philadelphia, is in the market for the following electric traveling cranes: one 10-ton, 30 to 40-ft. span, for 220-volt direct current; two 3 to 5-ton, for 50-ft. span, operating on a 500-volt direct current, and one 5 to 10-ton, for 46 to 50-ft. span, for a twophase, sixty-cycle, 220-volt alternating current.

W. S. Shield, Philadelphia, will build a one-story brick garage, 165 x 200 ft., on Woodland Avenue, to cost about $30,000. The Standard Construction Company is the contractor.

The Keystone Screw Company, Philadelphia, will make alterations and additions in its plant on Seventeenth Street.

The Carwen Steel Tool Company, North Philadelphia, manufacturer of milling cutters and similar steel tools, is planning to increase the capacity of its plant by the installation of new equipment.

The Commercial Car Unit Company, Philadelphia, has been incorporated with a capital of $10,000 to manufacture motor trucks. N. S. Mackie, Philadelphia, is treasurer.

The American Ice Company, Philadelphia, will build an addition to its ice manufacturing plant on Washington Avenue. Ballinger & Perrot, Philadelphia, are the architects.

Baltimore

BALTIMORE, MD., Oct. 30, 1916.

Machinery in the plant of the Baltimore Copper Smelting & Rolling Company, Canton, Md., was destroyed by fire on Oct. 29.

The plant of the American Manganese Steel Company at New Castle, Del., suffered damage by fire Oct. 20, principally to the roof of its foundry, to the extent of about $20,000. It is placing contracts for rebuilding the burned portion of the plant which it expects to have completed within 30 days. It is operating in the meantime nearly to full capacity. Walker Brinton is local manager.

Hackley Morrison, Box 120, Richmond, Va., is in the market for the following equipment: One 10 x 10 or 10 x 12 skidder, Flory type preferred; one 9 x 10 loader, Lidgerwood type preferred; six standard gage steel logging cars; one 30-ton locomotive, standard gage; one 750 or 1000-hp. boiler feed heater; one circular sawmill of about 15,000 to 20,000 ft. per day capacity; one 750-gal. per minute fire pump; three 10, 12 or 14-track nailing or cleating machines; one 50-hp. motor, 250 volts d.c.; one 45-kw., one 40-kw. and one 20-kw. generator for 250 volts direct current; one 30,000-gal. tank with 50 or 60 ft. steel tower.

The Maryland Tube Corporation, Baltimore, has been incorporated with $500,000 capital stock by Herbert B. Stimpson, 400 Equitable Building, Baltimore; Charles H. Birmingham and Heyward Taylor. It has acquired a tract in South Baltimore and it is stated that it is planned to construct a tube, bar and sheet mill and a brass foundry. Mr. Birmingham will be in charge.

An additional unit will be built to the plant of the Crown Cork & Seal Company, 1601 Guilford Avenue, Baltimore, at Highlandtown, Md. It will be U-shaped, five stories.

The Penn-Mary Steel Company, Sparrows Point, Md., will build a blacksmith shop, 75 x 330 ft., to cost about $62,000.

With $10,000 capital stock the Edwin W. White Company, 107 Hanover Street, Baltimore, has been incorporated to deal in machinery, tools, implements, etc. The incorporators are Edwin W. White, 107 Hanover Street; Charles B. Bosley and Rignal W. Baldwin.

A garage to cost $15,000 will be built by the Star Motor & Machinery Company, Tazewell, Va.

With $100,000 capital stock the Motors Safety Starter Corporation, Richmond, Va., has been incorporated. Charles V. Carrington is secretary.

Plans for the construction of a one-story box factory are being made by David M. Lea, Richmond, Va.

The Fairbanks-Morse Company, dealer in machinery, 17 Hanover Street, Baltimore, Md., has leased 101 Light Street, and will occupy that building within the next few weeks.

The Alcoma Button Company, 123 Market Place, Baltimore, has been incorporated with $250,000 capital stock. The incorporators are Charles S. Hayden, 200 East Lexington Street, Albert N. Palmer and William H. Harris, the latter of New York City.

The Hughes Furniture Mfg. Company, Haubert and Beason streets, Baltimore, will build an addition, 50 x 90 ft., to cost $7,500.

Fire recently destroyed the new building of the Congoleum Company, Marcus Hook, Pa., used as a rubber-coating department. It will be rebuilt immediately. The damage was about $12,000.

Chicago

CHICAGO, ILL., Oct. 30, 1916.

Despite the fact that prompt delivery of machinery of almost any description can be had only at prices which argue for the postponement of every purchase that can possibly be delayed, there is a large activity in the buying of equipment. What is not now being bought is steadily accumulating against the time when lower prices shall again be in effect, and substantial as matters are to be had from this fact alone that a large domestic business will continue after the declaration of peace.

The Interstate Iron & Steel Company, Chicago, has bought a large shear and is about to buy other equipment necessitated by the expansion of its machine shop.

The Pressed Steel Mfg. Company, Cedar Rapids, Iowa, will consider the purchase of air compressors, shears, punches, stamping presses and a motor, and such valves, pipes and fittings as may be required in its business of manufacturing tanks and heating apparatus.

The Lincoln Steel & Forge Company, St. Louis, Mo., is in the market for steam drop hammers.

The Chatfield Machine & Foundry Company, Escanaba, Mich., is figuring upon additional equipment for its machine shop, to include a keyseater, pipe cutter and threader and possibly a planer and pneumatic tools and two 10-hp. and one 5-hp. motors.

Schweitzer & Conrad, 1770 Berteau Avenue, Chicago, have let contracts for a machine shop.

The Angert Wire & Iron Works, 6028 Grove Avenue, Chicago, will build a large factory to cost $75,000.

The Northwestern Electric Company, 613 West Adams Street, Chicago, is erecting an addition.

Schwertzer & Conrad will erect a one-story machine shop at 4431-39 East Ravenswood Avenue, Chicago, to cost $28,000. Van Holst & Fyfe, 72 West Adams Street, are the architects.

The Hughes Electric Heating Company, 211 West Schiller Street, Chicago, will build a one-story brick factory at Taylor Street and Waller Avenue, to cost $80,000.

C. Wouters, 2715 South Wabash Avenue, Chicago, will erect a one-story brick garage at 4943-49 South Wabash Avenue, at a cost of $20,000. R. G. Pierce is the architect.

The Chicago Bell Foundry Company, Chicago, has been incorporated with a capital of $2,500 by John Roeder, C. W. Taylor and F. L. Stetson.

Wilson & Co., Forty-first Street and Ashland Avenue, Chicago, have had plans prepared for a one-story brick factory, to cost $9,600.

The Steel Fabricating Company, Chicago Heights, Ill., will buy a second-hand 48, 60 or 72-in. gate shear of ½-in. capacity and a second-hand heavy-duty gang punch, 5 to 8 ft. long.

The Wabash Railroad Company has plans for a steel shop building to be erected at Decatur, Ill. A. O. Cunningham, Railway Exchange Building, St. Louis, is chief engineer.

The Pechstein Iron Works, Keokuk, Iowa, will be reorganized with a minimum capital of $25,000 for the erection of a building and the installation of new equipment.

The Fort Dodge Culvert Company, Fort Dodge, Iowa, has announced that it will build a new factory to cost $20,000 on ground adjoining its present quarters.

The American Fork & Hoe Company, Fort Madison, Iowa, has started work on the construction of a new plant, to consist of two buildings, one 60 x 150 ft., and the other 60 x 160 ft.

The American Cabinet Mfg. Company, Chicago, is establishing a branch plant at Fifth and Oak streets, New Albany, Ind., for the manufacture of cabinets. J. J. Quinn, of the company, states that the Chicago plant will ultimately be transferred to New Albany.

Milwaukee

MILWAUKEE, WIS., Oct. 30, 1916.

Milwaukee machine-tool builders believe the month of October will be the best ever known in volume of orders and production, with the possible exception of the same period of 1915, when conditions were abnormal. A steady stream of orders is coming in for one, two or three machines, generally in standard types. Shops are from 60 to 90 days behind on some orders and capacity on others is occupied until July 1. The labor shortage continues the most unsatisfactory feature of the situation. Other metal-working industries show unusual activity, but are also handicapped by the shortage of labor. The farm tractor industry continues to grow, although its development is hindered by the high costs of materials, and the difficulty to obtain them. Other farm machinery and implement lines are in the midst of a period of great activity.

The Jenkins Machine Company, Sheboygan, Wis., manufacturer of wood-working machinery, has passed into the ownership of A. G. Studeman and Mark Hoeper. W. W. and Louis Wolff retire. Mr. Studeman until recently was general superintendent of the wood-working machinery department of the Falls Motors Corporation, Sheboygan Falls., Wis. Mr. Hoeper has resigned as assistant treasurer and purchasing agent of the J. I. Case Plow Company, Racine, to take part in the new interest. The name of the company will not be changed, and the capital stock will remain at $70,000 for the present.

The Four Wheel Drive Auto Company, Clintonville, Wis., is spending approximately $20,000 in new tools and equipment for additions now being completed. It has a standing order for twenty trucks per week for an indefinite period and is now producing four a day. By Jan. 1 the output is to be six a day.

The Racine Auto Tire Company, corner of Fourteenth and Clarke streets, Racine, Wis., manufacturer of tires, tubes, etc., is preparing to build a new plant involving a total expenditure of $100,000. A site of four acres on High Street has been purchased and plans are being prepared for a group of factory buildings, warehouses, power plant, etc. Construction work will be carried on through the winter.

L. G. Widule, county clerk, Milwaukee, will close bids Nov. 10 at 9.30 a. m., for electric motors, starting boxes, etc., required for the chair factory unit of the new Milwaukee County House of Correction, North Milwaukee. The architects are Leenhouts & Guthrie, 428 Jefferson Street.

Wegner & Pirwitz, Marshfield, Wis., are building a machine shop addition, 36 x 88 ft., to their garage.

Schneider & Dorff, Milwaukee, have awarded contracts for the erection of a garage and repair shop, 55 x 146 ft., two stories and basement.

The Wrought Washer Mfg. Company, Milwaukee, will build a new warehouse, stockroom and shipping room, 90 x 331 ft., one-story, at 54-60 South Bay Street.

The Neacy-Read Investment Company, Downer Avenue and Webster Place, Milwaukee, will build a garage, 110 x 122 ft., two stories and basement, at a cost of $50,000.

A report from Schleisingerville, Wis., states that Robert LaPoint, formerly with the International Harvester Company, Milwaukee, has purchased the controlling interest in the Standard Machinery Company, Inc., maker of gasoline engines and farm implements. The name has been changed to the LaPoint Foundry Company and the force will be increased to handle additional business.

The Industrial Chemical Company, 200-210 Pleasant Street, Milwaukee, has established a chemical manufactory at South Milwaukee, Wis. P. A. Singer is general superintendent.

The John Strange Paper Company, Neenah, Wis., is planning to construct a new dam and hydroelectric plant at McDill, near Stevens Point, Wis. It has purchased the property of the Wisconsin Graphite Company and will establish a paper mill.

The Gillette Safety Tire Company, Eau Claire, Wis., expects to open its new plant Dec. 1, instead of Nov. 1, the delay being caused by the difficulty of getting equipment deliveries.

The Philadelphia & Reading Coal Company, 704 Majestic Building, Milwaukee, will construct a one-story reinforced concrete coal pocket and conveyor house, 30 x 72 ft., costing $5,000, at Sixteenth and Canal streets. E. J. McDonald is manager.

The Brandt Cashier Company, Watertown, Wis., manufacturer of cash register and accounting machines, is enlarging its capacity.

The Western Machine Company, Milwaukee, has been incorporated with $5,000 capital stock by William E. Bechmann, Eric H. Redstrom and B. Beebe.

The board of education, LaCrosse, Wis., is having plans made for remodeling the old high school building for manual training purposes at a cost of $30,000.

The LaCrosse Tractor Company, LaCrosse, Wis., has been organized in Delaware with a capital stock of $1,500,000 to manufacture tractors and other farm machinery and will take over the business of the Stay-Rite Engine Company, maker of gasoline engines. The incorporators are L. Hirshheimer, J. M. Fixon, L. F. Easton and L. C. Colman, all of LaCrosse.

The Interstate Steel Mfg. Company, Milwaukee, has been incorporated with a capital stock of $60,000 by James J. Devlin, Walter B. Potter and Harry F. Bayley, president of the Bayley Structural Iron Company, Milwaukee.

The Car Lighting Improvement Company, Milwaukee, has been organized with a capital stock of $25,000 to manufacture the Watson system for lighting. The incorporators are T. H. Spence and other members of the law firm of Quarles, Spence & Quarles, Sentinel Building.

Cleveland

CLEVELAND, OHIO, Oct. 30, 1916.

New demand for small lots of machines continues fairly active. Early delivery is wanted in most cases, but some dealers are unable to take orders for standard lines because they have no stock for early shipment. While the general delivery situation shows no improvement, buyers, by shopping around, are able to secure fairly prompt shipments. Milling and grinding machines are more difficult to get. The General Electric Company is in the market for 12 large standard machines, including boring, planing and shaping machines, for its Erie, Pa., works. The Babcock & Wilcox Company is purchasing considerable equipment for its Barberton, Ohio, plant. The demand in this section is largely from makers of automobile parts, the call for tool room equipment being particularly active. The demand for punching and shearing machinery continues very active, especially from steel mills, but deliveries are not promised in less than about six months. Considerable inquiry is noted for heavy handling equipment. A Cleveland builder has taken an order for a coal handling plant for installation on the seaboard in 1918, being unable to get the work out sooner.

The American Steel & Wire Company is in the market for a 240-ft. bridge equipped with a 9-ton bucket for use in connection with its by-product coke plant at Cleveland, and an inquiry is pending from the Bethlehem Steel Company, for a 15-ton ore bridge for its Sparrows Point, Md., plant.

The Cleveland Wrought Washer Company, Cleveland, will increase its capital stock from $70,000 to $500,000 and shortly place the contract for an extension to its plant. It will add cap and set screws and screw machine products to its present line, and is in the market for lathes, shaping and milling machines, furnaces and other equipment. J. S. Jennings and G. S. Case, of the Lamson & Sessions Company, manufacturer of bolts and nuts, have become financially interested in the washer company, but no change will be made in the management.

An inquiry is in the Cleveland market from the New York, New Haven & Hartford Railroad for two open-gap punching and shearing machines.

The Carnahan Tin Plate & Sheet Company, Canton, Ohio, will purchase at once a new or second-hand guillotine squaring shear with 42, 52 or 62-in. blade to cut not less than 3/16 in. plate.

The Cleveland Galvanizing Works Company, Cleveland, has commenced the erection of a one-story addition to its plant, 70 x 150 ft., to be used as a galvanizing department. When the extension is completed the portion of the old plant now used as a galvanizing department will be devoted to general manufacturing. New equipment will be installed.

The Fanner Mfg. Company, Cleveland, is enlarging its malleable iron foundry by the erection of a 40-ft. extension.

The Ohio Blower Company, Cleveland, has awarded the contract for the first unit of its new plant, to be four stories, 60 x 200 ft., of mill construction.

The Guardian Gas Appliance Company, Cleveland, recently organized with a capital stock of $25,000, will establish a plant at 2707 East Ninety-first Street for welding automobile engines and cylinders. A. R. McRitchie is general manager.

G. A. Schanze, doing business under the name of the Climax Motor Devices, 759 Rose Building, Cleveland, will shortly organize a company and plans to build a plant to manufacture magneto and generator couplings and motor indicators. Considerable machinery equipment will be required.

It is announced that the Holl Stamping & Mfg. Company, in which H. C. Holl and other Cleveland men are interested,

will be established in Mansfield, Ohio, in the plant of the Cornell Mfg. Company. It will manufacture electric equipment.

The Massillon Foundry & Machine Company, Massillon, Ohio, will increase its capital stock from $100,000 to $300,000 for the purchase of a site and erection of a new plant. It will be 100 x 300 ft., of brick and steel, and located near the plant of the Central Steel Company.

It is reported that the Standard Stamping Company, Marysville, Ohio, will move its plant next spring to Huntington, W. Va., where larger quarters will be provided.

The Good-Ware Rubber Company, 307 Masonic Temple, Elyria, Ohio, will use the Toplift & Ely plant in that city for the manufacture of automobile tires and other products. It will be remodeled and equipment added. Among the stockholders are Jacob Murbach and W. E. Brooks.

The Dahlstrom Metallic Door Company, Jamestown, N. Y., is enlarging its plant by an extension 22 x 120 ft., and the erection of a new building 100 x 100 ft. The Austin Company, Cleveland, has the contract.

Detroit

DETROIT, MICH., Oct. 30, 1916.

A pronounced increase in the number of orders and inquiries in the machinery market was evident the past week. The demand for standard machines is greater than it has been for some weeks. The largest order was for 12 high grade machines for the Springfield Body Company. Deliveries still require from four to eight months.

The Disco Electric Starter Corporation, Detroit, will begin the erection of a new factory with more than 28,000 sq. ft. of floor space which will triple its output, according to an announcement made by President S. W. Elston. Sol. Meyer, Detroit, is treasurer.

The Detroit Closed Bushing Company, Detroit, has been incorporated with $15,000 for the manufacture of closed bushings and electrical and mechanical devices. H. E. Watson, Frank M. Hydon and William Short are the incorporators.

The Michigan Stamping Company, Detroit, has increased its capital stock from $700,000 to $1,000,000.

The Lansing Cast Stone Block Company, Lansing, Mich., has begun work on a factory building. George Tews is general manager.

The Detroit Weatherproof Body Company, Detroit, recently organized with a capital stock of $200,000, is constructing several additions to its factory on Mount Elliott Avenue. It is reported that its entire output for the remainder of the year has been sold to automobile factories, and work on the additions is being rushed to provide for next year's business.

The Detroit Motor Lock Company, Detroit, has been incorporated with $30,000 by Charles R. Kerns, George M. Conner and R. M. Muir, to manufacture automobile parts.

The Hayes Motor Truck Wheel Company, St. Johns, Mich., will double its factory output. A large boiler is to be installed and a new tire press and facer added to the equipment.

The Baker-Vawter Company, St. Joseph, Mich., has awarded the contract for three factory buildings to Max Stock, Jackson, Mich., to be erected at a cost of $55,000.

The Brunswick-Balke-Collender Company has purchased the Commonwealth Adding Machine Company's plant at Muskegon, Mich., for the manufacture of steel pool and billiard tables. The building will be enlarged. It will manufacture an electric pin setter in Muskegon if labor can be secured.

The Howell Electric Motor Company, Howell, Mich., has increased its capital stock from $30,000 to $100,000 and expects to double its capacity and number of employees.

Fire destroyed the machine shop of the Moeke planing mill at Zeeland, Mich., causing a damage estimated at $16,000.

The Standard Foundry & Mfg. Company has moved its equipment from Alma to the new plant erected at St. Louis, Mich.

The Western Tool Works, Holland, Mich., is planning an addition to its plant which will double its capacity.

The Consumers Ice Company will erect an ice manufacturing plant at Grand Rapids, Mich., to cost $20,000.

Indianapolis

INDIANAPOLIS, IND., Oct. 30, 1916.

The Greencastle Foundry, Greencastle, Ind., has been taken over by Walter O'Neil and Max Prewitt, who will remodel the plant and install new machinery.

The Judd-Knoblock Corporation, South Bend, Ind., has been organized with a capital of $30,000 to manufacture flour purifying machines in connection with the George T. Smith Company. G. W. Judd will be general manager.

The Hoosier Motor Company, Goshen, Ind., is in the market for a 48 x 48-in. planing machine of from 16 to 22 ft., with four heads and in first-class shape.

The South Bend Machine Tool Company, South Bend, Ind., wants a second-hand 16 to 20-in. stroke traveling head shaping machine.

Cincinnati

CINCINNATI, OHIO, Oct. 30, 1916.

Automobile garages in different parts of the country have lately bought quite a number of machine tools and portable electric drilling machines. The steel mills are also good customers, but the demand from that source is for the larger sizes of lathes. Makers of internal combustion engines in this territory were never busier, and they are only handicapped by the advanced costs of both labor and material and the difficulty of establishing correspondingly higher selling prices on the smaller farm units. So far the car shortage has not inconvenienced the larger local plants who use coal, but some uneasiness is felt as to the winter season.

As a rule, the mill and factory supply firms are compelled to curtail shipments on many orders so as to make an equitable distribution. Shipments from the mills are much behind the schedule and prompt deliveries on many machine shop supplies are very difficult to make.

The new foundry of the Lunkenheimer Company, Cincinnati, will soon be under cover and the necessary equipment will be installed before Jan. 1.

The Citizens Artificial Ice Company, Cincinnati, will increase the capacity of its plant on Jefferson Avenue. Most of the equipment has been purchased.

The Acme Box Company, Cincinnati, has leased a building on Western Avenue and will increase the capacity of its plant.

The Norwood Sash & Door Mfg. Company, Norwood, Ohio, is making arrangements for an addition to its plant, principally for storage purposes.

The Niles Tool Works Company, Hamilton, Ohio, is contemplating the installation of an oxy-acetylene outfit in its plant.

The Dayton Screw Company, Dayton, Ohio, is a new company headed by W. P. Anderson, formerly general superintendent of the Delco Company. The company will fit up a plant in the Webb Building for the manufacture of cap screws.

The Duriron Company, Dayton, Ohio, has acquired an additional site on which an addition to its foundry will be built next year.

The W. C. Downey Company, Springfield, Ohio, maker of baling ties, has let contract for an addition to its plant, 30 x 100 ft., one story, of steel construction, to be used principally for storage purposes.

The Laboratory Supply Company, Columbus, Ohio, maker of glass and porcelain laboratory utensils, is increasing the capacity of its plant.

The Columbus Mill & Mine Supply Company, Columbus, Ohio, has made arrangements to concentrate its sales department with its structural steel plant, and will construct a building on Marion Road, 140 x 220 ft., two stories, of brick construction.

The Central Ohio Handle Company, Washington Courthouse, Ohio, has acquired the former plant of the Washington Handle Company and will add wood-working equipment.

The Marietta Mantel Company, Marietta, Ohio, is planning the erection of a new plant in the suburbs of that city.

The Central South

LOUISVILLE, KY., Oct. 30, 1916.

Much interest is being taken by industrial companies in the Interstate Commerce Commission's inquiry into the car shortage, to begin here this week, with a view to determining on a means of expediting loading and unloading of cars, which continues a seriously limiting influence on business. Inquiries in power, ice machine, plate and motor lines are numerous, many involving possible large orders. Most of the business, however, comes from the North and East.

The James Clark, Jr., Company, Louisville, manufacturer of electric motors, tools, etc., contemplates erecting a foundry to make its own castings. James Clark, Jr., is president.

The Brinly-Hardy Company, Louisville, Ky., agricultural implement manufacturer, is electrifying its plant at a cost of about $3,500, and has purchased 11 alternating-current motors of 5 to 40 hp.

The Louisville Motor Car Company, Louisville, Ky., with $10,000 of capital stock, has been incorporated by A. H. Douglas, Elizabethtown, Ky.; H. C. Dunevant, Smithville, Ky., and R. L. Thomas, Louisville, and will operate a garage.

The Roy C. Whayne Supply Company, Louisville, Ky., is in the market for a 2 or 2½-yd. steam or electric revolving shovel.

Thomas L. Barret, Louisville, Ky., is asking for a locomotive crane to handle a 2-yd. grab bucket at a 60-ft. radius, new or used.

The Simplex Farm Ditcher Company, Owensboro, Ky., has been incorporated, with a capital stock of $250,000, by Joseph Wile, G. Taylor Herr, W. H. Brannon, D. C. Stimson and J. R. Kinder, and has leased the old plant of the Owensboro Ditcher & Grader Company.

The American Metallic Packing Company, Lexington, Ky., is in the market for three return tubular boilers, 72. in. x 18 ft., 150 lb. working pressure, and a 500-hp. turbine steam engine direct connected to generator, the latter in first-class condition.

John Greeley and William Roth, Covington, Ky., have purchased the Maysville Machine & Iron Works, Maysville, Ky., formerly operated by the late Dan Daly.

Knoxville, Ky., will issue $225,000 in bonds for the purchase of a new vertical pump of 15,000,000-gal. capacity, and other improvements to the municipal water system. R. C. Anderson, Cincinnati, is engineer. The improvements will be made under direction of a commission composed of J. Wright Culton, Frank H. Mead and Capt. John M. Brooks.

The Kingsport Waterworks Company, Kingsport, Tenn., has increased its capital from $100,000 to $150,000.

The John G. Duncan Company, Knoxville, Tenn., is asking prices, for quick delivery, on 40, 50 and 60 hp. locomotive or Scotch marine boilers, second hand.

The White Oak Veneer & Lumber Company, Johnson City, Tenn., has been incorporated with $50,000 capital stock by H. T. Johnson, president, Johnson City; F. A. Jackson, secretary, Shells Mill, N. C., and others, and will establish a plant at Kingsport, Tenn. It is asking prices on electric motors, two or more veneer saws, a 7 or 8-ft. band mill and other equipment, new or second hand.

Birmingham

BIRMINGHAM, ALA., Oct. 30, 1916.

Machinery dealers are principally concerned about the slow deliveries, especially of machine tools. Wood-working machinery is quite active. The general demand is good. Small gasoline engines for farms are not in supply equal to the call. Hydroelectric apparatus remains on the active list.

The Birmingham Machine & Foundry Company, Birmingham, will at once repair the damage to machinery done by fire Oct. 25. Some machinery must be replaced.

The Morris Frogless Switch Company, Birmingham, has been incorporated with a capital stock of $100,000 by U. D. Davis, Johns, Ala.; H. C. Kelly, J. C. Morris, and others, of Birmingham, to operate a frogless switch plant.

The Southern Cotton Oil Company, Andalusia, Ala., will rebuild its plant burned with a loss of $50,000.

The Acme Ice & Bottling Company, Macon, Ga., will convert its brewery into a meat-packing plant. The machinery is to cost $100,000 and the building $300,000.

The Toccoa Machine Works, Toccoa, Ga., has been incorporated with a capital stock of $3,000 by H. L. Hayworth, T. G. Hones, and others.

The Pasco Tool Company, Atlanta, has been incorporated with a capital stock of $10,000 by George G. Pasco, A. R. Brittain, and others.

The Defi Vibration Bolt Company, Chattanooga, Tenn., has been incorporated with a capital stock of $10,000 by C. E. Buek, George W. Thompson, and others.

Texas

AUSTIN, TEX., Oct 28, 1916.

The machinery and tool trade continues satisfactory in every respect. With cotton prices still mounting upward all lines of industry and business are being stimulated to an almost unprecedented degree.

The towns of Pecos and Barstow, situated 10 miles apart, have awarded the contract for the construction of a joint waterworks plant to H. LaSalle, El Paso. The proposed improvement will cost about $200,000, and will consist of wells, pumping plant and storage reservoir.

The Texas Company, Houston, which recently increased its capital stock from $37,000,000 to $44,400,000, plans to make a further increase of $10,000,000 early in November. The refining and pipe-line facilities of the company will be greatly enlarged.

The municipal warehouse which is to be erected at Houston at a cost of $350,000, will be equipped with electric conveyors and a 20-ton electric crane.

St. Louis

ST. LOUIS, Mo., Oct. 30, 1916.

Activity in the machine-tool business continues at much the same level as in the past few weeks, dealers having about all the business they can take care of. Deliveries are the chief problem in the closing of transactions. The demand continues broad and comes from all classes of industry.

The Ebbeler Motor Car Company, St. Louis, has been incorporated with a capital stock of $100,000 by L. B. Ebbeler, Windsor Springs, Mo., J. J. Pitlyk and L. E. Erwin, St. Louis, to manufacture automobiles.

The Potter Electrical Signal & Mfg. Company, C. E. Potter president, will equip a plant at 811 North Ninth Street, St. Louis, to manufacture electric signal devices for use with sprinkler systems.

The Dodson Automatic Calculator Company, Milan, Mo., has been incorporated with a capital stock of $19,000 by A. F. Dodson, John Morris and L. P. Butler to manufacture automatic calculating machines.

Sedalia, Mo., will receive bids until Nov. 6 for a sewage disposal plant estimated to cost $50,000. F. T. Leaming is city engineer and E. L. Hackett city clerk.

C. K. Birdsall, architect, Commerce Building, Kansas City, Mo., is in the market for a deep well pumping equipment and an icing machine for drinking water.

The St. Louis & Southern Illinois Interurban System, with headquarters at Benton, Ill., which has had under consideration a project for 81 miles of electric line to cost with power plant equipment about $3,000,000, has completed preparations and will shortly be in the market for the equipment.

The equipment of Prairie Creek Mine No. 4, near Fort Smith, Ark., will be increased to a capacity of 1000 tons of coal per day at a cost of $200,000 by the Central Coal & Coke Company, Kansas City, Mo.

The Lambe & Demarke Light & Water Company, Arkansas City, Ark., will equip an electric light and waterworks plant and an ice plant and is receiving bids for oil engines, a 100-kw. electric unit, etc.

The Oklahoma Oxygen Company, Oklahoma City, Okla., has been incorporated with a capital of $15,000 by T. S. Chambers, Oklahoma City; H. M. Chambers, Tonkawa, Okla., and others, to equip a plant for the manufacture of oxygen.

The mill and grain elevator of the Thomas Milling Company, Thomas, Okla., which has been destroyed by fire with a loss of $300,000, will be rebuilt.

Oklahoma City, Okla., which voted $1,500,000 for a water system, will proceed with the construction at once and will receive bids for the machinery, detailed plans for which have not been completed. C. F. Semmelbeck is clerk.

Wilburton, Okla., will spend $75,000 for improvements in its water and sewer systems, including pumping machinery and disposal equipment. The McIntosh-Walton Engineering Company, Oklahoma City, Okla., is consulting engineer.

W. D. Caldwell, Oklahoma City, Okla., will build a garage and machine shop to cost $16,000.

The Gulf, Colorado & Santa Fe Railway will build a 20 stall roundhouse and make shop improvements at Guthrie, Okla., to cost about $250,000. F. Merritt, Galveston, Tex., is chief engineer.

The Ottawa County Ice Company, Commerce, Okla., will spend about $12,000 for new machinery for ice plants at Commerce and Miami.

The Consumers Refining Company, Oklahoma City, Okla., James A. Jones president, will equip a plant to cost about $250,000 and is in the market for four 150-hp. boilers, adapted for burning residues; one engine, four steam pumps, steel tanks, filter presses, sulphuric acid retort equipment, etc. A. D. Lloyd, Skirvin Hotel, Oklahoma City, is the engineer.

J. C. Ford, Summit, Miss., is in the market for equipment for the manufacture of a wire-fastening device.

C. A. Sanders will rebuild the saw and planing mill recently burned at Magnolia, Miss., with a loss of $17,000.

Charles A. Zilker, Memphis, Tenn., has bought the ice plant at Monroe, La., and will install additional machinery, making the daily capacity 125 tons.

The Sugar By-Products Company, New Iberia, La., will install equipment for a paper mill, including pumps, baling presses, etc., also machinery to manufacture cellulose, pulp.

alcohol, etc., from sugar-mill waste. Mark W. Marsden, Widener Building, Philadelphia, is president and D. W. Greene is local manager. The capital is $5,000,000.

The Northern Motor Company, St. Louis, has been incorporated with a capital stock of $16,500 by Charles Moench and others to manufacture motor car parts.

The Fuse Electric Fire & Burglar Alarm Company, Wheeling, Mo., has been incorporated with a capital stock of $30,000 by A. E. Lowe, Thomas J. Lilly and W. S. Cherry.

The Pacific Coast

SEATTLE, Oct. 24, 1916.

The car shortage, particularly in Oregon, is steadily growing more acute, and the total shortage at this time is greater than ever. With water front conditions in Seattle steadily improving, and recovering from the extended longshoremen's strike, the lull in shipping from that port has been practically overcome. Seattle's water-borne commerce for the first nine months of 1916 amounted to the enormous total of $302,213,297, or $44,420,904 more than the entire twelve-month period of 1915. In this connection, it is interesting to note that of this sum almost half, or $149,233,095, covered Seattle's trade with China, Japan and Vladivostok. This latter figure shows a gain of more than $57,000,000 over that for the entire year 1915.

While current lumber shipments are curtailed, the evidence of increasing demand, both domestic and foreign, is causing greater interest in that industry, and a number of plans for larger plants are taking shape. Machinery orders from the interior mining districts make quite a substantial aggregate, and inquiries from Alaska are fairly numerous. The movement of machine tools is satisfactory, many orders being received from new projects or additions to shops in the smaller towns, which are quite generally increasing the scope of their work. Many improvements are still being made in the shipbuilding shops, though most of the heavy machinery needed has already been ordered. There is some talk of large Diesel-engine building projects in the vicinity of Portland, but nothing is assured beyond what has already been announced by the gas engine manufacturers. Activity is general in miscellaneous manufacturing equipment.

J. F. Duthie & Co. have taken out building permits for four additional buildings for their new shipbuilding plant at Seattle. The company is preparing to build two steel steamers for A. O. Anderson & Co., Ltd., Copenhagen, Denmark.

The Albina Engine & Machine Works, Portland, has applied for permission to use certain street-ends on the waterfront adjoining its plant, where new shipbuilding facilities are to be installed.

Plans are under way for the construction for the United States Government of a wharf at Anchorage, Alaska, estimated to cost $500,000.

The Studebaker Motor Company is preparing to build a garage and shop at Belmont Avenue and Pike Street, Seattle.

The Columbia Iron & Welding Company, Astoria, Ore., has been incorporated with a capital stock of $27,000 by John Weinberg, William Silva and A. Steinberg to manufacture boilers.

The equipment of the old Boca & Loyalton Railroad roundhouse at Loyalton, Cal., is being moved to the Jeffery shops of the Western Pacific Railroad near Sacramento.

The North Coast Power Company, Portland, Ore., plans improvements to its water system to cost $50,000.

It is officially announced that the Great Northern Railway Company plans to begin work early in 1917 on the development of the Lake Chelan hydroelectric power project, to produce 150,000 hp. for use in operating its lines from Spokane to Seattle. Plans include the construction of a dam and power station at the foot of Lake Chelan. It is estimated the project will cost $16,000,000 and will provide for the electrification of 500 miles of railroad.

William Cornfoot, owner of the Albina Engine & Machine Works, Portland, Ore., announces that he will begin work on the construction of a steel shipbuilding plant in Portland.

The Kane Mfg. Company, Centralia, Wash., recently organized for $50,000 to manufacture automobile shock absorbers, has moved into a new concrete factory at Third and B streets. It plans to manufacture other accessories.

Work is progressing on the new plant of the American Can Company now under construction in Seattle. Warehouses and docks are practically completed, and work on the main factory buildings will begin immediately. The initial unit of the plant will cost $200,000; but plans provide for an ultimate expenditure of $500,000. The plant, it is stated, is to be in operation in the early spring.

The Gardner-Wilkinson Company, recently incorporated, [illegible] Ore., plans for erection of a sawmill to cut 24,000,000 ft. of timber. W. R. Wilkinson is vice-president and general manager.

The Grays Harbor Shipyards, Aberdeen, Wash., has received contracts [illegible] for six lumber schooners of the latest type equipped with Diesel engines. The vessels will have a capacity of [illegible].

It is announced that sufficient acreage has been signed for sugar beets in the vicinity of North Yakima, Wash., to assure the immediate construction of the proposed sugar plant to be built by the Utah-Idaho Sugar Company at a cost of $1,000,000. Thomas R. Calder is president.

Russell Brothers, manufacturers of tractors and harvesting machines, of Ohio, are completing negotiations for a site in Portland, Ore., on which a concrete and steel manufacturing plant will be built. The site, it is said, represents a cost of $50,000.

The Electric Steam Generator Company, Spokane, Wash., has filed articles of incorporation with a capital stock of $100,000. L. B. Williams, I. A. Shorno, Frank Tunis, I. M. Timberman, Charles A. Gram and H. B. Pierce are the incorporators. It will manufacture a newly patented electric steam generator.

The Eugene Iron Works, Eugene, Ore., has completed plans to rebuild the machinery room of its plant. Some new equipment will be required.

The Grays Harbor Lumber Company, Hoquiam, Wash., according to C. G. Blagen, manager, is preparing plans for improvements to its plant to cost $75,000. The capacity will be increased to 1,250,000 ft. for a 21-hr. run.

The Seaborn Shipyards, Tacoma, Wash., has contracts on hand for the construction of wooden vessels costing $1,050,000. It has recently received contract for three wooden steamers and has two ships under construction.

The Oregon Box & Mfg. Company, Bay City, Ore., has recently bought 30,000,000 ft. of spruce timber on Tillamook Bay. Logging will be started immediately, and it is understood the company will enlarge its plant.

The Columbia Iron & Welding Company, Astoria, Ore., has been incorporated with a capital stock of $27,000 by John Weinberg, William Silvo, Andrew Maki and August Steinberg to manufacture engines and boilers.

The Western Foundry & Machine Company, Ogden, Utah, has plans for a $100,000 foundry building, to be erected on the site of its present plant.

Canada

TORONTO, Oct. 30, 1916.

The ratepayers of Port Arthur, Ont., have ratified an agreement between the city and Annwell G. McIntyre, Traders Bank Building, Toronto, by which the latter, representing interests which now have four pulp mills in Canada, will erect another plant at Port Arthur. It is to have a daily capacity of 150 tons and will be constructed in three units, with a capacity of 50 tons per day each, to which is to be added a paper mill. The municipality gives 100 acres of land, with no exemption or bonus.

The building on Section 2, Welland Ship Canal, at St. Catharines, Ont., owned by Baldry, Yerburg & Hutchison, contractors, and used as an engine house, machine and blacksmith shop, was totally destroyed by fire Oct. 24, with all the contents except the locomotives. The machine shop was one of the best equipped on the canal and the loss will amount to approximately $40,000.

The Perfection Tire Company will commence work soon on the erection of a plant at Niagara Falls, Ont., for the manufacture of rubber goods, etc.

The Imperial Oil Company, Sarnia, Ont., has secured a tract of land at the south of the city and will construct another refinery there. It will cost several hundred thousand dollars and will be enlarged later.

The Benedict Company, Syracuse, N. Y., manufacturer of silverware, etc., has secured a building at Trenton, Ont., and will equip it to manufacture for its Canadian trade.

Fairbanks, Morse & Co., Ltd., has been granted a permit to erect an addition to its foundry at 1379 Bloor Street West, Toronto, at a cost of $10,000.

Tenders are being received for a building for Brown's Copper & Brass Rolling Mills, Ltd., New Toronto, Ont., to cost $50,000. J. F. Brown is president.

The Dupont Fabrikoid Company, Dufferin Street, Toronto, has commenced the erection of a plant at New Toronto, Ont., under the supervision of F. W. Curtis, Goodyear Building, Toronto, at an estimated cost of $75,000 and [illegible] cost for machinery of $175,000.

Plans are being prepared by T. H. Wiley, 12 St. Paul Street, St. Catharines, Ont., for a brick mill-type foundry building for the St. Catharines Brass Works.

The Canadian Tube & Iron Company, Ltd., Montreal, will purchase a 4000-lb. double-legged steam hammer in first-class shape for quick delivery.

The lumber and planing mill of Haley & Son at St. Stephen, N. B., was almost totally destroyed by fire Oct. 17, with a loss of $100,000. Much new machinery will be required for the mill, which will be erected to replace it.

Plans are being prepared for the construction of an addition to the pumping station at Cornwall, Ont., and tenders will shortly be called. Equipment will include two centrifugal pumps and a waterwheel to cost $20,000. F. Stidwell is engineer.

The Toms Contracting Company, Toronto, has been awarded contracts for additions to the plant of the Chevrolet Motor Company, Oshawa, Ont.

The Saskatchewan Clay Products Company, Moose Jaw, Sask., will make extensive additions to its plant, including the installation of a new gas producer system for burning brick. Gordon H. Love is manager.

The Dictating Machine Company, Ltd., Toronto, has been incorporated with a capital stock of $40,000 by William E. Moore, Harry Y. Claxton, 258 George Street, and others, to manufacture receiving and transcribing machines, etc.

The K. & S. Canadian Tires, Ltd., Toronto, has been incorporated with a capital stock of $250,000 by Clarence W. Moorhead, 43 Metcalfe Avenue; George O. Merson, 241 Wright Avenue, and others, to manufacture tires, etc.

Government Purchases

WASHINGTON, D. C., Oct. 30, 1916.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until date [illegible], schedule 319, for four water-tube boilers, f.o.b. works; schedule 321, for one boring, drilling and milling machine for Washington; schedule 323, for three squeezer type molding machines.

The commanding officer of the Frankford Arsenal, Philadelphia, will receive sealed proposals until Nov. 3 under proposal 162 for furnishing one power punching press.

Sealed proposals will be received until Nov. 2 under circular 474 by the commanding officer of the Rock Island Arsenal, Rock Island, Ill., for furnishing and installing coal-handling equipment.

Bids were received by the Bureau of Supplies and Accounts, Navy Department, Washington, Oct. 24, for supplies for the naval service as follows:

Schedule 214, Ordnance

Class 176, Washington—Two cartridge case [illegible] lathes—Bid 200, $3,500, $3,550 and $3,600.

Class 179, Washington—Two cartridge case annealing furnaces—Bid 12, $5,500; 104, $10,600 and $12,400; 121, informal 144, $5,690, 173, $6,500.

Schedule 225, Ordnance

Class 231, Washington—One 135-ton overhead traveling crane—Bid 126, $47,000.

Class 232, Washington—Two surface grinding [illegible]—Bid 19, $574; 91, $858.50; 127, $499.

Class 233, Washington—Three 3-spindle drill presses—Bid 91, $220.50; 97, $187; 133, $215.25; 134, $210.

Class 234, Washington—One 36-in. x 3-ft. flat turret lathe—Bid 88, $2,207; 91, $2,801.

Class 235, Washington—Two bench milling [illegible]—Bid 127, $492; 133, $495.

Class 236, Washington—Two universal milling machines—Bid 19, $3,025.

Class 237, Washington—One wire-feed screw machine—Bid 19, $1,152.50.

Class 238, Washington—One wire-feed screw machine—Bid 19, $2,263.50; 91, $732.50.

The names of the bidders and the numbers under which they are designated in the above list are as follows:

Bid 12, American Shop Equipment Company; 19, Brown & Sharpe Mfg. Company; 88, Jones & Lamson Machine Company; 91, Kemp Machinery Company; 97, Leland-Gifford Company; 104, The Macleod Company; 121, Metals Production Equipment Company; 126, Niles-Bement-Pond Company; 127, D. Nast Machinery Company; 133, Pratt & Whitney Company; 134, William Pilton Machinery Company; 144, W. S. Rockwell Company; 173, Tate, Jones & Co.; 200, Bullard Machine Tool Company.

NEW TRADE PUBLICATIONS

Portable Factory Cranes and Hoists.—Franklin Portable Crane & Hoist Company, Franklin, Pa. New booklet, size, 4 x 7¼ in.; pages, 20. It contains fewer pages than former booklets, and yet gives full description of the portable cranes and hoists made by this company. The company claims to be the original manufacturer of portable cranes, being owner of the patent of D. T. Lane, who was associated with the company until his death. A point made is that its prices are unchanged. The last page of the folder gives a condensed table of sizes, capacities, weights and list prices.

Mechanical Rubber Goods.—Goodyear Tire & Rubber Company, Akron, Ohio. Encyclopedia of mechanical rubber goods. Illustrates and describes the application of the company's products to paper and pulp mills and belt conveyors. The encyclopedia is a presentation of what has been found to be the best practice and the recommendations are the results of actual records in plants using Goodyear equipment. Alphabetical lists of the products and tables of weights are included, together with a number of useful hints on belting.

Forges and Furnaces.—Tate, Jones & Co., Inc., Empire Building, Pittsburgh, Pa. Two circulars. The first, No. 151, mentions a line of bolt heading forges and rod heating furnaces using either oil or gas as fuel. Illustrations and brief descriptions of both are presented, together with a list of the standard sizes of each that can be supplied. A number of views of installations are included. The second, No. 152, describes tool dressing furnaces and blacksmith forges using oil or gas as fuel. Emphasis is laid upon the simplicity and cleanliness of the apparatus, which is designed to take the place of the older coal and coke fired forges. The furnaces and forges are illustrated and tables giving the various dimensions [illegible] included.

Paint Spraying Gun.—Spray Engineering Company, 93 Federal Street, Boston, Mass. Bulletin No. 310. Presents a description with illustrations of a paint gun which is a hand tool for applying all kinds of liquid coatings. The advantages claimed for this equipment, which can be used either in the shop or field, are a saving in time, the securing of better results, the covering of relatively inaccessible surfaces and ease of operation. A list of the articles which can be [illegible] is presented and mention is made of the auxiliary equipment that can be supplied for use with the apparatus. Several views of the gun in use are included.

Horizontal Routing Machine.—George Gorton Machine Company, Racine, Wis. Form No. 748. Illustrations and descriptive matter explain the operation of a universal horizontal machine for routing vent and powder grooves in fuse rings. Drawings showing the position of the grooves in the rings and the cutters employed are included. A partial list of users of the machine is given and mention is made of a heavy-duty cutting-off machine for war material and general machine work. An illustrated description of the routing machine appeared in THE IRON AGE, April 20, 1916.

Heat Treating Furnaces.—Bellevue Industrial Furnace Company, 703 Bellevue Avenue, Detroit, Mich. Catalog No. 3. Describes and illustrates a line of furnaces and their accessories for heat treating metals. The furnaces are adapted for either oil or gas fuel and in addition to furnaces for melting metal include others for annealing, brazing, case hardening, flue welding, forging, preheating and tempering. Brief specification tables are given in a number of cases in addition to the engraving and description of the furnace. A number of engravings of installations are presented, and accessories such as firebrick, burners, blowers, pressure pumps, gages and pyrometers are mentioned..

Evaporating, Concentrating and Drying Equipment.—J. P. Devine Company, Buffalo, N. Y. Bulletin No. 105. Deals with the apparatus required for the chemical and allied industries and gives in detail the apparatus needed for complete chemical, color and dyestuff plants. A separate page is given to each piece of apparatus and illustrations and brief descriptions are presented.

Fuel Oil Driven Compressors.—Chicago Pneumatic Tool Company, Fisher Building, Chicago, Ill. Bulletin No. 34-K, third edition. Treats of a line of compressors designed for operation with practically all low-grade distillates. Illustrations and capacity tables of the stationary and tank mounted types are presented, followed by a description of the construction which is supplemented by engravings of the various parts. A condensed specification table of vertical and horizontal air receivers for use with the compressors is presented together with a partial list of users. An illustrated description of the tank mounted compressor appeared in THE IRON AGE, March 2, 1916.

Iron and Steel Institute Honors Judge Gary

(*Continued from page* 1001)

with wet sacking. The furnace is then tilted for pouring. Before the sacking is burnt through, the slag is up along the back wall so that clean metal comes from the furnace. As mentioned before, only enough slag is drawn off to properly cover the steel in the ladle.

The 100-ton pouring ladle is held in place in the large hooks of the 165-ton crane, and when the bottom of the ladle is well covered with metal the molten spiegel mixture is also poured into the ladle. The molten spiegel comes from the spiegel cupolas along the track above the pouring platform, and the spiegel ladle is handled by the 35-ton trolley of the 165-ton pouring crane. When making rails the weight of spiegel mixture varies from 25,000 to 28,000 lb., depending on the specification to be met, and the weight of the heat is about 100 tons, the average for 8073 heats being 102.7 gross tons of ingots.

Tables 1 and 2 give typical analyses of the materials used, together with an average slag analysis. The iron ore is occasionally used in order to get the slag into good condition, and the analysis of spiegel mixture given is one used when making rails.

Table 1—Analysis of Materials and the Slag

	Burnt Limestone, Per Cent	Burnt Dolomite, Per Cent	Burnt Magnesite, Per Cent	Pittsburg Ore, Per Cent	Foundry Coke, Per Cent	Limestone, Per Cent	Slag, Per Cent
Silica	2.10	0.45	4.10	3.44	1.75	5.15	6.50
Alumina	0.95	0.75	2.30	1.10	...	1.42	1.02
Lime	85.00	58.30	3.25	...	...	4.70	43.47
Magnesia	11.05	39.24	83.98	...	...	0.72	8.64
Ferrous oxide	...	...	...	...	...	...	21.55
Ferric oxide	...	...	6.70	...	...	...	0.85
Total iron	...	...	...	...	70.00	61.00	21.77
Manganese	...	...	...	...	0.1	0.16	1.01
Calcium carbonate	...	...	...	9.87			...
Magnesium carbonate	...	...	...	0.53			...
Calcium fluoride	...	...	...	86.77			...
Phosphorus	...	...	...	...	0.09	1.14	0.1
Loss on ignition	1.05	...	...	...	...	...	...

About midnight on Saturday the furnace is drained. The bath is worked down so that after the heat is tapped there are not more than 40 to 60 tons in the furnace. Then, as soon as a ladle and crane can be

Table 2—Analysis of Ferroalloys and Spiegel used

	Molten Spiegel, Per Cent	Ferro Manganese, Per Cent	Ferro Silicon, Per Cent	Ferro Phosphorus, Per Cent
Carbon	4.30	7.00	0.15	0.17
Manganese	16.00	79.50	....	0.15
Sulphur	0.02	....	....	0.05
Phosphorus	0.08	0.20	0.05	18.70
Silicon	1.25	1.00	14.70	0.20
Iron	...	12.30	79.00	77.00
Aluminum	....	....	.30	....

obtained, this metal is tapped and is made into a structural or soft steel heat with the proper additions of ferromanganese, etc.

THE RESULTS OBTAINED

In Table 3, are given the tonnages obtained each month, the number of turns worked since the furnaces were started to the end of August, 1916. The total for the two furnaces is 8073 heats with a total tonnage of good ingots amounting to 830,230 gross tons. This gives an average of 102.7 gross tons per heat. It will be noticed that the best monthly tonnage for the two furnaces was the large total of 50,071 gross tons in December, 1915, and the best tonnage for a single furnace was as high as 30,272 gross tons for No. 15 in June, 1915. The average number of heats per turn for each furnace is 4.14, and the average time from tapping one heat to tapping the next is 2 hr. 53 min. The average tonnage of good ingots per furnace for each turn is 427.6 gross tons.

In order to give an idea of the life of the furnace, a short history of each of them may be given. The first heat was tapped from No. 15 furnace May 29, 1913, and it was run until Oct 5, 1913, being then shut down on account of business depression and repairs. Eight hundred and eighty heats had been tapped. A new roof was built, ten courses of new brick placed in the air checkers and six courses in the gas checkers. The furnace was started again April 12, 1915. On July 16 it was shut down for a new roof and checkers after 838 heats on the roof, 1718 heats on the checkers. Fourteen turns were lost. Nothing more than minor repairs were then necessary until January, 1916, when the furnace was down for a new roof after 1212 heats on

Table 3—Results for Months from Two Furnaces

Period 1913	Furnace No. 15 Turns	Heats	Tonnage	Furnace No. 16 Turns	Heats	Tonnage	Total Tonnage
May	54½	0	541				541
June	49	261	18,004				18,004
July	54	223	22,168	19½	63	6,563	28,731
August	41	227	22,705	40	190	19,736	42,441
September	2	199	20,069	12	147	14,141	34,210
October	5½	21	2,170	0	189	18,960	21,130
November				31	102	10,030	10,030
1915							
April	34	132	13,056				13,056
May	41	243	23,413				443
June	324½	284	30,272				30,272
July	55	179	18,570	31	130	14,565	34,135
August	53	220	23,168	54	218	22,439	45,607
September	54	242	25,252	27	94	9,739	34,991
October	54½	212	22,115	50½	190	19,247	41,362
November	53½	231	24,480	53½	221	23,012	47,492
December	54½	245	25,693	55½	236	24,378	50,071
1916							
January	40	166	17,302	54	222	22,852	40,154
February	51½	228	23,695	51½	226	23,402	47,097
March	55½	244	25,710	41	170	17,611	43,321
April	52	218	22,690	52	218	22,372	45,062
May	54½	228	23,772	54½	229	23,789	47,561
June	52½	225	23,387	52½	218	22,623	46,010
July	29½	111	11,234	52½	196	19,798	31,032
August	54½	225	22,790	54½	216	21,773	44,563
Total	1,053	4,513	466,061	888½	3,560	364,169	830,230

the old one. Fourteen turns were lost. The last repairs were made in July 1916, consisting of a new roof and checkers after 1303 heats on the roof, and 4233 on the checkers. This repair took 23 turns.

No. 16 furnace was started July 22, 1913, and shutdown Nov. 22, 1913, due to business depression. A new roof was built after 720 heats on the old one. It was started July 6, 1915, and ran until Sept. 19, when a new roof and checkers were put in. The heats on the old roof were 499, and 1219 heats on the checkers. Twenty-seven turns were lost. The next shut down was March 20, 1916, when a new roof was built after 1239 heats on the old one. Fourteen and a half turns were lost.

The standing at the end of August, 1916, for Furnace No. 15 was 280 heats on the roof and checkers, 4513 on the ports and slag pockets; and for Furnace No. 16 1102 heats on the roof, 2833 heats on the checkers, and 3560 heats on the ports and slag pockets.

In regard to the quality of the steel made it has hardly been thought necessary to give long tables of heat analyses and the results of physical tests. All the steel has been made to specification, and many of the specifications have been of the most rigid character. It is not too much to say that the steel has fully met all the requirements and has proved to be very uniform from one heat to another.

Discussion

Discussions of the paper were presented by Quincy Bent, Bethlehem Steel Company, and T. W. Robinson, first vice-president Illinois Steel Company.

DISCUSSION BY QUINCY BENT

The Lackawanna Steel Company is, indeed, to be congratulated upon the results which have been obtained. Details of construction of the Steelton plant were published in THE IRON AGE, Sept. 10, 1914. There is a marked similarity to the Lackawanna plant in the open-hearth furnace construction. The methods of operation of the two plants are likewise similar, save for a very few details. At Steelton the principal difference

is the size and location of the Bessemer vessels, the overhead-crane transportation method from the Bessemer to the open-hearth, and the use of bottom, side tap ladles direct from the converters for the elimination of the Bessemer slag.

All duplex processes in general are efforts toward the same end, namely, to divide the work of making steel from iron into two parts: first, decarburizing and desiliconizing; and, second, dephosphorizing, desulphurizing and refining, assigning the first task to the Bessemer converter, which meets the conditions most admirably, and the latter to the basic open-hearth furnace, where again the requirements are most advantageously provided. The details of apparatus and variations of method are, of course, numerous, depending upon individual preference, local conditions and plant facilities.

There are, however, several important features which should be present in the ideal duplex installation: First, an ample supply of molten pig iron, sufficiently high in heat-producing elements to assure warm blows, with or without the addition of a small amount of scrap; second, a fair reservoir of hot metal providing a good mixture of iron as it is produced by the various blast furnaces; third, a close proximity of mixers, converters and open-hearth furnaces, with ample means for rapid and regular transportation between the three divisions; fourth, converters of as large a capacity as practical—25 or 30 tons, three of which can be blown simultaneously; fifth, crane and ladle capacity to collect these three heats and transfer them as a unit to the open-hearth furnace; sixth, proper means for preventing the Bessemer slag from entering the open-hearth furnace, and facilities for the disposal of this slag; seventh, large tilting open-hearth furnaces of 200 to 250 tons capacity, tapping from 90 to 110 tons per heat; eighth, provision for recarburizing heats in the steel ladle; ninth, ample pit room and teeming facilities to handle the open-hearth output.

Unit Production and Cost

As to the production per unit of installation, the most rapid work, of course, is accomplished by the use of 100 per cent hot metal; and on this basis one 200-ton open-hearth furnace can produce from 800 to 1000 tons of ingots per day, provided no delays are encountered in the elimination of phosphorus and sulphur. From this point of maximum production to minimum production, using the straight pig and scrap process at the rate of two heats, or 200 tons per day, is a varying productivity range, depending upon the percentage of scrap used in the open-hearth. The actual percentage of scrap used in these large tilting furnaces will always be governed by commercial conditions, and much thought should be taken to consider carefully the value of the furnace output, the cost of blown metal and the price of scrap.

The cost of plant per ton of ingots, embracing additional blast-furnace capacity, Bessemer and open-hearth, will be fully as great as the cost of stationary open-hearth furnaces per ton of ingots; but the duplex plant will possess a greater flexibility, permitting of maximum output in prosperous times, and still providing economical operation in periods of restricted product. Obviously the most profitable location for such a plant is where molten pig iron production is on a low cost basis as compared with the normal price of melting scrap.

DISCUSSION BY T. W. ROBINSON

Dr. Waterhouse's paper is a valuable contribution to the literature of American steel practice. While primarily a description of the duplex plant and process as used at the Lackawanna works, it covers the fundamentals of a development in this country already important and one that is destined to command greater consideration as time goes on. The term "duplex process" is an elastic one. In the United States it may be considered as specifically applied to the primary refining of pig iron in the acid Bessemer converter, with a secondary and final refining of the blown metal in the basic open-hearth furnace, either of the fixed or tilting type.

In 1876—40 years ago—this country produced a little over 500,000 tons of steel. Nearly 90 per cent was Bessemer, and only 19,000 tons were open-hearth. In 1906—30 years later—our steel production had risen forty-eight-fold, to nearly 23,000,000 tons. Of this, 11,000,000 tons were open-hearth and 12,250,000 tons were Bessemer.

The year 1906 marks the peak of Bessemer steel production in the United States, and will undoubtedly go down in our annals as the zenith of an invention that has perhaps done more for the rapid development of the American continent than any other industrial device. Since then the decline of Bessemer steel in this country has been slow but certain, and open-hearth production has increased by leaps and bounds. Of the 32,000,000 tons of steel produced by our mills last year, 8,250,000 tons were Bessemer and 23,500,000 tons were open-hearth.

Why such a change? Primarily this marvelous transformation in method is the American steel master's answer to the demand for steel of higher quality. In response to this demand, the comparatively complex and expensive open-hearth process slowly grew through metallurgical stress and financial strain. Spurred by decreasing Bessemer ore reserves, and assisted by mechanical invention and metallurgical discovery, its development in recent years has been rapid.

Effect of Duplex Process on Scrap Supply

But the tides of industry, like the ebb and flow of the sea, necessitate equilibrium. Change spells disturbance, and readjustment there had to be, when the open-hearth rose and the Bessemer fell. The result is the duplex process with its balancing influence and its scrap consumption, a process which last year produced over 1,750,000 tons of steel in this country. It may be that the installation cost of the duplex process is slightly less per ton of product than the straight open-hearth melting process. It may also be that the operating cost of the duplex process is somewhat less, at least in some districts. But the underlying cause of the growth of the duplex process is its independence of a steel-scrap supply.

Scrap or its equivalent is an economic necessity for the straight, open-hearth process. It is perhaps reasonable to assume that of our ingot production 20 to 25 per cent is discarded as scrap in the process of manufacture. Probably 7,000,000 tons of our steel production last year went to the melting furnace. To this must be added the reclaim from the nation's scrap pile While the combined amount is large, our scrap supply is to-day relatively smaller than when the Bessemer converter was dominant with its small scrap consumption. Blown metal may be considered essentially as molten scrap, and the duplex process is an important factor in maintaining the equilibrium of our scrap supply.

New Duplex Plants at Gary and South Chicago

At the South Chicago plant of the Illinois Steel Company several years' experience with Bessemer blown metal in stationary open-hearth furnaces helped to demonstrate the advantages of the duplex process. At the Gary works there will soon be completed a plant consisting of two 25-ton acid Bessemer converters and two tilting open-hearth furnaces, each with a hearth area along the metal line of 46 x 14 ft. This plant may be rated as having a capacity of about 600,000 tons of steel per annum. At the South Chicago works a similar duplex plant is under construction, with the exception that three tilting furnaces are provided instead of two. Two of these furnaces, with a nominal capacity of 600,000 tons per year, will be used for duplex open-hearth steel. The third furnace will serve as an adjunct to two auxiliary 20-ton electric furnaces.

The installations of the duplex process in the United States have thus far been chiefly confined to plants already established. The process as generally practised in this country may be divided into the practice of adding blown metal from an acid Bessemer converter into an open-hearth furnace in which there has been left a residual bath of finished steel, as is the case at Lackawanna, and the practice of adding blown metal to an

open-hearth furnace where only the preliminary oxides, with or without scrap additions, have been prepared, and where the heat when finished is completely tapped. The methods are interchangeable, and the adoption of one or the other is subject to local conditions. When a residual bath is used it is not customary to use scrap on account of slowing down the process. When complete individual heats are made scrap is sometimes used.

Dr. Waterhouse spoke of the use of a "kicker" of partly blown metal. The practice of mixing partly blown metal with full blown metal in the open-hearth furnace is an important element in the satisfactory working of the process on account of the deoxidizing effects of the carbon and the mechanical agitation that ensues. Where only full blown metal is used similar results may be obtained by recarburizing the blown metal with molten pig iron between the Bessemer and the open-hearth; or, as was usually the case with the stationary furnaces at South Chicago, by mixing full blown metal and molten pig iron in the open-hearth furnace.

Quality of Duplex Steel

Dr. Waterhouse's paper refers to the satisfactory quality of duplex steel made at Lackawanna. Poor steel can be made by any standard process. For the highest requirements, open-hearth steel, generally speaking, is better than Bessemer. And by the same token, electric and crucible steel are better than open-hearth. Yet Bessemer steel lends itself particularly well for certain purposes. The metallurgy of steel is not an exact science, and every steel man knows that, whether as measured by chemical analysis, mechanical structure or physical test, it is difficult at times to differentiate between steel made by one process or another.

It is proper to record that, as with our other standard methods of manufacture, we are indebted to Europe for the original development of the duplex process. In Europe, however, the duplex process has been often a combination of the basic Bessemer and the open-hearth, instead of, as with us, a combination of the acid Bessemer and the open-hearth.

More or less prejudice has existed as to the quality of some of the duplex open-hearth steel made in Europe. In this connection, however, it is interesting to recall that at one time there was a good deal of prejudice concerning the quality of straight basic open-hearth steel. But prejudice then, as often now, proved to be but an opinion formed without such a fair consideration of the truth as was necessary for a just determination.

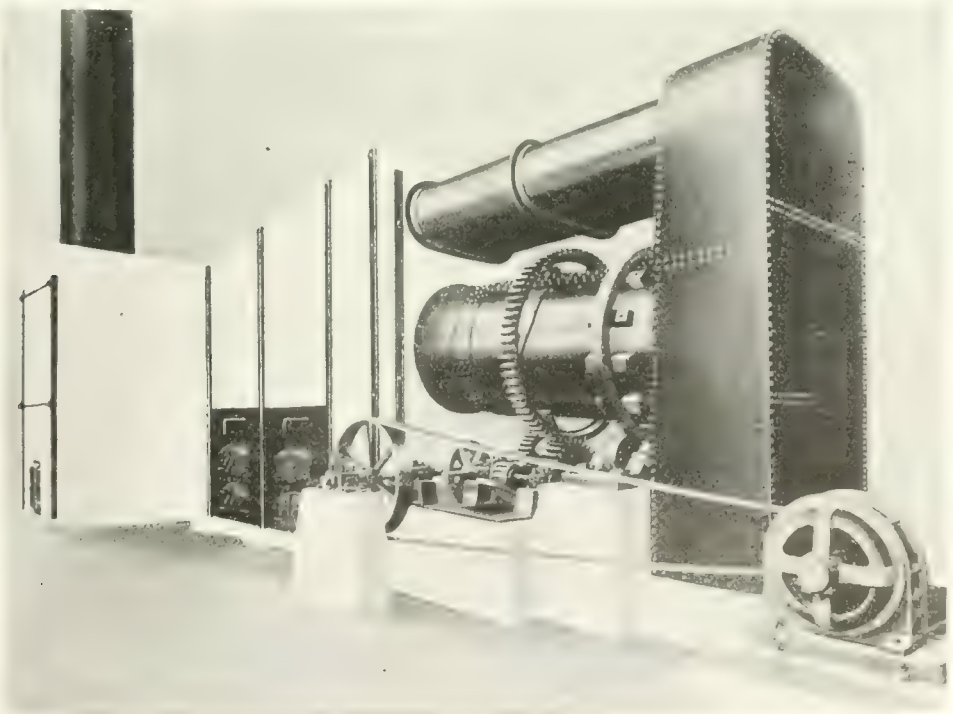
I cannot vouch for the facts as to European duplex steel, but if there has been discrimination it may perhaps be accounted for by the use of the relatively highly oxidized blown metal from the Bessemer converter. The truth probably is that any such adverse opinion as may exist is due rather to individual poor practice than to any inherent defect in the duplex process. Certainly the high quality of American duplex steel tends to substantiate such a conclusion.

Pulverized Coal as Fuel for Open-Hearth Furnaces

BY JAMES WHEELER FULLER*

In recent years pulverized coal has been applied to a large number of open-hearth furnaces, varying in size from 20 to 80 tons per heat. It has been shown that when properly installed on a furnace with the correct design of burners and controlling apparatus, a very marked efficiency has been obtained, also an increased production, in some instances over 50 per cent, and at the same time showing economies between 20 and 45 per cent over the fuel formerly used.

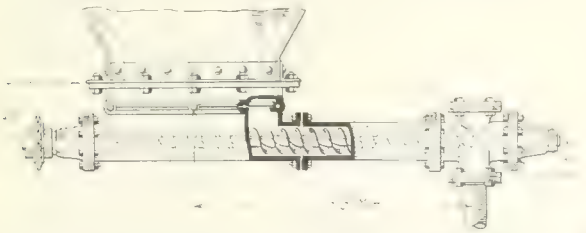
There have been many different types of burners tried out on open-hearth furnaces, but it has been found by actual operation that there is really but one type that is dependable and that gives the highest efficiencies for all things considered. Volume air is admitted to the furnace through the burner. This volume air carries the coal from the feeder discharge into the furnace. At or near the nozzle of the burner a jet of compressed air is applied, which properly diffuses and mixes the coal and the air, so that upon entering the furnace the hot air, which is regenerated and which



The Hot Gases from the Furnace Fire Circulate Around the Outside of the Drier Shell, Passing Through the Combustion Chamber of the Furnace. They then leave the combustion chamber through the horizontal breeching and enter the top of the hood at the lower end of the drier. From this hood the hot gases flow through the interior of the drier shell removing the moisture which has been driven off from the coal and then escape to the atmosphere through the stack

*Fuller Engineering Company, Allentown, Pa.

is about 80 per cent of the air required for combustion, can quickly surround each particle of coal with the proper amount of air for immediate and complete combustion. The nozzle on this burner is so designed that the direction of the flame is under control and can be forced to any particular portion of the furnace. The advantage of this is that it is sometimes desirable to



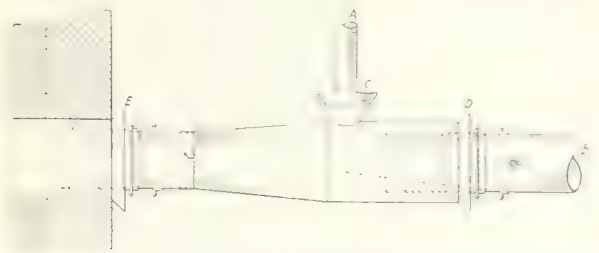
The Pulverized Coal Feeder to the Burner Is Provided with a Long Screw Conveyor. The housing is lapped to a heat fit to prevent any flushing of the pulverized coal

melt down very large pieces of material. With proper control of the flame in a powdered coal furnace it can be impinged directly on this material, and will thus melt it immediately without the oxidation losses which are so frequent with other forms of fuel.

With the burner described there are three methods of control: the volume air, the high-pressure air, and also the quantity of fuel delivered to the burner, which will give the furnace operator any condition in the furnace which he desires during each period of the work. This control is positive, and any change of conditions can be obtained immediately. The control is also situated to facilitate reversing the flame in the furnace. In a number of installations this is being done regularly with coal off less than 6 sec., thereby maintaining at all times a high uniform temperature within the furnace, which is hardly possible with other types of fuel over a long period of operations.

PULVERIZED COAL VERSUS PRODUCER GAS

The application of pulverized coal as compared to producer gas in connection with a new installation is much in favor of the powdered coal, in that the investment is considerably less. This, combined with other essential features, makes the cost of a unit about 40 per cent under the cost of one using producer gas. In addition to the cost of the actual equipment required for preparing the fuel, there would also be additional savings effected in the furnace design and construction. For instance, the amount of regenerating capacity would be materially reduced, being only about 60 per cent of that required with a producer-gas-fired furnace; for, with the gas fuel, it is necessary to regenerate not only the air, but also the gas; whereas, with powdered coal as a fuel it is only necessary to regenerate about



The Pulverized Coal Is Discharged from the Feeding Device Into Pipe *A*. Air from a fan at a few ounces' pressure enters from the pipe *B* and produces an injector action which draws the coal and air into the burner through the opening *C*. It also induces air at *D*, the amount of which is controlled by a cone fitted over the air pipe and arranged so it can be moved back and forth, controlling the amount of air admitted. Any additional air required for combustion is induced at the point *E* under similar control

80 per cent of the air for combustion. The roof, too, is simplified in construction, and there is no expensive port construction in the furnace.

One of the features now receiving considerable attention is the proper design of the regenerative chambers so that they will not become clogged with the ash deposit from the powdered coal and can be cleaned without hindering the operation of the furnace. This matter has already been successfully overcome, but further developments are under way, which all indicate that it is one which can be readily overcome and not hinder or prevent the application of powdered coal to this form of furnace.

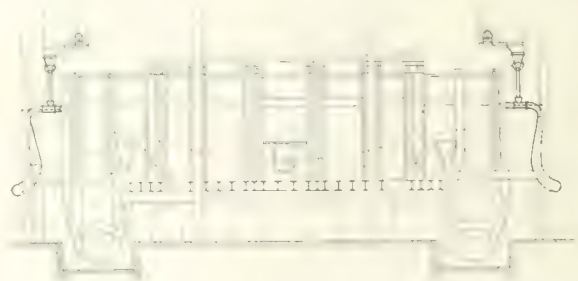
SUMMARY OF ADVANTAGES

Summing up, the advantages offered by the use of powdered coal as a fuel for open-hearth practice are as follows:

Not only are economies effected in the consumption of fuel per ton of product, but there is also a material increase in the life of the furnace refractories; there is a regular, uniform high temperature, which is under the control of the operator; there is increased tonnage, and, in addition to this, the steel produced is of better quality.

Combined with the above features is the lower cost of initial installation, making the use of powdered coal in connection with metallurgical furnaces a very highly efficient and desirable fuel.

From the number of applications of pulverized coal as a fuel, there is no limit, practically speaking, to the size of the furnace in which such coal can be burned successfully, as it has already been applied to open-



The Volume Air, Which Is Between 20 and 30 Per Cent of Air Required for Combustion, Is Supplied from a Fan and Is Control'ed by a Blast Gate Inserted in the Line. In the nozzle of the burner is inserted a jet of compressed air which serves not to increase the velocity of the coal and air entering the furnace but to mix the coal and air. The burner is supplied with a flexible nozzle to direct flame where desired

hearth furnaces of 80 tons capacity, down to small heating furnaces of practically 1 to 3 cu. ft. contents, or having dimensions of 18 x 30 x 16 in.

The first large and successful installation of the application of pulverized coal under stationary boilers is now in operation at the power house of the Missouri, Kansas & Texas Railroad at Parsons, Kan. This installation consists of a battery of eight 250-hp. water-tube boilers of the O'Brien type. The coals which have been successfully burned in these boilers are lignites from Texas and low-grade bituminous coals from Kansas and Oklahoma fields.

Discussion

An extended discussion of the use of powdered coal was presented in contributions from J. P. Kittredge, manager, National Malleable Castings Company, Sharon, Pa.; W. A. James, chief engineer, Lackawanna Steel Company, Buffalo, N. Y., and N. C. Harrison, general superintendent, Atlantic Steel Company, Atlanta, Ga.

DISCUSSION BY J. P. KITTREDGE

The following observations are taken from experience in a plant which started the application of pulverized coal to a basic open-hearth furnace about four years ago.

The first experimental heats were made successfully. The all-important information, as to whether or not the siliceous ash would deposit on the basic slag, was determined by taking frequent tests of the slag during the progress of the heat and comparing them with tests taken in a similar way from the slag of a furnace using oil as a fuel. It was found that ash had little, if any, influence, indicating that it was not being deposited on the slag in any great quantities.

The Experience at Sharon, Pa.

With this point settled and the conclusion reached that high temperature and rapid time could be obtained, the permanent equipment was installed for four 30-ton furnaces and has been in uninterrupted service ever since. The equipment was further extended to serve

three smaller open-hearth furnaces in another part of the plant. The entire open-hearth capacity of the plant is now being operated with pulverized coal as a fuel and approximately 6000 heats have been made to date.

This is cited to illustrate that at the plant referred to the use of pulverized fuel for open-hearth furnaces has passed the experimental stage and has started on the next cycle, which is the slow but gradual development of any new practice.

The time required to make heats is largely dependent upon furnace design, but there has been no difficulty in making heats with pulverized coal in the same time as they could be made with fuel oil, in practically the same open-hearth furnace.

Mr. Fuller has emphasized the matter of decreased oxidation, due to the use of pulverized coal fuel. I regret we have not been able as yet to determine definitely and to our complete satisfaction that such is the case, because of the many variables which enter into melting cold charges, i. e., the nature and analysis of the scrap used, the time the heat is in the furnace, and the condition of the slag. Taken all in all, we can safely say that the oxidation is not greater than with fuel oil or producer gas practice.

Ash and Slag

The large quantity of ash with which we must contend offers by far the greatest problem to solve. Let us reason that with a comparatively small furnace, burning 1 ton of coal per hour, 4 to 10 per cent of such coal is noncombustible. To attempt to pocket or catch all this ash in the checkers would mean an unreasonably short life of the checker chambers before clogging. This readily leads us to conclude that a means of passing as large a percentage of the ash as possible through the checkers, and thence out of the stack, is the most logical course to follow. To reach this result it is also reasonable to assume that the effluent gases containing the ash should travel at a comparatively high velocity and with as few changes of direction as possible. Where the change of direction is unavoidable such places should be accessible so that the deposited ash may be artificially agitated, causing it to be picked up by the draft and carried to the stack. It is quite important that no passageway for the effluent gases through the checkers be allowed to become clogged, as that immediately tends to increase the deposit at such a point.

The slag collected in the pockets of the pulverized coal furnace is considerably greater than that of the oil or producer gas type, and it is important that arrangements be made to facilitate its removal by means of slag cars or otherwise. It should be the aim of the engineer, in designing the equipment, to make the reversing operation, slag removals, and all duties required of the furnacemen and helpers, as free from arduous labor as possible, as the enthusiastic co-operation of the furnacemen is, of course, essential to success.

In conclusion, we have found the results obtained from the use of pulverized coal furnaces to be very gratifying, in regard to economies obtained, and we expect to see wide development in the application of this fuel to metallurgical furnaces.

DISCUSSION BY W. A. JAMES

Our experience in connection with powdered fuel has been almost entirely along the line of firing rotary lime and calcining kilns. Several years ago, however, some attempts were made by us to burn powdered coal under a horizontal water tube-boiler. The coal tried out was rather low in volatile matter and high in sulphur, and, in addition to these objections, the pulverizing was not well done, and the coal not thoroughly dried. We were able to burn this coal under the boiler, though we did not continue the experiments far enough to call it a commercial success.

With reference to our calcining equipment which was furnished by the Fuller Engineering Company I wish to say that we have three 125-ft. kilns, 8 ft. in diameter throughout. The coal used is our regular coking mixture, which is dried by a rotary dryer, pulverized by a Fuller-Lehigh mill, then conveyed to the bins, from which it is fed by screw conveyors to the blast pipes, thence to the kiln burners in the regular way. We are using about 1400 gross tons of coal per month, and estimate the cost of pulverizing and conveying to burners to be about 50 cents per ton.

Some of the advantages derived from the burning of powdered coal are continuous and uniform heating and complete combustion. The heat also can be directed where most needed and the furnaces are practically smokeless. In addition to these very desirable features of operation is the fact that considerable saving in fuel has been shown over both the direct firing of coal on grates and the gas producer practice. As the methods of preparing and burning pulverized fuel are becoming more familiar, it is being applied more generally.

DISCUSSION BY N. C. HARRISON

The question of properly designed checkers and slag pockets is of vital importance in an open-hearth furnace using pulverized coal. To handle the accumulation, the furnace should undoubtedly be designed with removable slag pockets and blowers for the checkers.

We have in our plant three open-hearth furnaces making 50 tons per heat, using only cold stock. Two of these are producer-gas fired and the other fired with pulverized coal. This last furnace was built in December, 1915. As regards the fuel consumption on these two classes of furnaces, we find that the pulverized coal furnace uses from 100 to 150 lb. of coal less than the producer gas furnace per ton of ingots produced.

As regards the life of the furnace refractories and the quality of steel produced, we notice no appreciable difference between the two classes of furnaces, although the increase of production secured by the use of powdered coal as compared with producer gas, is very marked, the average time of heats being cut down 1½ to 2 hr. We have made 50-ton heats of 0.10 to 0.15 per cent carbon steel in our pulverized coal furnace in little over 7 hr., and have averaged over a several weeks' run approximately 8 hr.

I do not believe the cost of an open-hearth furnace installation, using pulverized coal on one furnace only, is any cheaper than a producer gas furnace. But where a number of furnaces, at least three, are involved, the powdered coal installation is undoubtedly cheaper than the producer gas, due to the central coal pulverizing building, which can be built at approximately the same cost for three furnaces as for one. I consider pulverized coal about the best fuel on the market for open-hearth furnaces.

Iron Ores of the Adirondack Region

BY FRANK S. WITHERBEE*

MAJOR PHILIP SKENE, of Skenesborough, now known as Whitehall, N. Y., is probably the first man who mined iron ore in the Adirondack iron ore district. He received, before the Revolutionary War, a grant of about 600 acres from the English Crown, located just north of Port Henry, on Lake Champlain, known as the Skene ore-bed tract. He built a small Catalan forge at Skenesborough, and a fairly well authenticated tradition exists that ore was mined from this tract and shipped to Skenesborough, where anchors, chains, spikes and other needed appurtenances were made to fit out Benedict Arnold's fleet.

No other development in this district is known to have taken place until about 1800, when the Cheever Mine, located in the Skene Tract, and the Arnold Hill Mine in Clinton County, began to be worked in a primitive way to supply a few Catalan forges in the vicinity. But it was not until the completion of the Champlain Canal, which connected Lake Champlain with the Hudson River at Troy, that the real develop-

*President Witherbee, Sherman & Co., Port Henry, N. Y.

ment of the district commenced. With this outlet established, many new Catalan forges were built, and the first charcoal blast furnace was completed at Port Henry about 1822. This furnace was supposed to be the best thus far built. It produced about 25 tons of pig iron weekly.

Perhaps nothing in the metallurgy of iron and steel is more impressive than a comparison of the output of a modern blast furnace with the one to which I refer. Ten additional blast furnaces were afterward built in the district, chiefly in the vicinity of Port Henry, while rolling mills, nail factories, etc., were established chiefly in the Ausable Valley district.

Iron ore was shipped to outside furnaces, and it is an interesting historical fact that Lake Champlain ores were introduced into the Pittsburgh district before Lake Superior ores were delivered there. Pittsburgh also became the largest market for the charcoal billets and blooms made in the district. From 1860 to 1870, the iron industry of the district was at its height, but soon after this period the new Bessemer and open-hearth processes of producing steel commenced to displace the crude and wasteful method of the Catalan forge, and the little charcoal blast furnaces gave way to the larger stacks which used first anthracite coal and finally coke. The small and lean deposits of ore could not compete with the newly discovered and cheaper mined Gogebic and Mesaba ores of Lake Superior, but the larger deposits and more cheaply mined ores have survived this competition, and there is more ore mined in the district to-day than ever before.

PROGRESSIVENESS OF THE DISTRICT

To the credit of the Adirondack district, it can be said that it has always been progressive, as is shown by the fact that the use of electric lights underground and the substitution of dynamite for black powder were first introduced there; and probably nowhere in the country to-day has electrical power for mining been more generally used than in the completely equipped plants of the Port Henry district. The ores are undoubtedly the richest and of the highest grade shipped from any district, being guaranteed from 60 per cent iron in the crude to 65 per cent in the concentrates, and in one special grade a guarantee is given of 71 per cent. Throughout this paper the iron content given refers to the ore in its natural state, not dried at 212 deg. Fahr. As a rule, magnetites carry less than half of one per cent of moisture. The phosphorus content of the different ores runs from 0.005 per cent to 1.50 per cent, although probably 60 per cent of the known deposits are well within the Bessemer limit.

It is an interesting fact that in the Barton Hill mine of Witherbee, Sherman & Co., there was at one time an enrichment of a vein from which over 60,000 tons of crude ore were mined, with only three analysis running below 70 per cent in iron. This is probably the richest shipment ever made from any deposit in this country.

In the Adirondack region to-day two blast-furnace plants are operating, one at Standish, where an exceedingly low phosphorus special Bessemer iron is made from Chateaugay ores, and another at Port Henry, where all grades of iron are produced, including special Bessemer, forge, foundry and basic. The special Bessemer irons frequently carry phosphorus as low as 0.02 per cent, and are regularly sold on a guaranty of not to exceed 0.03 per cent phosphorus and sulphur. Local magnetic ores are used exclusively in both furnaces, and the fuel records from the rich all-magnetic ore mixture compare most favorably with the best practice of the Central West. The Adirondack region is not the ideal one, however, for the manufacture of iron, owing to the very high freights on fuel and the distance from active pig-iron markets.

IRON-ORE OUTPUT

Thirty-six years ago, when magnetite ore was about 35 per cent of the total iron-ore production of the United States, the Cheever Iron Ore Company at Port Henry, Witherbee, Sherman & Co. and the Port Henry Iron Ore Company at Mineville, Palmer Hill and Lyon Mountain in Clinton County, produced about 66 per cent of the magnetite. The remaining 34 per cent came mainly from Pennsylvania, New Jersey and southeast New York. To-day the production of magnetic iron ore comes mainly from the Adirondack region. Two mining districts, Mineville, including the Cheever at Port Henry, and Lyon Mountain produce at the rate of 1,250,000 to 1,500,000 tons of shipping ore yearly. The crude ore carries about 60 per cent iron and the concentrates 63 to 68 per cent. With comparatively small additional development, this production could be largely increased.

The total iron-ore production of the United States in 1916 will approximate 80,000,000 tons, with an average of about 50 per cent Fe. It is well within the range of possibility that the Adirondack field can produce over 6 per cent of this tonnage, and because of the richness of its ores about 8 per cent of the total iron. Moreover, with iron-ore reserves conservatively estimated at 1,100,000,000 tons, concentrating on an average of 2 into 1 of higher than 63 per cent Fe, the Adirondack field promises, on present showing as above, when developed, to produce 5,000,000 tons of concentrates annually for over one hundred years.

The above may seem to be a daring statement to one only somewhat familiar with iron-ore production in the East. It may cause a complete surprise to many whose interests have been mainly centered in the Lake, Minnesota or Birmingham fields.

There are three species of iron ores in the Adirondack field. Straight magnetite, Fe_3O_4; titaniferous magnetite, a mechanical mixture of ilmenite and magnetite, in which titanium varies from 1 per cent to 3 per cent up to straight ilmenite; and martite, Fe_2O_3.

THE STRAIGHT MAGNETITES

As a rule, these are almost absolutely pure, except the mechanical mixture of rock and rock minerals which dilute the ores as mined. Special concentrates are now being prepared by Witherbee, Sherman & Co., running upward of 70 per cent Fe. It is thus practically demonstrated that the straight magnetites of the Adirondack field lack not more than 0.3 per cent of being chemically pure iron oxides. Almost without exception they are amenable to magnetic concentration, the gangue minerals—quartz, feldspar, biotite and hornblende, as well as the magnetite itself—existing as distinct, separate grains.

The most extensive workings of straight magnetites in the Adirondacks are at Mineville, near Port Henry on Lake Champlain, where Witherbee, Sherman & Co. have very extensive and modern mining plants and the largest magnetic concentrating operation in the world. The Port Henry Iron Ore Company also operates the "21 Mine" at Mineville. The other active producers of straight magnetites are the Chateaugay Ore & Iron Company at Lyon Mountain, the Cheever Iron Ore Company at Port Henry, and the Benson Iron Mining Company at Benson Mines. At all of these mines magnetic concentration is employed.

The separation or concentration of magnetic iron ore is a comparatively simple process. It consists in breaking apart the grains of iron, quartz, apatite, etc., by means of crushers and rolls; after screening and sizing, the crushed material is treated by machines equipped with electro-magnets, which pick up or deflect the magnetic particles making so-called heads and tails. The heads are the concentrates and the tails the waste product. This so-called waste product, however, frequently has considerable value. For example, the tailings of the Old Bed 21 ores at Mineville carry so large a quantity of phosphorus that they are used extensively as fertilizers, and the tailings from all grades of ore make a most excellent concrete.

To sum up, the straight magnetites of the Adirondack field are nearly chemically pure. The run of mine, as mined now, varies from 30 to 50 per cent for milling purposes to 55 to 60 per cent for shipment without concentration. Regarding pig iron as the ultimate concentration product—with the Adirondack ores mechanical concentration can account for 72 per cent, the remaining 28 per cent is and must be chemical. Regardless of comparative cost, 70 to 72 per cent Fe is the limit of mechanical concentration. The relative cost of the mechanical and chemical (blast furnace)

will alone set the limit of mechanical concentration, except in the case of titaniferous ores. At present it seems to be established that the commercial limit of concentration is 60 to 65 per cent, except when a specially high-grade concentrate is desired and paid for at a much higher rate.

TITANIFEROUS MAGNETITES

The complete analyses of these ores vary in iron content from normal with 36.8 per cent Fe. and 31.6 per cent. Ti. to 55 per cent to 68 per cent Fe. and 1 per cent to 5 per cent Ti. As distinguished from the straight magnetites, they invariably contain vanadium up to 0.65 per cent V_2O_5. In addition, they carry variable amounts of nickel, chromium, manganese, magnesia, phosphorus and lime. In the Adirondack field there are many occurrences of titaniferous ores, but usually in small bunches or pockets. The one remarkable exception is the Sanford Lake deposit. Trenches, test pits and diamond drill holes have furnished data for safe tonnage estimates. The lowest estimate for this deposit is 70,000,000 to 100,000,000 tons. Even with the work done, neither the lateral extent nor the depth of the deposit has been determined.

The ores have been proved to be amenable to beneficiation by magnetic separators. The ores vary from fine to very coarse grained, yet some of the fine-grained ores separate magnetically as easily as the coarse grained. Some of these ores, however, are entirely unamenable to magnetic separation. This is due to interlamellar growth, alternating layers of ilmenite and magnetite. So intricate is this growth, occasionally even fine grinding fails to break apart the ilmenite and the magnetite. Several experiments, however, showed that coarsely crystallized titaniferous ores crushed to 40 mesh, treated with a hand magnet yielded heads that carried 64 per cent Fe., 3 per cent Ti., and 1 per cent metallic vanadium. The vanadium of the crude ore went entirely with the magnetite. Typical analyses follow:

	Sanford Crude. Per Cent	Sanford Concentrate. Per Cent
Iron	30.52	58.39
Titanium	11.71	6.19
Phosphorus	0.009	....

The great proved tonnage of the Sanford Lake deposit compels it to be acknowledged as an addition to the ore reserves of the Adirondacks, even though they are not commercial to-day. It seems quite probable that, when transportation facilities are provided which will put these ores on the market, exploration will disclose other deposits in other localities, especially since the mining of the Sanford Deposit will probably show structural features not now known. The Adirondack gabbro field, therefore, though covering 1500 to 2000 square miles or more, is not counted on to contribute further to the estimated reserves.

MARTITE ORES

As the third class of iron ore, martite, is of a very limited occurrence and is found exclusively associated with the straight magnetites. Martite, as is well known, is an ore with the crystallization of magnetite and the hematite formula. In Clinton County it is nearly 33 per cent of the iron content of one large ore body. When the ore body in which martite is found is of shipping grade as mined, it is rather beneficial than detrimental. In a milling ore, however, the case is quite different, since martite is non-magnetic. When, therefore, martite is a considerable per cent of the total iron in milling ores, other concentration processes must be used in connection with the magnetic, otherwise heavy losses in the tailings will be unavoidable. The known occurrences of martite are, however, very rare.

Whatever may be thought of the estimated tonnage of the Adirondack region this is a fact: The class of iron ores in the Adirondack field is the only one where, by purely mechanical operations, the ore can be brought to 70 per cent or 72 per cent of purity, with pure iron 100 per cent. This fact alone is one worth considering; that in the best blast-furnace practice from 75 per cent to 85 per cent of the consumed fuel is used for maintaining the reduction temperature above, leaving 15 per cent to 25 per cent fuel for reduction. It is within the range of possibilities that with an oxide of iron, free from all impurities, some direct process may be discovered which will eliminate the blast furnace and convert these practically pure concentrates directly into a semi-finished steel product. If, however, no further economic use can be made of the purity of these ores, this is worth consideration. In a 70 per cent concentrate there is only 30 per cent of the inert units on which freight must be paid, as against 50 per cent on a 50 per cent ore, or 45 per cent on a 55 per cent ore. Even with present mill practice at Mineville and Lyon Mountain, no trouble is experienced in bringing concentrates to a 62 per cent to 68 per cent grade.

The question may be asked how we are able to assert at the present time that the Adirondack region is capable of producing such an enormous tonnage of iron ore in comparision with what was thought to be its maximum tonnage a few years ago. The improvements in modern mining methods and machinery, together with modern crushing and preparing machinery and magnetic separation, have made it possible to utilize ores that are low in iron but mined at a moderate cost which a few years ago had no market value whatever.

THE MARKETS FOR THESE ORES

Brief reference may be made in conclusion to the markets past, present and prospective, for the ores under discussion. As has been said, prior to the discovery and development of the Lake Superior iron-ore ranges, the ores from the Adirondack and Lake Champlain district were largely used in Pittsburgh and vicinity, but were gradually driven back into their more legitimate district east of the Alleghenies, where for several generations they have formed the basis of the mixture in blast furnaces. The selected lump ore from the Port Henry mines has also been used for very many years as a fix in puddling; and later, with the development of the basic open-hearth furnace, this ore has come into almost universal use east of the Alleghenies as an oxidizing agent.

The recent rapid development of the East furnishes a market much in excess of the capacity of the developed mines of the Adirondack section at the present time, and plants are obliged therefore to secure the balance of their ore mixtures from foreign countries or from the Lake Superior fields.

The Dominion of Canada offers a market by no means negligible for the ores mined near Lake Champlain, and steel plants in the Dominion have for many years been large buyers. In passing, it may be of interest to note the fact that in 1895 about 40,000 tons of high phosphorus Port Henry ore were exported to Germany and England, making, it is believed, the only over-seas shipment of United States ores on record.

The cost of hard ore mining, with the cost and waste of concentration, is, of course, higher than that of the steam shovel operations of the West; but mining costs compare favorably with those in underground mines in the Lake Superior region.

The freight rates from the Adirondack region to points of consumption in the East compare most favorably with the rates paid on Lake Superior ores to similar points. Using Port Henry, the largest shipping point in the region, as a basis, an analysis of freight cost shows the following:

	From Port Henry, Per Unit	From Lake Superior Mines, Per Unit
To Lehigh Valley	$0.0254	$0.0485
To Schuylkill Valley	.0262-0270	.0485
To Central Pennsylvania	.0292	.0485
To Pittsburgh	.0317	.0372
To Mahoning-Shenango Valleys.	.0317	.0320
To Buffalo	.0206	.0203

The all-rail rates to the principal consuming points are grouped into districts and range from $1.30 to $2 per gross ton, while a uniform rate of $1.45 per gross ton prevails to the East from Lake Erie ports. For the purposes of comparison the following table, giving the freight costs per unit metallic iron, will be interesting. I have used 63 per cent Fe. for Adirondack ores and 51.50 per cent for Lake Superior ores, and have assumed $1.05 as a total freight rate from Lake Superior mines to lower lake ports.

From the Adirondack mines (including Mineville) to the trunk line railroads or to Lake Champlain, there should be added to the foregoing figures from one-third to one-half cent per unit, to cover cost of terminals or mine railroads.

In the spring of 1917 the enlargement of the Champlain Canal will be completed. This is a part of the Barge Canal system of the State of New York and will provide a waterway between Lake Champlain and the Hudson River with a channel 12 ft. deep and a minimum bottom width of 75 ft. To overcome comparatively slight elevations, there are 11 locks of the following dimensions: usable length 311 ft., width 45 ft., 12 ft. over miter sills.

Less than 20 miles of this waterway is through a land cut. The balance of the total distance of 61½ miles, from Whitehall at the southern end of Lake Champlain to Waterford, is by means of the canalized Hudson River. This waterway will offer a means of transportation from Lake Champlain to New York Harbor, thence by rail to furnace plants, which will result in lowering the above rates very materially and will still further increase the differential in favor of the Adirondack ores.

From the above freight analysis it will be observed that the Adirondack district commands a most favorable location with regard to a market for its ores, particularly for eastern plants. With furnaces located on the Hudson River, New York Harbor or elsewhere on the Atlantic Seaboard, the freight on an ore supply would be remarkably low. From mines tributary to Lake Champlain it is safe to say, from trial shipments actually made on the partially completed canal, that the total freight from mine to alongside New York Harbor will be approximately one cent per unit metallic iron.

While many millions of tons of concentrated ores have been shipped from Lake Champlain mines, and many more millions of tons of high grade crude shipping ore have been moved from this district, it is frequently said that the "surface has hardly been scratched." And many competent authorities believe that the future will look toward this region more and more as one of its greatest sources of raw material for the rapidly increasing needs of its iron manufacturers.

Discussion

Frank E. Bachman, of the MacIntyre Iron Company, Port Henry, N. Y., commented on Mr. Witherbee's paper as follows:

Mr. Witherbee has so thoroughly covered the geology and available supply of iron ore in the Adirondack region that but little remains to be said.

During my connection in 1914 with the smelting test of titaniferous ores for the MacIntyre Iron Company, a report of which appeared in the Institute's Year Book for that year and to which I hope in the near future to add a report of further investigations, I became familiar with their ore reserves. In addition to the Sanford Hill deposit containing 70,000,000 to 100,000,000 tons, there are the Iron Mountain deposit, which recent drilling shows to contain as much or more ore than Sanford Hill, and the Calamity and Mill Pond deposits, estimated to contain 40,000,000 tons. Mining on Sanford Hill and Iron Mountain will be by open cut, these deposits ranging from 500 to 1200 ft. wide and having almost no overburden.

The physical characteristics of all these ores are such that they can be easily concentrated. The ore used in the furnace test was mined at the base of Sanford Hill. It was concentrated in four different mills, none of which was designed to meet its special requirements. These tests proved that by crushing to pass a ¼-in. mesh, the concentrates produced contain 55.00 to 56.50 per cent Fe., 7.00 to 8.25 per cent Ti., a trace to 0.004 P. As shown by Mr. Witherbee, crushing to 40 mesh increases the iron in the concentrates to 64 per cent and reduces the Ti. to 3 per cent or less. The Iron Mountain, Calamity and Mill Pond ores are richer in Fe. and lower in Ti. than those from Sanford Hill, their crystal is larger and the interlaminar growths of ilmenite are less. It is therefore to be expected that ¼-in. concentrates made from them will be higher in Fe. and lower in Ti. than are the Sanford concentrates of same size.

The furnace test of titaniferous concentrates having demonstrated that iron is produced from them with lower fuel consumption than from non-titaniferous magnetites of same iron content, that their mixture with non-titaniferous magnetites tends to decrease furnace irregularities, and having indicated that owing to the greater rapidity of their reduction they make a better mixture with Lake ores and straight magnetites, the value of his ore reserve is apparent.

LOW COST IN NEW YORK HARBOR

The average composition of the Sanford Hill deposit is such and the overburden so light that not more than two tons of material will be mined per ton of concentrates produced. In a quarry operation, this will not cost to exceed 30c. per ton. With water power on the property which can be developed cheaply, the concentrating cost should be less than 20c. per ton of crude. Assuming a rail freight at 1c. per ton per mile on the 60 miles of road necessary to bring these ores to the Champlain Canal and a 35c. per ton canal freight to tidewater at New York harbor, we have a cost of but $1.95 per ton for a 57 per cent. ore alongside New York, or less than 3½c. per unit. If the ore is crushed to 40 mesh and the iron content increased to 64 per cent., necessitating clinkering or sintering before use, the cost will be increased to 1½c. per unit but will still be well below lowest cost of ores delivered at Eastern furnaces.

The tailings from each ton of concentrate contain an average of 850 lb. of recoverable ilmenite, which it is expected will soon be used for the production of a material for which there is a wide sale. I am advised the plant to produce this material is now being erected. If the product proves as valuable as the tests indicate, the ilmenite from the tailings is likely to be of greater value than the ore.

CONCENTRATES IN THE BLAST FURNACE

For ten years I was directly connected with the exclusive use of magnetically concentrated ores in the blast furnace. During this period I used all of the ores then produced on the eastern slopes of the Adirondacks. I found the only difficulties connected with their use were those due to their size and, where the crude ore mined was of variable composition, to the variable composition of the concentrates produced.

The flue dirt loss using magnetic concentrates is greater than when using fine Lake ores. On this account a furnace using them cannot be driven to a product equal to that which the same furnace will make when using fine Lake ores. Increased flue dirt production is due to the non-plastic nature of magnetic concentrates. Owing to the weight of the concentrates and their granular structure, their distribution in the furnace requires a great deal of attention. Unless very large charges are used and the bell opened suddenly, the ores trickle through the coke charge along the furnace walls, leaving an open center. The distribution question was solved at the Northern Iron Company's Standish furnace using the exceptionally fine Chateaguay concentrates by clinkering three-eighths of the mixture. The practice was further improved by enlarging the furnace hearth and steepening the bosh. Since these changes were made the yearly average fuel consumption, while making low phosphorus iron, has been less than 2200 lb. of coke per ton of iron. At the Port Henry furnace, where no coarse ore or clinker is available, the shotty nature of the concentrates makes their distribution more difficult. The distribution question has never been entirely solved. The best results have been obtained by using a double bell so constructed that the ore is distributed in two concentric rings. The fuel consumption of this furnace has never been under pound for pound over long periods, but has ranged for year periods at from 2240 to 2340 lb. per ton of iron produced, the product being basic, foundry and malleable.

Annual Meeting of Machine-Tool Builders

Larger Attendance and Greater Interest than at Any Previous Meeting—President Doan Discusses Co-operation Among Manufacturers

With the unprecedented registration of 166 members and guests, the National Machine Tool Builders' Association held its fifteenth annual convention at the Hotel Astor, New York, Oct. 24 and 25. It will go down in the records of the association as one of its most interesting and profitable gatherings. Much of the real work of the convention was done in executive meetings of the whole body and of the several committees and is therefore not available for publication, but the addresses delivered at its open sessions had a measure of constructiveness and a meed of inspiration that made them worthy of a far more extensive review for the benefit of all industry than is made possible by the space at our disposal.

Address of President J. B. Doan

The dry routine of the opening features of the convention was enlivened by the carefully prepared address of the president of the association, J. B. Doan, American Tool Works Company, Cincinnati. After pointing out that there can be no honorary memberships in an association of machine-tool builders, Mr. Doan made a plea for co-operation in these words:

"Men have learned that co-operation is one of the necessities of business success. By combining our wisdom we learn better methods of manufacture; we learn that there is some better system of business than merely trying to cut the throat of a competitor; and we find that the concentrated rays of business friendship, like concentrated sunbeams, will melt the coldest and hardest markets. In other words, co-operation and the exchange of business ideas teach us to manufacture more scientifically, to keep costs more accurately, and to market our product more successfully. So let this membership get together, abandon business suspicion and build up business confidence.

"There never was a time when these fundamental laws of success were so essential to business men. We are living in the most momentous days of history and are witnesses of the results which follow when national suspicion becomes national fear and national fear turns to national hatred, leading to international destruction. . . . Such associations as ours keep alive in our country the great spirit of national trust and national co-operation.

ELEMENTS OF INFLUENCE ON THE FUTURE

"As far-seeing business men living in these historic days, there are three elements of profound influence on the future which I would suggest that we consider deeply: First, the effect of the international war in Europe on our future, both at home and abroad. Second, the effect of the enormous business expansion which has come about in this country as a result of the war, both in the enlargement of old machine-tool factories and the adddition of new ones. Third, the effect of whatever changes in national laws may be made after the forthcoming Presidential election."

At this point in his talk, President Doan dwelt upon the economic conditions likely to prevail in Europe after the war and drew a comparison with the South after our Civil War. He then continued:

"None but those who are blind and deaf can fail to comprehend that there will be terrific effects following the ending of the European war. . . . It will be a time for wise heads to acquire and use greater wisdom than they ever before possessed. No one can accurately forecast that future. It's all in the second act of the great tragedy now being enacted.

"In the United States there has been immense business development during the last two years. Old machinery has been put in shape for work and new machinery has been built with breakneck speed. New buildings have been erected, and expansion has been the order of the day in the machine-tool industry along with others. Our demand has been due to the enormous call for machinery and supplies of every kind from Europe. We might picture business in America as a great forge made white hot as the demand from Europe has blown upon it like a mighty bellows. The anvils have rung, the workers have toiled, and still the cry has been for more, more. But this Hercules of war will grow weary. The giant bellows will lose its force. Will there then be a sufficient demand to keep all busy? America wants and needs all the prosperity it can get, so in the midst of unprecedented prosperity let us not forget to prepare for other days.

OUR RELATIONS WITH OTHER NATIONS

"In the days that are to come we need to enlarge our vision and build up the friendliest possible relations with other nations. In building up that business, the fundamental principle still holds. Tell exactly what your machine is when you try to sell it, and make it exactly as you have agreed to make it before you ship it. We want no soft spots in machine tools, no matter where they go. We are going to meet these different nations in the future, not merely on foreign soil, but perhaps on ours. . . . It will tax the ingenuity of Americans to meet that competition of the future. America is in a condition of the fat and well favored to-day. The old adage was, 'A lean hound for a long race.' We will have to race with a lean and hungry hound after this war, so let us prepare for it."

The speaker then discussed the political future from a non-partisan standpoint, laying stress upon the point that each member of the association could do much for the permanent well-being of American life by giving straightforward information on the greatest of American industries, the fundamental industry, the building of machine tools, to the law makers. In closing, he said:

"We represent an industry that is fundamental in the world, more fundamental to-day than ever before. The struggle of the world has become one of machinery against machinery. If we did not know it before, the European war has taught us this fact. The nation with the largest and most powerful machinery, and the most of it, wins. . . . Our lathes, our turret machines, our planers, our milling machines, our fine mechanical devices of every nature are the war weapons of civilization. We represent a great industry. We manufacture the mechanism which keeps men always at the topmost point of civilized development. It is an honor to be a machine-tool builder. It is a great honor to be a builder of good machine tools. It is more than an honor—it is a national responsibility, as it never was before, that the machine-tool builders of America should be the builders of the best machine tools. Gentlemen, let us be worthy of that responsibility."

Discussion of Health Insurance

The program of Tuesday morning's session ended with the delivery of a notable paper on "Health Insurance" by Frank F. Dresser, Worcester, Mass. This subject is so broad and the speaker handled it at such length and so comprehensively that it is possible in the following digest to touch upon only the most outstanding parts of the paper.

The passage of the New York workmen's compensation act in 1910 and the adoption of the principle by other States mark a striking change in our philosophy. The laissez-faire theory, that the welfare of the State is surest to be found by permitting the individual to work out his own salvation in his own way free from undue interference by others or by the State itself (a

theory which we were wont to believe accounted for the progress and the political freedom of both England and this country) was abandoned and in its stead the collectivist theory was adopted, that the welfare of the State as a whole should be striven for because if the State is prosperous its members will be and therefore individual needs and desires must be subordinated to the advantage of the mass. The surprisingly rapid and widespread approval of this philosophy has made possible the advocacy of measures which ten years ago would have seemed utterly repugnant.

Health insurance, unemployment insurance, invalidity insurance and old age pensions are possibly on the threshold of enactment while further advances are likely along the lines of widow's pensions, minimum wage, regulation of hours of labor and treatment of industrial disputes with which we are already familiar.

THE MOVEMENT FOR HEALTH INSURANCE

The American Association for Labor Legislation after considerable study drafted a uniform bill for health insurance and last winter presented it to the legislatures of New York, New Jersey and Massachusetts. It will be presented again to these bodies and to others the coming year.

Health insurance is not a new matter abroad. Bismarck proposed the first compulsory health insurance law in Germany in 1883 as a sop to the Socialist party. Austria and Hungary followed in 1888 and 1891, Luxemburg in 1901, Norway in 1909, Serbia in 1910, Great Britain in 1911, Russia and Roumania in 1912 and the Netherlands in 1913. Systems other than general compulsory insurance are found in Belgium, Italy, France, Spain, Sweden, Denmark and Switzerland.

A belief so universal must have its effect here, however much we think our conditions differ from those of Europe, in the existence of the need and in the peculiar difficulties to be met because of our constitutional guarantees and because of the competitive burden on the States which first adopt the law.

One of the commonest causes of reduction in income or increase in expenditure or both is the illness of the wage earner or his dependents. This illness loss means, to all people of slight resources, a reduced standard of living and consequently a greater susceptibility to disease. It is an efficient cause in recruiting the ranks of the casual worker and the inefficient. It fills our hospitals, jails and poorhouses and drains the resources of our charities. For illness is the chief cause of poverty and the poverty stricken are by far the fairest marks for disease.

But the wage loss and expenditure are not the only need. Medical advice, because of its cost, is not obtained except as a last resort and frequently too late, and even when secured is too apt to be careless or unskillful. It has been said, I do not doubt with truth, that "there is perhaps a distance of a quarter of a century between the present status of medical science and that of medical practice among the poor."

THREE GENERAL FORMS USED ABROAD

We may readily admit that such conditions among the great majority of our people are not well for the State and cast about for remedies. In foreign countries one of these three general forms has been adopted:

1. State subsidy to the voluntary insurance organizations whose cost is borne about one-third by the State and the rest by the insured workers themselves, of which Belgium is a type.

2. Compulsory insurance, with freedom to choose the insurance carrier, and the cost divided between the employer, employee and the State, which is the English plan.

3. Compulsory insurance in a closely prescribed insurance carrier under State supervision at State expense, with the cost divided between the employer and the employee, which is the German system.

The proposed bill of the Association for Labor Legislation inclines toward the German plan. (At this point the speaker explained at considerable length the provisions of the bill. The cost provision of this bill distributes the burden two-fifths to employees, two-fifths to employers and one-fifth to the State. The employer is required to make a payment to the insurance carrier each pay day and is permitted to deduct the employee's contribution from the wages paid him.)

Like all other legislation based upon the collectivist theory, the proposed enactment looks to the advantage of a class and not of an individual and rests upon the principle that the more fortunate or efficient or thrifty among the insured as well as the community at large shall share the burdens of the weaker members of society. It looks not to the strengthening of the survival of the fittest, but to the preservation of the less fit.

Its proponents justify the contribution of the State and of the employers by saying that the workers cannot bear the necessary cost themselves and must be helped, that it is to the advantage of the State to diminish its expenditure for poor relief and to have a well and self-sustaining citizenry, that it is to the employer's advantage to have more efficient and constant workers and that to some degree both the State and the employer are responsible for illness among the insured class.

The cost of the plan is problematical. The data in this country are of the vaguest description and such foreign data as are available are difficult to transpose into our terms. We know that the German costs have been rising steadily since 1884 and that the peak of expenditure is not yet reached, that the days of sickness per insured have increased rather than diminished and that the duration of illness has lengthened remarkably. A similar condition is observed in other countries having an insurance system.

It has been computed, arguing from German and British experience but realizing almost the total lack of necessary data, that the cost of the sickness, medical and funeral benefits, including administration costs but excluding, apparently, any contribution to reserves and the quite considerable sums which employers must in the first instance pay for their accounting department, would be between the limits of 3 per cent and 5 per cent, say about 4 per cent, of wages.

If we apply this 4 per cent of wages to a single State, say Massachusetts, assuming the average wage to be $570 a year and that there are about a million persons who would be insured, the cost to Massachusetts is about $23,000,000 annually, of which the workmen would contribute nearly $9,000,000, the employers $9,000,000 and the State about $5,000,000, an increase of our present State tax by over 40 per cent.

The proposed benefits and the consequent cost are at the minimum and experience shows that once the bill is enacted the extension of its benefits will become a political slogan and their cost an ever increasing burden.

In spite of the common belief that the State and the employer have, just under the treasurer's desk, a hidden stock of gold which, if it can be got at, will prove inexhaustible, these contributions will not all remain where they first fell, but be passed on. The State's contribution, as well as its payment as employer of State and municipal employees, is raised by the general levy upon all taxpayers. The employer's contribution plus his increased State and municipal tax will become an item in his cost of production to be charged, so far as possible, in the competitive rivalry of the several States, in the price of his product and paid by the consumer or else be saved by greater economy, as, for example, by reducing wages. The greater portion of the consumers are the insured workmen and their families who thus, besides their own direct contribution, will indirectly bear in the increased cost of necessaries or in less wages a large proportion of the contribution of the employers and the State. In this, therefore, as in so many similar proposals, it would seem that the class which it is hoped to benefit is simply set to chasing its own tail again.

The first query is whether compulsion may be effected in any other way than by this administrative device of making the employer an insurance collector. It might be possible to enforce insurance by providing that no servant shall be hired or retained in an employment unless he is or has been insured for a certain period, and to collect his insurance payments by his

purchase of stamps and entry of them in an employment ticket. It would avoid one serious consideration at least. The payment of wages ought not to be entangled with anything but money paid for value given. Any deduction made by an employer from the pay envelope, however slight it may be, is a constant incentive to the worker to make up the deficit by asking increases of pay. Collection through the employer also creates a very considerable cost.

There are certain other considerations which render contribution by the State or the employer unwise. So long as the public thinks the employer and the State are paying any part of the cost it will be willing to have them pay more. The worker, already reasoning from the fallacious analogy of workmen's compensation, will seek to escape any contribution and the public, not realizing the incidence of the cost, will not object. Thus the Legislature influenced by political considerations will year by year extend the scope of the statute, increase its benefits, alter the proportions of contributions and the like and just as we have noticed in our compensation legislation where, for example, in the five sessions since the Massachusetts act was passed it has been altered in sixty-four particulars.

The employer seeking to diminish his sickness cost may take the obviously preventive course of not employing men likely to be sick. The defective men of any age or the man who, reaching forty-five, has entered upon the period of increasing illness hazard will be excluded from regular employment and, at a time of his greatest need, see his opportunities of earning reduced. Instead of making it easier to employ such men a course is taken which is best fitted to enlarge the class of dependents; and this is not a fanciful condition, for England has noticed its effects.

The time for choice has come. Shall we permit these crude and uncertain legislative regulations to continue, shall we agree that industry is responsible for certain preventable inducements to disease and inflict upon ourselves and upon the community the rule of thumb penalty of health insurance, or shall we of our own motion study our conditions and set about to cure their evils, whether they be evils in the mills or in the general health conditions of our towns?

Progress along these lines by industrial employers themselves, progress by wise State and municipal regulations which shall reach all classes, closer study by the medical profession of their peculiar problems seem to me far preferable and to offer greater hope than to embark upon the uncharted sea of health insurance.

Dr. Friedensburg, former president of the senate in the Imperial Insurance Office (retired), after over 20 years of service, ends an article on the practical results of workingmen's insurance in Germany with the words, "I deem it a deed well done to have called attention once again to the all-pervading cancer that is destroying the vitals of our State."

Other Proceedings

Tuesday afternoon was given over to committee meetings, and Wednesday morning to an executive session and further committee meetings. On Wednesday afternoon, James A. Emery, Washington, delivered an address on "Industry and Politics" which was received with so much enthusiasm that it was immediately voted that the address be printed and distributed among the members.

An executive session was then held for the consideration of reports and resolutions and for the election of officers for the ensuing year. All the officers of the past year were re-elected as follows:

President, J. B. Doan, American Tool Works Company, Cincinnati; first vice-president, D. M. Wright, Henry & Wright Mfg. Company, Hartford, Conn.; second vice-president, Aug. H. Tuechter, Cincinnati Bickford Tool Company, Cincinnati; treasurer, A. E. Newton, Reed-Prentice Company, Worcester, Mass.; secretary, Charles L. Taylor, Taylor & Fenn Company, Hartford; general manager, Charles E. Hildreth, Whitcomb-Blaisdell Machine Tool Company, Worcester.

Five new members, as follows, were added to the rolls of the association: W. W. & C. F. Tucker, Hartford, Conn.; Cincinnati Grinder Company, Cincinnati; Sipp Machine Company, Paterson, N. J.; Nutter & Barnes Company, Hinsdale, N. H.; Fitchburg Grinding Machine Company, Fitchburg, Mass.

The next meeting of the association will be held in Cincinnati, May 21 and 22, 1917.

OBSTACLES TO METRIC SYSTEM

Difficulties in Its Adoption Pointed Out by Coleman Sellers, Jr.

In connection with the inquiry which the Philadelphia Bourse is conducting among manufacturers and exporters of a variety of industries as to their attitude toward the general adoption of the metric system in the United States and the extent to which their foreign business now requires it, the following statement has been made by Coleman Sellers, Jr., president and engineer of William Sellers & Co., Inc., machine-tool manufacturers:

"I would certainly recommend exporters to make any use of the metric system that will facilitate their foreign business, such as expressing weights and dimensions in the units used by the purchaser, if he so desires. The Bourse is to be commended for putting the necessary information before manufacturers and exporters, but I should be very sorry to see it lend itself to any propaganda designed to force the use of the metric system on the whole country by act of Congress.

"The French units have been legalized by our Government and accurate standards have been prepared for distribution. This, I think, is as far as the Government should go. I am perfectly willing that any one shall make what use of the metric system he deems desirable, but I object seriously to any attempt to force the extension of the system by legal enactment. The advocates of this course are no doubt absolutely sincere in their belief, but they approach the subject too much from a scientific point of view and do not give due consideration to the practical side. If the system is really better than ours, it will in time supplant it without the violent disturbance which would follow an enforced use.

"Our own foreign business is chiefly confined to machine tools or other machinery for working metals, and the metric system is only involved to the extent that we occasionally are required to furnish the principal screws with metric threads, or to arrange a machine to cut metric threads; that is, threads in which the lead or pitch is expressed in millimeters instead of in inches or fractions of an inch. Even this requirement is not universal. We are now building machines for Russia (a metric country) which are required to cut inch threads. It really makes no difference to the buyer of a machine whether the inch or the millimeter has been the unit of measurement used in constructing it.

"As to the use of the system in our own establishment, I may say that when we began the manufacturing of the Gifford injector about 1860 we followed the drawings of the French inventor, using his units, and all our gages and tools were made accordingly, with the single exception that the threads for the pipe connections conform to the American standard. We have continued to use the metric units in this department since it started, with entire satisfaction, but with no desire to extend it to the rest of our establishment.

"To change a manufacturing plant such as ours from one system to the other is not so simple a matter as merely substituting a rule differently graduated, but it involves a large investment in tools and fixtures and an interference with established standards which it is practically impossible to change. This difficulty is very real, as is illustrated by the fact that even in France the metric system is not used to the entire exclusion of other standards; and in other countries, Russia for example, the English system of threads still generally prevails. The matter of thread standards is in a chaotic state in the meter-using countries, and they have not yet agreed to conform with a universal standard of diameters, pitches and forms of thread, although

numerous efforts have been made to bring this about. In fact, the subject is in the same confusion that existed in England before Sir Joseph Whitworth introduced his system of screw threads which was suggested by the late William Sellers and officially approved by the Franklin Institute."

In commenting upon Mr. Sellers's statement, the Bourse states that it is in complete agreement with his view that the metric system cannot be forced suddenly upon this country by legal enactment.

American Shipbuilding Company's Report

The American Shipbuilding Company, Cleveland, in issuing its seventeenth annual report covering the fiscal year ended June 30, 1916, presents the following income account, including subsidiary companies:

Earnings after deducting manufacturing expenses	$1,613,645.60
Other income	165,123.94
Total income	1,808,769.54
Deductions:	
Administrative and general expenses	$369,394.89
Taxes	149,166.02
Repairs to machinery, equipment, etc.	362,805.32
Depreciation	325,472.48
Interest	22,624.04
Net profit for the year	$579,306.79

The net profit presents a strong contrast to the returns for immediately preceding years. The net profit for the fiscal year 1914-15 was $5,405.63, and for the fiscal year 1913-14 was only $2,804. The balance sheet of the company and its subsidiaries shows a surplus at the close of business, June 30, 1916, of $3,361,023.77, against a surplus 12 months before of $2,971,234.51.

President M. E. Farr, in his accompanying remarks to stockholders, says:

"The present activity in the Lake carrying trade, influenced largely by the unprecedented demand for steel and iron products, and the marked shortage in ocean tonnage, account almost wholly for the present prosperous condition of your company. The company has for many years confined its operations to the construction and repairing of Lake vessels, and was, therefore, not well prepared in the way of organization and equipment to undertake the building of ships intended for salt-water service. When the demand for this type appeared stable, the working forces of the several plants were reorganized and certain necessary equipment was bought and installed. During the first half of the fiscal year contracts were closed for six ships of Norwegian type, and the experience gained in constructing these ships warranted the closing of many more contracts at attractive prices. The greater part of the earnings shown accrued during the last half of the business year. This showing does not reflect the maximum earning capacity of the company.

"The commerce of the Great Lakes is in a very prosperous condition. The demand for carrying tonnage has been steady and at good rates of freight. The prevailing high prices for ship materials and labor have limited the placing of orders for Lake ships to the actual necessities of shipping interests. A large number of Lake vessels have been sold and taken to the Atlantic coast to engage in coastwise and other deep-sea service.

"During the current fiscal year four ships, with a total carrying capacity of about 37,000 gross tons, have been completed and delivered to owners. There are now 33 ships with a total carrying capacity of about 174,000 gross tons under contract for delivery during the next fiscal year, and two ships with a total carrying capacity of about 21,000 gross tons under contract for delivery during the last half of 1917. Present prospects are favorable for securing enough contracts to fill all building berths for 1917 delivery. The volume of repair work has been large and profitable.

"Many improvements have been made, including a large concrete drydock at the South Chicago plant, which was completed in November, 1915, at a cost of $355,826.81. Sundry buildings and equipment have been added to various plants at a cost of $442,387.06. In order to permit the enlargement of our Wyandotte, Mich., plant, 10.4 acres of land was purchased, at a cost of $60,000. The cost of this land and all improvements has been paid. In order to get higher efficiency and greater economy in our production, it will be necessary to replace obsolete tools and equipment with modern ones, and also to add other much needed equipment.

"The prospects for future business and earnings are good, and the affairs of the company are in excellent shape. The shortage of materials and skilled labor has hampered operations and restricted production. Indications are that this condition will improve. Our workmen are paid the highest wage in the history of the shipbuilding industry, and their working conditions receive careful attention. The officers, directors and operating heads have co-operated with the management in every way, and these men have been untiring in their efforts to make your company one of the most stable and at the same time one of the most profitable concerns of its kind."

Steel Conductors for Electric Transmission Lines

The possibility of using steel wires and cables for electric transmission lines was discussed by H. B. Dwight in a paper presented at the convention of the Association of Iron and Steel Electrical Engineers at Chicago, Sept. 18-22. The paper points out that the effective resistance and reactance of iron and steel conductors increased to a maximum as the current is increased and then decreased. In most cases, especially with larger cables, the decrease is slow and the resistance maintained approximately at its maximum value for most large values of current. This property can prove useful in transmission line work for conductors where they have low impedance with a normal load current, but about double the impedance to a current flowing as the result of a short circuit.

The higher conductivity of steel for direct current than for alternating current makes the use of bare steel cables for direct current often more economical than for alternating current lines, according to the author. The steel cable has eight times the resistance to direct current that a copper cable of the same size has, and seven times the resistance of a copper cable of the same weight. Inasmuch, however, as galvanized steel cables usually cost less than one-seventh as much as copper cables per pound, they should be more economical, other things being equal. Steel cables have been used on transmission lines for spans up to 3000 ft. or more. In some cases they have formed the support of copper conductors, but often they themselves carry the current.

Another application of steel conductors is their use for lines transmitting a relatively small amount of power. Thus a line to transmit 75 kva. a distance of 7 miles, would require, if constructed of copper, a wire large enough to transmit 750 kva. This is due to the mechanical properties of copper, a smaller wire being too weak to be safely used. A steel line small enough to transmit 75 kva. will have ample mechanical strength to withstand all ordinary contingencies of wind, ice, sleet and snow. While poles and insulators will cost the same in both cases, steel conductors will cost only $220 against $2,600 for copper. The use of steel conductors on moderately long, small capacity lines will make it profitable for power companies to enter a field where otherwise the cost would be prohibitive.

In a decade the zinc concentrate production of the Broken Hill mines of New South Wales has greatly increased, 506,660 tons having been exported in 1913. In 1905 the exports were only 103,532 tons, increasing to 520,518 tons in 1912. Of the latter the spelter contents paid for were 194,214 tons. The British Government has agreed to take 100,000 tons per year of Australia's zinc concentrates during the war and for 10 years thereafter and to also purchase 45,000 tons of spelter to be produced in Australia, which will represent 115,000 tons of concentrates.

Zinc Dust by a New Process

The production of zinc dust by a new process was discussed by Harry J. Morgan and Oliver C. Ralston in a paper, "Electrolytic Zinc Dust," before the fall meeting of American Electrochemical Society in New York, Sept. 29, 1916. Mr. Morgan is research fellow, University of Utah, and Mr. Ralston is assistant metallurgist, U. S. Bureau of Mines.

The author's introductory remarks together with a statement of the cost of the process and the conclusions are as follows:

The sudden increase in the price of zinc dust after the beginning of the European war, owing to the cutting off of the German and Belgian supply, led to the conducting of some experiments on the possibility of its production on a commercial scale from solutions of zinc, and the substitution of the zinc made in this manner for the zinc dust ordinarily used in the precipitation of gold and silver in the cyanide process.

The United States, in 1913, imported 4,382,470 lb. of zinc dust, valued at $227,585. Most of this was from either Germany or Belgium. The domestic production, in comparison with the imports, was very small. In the years 1912 and 1913 it was 492 and 423 tons respectively, while the imports were 2400 and 2200 tons respectively. For a time the zinc dust made in zinc smelters was a drug on the market and when first utilized in cyanidation could be bought for a lower price per pound than solid zinc. After the advantages of the use of zinc dust for precipitation were realized, so much zinc dust began to be used for this purpose that it brought a premium of about 3c. per lb. over what the value of spelter was at the beginning of the war.

COST OF THE PROCESS

Due to the high consumption of electrical energy, 3 kw.-hr. per lb. (6.6 kw.-hr. per keg) of zinc dust, the principal item to be considered is the cost of electric energy. The high efficiency of the zinc dust in comparison with ordinary zinc dust and the high efficiency of the latter in comparison with zinc shavings precipitation, will probably allow of considerably higher cost per pound for the new dust than for zinc shavings, or ordinary commercial zinc dust.

The high current density used allows of smaller electrolytic tank equipment than is used in most electrolytic installations. The design of a small set capable of supplying the ordinary small cyanide mill with zinc dust is hence a matter of interest. We believe that the figures presented allow of the design of such plants, but until a semi-commercial plant has been built and tested out thoroughly it is needless to present possible designs. The object of this work, as likewise of other investigation which has been conducted by the Salt Lake station of the Bureau and the Department of Metallurgical Research of the University of Utah, has been to test out various ideas and suggestions with a view of determining whether or not they possess sufficient merit to warrant their being tried out on a semi-commercial or commercial scale.

CONCLUSIONS

By depositing a "sponge" metal from solutions by electrolysis it is possible to get a zinc product that on drying crumbles into "zinc dust."

Sponge metal can be obtained from zinc sulphate solutions by the continual addition of a small amount of either copper or arsenic salts to the electrolyte. The objection to the use of zinc dust prepared by this method is the needless dilution of the bullion caused by the copper, and the danger met in the handling of gold or silver precipitates when arsenic is used to produce the sponge. These difficulties are probably not insurmountable. Fairly impure solutions can be worked only when zinc sponge is desired, and this will not handicap the ordinary electrolytic methods.

The preparation of zinc sponge is also possible from sulphate solutions by keeping acidity low and temperature high. Zinc oxide, rendering the solution slightly basic, is the most desirable chemical for maintaining this condition. It is subject to the objection that it is only slowly and slightly soluble in zinc sulphate solutions.

The same remarks apply to zinc sponge prepared from chloride solutions, except that the zinc sponge seems to be more inclined to be oxidized during drying.

Sodium zincate solutions allow of the deposition of zinc sponge under a widely varying range of electrical and thermal conditions. Stirring of the electrolyte must be avoided. Current efficiencies of about 60 per cent and zinc dust precipitating efficiencies of 70 to 75 per cent are possible. There seems to be no difficulty in getting 1 lb. of zinc dust from a solution of zinc, with 3 kw.-hr. of energy.

Sodium zincate solution recommends itself because of its ease of preparation from caustic soda and zinc oxide, both of which are articles of commerce. The zinc tenor of the solution can be maintained either by the addition of more zinc oxide or by the use of zinc anodes, by which latter process spelter can be converted into zinc dust.

British Iron and Steel Research

At the autumn meeting of the Iron and Steel Institute in London, Sept. 21 and 22, the president, Sir William Beardmore, presented the recommendation of the council that committees be formed to report on new developments in the industry and to assist in obtaining practical papers thereon. Five committees were suggested dealing respectively with mining, fuel and refractories; pig iron and foundry practice; steel and alloys; mechanical treatment, and physics, chemistry and microscopy. In addition, a research committee might be formed to suggest and advise on subjects suitable for investigation and research. The council advised that the committees consist of about eight members each, holding for four years, the terms of half of them expiring each two years. The research committee, it is proposed, will consist of one or two members of the council and one from each of the five committees.

Commenting on this recommendation by the Institute, the London *Times*, in its Engineering Supplement, says:

It is yet another sign of the new spirit in industry that the Iron and Steel Institute, without relinquishing the high status it has long enjoyed as an international association, is considering measures to strengthen its national standing and is promoting work designed to benefit British trade. There has been apparent recently, throughout the great industry of which the Institute is fully representative on the technical side, a determination to get rid of that dependence on German sources of supply, which it is now realized has hampered British capacity for production in the past. Steps are to be taken not merely to bring about a union of interests with other old-established technical institutions in the Midlands, the Northeast Coast, and Scotland, but to form local committees in the overseas dominions to report on new developments and strengthen the commercial relations with the mother country. In view of the need of additional research work into such problems as those referred to in the previous note a research committee is to be formed, and other committees will be constituted to assist progress in the fields of mining and fuel, pig-iron and foundry practice, steel and alloys, mechanical treatment, and physics, chemistry and microscopy.

The suggestion that the borders of the Institute should be enlarged by the inclusion of a new associate class to be formed of the younger men engaged in the scientific and technical branches of the industry will be generally approved, although it may be doubted whether the proposal made by an eminent past president of the Institute to open the doors to women associates will meet with acceptance.

With an American locomotive of the decapod type, a member of the engineering board of the Russian Ministry of Ways of Communication has established a new European record for the most heavily loaded train. He brought over the Nikolaief division of the Southern Railway a train with a load of 4424 tons. Its length was 2800 ft. and signaling was done with flags. A Russian engine was tried out against the American and the superiority of the latter was clearly established. An Odessa paper of Sept. 5, 1916, states that a number of American freight cars are giving great satisfaction on the Ekaterininskaya Railway because of their great capacity.

Judicial Decisions

ABSTRACTED BY A. L. H. STREET

TRADEMARKS AND NON-COMPETING ARTICLES.—The originator of a trademark covering one kind of goods cannot complain of the appropriation of the same brand by another manufacturer for another and non-competing kind of goods. "Valid registration of a trademark is acquired, not by the invention or adoption of a word or symbol, but solely by affixing it to an article of merchandise as a mark; it is the trade, not the mark, that is protected." So it has been held by the courts there is no infringement of a trademark in its use by one manufacturer to cover automobiles and by another to cover fire extinguishers. It may be deceptive, and therefore morally wrong, for a manufacturer to adopt a name under such circumstances that the public are apt to be deceived into believing that in buying his product the goods of another manufacturer, who in fact does not make goods of the particular class, are being secured; but, in the absence of a showing that the guilty manufacturer is causing injury to the other's trade in consequence, the latter has no right of action, although the former may profit by the use of the mark under such deception. And when there is nothing to show that the complaining manufacturer's reputation has been injuriously affected by the other manufacturer's use of the same brand, through the sale of inferior goods, such use will not be enjoined upon a mere suggestion of the possibility of such injury occurring. (United States District Court, Eastern District of New York, Aunt Jemima Mills Company vs. Rigney & Co., 234 Federal Reporter, 804.)

PHASES OF PATENT LAW.—On a claim of infringement of a patent and a dispute as to the patentable novelty of a machine, immediate commercial success of the machine will resolve the doubt in favor of the patent. (United States Circuit Court of Appeals, Second Circuit, Eibel Process Company vs. Remington-Martin Company, 234 Federal Reporter, 624.) Patentable invention will be prima facie presumed from the issuance of a patent in regular and proper form. As affecting legal liability for infringement, a patentee is bound to take notice of all pre-existing devices pertaining in any way to his device. (United States District Court, District of Oregon, Brown Portable Elevator Company vs. Interior Warehouse Company, 234 Federal Reporter, 649.) In ascertaining the profits derived from using a rolling-mill furnace which constituted an infringement of a patent, as a basis for an award of damages to the aggrieved patentee, the inquiry being limited to the saving of labor cost, the proper standard of comparison was with the furnaces in previous use by defendant and replaced by the infringing furnaces. And, the improved furnaces being of unitary character, the complaining patentee is entitled to recover the entire in the cost of the heating operation as between the two types of furnace. In compelling the infringing manufacturer to account for profits derived from the infringement, he is not entitled to any deduction on account of the cost of changes made in equipment sold, to make it satisfactory to the buyer. (United States Circuit Court of Appeals, Third Circuit, Morgan Construction Company vs. Forter-Miller Engineering Company, 234 Federal Reporter, 324.)

RIGHT TO RESCIND PURCHASE—DAMAGES FOR BREACH OF WARRANTY.—A buyer of belt guides and shifts could not rescind a completed purchase on the ground of a breach of warranty, without showing reservation of a right of rescission in case of a breach of warranty, or fraud on the part of the seller. Damages recoverable by the seller for a breach of warranty as to the condition of a thing bought are to be measured by the excess of the value of the article contracted for above the value of that delivered. (North Dakota Supreme Court, Elliott Supply Company vs. Johnson, 159 Northwestern Reporter, 2.)

"IMMEDIATE" RETURN OF UNSATISFACTORY MACHINERY.—Under a contract for the sale of machinery, giving the buyer the right to return it on condition that the return be made "immediately" after failure of the machinery to do good work, a delay of 40 days bars the right to return. (South Dakota Supreme Court, Purcell vs. International Harvester Company, 159 Northwestern Reporter, 47.)

VALIDITY OF CLAYTON ACT.—The provision of the Clayton act, prohibiting agreements binding a lessee or purchaser of goods or machinery not to use or deal in the goods or machinery of a competitor of the lessor or seller, is valid as applied to interstate transactions. (United States District Court, Eastern District of Missouri, United States vs. United Shoe Machinery Company, 234 Federal Reporter, 127.)

Customs Decisions

CARBURETERS

Another and an unsuccessful attempt has been made before the Board of United States General Appraisers to expand the agricultural implement provision of the tariff act of 1913 in such way as to admit under its provisions carbureters manufactured for oil-burning traction engines. The J. D. Richardson Company, Detroit, appeared as the protestant of record, it being shown that the carbureters involved in the suit were made by the Windsor Machine & Tool Company, Windsor, Ontario, for the account of the M. Rumely Company, La Porte, Ind. The collector regarded the articles as falling under the provision in the law for "manufactures of metal, not specially provided for," and accordingly took duty at 20 per cent. The importer, on the other hand, held that the carbureters should be deemed "parts of agricultural implements," and as such given free entry. In support of this contention, witnesses testified that the carbureters were used only in the traction engines turned out by the Rumely Company. These engines, it was testified, were employed for hauling hay or potatoes to the market or heavy loads along roads.

Judge Fischer said the same protestant was before the board on this issue last April when the claim for free entry was overruled. Later, however, the question was reopened at the request of the importer, who desired to introduce additional testimony. With this further evidence before it, the customs tribunal again found against the claim for free entry. The attitude of the board relative to claims of this kind was summed up by Judge Fischer in his decision, coincided in by the other members, as follows:

> From this testimony we think it is clearly obvious that these traction engines are primarily and solely intended for hauling purposes, and that they possess no function which in the remotest degree could be considered "agricultural" in character. The fact that one particular type of engine may prove peculiarly adaptable for hauling agricultural products will certainly not operate to make such an engine an agricultural implement. It still remains, what its internal mechanism [illegible] it, a hauling engine, and its definite status as such will not be changed merely because it may prove advantageous to use the engine for some particular [illegible] of work.

SPLIT RINGS FOR FISHING TACKLE

The Enterprise Mfg. Company, Cleveland, won before the board in a contention relating to the classification under the present tariff law of split steel rings used in the manufacture of fishing tackle. Duty was levied at the rate of 30 per cent under the provision in paragraph 136 for "fishing tackle or parts thereof," while the importer's contention was for a rate of 15 per cent under paragraph 114, as articles made of wire, or at 20 per cent under paragraph 167 as "metal manufactured not specially provided for." It developed that the rings were not used in completing fishing tackle until they had been copper-plated and burnished. The decision said that, admitting that the steel rings were employed chiefly in the manufacture of fishing tackle, the board was confronted with the fact that they were never so used in the condition as imported in the present case. In view of this circumstance, it was held the prevailing judicial constructions on the subject required that they be excluded from the tariff provision for parts of fishing tackle. It was held that, inasmuch as the rings were made from steel wire, they were properly classifiable as manufactures of wire at 15 per cent as claimed. The alternate claim for a rate of 20 per cent under the metal manufactures provision was not considered applicable by the board.

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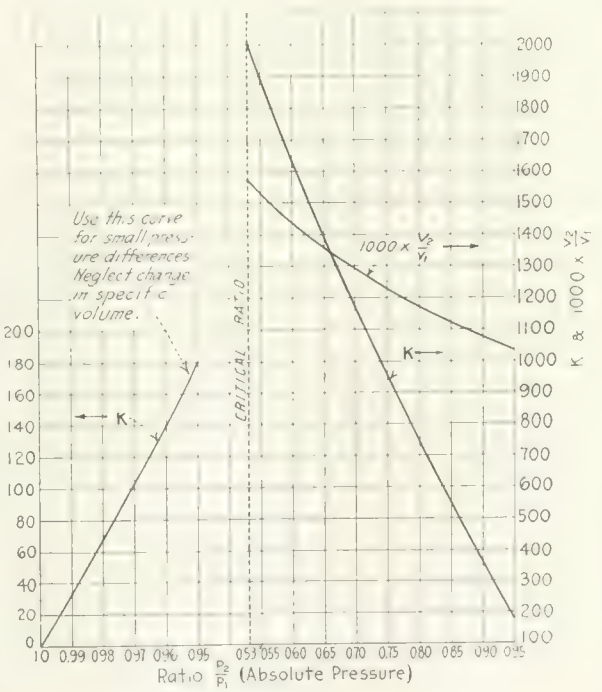
Measuring the Flow of Compressed Air

A Curve to Facilitate the Calculation of the Weight of Air Flowing Through Orifices—Some Examples Worked Out

BY THOMAS G. ESTEP, JR. –

The problem of metering, with a reasonable degree of accuracy, the flow of air under pressure, is one that arises very often in engineering practice, and until recently has always been difficult, both in the method to be used and in the calculations that are required. Proportional meters and displacement tanks have been used and are fairly accurate, but the equipment necessary is very expensive and the end does not often justify the means. The simpler methods are the throttle disc and the pitot tube, but the great trouble here is to determine accurately the coefficient of discharge which will vary under varying conditions of flow.

In the last few years very exhaustive investigations have been made on the flow of air through well-rounded orifices, and it has been found that with a certain shape of orifice the coefficient of discharge will remain practically constant over a wide range of conditions and is nearly equal to unity. This at once gives us a very accurate method of determining the quantity of air flowing and at the same time requires very little apparatus. All the equipment necessary is an accurate thermometer, a means of determining the pressure on the two sides of the orifice and a standard orifice. All recent handbooks for engineers give the shape of the standard orifice with the coefficients of discharge for each shape.



A Curve to Facilitate the Calculation of the Weight of Air Flowing Through a Standard Orifice

Probably the most common case where it is necessary to measure the flow of air is in the testing of compressors in order to determine the real volumetric efficiency, particularly the larger compressors, such as the blast furnace blowing engines.

One reason that the standard orifice method is not used more is probably the fact that after the observed data are obtained the calculation of the quantity of air flowing is laborious and somewhat difficult. In order to facilitate this calculation, a curve has been prepared, and by its use the calculation has been very much shortened and reduced to simple arithmetic.

It can be proved that the velocity of the air in the orifice, for a given ratio of pressures on each side of it, is given by the equation,

$$W_2^2 - W_1^2 = 2g \frac{n}{n-1} RT \left[1 - \left(\frac{p_2}{p_1} \right)^{\frac{n-1}{n}} \right]$$

Where

W_1 = initial velocity, or velocity at pressure p_1 in feet per second.

W_2 = velocity at pressure p_2, feet per second.

g = acceleration due to gravity feet per second.

n = ratio of the specific heat at constant pressure to the specific heat at constant volume.

R = constant, and is equal to 53.34 for air.

T = absolute temperature at pressure p_1 degrees Fahr.

p_1 = pressure of air just before it enters orifice, pounds per square inch absolute.

p_2 = pressure in the orifice, pounds per square inch absolute.

A peculiar condition arises in relation to the pressure p_2 due to what is known as the critical ratio. So long as the ratio of the pressure of the region into which the orifice is discharging to the initial pressure p_1 is equal to or greater than 0.53, the pressure p_2 in the orifice is the same as the pressure of the region into which the orifice is discharging, but when the above ratio is less than 0.53, the pressure p_2 takes the value 0.53 p_1 and remains constant at that, no matter how much the pressure of the region into which the orifice is discharging is reduced.

To illustrate this, assume that p_1 is 100 lb. per sq. in. absolute and the pressure on the other side of the orifice is 70 lb. per sq. in. absolute. The ratio here is 0.7 which is greater than 0.53, hence the pressure p_2 in the orifice is 70 lb. But suppose that the pressure on the discharge side is 40 lb. per sq. in. absolute. Then the ratio is 0.4, which is less than 0.53, hence p_2 takes a value 0.53 p_1 or 53 lb. per

sq. in., and no matter if the pressure on the discharge side is reduced still further, p_2 remains constant at 53 lb. per sq. in. absolute. This means that the maximum velocity in the orifice is reached when the ratio of pressures on the two sides is equal to 0.53.

In the equation for velocity given above, it is usually assumed that W_1 is equal to zero. It is always so small compared to W_2 that this assumption introduces very little error. It is also assumed that the expansion of the air in the orifice is adiabatic.

An examination of this equation shows that for a given pressure ratio $\frac{p_2}{p_1}$ all the quantities in the equation are constant except T. Hence let

$$K = 2g \cdot \frac{n}{n-1} R \left[1 - \left(\frac{p_2}{p_1} \right)^{\frac{n-1}{n}} \right]$$

and then

$$W_2 = \sqrt{KT}$$

The weight of air discharged is equal to the area of the orifice multiplied by the velocity and divided by the specific volume, or

$$M = \frac{C \cdot A \cdot \sqrt{KT}}{V_2}$$

where M = weight discharged, pounds per second
C = coefficient of discharge.
A = area of orifice in square feet.
V_2 = specific volume at pressure p_2, cubic feet

V_2 is not easily determined, but for each value of $\frac{p_2}{p_1}$ there is a corresponding value for $\frac{V_2}{V_1}$, where V_1 is the specific volume at the pressure p_1 and the temperature T. V_1 can be readily determined by the use of the simple relation

$$V_1 = \frac{RT}{144 p_1}$$

Then the equation for weight may be written,

$$M = \frac{C \cdot A \cdot \sqrt{KT}}{\left(\frac{V_2}{V_1} \right) V_1}$$

The curve of K has been plotted by choosing successive values of $\frac{p_2}{p_1}$ and solving for K and also finding the value of $\frac{V_2}{V_1}$ for each value of $\frac{p_2}{p_1}$.

For small differences of pressure, a curve has been plotted to an enlarged scale, in which the ratio of specific volumes has been neglected, for this ratio is so near unity that the error is very small.

A few problems will now be solved to illustrate the use of the curve. Suppose air at an initial pressure of 100 lb. per sq. in. absolute and a temperature of 70 degrees Fahr. or 530 degrees absolute, is allowed to flow through a standard orifice, having a cross sectional area of 2 sq. in., into a region of pressure of 60 lb. per sq. in. absolute. What weight is flowing? First $\frac{p_2}{p_1} = \frac{60}{100} = 0.6$ which is greater than 0.53 so that p_2 is equal to 60 lb. From the curve, when $\frac{p_2}{p_1} = 0.6$, $K = 1620$ and $\frac{V_2}{V_1} = 1.44$.

$$V_1 = \frac{RT}{144 p_1} = \frac{53.34 \times 530}{144 \times 100} = 1.96 \text{ cu. ft.}$$

Let the coefficient of discharge be equal to 0.98. Then

$$M = \frac{C \cdot A \cdot \sqrt{KT}}{\left(\frac{V_2}{V_1} \right) V_1} = \frac{0.98 \cdot \frac{2}{144} \cdot \sqrt{1620} \cdot 530}{1.44 \cdot 1.96}$$

= 4.47 lb. per sec.

Suppose that the conditions are the same as in the previous problem, except that the pressure of the region into which the orifice is discharging is 30 lb. per sq. in. absolute, instead of 60 lb. In this case $\frac{p_2}{p_1} = \frac{30}{100} = 0.3$, which is less than 0.53, so that p_2 is equal to 0.53 p_1 and the ratio is then 0.53. For this ratio, $K = 2010$ and $\frac{V_2}{V_1}$ equals 1.57. As before, V_1 = 1.96 cubic feet. Then the quantity discharged is

$$M = \frac{C \cdot A \cdot \sqrt{KT}}{\left(\frac{V_2}{V_1} \right) V_1} = \frac{0.98 \cdot \frac{2}{144} \cdot \sqrt{2010} \cdot 530}{1.57 \cdot 1.96}$$

= 4.71 lb. per sec.

Take the same conditions as in the previous problem, except that the pressure of the region into which the orifice is discharging is 97 lb. per sq. in. absolute instead of 60 lb. Here the ratio $\frac{p_2}{p_1}$ is equal to $\frac{97}{100}$ 0.97, which is greater than 0.53. Use the curve plotted to the larger scale, from which we find that $K = 104$. The ratio of specific volumes may be taken as unity. Then quantity flowing,

$$M = \frac{C \cdot A \cdot \sqrt{KT}}{\left(\frac{V_2}{V_1} \right) V_1} = \frac{0.98 \cdot \frac{2}{144} \cdot \sqrt{104} \cdot 530}{1 \cdot 1.96}$$

= 1.63 lb. per sec.

From the above examples, it is seen how much the curve simplifies the calculation. Other uses will suggest themselves to the engineer, particularly those who have a knowledge of the theory of the flow of elastic fluids. By introducing certain other factors in the equation, the curve can be made to apply to gases other than air.

A word of caution might be given here in the use of standard orifices for measuring the flow of air. The flow through the orifice must be constant; if it is pulsating or fluctuating, a large error will result. In case the flow is not steady, it should be made so by means of tanks and throttling.

Russia's Iron and Steel Output

Russia's production of pig iron, semi-finished and finished steel in the last two years, according to *L'Economiste Européen* of Sept. 29, 1916, was as follows in net tons:

	1914	1915
Pig iron	4,769,300	4,062,100
Semi-finished steel	5,308,800	4,539,100
Finished steel	4,334,100	3,599,500

Central Russia is credited with over 70 per cent of the total pig-iron output, the Ural region coming second. Central Russia also leads in semi-finished and finished steel, making 60 per cent of the total semi-finished steel, while the Ural region made 20 per cent. In 1914 Poland produced 269,500 tons of pig iron, 389,900 tons of semi-finished steel and 313,000 tons of finished steel.

Belgium's coke output for the first half of 1916, according to a German source, was 408,812 metric tons. The briquette and coal output was 1,077,735 tons and 8,478,732 tons respectively.

NEW RIFLE MACHINERY

Twelve-Spindle Drilling and Reaming Machines at New England Westinghouse Plant

Responding to the pressure for small arms brought about by the warfare in Europe, rifle making in this country is making rapid strides toward larger production. Keeping pace with this larger production is the increase in accuracy and general excellence of the output. One of the aggressive rifle manufacturers in America in this regard is the New England Westinghouse Company, with plants in Chicopee Falls and Springfield, Mass., and Meriden, Conn. Particularly interesting is the East Springfield plant of this company wherein are many new developments in rifle-making machinery.

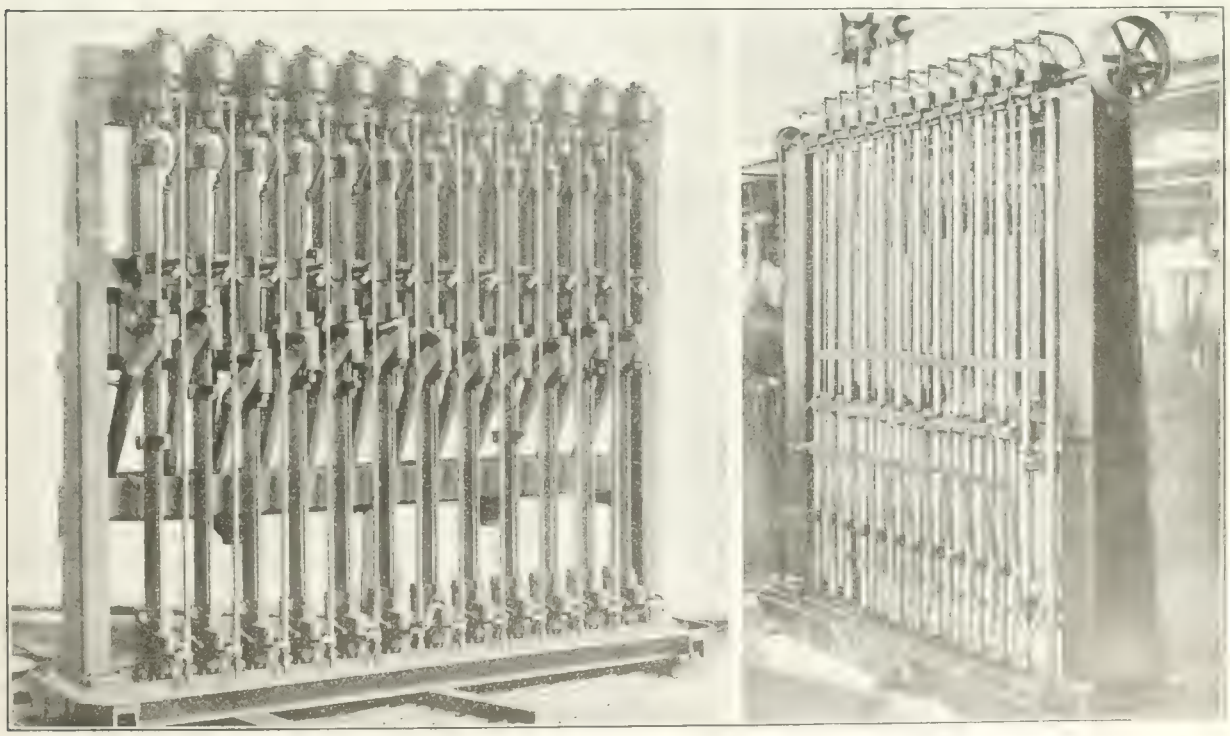
A new type of barrel-drilling machine and a new type of barrel-reaming machine, developed by the company from designs of Walter L. Clark, its general manager, are notable illustrations of the progress which has been made. The standard type of barrel-drilling machine is a horizontal two-spindle machine. The new type of machine holds the barrels in a vertical position and has twelve spindles, each driven by an individual motor. It occupies precisely the same floor space as a two-spindle machine, and is handled by one operator. This one statement makes plain the economies brought about by this new type. Moreover, with an independent drive for each spindle by an adjustable-speed motor, the speed of each spindle can be quickly set to suit the kind of steel which may happen to be in use. If, by reason of a drill sticking or becoming dull, a motor is consuming too much power, the spindle is instantly stopped by the action of an automatic switch set so that the motor stops when loaded beyond a predetermined point.

It has been found in practice that the vertical position of the barrel has marked advantages. With the barrel in a vertical position, the pull of gravity is parallel to the axis of the barrel, making it possible to obtain a true hole and aiding to keep the drill clear of chips.

Most of the details of this machine are made clear in the left portion of the accompanying illustration. The barrels alone are rotated and the drill is fed into the barrel from below. The illustration shows how the lead screw is driven. This feeds the drill chuck upward, also a traveling guide for the drill shank. The oil is supplied from oil mains in ducts in the floor from a central pump at a pressure of 800 lb. to the square inch. It enters the machine at the top, flowing through the piping system shown on the top half of the machine and is conducted by flexible pipes to the cored drill chucks, flowing up through the drill shank and being discharged through a hole at the lip of the drill as in the ordinary practice for this operation. From the barrel it flows down through a chute into the tank shown on the back of the machine. The bulk of the chips are removed directly from the tank and the oil recovered for further use by the usual separating methods.

In the 12-spindle reaming machine are similar advantages. It takes no more floor space than the older type of machine and the compact placing of the spindles makes it readily handled by one operator. In this machine the barrels are swung from a universal joint, producing a floating action which enables the reamer to follow accurately the drilled hole. By the use of counterweights a feed is obtained which automatically adjusts itself to the varying conditions always present in this operation. Thus if the amount of stock to be reamed out is more than normal, the reamer slows up to meet this condition; if it encounters a hard spot in the barrel, it feeds more slowly through this portion. The counterweights can be placed on the cross-head to give a pulling action on the reamer, or the feed can be reversed and the reamer pushed through the barrel.

The vertical position of the machine makes it possible to utilize the advantageous method of feeding the oil through the shank of the reamer. The oil enters at the top of the machine as in the barrel-drilling machine and is led to the reamer shanks through a similar system of pipes. The barrel-



These Two Machines Mark a Departure from the Accepted Practice of Drilling [illegible] Are Held Vertically. The production [illegible] machine [illegible]

drilling machine has also been successfully adapted to the operation of drilling receivers.

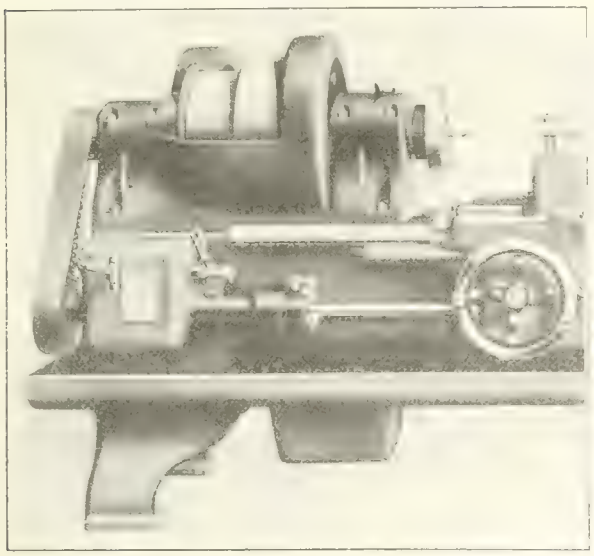
The machines are marketed through the Walter H. Foster Company, 50 Church Street, New York.

Heavy-Duty Manufacturing Lathe

The Himoff Machine Company, 128 Mott Street, New York, has placed a heavy-duty manufacturing lathe on the market. It was designed especially for heavy duty plain, taper and form turning and is the outgrowth of a machine originally designed with the single idea of turning shells rapidly. All of the classes of work usually handled by an ordinary lathe can be machined except thread cutting, which is done by a thread milling machine. The lathe is intended for turning projectiles and forgings where the finished diameter does not exceed 9 in. A chain is used for driving the feeds.

Box-section construction is used and the bed is provided with a number of box-type cross ribs to serve as reinforcement and to resist twisting strains. Two V's are provided, one to guide the head and tail stocks and the other for the carriage, the latter being large. The headstock contains a large diameter, two-step cone pulley designed for a 5-in. belt. The spindle, which is of large diameter, is a steel forging of between 0.50 and 0.60 per cent carbon. It is ground at bearing points and has a 2¼ in. hole extending entirely through it. A chain oiling system is relied upon to lubricate the bearings positively, and as a check on the working of the system sight-feed oilers are provided. A hardened steel washer at the rear bearing takes the thrust and a nut at the rear provides an adjustment to take up wear. The tailstock is of the extension barrel type which, it is pointed out, gives clearance over the carriage bridge for turning short work. The spindle, which is 3½ in. in diameter and has a travel of 6 in., is provided with a No. 5 Morse taper. A plug binder clamps the spindle without, it is emphasized, affecting the alignment. The tailstock is fastened in position by four bolts.

The saddle is driven by a large-diameter splined shaft through a worm gear and a friction cone device forms a part of the drive and is relied upon to eliminate the danger of breakage through accident or negligence. Steel forgings are used for all the apron gears, which are keyed to shafts having both front and rear supports. Oil tubes extending from the front of apron are employed to oil the bearing points. The saddle is wide and has a bearing of 32 in. on the ways. The tool slide, which is 11¾ in. wide, is equipped with the so-called European tool post, thus enabling two or more tools to be held at one setting. The feeds are driven positively by a chain. The use of change gears provides five rates ranging from 0.02 to 0.10 in. per revolution of the spindle. An adjustable collar on the splined shaft is provided and can be set to stop the carriage after each operation. As the apron is moved along the bed and reaches the end of its travel, it strikes this adjustable collar, causing a positive jaw clutch in the gearbox to be disengaged. This clutch automatically engages itself again when the saddle is moved to the left.



The Headstock End of a Heavy-Duty Lathe Equipped with a Chain Drive for the Feeds and Capable of Doing Plain, Taper and Form Turning but Not Thread Cutting

The following table gives the principal dimensions and specifications of the lathe:

Length of bed, ft	8
Height from floor to spindle center, in.	40
Swing over V's, in.	21
Swing over slide, in.	11
Net weight, lb	1,750
Gross shipping weight, lb	2,400
Contents of case, cu. ft.	26

National Founders' Meeting Next Week

A wide variety of topics of vital interest to the business men is scheduled for the annual meeting of the National Founders' Association to be held at the Hotel Astor, Nov. 15 and 16. Half-hour talks are announced as follows for Wednesday afternoon:

"The National Industrial Conference Board," by M. W. Alexander, West Lynn, Mass.

"How Shall Manufacturers Contribute to American Industrial Progress," by E. W. Rice, Jr., president General Electric Company, Schenectady, N. Y.

"The Banker's Relation to Industry," by Frank A. Vanderlip, president National City Bank, New York.

"Proposal for Increasing the Effectiveness of the National Founders' Association," by Ely Griswold, Griswold Mfg. Company, Erie, Pa.

The convention will open at 10:30 a. m. Wednesday morning and, besides the reports of officers, the general counsel of the association, George F. Monaghan, will deliver an address on "Industrial Legislation"; A. F. Corbin, as chairman, will make a report of the association's committee on safety and sanitation, and J. J. Wilson, as committee chairman, will report on "Foundry Methods." Following the morning session and a buffet luncheon, the half-hour talks mentioned for the afternoon will take place.

On Wednesday evening will occur the annual dinner and the speakers for the banquet, at which President William H. Barr will preside, are Frederick P. Fish, Boston, who is to speak on "Industrial Co-operation," and James A. Emery, Washington, D. C., whose address is "The Story of San Francisco."

The Thursday morning session, called for 10 a. m., is to devote itself to an address on "Pittsburgh Strike Situation," by Edward Kneeland, United Engineering & Foundry Company; "The Responsibility of the Individual Employee," by Edward K. Nicholson, counsel, Bridgeport Manufacturers' Association, and "Joint Conference Board on Apprentices," by W. H. Van Dervoort, president National Metal Trades Association. The remainder of the session will be given up to reports of committees and the election of officers.

Pittsburgh Office for Steel Exports

The American Steel Export Company, Woolworth Building, New York, has opened a Pittsburgh office under the direction of Charles E. McKillips, Jr., in the Farmers' Bank Building. In view of the volume of its transactions with Pittsburgh district mills, the company has decided to establish this service bureau to facilitate the handling of its orders. All purchases will be made as heretofore through the main office in New York.

Aluminum exports from Switzerland to Germany in 1915, according to Swiss reports, were 12,000 to 14,000 tons. Before the war Germany obtained aluminum from Switzerland, France and Canada. The Aluminum Industrie A. G. is now the largest source of the German aluminum supply, with the largest plant at Chippis, in Valais, at the junction of the Rhone and the Navizance.

Determining Carbon in Steel by Combustion

Ten Analyses Each Hour in the Laboratory of a Large Automobile Company—Details of the Arrangements and the Results

BY JACOB W. BARBEY

THE working conditions in the chemical laboratory of one of the largest automobile companies required a large number of carbon determinations and the development of a very rapid and accurate method. The work had to be done by a single operator. It is possible to obtain accurate results, under the conditions outlined, at a speed of 10 determinations per hour. In the following, a brief outline of the chemical operation and a more detailed account of the mechanical features is given.

The well-known rapid method of direct combustion of the steel and the absorption of carbon dioxide in potash was chosen. The carbon train consists of an oxygen tank, purifier, furnace, purifier and a potash bulb. The first purifying train is made up of, in order, a Johnson bulb filled with liquid potash, a mercury gage connected by a T tube, and third, a tower filled with calcium chloride. The furnace is an ordinary Hoskins tube furnace with a 30-in. quartz tube. Provision is made for advancing the tube as it becomes clogged with oxide. Following the tube is a U tube containing in order granulated zinc, calcium chloride and phosphorus pentoxide introduced and separated by glass wool. The use of the chloride tends to lengthen the life of the phosphoric acid and save refilling. The bulb used is an enlarged form of Geissler bulb, made to order. The bulb contains potash, Sp. Gr. 1.27. The first half of the drying tube contains broken stick KOH and the second half P_2O_5, introduced in small quantities by the use of glass wool.

The capacity of this bulb is 100 to 150 determinations and a weight increase of four to five grams. The bulb is connected and the oxygen passed at the rate of 340 c.c. per minute, indicated by gas meter at the end of the train, and the position of the mercury noted. At the end of five minutes the bulb is disconnected and weighed against another bulb similarly filled (a discarded one). The apparatus is then ready for use. During a series of combustions the oxygen is never turned off, saving the loss in time and annoyance of readjustment. A half-factor weigh, 1.3636 gram of sample, is used, laid on alundum contained in a platinum boat.

A table of operations and a thorough time study of all the individual units revealed a great loss of time and expenditure of effort in carrying the bulb to and from the balance and the samples to the boats. This was then absolutely eliminated by moving the balances close to the train, or vice-versa. A tube was led from the last dryer to the balance and directly to the bulb on the pan through the side door. Aside from the time and energy saved, the bulb temperature and surface moisture condition is never changed, is absolutely parallel by the counter balance and can be weighed absolutely accurately at once.

The following table of operations gives the average time required for each unit and the routine work to be done by the operator as ascertained by a test run on four different classes of steels.

Table of Operations and Average Time Required for Each Unit in Combustion Process

No.	Name	Time Sec.	Time Min.	Total Min.	Total Sec.	Routine
1	Connecting bulb..	17		0	17	
2	Weighing and inserting boat	45		0	45	
3	Time to ignite...	0		1	34	Lighting taper, put boat for next determination in
4	Ignition ..	0		2	33	Finishing last determination, and computing weights for this one
5	Sweeping out CO_2.	120		4	33	Weighing out two samples (7" x 10") Record No's
6	Disconnecting bulb	12		4	45	Determine the position of rider as closely as possible by sensitivity of balance before taking a full swing to verify
7	Weighing	61		5	46	

From this table and the illustration the exact conditions can be realized. The fastest determination has been made in 5 minutes and 7 seconds. An average rate is 10 combustions per hour. The output on one single 8-hr. day was 70 combustions in a running time of 7 hours and 9 minutes, the rest of the time being used for bulb filling and other work. Inasmuch as there are two three-minute rest periods every alternate two determinations, the operator has a total rest of 25 per cent and should not be overly fatigued. Routine checks average under one point with a maximum of one and one-half points of carbon, a control of 0.746 per cent on a 0.745 per cent Textor standard being not unusual

Further study of the table may show where changes and improvements consistent with all other factors are possible.



General Arrangement of the Apparatus in the Laboratory of the Packard Motor Car Company for Rapid Combustion of Carbon in Steel

The plant of the Pacific Steel Products, Ltd., Bridgeport, British Columbia, which was destroyed by [illegible] some time ago, has been rebuilt and placed in o[illegible]ation. Improvements and extensions are under way. The company is installing an open-hearth furnace and machinery to manufacture railroad and boat spikes, bolts, nuts, etc.

*Chemist, Packard Motor Car Company, Detroit, Mich.



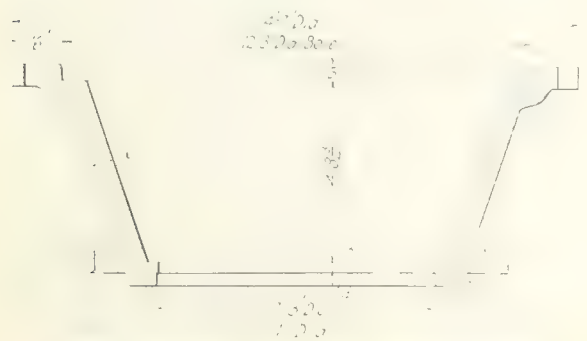
MOLDING CRUSHER CASTINGS

Some Large Sweep Molds at Hooven, Owens, Rentschler Works

The castings for one of the largest stone crushers ever built were recently completed by the Hooven, Owens, Rentschler Company, Hamilton, Ohio, for the Michigan Stone Company. Each of the three castings involved in the order weighed approximately 48 tons. Two of the castings were the top and bottom halves of the shell, while the third was for the spider of the crusher. The largest of the three castings had a maximum diameter of 17 ft. 6 in., and a height of 4 ft. 9 in. The molds for all three were swept up in loam, and while they presented no unusual complications from the foundry standpoint, their large size renders the methods used in molding of considerable interest.

Ordinarily castings of the character of these would be bedded in the floor. In the present case, however, a steel plate curbing was erected and the molds were built up on the floor. The spider casting requires but slight consideration, it being but a variation of ordinary flywheel molding. The arms were formed by means of cores and the rim was swept up in the usual way. The shell castings were more difficult.

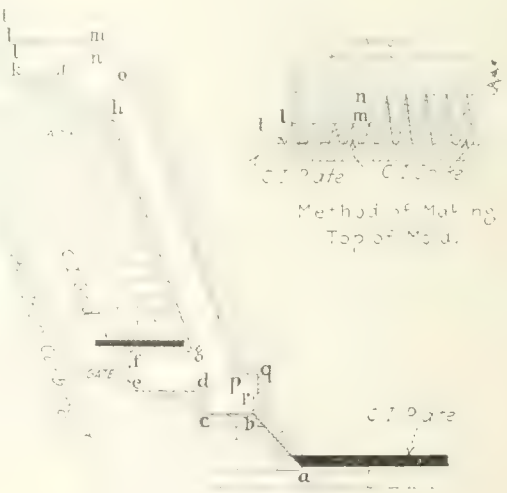
The reproduction of the photograph and one of the drawings show the form and dimensions of one of the shell castings, and the sketch has been made to illustrate the method of molding. The base of the mold was first swept up, the sweep being constructed so as to form the surface *a b c d e f*. Upon this base the core was then built. A cast-iron plate was set in position as shown, and a sweep, the inner edge of which conformed to the surface *o p q r b* was used to form the exterior surface of the core. This surface comprised a thin facing of loam backed up by 8 in. of brick as shown, and supported on a cast-iron plate. Upon completion the core was removed, parting from the base on the line *a b*, and the mold proper was then swept.



The Dimensions of One of the Large Castings

The first sweep for making the base formed also the edge *c b* and also the surface of the flange *e d*. Another sweep was used to form the flange *b e f g*, while the remainder of the mold was formed by a sweep conforming to the outline *t l k j h g*. A cast-iron grid was set immediately above the loam facing forming the surface *f g* prior to making the upper portion of the mold. Four gates were used in the mold, the location of two of them being about as shown in the sketch. The remaining two were placed diametrically opposite. All four gates entered the mold tangentially, the iron flowing in the same direction through each gate, thus insuring a smooth entry and rapid filling of the mold.

The mold was closed by a cover plate built up, as shown in the insert sketch. The reference letters on this sketch correspond to the similar reference letters on the section of the mold in the main part of the illustration. The cast-iron plate, bearing on its face spikes of varying lengths as shown in the illustration, formed the basis of the cover plate. The spikes above the surface *l m* of the casting were made slightly shorter than the distance *t l* on the mold, while those above the surface *n o* were made somewhat longer. A sweep of the form *l m n* was then used and the space between the spikes filled with loam. But a single riser was used on each of the castings, this being located on the upper flange *l m*. Both the mold and the core were dried by placing in them an ordinary salamander.

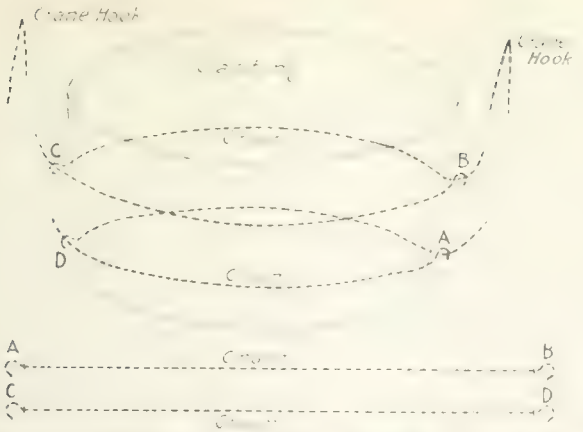


How the Parts of the Mold Were Made

The holes in the several flanges of the castings were cored. It was required that these holes be located with a considerable degree of accuracy, as the holes in the several castings were required to match when the crusher was assembled. The holes at the extremities of the two diameters at right angles to each other of each flange were located by means of a template and the remaining holes between these four were then spaced by means of a jig. The brackets underneath the flanges were formed by setting wooden blocks in position between the holes when the mold was being built. After the mold was dried, these blocks were dug out, leaving a cavity of the proper shape and size in the mold.

A hard, close grain iron was used in pouring. The analysis is given as follows: Silicon, 0.80 per cent; phosphorus, 0.55 per cent; manganese, 0.75 per cent; and total carbon, 3.30.

The iron was drawn from two cupolas and run into a mixing runner above the mold. When this runner



Two Chains With Hooks at Each End Were Used in the Manner Indicated to Lift the Castings

was filled, the stoppers to the several gates in the mold were lifted, allowing the iron to enter the mold from the runner.

Due to the large size and sharp taper of the castings, they were somewhat difficult to handle. The problem was finally solved by the use of two cranes which lifted the castings by means of a "basket hitch." The basket hitch is somewhat unusual. It is formed by means of two chain slings with hooks at each end. These slings are roped around the casting as indicated in one of the sketches.

Shop Pump Testing Plant

To test its turbine pumping machinery for efficiency as well as capacity, the Lea-Courtenay Company, Newark, N. J., has added to its factory equipment a testing rig capable of giving searching information of the performance of its productions beyond that sufficing for ordinary commercial requirements. The pump to be tested is driven by means of a steam turbine with a dynamometer between the source of power and the driven pump, and a Pitot tube, weir, Venturi meter, standardized nozzle or other device may be used to measure the quantity and head of the water pumped. The dynamometer gives a measure of the power input to the pump and the delivery pressure and quantity of water moved gives a measure of output. Thus the capacity of the pump is determined and also the efficiency.

The steam turbine driving the pump is a 500-hp. non-condensing unit built especially for this plant. Its speed can be regulated and held constant at speeds of 800 to 3000 r.p.m. Steam is furnished by a 500-hp. torpedo-type boiler separate from the power plant of the shops and designed for a steam pressure of 250 lb. per sq. in. Oil is used for fuel, and it is understood, incidentally, that a working pressure of steam may be obtained from cold water in less than 30 min. The dynamometer is of the torsion type and measures the power transmitted by the amount of torsion of a square shaft.

The testing equipment is built over a concrete tank holding approximately 50,000 gal. of water. For measuring the water quantity, the Lea-Courtenay Company ordinarily uses a Pitot tube in connection with a 10-ft. mercury column. On small quantities of water tests are made by means of calibrated nozzles. These devices are checked as necessary by means of a Venturi meter or a weir.

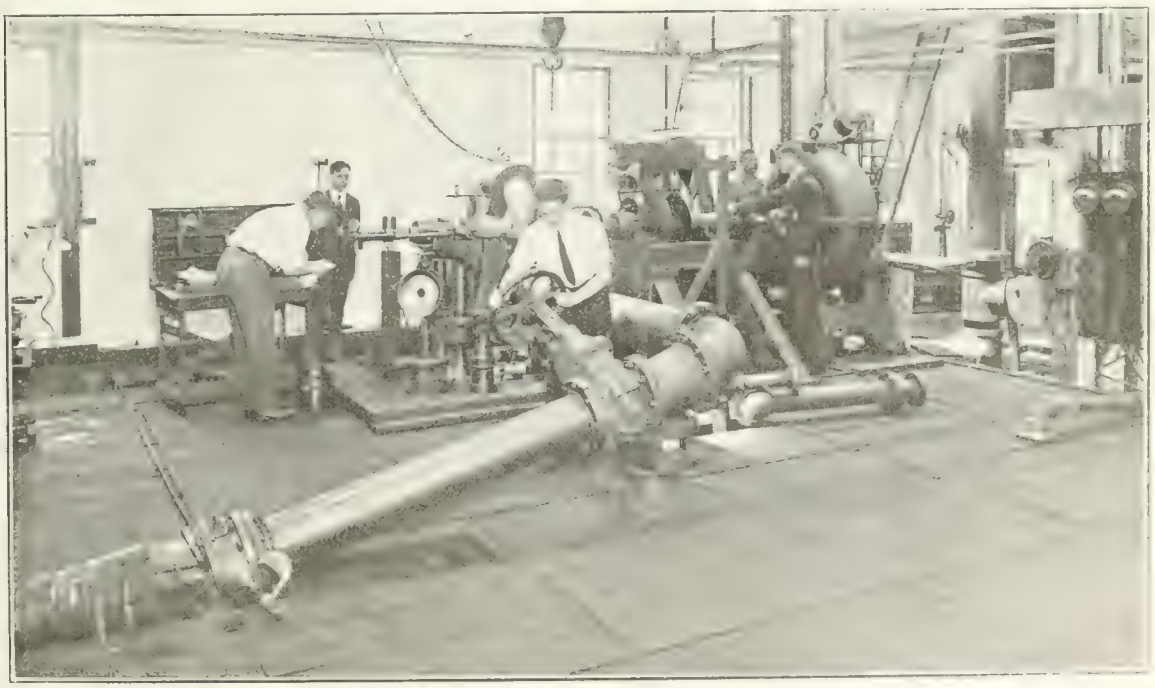
The company has also perfected an instrument known as a thrust meter, an instrument designed to tell how much and in what direction the end thrust of the pump may be. A scale gives the actual thrust in pounds, read directly from the instrument.

Large Hydraulic Press Order

The Hydraulic Press Mfg. Company, Mount Gilead, Ohio, has received an order for 70 hydraulic hot-plate presses of 115 ton rating. The order was placed by the Goodyear Tire & Rubber Company, Akron, Ohio. The presses, the first of which will be delivered at an early date, will be used for vulcanizing purposes. All of the presses are of one design and will be operated from the hydraulic pump and accumulator systems already installed.

The Monitor Controller Company, Baltimore, originator of a system of automatic control for motor-driven machinery, has moved to 500-516 East Lombard Street. The new factory is about twice the size of that formerly occupied, and extends on East Lombard Street from South Gay to Frederick. The lease on the old quarters has still some time to run, but it is necessary to provide increased facilities.

The Barnes & Kobert Mfg. Company, manufacturer of pressed-steel constructon specialties, has changed its name to the B. & K. Mfg. Company. The executive and general offices are now located at the factory at New Britain, Conn.



Plant for Testing Pumps at Works of Lea-Courtenay Company, Newark, N. J.

Deterioration of Refractory Materials*

Conditions Affecting Silica and Fire Brick in Open-Hearth Furnaces—Value of the Microscope in Fixing Quality — Bauxite and Other Brick

BY H. B. CRONSHAW

DURING the last ten years, and especially during the second half of this period, users of the best procurable firebricks have frequently directed attention to the inefficiency of the material. This is evidently an outcome of the rapid advances made in metallurgical operations, both as regards output, which means increase in the severity of working conditions, and because of the efforts which are continually being made to economize. Hence refractory materials have been called upon to cope with more and more exacting requirements, and at the same time it has become clearer to metallurgists that efforts ought to be made to decrease the great expense incurred in the installation and upkeep of furnace linings.

Both in America and Great Britain, it has been customary to regard the brick manufacturer as being entirely responsible for this state of affairs. Very probably this is actually true in a great number of cases where the brick manufacturer has failed to keep pace with metallurgical advances and properly to understand the requirements of the consumer. On the other hand, the latter has not, in many cases, been in a position definitely to state these requirements.

The first step toward supplying any particular furnace with a lining, etc., is to ascertain the chief destructive agents at work in every part of it. If these are known, the consumer will understand exactly what kinds of bricks are most suitable for the various parts of his furnaces. It then rests with the brick manufacturer to produce the required material.

It is now generally recognized that such factors as infusibility and chemical composition are not to be taken as the sole indications of the degree of refractoriness of a material, using the term in its broader sense, as indicating the ability to resist all forms of destruction, and not fusion alone. The old idea that a high content of silica was necessarily associated with high refractoriness is also practically dispelled, and it has come to be more clearly recognized that the refractoriness of a given material is not a function of one property alone, but depends on a number of factors which vary in relative importance according to the working conditions which prevail in the place it is used. Chemical analyses are, of course, very important, for, besides indicating the extent to which the material will resist destruction of a chemical nature, they supplement observations under the microscope.

THE USE OF THE MICROSCOPE

Attention should be called to the possibilities underlying the use of the petrological microscope as an important accessory in determining whether a clay or quartz-rock is suitable for firebricks, and also for observing the changes which occur in a firebrick on burning. The chemical and physical properties of a clay, or any raw material used in brick-making, are determined by its mineralogical composition and texture; and if the latter could be conveniently and accurately estimated, they would no doubt constitute the most scientific basis for a classification. The various processes by which the mineralogical constitution of a clay is ascertained are particularly complex and tedious. On the other hand, practically the same results could be obtained by making use of a high-power microscope.

It would, of course, be impossible to adopt the ordinary methods of cutting thin sections in the case of clays in their plastic condition, but if they were burnt hard and soaked in Canada balsam, there ought to be no particular difficulty in obtaining sections thin enough for examination. Possibly similar results would be obtained without burning, supposing the material to be warmed with the balsam and then carefully ground. It must be remembered, however, that some of the constituents of clays are in such a very fine state of subdivision that their detection is a matter of extreme difficulty, while in many cases it becomes almost impossible to effect a determination with any degree of confidence. On the other hand, quartzites, sandstones, grits, and other rocks which are used in brick manufacture can easily be cut into thin sections, and conveniently examined under the microscope. In this way a very good idea can be obtained of the amount of free quartz in the material, whether the grains are rounded, angular, or sub-angular, and how they are distributed in the material. Observations of this kind have a direct bearing on the technical value of brick-making materials.

In judging a particular clay as regards its suitability for firebricks, determination of the softening point is a matter of first importance. In this way Mellor has classified clays and shales, first of all, into two main groups—refractory clays which soften above 1500 deg., and non-refractory clays softening below this temperature. The determination of softening point is made under certain fixed conditions which take into account the rate at which the temperature rises.

A further use for the microscope is found in its appilcation to the examination of firebricks, by both manufacturer and consumer. As in the case of the raw materials, the mineralogical composition can be qualitatively, and to some extent quantitatively determined, especially if supplemented by chemical analyses. Apart from this, it is also possible to see how much internal fusion has taken place in burning, and hence be in a position to form an opinion as to whether the bricks have received adequate treatment in this respect.

OPEN-HEARTH FURNACES

With regard to a single furnace, the refractory materials are required to perform special functions which depend on their particular position in the furnace, and furthermore, they are subjected to various destructive agents of both a physical and chemical nature. It is these conditions which determine the various qualities and kinds of firebricks used in building up the body, blocks, and regenerators of any particular open-hearth furnace. Speaking in a general way, the arrangement of the refractory materials is very similar for all these furnaces.

In the case of furnaces working on the acid process, the roof, sides, and blocks are constructed of silica bricks, while the hearth is made up of a number of layers of fritted sand, resting on a stepped arrangement of silica bricks which constitutes the bottom of the furnace. The sand is banked up to the level of the doors. An inferior type of brick is often used for part of the blocks. The roof of an actual example was 9 in. in thickness, the sides 18 in., while the bottom consisted of 6 in. of silica bricks and 15 in. of fritted sand.

Furnaces of this type, without slag-pockets, usually run about 16 weeks, or 144 heats, before being stopped for serious repairs or partial rebuilding, which may consist in the erection of a new roof and sides. If, however, slag-pockets are attached, which is always the case in modern furnaces, the length of life is increased to 22 weeks, or about 198 heats. In more favorable instances, however, the roof may last double this time if skilfully repaired. The bottom lasts several years before it re-

*From a paper which was granted a Carnegie Scholarship memoir by the Iron and Steel Institute in May, 1916.

quires rebuilding. Apparently better results are obtained in America, for, according to Stoughton, an acid furnace will survive as many as 1000 heats.

In basic furnaces in the course of about 15 weeks the roof, which was originally 12 in. in thickness, is worn down to about 4 in. The bottoms are said to have a lifetime of from 7 to 9 years. On the authority of F. T. Havard, it would be considered very satisfactory in American practice if a furnace survived 350 heats, corresponding to from 18 to 24 weeks.

Several methods have been used for detailed construction of the hearth. At one time the hearth was built up entirely of basic bricks. This, however, was not a success. Another method consisted in first ramming the bottom with crushed dolomite and tar, and then drying the whole gradually prior to subjecting it to higher temperatures. In this case also the results were not satisfactory. The best results are obtained when the basic material is fitted on in layers in a way similar to that employed in acid furnaces. The bottom itself may consist of silica and magnesia bricks. The latter give the best results, but are more expensive. According to Harbord, the hearths in some of the American furnaces are built up first with a course of firebricks, followed by magnesia bricks, and then the usual layers of fritted basic material.

BRICKS FOR THE BLOCKS

The arrangement of bricks in the blocks and regenerators is very much the same for both acid and basic furnaces. Various forms of blocks appear to have been tried, but the present tendency seems to be toward a reduction in size. Very often somewhat inferior bricks are used for certain parts, but it is questionable whether any advantage is gained by doing so. On the other hand, in the case of modern Talbot furnaces the more expensive magnesia bricks are built into the gas ports. As regards the regenerators, ganister bricks appear to find general use for the checkerwork. The lifetime usually assigned to regeneartors attached to large Talbot furnaces is about 18 months for the gas chambers, and 12 months in the case of the air chambers. At the end of this time the checkerwork has to be rebuilt.

The destructive effects are to be traced to a variety of agencies, which assist one another in their work. This can easily be realized by examining the interior of an abandoned furnace. The surface of the roof has been worn away in an irregular manner, leaving hollows and grooves. The sides and walls are glazed, and the bricks are darkened. The latter have apparently undergone considerable changes in texture, and to some extent in composition. Furthermore, portions of the refractory lining have cracked, or even broken away.

BODY OF THE FURNACE

Abrasion.—Examination of the interior of the body of a furnace after 14 to 18 weeks, shows that erosion of the roof has taken place, not uniformly over the whole surface, but irregularly, so as to leave furrows, hollows, and crevices. The most pronounced effects occur in the central portions, usually including an area about 6 ft. square situated above the middle door. At either end well-marked furrows spread out fanlike from the air port. Another example of localized destruction is to be found in the peculiar form assumed by the roof of an open-hearth furnace, having its two air ports situated at the upper corners. Here denudation proceeds most rapidly along either side of the roof, so as to form two long hollows separated by a broad ridge. These peculiarities can be best ascribed to the abrasive action of fine dust swept through the furnace by the producer-gas. A continuous bombardment of the roof by innumerable particles of flue-dust must constitute an effective means of destruction.

Volume Changes.—When a body of firebrick is subjected to temperature variations, it generally undergoes a corresponding change in volume. These temperature fluctuations arise from a number of causes—when the lining receives its first heat, or when the gas is cut off for the usual week-end repairs. Rapid changes in temperature of a local character also occur when the doors are opened, and cold material charged into the furnace. There are numerous cases where neglect to apply precautions has resulted in the rapid collapse of the lining.

The second result of temperature variation are strains and differential movements within the bricks themselves. Fragments of bricks may drop from the roof and sides, and cracks may be produced, offering access to fluxing agents, such as vapors, fine particles of dust, and molten slag, or, in the case of the hearth, of molten metal, which exerts a very effective disruptive force.

Heat and Fluxes.—These act conjointly; the independent efforts of either would, relatively speaking, produce slight results. Most furnaces are equipped with linings made from materials which soften at temperatures higher than those under working conditions, that is, providing the material is not directly exposed to the full play of the flame. How important the latter consideration may become is shown by the rapid erosion of roofs in the earlier forms of open-hearth furnace. They were built with a depression in the middle, and thus came under the direct influence of the flame.

TEMPERATURES INSIDE OPEN-HEARTH FURNACES

There appears to be no really reliable information concerning the temperatures in different parts of the furnace. Le Chatelier estimates the temperature of gas entering the body from the regenerators as 1200 deg. C., and the air as 1000 deg. C. As a result of a large number of observations made on the gas passing from the regenerators into the body of a 150-ton Talbot furnace, the temperature may be regarded as varying between 1000 and 1200 deg. C. The temperature of the flame must therefore rise considerably above this, and hence the importance of preventing the flames from impinging on the brickwork. It would be interesting to make direct measurements of the temperatures attained by the inner surface of roof and walls, particularly the roof. Experienced chemists estimate it as being something like 1500 deg. C. If so, this is rather dangerously near the softening point of silica bricks. Kanolt gives 1700 to 1750 deg. C. as the softening point of silica bricks, the determination having been made on three samples. A magnesia brick, on the other hand, is recorded as softening at 2165 deg. C.

Simple examination of bricks taken from the roofs of abandoned furnaces is not sufficient to determine whether the temperature alone was high enough to fuse the exposed faces, because the effects are completely masked by the interference of fluxes. They do not soften to any appreciable extent, as they preserve their form in spite of considerable pressure. Microscopic examination, however, makes it clear that the surface of the roof is exposed to temperatures well under the melting point of quartz. Certain changes do take place which are the outcome of protracted exposure to high temperature alone.

Fig. 1 is a photograph of a high class silica brick taken from the central portion of the roof of a 150-ton Talbot furnace after a period of 18 weeks. Its original length was 12 in., which has been reduced in reproduction. For convenience of description, it has been divided into four portions—A, B, C and D. The portion A is next to the exposed surface of the brick, and consists of a light grey band about 1 in. wide. The outer surface is fused, but the thickness of slag is very small, and sharply marked off from the interior. Next to this comes the portion B, about 2 in. wide, which is similar in texture to A, but differs remarkably in color, being practically black, relieved by a few pieces of white grog. This grades more or less sharply into the section C, which is dark olive green and crowded with angular pieces of grog. Lastly, there is a narrow strip of comparatively unaltered material. Sections taken from these various parts and examined under the microscope revealed a series of very interesting changes.

[illegible]—It is important that the bricks in every part of the lining be set close together, with the object of making the joints as narrow as possible. In certain places this is not possible, because room for expansion of the masonry must be allowed for. The joints

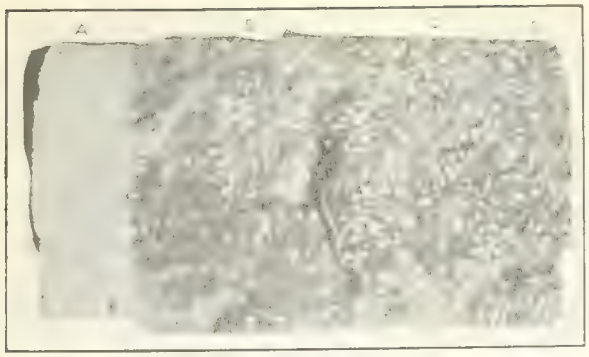


Fig. 1.—Silica Brick Taken from the Central Part of the Roof of a 150-Ton Talbot Furnace After 18 Weeks. It has Been Reduced Here About One-Half

will form lines of greatest weakness, so that the narrower they are the better. The roof of an abandoned furnace clearly shows this. In the walls, and in many places in the roof, shallow fissures mark the joints, and the surfaces have a kind of embossed appearance. Actual observation shows that far too much mortar is used. To a large extent this is due not so much to defective workmanship, as to the fact that even the best bricks show remarkable variations in size and form.

THE PORT-BLOCKS

The brickwork in the port-blocks suffers under influences which are similar to those obtaining in the body of the furnace, though somewhat modified. Denudation is particularly intense at the ports, and is by no means eliminated by use of water-cooled tubes. In other parts the temperature is not so high, probably in the neighborhood of 1100 deg. C.; although, on the other hand, the action of the dust must be rendered more intense on account of its being confined in less space. In any case, the surface of the bricks is fluxed, as can easily be seen by looking into the flues soon after the gas is cut off and the blocks drawn back.

Fig. 2 shows a portion of a brick taken from the air flue of a large Talbot furnace. A section taken at the fused surface showed, when examined under the microscope, well-formed crystals of secondary quartz embedded in a yellowish glass. The pieces of grog had been converted into an isotropic glass, which was somewhat clouded owing to the presence of fine inclusions. Another section, taken from a silica brick which had been built into the block of a basic open-hearth furnace, showed the same general features, with the exception that the glass in the groundmass was crowded with skeleton crystals of magnetite.

THE REGENERATORS

The chief troubles in the regenerators are undoubtedly due to the slagging effects of dust. The results of this are particularly serious. Undesirable effects begin to appear very soon after the checkers have been built up. For instance, the regenerators attached to a 150-ton Talbot furnace had to be opened for inspection and general cleaning only 14½ weeks after the checkerwork had been erected. On this occasion the upper surfaces of the bricks were thickly covered with a chocolate-brown dust, which had fused at its contact with the bricks. This gave rise to a dark-colored, viscous slag, which had run over the sides of the bricks, and collected into stalactites on their under surfaces. Thus when the regenerators are in use this slag must drip through the checkerwork from brick to brick.

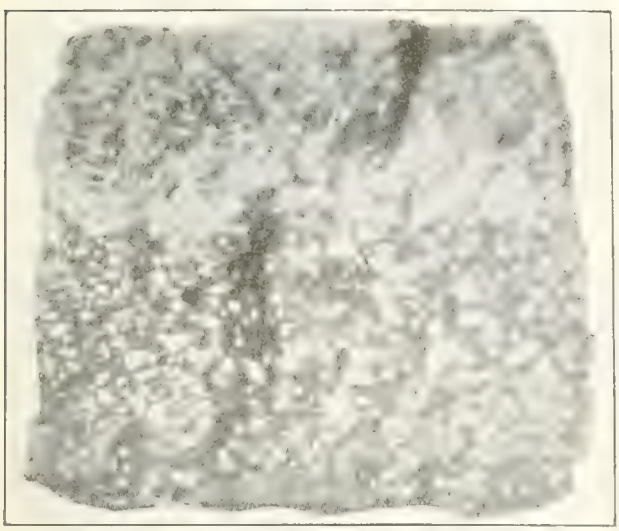


Fig. 2.—Portion of a Brick Taken from the Air Flue of a Large Talbot Furnace

Generally speaking, the bricks themselves had retained their form, and were not noticeably reduced in size. A certain number were fractured, and had to be removed, but the majority seemed to be fairly sound. In the air-chambers there appeared to be more slag, and the evidences of destruction were more noticeable. The internal structure of the bricks had not undergone any marked change. The central portions were yellowish while the outer portions were bleached, and to some extent fused, but textural changes had not progressed very far into the interior. Within the gas-chamber the same general features obtained.

In the case of a set of regenerators of a small basic open-hearth furnace provided with slag-pockets, the fluxing process had proceeded to a very advanced stage. The bricks in the air-chamber had been in use for about a year, while in the gas-chamber they had run for a period of two years. Most of them were very considerably reduced in size. The upper surfaces were somewhat depressed in the middle, with numerous holes reaching into the interior. In many instances the whole of the bricks had been reduced to a partly fused and stone-like condition. Thus, unlike the case of the roof bricks, the slag which collects in the hollowed surfaces of these checker bricks gradually works its way into their interior.

The gas-chambers in a large steelworks where Talbot furnaces were being used were allowed to run for 18 months, and the air-chambers for 12 months, before being completely rebuilt. In another instance, where basic open-hearth furnaces were in use, the gas and air chambers survived 24 and 12 months respectively, while for a particular set of acid open-hearth furnaces both pairs of chambers were only allowed to run for 40 weeks. In all these examples slag-pockets were provided, and ganister bricks were used in the checkers.

The following set of analyses throws additional light on the details involved in the process:

	A.	B.	C.	D.	E.
	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent
SiO_2	59.80	86.34	83.62	12.70	30.5
Al_2O_3	5.50	7.98	10.97	60.70	15.8
FeO	20.57				28.2
CaO	11.90	2.68	4.73	26.30	4.1
MgO		Trace	Trace	2.19	0.6
Ignition loss..		0.16	0.16		10.2
					K_2O 1.9
					Na_2O 1.2
					SO_3 5.8
					TiO_2 1.1

A. Partial analysis of slag taken from the slag-pocket of the furnace mentioned under B and C.

B. Partial analysis of the interior of a checker brick taken, after two years' use, from the gas-chamber of a small basic Siemens furnace.

C. Analysis of the surface portions of the same brick.

D. Analysis of checker dust taken after 14½ weeks from the gas-chamber of a large Talbot furnace.

E. Analysis of producer fuel ash given by Dr. Mellor.

A consideration of analysis D makes it clear that the dust which collects among the checkerwork is very rich in ferric oxide and lime, and also contains a surprisingly large amount of magnesia. Comparing this with the analysis given by Dr. Mellor, it becomes evident that a large portion of the oxide of iron, and practically all the lime, must come from the materials charged into the furnace. The small amount of magnesia may be assumed to have its origin in the mag-

nesia limestone, or dolomite, which is thrown into the furnaces while repairs to the hearth are being carried out. Magnesia, whatever its origin, materially assists the fluxing action of the iron and lime.

The slag (analysis A) is remarkable for its relatively high content of silica. From this and other considerations it seems reasonable to infer that it represents drops of slag from the roof, particles of slag which are shot up during the periods of violent ebullition which occasionally occur in the slag bath, small pieces of brick which fall from the roof, and the products of fluxing which goes on in the flue and slag-chamber itself. Further, it is very probable that the slag-pocket serves to retain only a very small fraction of the dust.

GENERAL CONCLUSIONS

Taking the body first, and, in particular, the most vulnerable part of it, the roof, practically all the erosion which occurs can be attributed to the effects of abrasion, volume changes, and the conjoint influence of heat and fluxes. Assuming that the flame is not allowed to impinge directly on the roof, and that the masonry has been well carried out with bricks of uniform size, there seems no reason to doubt that the combined action of heat and fluxes takes by far the greatest share in the process of wear and tear, which is therefore, for the most part, of a chemical nature.

The principal source of trouble is the dust, which is derived partly from the producers, and partly from the charges. It consists chiefly of oxide or iron and lime, and consequently the roof, being built up of quartzose material, is readily attacked, and is eaten away far more rapidly than the basic walls. As pointed out above, the degree of porosity does not influence the rate at which fluxing proceeds as much as it would otherwise do, supposing the slag were allowed to accumulate on the surface of the bricks. As soon as the slag has reached a condition of suitable fluidity, the strong draught through the furnace sweeps it away, and at the same time exposes fresh surfaces for attack by the constantly replenished supplies of fluxing material.

The influence of volume changes probably comes next in relative importance. Large cracks and general disintegration of the lining can, to some extent, be obviated by proper attention to the tie-rods, as well as a careful regulation of the rate at which the furnace is heated or cooled, particularly for the first heat. The small cracks which develop within the bricks themselves prove, in most cases, a source of considerable danger by accelerating the fluxing processes. The trouble is, ever, not so serious in the case of the roof, as the slag cannot collect in sufficient quantity to penetrate the cracks. Indeed, the exposed surfaces are remarkable for their smoothness, and freedom from holes and crevices.

The extent to which abrasive action contributes toward the general destruction is difficult to estimate, but when considered along with the more obvious influence of heat and fluxes, its importance is not very great. This is made additionally clear by the fact that erosion proceeds most rapidly in the central portions of the roof where the influence of abrasion is least felt.

The natural way out of these difficulties is therefore to be found either in suppressing the dust or using a chemically inactive material for the roof, which would, in this case, have to be basic in character. The bricks should have as small a porosity as possible without increasing their susceptibility to temperature changes. This also applies to the upper part of the side walls, and to both acid and basic furnaces.

The important part played by the fluxing action of dust has been pointed out in the discussion on regenerators. Here the trouble is chiefly chemical. Abrasive action can come into play in only a very limited sense; while, on the other hand, the degree of porosity of the checker bricks, and their ability to withstand changes of temperature, become important.

In considering the possible ways which might be adopted to insure even a partial elimination of these effects, several methods suggest themselves, all of which must involve considerable practical difficulties, which, however, do not appear altogether impossible of solution. For example, some means of suppressing the dust might be devised. Even partial success in this direction would produce very satisfactory results. The first step has been taken by making use of slag-pockets, although these can only be regarded as retaining a very small fraction of the dust which comes through the furnace. It seems quite possible that some method could be found either for preventing a large portion of the dust from entering the regenerators, or for removing the dust as it settles on the bricks. Another possible way out of the difficulty consists in replacing the acid bricks of the checkerwork by basic ones. Magnesia bricks are expensive, and in many cases are liable to shrink a great deal.

BAUXITE AND OTHER BRICK

There are a number of other basic materials, having an advantage as to expense, which might furnish very suitable bricks at the cost of a certain amount of research. Bauxite, serpentine, steatite, lime, dolomite, and magnesian limestone may be instanced. Bauxite bricks have proved rather troublesome because of their tendency to shrink, but there is no reason why this weakness should not be overcome by burning at a sufficiently high temperature, and by suitably arranging the texture and composition. The chief difficulty in the case of lime lies in the rapidity with which it absorbs moisture. On the other hand, lime which has been fused in, for instance, an electric furnace, is said to resist water very well. Dolomite and magnesian limestone would seem to be exceptionally good materials to experiment with. Magnesia bricks appear to have proved quite a success for the walls and bottom. They are, however, somewhat expensive, and very often shrink a great deal, with the result that the joints are widened and portions of the brick break away.

Another suggestion involves the use of ganister, or good firebricks of minimum porosity, combined with a maximum resistibility against temperature fluctuations. But so long as the bricks are of an acid nature, fluxing will still go on, however dense and free from cracks they are. Furthermore, there will still be difficulties to overcome, which arise out of the dust accumulating in the checkerwork.

Exports of Zinc Exceed Records

Zinc exports from the United States, while not quite as large as they were for a few months late in 1914 and early in 1915, are still of extraordinary proportions and exceed previous records. Based on the monthly rate of 12,182 gross tons to Sept. 1, 1916, the outgo of zinc as pigs, bars, plates and sheets is at the rate of 146,184 gross tons per year. The following table compiled from Government data shows comparative exports:

Period	Total, Gross Tons	Per Month, Gross Tons
To Sept. 1, 1916 (eight months)	[illegible]	12,182
Fiscal year ended June 30, 1916	124,564	10,380
Fiscal year ended June 30, 1915	115,482	9,623
Fiscal year ended June 30, 1914	[illegible]	[illegible]
Calendar year, 1915	111,788	9,315
Calendar year, 1914	[illegible]	4,825
Calendar year, 1913	[illegible]	[illegible]

The exports in July and August, 1916, were 15,371 and 14,439 tons respectively, and if maintained at this rate the total will be 178,860 tons for one year. The exports in 1916 have varied between 7808 tons in March and 15,371 tons in July. The largest war month was 17,005 tons in September, 1914, with 16,354 tons in December of the same year.

The merchant mill of the Pittsburgh Crucible Steel Company, Midland, Pa., broke all records Oct. 26 in rolling 543 tons of high carbon steel rounds in 12 hours. During this period the sections were changed three times. The actual rolling time was 11 hours and 30 minutes. During this record there were times when 199 billets were rolled in one hour and the turn was finished by making an average of [illegible] billets per hour.

Cruisers Require Larger Appropriations

Government Must Assume Advances in Materials—French Submarine Proposal—Reasonable Armor Plate Bids

WASHINGTON, D. C., Nov. 7, 1916.—A grave situation confronts the Navy Department as the result of bids opened Nov. 1 for four scout cruisers and 29 submarines. While contracts for the submersibles may easily be let on the basis of the proposals submitted, but one bid within the statutory cost limit and that for a single vessel was tendered for the scout cruisers. The department is thus obliged to face the alternative of reducing the efficiency of the vessels by radical changes in structure and motive power, or of going to Congress for an increased appropriation roughly estimated at 10 per cent. The fact that only one shipyard offered to build a cruiser on acceptable terms and that other leading yards declared their inability to compete at all or offered to take contracts only upon condition that the Government would assume the risk of advance in material and labor foreshadows further embarrassment to the department when proposals for the battle cruisers are opened next month. The possibility that a large part of the naval program, which was fought through Congress with such a tremendous expenditure of energy on the part of the friends of an adequate navy, may require to be referred back to the House and Senate for additional appropriations has filled the naval experts with dismay, especially in view of intimations already current here that much difficulty is certain to be encountered in securing at the coming session the money morally pledged at the last session for the remainder of the construction program not yet appropriated for.

Bids were also received Nov. 1 for upward of 45,000 tons of armor for the battleships and battle cruisers recently authorized, the Bethlehem, Carnegie and Midvale companies submitting figures that are generally regarded as very reasonable, especially in view of existing conditions in the steel market. The slight differences between the three proposals, while to be expected because of the exhaustive investigation of armor plate costs during the past year, will serve to test the sincerity of the Secretary of the Navy, who has so often roundly abused his predecessors for dividing armor contracts among the existing manufacturers. The comparatively low bids now offered by the three plants will also emphasize the folly of an attempt on the part of the Government to build and operate an armor factory which could hardly be regarded as more than an experiment for several years to come.

THE SCOUT CRUISERS A PROBLEM

The four scout cruisers included in the naval program undoubtedly present a serious problem to the shipbuilders of the country because of their enormous power requirements which must be guaranteed to develop a speed of 35 knots per hour. In fixing a limit of $5,000,000 each for these ships the committees of Congress figured more closely than on any other class of vessels authorized. The result is that only one shipyard, that of the Seattle Construction & Drydock Company, made an unconditional bid for one of these vessels, the price being $4,975,000. The Fore River Shipbuilding Corporation, Quincy, Mass., offered to build two vessels for $4,900,000 each on the basis of present costs, the Government to assume the risk of any increase that may occur before the vessels are finished. This concern also proposed to build a ship on a basis of cost plus a profit of 15 per cent. The Union Iron Works, San Francisco, duplicated the proposal of the Fore River Company as to building on a basis of cost plus 15 per cent and offered to take two vessels on these terms. The bids for the scout cruisers Nos. 4 to 7 were as follows:

BIDS FOR SCOUT CRUISERS NOS. 4 TO 7

Class 1—Department's design

Class 2—Hull and equipment of department's design, machinery of builder's design

Seattle Construction & Dry Dock Company

Class 1, 90,000 hp.:

1 vessel, 30 months $4,975,000

Time based on 8 hour workday.

Fore River Shipbuilding Corporation

Proposal A

Class 1, 7100 tons trial displacement, 90,000 shaft hp.:

2 vessels, 28 and 26 months each $4,900,000

This proposal contemplates assumption by Government of risks of increased cost of labor and material. Certain conditions enumerated

Proposal B.

Contemplates construction of vessel on basis of actual construction cost plus profit of 15 per cent, subject to certain enumerated conditions. If this company is awarded contract for battleships or battle cruisers, it will not accept award for any scout cruisers.

Union Iron Works

Two vessels in accordance with plans, data sheets, etc., submitted by Fore River Shipbuilding Corporation on basis of actual cost of construction plus a profit of 15 per cent. Certain conditions enumerated.

COMPETITION FOR SUBMARINES

The construction of submarines has now progressed to a point where both hulls and power plants are practically standardized, and because of the relatively small size of these vessels it is unlikely that the Government will ever have any difficulty in securing as many as Congress can be induced to provide for. For the two 800-ton fleet submarines Nos. 105 and 106, the Electric Boat Company, New York, the lowest bidder, submitted alternative bids for both vessels well within the limit, while the Lake Torpedo Boat Company, Bridgeport, Conn., offered to build one vessel within the limit, or to license the Navy Department to build one or two for $100 per ton of submerged displacement, or approximately $80,000 each. These bids were as follows:

Electric Boat Company

Design 73-AA, 850 tons, 26 months, works of Fore River Shipbuilding Corporation, Quincy, Mass., department's plans and specifications and contract form B.

1 vessel $1,165,000

2 vessels, 26 and 27 months, each 1,148,000

Design 73-A, 850 tons, works of Fore River Shipbuilding Corporation, Quincy, Mass., department's plans and specifications and contract form C.

1 vessel, 26 months $1,189,000

2 vessels, 26 and 27 months, each 1,167,000

Lake Torpedo Company

One vessel, built at Bridgeport, in general accordance with department's outline specifications, modified as shown in altered copy of and with plans, data, etc., submitted herewith, 16 knots surface speed, 11 knots submerged speed.

Design 73-A $1,197,000

Time 24 months if awarded in combination with coast defense boat contracts type 24-M1; and 27 months if awarded in combination with types 31-A or 31-B; modified form of contract attached.

Will license department to build at navy yards for $100 per ton of net design submerged displacement.

There was plenty of competition for the 27 coast defense submarines Nos. 78 to 104, making it certain that all of these vessels can be built by private contract. The Electric Boat Company submitted no less than eight separate proposals covering 24 boats. Four alternative designs submitted by this company were offered within the department's limit of $700,000, but a stipulation was included requiring a minimum construction period of 22 months. To bring this time down to 15 months, as desired by the department, this

company stated that it would be necessary to exceed the cost limit, but even the maximum figures for early deliveries may be accepted under the provision of the naval appropriation act, authorizing a 20 per cent increase in cost to insure speedy deliveries. The Lake Torpedo Boat Company submitted proposals for from six to ten vessels within the limit of cost, but the designs are for a smaller type of boat than those estimated for in the Electric Boat Company's proposals. Bids were also received from the California Shipbuilding Company of Long Beach, Cal., conditioned upon the awarding of contracts for boats of the same design to its licensor, the Lake Torpedo Boat Company, the terms of both companies to be the same.

FRENCH OFFER OF SUBMARINE LICENSE

A novelty in this class of bids was the proposal submitted by the well-known French concern, Schneider & Co., which proposed to license the Navy Department to build vessels under its designs and patents. Estimates of the cost of constructing these vessels in France prior to the war submitted by this company brought their cost on this basis in close competition with the American yards, but allowing for the great increase in both material and labor that has since taken place and the difference between French and American costs on both items, figures are obtained above those of any other bidder. Following are the proposals for coast defense submarines:

BIDS FOR COAST DEFENSE SUBMARINES NOS. 78 TO 104

Class 1—Department's specifications and bidder's design.
Class 2—Department's specifications modified and bidder's design.

Electric Boat Company

Bid 1—Design 77-A, 570 tons, class 2, contract form A.
24 or more boats, at Fore River Shipbuilding Corporation's works at Quincy, Mass., or Union Iron Works, San Francisco or Alameda, Cal., 1 in 18 months, 2 every month thereafter up to and including 22nd month, and 3 every month thereafter, 10 delivered on Pacific coast, remainder on Atlantic, each.....$835,400
And license department to build 3 boats at navy yards exclusive of engines, each..... 50,000
Including engines, each..... 62,500

Bid 2—Design 77-AA, 570 tons, class 2, contract form A.
24 or more boats, same time and place of delivery as in bid 1, each.....$823,400
Same license agreements as bid 1.

Bid 3—Design 68-C, 530 tons, class 2, contract form A.
24 or more boats, constructed as stated in bid 1, 1 in 15 months, 2 every month thereafter up to and including 25th month, and 3 every month thereafter, 10 delivered on Pacific coast, remainder on Atlantic, each..$812,400
Same license agreement as bid 1.

Bid 4—Design 68-CA, 530 tons, class 2, contract form A.
24 or more boats, same deliveries as bid 3, each..$803,400
Same license agreements as bid 1.

Bid 5—Design 77-A, 570 tons, class 2, contract form B.
24 or more boats, constructed as stated in Bid 1, 1 in 25 months and 2 per month thereafter, 10 delivered on Pacific coast, remainder on Atlantic, each....$697,000
Same license agreement as bid 1.

Bid 6—Design 77-AA, 570 tons, class 2, contract form B.
24 or more boats, same deliveries as bid 5, each..$685,000
Same license agreement as bid 1.

Bid 7—Design 68-C, 530 tons, class 2, contract form B.
24 or more boats, constructed as stated in bid 1, 1 in 22 months and 2 per month thereafter, 10 delivered on Pacific coast, remainder on Atlantic, each.....$677,000
Same license agreement as Bid 1.

Bid 8—Design 68-CA, 530 tons, class 2, contract form B.
24 or more boats, same deliveries as bid 7, each..$668,000
Same license agreement as bid 1.

Lake Torpedo Boat Company

Bid 1—Class 2A, 495 tons, New York Yard delivery.
Not less than 6 or more than 10 boats, 14 knots surface speed, 11 knots submerged speed, 1 in 22 months, successive boats at intervals of 3 weeks thereafter.
Design 31-A, each $694,000
Design 31-B, each 692,000
And license department to construct boats at navy yards under said designs, contract form similar to L-8, furnishing duplicate plans, etc., for $100 per ton of net design submerged displacement.

Bid 2—Class 2, 485 tons, New York Yard delivery.
Not less than 6 or more than 10 boats, same speed as bid 1, first boat in 21 months, successive boats at intervals of 3 weeks thereafter.
Design 24-M1, each..... $689,000
Same license agreement as bid 1.

California Shipbuilding Company

Bid 1—Class 2A, [illegible] at Mare Island Yard
Not less than 5 or more than 6 boats, 14 knots surface speed, 11 knots submerged speed, of Lake Torpedo Boat Company's design, first boat in 23 months, successive [illegible] intervals thereafter:
Design 21-A, each..... $695,000
Design 21-B, each..... 690,000
Contract, [illegible] of contracts for boats of same design, to be awarded Lake Torpedo Boat Company, terms of contracts of both companies to be the same.

Bid 2—Class 2A, [illegible], at Mare Island Yard
Not less than 5 or more than 6 boats, same speed, etc., as bid 1, 1 in 22 months, successive boats at intervals of 3 weeks thereafter:
Design 24-M1, each.....$693,000
Same conditions as bid 1.

Schneider & Co.

42 rue d'Anjou, Paris, France; 14 Whitehall Street, New York, represented by W. Cobb.

Type F, project A, license department to construct at navy yards, 1 or more boats, furnishing plans and specifications, general arrangement plan No. 766.
For first vessel..... $68,000
For each succeeding vessel..... 38,000
Estimated cost of construction in France before the war, each.....$585,000

Type F, project B, plan No. 767, first vessel..... $57,000
For each succeeding vessel..... 33,000
Estimated cost of construction in France before the war, each.....$500,000

Type F, project C, plan No. 768, first vessel..... $70,000
For each succeeding vessel..... 40,000
Estimated cost of construction in France before the war, each.....$598,000

MODERATE PRICES ON ARMOR PLATE

Great interest attaches to the bids for armor because of the long-pending controversy on this subject and the authorization by Congress of a Government factory. On Class A-1 armor, including heavy side armor, which constitutes the great bulk of the protection for the four battleships and four battle cruisers authorized by Congress, the Bethlehem Steel Company for battleship armor bid $420, the Carnegie Steel Company $425 and the Midvale Steel & Ordnance Company $427, while for the plates for the battle cruisers the three companies bid $435, $425 and $440, respectively. On Class A-2 turret armor, the bids ranged from $485 to $496 per ton, while on Class B, thin plates, the range was from $460 to $466 per ton. Following are the bids in detail:

BIDS ON ARMOR PLATE FOR FOUR BATTLESHIPS AND FOUR BATTLE CRUISERS

	Class A-1		Class A-2		Class B	
	Per Ton	Tons	Per Ton	Tons	Per Ton	Tons
Bethlehem Steel Co.:						
Two battleships	$420	14,479	$485	820	$466	602
Two battle cruisers	435	6,086	485	336	466	288
Carnegie Steel Co.:						
Two battleships	425	14,479	486	820	460	602
One battle cruiser	425	3,043	486	168	460	144
Midvale Steel & Ordnance Co.:						
One battleship	427	7,500	496	450	466	325
One battle cruiser	440	3,200	496	200	466	150

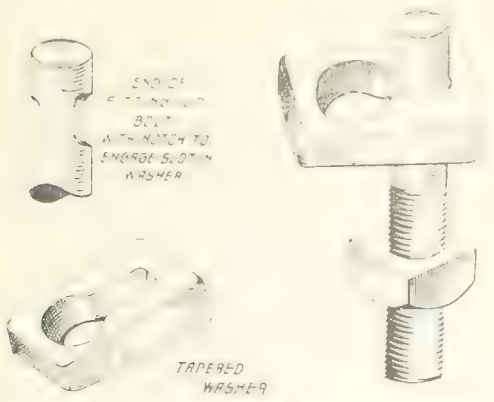
While the Midvale Steel & Ordnance Company bid $385 per ton for 90 tons of steel bolts and nuts, the Bethlehem Steel Company bid $395 per ton for 173.4 tons and the Pittsburgh Screw & Bolt Company bid $548.80 per ton for 173.4 tons. The Bethlehem Steel Company also bid $785 per ton for 6.6 tons of bronze bolts and nuts, while the Pittsburgh Screw & Bolt Company bid $2240 per ton for the same quantity.

W. L. C.

Pennsylvania's industrial fatalities in September were 245, while 21,949 other employees received injuries that disabled them for periods of more than two days. The daily average of injuries was 888. In the first nine months of this year 188,278 industrial employees in Pennsylvania were injured while at work—a monthly average of 20,717—and of that number 1827, or a monthly average of 203, died as a result of their injuries. These figures were made public Oct. 21 by John Price Jackson, commissioner of the Department of Labor and Industry.

Fitting-up Bolt with Taper Washer

Donald Gay, Newport News, Va., has developed a new type of fitting-up bolt. It is intended for use wherever two pieces of steel are to be fastened together



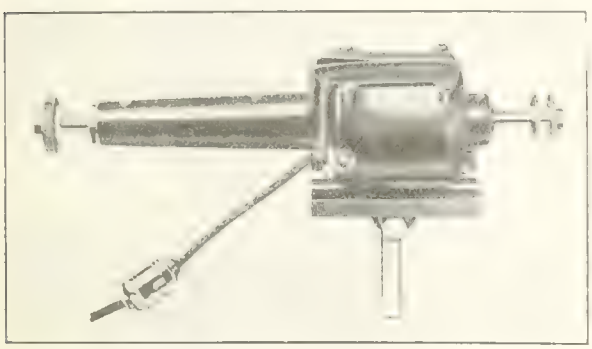
The Taper Washer May Be Quickly Inserted and Taken Out. Unbolting and the Threads Are Protected

and have holes through which the bolt can be passed to hold them in position while permanent connections are made. The particular advantages claimed for the bolt are a saving of time in unbolting and a saving in the number of bolts that have to be used for the purpose, due to the fact that the threads are protected against injury.

As will be noted the device consists of three parts, a tapered washer with a special form of slot, the bolt and the nut. The bolt is slipped through the holes and the washer passed over the end so that the slot near the end of the bolt engages with the narrow portion of the slot in the washer. The nut on the threaded end is then turned as much as may be necessary to hold the two pieces closely together. When it is desired to remove the bolt the washer is simply knocked off, which is accomplished in a much shorter space of time than is required to unscrew the nut. The threads on the bolt, it is pointed out, are not injured as it is the unthreaded end which passes through the holes in place of the threaded one as ordinarily would be the case, and where the holes are not smooth, the threads are frequently damaged by roughness either at the edges or in the center of the material. It is also emphasized that the nut is kept on the bolt at all times, which further serves to protect the threads from injury where the bolt drops through the staging to the ground and also in the interval while it remains there before being recovered.

Extension Arm for Internal Grinding

To enable its portable toolpost grinding machine to be used for deep internal work, the Wisconsin Electric Company, Racine, Wis., has developed an extension arm which is supplied as extra equipment. Among the work which the arm is designed to handle are the regrinding of valves and cylinders, the lapping out of deep drawing dies and the grinding of large gages.

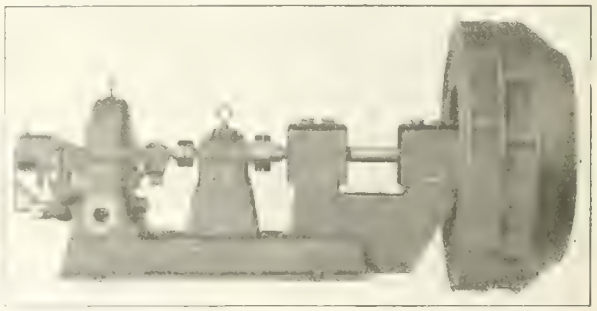


The Extension Arm at the Left Is Intended for Use with a Portable Tool Post Grinding Machine, as Shown, to Enable Deep Internal Work to Be Handled

The extension arm is a separate unit mounted on ball bearings and receiving power from the motor of the machine through a specially designed leather coupling. This arrangement is relied upon to give an accurate alignment and eliminate vibration. The arm has a reach of 10 in. and is thus designed to increase the range of the smaller high-speed attachment regularly furnished. It can be quickly attached or detached when it is desired to change from one class of work to the other. The arm operates at a speed of 10,000 r.p.m.

Induced Draft Fan with Turbine Drive

An induced draft fan with turbine drive for use in connection with waste-heat boilers, such as those utilizing the heat in the gases from furnaces and cupolas, has been developed by the Terry Steam Turbine Company, Hartford, Conn. This unit consists of one of the builder's high-speed turbines driving a Green Fuel Economizer Company's fan through a reduction gear. In this way it is possible to utilize the relatively high speed of the turbine for driving the fan, which, on account of the large volume of air handled, is usually of relatively slow speed.



This Induced Draft Fan for Waste-Heat Boilers Is Driven by Direct Connected Steam Turbine Through High-Speed Reduction Gears

Barb-Wire Exports Steadily Growing

Barb-wire exports from the United States are now at the rate of 449,268 gross tons per year, based on the monthly average to Sept. 1, which was 37,439 tons. The exports for recent periods are given in the following table compiled from Government data:

Period	Total, Gross Tons	Per Month, Gross Tons
To Sept. 1, 1916 (eight months)..	299,480	37,439
Fiscal year ended June 30, 1916..	364,283	30,357
Fiscal year ended June 30, 1915..	147,591	12,299
Fiscal year ended June 30, 1914..	79,775	6,648
Calendar year, 1915.....	253,084	21,090
Calendar year, 1914.....	93,400	7,783
Calendar year, 1913.....	82,050	6,837

The exports this year have been constantly on the increase, ranging from 33,962 tons in January to 47,474 tons in July and 46,843 tons in August. Taking the average of the exports for July and August, the outgo is at the rate of 565,896 tons per year.

Of the total wire exports for the seven months ended July 31, 1916, France had taken 101,790 gross tons; Russia in Europe, 69,086 tons; Canada, 40,989 tons; United Kingdom, 23,671 tons and other countries, 111,527 tons.

Spain is seriously short of coal. Reports state that some qualities cost about $26 per ton at Madrid and $19 at Barcelona. Madrid has reduced the consumption of gas and Barcelona has raised the price from $1.35 to $1.89 per 1000 cu. ft. Purchase of American coal is seriously planned.

The Biggs-Watterson Company, Cleveland, has opened an office in the Traction Building, Cincinnati, with W. P. Dolle as sales engineer.

"EXHIBIT OF ENEMY SAMPLES"

Toronto Shows Low-Priced Manufactures of German Competitors

TORONTO, CANADA, Nov. 4, 1916.—Within one month after the outbreak of the present European war, British consular agents throughout the world began the collection of samples of all kinds of goods manufactured in Germany or Austria and found in the markets throughout the world. Thousands of samples of textiles, clothing, hardware, tools and machinery were collected, and the wholesale and retail prices of each were obtained and affixed to the goods. The articles were brought together in England, exhibited in important cities, and finally sent to Canada for the information of that country in turn. They have just been on exhibition in this city, where hundreds of manufacturers' representatives visited the display with great interest.

The articles were obtained from over 60 different countries of the globe. The characteristic German commercial thoroughness of method is evident everywhere. None of the goods suggests German taste or art, as observed in the various displays made by Germany and Austria in past international expositions. Instead, almost every article looks as if it were made in the country from which the British collector obtained it. Turkish fezzes, Russian countrymen's heavy watch-chains, African machetes and Oriental silks (imitation) do not look at all German. Everything is patterned in the exact style to which the prospective buyer is accustomed. Swatches of textiles are there, which show only patterns of interest to the Asian or African country for which they were destined. Clothing for men, women and children is cut and finished in the peculiar styles in fashion in the places where it was to be worn.

CHEAP GERMAN HARDWARE

The metal manufacturer will be interested particularly in the samples of hardware. Most of the German-made pliers and nippers were bought right in Canada. They are a little rougher in finish than those made in Connecticut, for instance, and some show traces of hand work. All of them were put down in Canada at a discount of 60 per cent from the retail selling prices—a margin liberal enough to overcome a good deal of sentiment. Locks (mostly sheet metal kinds for drawers and cupboard doors), bits, gimlets, etc., show the same ratio of retail to wholesale prices.

Some surprising comparisons of price between American and German goods are possible. Barn lanterns for 30c., alarm clocks for 28c., sewing machines for $8, $9 and $10, assorted two-blade pocketknives for 90c. per card of 12, and one-bladed pocketknives with cast-iron handles for 4c. each, show the possibilities of cheap manufacture. Almost all the prices quoted for articles exhibited were c.i.f. port of destination. The German manufacturer put his offers in the form most convenient to the buyer in every case. Terms on many of the articles were six months, with 5 per cent discount for cash.

Among oddities of hardware are hand-forged spade and hoe heads, sold in South and East Africa for the native to fit with a rough handle cut in the woods. These were made for 5c. each. Machetes or cane-cutting knives with wooden handles cost $1 each, up to $1.50 for the longest. A small screw plate with four dies and four taps was sold for 75c. Razors for use in northern Africa, a flat blade in the roughest sort of wood handle, were sold for 3c. each. Besides this were razors of familiar type and finish, priced wholesale at $11.70 per dozen, retailing at $2.50 each —a liberal margin of profit. Nails mounted on cards were sold for 1½c. per pound for base sizes c.i.f. Nigeria and at 3c. per pound in Manchuria and Morocco; but always dimensioned, packed and listed in the prevailing units of size, weight and quantity as well as currency.

There are many samples of coarse and fine cloths on which the description is embroidered in chainstitch (by machine) in Arabic, Turkish or Chinese. There are blankets from a 4-lb. 60 x 90 in. army for 43c. retail, to soft-finished camel's-hair at $2 and $4 each. Clockwork toy locomotives for 87c. and $1.75 per dozen, and toy steam engines with alcohol lamps for $1.90 per dozen, give an idea of the manufacturing possibilities of German toymakers. A 3-burner oil stove for cooking was sold for 87c., and a glass hand-lamp with reflector for 6c.

HAND LABOR USED LARGELY

No manufacturer can look over this remarkable collection of goods without being impressed with the care that must have been given to the design of each article. The patterns must have been obtained by agents who went to the foreign countries and learned the desires of the inhabitants. Infinite detail was worked out in arranging dimensions, packing, price-lists and terms of sale, so that the transactions could be carried out easily. As a result, the goods became staples in the markets of each country.

It is also evident that the increase of wages which proceeded in Germany and Austria before the war had not reached the point where hand labor became more expensive than machine work. Many of the articles exhibited are obviously hand-made, particularly hand-forged. All of these could be made more cheaply by machine methods. Wooden handles, plane blocks and other wooden parts frequently bear marks of hand fashioning or trimming, and are not as well finished as American-made goods of the same kind. Much of the exhibit is of a quality which would not be a source of pride to an American manufacturer. In this respect, however, there is always a difference of opinion between the manufacturer who wants to do his best and the one who desires to meet the wants of the buyer. Whoever can do both at once is extremely fortunate.

The difference between doing a large export business and doing little or none is merely a difference in thoroughness. United States manufacturers may well learn, with British and Canadians, that the way to a large foreign trade is in the direction of finding out what the buyer wants and giving him that thing, in the way he wants it.

Germany's August Steel Output

Germany's steel output for August was 1,412,326 metric tons, or 52,308 tons per day, against 1,365,641 tons in July, or 52,524 tons per day. While this is the largest month's output for the war, the daily rate ranks third, the highest having been 54,990 tons per day in June. The August total was made up of 670,613 tons of Bessemer ingots, 601,273 tons of open-hearth, 113,275 tons of steel castings, 10,072 tons of crucible steel and 17,093 tons of electric steel. The steel casting and crucible steel outputs are the highest for the war. At no time in Germany's history has the electric steel output reached 17,000 tons in one month.

Holland is credited with having imported 36,233 tons of pig iron in the first six months of 1916 against 22,782 tons in the same period of 1915, and 157,332 tons in the like months of 1914. Her pig-iron exports this year were only 36 tons to July 1, 1916, but 3580 tons and 96,603 tons in the same period of 1915 and 1914 respectively. Rail imports for the same period were this year 12,057 tons against 30,611 tons in 1914, while rail exports this year were 1758 tons against 20,294 tons in 1914.

ESTABLISHED 1855

THE IRON AGE

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Distortion of World's Trade

Among the most interesting developments of the European war is the diversion of the world's trade into unusual channels. It was observed very early after the outbreak of the war that the regular sources of supply for South American trade would be largely cut off, but it was by no means foreseen that the steel trade of the globe would almost wholly be deprived of the usual contributions from Great Britain, Germany, France and Belgium. Our manufacturers and merchants expected that America would be the beneficiary of Europe's misfortunes to a considerable extent, but the most experienced did not dream that so large a part of the steel requirements of other countries would have to be supplied and could really be furnished by the United States.

This country is now placed in the position of supplying important former customers of Great Britain and Germany with their iron and steel requirements. Markets have been opened to us which had either always been closed for us or had only received American iron and steel products to a limited extent. Even Great Britain has been obliged to take considerable shipments from this country to meet the heavy demand on her own productive resources as the result of the tremendous draft for war purposes. In addition to the restrictions on export trade brought about by home necessities, some of that trade has been cut off by the action of the belligerents themselves. Germany, for instance, is limiting its iron and steel exports to Holland for the purpose of hampering the shipbuilding interests of that country, which the Germans are inclined to believe are operating to the benefit of the Allies. All these influences are tending to increase the enormous movement of iron and steel from this country to the general markets of the world.

The statistics of our exports for September show to what extraordinary figures the movement has grown. Whereas only a few years ago, exports of 200,000 tons per month of the so-called tonnage products would have been deemed large, the figures as published in our issue last week show that September attained the phenomenal aggregate of 643,763 gross tons. In the nine months ended with September our exports of such products were 4,358,189 tons, which is as much as any other country ever exported of similar products in a whole calendar year. We may well take pride in these figures, as they show to what extent this country is equipped to meet the world's requirements in a time of such a violent distortion of ordinary trade movements.

Steel for Shipbuilding

There has been no diminution in the buying of ships. The early buying could be attributed to an expectation that the yards would be able to deliver the ships in time to participate in the remarkable freight movement, at extremely high prices, that the urgency of war brought about. The latest orders placed, involving delivery after the close of next year, are not based upon participation in war freight rates except as a possibility. There is good opinion that the war will be over by Jan. 1, 1918; but even were there assurance of its being prolonged for another twelvemonth the dangers of loss, possibly greater if the war were thus prolonged, would require a large allowance to be made from the prospective profits.

It is evidently the view of those concerned that the end of the war will find a shortage in merchant-vessel capacity. While there has been feverish activity at all the world's shipyards, an unusual proportion of the capacity has been diverted to the building of war vessels. Before the war the output of merchant vessels had reached a rate of about 3,000,000 tons annually, representing partly replacement and partly an expansion in the world's needs. The amount destroyed in the war to date amounts to more than 3,000,000 tons, while there has been extraordinary depreciation on account of hard driving. The question is whether the war will be found to have set commerce back or forward. The growth in requirements may not be equal to three years of development in peace times, but it certainly must amount to something, and it may possibly amount to more than would have been the case had peace continued. One should not be misled by the statistics of the great amount of ocean commerce now being conducted. The statistics refer to values, not quantities. It is the opinion of some observers that 10,000,000 of vessel tonnage will be needed after the war, representing something like 5,000,000 tons of steel required for the construction, apart from machinery.

The Flight of Pig Iron

The sensational rise in pig iron that has been in progress in the past few weeks, advances being in dollars per ton when in the past advances of quarters per ton would have been considered remarkable, cannot be analyzed with confidence at this time. It cannot be asserted positively that the rise is due to a shortage already developed. In some of the markets prompt iron has commanded higher prices than iron for forward delivery in occasional instances, but there is no generally established premium market, and some of the cases are attributable to local car shortages.

One thing is obvious, that the settings have all been favorable for the adoption, in sellers' minds, of higher quotations, and the acceptance of them by buyers, whose minds are prepared by the spectacular performances in the steel, coke and coal markets for almost anything. It has not been necessary for the actual physical conditions to exert as much pressure as is ordinarily the case, to move the market.

It may be urged that there are some buyers who cannot afford to pay very high prices for pig iron, but the history of the steel market to date is strongly suggestive that not much reliance should be placed upon such conditions, to apply the brakes to an advancing market. It was being urged a year ago that many consumers of steel could not afford to pay the high prices to which the steel market was then making so rapidly; but events have shown that if some buyers were unable, others, and a great many others, were not only able but anxious. The ability to pay cannot be measured by former standards. As for pig iron itself, there is scarcely any price limit with respect to those who need pig iron for the production of steel. There is no price limit, apparently, in the steel market. If there is any limit it is a time limit, more likely than not the end of the war, and that creates the incentive to produce every ton of steel possible before the end of the war. In past periods of activity in steel the common analysis has been that there are a price limit and a tonnage limit, that the activity would last until a given tonnage had been furnished to consumers, provided the buyers were not discouraged from taking the entire tonnage by prices being permitted to rise to too high a level.

Another precedent that it will be well not to rely upon is that of the pig-iron productive capacity of the country being flexible, the price offered in the market being a factor. There have been fit furnaces, less fit furnaces and still less fit furnaces, down a long line, so that the commercially available pig-iron capacity was so many million tons if $15 could be secured for the iron, a larger number of tons if $20 could be secured and a still larger quantity if $25 could be secured. The view is correct only if raw materials are available. With substantially the same amount of blast-furnace capacity in operation, spot Connellsville furnace coke in the past few weeks has commanded two and one-half times the average price during the first half of the year. Where is coke to be found for the blowing in of the less fit furnaces, when some of the furnaces already in operation, and provided in most cases with contracts, have been forced to bid such prices? Evidently there is a fear that the production of pig iron will decrease in the next few months, instead of increasing.

Europe's Growing Steel Output

The idea that has found some currency that the steel industries of Germany and Great Britain have been weakened by the strain of war and will be in that condition when the war ends is completely refuted by the statistical statement on another page. Germany's steel output is now over 82 per cent and her pig-iron production 70 per cent of that of 1913, the record year. Great Britain produced more steel in 1915 than in any previous year and the pig-iron production was nearly 84 per cent of the record total of 1913. Under present high pressure operations it is entirely likely that the British steel output will make a new record this year and that in spite of labor and raw material difficulties nearly as much pig iron will be made as in 1913. Both countries will be able to produce steel and iron in larger quantities when peace comes, and both will be on a new plane of efficiency. With labor more plentiful and raw materials restored to normal channels, with the experience gained in the application of new economies and in the use of metallurgical substitutes, competition from Germany in the world's markets as well as in our own will be sharper than ever. No account is taken in the statistics given elsewhere of the production of steel in the Belgian and French territory which Germany now holds. It can readily be appreciated, however, that with normal exports of 5,000,000 to 6,000,000 tons of iron and steel products cut off, Germany has an output of steel entirely adequate to meet the demands of her unparalleled consumption for ordnance, munitions, shipyards and railroads, and that when the strain is off there will be millions of tons a year for which a place must be found in the world's markets. It is significant in this connection that France, in the portions of her territory free from German control, and with so much of her iron-ore resources now in German hands, has been able to double the 1915 rate of production at the iron and steel plants still operated by their French owners. At the Creusot works, for example, large additional capacity has been built, both in pig iron and steel. Thus there bids fair to be a greater French steel output after the war, to be added to the increases in Germany and Great Britain.

Noteworthy Freight Car Buying

The rate at which the railroads have been buying freight cars in the past two months and still are so doing is an astonishing one in view of the prices that must be paid, but the buying is perfectly natural in the light of the present car shortage and the prospects of continued heavy freight movement. After the sharp advances that occurred in mill prices of plates, shapes and other descriptions of steel entering into the manufacture of freight cars, the railroads practically withdrew from the market and it was, perhaps, the common view that they would not enter the market again until prices were lower. The heavy buying of the past

two months has occurred with rolled steel commanding higher prices than obtained last spring and with the mills disposed to give the car builders smaller concessions than they were then ready to offer for the purpose of keeping the railroads in the market. A compilation of freight cars ordered each month shows how complete was the withdrawal of the railroads from the market and how clear has been their re-entrance in the past two months. In such a compilation it is impossible to allot every order to the precise month in which it belongs, but the compilation is believed to be substantially correct. The figures below refer to orders for freight cars placed with car shops in the United States, both for domestic use and for export, and include orders placed by railroads with their own shops.

	Freight Cars Ordered
January	21,000
February	13,000
March	11,000
April	8,000
May	7,000
June	4,000
Six months	64,000
July	2,000
August	3,000
September	20,000
October	32,000
Four months	57,000

Thus in the past two months cars have been ordered at the rate of 26,000 per month, against an average rate of less than 5000 per month in the preceding five months, so that the rate of buying has been more than quintupled. A similar record of cars ordered since the beginning of 1913 is as follows:

1913, first half	114,000	
second half	33,000	
Year 1913		147,000
1914, first half	66,000	
second half	14,000	
Year 1914		80,000
1915, first half	62,000	
second half	69,000	
Year 1915		131,000
1916, first half	64,000	
four months	57,000	
Ten months 1916		121,000

Thus it would require the placing of orders for only 10,000 cars this month and next to make this year's buying as heavy as that of last year, and to exceed the average of 1913-14.

Included in this year's car orders are orders for about 16,000 cars for export, placed chiefly in the first half of the year. Last year's export orders totaled about 23,000 cars. Statistics of the *Railway Age Gazette*, covering freight cars ordered by railroads of the United States and Canada, excluding export orders, and freight cars built in the United States and Canada, whether for export or not, are as follows:

	Freight Cars				
	Ordered	Built		Ordered	Built
1901	193,439	136,950	1910	187,760	92,370
1902	195,248	162,599	1910	141,964	180,945
1903	108,936	153,195	1911	133,117	72,161
1904	136,561	60,806	1912	324,758	152,429
1905	341,315	165,155	1913	146,172	207,684
1906	310,315	240,703	1914	81,964	164,541
1907	151,711	284,188	1915	107,796	74,112
1908	62,669	76,555			

The average indicated by the above figures for the 15 years is 175,000 cars ordered per year and 145,000 cars built. The discrepancy is somewhat large, as the divergence should have been in the opposite direction, because cars built for export are included in the "built" column but not in the "ordered" column. The cars built in Canadian shops are included for 1905 and subsequent years. The number of cars has been smaller in recent years than formerly, chiefly because there used to be a large business in the replacement of wooden cars by steel cars, a work that is now largely accomplished.

Attention should be called to the small part that export business has played in the car buying of the past two years. The export orders have been large individually, but they have been separated by long intervals, and many of the inquiries have resulted in the business being placed largely in Canada. Of the cars placed with shops in the United States since the beginning of 1915, approximately 252,000, about 39,000, or 15 per cent, have been for export.

Locomotive buying has swung in a different direction from car buying. There were more locomotives bought in the first half of this year than in all of last year. A study of the rate of buying suggests that when freight cars advanced sharply in price the railroads turned their attention to locomotives, as while they also had advanced in price the percentage of advance was not so great. Thus far this year about 3400 locomotives have been ordered from shops in the United States, about one-third the number of locomotives being for export. As many of these were narrow-gage, the value of the export business was less than one-third the total.

Another interesting point is that in the car business history is repeating itself. The buyer is finding the producers' order books so well filled that his inquiries are carefully scrutinized to eliminate the unattractive, while fresh foreign business, not considering the large Russian order about ready for placing, is given scant consideration. Following the heavy preemption of wide plates for shipbuilding, the late buying of steel cars has resulted in good bookings for the narrower plates and the country's capacity for tank cars is pretty well engaged for all of 1917. Thus here is another analogy to the condition of the steel mills, and few cars of any kind ordered now can be delivered before July, 1917.

The British Ferromanganese Market

The weekly market report of the London *Iron and Coal Trades Review* for Oct. 13, 1916, has the following regarding ferromanganese:

A fair demand continues for ferromanganese, with prices nominally unchanged in this country. There is no relaxation in the official attitude in regard to licenses for foreign shipments. The British makers, however, have made a reduction of £2 per ton in their price for shipment this year or during 1917 to the United States. This brings the English product to a price of approximately £33, seaboard, as against a former level of £35, in effect for several months. English makers have found that the market in America recently has been practically dominated by domestic producers who have been accepting £33, delivered, for the 80 per cent alloy. Considerable tonnage has been booked by the American makers on this basis. The lower English price now offered is made subject to the submission to the makers of each inquiry by the agents in America, and also is contingent upon licenses to ship for the delivery prescribed being granted by the British authorities.

Large Exports of Railroad Cars

Exports from the United States of cars for steam railroads exceed all records. For the eight months to Sept. 1, 1916, the total value is $16,678,909, or $2,084,863 per month. Only $391,728 represents passenger cars, the rest being classified as "all other," probably freight. In 1915 the total value was $10,025,305, and in 1913, $11,985,181, or $998,765 per month. The present rate is therefore double that for 1913, and if maintained will make the 1916 total exceed $24,000,000.

GERMAN AND BRITISH STEEL

Output in Both Countries Has Grown in the Years of the War

In both Germany and Great Britain the steel industry has made great strides in output and productive capacity as the war has progressed. In Germany the war's outbreak reduced the iron and steel production over 60 per cent, but since then the recovery has been very rapid. In Great Britain the first shock was not so severe, but the expansion has been noteworthy ever since.

GERMANY'S STEEL AND PIG-IRON OUTPUT

The following table, based on the official data of the Association of German Iron and Steel Manufacturers, gives the comparative pig-iron and steel output for calendar years and for the two war years, August to July, inclusive, in metric tons.

	Steel	Pig Iron
1911	15,01[illegible],838	1,280,527
1912	17,3[illegible],908	17,868,909
1913	18,958,819	19,309,172
1914	14,[illegible],106	14,389,547
1915	13,247,641	11,790,199
1916*	15,616,296	13,190,172
First year of war	11,355,841	10,135,319
Second year of war	12,025,208	12,8[illegible],743

*Estimated.

The pig-iron output in the second war year has ranged from a minimum of 1,034,124 tons in September, 1915, to 1,134,306 tons in July, 1916, while in the first year of war the range was from a minimum of 580,087 tons in September, 1914, to 1,064,899 tons in July, 1915. In 1916 the range has been from a minimum of 1,036,683 tons in February, to 1,145,292 tons in August. Based on the August rate, Germany's pig-iron production is now at 70 per cent of that in the peak year, 1913.

The above estimate of over 15,500,000 tons for Germany's steel production in 1916 is based on an actual output of 15,025,208 tons in the second war year. The monthly range has been between 1,157,692 tons (minimum) in August, 1915, and 1,366,107 tons in July, 1916. The production in the first war year ranged from a minimum of 566,822 tons in August, 1914, to 1,138,651 tons in July, 1915. The 1916 range has been from 1,212,695 tons in April to 1,366,107 tons in July. In May, June and July, 1916, Germany produced 4,097,562 tons of steel, or at the rate of 16,390,248 tons a year.

These figures show that Germany's present steel output is over 82 per cent of that in 1913, when her unparalleled exports brought her production to the highest point in her history.

CHARACTER OF THE GERMAN WAR PRODUCTION

The extent to which the war has affected the character of the German steel and pig-iron output is shown by the following tables of percentages:

Steel

	1912	1913	First War Year	Second War Year
Bessemer ingots	57.7	57.0	50.6	49.3
Open-hearth	38.9	40.3	42.6	42.7
Steel castings	1.9	1.9	3.66	6.16
Crucible steel	0.46	0.52	0.80	0.69
Electric steel	0.44	0.54	0.79	1.12

Pig Iron

	1913	1914	
Foundry	18.94	17.34	15.8
Bessemer	1.91	1.65	1.41
Basic	63.15	64.74	63.1
Steel-making and Spiegeleisen	13.46	13.88	17.5
Forge or puddle	2.53	2.58	1.87

The Bessemer ingot output has decreased over 7 per cent during the war, while the open-hearth steel output has increased over 3 per cent. The striking facts, however, are that the steel-casting output has nearly doubled, the crucible steel output has decreased about 12 per cent and the electric steel output has expanded nearly 40 per cent.

In pig iron the changes have been less marked. While the foundry iron output has decreased, basic iron has maintained its own, and the steel-making iron and the spiegeleisen production has increased considerably.

GREAT BRITAIN'S STEEL AND IRON OUTPUT

Official statistics of Great Britain are available only up to Jan. 1, 1916. For the past five years they are as follows in gross tons:

	Steel Ingots	Pig Iron
1911	6,461,612	9,718,638
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
1915	[illegible]	[illegible]

The British pig-iron output in 1915 was 83.75 per cent of normal, using that for 1913 as a basis. The steel output exceeds that for any year previous, the monthly rate having been 695,912 tons against 678,656 tons per month in 1913. Under present high pressure operations, it is to be expected that a new record in steel production will be made in 1916.

Larger Lake Ore Shipments in October

Iron ore shipments down the Lakes from the Lake Superior region in October were 9,116,196 gross tons, compared with 7,146,873 tons in October, 1915. The October shipments compare with 9,600[illegible] tons in September, 1916, the largest monthly shipments ever recorded. The increase in October is 27.55 per cent over the total for October, 1915. The following table gives the October and season shipments by ports and the corresponding figures for 1915 in gross tons:

	October, 1916	October, 1915	To Nov. 1, 1916	To Nov. 1, 1915
Escanaba	[illegible]	[illegible]	6,367,482	4,640,981
Marquette	519,806	522,671	3,546,651	2,836,203
Ashland	1,218,134	865,170	[illegible]	4,035,752
Superior	1,732,865	1,351,893	11,493,831	7,348,916
Duluth	3,298,314	2,301,352	19,472,473	14,108,571
Two Harbors	1,470,589	1,176,388	9,642,563	7,886,916
Total	9,116,196	7,146,873	57,932,846	41,816,439
1916 increase	1,969,323		16,116,407	

The Duluth percentage to Nov. 1, 1916, was 33.61 against 33.74 last year, while the Great Northern dock at Superior shipped 17.29 per cent of the total this year against 15.14 per cent to Nov. 1, 1915. The increase to Nov. 1, this year, of 16,116,407 tons, or 38.54 per cent, contrasts with an increase of 35.10 per cent to Nov. 1, 1915, and a decrease of 32.42 per cent to Nov. 1, 1914.

Higher Demurrage Rates Proposed

WASHINGTON, D. C., Nov. 6, 1916.—Carriers have begun to file tariffs with the Interstate Commerce Commission to carry out their threats to advance demurrage rates and change rules relating to the detention of cars, in accordance with the notice they served upon the National Industrial Traffic League in August, after futile conferences had been held. The two interests split, not on rates, but on the rules. The railroads propose to eliminate the regulation which stops the running of free time while weather conditions are such as to prevent unloading of cars. They claim shippers abuse that rule.

A committee from the League on Nov. 4 made a formal protest to commissioners with whom they were able to procure personal interviews, asking the suspension of the new tariffs, in which the basic penalty is raised for detention beyond the period of free time. The League objected to this, but its protest is less emphatic than on the elimination of the weather condition rule. The penalty, if the new tariffs are allowed to become operative, will progress from $2 for the first day beyond the free time of 48 hours, to $3 for the second day, $4 for the third and $5 for the fourth day.

W. L. C.

Col. Thomas Cantley, president, reported at a board meeting of the Nova Scotia Coal & Steel Company, held at Montreal recently, that the company's output for the first nine months of the year is 40 per cent higher than that of the previous year. It was decided to enlarge the company's shipbuilding activities by building a second ocean-going vessel. In the works of the Eastern Car Company, a subsidiary, a drop forging plant and an electric furnace are being installed. These will make the works self-contained in practically every respect. As regards forward business, he stated that the company was booked practically to capacity to the middle of 1917.

Sheet and Furnace Interests Merge

A merger of the American Rolling Mill Company, Middletown, Ohio, with the Columbus Iron & Steel Company, Columbus, Ohio, has been effected. It is understood that both companies will continue to operate under their respective names, but a new holding company will be organized under the name of the American Rolling Mill Company, which will be the parent company.

The Columbus Iron & Steel Company operates two blast furnaces and is contemplating further extensions. It is also interested in iron-ore and coke properties in different parts of the country. J. G. Battelle is president of the company; J. H. Franz, vice-president, and J. C. Miller, secretary and treasurer.

The American Rolling Mill Company's officers are George M. Verity, president; R. B. Carnahan, Jr., W. S. Horner and Charles R. Hook, vice-presidents; R. C. Phillips, secretary; N. W. Collord, treasurer, and G. H. Charls, general manager of sales.

Railroad Car Buying

With car builders' shops well booked for the first half of 1917, and so far as tank cars are concerned for practically all of 1917, and with sales in the past two weeks totaling over 26,000 cars following upward of 10,000 cars closed three weeks ago and with active inquiries at the present time for all of 10,000 cars, the car builders are beginning to choose the business offered, particularly that coming from foreign sources. Incidentally the large Russian car order is expected shortly to materialize and further buying for France is under consideration. Much that is placed for domestic roads is done quietly and at this writing several thousand cars have been put under contract but the details cannot be learned and the totals are not included in the foregoing figures.

The late purchases and inquiries of different roads are as follows: Union Pacific, 1500 box and 1000 automobile cars bought; Illinois Central, 400 ballast cars bought and 600 general service and 2000 gondola cars inquired for; Great Northern, 1000 refrigerator and 1500 box cars, inquired for; Baltimore & Ohio, 980 more freight cars and 100 passenger cars bought; Philadelphia & Reading, 2000 hopper cars bought, half of Cambria Steel Company, and the other half divided between the Pressed Steel and the Standard Steel Car Companies; the Burlington, 1500 cars bought; the New York Central, 1000 cars placed with the Barney & Smith Car Company and passenger cars distributed thus: 125 to American Car & Foundry Company, 60 to the Pressed Steel Car Company, 75 to the Standard Steel Car Company and 25 to Barney & Smith Car Company; Chicago & Northwestern, 200 stock cars bought; Erie, 1000 box cars bought; Atlantic Coast Line, 1700 cars bought; Southern, 2813 placed, 1500 with the Lenoir Car Works and the remainder with the Pressed Steel Car Company; Louisville & Nashville, 2000 additional cars placed and 1500 underframes; Missouri, Kansas & Texas, 1000 cars under revived inquiry; Atchison, 500 tank cars bought; the Soo Line, 1000 cars placed with the Haskell & Barker Car Company; Northern Pacific, 350 ore cars placed; Cambria & Indiana, 1000 cars bought of the Cambria Steel Company, and the Chesapeake & Ohio, 1500 car repairs, contracted for. A number of active inquiries involve 500 tank cars, and the foreign business offered covers 175 passenger cars for Spain and some 75 cars for China.

The United Alloy Steel Corporation, Canton, Ohio, according to an announcement made by the president, Harry R. Jones, contemplates the erection, next year, of a large plant for the manufacture of heavy railroad forgings in alloy steels. Other extensions to be made are additional finishing mills and an enlargement of the electric furnace department. It is stated that the proposed extensions will involve an expenditure of about $2,000,000.

Oppose Western Trunk Line Rate Advance

WASHINGTON, D. C., Nov. 6, 1916.—A determined contest has been begun, between the railroads in the section known as Western Trunk Line territory on the one hand and iron and steel manufacturers and consumers on the other, over an advance in rates on iron and steel proposed by the carriers. The iron and steel interests have asked for the suspension of a tariff canceling commodity rates so as to make the fifth-class rates apply throughout that territory. Roughly speaking, the eastern boundary of the affected region is a line drawn from Chicago to St. Louis with the foothills of the Rocky Mountains as the western limit.

The advances, according to declarations made to members of the Suspension Board of the Interstate Commerce Commission, will range from 15 to 40 per cent. They apply on everything in the iron and steel list except pipe. It is the intention of the carriers, however, to file tariffs advancing charges on pipe from a commodity basis of much less than fifth class, in many instances, to as near fifth class as possible. On account of conditions in Oklahoma, fifth class is impracticable on pipe throughout the territory.

Protests, both written and oral, have been made by numerous representatives of manufacturers and consumers. Uniformity is the reason given by the carriers for their proposal. Their defense has been conducted by E. B. Boyd, their agent in the filing of the tariff. No traffic manager has thus far appeared to explain why uniformity should be accomplished at the expense of the consumers of iron and steel. Kansas City interests assert that even if uniformity is brought about the effect will be disastrous to them because their advances will be 6 and 7 cents per 100 lb., while those of Chicago will be only 1 and 2 cents and no change in the raw material rates, which Kansas City declares now heavily favor Chicago. Chicago, Quincy and St. Louis stove and range manufacturers have protested particularly against the advances on their wares to Duluth and the Twin Cities.

WASHINGTON, Nov. 7.—Freight tariffs proposing increased rates ranging from 5c. to 7c. per 100 lbs. in the iron and steel traffic between Chicago, Florida, St. Louis and Kansas City and Des Moines, St. Paul, Duluth and other points in the Western Trunk Line territory were suspended by the Interstate Commerce Commission to-day from Nov. 10 until March 10, pending investigation. The tariffs provided for cancellation of the present commodity rates on iron and steel articles in carloads between these points. W. L. C.

Locomotive Orders Increase

The railroads of the country continue to order and inquire for large numbers of locomotives. In the past week they have placed contracts for 84 and issued inquiries for 98. The Southern Railroad contemplates buying 45, the Chicago, Burlington & Quincy 30, the Union Pacific 15 and the Duluth, Mesaba & Northern 6. The American Locomotive Company will build 40 consolidation locomotives for the Italian State Railways, 10 Pacifics for El Paso & Southwestern and 5 locomotives each for the Delaware, Lackawanna & Western, the Central Railroad of New Jersey and the Western Pacific. The Louisville & Nashville is building 8 Mikados in its own shops and will soon start the construction of 8 more. It is stated that the British Government has recently increased to 395 its order for 45 narrow gage tank locomotives given to the Baldwin Locomotive Works late in August. The British War Office is also reported about to increase the order recently given to the American Locomotive Company for 100 18-ton tank locomotives by 100 or 150 engines. Expectations are keen that the Russian Government will very soon close definite contracts for 400 Decapod locomotives. The understanding is that Canadian builders will secure 40 to 60 of these, the remainder to be divided between the American Locomotive Company and the Baldwin Locomotive Works.

Ferrotungsten exports in August were very large—47,966 lb., bringing the total to Sept. 1, 1916, to 56,373 lb.

The Wharton Steel Company Properties

There has been no further development in the past week concerning the Wharton Steel Company properties which were reported recently to have been acquired by J. Leonard Replogle. Examinations of the blast furnace and iron-ore properties have been made by engineers and their reports will determine the line of future action. It is understood that Mr. Replogle has an option running until January 1 and that decisions as to his acceptance of the property and his plans concerning it have not yet been made.

United Engineering Buys Tod Company

The United Engineering & Foundry Company, with main offices in the Farmers' Bank Building, Pittsburgh, has taken over the entire holdings of the William Tod Company, Youngstown, Ohio. The property thus acquired consists of about nine acres, lying in the heart of the industrial section of Youngstown, on which are located about 20 buildings of various sizes devoted to the manufacture of engines, hydraulic machinery and iron and steel works equipment of all kinds. The Tod Company has built blooming mills and other machinery for the Youngstown Sheet & Tube Company, Republic Iron & Steel Company, Brier Hill Steel Company and Youngstown Iron & Steel Company. It enjoys a large foreign trade, having under construction in its shops a plate mill for shipment to the Imperial Steel Works at Kobe, Japan, and sheet mills also for Japan. It has been turning out large quantities of shells for the Allies for about two years, starting this work shortly after the war broke out. The official announcement of the completion of the deal is, in part, as follows:

The controlling interests in the William Tod Company exchange their stock for stock of the United Engineering & Foundry Company. The plant of the William Tod Company will for the present at least be operated as a separate unit and with the present operating organization. At a special meeting of the board of directors of the William Tod Company, the following officers were elected: President, John T. Harrington; vice-president, C. H. Booth; secretary and treasurer, H. J. Stambaugh. The following directors were elected: David Tod, John Stambaugh, C. H. Booth, H. M. Kelly and John T. Harrington.

The William Tod Company had an authorized capital of $1,500,000, of which $1,000,000 common stock was outstanding. The other $500,000 was preferred stock and was held in the treasury. The United Engineering & Foundry Company has outstanding $6,600,000 of stock, of which $4,600,000 is common. The acquisition of the Tod Company will give the United Engineering Company a line of product in rolling-mill, steel-works and blast-furnace engines which it has not built heretofore. It will now be in position to furnish practically every kind of equipment needed for blast furnaces, rolling mills, steel works and sheet and tin mills. The William Tod Company was established in 1856, therefore being one of the oldest manufacturing concerns in the Youngstown district.

New Steel Tubing Factory at Detroit

A new plant for the manufacture of steel tubing and tubular products will be established in Detroit by the Michigan Steel Tube Products Company, incorporated with a capital stock of $300,000. W. O. Briggs is president; Frank Navin, vice-president; H. A. Flagg, secretary, and C. E. Miller, treasurer. The officers and L. A. Young and Frank Kritz comprise the board of directors. Messrs. Kritz, Miller and Flagg have long been identified with the steel tubing business, Mr. Kritz in manufacturing and Messrs. Flagg and Miller in the selling end. Mr. Flagg was formerly sales manager of the Standard Welding Company, Cleveland, and Mr. Miller was manager of its Detroit office. The new company has opened a temporary office at 75 Baltimore Avenue, West. Ground is now being broken for building construction.

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Iron-Ore Exports Increasing

Iron-ore exports from the United States are now at a greater rate than in 1915 or in 1913, while present imports are only 50 per cent of what they were in 1913, but a little in excess of those for 1915. The following table compiled from Government data shows this in gross tons:

	Average Per Month	Average Per Month
To Sept. 1, 1916	114,982	91,809
Calendar year, 1915	111,773	59,053
Calendar year, 1913	216,230	86,846

These show the exports 500 tons per month greater than in 1913 and much larger than in 1915, despite the threatened scarcity at home.

HIGHEST PIG-IRON OUTPUT

Remarkable Performance in October

Steel Company Output Exceeds All Records—Merchant Furnace Gain

Following the October tradition, many pig-iron producers pushed their furnaces to the utmost last month. Considering the handicap some of the merchant furnaces had in shortened coke supply, the output of the month was a marvel, the large steel companies in the Pittsburgh and Chicago districts in particular making surprising records. The total for the month was 3,508,849 tons, or 113,189 tons a day, against 3,202,366 tons in September, or 106,745 tons a day. The estimate of capacity active Nov. 1, based on average output of the furnaces then in blast, rather than the spectacular performances of October, was 108,622 tons a day for 326 furnaces against 106,578 tons a day for 328 furnaces on Oct. 1.

DAILY RATE OF PRODUCTION

The daily rate of production of coke and anthracite pig iron by months, from October, 1915, is as follows:

Daily Rate of Pig-Iron Production by Months—Gross Tons

	Steel Works	Merchant	Total
October, 1915	73,595	27,227	100,822
November	73,282	27,962	101,244
December	73,647	29,686	103,333
January, 1916	72,614	30,132	102,746
February	75,305	31,151	106,456
March	76,274	31,393	107,667
April	77,226	30,366	107,592
May	77,706	30,716	108,422
June	76,526	30,527	107,053
July	74,397	29,620	104,017
August	74,617	28,729	103,346
September	76,990	29,755	106,745
October	81,639	31,550	113,189

CAPACITY IN BLAST NOVEMBER 1 AND OCTOBER 1

The following table shows the daily capacity in gross tons of furnaces in blast Nov. 1 and Oct. 1 by districts:

Coke and Anthracite Furnaces in Blast

Location of furnaces	Total number of stacks	Nov. 1 Number in blast	Nov. 1 Capacity per day	Oct. 1 Number in blast	Oct. 1 Capacity per day
New York:					
Buffalo	19	17	5,843	17	5,747
Other New York	5	3	562	3	583
New Jersey	6	1	240	1	230
Pennsylvania:					
Lehigh Valley	20	13	3,650	13	3,378
Spiegel	2	2	182	1	109
Schuylkill Val.	12	11	3,212	11	3,049
Lower Susquehanna	6	5	1,427	5	1,322
Lebanon Val.	8	6	923	6	742
Ferro and Spiegel	2	2	141	1	86
Pitts. District	53	51	24,515	52	23,839
Ferro	3	3	424	3	408
Shenango Val.	19	18	5,799	19	6,176
Western Pa.	24	19	5,826	20	6,014
Ferro and Spiegel	3	2	127	2	201
Maryland	4	4	1,553	4	1,600
Wheeling Dist.	14	14	4,491	14	4,499
Ohio:					
Mahoning Val.	25	24	10,504	25	11,031
Central and Northern	24	22	8,144	22	8,232
Hock. Val. and Hang'g Rock.	15	10	1,639	11	1,608
Illinois and Ind.	35	32	15,191	32	13,463
Ferro	2	0	0	1	84
Michigan, Wis & Minn.	12	10	2,849	10	2,834
Colo. and Mo.	6	4	1,094	4	1,325
Ferro	1	1	105	1	55
The South					
Virginia	18	8	956	8	1,121
Kentucky	4	4	623	3	478
Alabama	37	28	7,457	27	7,[illegible]
Ferro	1	1	70	1	59
Tennessee	15	10	1,065	10	957
Total	394	326	108,622	328	106,578

Among the furnaces blown in between Oct. 1 and Nov. 1 were one Palmerton in the Lehigh Valley, one Lebanon stack of the Bethlehem Steel Company in the Lebanon Valley, one Ashland in Kentucky, Newburgh in Ohio, one South Chicago in the Chicago district, one Sloss in Alabama and Napier in Tennessee.

The furnaces blown out last month include one Edgar Thomson in the Pittsburgh district, one Shenango in the Shenango Valley, one Cambria in western Pennsylvania, Max Meadows in Virginia, one Haselton in the Mahoning Valley, Dover in Ohio, Bessie in the Hanging Rock district, Miami in the Chicago district and one Bessemer in Alabama.

OUTPUT BY DISTRICTS

The accompanying table gives the production of all coke and anthracite furnaces in October and the three months preceding:

Monthly Pig-Iron Production—Gross Tons

	July (31 days)	Aug. (31 days)	Sept. (30 days)	Oct. (31 days)
New York	190,319	182,812	185,483	194,657
New Jersey	6,621	7,020	6,907	7,431
Lehigh Valley	104,835	99,650	104,989	122,025
Schuylkill Valley	89,811	88,373	91,483	99,587
Lower Susquehanna and Lebanon Valley	73,440	69,558	64,514	72,574
Pittsburgh district	736,477	721,917	724,183	812,572
Shenango Valley	178,903	179,970	185,276	194,534
Western Pennsylvania	169,979	172,970	183,647	187,764
Maryland, Virginia and Kentucky	87,294	92,540	94,382	97,612
Wheeling district	128,135	123,426	124,034	139,225
Mahoning Valley	314,461	326,413	316,907	339,592
Central and Northern Ohio	261,162	263,587	248,434	273,485
Hocking Valley and Hanging Rock	48,624	50,168	43,948	50,797
Chicago district	465,895	460,836	457,637	504,368
Mich., Minn., Mo., Wis and Col.	121,285	115,341	121,877	131,389
Alabama	213,973	219,076	219,508	248,863
Tennessee	33,299	30,056	29,157	32,374
Total	3,224,513	3,203,713	3,202,366	3,508,849

PRODUCTION OF STEEL COMPANIES

Returns from all furnaces of the United States Steel Corporation and the various independent steel companies show the following totals of steel-making iron month by month, together with ferromanganese and spiegeleisen. These last, while stated separately, are also included in the columns of "total production."

Production of Steel Companies—Gross Tons

	Pig, total production 1914	1915	1916	Spiegeleisen and ferromanganese 1914	1915	1916
Jan.	1,261,430	1,115,944	2,251,035	17,325	18,041	24,866
Feb.	1,329,414	1,237,380	2,183,845	10,524	13,319	23,877
Mar.	1,704,688	1,551,082	2,365,116	20,133	12,274	29,388
Apr.	1,635,226	1,584,111	2,316,768	18,676	12,337	31,862
May	1,457,847	1,694,290	2,408,890	21,504	13,440	35,844
June	1,329,623	1,770,657	2,295,784	16,254	19,200	38,597
July	1,395,851	1,949,750	2,306,303	16,524	17,854	31,353
Aug.	1,455,054	2,101,818	2,313,122	11,577	27,463	33,338
Sept.	1,390,322	2,129,322	2,309,710	13,786	23,159	29,451
Oct.	1,271,820	2,281,456	3,530,806	17,435	23,992	34,566
Nov.	1,059,159	2,198,459	.....	21,977	28,741	.....
Dec.	1,034,802	2,283,047	.....	20,733	25,004	.....

THE RECORD OF PRODUCTION

Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1912—Gross Tons

	1912	1913	1914	1915	1916
Jan.	2,057,911	2,795,331	1,885,054	1,601,421	3,185,121
Feb.	2,100,815	2,586,337	1,888,670	1,674,771	3,087,212
Mar.	2,405,318	2,763,563	2,347,867	2,063,834	3,337,691
Apr.	2,375,456	2,752,761	2,269,655	2,116,494	3,227,768
May	2,512,582	2,822,217	2,092,686	2,263,470	3,361,073
June	2,440,745	2,628,565	1,917,783	2,380,827	3,211,588
July	2,410,889	2,560,646	1,957,645	2,563,420	3,224,513
Aug.	2,512,431	2,545,763	1,995,261	2,779,647	3,203,713
Sept.	2,463,839	2,505,927	1,882,577	2,852,561	3,202,366
Oct.	2,689,933	2,546,261	1,778,186	3,125,491	3,508,849
10 mo.	23,969,899	26,507,371	20,015,384	23,421,936	32,549,894
Nov.	2,630,854	2,233,123	1,518,316	3,037,308	.....
Dec.	2,782,737	1,983,607	1,515,752	3,203,322	.....
Total yr.	29,383,490	30,724,101	23,049,752	29,662,566	.....

DIAGRAM OF PIG-IRON PRODUCTION AND PRICES

The figures for daily average production, beginning January, 1909, are as follows:

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1909. Gross Tons

	1909	1910	1911	1912	1913	1914	1915	1916
Jan.	57,975	84,148	56,752	66,384	90,172	60,808	51,659	102,746
Feb.	60,976	85,616	64,090	72,442	92,369	67,453	59,813	106,456
Mar.	75,232	84,459	70,036	77,591	89,147	75,738	66,575	107,667
Apr.	79,082	82,792	68,836	79,181	91,759	75,665	70,550	107,592
May	60,753	77,102	61,079	81,051	91,039	67,506	73,015	108,422
June	64,656	75,516	59,585	81,358	87,619	63,916	79,361	107,053
July	67,793	69,305	57,841	77,738	82,601	63,150	82,691	104,017
Aug.	72,546	67,963	62,150	81,046	82,057	64,363	89,666	103,346
Sept.	79,707	68,476	67,906	82,128	83,531	62,753	95,085	106,745
Oct.	83,856	67,520	67,811	86,722	82,133	57,361	100,822	113,189
Nov.	84,917	63,659	66,648	87,697	74,453	50,611	101,244	.....
Dec.	85,022	57,349	65,912	89,766	63,987	48,896	103,333	.....

The fluctuations in pig-iron production from January, 1908, to the present time are shown in the accompanying chart. The figures represented by the heavy

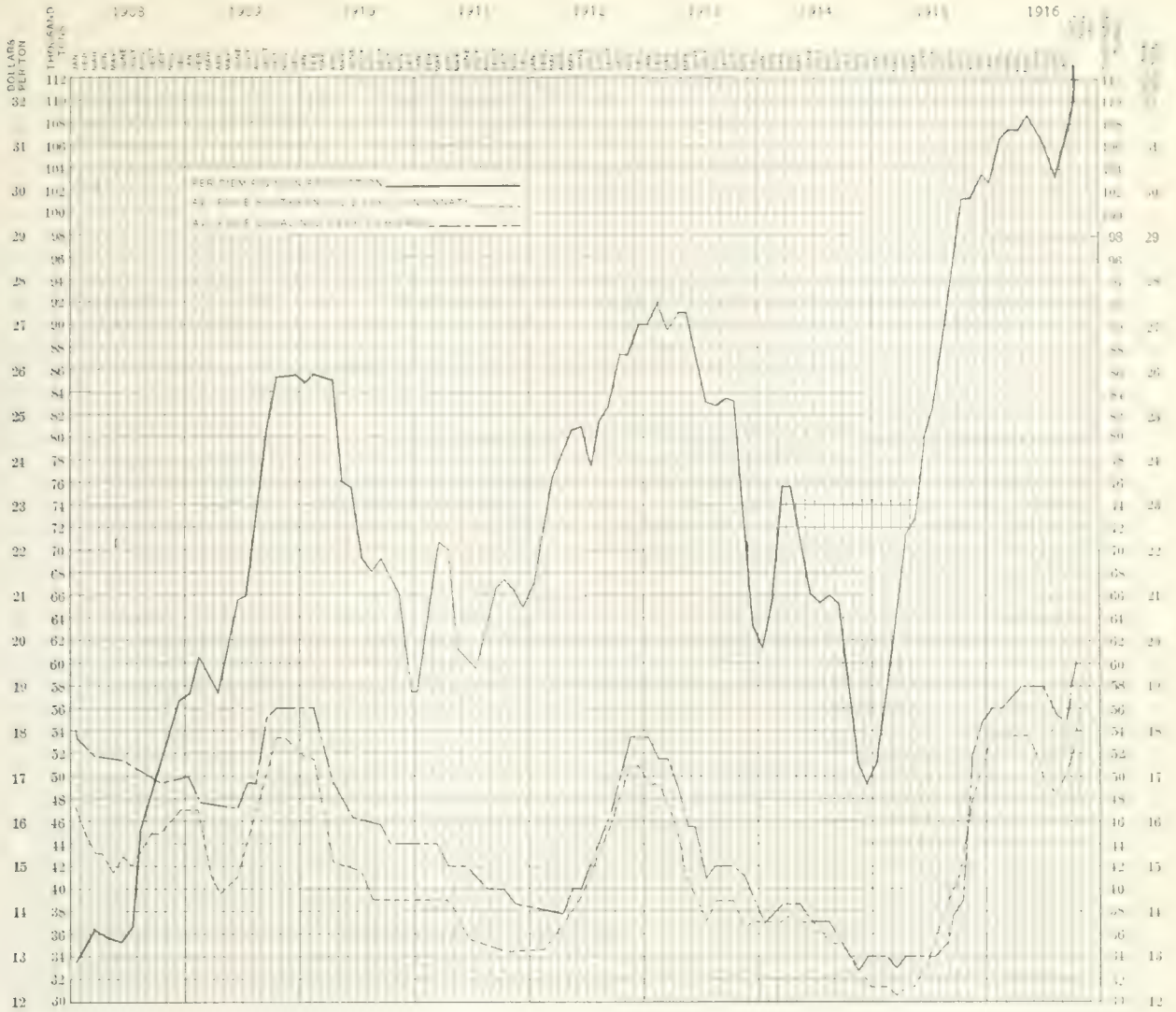


Diagram of Daily Average Production by Months of Coke and Anthracite Pig Iron in the United States from Jan. 1, 1908, to Nov. 1, 1916; Also of Monthly Average Prices of Southern No. 2 Foundry Iron at Cincinnati and Local No. 2 Foundry Iron at Chicago District Furnace

lines are those of daily average production, by months, of coke and anthracite iron. The two other curves on the chart represent monthly average prices of Southern No. 2 foundry pig iron at Cincinnati and of local No. 2 foundry iron at furnace at Chicago. They are based on the weekly market quotations of THE IRON AGE.

Iroquois Iron Will Build New Stack

The Iroquois Iron Company, Chicago, which some time ago announced its intention to build a fifth furnace, has decided to proceed with that plan. It is also planned to remodel its A furnace, now under lease to the Miami Products Company for the manufacture of ferromanganese and spiegeleisen, increasing its capacity to 300 tons daily. This work will probably not be undertaken until next March, as it will, of course, involve the termination of the Miami operation.

The blast furnace operated by the Miami Products Company at Chicago in the manufacture of ferromanganese is out for relining. As only the jacket lining was lost, the delay in operations is not expected to exceed two weeks. The company has good orders on its books and has been making sales at prices ranging upward from $166.

The blast furnace at Rome, Ga., which has been idle for several years, is reported to have been leased by Chattanooga capitalists and will be blown in as soon as it is put in condition. It is the only furnace in that section now idle.

Youngstown Sheet & Tube Company to Add to Steel Capacity

The Youngstown Sheet & Tube Company, Youngstown, Ohio, has completed the program for large additions to its plants at East Youngstown, including three more 100-ton open-hearth furnaces, four additional pit heating furnaces, a new ingot stripping department, a new cinder yard, with the necessary breaking and handling machinery, a roll shop and a locomotive repair shop. To cover the necessary structural work in connection with these extensions, the company has contracted with the McClintic-Marshall Company of Pittsburgh for approximately 4000 tons of structural steel erection. After these additions have all been completed the ingot capacity in Bessemer and open-hearth steel of the Youngstown Sheet & Tube Company will be 135,000 gross tons per month. Several months ago the Youngstown Sheet & Tube Company completed the building of three 100-ton open-hearth furnaces, having previously had six, so that with the three more just authorized the company will have a total of 12 100-ton open-hearth furnaces. It also operates a Bessemer department, containing two 12-ton converters. Contracts for this additional equipment will soon be placed.

Two More Open-Hearths for Inland

The Inland Steel Company, Chicago, which has just completed a battery of eight 80-ton open-hearth furnaces as a part of its large plant extensions, announces that it will build two additional furnaces of like capacity, extending the new open-hearth building for the purpose. It is expected that the additional furnaces will be completed in six months.

Iron and Steel Markets

SHARP PIG-IRON ADVANCES

Finished Materials Moving to New Levels

New Blast Furnace Record in October—Car Buying Very Active

The pig-iron market shows a continuance of the excited conditions of the past two weeks, with further sharp advances in price. At the same time the action of steel products has confirmed the predictions of higher prices and of full occupation of the mills throughout 1917.

October pig iron output exceeded all expectations. It is the furnace companies' habit to make a spurt in that month and in this case all records were broken with a total of 3,508,849 tons, or 113,189 tons a day, against 3,202,366 tons in the 30 days of September, or 106,745 tons a day. The large steel companies, particularly in the Pittsburgh and Chicago districts, strained for great outputs, and were unhampered by the coke shortage which affected some merchant stacks.

In the present condition of the pig iron market the great production last month was highly opportune. Nothing like it is to be looked for as winter comes on and car troubles increase. Our estimate of Nov. 1 capacity, based on average furnace performance, is 108,622 tons a day for 326 furnaces, against 106,578 tons a day for 328 furnaces on Oct. 1. Allowing 400,000 tons a year for charcoal iron, the October output represents a yearly rate of no less than 41,700,000 tons.

The political tension of the week and the closeness of the election have apparently had no effect on the buying of iron and steel. Probably no week before a national election has shown more activity in those markets.

Last week's sensational advances in pig iron did not check but rather stimulated buying, but the market is in confusion over wide variations in prices and the withdrawal of a good many sellers, particularly on business for the second half of 1917. Some of the new advances are without a parallel for a single week. Virginia iron, which last week sold at $19.50, is now $24. Eastern Pennsylvania basic, quoted last week at $21.50, is now $25. Lake Superior charcoal iron, Chicago, has gone from $20.25 to $25. Southern No. 2 iron has sold at $18, Birmingham, in the past two days, and some sellers got $20, while two important producers are out of the market.

In the Central West Bessemer iron has sold at $27, Valley furnace, and basic at $23, an advance of $1 for both. The buying of steel-making iron for export promises to keep up, and a rising market is indicated.

The rise in finished steel products goes on. On black sheets the leading interest, which is now practically sold up for the first half, has made advances of $2 to $3 a ton. It has followed independent tin plate makers in putting its price at $6 per base box, or 25c. above its first sales for the first half. Wire nails were advanced $3 on Nov. 6, or to $2.85, while fence wire has gone from $2.65 to $2.80, and woven wire fencing is up $6 a ton.

On the leading finished steel products—plates, structural shapes and bars—some mills are refusing to quote for next year except on specific amounts to cover contracts in the hands of manufacturing consumers. In plates the inability of the mills to cope with the demand is more pronounced and prices are telling the story. A sale of 12,000 tons of export plates for Italy was made at 4.48c., Eastern mill. One central western mill has entered ship plate orders for the second half of 1917 at 4.50c., Pittsburgh.

In the Chicago district there has been good buying of cars, rails, track fastenings and bars. About 100,000 tons of steel was taken for the Western car lettings, and implement manufacturers added 40,000 tons of steel bars to their purchases for the first half of next year. Of the 100,000 tons additional rails placed at Chicago for 1917, 50,000 tons are for France and 30,000 tons for a transcontinental line of the Northwest.

Car orders are growing as prices rise. In the past three weeks fully 36,000 cars have been placed and builders are now beginning to choose between offers, being well booked for the first half of next year and on tank cars for all of 1917.

There is nothing new as to shell steel contracts for the second half of 1917. Two large steel companies are believed to have closed recently for considerable amounts, and the situation is that on some hundreds of thousands of tons of rounds and forging billets that must be bought there will be no particular haggling over the price.

In cast-iron pipe an advance of $3 to $4 a ton is imminent, following the upward movement in pig iron. Chicago is about to contract for 18,000 tons.

Pittsburgh

PITTSBURGH, PA., Nov. 7, 1916.

An advance of at least $1 per ton on Bessemer pig iron, $1 on basic and foundry iron, $2 to $3 on sheets, 25c. per box on tin plate, from the lowest price heretofore quoted, $3 per ton on wire products, $6 on woven wire fencing, probably $5 on wire rods, and $1 to $2 per ton on nearly all grades of scrap are some of the developments of the past week. It is almost impossible to keep up with the advances in prices, a quotation sent out at the full market price often being $1 to $2 per ton below the market a day or two after. On some lines of finished steel, notably plates, sheets and tin plate, consumers are sending in orders asking that they be entered for delivery in the second half of 1917, the price to be fixed by the mill when the proper time comes to do so. The strength of the market is shown in the fact that some of the larger steel mills are refusing to quote prices on some lines of finished steel except for specific work, and will only protect the customer on the actual amount involved in his contract. The shortage in cars is getting worse. Not much relief can be expected in this direction before next spring, but the situation is liable to get much worse. There is also a great scarcity of labor, and it is no uncommon thing for superintendents of mills to offer $3 per day for ordinary labor and often this does not bring it.

Pig Iron.—Bessemer iron has been sold in small lots at $27, with reports that $28 has been done; basic at $23, and No. 2 foundry, $24, Valley furnace. Sales

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron,				
No. 2 X, Philadelphia	**$24.00**			$16.75
No. 2, Valley furnace	**24.00**	23.00	20.00	14.25
No. 2 Southern, Cin'ti	**20.30**	19.80	14.40	14.90
No. 2, Birmingham, Ala.	**18.00**	17.50	14.50	13.00
No. 2, furnace, Chicago*	**25.00**	24.00	19.00	17.00
Basic, del. eastern Pa.	**25.00**	24.00	20.00	17.00
Basic, Valley furnace	**23.00**	22.00	18.00	14.00
Bessemer, Pittsburgh	**27.95**	26.00	20.00	14.45
Malleable Bess., Ch'go*	**25.00**	24.00	19.50	17.00
Gray forge, Pittsburgh	**23.95**	22.00	18.00	14.45
L. S. charcoal, Chicago	**25.75**	20.25	20.75	16.75
Rails, Billets, etc., Per Gross Ton:				
Bess. rails, heavy at mill	**$38.00**		34.00	28.00
O.-h. rails, heavy, at mill	**35.00**	35.00	35.00	30.00
Bess. billets, Pittsburgh	**50.00**	50.00	40.00	26.00
O.-h. billets, Pittsburgh	**50.00**	45.00	40.00	27.00
O.-h. sheet bars, P'gh	**45.00**	40.00	45.00	28.00
Forging billets, base, P'gh	**75.00**	70.00	60.00	45.00
O.-h. billets, Phila.	**55.00**	55.00	50.00	32.00
Wire rods, Pittsburgh	**60.00**	60.00	55.00	35.00
Finished Iron and Steel,				
Per Lb. to Large Buyers	Cents.	Cents.	Cents.	Cents.
Iron bars, Philadelphia	**2.659**	2.659	2.659	1.709
Iron bars, Pittsburgh	**2.85**	2.85	2.60	1.50
Iron bars, Chicago	**2.40**	2.40	2.35	1.45
Steel bars, Pittsburgh	**2.75**	2.75	2.75	1.60
Steel bars, New York	**2.919**	2.919	2.919	1.769
Tank plates, Pitsburgh	**4.00**	4.00	4.00	1.60
Tank plates, New York	**4.169**	4.169	4.169	1.769
Beams, etc., Pittsburgh	**2.75**	2.75	2.75	1.60
Beams, etc., New York	**2.869**	2.869	2.869	1.669
Skelp, grooved steel, P'gh	**2.70**	2.70	2.50	1.60
Skelp, sheared steel, P'gh.	**2.80**	2.80	2.60	1.70
Steel hoops, Pittsburgh	**3.00**	3.00	3.00	1.75

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire,	Nov. 8, 1916.	Nov. 1, 1916.	Oct. 11, 1916.	Nov. 10, 1915.
Per Lb. to Dealers	Cents.	Cents.	Cents.	Cents.
Steel hoops	3.50	3.50	3.50	3.10
Sheets, galv., No. 28, P'gh	**5.00**	4.90	4.90	3.70
Wire nails, Pittsburgh	**2.85**	2.70	2.60	1.85
Cut nails, Pittsburgh	**2.80**	2.70	2.60	1.80
Fence wire, base, P'gh	**2.80**	2.80	2.55	1.70
Barb wire, galv., P'gh	**3.70**	3.70	3.45	2.70
Old Material, Per Gross Ton:				
Iron rails, Chicago	**$23.00**	$23.00	$20.00	$14.50
Iron rails, Philadelphia	21.00	21.00	21.00	17.50
Carwheels, Chicago	16.00	16.00	12.00	13.00
Carwheels, Philad'phia	**17.00**	16.00	15.50	14.00
Heavy steel scrap, P'gh.	**20.00**	19.00	18.00	17.00
Heavy steel scrap, Phila.	**17.00**	16.00	15.50	14.50
Heavy steel scrap, Chgo.	**19.75**	18.75	16.50	12.75
No. 1 cast, Pittsburgh	**17.00**	16.00	16.00	13.00
No. 1 cast, Philadelphia	**17.00**	16.75	16.00	14.00
No. 1 cast, Chicago (net)	**15.00**	14.00	13.25	11.75
No. 1 RR. wrot, Phila.	**23.50**	23.00	22.00	16.00
No. 1 RR. wrot, Chgo. (net)	**20.00**	19.00	17.50	12.25
Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	$7.50	$7.50	$4.25	$2.50
Furnace coke, future	4.00	4.00	3.25	2.50
Foundry coke, prompt	7.00	7.00	3.50	3.00
Foundry coke, future	**5.00**	4.50	4.00	2.75
Metals,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	**29.50**	29.00	28.50	18.25
Electrolytic copper, N. Y.	**29.50**	28.50	28.50	18 12½
Spelter, St. Louis	**10.50**	10.37½	9.50	15.75
Spelter, New York	**10.75**	10.62½	9.75	16.00
Lead, St. Louis	6.87½	6.90	6.85	5.05
Lead, New York	7.00	7.00	7.00	5.15
Tin, New York	**42.25**	41.87½	42.75	36.50
Antimony (Asiatic), N. Y.	**12.75**	13.00	11.50	36.00
Tin plate, 100-lb. box, P'gh.	**$6.00**	$5.75	$6.00	$3.25

during the week were not large, but this is due mostly to the fact that large blocks of Bessemer and basic iron are hard to find. Some consumers of both Bessemer and basic who are not fully covered for first half of 1917 have had offers of $23 for basic and $27 for Bessemer turned down. The acute situation in coke, some furnaces having paid as high as $8 a ton for spot, is adding not a little to the cost of making pig iron, and is partly the reason for the recent heavy advances in prices. We note a sale of 1500 tons and one of 2000 tons of Bessemer at $27, Valley furnace, with reports of another sale at $28 at furnace. We also note a sale of 7000 tons of basic to a Shenango Valley consumer at $23 at maker's furnace. There have been sales of 8000 to 10,000 tons of No. 2 foundry, and probably more, for delivery in first quarter and first half of next year at $24, Valley furnace. We quote standard Bessemer iron at $27; basic, $23; malleable Bessemer, $24 to $25; No. 2 foundry, $24 to $24.50, and gray forge, $24, all at Valley furnace, the freight rate for delivery in the Cleveland and Pittsburgh districts being 95c. per ton.

Ferroalloys.—One producer and possibly two of Bessemer and silvery ferrosilicon have advanced prices $2 per ton, and this will likely become general in a few days. However, nearly all consumers are covered over first quarter and first half of next year at lower prices than are ruling now. There is not much new inquiry for ferromanganese, and prices are only fairly steady. We continue to quote 80 per cent English at about $164, seaboard, but domestic is still being offered at $160 to $162 at furnace, the price depending largely on the size of the inquiry. We quote 18 to 22 per cent spiegeleisen at $50 to $55, and 25 to 30 per cent at $65 to $75, delivered. Nearly all consumers of ferrosilicon are covered for first half of 1917 and some for the entire year, so that the new demand is only fair. We quote 50 per cent ferrosilicon for delivery next year in lots up to 100 tons at $100; 100 tons to 600 tons, $99, and over 600 tons, $98, all per gross ton, f.o.b. Pittsburgh. We quote 9 per cent at $32; 10 per cent, $33; 11 per cent, $34; 12 per cent, $35; 13 per cent, $36.50; 14 per cent, $38.50; 15 per cent, $40.50; and 16 per cent, $43. We quote 7 per cent silvery at $26.50; 8 per cent, $27; 9 per cent, $27.50; 10 per cent, $28; 11 per cent, $29; and 12 per cent, $30. These prices are f.o.b. furnace, Jackson or New Straitsville, Ohio, and Ashland, Ky., all of which have a freight rate of $2 per gross ton to the Pittsburgh district.

Billets and Sheet Bars.—The Potter Title & Trust Company of this city has an inquiry in the market from Eastern interests for 45,000 tons of forging billets for delivery in April, May and June of next year. This inquiry carries British specifications. Intending buyers say it is almost impossible to get Bessemer or open-hearth billets or sheet bars at any price, and there is no doubt that $55 would be paid if fairly prompt shipment could be made. As many large consumers are getting their billets and sheet bars for this quarter at not over $50, and some at less, we do not change our quotations, which, however, are largely nominal. The Youngstown Sheet & Tube Company has just authorized the building of three more 100-ton open-hearth furnaces, which will give this company a total of 12 of this size. We quote base sizes and base carbons of Bessemer and open-hearth billets and sheet bars at $50 to $55 at mill, Youngstown or Pittsburgh, and forging billets at $75 for sizes up to but not including 10 x 10-in., and for carbons up to 0.25.

Plates.—New orders for steel cars are being placed more freely than for some months. In the past week the New York Central has placed 2000 with the American Car & Foundry Company, 750 with the Ralston Steel Car Company and 1250 with the Barney & Smith Car Company. This road also divided an order for 75 steel passenger coaches among several makers. The Philadelphia & Reading has placed 2000 steel gondolas, the Chesapeake & Ohio, 500 steel hoppers, and the Wabash, 1000 box. The Atlantic Coast Line has placed 1200 box cars and 500 flat cars; the Southern, 1300 steel gondolas; the Erie, 1000 box, and the Chicago, Burlington & Quincy, 500 general service cars, those

orders having been divided among the Standard Steel Car Company, the Pressed Steel Car Company and several other builders. The Cambria Steel Company has taken an order from the Pennsylvania Railroad for 4000 sets of steel car trucks, and the Pressed Steel Car Company is reported to have an order from the Michigan Central for 4000 automobile cars, 1000 steel coal cars and 250 each of stock, ballast and refrigerator cars, this latter being the largest single car order placed in a long time. With the heavy demands on the mills from carbuilders, shipbuilders and other consumers, the supply of plates is far short of being large enough to meet the demand, and mills that can make deliveries in two to four months are able to sell plates at 4.50c. to 5c. One leading mill has entered several contracts for plates for shipbuilding companies for delivery in the second half of 1917 at 4.50c. at mill. The mill price of the Carnegie Steel Company on sheared plates remains at 3.25c., but with no promise whatever as to delivery, and from this the price ranges up to 4.50c. for delivery in second half of next year. For delivery in two to three months, sheared plates have sold at 5c. at mill, and higher prices have been paid for small lots.

Steel Rails.—The Carnegie Steel Company is not accepting new contracts for standard sections for delivery before the last quarter of 1917, but for some time only small lots have been placed in this district. The new demand for light rails is active, especially from the coal mining companies. Several large export shipments of rerolled rails have lately been made at higher than domestic prices. We quote 25 to 45 lb. sections at $47; 16 and 20 lb., $48; 12 and 14 lb., $49, and 8 and 10 lb., $50, in carload lots, f.o.b. at mill, the usual extras being charged for less than carload lots. We quote standard section rails of Bessemer stock at $33 and of open-hearth $35, per gross ton, Pittsburgh.

Structural Material.—The new inquiry is fairly active, but no large jobs were placed in the past week. The Fort Pitt Bridge Works has taken about 500 tons for extensions to the plant of the Petroleum Iron Works Company, Sharon, Pa., and W. N. Kratzer & Co. have taken 250 tons for extensions to the open-hearth building of the American Steel Foundries, Sharon, Pa. We quote beams and channels up to 15 in. at 2.80c. to 3c. at mill, depending on deliveries, while small lots from stock for fairly prompt shipment are quoted at 3.25c. to 3.50c., Pittsburgh.

Sheets.—Late last week the American Sheet & Tin Plate Company and some of the independent mills advanced prices on all grades of sheets $2 to $3 per ton, now quoting blue annealed Nos. 3 to 8 at 3.50c. to 3.60c.; Bessemer black, from 3.50c. to 3.65c.; galvanized, 5c. to 5.10c., some mills asking 5.25c. Tin-mill black plate has been advanced about $2 per ton. The American Sheet & Tin Plate Company is practically out of the market as a seller of sheets for delivery in the first half of 1917, having most of its output under contract, and some independent mills have very little product to sell for first half. The new demand for all grades is abnormally heavy. The output is very heavy, but is still being restricted to some extent by shortage in labor and in steel. Minimum prices now ruling are as follows: Blue annealed sheets, Nos. 3 to 8, 3.50c. to 3.60c.; box annealed, one-pass cold-rolled sheets, No. 28, 3.50c. to 3.65c.; No. 28 galvanized, 5c. to 5.10c., and No. 28 tin-mill black plate, 3.40c. to 3.50c., all f.o.b. Pittsburgh.

Tin Plate.—On Monday, Nov. 6, the American Sheet & Tin Plate Company withdrew its price of $5.75 per base box on bright plate, stating that its entire output of tin plate for the first half of 1917 was sold up and there was no use of carrying a nominal price. This action firmly establishes the tin-plate market at $6 per base box, the price fixed by the independent mills about a month ago. Practically the entire output for the first half of 1917 is sold, and a large amount has been sold for delivery in the second half, the price to be fixed later. The export demand is heavy, but some of the larger mills say they cannot possibly take on any export business, as they will not have enough tin plate to supply their domestic trade. The Continental Can Company is in the market for a very large quantity of tin plate, having been unable to cover its full needs from its regular source of supply. Predictions are that before the first quarter of next year has expired tin plate will be on the basis of $7. We quote bright plate, 14 x 20, at $6 per base box, f.o.b. Pittsburgh, for delivery in first half of 1917.

Shafting.—It is said that nearly all large consumers of shafting have covered their needs for the first quarter and first half of next year, these contracts having been placed on the basis of 20 per cent off list and a few at 15 per cent off. An item of interest is that some makers of shafting have caught up to some extent on deliveries, one leading maker now being able to ship out in six to seven weeks from date of order; but another large maker says it has five months' work ahead. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots and 10 per cent off in less than carload lots for first quarter and first half of 1917, f.o.b. Pittsburgh, freight added to point of delivery.

Wire Products.—On Saturday, Nov. 4, the American Steel & Wire Company sent out notices of an advance of $3 per ton in all wire products, and at the same time lowered discounts on woven wire fencing three points, an advance of about $6 per ton. This action was followed on Monday by all independent mills, so that wire nails are now firmly established at $2.85 and bright basic wire $2.90 per 100 lb. The domestic demand is extraordinarily heavy, and any mills that could ship nails or wire fairly promptly could likely secure premiums over even the present high prices. There is a shortage in the supply of wire nails, mills being sold up for three to four months, and customers report deliveries unsatisfactory. Prices in effect from Monday, Nov. 6, are as follows: Wire nails, $2.85, base, per keg; galvanized, 1 in. and longer, including large head barbed roofing nails, taking an advance over this price of $2, and shorter than 1 in., $2.50. Bright basic wire is $2.90 per 100 lb.; annealed fence wire, Nos. 6 to 9, $2.80; galvanized wire $3.50; galvanized barb wire and fence staples, $3.70; painted barb wire, $3.00; polished fence staples, $3.00; cement-coated nails, $2.75, base, these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing are 55 per cent off list for carload lots, 54 per cent for 1000-rod lots and 53 per cent for small lots, f.o.b. Pittsburgh.

Railroad Spikes and Track Bolts.—Makers continue to report the new demand for railroad spikes dull, and say they are running as few machines as possible, preferring to put the steel into other products for which the demand is heavy and prices are high. At 2.65c., railroad spikes are lower than steel bars. The new demand for track bolts is also quiet, but makers say prices are very firm and should be higher. We quote track bolts with square nuts at 4.50c. to 4.75c. to railroads and 5c. to 5.25c. in small lots to jobbers, base. Track bolts with hexagon nuts take the usual advance of 15c. per 100 lb. Prices on spikes are as follows:

Standard railroad spikes, 4½ x 9/16 in. and larger, $2.65 to $2.75; railroad spikes, ½ to 7/16 in., $2.75 base; railroad spikes, ⅜ in. and 5/16 in., $3.05 base; boat spikes, $2.80 base, all per 100 lb., f.o.b. Pittsburgh.

Rivets.—Makers report the new demand heavy. Consumers are now covering their needs for the first quarter and in some cases the first half of 1917. The export demand is heavy, especially from Africa and India. Due to the higher market on steel bars, an advance in rivets may be made in the next week or ten days. Makers' quotations are: Buttonhead structural rivets, ½ in. in diameter and larger, $4 per 100 lb., base, and conehead boiler rivets, same sizes, $4.10 per 100 lb., base, f.o.b., Pittsburgh. Terms are 30 days net, or one-half of 1 per cent for cash in 10 days.

Iron and Steel Bars.—The minimum price on steel bars remains at 2.70c. at mill, with no definite promise as to deliveries. Some makers are quoting 2.75c. to 2.85c., and have entered orders at the higher price for delivery in the second quarter. Most large consumers have covered for the first half of next year, and the two leading makers of steel bars report their output

sold up for the first half with some obligations on their books for the third quarter. There are still heavy export inquiries for steel rounds, and fabulous prices have lately been paid, 4.50c. having been reported. Deliveries on steel bars by the mills are much behind, and with the car and labor shortage this condition is likely to be worse. We quote merchant steel bars at 2.70c. at mill for indefinite delivery, and 2.75c. to 2.85c. for specified deliveries in the second and third quarters of next year. The demand for iron bars is heavy and prices are very strong. We quote refined iron bars at 2.85c. to 2.90c., and railroad test bars, 2.90c. to 3c., f.o.b., Pittsburgh.

Cold-Rolled Strip Steel.—Makers are now covering their customers for delivery in the first quarter of next year, and it is said that none will sell for delivery beyond that period, owing to the uncertainty as to prices of raw materials and the labor supply. The minimum price on cold-rolled strip steel for first quarter delivery is $6.50, base, per 100 lb. There is some export demand, but local makers say they have all they can do to take care of the needs of domestic customers. We quote on contracts for first quarter delivery $6.50 to $7, while on small lots for fairly prompt shipment, from $7 to $7.50 is quoted. Terms are 30 days net, less 2 per cent off for cash in 10 days, delivered in quantities of 300 lb. or more when specified for at one time.

Merchant Steel.—The new demand is extremely heavy and customers report that deliveries from the mills are unsatisfactory. For fairly prompt shipment premiums over regular prices would readily be paid. Prices are likely to be higher, owing to the increased cost of labor and materials and the shortage of cars. On small lots we quote: Iron-finished tire, ½ x 1½ in. and larger, 2.75c., base; under ½ x 1½ in., 2.85c.; planished tire, 2.90c.; smooth channel tire, ¾ to ⅞ and 1 in., 3c. to 3.10c.; 1⅛ in. and larger, 3.10c.; toe calk, 3.25c. to 3.50c., base; flat sleigh shoe, 2.75c.; concave and convex, 2.85c.; cutter shoes, tapered or bent, 3.50c. to 3.75c.; spring steel, 4c. to 4.10c.; machinery steel, smooth finished, 3.10c. to 3.25c., all f.o.b. at mill.

Nuts and Bolts.—Makers report the new demand better and say they are still having much trouble in getting deliveries of steel. Premiums are readily paid by consumers for fairly prompt shipments. Not much attention is paid to the export demand, as makers say they are having trouble to take care of the domestic trade. Discounts are as follows, delivered in lots of 300 lb. or more, where the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days.

Carriage bolts, small, rolled thread, 50 and 5 per cent; small, cut thread, 40, 10 and 5 per cent; large, 35 and 5 per cent.

Machine bolts, h. p. nuts, small, rolled thread, 50 and 10 per cent; small, cut thread, 50 per cent; large, 40 and 5 per cent.

Machine bolts, c. p. c. and t. nuts, small, 40 and 10 per cent; large, 35 per cent. Blank bolts, 40 and 5 per cent. Bolt ends, h. p. nuts, 40 and 5 per cent; with c. p. nuts, 35 per cent. Rough stud bolts, 15 per cent. Lag screws (cone or gimlet point), 50 and 5 per cent.

Forged set screws and tap bolts, 10 per cent. Cup and round point set screws, case-hardened, 60 per cent. Square or hexagon head cap screws, 55 per cent. Flat, button, round or fillister head cap screws, 30 per cent.

Nuts, h. p. sq., tapped or blank, $2.70 off list; hex., $2.70 off. Nuts, c. p. c. and t. sq., tapped or blank, $2.40 off; hex., $2.80 off. Semi-finished hex. nuts, 60 and 5 per cent. Finished and case-hardened nuts, 60 and 5 per cent.

Rivets, 7/16 in. in diameter and smaller, 45, 10 and 5 per cent.

Hoops and Bands.—The demand is heavy, but most large consumers are covered through the first quarter and first half of next year. The nominal price of the Carnegie Steel Company on hoops is 3c., and bands, 2.70c., but with no promise of delivery. Other makers quote steel hoops as high as 3.25c. and steel bands at 3c. for specified delivery.

Wire Rods.—There is a runaway market in wire rods, the supply being limited and the new demand heavy. One local maker has sold soft rods, either Bessemer or open-hearth, at $65 a ton at mill, and the buyer was glad to get them. High carbon rods have been quoted from $75 to $85, and one sale is reported to have been made at close to $70 at mill. We quote soft Bessemer, open-hearth and chain rods at $60 to $65 per gross ton, f.o.b. Pittsburgh, but it would be hard to find rods at the lower price.

Wrought Pipe.—A leading mill in the Wheeling district has taken an order for 120 miles of 6 and 8 in. line pipe for delivery to an Oklahoma oil interest. The Texas Gas Company is in the market for 10 miles of 6-in. All the pipe mills are refusing to quote to any but regular customers, and on lap-weld sizes the leading interest reports it has its output sold up for about eight months. The Jones & Laughlin Steel Company, which came in the market recently as a maker of lap and butt weld pipe, is reported to be in shape to make fairly prompt deliveries. On butt-weld sizes, mills can ship out in three to four weeks. The Wheeling Steel & Iron Company last week lowered discounts on lap-weld steel pipe three points, an advance of $6 per ton, and on butt weld, one point, an advance of $2 per ton. Discounts on black and galvanized iron and steel pipe in effect from Nov. 1, 1916, are given on another page.

Boiler Tubes.—Local makers are sold up on locomotive and merchant iron and steel tubes to July 1, 1917, or longer, and on seamless steel tubing have their entire output sold up for all of next year. Any mills that are in position to make fairly prompt deliveries on either locomotive or merchant tubes have no trouble in getting premiums over regular prices. Discounts are given on another page.

Old Material.—Signs are that scrap is finally coming into its own, it being the last material to respond to the much higher prices ruling on other products. In the past week selected heavy steel scrap is reported to have sold at close to $21, delivered. Borings and turnings are up fully $1 per ton, and low phosphorus melting stock is also higher. Not a very large amount of scrap is being bought by consumers, but the available supply is light. Dealers are afraid to sell short, while those who have scrap piled in their yards are strongly inclined to hold it for higher prices. The market shows every sign of being higher in the very near future. A sale of 2000 tons of selected heavy steel scrap is reported at $20.50, and another sale of a larger amount at $21, the latter for delivery to a consumer in the Youngstown district. Prices now being quoted by dealers for delivery in Pittsburgh and points that take the same rates of freight, per gross ton, are as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	$20.00 to $21.00
No. 1 foundry cast	16.50 to 17.00
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	22.00 to 23.00
Hydraulic compressed sheet scrap	15.50 to 16.00
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	13.00 to 13.50
Bundled sheet stamping scrap	13.00 to 13.50
No. 1 railroad malleable stock	16.50 to 17.00
Railroad grate bars	12.00 to 12.50
Low phosphorus melting stock	23.00 to 24.00
Iron car axles	42.00 to 43.00
Steel car axles	42.00 to 43.00
Locomotive axles, steel	43.00 to 44.00
No. 1 busheling scrap	15.50 to 16.00
Machine-shop turnings	8.50 to 9.00
Old carwheels	16.50 to 17.00
Cast-iron borings	10.00 to 10.50
*Sheet bar crop ends	21.00 to 22.00
No. 1 railroad wrought scrap	20.50 to 21.00
Heavy steel axle turnings	12.50 to 13.00
Heavy breakable cast scrap	15.00 to 15.50

*Shipping point.

Coke.—The market has quieted down to some extent. Furnace operators that have not covered on their supply of furnace coke for first half of next year say they are not going to pay $4 per ton for coke, but will hold off. Some consumers of furnace coke who covered their needs for the first half several months ago at $2.30 to $2.50 are now getting a little nervous over these contracts, wondering whether they will get the coke when they need it, in view of the fact that other producers will get $3.75 or $4, or more, for their coke for the same delivery. Very high prices continue to rule on coal, and as long as these last, there is not likely to be a serious decline in the price of coke. The new demand for prompt blast-furnace coke is not so active as it was, but prices are firm on the basis of about $7.50 per net ton at oven, and we note a sale of

20 cars made on Monday at that price. No pressing inquiries are in the market for furnace coke for first half delivery. We quote best grades of Connellsville furnace coke for prompt shipment at $7 to $7.50, and on contracts for first half of 1917 at $3.75 to $4 per net ton at oven. A contract for 10,000 tons of blast-furnace coke per month for first half of 1917 is reported at $4 per net ton. We quote best grades of 72-hr. foundry coke at $7 to $8 per net ton for spot shipment, and on contracts at $4.50 to $5 per net ton at oven. The Connellsville *Courier* gives the output of coke in the upper and lower Connellsville regions for the week ended Oct. 28 as 430,331 net tons, an increase over the previous week of 32,235 tons. This is the largest increase shown in any one week for some months.

Chicago

CHICAGO, ILL., Nov. 7, 1916.

The buying of cars, of rails and track fastenings and of bars by the implement manufacturers stands out as the prominent activity of the week in rolled steel products. Over 12,000 cars have been bought, for which close to 100,000 tons of steel have been placed on mill books. Nearly 100,000 tons of rails, for delivery in 1917, were placed, of which 50,000 tons for France and 30,000 tons for a transcontinental line of the Northwest were the large items. The implement makers have been adding to previous purchases of bars and the aggregate of a large number of orders runs up to 40,000 tons. With respect to prices, the market is in an almost feverish condition, with quotations on contracts for plates, for the last half of 1917, as high as 4.60c., with black sheets at a minimum of 3.65c., and running up to 4.25c., galvanized sheets as high as 6c., and wire products up $3 per ton. The bar-iron mills have very little to sell at 2.40c. and for rail-carbon steel, 2.60c. is being asked, with a further prospective advance of $3 per ton. Store prices also have been advanced for shapes, plates, sheets and bars. There has been heavy contracting in bolts and nuts. The scarcity of pig iron now available at any price is keeping the market on edge even though the volume of inquiry is less. Prices are still moving upward and there is practically no Northern iron to be had at less than $25 at Chicago furnace, while from $21 to $21.50 at Birmingham has been realized on recent sales of Southern iron. Charcoal-iron quotations have been moved up correspondingly. The advance in prices of scrap are exceeding expectations, and in view of the great scarcity of some grades are likely to run to still higher levels. Cast-iron pipe, for which there is inquiry at Chicago amounting to 18,000 tons, has also been put up $1 per ton.

Rails and Track Supplies.—Heavy bookings of rails were a feature of the week, an order coming from France for 50,000 tons, which, with the closing of requirements of the Great Northern for 30,000 tons and the placing of 5000 tons each by the Soo Line and the St. Louis & Southwestern, brought the total close to 100,000 tons. The one railroad also contracted for track fastenings, including 15,000 kegs of spikes, 8000 kegs of bolts and 7000 tons of tie plates. It is understood that no consideration is being given by the mills to rails for 1918 delivery and there is no important inquiry of this nature reported. Quotations are as follows: Standard railroad spikes, 2.75c., base; track bolts with square nuts, 3.25c. to 3.50c., base, all in carload lots, Chicago; tie plates, $52 to $54, f.o.b. mill, net ton; standard section Bessemer rails, Chicago, $33, base; open-hearth, $35; light rails, 25 to 45 lb., $40; 16 to 20 lb., $41; 12 lb., $42; 8 lb., $43; angle bars, 2c., Chicago.

Pig Iron.—The principal seller of pig iron at Chicago, with but little iron of any grade remaining to be sold, is asking a minimum of $25 at the furnace for foundry, malleable and basic iron. Selling continued actively throughout last week, one transaction at $24.50 for 5000 tons of basic iron indicating the course of the market. In the past few days there have been sales of standard Bessemer at $27.50, Chicago, while other quotations have run as high as $29. An important steel foundry interest is still in the market for 5000 tons of Bessemer. At the end of last week some Southern iron was still available on the basis of $18, Birmingham, but two producers quoting that price have since withdrawn from the market, and subsequent sales have been at prices $3 per ton higher. The charcoal-iron interests are understood to have put their prices up from $3 to $5 per ton and $25.75, Chicago, is not now out of line. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of $1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5	$25.75 to $26.25
Lake Superior charcoal, No. 1	26.25 to 26.75
Lake Superior charcoal, No. 6 and Scotch	26.75 to 27.25
Northern coke foundry, No. 1	25.50
Northern coke foundry, No. 2	25.00
Northern coke foundry No. 3	24.50
Northern high phosphorus foundry	24.00 to 24.50
Southern coke No. 1 f'dry and 1 soft	24.50 to 25.00
Southern coke, No. 2 f'dry and 2 soft	24.00 to 24.50
Malleable Bessemer	25.00
Basic	25.00
Low phosphorus	40.00
Silvery, 8 per cent	34.50 to 35.50
Bessemer ferrosilicon, 10 per cent	40.50 to 42.50

Structural Material.—Car builders last week closed with the railroads for a total of more than 12,000 cars. The Haskell & Barker Car Company will build 450 refrigerators for Morris & Co. and 500 box for the Duluth, South Shore & Atlantic; the American Car & Foundry Company, 1500 box for the Union Pacific, 400 ballast for the Illinois Central and 1500 box for the Chicago & Northwestern; the Bettendorf Company, 500 refrigerators for Morris & Co.; the Mount Vernon Car & Mfg. Company, 750 underframes for the Louisville & Nashville; the Standard Steel Car Company, 1000 gondolas for the Illinois Central, 1000 box for the Erie and 1000 gondolas for the New York Central Lines, the last two items having been mentioned as placed a week ago; the Barney & Smith Car Company, 500 stock for the Chicago & Northwestern, and the Western Steel Car & Foundry Company, 3000 cars, of which 1500 are understood to be for the Chicago, Burlington & Quincy. Other cars for which negotiations are still pending include 300 ore cars for the Northern Pacific, 2000 hoppers for the Chesapeake & Ohio, 600 gondolas for the Illinois Central, 1000 box for the Pere Marquette, 2000 box for the New York Central Lines, 1000 stock for the Missouri, Kansas & Texas and 1000 automobile cars for the San Pedro, Los Angeles & Salt Lake City. For the cars that have been placed a total of nearly 100,000 tons of shapes, plates and bars is estimated to have been booked. Contracts for structural steel for building purposes were small except for 3000 tons awarded to the American Bridge Company for the terminal freight-house of the Chicago, Burlington & Quincy Railroad at Chicago. We quote for Chicago delivery of structural steel from mill 2.989c.

The price of structural steel from store has been advanced [illegible] on and we quote for Chicago delivery from jobbers' 3.5c.

Plates.—Sellers of plates report little or no falling off in the inquiry for plates in all sizes. For prompt shipment of tank plate in average widths, 3.75c., Pittsburgh, is being regularly done, and for wide plates, practically no orders can be placed at less than 4.50c., prices in some instances running to 5c. Buyers seeking to place contracts for plates in the last half of next year have been quoted 4.60c., but few plate makers are interested in business that far ahead. We quote for Chicago delivery of plates from mill at its convenience 3.439c. For prompt shipment, we quote 3.689c. to 3.939c. in widths up to 72-in., and for wide plates 4.439c. to 4.689c.

An advance of $5 per ton has been announced in the price of plates out of store and we quote for Chicago delivery from jobbers' stock 4c.

Sheets.—A general advance in the price of sheets has been made by all of the mills with the leading interest quoting as a minimum 3.65c., Pittsburgh, for

one-pass Bessemer sheets and 3.85c. for open hearth. Other mills are quoting as high as 4.25c., for No. 28 black and in galvanized sheets, business has been transacted on the basis of 6c., Pittsburgh. In view of the number of mills that are not quoting on any business, inquiry is more than equal to the offerings by the remaining makers. We quote, for Chicago delivery, blue annealed, No. 16 and heavier, 3.439c. to 3.589c.; box annealed, No. 17 and lighter, 3.839c. to 3.939c.; No. 28 galvanized, 5.689c. to 6c.

We quote for Chicago delivery of sheets out of stock, minimum prices applying on lots of 2 tons or more, as follows: No. 10 blue annealed, 3.65c.; No. 28 black 3.90c. to 4c.; No. 28 galvanized, 5.40c. to 5.50c.

Bars.—The past two weeks have brought out a general buying of bars by the implement interests. Individual orders have not been noticeably large, but there has been a general augmenting of tonnages under contract, with the result that approximately 40,000 tons has been recently closed. The advancing prices of scrap, of coal and of labor are firming up the prices for both iron and rail-carbon steel bars. Some business is still being done in bar iron at 2.40c., Chicago, but quotations are more frequently higher; while for rerolled steel an advance of $2 per ton has already been made and a further advance is contemplated. Sales of bar iron in October mounted almost to record figures, but for high-carbon steel bars the demand is still only moderate. We quote mill shipment, Chicago, as follows: Bar iron, 2.40c. to 2.50c.; soft steel bars, 2.889c.; hard steel bars, 2.60c.; shafting, in carloads, 20 per cent off; less than carloads, 15 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 3.35c.; bar iron, 3.35c.; reinforcing bars, 3.35c. base with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting net list.

Rivets and Bolts.—Contracting by the implement interests, by the railroads and by hardware jobbers has been specially active, the railroads having still to close a number of contracts under negotiation. Buying by jobbers in particular is indicative of the change in sentiment, and the permanence of high prices now seems to be generally accepted. We quote as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 50-5; cut thread, 40-10-2½; larger sizes, 35-2½; machine bolts up to ⅜ x 4 in., rolled thread, with hot pressed square nuts, 50-10; cut thread, 50; large size, 40-5; gimlet-point coach screws, 50-5; hot pressed nuts, square, $2.70 off per 100 lb.; hexagon, $2.70 off. Structural rivets, ¾ to 1¼ in., 4c. to 4.15c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

Store prices for rivets have been advanced and we quote as follows: Structural rivets, 4.25c.; boiler rivets, 4.35c.; machine bolts up to ⅜ x 4 in., 50; larger sizes, 40-5; carriage bolts up to ⅜ x 6 in., 40-10; larger sizes, 35-5; hot pressed nuts square, $3, and hexagon, $3 off per 100 lb.; lag screws, 50-5.

Cast-Iron Pipe.—The City of Chicago is advertising for bids on 18,000 tons, but this is the only important inquiry in this territory. Prices of pipe have been advanced $1 per ton. We quote as follows, per net ton, Chicago: Water pipe, 4 in., $35.50; 6 in. and larger, $32.50, with $1 extra for Class A water pipe and gas pipe.

Wire Products.—An advance of $3 per ton has been announced by the leading wire interest on wire nails, plain and barb wire, and also a three-point advance for fencing. The principal interest is assuming a markedly conservative attitude in the matter of further selling, in consequence of the general concern regarding manufacturing conditions now so seriously threatened by fuel and car shortage. We quote as follows per 100 lb.: Plain wire, Nos. 6 to 9, base, $3.089; wire nails, $3.039; painted barb wire, $3.189; galvanized barb wire, $3.889; polished staples, $3.189; galvanized staples, $3.889; all Chicago.

Old Material.—Prices of scrap are moving upward without check. Astonishing advances of from $1 to $3 per ton are noted. All grades of old material emanating from the railroads or requiring fabrication are scarce, and are being quoted at abnormally high prices. Rerolling rails in particular are difficult to secure, one railroad selling last week at $24.50 and another at $25. In some instances relaying rails have been purchased for rerolling purposes, with a resultant sharp advance in their price. With the price level of heavy melting steel as high as it is and the supply as limited, short rails are in exceptional favor. Wrought scrap and busheling also show substantial advances. Railroad offerings of scrap are again small, and include 850 tons from the Vandalia, 2000 tons from the Wabash, 1600 tons from the Pere Marquette and 500 tons from the Soo Line. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	$21.00 to $21.50
Relaying rails	24.00 to 25.50
Old carwheels	16.00 to 16.50
Old steel rails, rerolling	24.50 to 25.00
Old steel rails, less than 3 ft.	22.50 to 23.00
Heavy melting steel scrap	19.00 to 20.00
Frogs, switches and guards, cut apart	20.00 to 20.50
Shoveling steel	19.00 to 19.50
Steel axle turnings	10.00 to 10.50

Per Net Ton

Iron angles and splice bars	$22.50 to $23.00
Iron arch bars and transoms	24.00 to 25.00
Steel angle bars	18.00 to 19.00
Iron car axles	30.00 to 31.00
Steel car axles	37.00 to 38.00
No. 1 railroad wrought	20.00 to 20.50
No. 2 railroad wrought	19.00 to 19.50
Cut forge	17.00 to 17.50
Pipes and flues	14.00 to 14.50
No. 1 busheling	16.00 to 16.50
No. 2 busheling	11.50 to 12.00
Steel knuckles and couplers	19.50 to 20.00
Steel springs	20.00 to 20.50
No. 1 boilers, cut to sheets and rings	12.50 to 13.00
Boiler punchings	17.50 to 18.00
Locomotive tires, smooth	24.75 to 25.25
Machine-shop turnings	7.00 to 7.50
Cast borings	7.25 to 7.75
No. 1 cast scrap	15.50 to 16.00
Stove plate and light cast scrap	12.25 to 12.75
Grate bars	12.00 to 12.50
Brake shoes	12.00 to 12.50
Railroad malleable	16.00 to 16.50
Agricultural malleable	14.00 to 14.50

Philadelphia

PHILADELPHIA, PA., Nov. 6, 1916.

The excited condition of the pig-iron market continues the dominant feature. The minimum for eastern Pennsylvania No. 2 X appears to be $24, furnace, with the producers backward about selling at that level. Over 20,000 tons of basic has been purchased at $25 to $25.50, delivered. Consumers show unabated zeal in endeavoring to cover 1917 requirements. Virginia No. 2 X is quoted at $24, furnace, equal to $26.75, Philadelphia. A prominent plate mill is so filled with business that it has raised its quotation for tank plates to 4.75c., Pittsburgh base. J. P. Morgan is in the market for 50,000 tons of structural shapes, for which one producer now quotes 3c., Eastern mill. The demand for car material is extremely strong, indicating that the carbuilders have abandoned hope of lower prices and intend to cover their needs at present levels. Local mills are not yet showing any interest in heavy melting steel, but its quotation is strengthened by the big demand in the West. Meanwhile rolling mills and foundries are active buyers, and the old material market shows a general upward trend in prices. The spot coke situation is more serious than ever, prominent makers having withdrawn all offerings.

Pig Iron.—The market is active, with consumers pressing to buy to a considerable extent into the last half of 1917, despite the fact that minimum prices for No. 2 X are close to $25, delivered. Up to $27.50 is quoted. A few weeks ago the optimistic among the trade were predicting $25 iron, and now that this level has arrived they are asserting that the price will go to $30. Notwithstanding all the talk of a shortage, iron is available in several directions, but the holders are reluctant to sell, feeling that prices even more advantageous than those prevailing will be obtainable later. Many large buyers in recent weeks have quietly covered their requirements and this fact, together with the absorption of iron for export, is responsible for the situation. Basic is firmly on the $25 level. A Phoenixville interest has taken about 22,000 tons of eastern Pennsylvania basic, in two lots, at $25 to $25.50, delivered, 12,000 tons going for the lower price. Makers who last week asked $23 furnace, for No. 2 X foundry

have advanced their furnace price to $24 and many sales have been made at this level for future delivery, the freight rate in one instance being 79c., but they make it understood that they are not anxious to sell at this price. A large Buffalo producer has withdrawn from the market for any delivery. Late last week the largest producer of Virginia iron, which has been out of the market entirely, announced that orders would be accepted at $22, furnace, or $24.75, Philadelphia, for No. 2 X. So much business came in that this maker subsequently advanced his price to $24, furnace, or $26.75, Philadelphia. Buying of Virginia brands is not as heavy as it was, but this is to be expected in view of the great tonnage recently booked. Practically no prompt or first half is available. Southern iron is equally strong at $19 to $20, Birmingham, some makers having only second-half to sell. They have heavy commitments for export. Inquiries from abroad continue to appear, but some of them are sadly lacking in detail as to the character of iron wanted, one such inquiry for 5000 to 10,000 tons for export to Sweden merely asking for American pig iron. Standard low phosphorus is active and stronger at $43 to $45, delivered. Copper bearing low phosphorus is quoted at $38, furnace, with sales reported at $40, furnace. Quotations for standard brands delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa. No. 2 X foundry	$24.00 to $25.00
Eastern Pa. No. 2 plain	23.50 to 24.50
Virginia No. 2 X foundry	26.75
Virginia No. 2 plain	26.50
Gray forge	22.50 to 23.00
Basic	25.00 to 25.50
Standard low phosphorus	43.00 to 45.00

Iron Ore.—The only arrival of foreign ore reported at this port in the week ended Nov. 4 consisted of 7600 tons from Cuba. The foreign ore business continues dormant. A moderate quantity of Lake Superior ore for delivery this year is offering.

Ferroalloys.—In English 80 per cent ferromanganese there is no change, first half material being obtainable at $164, seaboard. The prompt situation is in the hand of domestic makers, who are asking $165, but might scale their price down to $162.50. Spiegeleisen, 19 to 21 per cent, is quoted at $45, delivered, with a possibility of $44 being done. For 11 per cent blast-furnace ferrosilicon, some makers are asking $44.44. Standard 50 per cent ferrosilicon is about $100, Pittsburgh. Last week 210 tons of English ferromanganese arrived here.

Plates.—One of the more prominent eastern Pennsylvania plate mills has advanced its base price for tank plates to 4.75c., Pittsburgh, or 4.909c., Philadelphia, and asks 10.40c., Pittsburgh, for marine boiler steel. For ship plates it asks 5c. to 5.50c., Pittsburgh. It has found the car builders anxious to contract for material as far ahead as possible, and would soon be swamped if it took all the business offered. Universal plates are rapidly becoming as tight as sheared plates. Under a terrific pressure this mill is hampered by a lack of men and other detriments to increased output. A large part of the ship plate demand is coming from the vessels which Norwegians are having built in this country. Another mill which asks 4.50c., Pittsburgh, or 4.659c., Philadelphia, for ship plates, in the past week booked about 25,000 tons. Its quotation for tank plates is 4.159c., Philadelphia, but it is no secret that this price can be shaded.

Bars.—While some makers will supply steel bars to their regular customers on the basis of 2.70c., Pittsburgh, or 2.859c., Philadelphia, others quote 3.009c. to 3.159c., Philadelphia. Iron bars are moving actively at the unchanged price of 2.659c., Philadelphia, carload lots.

Structural Material.—J. P. Morgan & Co., purchasing agents for Great Britain, are in the market for about 50,000 tons of shapes, limited to few sizes. One mill, which like the others, has but little to sell, quotes 3.009c. for structurals and 3.659c. for ship shapes. Another producer abandoned the 2.85c., Pittsburgh base last week, and now quotes 3c., Eastern mill. The demand is strong, coming from jobbers, shipbuilders, railroads and carbuilders, all wanting plain material. No fabricated propositions are under consideration by the mills.

Billets.—The domestic demand for billets is developing more strongly than that for export, and it is believed that foreign consumers will seek finished rather than raw material from this time on. Discarded shell steel is scarce. Open-hearth rerolling billets are strong at $50 to $55, and high carbon billets at $65 to $75.

Sheets.—The market continues active and strong. No. 10 blue annealed are quoted at 3.409c. to 3.759c., Philadelphia.

Coke.—No relief is in sight so far as spot fuel is concerned, while the producers are not willing to contract with prompt prices soaring. High as prices are, one or two coke producers have withdrawn from the market. Prompt foundry has been quoted at $9 to $9.50 per ton, and contract at $5 to $6 per net ton at oven. Spot furnace is $7.25 to $7.75 per net ton at oven, and contract, nominally $3.75 to $4. Freight rates from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Old Material.—Buying by the rolling mills has been good and the foundries are active, but the mills refrain from entering the market for heavy melting steel. The market is strong, and its strength augmented by demand from the West and a tendency on the part of those having scrap to hold it more tightly. Turnings and borings are strong, and advances are predicted. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$17.00 to $17.50
Old steel rails, rerolling	21.00 to 22.00
Low phos. heavy melting steel scrap	23.50 to 24.50
Old steel axles (for export)	35.00 to 36.00
Old iron axles (for export)	35.00 to 36.00
Old iron rails	21.00 to 22.00
Old carwheels	17.00 to 17.50
No. 1 railroad wrought	23.50 to 24.00
Wrought-iron pipe	16.50 to 17.00
No. 1 forge fire	13.50 to 14.00
Bundled sheets	12.50 to 13.00
No. 2 bushelling	10.50 to 11.00
Machine-shop turnings	9.50 to 10.00
Cast borings	10.50 to 11.00
No. 1 cast	17.00 to 17.50
Grate bars, railroad	14.00 to 14.50
Stove plate	14.00 to 14.50
Railroad malleable	15.00 to 16.00

Cleveland

CLEVELAND, OHIO, Nov. 7, 1916.

Iron Ore.—Ore shipments during October amounted to 9,116,096 gross tons, making the total Lake movement up to Nov. 1, 57,932,746 tons. It is now practically sure that the movement for the season will be close to 64,000,000 tons, or somewhat larger than estimates earlier in the season. It is expected that the November movement will amount to 6,000,000 and some ore will be moved in December. Shippers are taking all the available vessel room and some will load ore as long as the weather permits. Less interest is being shown in the ore market for next year than was the case a month ago, owing to the fact that a large share of the consumers have made reservations for their 1917 requirements and need show no further anxiety over their ore supply. No important developments have appeared in the price situation although there apparently is no longer any doubt that the advance in ore prices will be at least $1 a ton and it may be slightly more than $1 for Bessemer ores. The advance in the vessel rate will probably be to $1 a ton. Lake Erie docks on Nov. 1 held 8,793,586 gross tons of ore, an increase of 1,763,562 tons over the balance on Oct. 1. The large increase in ore placed on the docks was due partly to the car shortage which prevented considerable ore from going directly to the furnaces. The dock balance on Dec. 1 will probably break all former records. We quote 1916 prices as follows, delivered lower Lake ports: Old range Bessemer, $4.45; Mesaba Bessemer, $4.20; old range non-Bessemer, $3.75; Mesaba non-Bessemer, $3.55.

Pig Iron.—Prices continue to advance on all grades. Some lots of Bessemer iron have been sold by Valley furnaces at $27 for first half delivery and we note the

sale of a round lot of basic iron for the last half of next year by a Valley interest at close to $23.50. Foundry and malleable grades have been advanced to from $24 to $25, Cleveland, Toledo and Valley furnaces, and the same prices are being asked for basic. Some small-lot sales of foundry iron are reported at $25 by Cleveland and Valley furnaces. Considerable inquiry is coming out for iron for both first and last half. Little Northern iron is now available for first half delivery, most furnaces having booked orders for as much as they feel they can safely take on for that delivery. Southern iron has sold up to $20, Birmingham, for No. 2. Some producers are entirely sold up and have withdrawn from the market for the first half and are quoting the high prices for the last half. Several sales were made last week at $18, Birmingham, for No. 2 for first half delivery. Ohio silvery is quoted at $30 for delivery through both the first and last half of next year. The United Furnace Company, Canton, Ohio, has completed its new stack and will begin making basic iron next week for its allied interest, the United Alloy Steel Corporation. We quote, delivered Cleveland, as follows:

Bessemer	$27.95
Basic	$24.50 to 24.50
Northern No. 2 foundry	24.50 to 25.50
Southern No. 2 foundry	24.00
Gray forge	23.95
Jackson Co., silvery, 8 per cent silicon	31.62
Standard low phos., Valley furnace	40.00 to 41.00

Coke.—We note the sale of 250 tons of foundry coke for prompt shipment at $11 per net ton at oven for immediate delivery, but the usual quotation for standard Connellsville brands for prompt shipment is $8 to $8.25. Some furnace coke for prompt shipment has been obtained at $7, but the usual quotation is $7.50 to $8. For contract Connellsville furnace coke is quoted at $3.75 to $4. Many producers are sold up and will not quote on foundry grades for contract.

Bolts, Nuts and Rivets.—The demand for bolts and nuts is heavy, and with the $3 a ton advance in wire products a price advance is expected shortly. A large amount of business is being booked in first quarter and first half contracts. Outstanding quotations on rivets are being withdrawn, and there is a probability that the present prices of 4c., Pittsburgh, for structural and 4.10c. for boiler rivets will be advanced. Rivet specifications are heavy. Bolt and nut discounts are as follows:

Common carriage bolts, ⅜ x 6 in., smaller or shorter, rolled thread, 50 and 5; cut thread, 40, 10 and 2½; larger or longer, 35 and 2½; machine bolts within h. p. nuts, ⅜ x 4 in., smaller and shorter, rolled thread, 50 and 10; cut thread, 50; larger and longer, 40 and 5; lag bolts, gimlet or cone point, 50 and 5; square h. p. nuts, blank or tapped, $2.70 off the list; hexagon h. p. nuts, blank or tapped, $2.70 off; c. p. c. and t. sq. nuts, blank or tapped, $2.40; hexagon nuts, all sizes, $2.80 off; cold pressed semi-finished hexagon nuts, all sizes, 60 and 5.

Finished Iron and Steel.—The demand for steel for early shipment continues very heavy, and there is a large volume of inquiry for first half contracts. Ohio tank shops are making considerable plate purchases at 4c., Pittsburgh. Eastern mills have advanced prices in this market and are now quoting plates at 3.75c. to 4c. for universal and 4.75c. for sheared plates, and structural material at 3c., delivered within the next three to six months. Considerable business is being placed by jobbers with mills able to make rather early deliveries, and fabricating shops are placing stock orders for structural material. Local bar-iron mills have withdrawn from the market because they fear that the coal shortage will interfere with operations. We quote bar iron at 2.50c. to 2.65c., Pittsburgh. The advance in the price of old rails has caused a stiffening up in the price of hard steel bars, which are now quoted at 2.60c. and 2.75c. at mill. The demand for sheets is very heavy and prices continue to advance. There is a shortage in the supply, and consumers are trying to cover by securing such deliveries as mills are able to make. A 5c. price is predicted for black sheets, which have sold as high as 4.30c. out of stock. Some mills are asking higher than warehouse prices. We quote sheets at 3.75c. to 4c., Ohio mill, for No. 28 black, 3.30c. to 3.75c. for No. 10 blue annealed, and 5c. to 5.50c. for No. 28 galvanized. Cleveland warehouse prices have been advanced $2 a ton on steel and iron bars and structural material and $5 a ton on plates, and others items have been advanced. New stock prices are as follows: Steel bars under 2 in., 3.50c.; squares and rounds, 2 in. and over, and flats over 1 in., 4c.; plates, 4.10c.; structural material, 3.60c.; No. 28 black sheets, 3.90c.; No. 10 blue annealed sheets, 3.75c.; hoops, 4.25c., and iron bars, 3.45c.

Old Material.—Scrap prices continue to advance, quotations having been marked up on about every grade, including borings and turnings, which have been inactive and weak. The market is very firm at the new prices, and sellers are looking for further advances. The local market is dull, but the demand for shipments to Youngstown and Canton continues active. Local dealers are offering as high as $19.50 for railroad melting steel. In the Valley heavy melting steel scrap is selling at $19.50. Iron rails have advanced about $4 a ton, sales being reported at as high as $24 per gross ton. Foundry grades, including malleable scrap, are $1 a ton or more higher. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton

Steel rails	$19.00 to $20.00
Old steel rails under 3 ft	22.00 to 22.50
Iron rails	23.00 to 24.00
Steel car axles	40.00 to 42.00
Heavy melting steel scrap	18.00 to 19.00
Carwheels	17.00 to 16.00
Relaying rails, 50 lb. and over	2.00
Agricultural malleable	14.50 to 15.00
Railroad malleable	17.50 to 18.00
Steel axle turnings	12.00 to 12.50
Light bundled sheet scrap	12.00 to 12.25

Per Net Ton

Iron car axles	$36.00 to $37.00
Cast borings	7.00 to 7.25
Iron and steel turnings and drillings	6.00 to 6.25
No. 1 busheling	14.25 to 14.75
No. 1 railroad wrought	18.50 to 19.00
No. 1 cast	15.50 to 16.00
Railroad grate bars	12.50 to 12.75
Stove plate	12.50 to 13.00

Birmingham

BIRMINGHAM, ALA., Nov. 6, 1916.

Pig Iron.—On Nov. 1 a prominent Southern interest sold 1000 tons for Middle Western delivery at $17.50, announced a minimum of $18, and withdrew from the market expecting still higher prices. The leading producer and the largest foundry-iron maker followed the example, both advancing to $18 minimum and both announcing order books as well filled as they cared to have them. Some sales at $18 were made Friday. Even the conservative are looking for spot iron to reach $20 within a week. In fact, there have been two sales of export foundry, one of 6000 tons and one of 4000 tons, by Alabama and Tennessee furnaces respectively, at $20. There never was such a pressure on the Southern iron maker. Inquiries are coming from customers never before heard of in the Southern market. Information is passing through the trade that a lot of iron badly needed shortly has not been bought and those who need it must pay the price. Producers report an improved movement of pig iron in spite of the car shortage—so much so that stocks are diminishing and there is no longer any anxiety in that direction. Stocks in this condition of the market are really desirable. The car situation has been helped by refusals to furnish cars for points where they are apt to be long off the original road. Some Virginia coal orders were not filled for this reason. The Tennessee Company has blown out a stack at Bessemer for relining after 16 months of active operation. The Republic Company's idle stack will go in soon. Steel plants are making new high records. The Gulf States Steel Company produced 20,070 tons of billets in October, 2766 tons of barb wire and 3757 tons of galvanized wire, besides other products. Its blast furnace turned out 10,126 tons. We quote, per gross ton, f.o.b. Birmingham district furnaces, minimum prices as follows:

No. 1 foundry, [illegible]	[illegible]
No. 2 foundry, [illegible]	[illegible]
No. 3 foundry	[illegible]
No. 4 foundry	[illegible]
Gray forge	[illegible]
Basic	[illegible]
Charcoal	[illegible]

Cast-Iron Pipe.—Makers are in a quandary. Cost of other material has increased so that municipalities

show a disposition to hold off making improvements. Hence, although the pipe makers feel that an increase in price of pipe ought to be made in consonance with the rise in pig iron, they hesitate to do so lest this should further halt prospective customers. However, an advance is imminent. Oil pipe is active. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., $29; 6-in. and upward, $26, with $1 added for gas pipe and 160-ft. lengths.

Coal and Coke.—As high as $5 per ton, f.o.b. mine, for ordinary steam coal was paid by the Du Pont Company for shipment to Hopewell, Va., to which $4.53 freight must be added. Many mills in the South have closed down days at a time for lack of fuel. Coke is selling up to $5 per net ton, f.o.b. oven, for standard beehive, and foundry coke has brought as much as $3.50 to $4. However, general levels for contract foundry coke are still around $4.25 to $4.50. Some spot coke has gone at $6. Spot markets have no regularity, any price being offered by belated consumers.

Old Material.—The advanced prices reported last week rule with strength and bid fair to go higher. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old steel axles	$25.00 to $30.00
Old steel rails	12.50 to 13.00
No. 1 wrought	15.00 to 15.50
Heavy melting steel	12.00 to 12.50
No. 1 machinery	11.50 to 12.00
Carwheels	11.50 to 12.00
Tram carwheels	11.00 to 11.50
Stove plate and light	9.50 to 10.00

Cincinnati

CINCINNATI, OHIO, Nov. 8, 1916.—(*By Wire.*)

Pig Iron.—The price situation is so complicated that it is difficult to determine what prompt shipment values of either Southern or Northern foundry iron should be. The latter part of last week a large tonnage of Southern iron was sold around $18, Birmingham basis, but sales at a higher figure were also made for first half delivery. It is rumored that a few melters were able to book their orders at $18 for delivery in the last half of next year, but the price for that shipment was advanced to $20 and by one furnace to $21. A number of Southern furnaces are not willing to open their books yet for business that far ahead. Prompt iron is unobtainable, except in small lots for old customers. The Northern furnaces are sold up on foundry, malleable and basic until July 1, and yard stocks in the Hanging Rock district are too small to be taken into consideration. Among sales reported are 1000 tons of Northern foundry and 500 tons of malleable in central Ohio for the last half of 1917 at $23, Ironton. Approximately 1600 tons was bought early last week for the same delivery by an Ohio melter at $22, Ironton, but to-day's quotation by all interests is on a basis of $24. In southern Ohio a sale was made of 4000 tons of mixed Northern and Southern grades for shipment in the second and third quarters of next year. Numerous sales of Southern foundry iron were made in Indiana for first half shipment, most of them averaging 500 tons each. Some business in that territory was taken for the last half. General reports indicate that last week's total tonnage booked will mark it as one of the best this year. As a consequence, few inquiries are now out. The sharp price advances also undoubtedly tend to keep consumers from coming into the market on the eve of the election. The silvery irons have registered another advance, and $32 at furnace is now minimum for an 8 per cent analysis. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 s'ft	$23.50 to $[illegible]
Southern coke, No. 2 f'dry and 2 s'ft	[illegible] to [illegible]
Southern coke, No. 3 foundry	[illegible] to [illegible]
Southern coke, No. 4 foundry	[illegible] to [illegible]
Southern gray forge	19.40 to 21.40
Ohio silvery, 8 per cent silicon	31.26 to 32.26
Southern Ohio coke No. 1	[illegible] to [illegible]
Southern Ohio coke, No. 2	[illegible] to [illegible]
Southern Ohio coke, No. 3	23.76 to 24.76
Southern Ohio malleable Bessemer	24.26 to 25.26
Basic, Northern	24.26 to 25.26
Lake Superior charcoal	23.20 to 24.20
Standard Southern carwheel	26.40 to 26.90

(*By Mail*)

Coke.—Figures named for nearby shipment are only nominal. As high as $8 at oven has been done on a small lot of furnace coke that was loaded on cars. Foundry coke for nearby shipment is quoted all the way from $7 to $10, although none has been sold at the last named figure as far as can be ascertained. Contracting is at a standstill on both furnace and foundry coke, and until the situation settles business will probably be confined to coke urgently needed by consumers.

Finished Material.—Local warehouses have marked up their prices on practically everything in stock, but they are still behind mill quotations in many instances. The store price on steel bars to-day is 3.45c.; twisted steel bars, 3.60c.; small structural shapes, 3.55c.; cold rolled shafting, 10 per cent plus list; plates, ¼ in. and heavier, 4.10c.; No. 10 blue annealed sheets, 3.75c.; rounds and hexagons, 2 in. and over, 4c. There is considerable improvement in business, even at the new prices named, as customers who are short are anxious to get under cover before further expected advances are made. The mill price to-day on No. 28 galvanized sheets is 5.40c., f.o.b. Cincinnati or Newport, Ky., and on No. 28 black sheets, 4.15c.

Old Material.—Dealers report the market as simply going wild. Advances that will average about $1 per ton on all grades of scrap have been made and there is a scramble by users to get under cover. Offerings are lighter than they have been for some time, and this connected with the phenomenal prices on pig iron has had considerable to do with stiffening up the scrap market. The following are dealers' prices, f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton

Bundled sheet scrap	$12.50 to $13.00
Old iron rails	19.75 to 20.25
Relaying rails, 50 lb. and up	24.25 to 24.75
Rerolling steel rails	20.00 to 20.50
Heavy melting steel scrap	17.75 to 18.25
Steel rails for melting	17.25 to 17.75

Per Net Ton

No. 1 railroad wrought	$18.00 to $18.50
Cast borings	5.50 to 6.00
Steel turnings	5.50 to 6.00
Railroad cast	14.25 to 14.75
No. 1 machinery cast	16.00 to 16.50
Burnt scrap	10.00 to 10.50
Iron axles	30.00 to 30.50
Locomotive tires (smooth inside)	23.75 to 24.25
Pipes and flues	11.75 to 12.25
Malleable and steel	13.50 to 14.00
Railroad tank and sheet	10.75 to 11.25

The C. L. Hils Company, Reedy Street, Cincinnati, expects to move its scrap yard to a site recently secured in West End. The present quarters are too small.

Buffalo

BUFFALO, N. Y., Nov. 7, 1916.

Pig Iron.—Prices continue to mount, with apparently no relief visible in the situation from the consumers' standpoint. Conditions are unprecedented; with all sources of supply contracted ahead for many months and no let up in demand in sight. One of the largest producers of the district announces that it is now entirely out of the market until after Jan. 1, 1918. Another large producer is practically sold up well over next year, and is now quoting $28, furnace, for immediate acceptance, for any deliveries it has available. Still another furnace, which yet has iron to sell, is holding its last half 1917 product at $30, with a minimum for first half delivery of $27 for any grade with a range to $28 for high-grade foundry, malleable and basic. A large sized tonnage of basic was to-day booked at $27.50, furnace. Bessemer has sold at $29, and is now held at from $29 to $30. Some yard stock iron owned by one interest is now held at $30 for spot delivery, and it is thought by most furnacemen that prompt delivery iron available from any furnace will soon reach that figure. We quote as follows, f.o.b., furnace, Buffalo, for last quarter and first half 1917 delivery:

High silicon irons	$27.00 to $28.00
No. 1 foundry	27.00 to 28.00
No. 2 X foundry	27.00 to 28.00
No. 2 plain	27.00 to 27.50
No. 3 foundry	27.00 to 27.50
Gray forge	27.00 to 27.50
Malleable	27.00 to 28.00
Basic	27.00 to 28.00
Bessemer	29.00 to 30.00
Charcoal, according to brand and analysis	27.00 to 27.50

Finished Iron and Steel.—Because of the rapid advance in the price of coke and coal and the absolute certainty of a scarcity in both products various steel companies have tightened up during the week and are more unwilling than ever to entertain additional forward obligations. This was brought about by their inability to know how much material they will be able to get out during the winter and because of the rapidly increasing cost of production. Warehouse prices have been advanced to 3.50c. for bars under 2 in., 3.60c. for structural, 4.10c. for plates and 4.25c. for hoops. Prices of wire products have advanced $3 per ton during the week, with the expectation on the part of both buyers and sellers that there will be a further advance before the close of the year. For the first time since the outbreak of the war there is an actual scarcity of wire nails. One selling agency reports an offer for wire rods equivalent to $68 per gross ton, Pittsburgh, but that it was unable to entertain it. The Buffalo Structural Steel Company has taken contract for 400 to 500 tons additional of structural steel for plant No. 3 of the International Graphite Company, Buffalo, and some additional tonnage of structural steel for the Wickwire Steel Company's new plant now under construction. The Eastman Kodak Company, Rochester, has, it is stated, let contract for reinforced concrete factory addition requiring 1000 tons of reinforcing bars to a Cincinnati construction company.

Old Material.—The market is very active and buoyant and prices have advanced all along the line. Some large sales have been made at the increased prices. Short orders held by dealers are still a feature of the market, causing such dealers to pay prices above what consumers would pay for like commodities. We quote dealers' asking prices, per gross ton, f.o.b., Buffalo, as follows:

Heavy melting steel	$18.50 to $19.00
Low phosphorus billet and bloom ends	24.00 to 25.00
No. 1 railroad wrought scrap	21.00 to 21.50
No. 1 railroad and machinery cast scrap	18.50 to 19.00
Steel axles	34.00
Iron axles	34.00
Carwheels	17.00 to 17.50
Railroad malleable	17.50 to 18.00
Machine shop turnings	7.50 to 8.00
Heavy axle turnings	13.50 to 14.00
Clean cast borings	9.00 to 9.50
Iron rails	20.50 to 21.00
Locomotive grate bars	13.50 to 14.00
Stove plate (net ton)	12.00 to 12.50
Wrought pipe	14.25 to 14.75
No. 1 busheling	16.00 to 16.50
No. 2 busheling	12.00 to 12.50
Bundled sheet scrap	13.00 to 13.50
Bundled tin scrap	15.00 to 15.50

St. Louis

ST. LOUIS, MO., Nov. 6, 1916.

Pig Iron.—The excited condition of the pig-iron market continued all through the week, with a rather wide spread of quotations as between the different furnaces. Opening Monday at $17, Birmingham, for No. 2 Southern foundry, the prices showed continuous advances, with sales made Saturday and to-day as high as $20 per ton, Birmingham. Transactions in Northern basic showed a similar condition as to price quotations, and sales were made at $24, Chicago, with the prices held to-day at $25, Chicago. A considerable number of sales of Bessemer ferrosilicon, 13 per cent, were made at $35 per ton, Ohio furnaces, with higher prices impending and $45 asked for 15 per cent silicon. On 4 to 5 per cent silicon a wide spread was noted as between different furnaces, ranging from $21 to $25 per ton. The excited character of the market was further exemplified by the readiness with which transactions were closed. The inquiry for 10,000 tons of basic was closed, being divided among several furnaces, no one furnace being in position to take the entire amount. There was very heavy buying in all grades and deliveries of foundry iron, the purchases coming from the stove-molding interests, car-wheel concerns, malleable foundries and all other branches of the trade. The aggregate, outside of the basic transaction referred to, is estimated at 25,000 tons for the week. The status of the market at this writing is shown by a variance in quotations for No. 2 Southern foundry, Birmingham basis, there being a range between $19 and $21, Birmingham. Foundries have purchased first half delivery iron with a view to carrying it over in their own yards when they found that furnaces would make no contracts for last half delivery at the prices prevailing. It is understood that the basic contract for 10,000 tons was done at $24 per ton, Chicago.

Coke.—The coke market, so far as quotations are concerned, remained in the same nervous condition as the week previous, but no transactions of consequence were closed. By-product coke, being considerably sold ahead so far as the local output is concerned, showed no particular feature during the week.

Finished Iron and Steel.—The leading interests are avoiding the acceptance of orders because of the extremely deferred deliveries now existing. In steel rails nibbles on standard sections are appearing for 1918 delivery; no specific inquiries for specified tonnages have been made. In track fastenings spikes are not so strong as bolts and angle bars. The warehouse interests advanced their prices, but movement out of warehouse stock continued active at these quotations: Soft steel bars, 3.40c.; iron bars, 3.35c.; structural material, 3.40c.; tank plate, 4.05c.; No. 10 blue annealed sheets, 3.70c.; No. 28 black sheets, cold-rolled, one-pass, 4.35c.; No. 28 galvanized sheets, black sheet gage, 5.60c.

Old Material.—The scrap market was very strong all week, with advancing prices as a result of increasing demand from the rolling mills, steel mills and foundries. Further accentuating the situation was the apparent short interest of some of the dealers. The light lists coming out from the railroads are also having a decided effect upon the situation, and two systems, the Missouri-Pacific-Iron Mountain and the Frisco, are putting out no lists at all, handling their scrap materials by special negotiations. Lists out included the following: Wabash, 1700 tons; Vandalia, 600 tons; Kansas City Southern, 350 tons; Union Pacific, 2000 tons. Relaying rails, continuously more difficult to get, are advancing with the accentuated scarcity. Altogether, the market is in an excited state, with transactions based largely upon the position of the buyer and seller at the moment of making the deal. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton	
Old iron rails	$21.00 to $21.50
Old steel rails, rerolling	22.00 to 22.50
Old steel rails, less than 3 ft.	21.50 to 22.00
Relaying rails, standard section, subject to inspection	25.00 to 27.00
Old carwheels	17.50 to 18.00
No. 1 railroad heavy melting steel scrap	20.00 to 20.50
Heavy shoveling steel	15.00 to 16.00
Frogs, switches and guards cut apart	19.00 to 20.50
Bundled sheet scrap	9.50 to 10.00

Per Net Ton	
Iron angle bars	$20.00 to $21.00
Steel angle bars	18.00 to 18.50
Iron car axles	31.50 to 32.00
Steel car axles	34.00 to 34.50
Wrought arch bars and transoms	24.50 to 25.00
No. 1 railroad wrought	18.00 to 18.50
No. 2 railroad wrought	18.00 to 18.50
Railroad springs	18.00 to 18.50
Steel couplers and knuckles	21.00 to 21.50
Locomotive tires, 42 in. and over, smooth inside	24.00 to 24.50
No. 1 dealers' forge	17.00 to 17.50
Cast-iron borings	8.50 to 9.00
No. 1 busheling	16.00 to 16.50
No. 1 boilers, cut to sheets and rings	13.00 to 13.50
No. 1 railroad cast scrap	12.00 to 13.00
Stove plate and light cast scrap	11.00 to 12.00
Railroad malleable	12.00 to 12.50
Agricultural malleable	11.00 to 11.50
Pipes and flues	11.00 to 11.50
Heavy railroad sheet and tank scrap	13.50 to 14.00
Railroad grate bars	11.00 to 11.50
Machine shop turnings	5.00 to 6.00

San Francisco

SAN FRANCISCO, CAL., Oct. 30, 1916.

New business is appearing rather slowly, though a few important inquiries are coming up, especially for plates and heavy sheets. Export demand continues to be an important item. Shipments on old contracts to manufacturers are large, and merchants also are specifying freely, though stocks in most lines are large and the tonnage going out in a jobbing way is hardly normal. Lumber interests are buying more than for some time. Manufacturing plants in nearly all lines are well

occupied, and shipbuilding capacity has not yet reached its maximum.

Bars.—Jobbing trade in merchant bars is quiet, but this apparently is much more than compensated for by the movement from mills to manufacturers. A fair amount of reinforcing steel has recently been placed for several large buildings, but requirements in this line are below expectations. Some Oriental business is coming through, but local mills at present have no great quantity available for export. The latter quote about 3c. on contracts for more or less distant delivery, while the latest figure on Eastern bars is around 2.75c., Pittsburgh. The jobbing figure remains at 4c.

Structural Material.—Inquiries for fabricated material continue few and usually small, and local shops are still somewhat hampered by the labor situation. Shipbuilders are constantly in the market, and most of them have placed contracts covering work for much of the coming year. Plans have been completed for a theater building in Berkeley. The California Steel Company has a small contract for the Carnegie Library at Sacramento, and plans are being drawn for a six-story building at Fresno, Cal.

Plates.—Foreign inquiries are still in the market, with mills showing no alacrity in bidding for them. The local ship situation shows no change. Tank and pipe manufacturers continue quite busy, and new inquiries amounting to about 1500 tons have just been received from southern California. Bids have also been taken for riveted pressure pipe for the Cherry River power development of the Hetch Hetchy project. It is rumored that the Union Oil Company is planning a new refinery at San Pedro. Mill quotations show great variation, narrow sizes being offered as low as 3.75s., or even 3.50c., Pittsburgh, while wide plates are firm at 4.25c.

Sheets.—Corrugated sheets have picked up a little, a few large orders having caused a perceptible reduction of stocks. Flat galvanized sheets also are in fair demand, though the jobbing price has been raised to 6.37c. for No. 28. Jobbing trade in blue annealed is limited, but inquiries are coming out well for special purposes and some attractive specifications for both blue annealed and black sheets for export have recently appeared.

Wrought Pipe.—Business in small sizes continues to drag, which is attributed to lack of building activity. Oil-field requirements are large, but have mostly been covered for the present, and oil operators are not disposed to undertake large line construction at present.

Cast-Iron Pipe.—Porterville, Cal., will take bids Nov. 6 for 30 tons of 4-in. and Los Angeles received bids Oct. 27 for about 235 tons of 8 and 12 in. Hermosa Beach is also in the market for a lot of 8 and 10 **in. flexible-joint pipe. Corporation** buying is about at a minimum, as requirements were anticipated before the recent advance. Prices continue at $37 per net ton for 6-in. and over, $40 for 4-in., and $1 extra for class A and gas pipe.

Pig Iron.—A fair tonnage of Southern foundry iron has recently been placed for railroad shops in this district, but most foundries are amply stocked from old purchases and are not yet willing to discuss next year's requirements, the impression among local buyers being that prices will be lower. Furnace agents, however, maintain a firm attitude, quoting $27 per gross ton for No. 1 Southern foundry.

Coke.—Business is quiet, with most foundries well supplied, but a few carloads have recently been placed. Southern foundry coke is offered here at about $15.25 per net ton.

Old Material.—The local scrap situation shows little change. While consuming requirements are much larger than in former years, with further increases in sight, dealers have been unable to get prices above the recent quotations on steel scrap of $10 to $13 per gross ton. Buyers at distant points are not operating in this market and supplies so far have been ample. Cast-iron scrap is rather firm, with a good demand, being quoted at about $16 per net ton.

Ferroalloys.—Ferrosilicon is in active demand, and local stocks are moving rapidly. Ferromanganese also is moving well, and is quoted at $175 to $180 in carloads, San Francisco, for December delivery.

New York

NEW YORK, Nov. 8, 1916.

Pig Iron.—A large volume of inquiry is still before the market, 2000-ton contracts being under consideration in many cases. A Connecticut malleable interest has asked for that amount for this year's delivery and from Poughkeepsie, Elizabethport and Jersey City are separate inquiries for 2000 tons, two of these being for delivery in the first half of next year and the third for the second half. The Virginia interest which last week withdrew from the market, having sold at $19.50 for No. 2 X at furnace, is now quoting $24 at furnace. This quotation is also made on No. 2 X by various eastern Pennsylvania furnaces, though $23 was done by such furnaces in the past week. In the Buffalo district, furnaces which last week were quoting $25 for No. 2 X have realized higher prices on sales early in this week, one interest having sold some iron at $26.50 while another has sold at $27.50 at furnace, delivery in the first half. Relatively a small portion of the business done in the past week has been with New England. The Southern iron situation shows a variety of prices. Warrants sold up to $18.50 by Nov. 3. Inquiry for warrant iron is more active at rising prices and comes from all sections of the country. Foundries are carrying fair stocks of iron and most first quarter deliveries will come to yards already quite well supplied. There are cases, however, where deliveries are being anticipated at the request of buyers and some iron sold for the last two months of this year and the first two months of next year is already in the buyers' hands. Virginia iron sold at $22 up to Nov. 3, including several lots of 1000 and 2000 tons. The total sales by Virginia furnaces in the past two weeks are put at 175,000 tons. Business seems to be swinging toward eastern Pennsylvania furnaces, as some quotations from that district have been rather more advantageous than from Buffalo and Virginia. We quote at tidewater for early delivery: No. 1 foundry, $25 to $25.50; No. 2 X, $24 to $25; No. 2 plain, $23.50 to $24; Southern iron at tidewater, $24 to $24.50 for No. 1 and $23.50 to $24 for No. 2 foundry and No. 2 soft.

Ferroalloys.—An unconfirmed report states that a domestic producer of ferromanganese has very recently contracted to furnish an American consumer with a large amount of the alloy, delivery to be made in 1917 at a price below the lowest recently mentioned or under $160, delivered. Another contract reported with a domestic producer is for about 100 tons a month for delivery in the first half of 1917. One foreign inquiry calls for 2500 tons. In general, inquiries and sales are few, with the British quotation standing at $164, seaboard, and the domestic at $160 to $165, delivered. Inquiries from Canada amount to several thousand tons for delivery in the early part of 1917, one large Canadian steel company alone asking for a substantial amount. Specifications on contract are urgent, while receipts from England are reported satisfactory. Spiegeleisen is quiet at $40 to $45, furnace. Ferrosilicon, 50 per cent, is scarce even for delivery on contract. Contracting for 1917 delivery is not very general as yet but the basis still spoken of is around $100, Pittsburgh.

Structural Material.—No notably large fabricated steel contracts are noted since last week's report, but quite a number of new steel building projects have been offered. The main jobs closed include 1200 tons for the Central of Jersey stationed at Newark; 600 tons for a factory at Paulsboro, N. J., and 1000 tons for hangars for the United States Government, the last placed through a general contractor. The work recently offered and still pending covers in part 1000 tons for the Watervliet Arsenal; 1000 tons for the National Electric Lamp Works of the General Electric Company at Providence; 650 tons for a Sheffield Farms Slawson-Decker Creamery, Brooklyn; 800 tons for the Broad Street subway under the City Hall, Philadelphia; 650 tons for a rolling mill building of the Cleveland Brass

& Copper Company; 400 tons for the Y. W. C. A. at Hartford; 800 tons for the Crucible Steel Company of America at Harrison, N. J.; 450 tons for extension of the United Engineering Society's Building, Thirty-ninth Street; 400 tons for Benning Road viaduct, Washington, D. C., and 350 tons for the State Normal Training School at Potsdam, N. Y. Some 3400 tons for the Maine Central, 2500 tons for the Pennsylvania and about 400 tons for the Southern Railroad are still pending. We quote plain material from 2.869c. to 3.169c., New York, for mill shipments, depending more on the mill selling than on the delivery. Warehouse prices are $3 per ton higher, or 3.5c. New York, minimum.

Steel Plates.—Buying of the last few weeks of railroad cars may be responsible in a large way for the apparent stiffening in universal plates, as only one sale below 3.50c., Pittsburgh, has been noted, and this a large one at 3.40c. The past week, like its predecessors, has been notable in the large tonnage of declination of foreign inquiries. The extent to which both seller and buyers will go is indicated in the sale for shipment in several days of a single plate for marine boiler use at 15c. per lb. No surprise is shown at a quotation of 10c. for as large a lot as 1000 tons for ship boilers, because this is an indication that the business is really not wanted. The status of the car buying is indicated briefly elsewhere. We quote universal plates at 3.569c. to 4.169c., New York, with 3.669c. minimum for earliest shipment, and sheared plates up to 84 in. and in about three months at 4.169c., New York, and the widest plates at 4.419c. to 4.669c. for what may be obtained in the first half of 1917. Plates from warehouse range from 4c. to 4.50c., New York for what is available.

Iron and Steel Bars.—No great amount of business is going at the higher future delivery prices recently established, but this is largely because consumers are covered for the first quarter at lower levels for as much as the mills are willing to put on the books. Anything approaching speculative buying is not possible, as mills are resisting any contracting far forward. Warehouse prices have advanced $3 per ton in the case of both iron and steel bars, but no advance has yet been made in the mill shipments of bar iron. We quote steel bars at 2.869c. to 3.019c., New York, the higher price for the earlier shipments. We quote mill shipments of iron bars at 2.669c., New York. From warehouse steel bars are 3.50c., New York, and iron bars, 3.40c.

Old Material.—The situation is much stronger on account of Western developments, but business with eastern Pennsylvania consumers is still checked by embargoes at important consuming points. Brokers quote buying prices about as follows to local dealers and producers, per gross ton, New York:

Heavy melting steel scrap (for eastern Pennsylvania shipment)	$13 00 to $13 25
Old steel rails (short lengths) or equivalent	16.50 to 17.00
Relaying rails	28.50 to 29.00
Rerolling rails	21.00 to 21.50
Rerolling rails (for export)	22.50 to 23.00
Iron car axles (for export)	39.50 to 40.00
Steel car axles (for export)	41.00 to 41.50
No. 1 railroad wrought	21.25 to 21.75
Wrought-iron track scrap	18.50 to 18.75
No. 1 yard wrought, long	16.00 to 16.25
Light iron (nominal)	3.50 to 4.00
Cast borings (clean)	8.25 to 8.50
Machine shop turnings (nominal)	7.00 to 7.25
Mixed borings and turnings (nominal)	7.00 to 7.25
Wrought pipe	14.25 to 14.50

Foundries are exhibiting a little more interest in scrap because of the rapid advances in the price of pig iron. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

No. 1 cast (machinery)	$17.50 to $18.00
No. 2 cast (heavy)	15.50 to 16.00
Stove plate	12.50 to 13.00
Locomotive grate bars	12.00 to 12.50
Old carwheels (nominal)	17.00 to 17.50
Malleable cast (railroad)	15.00 to 15.50

Cast-Iron Pipe.—The situation presents no new features, public lettings being few and small, but private buying proceeds vigorously, with good orders being placed for spring delivery. The rapid advances in pig iron are making consumers of pipe more desirous of getting in orders for their next year's requirements. Prices of pipe are strong and an advance of $3 to $4 per ton may be expected any day. Meanwhile, carload lots of 6 in., class B and heavier, are held at $32.50 per net ton, with $1 per ton extra for class A and gas pipe.

British Steel Market

More Blast Furnaces Starting—American Semi-Finished Steel Quiet

(By Cable)

LONDON, ENGLAND, Nov. 8, 1916.

Pig iron is in fair demand for November and December delivery, but export business remains restricted. Additional furnaces are starting and good contracts for hematite iron have been booked for Italy. Tin plates are steadier at 33s. American semi-finished steel is neglected. Italy has bought ferromanganese for January-March delivery at £34 f.o.b.

Benzol is quoted at 13d., toluol at 2s. 3d. and ammonia sulphate at 17s. We quote as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 33s.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £20.

Steel ship plates, Scotch, delivered local yards, £13 17s. 6d.

Steel rails, export, f.o.b. works, £10 17s. 6d.

Hematite pig iron, f.o.b. Tees, 142s. 6d., compared with about 140s. a week ago.

Sheet bars (Welsh) delivered at works in Swansea Valley, £15 5s. nominal.

Steel bars, export, f.o.b. Clyde, £18.

Ferromanganese (nominal), £33.

Ferrosilicon, 50 per cent, c.i.f., £27.

Manganese-Ore Imports

Manganese-ore imports to the United States in August this year were 76,721 gross tons, against 81,942 tons in July. The August receipts are next to the largest this year, those of May being third at 74,825 tons. The total of imports for the eight months to Sept. 1, 1916, was 395,686 tons, compared with 145,003 tons to Sept. 1, 1915, and 183,029 tons to Sept. 1, 1914. The average monthly rate thus far this year is 49,460 tons, against 28,757 tons in 1913, the previous record, and 22,470 tons as the average for the five-year period 1910-1914. Manganese ore imports to the United States are now considerably in excess of those to Great Britain, which for the first nine months of this year were 348,394 tons.

Proposed Japanese Steel Plant

A prospectus has been issued by the promoters of the Oriental Iron Smelting Company of Japan, which is to work the Taochun iron mine, Anhui, China, by taking over the concession obtained by the Chino-Japanese Industrial Development Company from the Pekin Government, referred to in THE IRON AGE, Aug. 3, 1916. The company will have a capital of $12,462,500 with which to complete one plant for producing 170,000 tons of pig iron per year and another to produce 150,000 tons of steel per year.

It is expected that at the coming session of the Wisconsin Legislature, in January, a bill will be introduced with the aim of placing a tax of 10c. per ton on all iron ore mined in Wisconsin and a tax of 2c. per ton on iron ore shipped through Wisconsin, as from docks at Superior and Ashland. The proposed tax, on the basis of present output and shipments, would mean a revenue of $600,000 annually.

The Koren Mfg. Company, Cleveland, will make several additions to its products, including cutting edge tools used largely for farm purposes and pressed steel wrenches. The company, in addition to its factory on East Fifty-fifth Street, has taken a location on Front Street, to be used mainly for heat-treating purposes.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c. Denver, pipe, 76.1c., minimum carload, 46,000 lb.; structural steel and steel bars, 83.6c., minimum carload, 36,000 lb. Pacific coast (by rail only), pipe, 65c.; structural steel and steel bars, 75c., minimum carload, 50,000 lb.; structural steel and steel bars, 80c., minimum carload, 40,000 lb. No freight rates are being published via the Panama Canal, as the boats are being used in transatlantic trade.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 2.75c. to 2.85c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	[illegible]
H-beams over 18 in.	[illegible]
Angles over 6 in., on one or both legs	.10
Angles, 3 in. on one or both legs less than ¼ in. thick as per steel bar card, Sept. 1, 1909	[illegible]
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	[illegible]
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	[illegible]
Deck beams and bulb angles	[illegible]
Handrail tees	[illegible]
Cutting to lengths, under 3 ft. to 2 ft. inclusive	[illegible]
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Plates.—Tank plates, ¼ in. thick, 6 in. up to 100 in. wide, 3.50c. to 4c. base, net cash, 30 days, or ½ of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras

	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers)	.10
Boiler and flange steel plates	[illegible]
"A. B. M. A." and ordinary firebox steel plates	.20
Still bottom steel	.30
Locomotive firebox steel	[illegible]

Marine steel, special extras and prices on application.

Gage Extras

Rectangular, ¼ in. thick, over 6 in. wide to 100 in. wide	Base
Lighter than ¼ in., to 3/16 in., up to 72 in. wide	.10
*Lighter than ¼ in., including 3/16 in., over 72 in. to 84	.20
*Lighter than ¼ in., including 3/16 in., over 84 in. to 96	.30
*Lighter than ¼ in., including 3/16 in., over 96 in. to 100	.40
*Lighter than ¼ in., including 3/16 in., over 100 in. to 102	.45
Lighter than 3/16 in., including No. 8, up to 72 in. wide	.15
*Lighter than 3/16 in., including No. 8, over 72 in. to 84	.25
*Lighter than 3/16 in., including No. 8, over 84 in. to 96	.35
Lighter than No. 8, including No. 10, up to 60 in. wide	[illegible]
Lighter than No. 8, including No. 10, over 60 in. to 64	.35

Up to 72 in. and not less than 10.2 lb. per sq. ft. will be considered ¼ in.
Over 72 in. must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.
Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.
Over 72 in., ordered weight 3/16 in., take No. 8 price.
Over 72 in., ordered weight No. 8, take No. 10 price.

Width Extras

Over 100 in. to 110 in. inclusive	.05
Over 110 in. to 115 in. inclusive	.10
Over 115 in. to 120 in. inclusive	.15
Over 120 in. to 125 in. inclusive	.25
Over 125 in. to 130 in. inclusive	.50
Over 130 in.	[illegible]

Length Extras

Universal plates 80 ft. long up to 90 ft. long	.05
Universal plates 90 ft. long up to 100 ft. long	.10
Universal plates 100 ft. long up to 110 ft. long	.20

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over.

Lengths under 3 ft. to 2 ft. inclusive	.25
Lengths under 2 ft. to 1 ft. inclusive	.50
Lengths under 1 ft.	1.55
Circles 3 ft. in diameter to 100 in.	.30
Circles over 100 to 110 in. (width extra)	.35
Circles over 110 to 115 in. (width extra)	.40
Circles over 115 to 120 in. (width extra)	.45
Circles over 120 to 125 in. (width extra)	[illegible]
Circles over 125 to 130 in. (width extra)	.80
Circles over 130 in. (width extra)	1.30
Circles under 3 ft., to 2 ft., inclusive	.55
Circles under 2 ft., to 1 ft., inclusive	.80
Circles under 1 ft.	1.85

Half circles take circle extras.
Sketches not over four straight cuts, inc. straight taper .10
Sketches having more than four straight cuts .20
Plates sheared to a radius take complete circle extras.

*Including extra for width.

Wire Rods.—Including chain rods, [illegible]

Wire Products.—Prices to jobbers effective Oct. 19: Fence wire Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, $2.80; galvanized, $3.50. Galvanized barb wire and staples, $3.70; painted, $3. Wire nails, $2.85. Galvanized nails, 1 in. and longer, $2 advance over base price; shorter than 1 in., $2.50 advance over base price. Cement-coated nails, $2.75. Woven wire fencing, 55 per cent off list for carloads, 54 off for 1000-rod lots, 53 off for less than 1000-rod lots.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect on butt-weld pipe from Sept. 7, 1916, and on lap-weld pipe from Nov. 1, 1916, all full weight:

Butt Weld

Steel Inches	Black	Galv.	Iron Inches	Black	Galv.
[illegible]	62	[illegible]	[illegible]	[illegible]	24
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			[illegible] to 1½	[illegible]	43

Lap Weld

Steel Inches	Black	Galv.	Iron Inches	Black	Galv.
[illegible]	62	[illegible]	1¼	45	30
[illegible]	[illegible]	[illegible]	1½	51	37
[illegible]	[illegible]	[illegible]	[illegible]	52	[illegible]
[illegible]	[illegible]	[illegible]	2½ to 4	[illegible]	41
[illegible]	[illegible]		4½ to 6	[illegible]	41
			7 to 12	[illegible]	40

Reamed and Drifted

Steel Inches	Black	Galv.	Iron Inches	Black	Galv.
1 to 3, butt	[illegible]	[illegible]	[illegible] to 1½, butt	[illegible]	37
[illegible], lap	[illegible]	[illegible]	1¼, lap	[illegible]	24
[illegible] to 6, lap	[illegible]	50½	1½, lap	46	31
			2, lap	[illegible]	32
			2½ to 4, lap	50	[illegible]

Butt Weld, extra strong, plain ends

Steel Inches	Black	Galv.	Iron Inches	Black	Galv.
[illegible]	[illegible]	[illegible]	⅛, ¼ and ⅜	[illegible]	34
½	[illegible]	[illegible]	½	[illegible]	43
¾ to 1½	67	54½	¾ to 1½	60	45
[illegible] to 3	68	55½			

Lap Weld, extra strong, plain ends

Steel Inches	Black	Galv.	Iron Inches	Black	Galv.
2	60	48½	1¼	47	32
2½ to 4	63	51½	1½	52	38
4½ to 6	62	50½	2	54	41
7 to 8	[illegible]	[illegible]	2½ to 4	56	44
9 to 12	53	[illegible]	4½ to 6	55	43
			7 to 8	49	37
			9 to 12	44	32

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts on less than carloads, freight to destination added, effective from Nov. 1, 1916, are as follows:

Lap-Welded Steel		*Standard Charcoal Iron*	
1½ in.	.31	1½ in.	.23
1¾ and 2 in.	[illegible]	1¾ and 2 in.	.35
2¼ in.	.40	2¼ in.	.32
2½ and 2¾ in.	[illegible]	2½ and 2¾ in.	.38
3 and 3¼ in.	[illegible]	3 and 3¼ in.	.43
3½ to 4½ in.	.52	3½ to 4½ in.	.44
5 and 6 in.	[illegible]	5 and 6 in.	.37
7 to 13 in.	.42	7 to 13 in.	.34

Locomotive and steamship special charcoal grades bring higher prices.

1¾ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Sheets.—Makers' prices for mill shipments on sheets of U. S. standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Blue Annealed Sheets

[illegible]	[illegible]
Nos. 9 to 12	3.15 to 3.25
[illegible]	[illegible]
Nos. 15 and 16	3.30 to 3.40

Box Annealed Sheets, Cold Rolled

Nos. 17 to 21	3.30 to 3.45
Nos. 22 and 24	3.35 to 3.50
[illegible]	[illegible]
No. 27	3.45 to 3.60
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

[illegible]

Nos. 10 and 11	4.00 to 4.10
[illegible]	[illegible]
[illegible]	[illegible]
Nos. 17 to 21	4.40 to 4.50
[illegible]	[illegible]
Nos. 25 and 26	4.70 to 4.80
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

[illegible]

Metal Markets

The Week's Prices

Nov.	Copper, New York, Electro	Tin, New York	Lead, New York	Lead, St. Louis	Spelter, New York	Spelter, St. Louis
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	29.50	29.50	42.25	7.00	6.87½	10.75	10.50

NEW YORK, Nov. 8, 1916.

Copper is higher and the market is sensitive because of the great scarcity of nearby metal. Tin is stronger despite having been dull. Lead has continued quiet at unchanged quotations. Spelter was active and quotations advanced last week, but the market now shows a quieter tendency. Antimony is quiet, but the large interests have faith in the future and are not sacrificing their metal.

New York

Copper.—A realization of the scarcity of copper for delivery up to the end of January has created a nervous and sensitive market. Quotations are not only higher, but show a wider spread than usually exists. Actual prices are largely a matter of negotiations. Conservative members of the trade put electrolytic at 29.50c. for November, 29c. for December, 28.50c. for January, 28.25c. for February, and 28c. for March. At the same time a sale of spot electrolytic is reported at 31c., and others for all of next year at 26.75c. This month probably 75,000,000 lb. has been placed, and it is believed that business would be of even greater volume were it not for the scarcity of nearby positions. Prime Lake is nominally held at 29.50c. A heavy business in arsenical Lake has been done at 28c. for March delivery. The London market was excited on Monday, advancing £1 10s. to £144. The exports this month, including yesterday, total 3044 tons. Imports in nine months of this year totaled 156,000 tons, against 137,500 tons in the entire year 1915. Stocks in Great Britain and France Oct. 31 amounted to 5458 tons against 5796 tons Sept. 30. The total European supply, including metal afloat from Chile and Australia, Oct. 31, amounted to 10,108 tons, against 10,371 tons a month previous.

Tin.—The market has been continuously dull, but it is nevertheless strong, the quotation for spot Straits Monday being 42.5c., with spot Banca at 41.75c. Banca is again offered for shipment from Batavia. On Nov. 3 the market was keenly interested in a report that a steamer with 360 tons, en route from Singapore to London, had been sunk by a submarine in the Mediterranean. The news had but little effect here, but the London market advanced £1 15s. Ordinarily such news would send the market up with a rush. The arrivals this month amount to 205 tons, and there is afloat 4377 tons.

Lead.—Dull, but comparatively firm, the market continues unchanged, except that independent producers show a tendency to shade at certain Eastern points. The leading interest has made no change in its quotations, asking 7c., New York, and 6.92½c., St. Louis. At the latter point other producers ask 6.87½c. The exports of this month, including yesterday, total 678 tons. The London quotation for spot, as compared with that of a week ago, is unchanged at £30 10s.

Spelter.—The demand from all directions was active last week and quotations advanced to 10.75c., New York, and 10.50c., St. Louis, for prompt. December is held at 10.37½c. to 10.50c., St. Louis, and first quarter at 10.25c., St. Louis. Dealers continue to show a disposition to buy, but the producers are seemingly not anxious to sell, continuing to adhere to their belief that a higher market is to be expected. On Monday a quieter tendency was evident, but it was largely due to the attitude of the producers. The exports this month, including yesterday, total 2861 tons. The London quotation for spot is higher at £53 5s. against £52 15s. a week previous.

Antimony.—Late last week a fair business was done in future shipments from the Orient, but on the whole the market has been quiet. The quotation for spot, duty paid, is 12.75c. to 13.25c. Some of the larger interests are unwilling to sell because of their faith in a stronger market next year.

Aluminum.—No. 1 virgin aluminum, 98 to 99 per cent pure, is slightly easier at 63c. to 65c. per lb.

Old Metals.—The market is firm. Dealers' selling prices are as follows:

	Cents per lb.
[illegible]	[illegible]
No. 1 red brass or composition turnings	16.00 to 17.00
[illegible]	[illegible]

Chicago

Nov. 6.—A more active market and higher prices developed in copper last week, orders for the first half of next year being freely placed. A stronger tin market also obtains. Lead has been dull but for spelter higher prices rule. We quote: Casting copper, 28c. to 28.50c.; Lake copper, 29c. to 29.50c.; tin, carloads, 43c., and small lots, 45c.; lead, 6.95c.; spelter, 10.65c.; sheet zinc, 15c.; Cookson's antimony, 50c.; other grades, 14.50c. to 15c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 24.50c.; copper bottoms, 21.50c.; copper clips, 23.50c.; red brass, 19.50c.; yellow brass, 15.25c.; lead pipe, 6c.; zinc, 7¼c.; pewter, No. 1, 25c.; tinfoil, 30c.; block tin pipe, 35c.

St. Louis

Nov. 6.—In the non-ferrous metal market prices generally are firm, with quotations as follows: Lead, 6.92½c. to 7c. in carload lots, and spelter 10c. to 10.25c., according to delivery, in carloads. In less than carload lots quotations are: Lead, 7.25c.; spelter, 11.50c.; tin, 44.50c.; Lake copper, 29c.; electrolytic copper, 28.50c.; antimony, 16c. In the Joplin district zinc ore prices were stronger by $5, the top basis price for zinc blende being $80, and the average for the week for the district $77. Calamine was also stronger with the best price $47.50, and the average for the week $43. Lead ore sold up to $87, and but little was sold lower than $85. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 9c.; heavy yellow brass, 12c.; heavy red brass and light copper, 17c.; heavy copper and copper wire, 19c.; zinc, 6c.; lead, 5c.; tea lead, 3.50c.; pewter, 25c.; tinfoil, 31c.

Ferrosilicon Imports Larger

Imports of high-grade ferrosilicon are larger now than in 1915, as the following table, compiled from Government data, shows. The figures represent the monthly average in gross tons:

[illegible]	[illegible]

The largest imports this year were 754 tons in April and the smallest, 417 tons in May. The July and August amounts were 487 tons and 479 tons respectively.

The consumption of 50 per cent ferrosilicon in the United States is now put at 30,000 to 35,000 tons per year.

To those particularly concerned with employment problems, Bulletin 202 of the U. S. Bureau of Labor Statistics, just issued, will appeal. [illegible] Managers' Association of [illegible] sentatives of nine States, including the New England [illegible] association.

Iron and Industrial Stocks

NEW YORK, Nov. 8, 1916.

After a few days of great strength, taking steel common and a few other stocks to new high records, the approach of the Presidential election appeared to cast its shadow on the market, causing some selling of securities and a more cautious attitude among investors, but on Monday of this week another burst of activity carried prices still higher. The range of prices on active iron and industrial stocks from Wednesday of last week to Monday of this week (Tuesday being a holiday) was as follows:

Allis-Chal., com..	25½- 28⅝	Gt. No. Ore Cert.	42⅜- 45
Allis-Chal., pref..	82 - 85¼	Int. Harv. of N. J., com.	116¾-118
Am. Can, com...	61¾- 64⅝	La Belle Iron, com.	78 - 79
Am. Can, pref...	113 -114	La Belle Iron, pref.	134
Am. Car & Fdy., com.	67½- 71⅞	Lacka. Steel	88¼- 92½
Am. Car & Fdy., pref.	117½-118½	Lake Sup. Corp..	19¼- 23⅛
Am. Loco., com..	82¼- 94	Midvale Steel....	68 - 70¼
Am. Loco., pref..	106¾-108½	Nat. En. & Stm., com.	27½- 34⅝
Am. Rad., com.....	420	Nat. En. & Stm., pref	96 - 97½
Am. Ship, com...	63 - 72	N. Y. Air Brake.	157½-160⅞
Am. Ship, pref...	93 - 94	Pitts. Stl., pref...	104½-105
Am. Steel Fdries.	63 - 66⅝	Pressed Stl. com	72 - 75⅛
Bald. Loco., com.	84 - 89¾	Pressed Stl., pref.....	104
Bald. Loco., pref.	106⅝-108½	Ry. Steel Spring, com	53⅜- 56
Beth. Steel, com.	645 -678	Ry. Steel Spring, pref	101⅜-101⅞
Beth. Steel, pref.	140 -150	Republic, com..	77½- 80¾
Cambria Steel	140	Republic, pref...	114¼-114¾
Carbon Steel, 1st pref.....	115 -118	Sloss, com.	62 - 72⅜
Carbon Steel, 2nd pref	80	Sloss, pref	98¼-103¼
Case (J. I.), pref.	84⅞- 87⅜	U. S. Pipe, com	25⅛- 26½
Central Fdry., com.	16 - 18	U. S. Pipe, pref..	62⅞- 65¾
Central Fdry., pref.	32 - 34	U. S. Steel, com.	118⅜-123¼
Chic. Pneu. Tool.	72 - 73	U. S. Steel, pref.	121⅛ 123
Colo. Fuel	52½- 55⅜	Un. Steel Alloy .	17 - 19
Cruc. Steel, com.	89½- 96½	Va. I., C. & Coke	56 - 58½
Cruc. Steel, pref.	122½-123	Warwick	9⅞- 10
Deere & Co., pref.	96¼- 96½	Westing. Elec.	63⅝- 67¾
Driggs-Seabury .	85 - 98½		
Gen. Electric....	181 -184½		

Dividends

The Pittsburgh Steel Company, regular quarterly, 1¾ per cent on the preferred stock, payable Dec. 1.

The United States Steel Corporation, regular quarterly, 1¾ per cent on the preferred stock, payable Nov. 29, and 1¼ and extra 1 per cent on the common, payable Dec. 30.

The Inland Steel Company, regular quarterly 2 per cent, payable Dec. 1.

The Great Northern Iron Ore Properties, 75 cents a share, payable Dec. 20. A dividend of 50 cents a share was declared in May.

The Eastern Steel Company, regular quarterly, 1¾ per cent on the first preferred stock and an extra of 28 per cent, being the remainder of accrued dividends, payable Dec. 15.

The American Radiator Company, regular quarterly, 1¾ per cent on the preferred stock, payable Nov. 15, and 4 per cent on the common, payable Dec. 30.

The International Harvester Company of New Jersey, regular quarterly, 1¾ per cent on the preferred stock, payable Dec. 1.

The International Harvester Corporation, regular quarterly, 1¾ per cent on the preferred stock, payable Dec. 1.

The By-Products Coke Company, regular quarterly, 1½ per cent and extra 1 per cent.

The Yale & Towne Mfg. Company, extra 5 per cent, payable Nov. 10.

The Standard Sanitary Mfg. Company, extra, 1 per cent on the common stock in addition to the regular quarterly dividends of 1¾ per cent on the preferred and of 1½ per cent on the common, all payable forthwith.

The Canada Foundries & Forgings Company, Ltd., regular quarterly, 1¾ per cent on the preferred stock and 3 per cent on the common and an extra of 3 per cent on the common,

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The Crucible Steel Company of America has issued its sixteenth annual report, covering operations for the fiscal year ended Aug. 31, 1916. Our space will only permit at this time the statement that the report shows net profits for the year of $13,223,655.05, against $3,073,749.73 for the preceding year, and that Chairman Herbert DuPuy says that the company "has paid from profits during the year its entire banking liabilities and will pay all liquid obligations before the new year, and during the coming year it is hoped to be able also to gradually liquidate a considerable portion of the deferred dividends due on the preferred shares."

An additional third floor has been engaged and plans are on foot to use the fourth floor of the Grand Central Palace, New York, for the third National Exposition of Chemical Industries in the fall of 1917.

Carbon Steel Company's Good Year

The annual report of the Carbon Steel Company, Pittsburgh, for the year ended Sept. 30, 1916, gives the following condensed surplus account:

Surplus Oct. 1, 1915		$132,687.77
Net profits for year ended Sept. 30, 1916	$3,099,610.75	
Sundry adjustments	1,336.44	
		3,100,947.19
Total		$3,233,634.96
Deduct:		
Cash dividends as follows:		
8 per cent on first preferred		40,000.00
8 per cent on second preferred		90,000.00
6 per cent on common		180,000.00
Depreciation, reorganization expenses, bond premiums, doubtful accounts and losses on former subsidiary companies		476,361.47
Additional reserve for Federal income tax		50,000.00
Balance surplus Sept. 30, 1916		$2,397,273.49

President Charles McKnight, in his accompanying remarks, says: "During the year, in addition to the retirement of the $891,000 collateral trust notes, all other notes of the company have been retired, so that the company is now free from all floating indebtedness, excepting current monthly bills for materials and supplies.

"The first and second mortgage bonds, issued by the Carbon Iron Company, aggregating $700,000, payment of which was extended by your company April 1, 1912, for a period of five years, will mature April 1, 1917. Your company now holds in its treasury $98,000 of these bonds, which have been purchased in the open market, and there are now in the hands of the trustees $700,000 (unissued) 5 per cent sinking fund gold bonds of the Carbon Steel Company. It is the intention of your officers to retire the outstanding first and second mortgage bonds at maturity, April 1, 1917, out of the funds of the company, without increasing the company's indebtedness. This will leave in the treasury of the company $1,470,000 of the 5 per cent sinking fund gold bonds, which may be used as your directors see fit from time to time.

"In March last your directors leased the mill of Moorhead Brother & Co., Inc., in Sharpsburg, and at that time entered into a contract to furnish the Italian Government with 30,000 tons of finished bars. The material for these bars was purchased in the outside market, and the contract will be completed within the next 30 days.

"A conservative estimate of the value of contracts and orders now on hand for the company's regular line of products shows an increase of more than $1,500,000 over a similar estimate made at the beginning of the year. This increase does not include orders or contracts which will be received from time to time in the regular course of business."

Prices for British Shells

A British blue book just issued contains evidence presented to the committee on public accounts, showing how the Ministry of Munitions compelled firms to reduce their prices for shells. After consulting accountants and engineers and arriving at what they considered the actual cost, they cut the prices of shell bodies by 25 to 30 per cent. The following instances were cited: 18-pounders, formerly 20s. to 23s., cut to 12s. 6d.; 4.5-in. shells, formerly 47s. to 65s., cut to 33s. 6d.; 60-pounders, formerly 63s. to 82s. 4d., cut to 52s. 6d.; 6-in. shells, formerly 80s. to 99s., cut to 70s.; 9.2-in. shells, formerly £13 2s. 6d. and £15 5s., cut to £11 7s. 6d.

The American Steel & Wire Company, in announcing advanced prices on wire products, has made an important change in its prices on wire nails to retailers. Heretofore it has asked 15c. per keg more on less than carload lots to retailers than the price named on carload lots to jobbers. This differential has been raised to 25c. per keg.

A plant for the manufacture of cold-rolled strip steel will be erected in Dover, Ohio, by H. C. Greer of Morgantown, W. Va. Some of the contracts have been placed, and it is expected that the plant will be in partial operation by April 1.

OBITUARY

WILLIAM COOPER CUNTZ, managing director of the Goldschmidt Thermit Company, 120 Broadway, New York, died Nov. 3, at Auburndale, Mass., aged 45 years. He was born and educated in Hoboken and started his business career with the Pennsylvania Steel Company and later went to Boston, Philadelphia and London, England, for the company. He became connected with the Goldschmidt Thermit Company in 1910. He was a member of the American Society of Civil Engineers, Engineers' Club, Chemists' Club, University Club of Philadelphia and other societies.

JOHN T. WILSON, for many years a partner in the firm of Wilson, Walker & Co., Ltd., operating bar-iron mills in Pittsburgh, died at Atlantic City, N. J., Oct. 29, aged 86 years. The Wilson-Walker plant is now the lower Union mills of the Carnegie Steel Company.

DAVID COLVILLE, managing director of David Colville & Sons, Ltd., Dalzell Steel & Iron Works, Motherwell, England, died Oct. 16 after a brief illness.

JULIUS BERBECKER, president Berbecker & Rowland Mfg. Company, Waterville, Conn., died Sept. 25, aged 84 years.

PERSONAL

Thomas E. Durban, Erie City Iron Works, Erie, Pa., chairman of the Administrative Council of the American Uniform Boiler-Law Society, organized to bring about the legal adoption of the boiler code of the American Society of Mechanical Engineers, has been asked to serve in an advisory capacity with the Industrial Board of New York State to draw up a boiler code.

G. V. Rottweiler has resigned as works manager and chief engineer of the Davis Sewing Machine Company to go into business for himself with Columbus, Ohio, associates, as general manager of the Paramount Motor Company, manufacturer of motor bicycles, bicycles and bicycle parts.

A. D. Race, DePere, Wis., who has purchased an interest in the Luther Grinder Mfg. Company, Milwaukee, has been elected treasurer and will participate actively in the management.

Fred S. Cadmus has resigned as resident engineer of the American Bridge Company, Ambridge, Pa., and has assumed the position of general manager of the plants of the McClintic-Marshall Company at Pottstown, Pa., succeeding W. M. Sterrett, who since the completion of the company's contract on the Panama Canal has been located at its Philadelphia offices.

Ray W. Light of Lebanon, Pa., has been made superintendent of the Bessemer department of the Cambria Steel Company at Johnstown.

The Transue & Williams Steel Forging Corporation, Alliance, Ohio, has elected the following board of directors: O. F. Transue, president of the company; Frank Transue, vice-president; F. E. Dussel, secretary and treasurer; W. H. Transue, Harry R. Jones, president United Alloy Steel Corporation; G. E. Farnsworth, cashier First National Bank of Cleveland, and John W. Prentiss of Hornblower & Weeks.

Arthur Harrop, for 14 years with the sales department of the American Hardware Company, New Britain, Conn., most of that time with the Corbin Screw division, has resigned to become sales manager of the Frank Mossberg Company, Attleboro, Mass.

David Potter has been promoted to purchasing agent of the Seth Thomas Clock Company, Thomaston, Conn., to fill the place made vacant by the resignation of J. C. Ames.

A. W. Petersohn, who for the past two years has had charge of department 18 (tool room) of the Aurora Automatic Machinery Company, Aurora, Ill., has been promoted to the position of supervisor of piece rate and lay-out departments.

R. S. Ramsey, formerly with the Pressed Steel Car Company, has accepted the position of manager of the Bellwood Mfg. Company, founder and machinist, Bellwood, Pa.

Albert L. Fay, for many years with the Holland Core Oil Company, has resigned and is now associated with the Werner G. Smith Company of Cleveland as its Chicago manager.

A. F. Faulhaber has joined the sales force of Crocker Brothers, pig-iron merchants, and will travel out of the Cincinnati office, which is in charge of Herbert F. Topp.

Edward S. Illig, for years San Francisco sales manager for the Bethlehem Steel Company, has been made sales manager of the Pittsburgh office of the company.

Norman L. Warford, until Nov. 1 in charge of the powdered coal department of the Anaconda Copper Mining Company, Anaconda, Mont., has become identified with the Powdered Coal Engineering & Equipment Company, Chicago, in the capacity of engineer in charge of construction. He is credited with having installed the largest powdered coal plant in the United States for the Anaconda Company at its several works, wherein approximately 1000 tons of pulverized fuel is daily burned.

W. H. Foster, president General Fireproofing Company, Youngstown, Ohio, has been elected president of the Association of Metal Furniture Manufacturers of the United States, which held a meeting in Chicago last week.

Philip Frankel, who has been secretary and an active executive officer of the Cleveland branch of the National Metal Trades Association, Cleveland, since it was organized, has tendered his resignation to take effect at the end of his present term, March 1, 1917, or sooner if some one is found to relieve him of his duties. His brother, Frederick Frankel, who has been associated with him for several years as assistant secretary, leaves with him. They will sever their connection with the association to devote their time to larger and broader association work, including various problems that confront manufacturers and the legal end of labor problems and labor troubles. They have moved to new offices at 1019-20 Guardian Building, where they will continue the general practice of law under the firm name of Frankel & Frankel.

Triple Supply Convention in Memphis

The officers of the Southern Supply and Machinery Dealers' Association, National Supply and Machinery Dealers' Association and American Supply and Machinery Manufacturers' Association have completed the preliminary arrangements for a triple convention to be held in Memphis, Tenn., April 12-13-14, 1917; headquarters, Chisca Hotel. Memphis is stated to be a convention city of a high order. It knows how to take care of a large crowd satisfactorily. The people of Memphis were anxious to have the triple convention held there last spring, but gracefully yielded to Pittsburgh, and are now looking for a great gathering in April in their own city.

The United Smelting & Aluminum Company, New Haven, Conn., now operating a large plant in Commerce Street, has begun the construction of a new plant at State and Edmund streets, where five acres of land has been purchased, with a frontage of 1000 ft. on the Hartford division of the New Haven Railroad, and it will erect five buildings to be used in smelting aluminum, the first building to be 100 x 200 ft., one story. The business of the company has increased so greatly that the Commerce Street plant also will be kept running permanently.

The Industrial Commission of Ohio has called a meeting of representatives of all the states in the Union to discuss boiler legislation. The meeting is to take place in the week of Dec. 4 at the Willard Hotel, Washington, D. C.

HOW IS GRAY IRON DEFINED?

Gray-Iron Founder Wins Legal Controversy Over Classification of Iron

At the meeting of the Philadelphia Foundrymen's Association, Philadelphia, on the evening of Nov. 1, George C. Davis, of that city, analytical and consulting chemist, read a paper entitled "What Is Gray Iron?" He said in part:

In May, 1913, a case was tried in our local courts which brought out some novel points that might involve any foundryman, and I believe it would be of interest to give a brief résumé of the case and the arguments on each side.

It has not been possible to present this paper at an earlier date, as a new trial was granted. This was delayed for various reasons, and it was only last spring that the case was finally settled. The verdict in the second trial was the same as the first—for the plaintiff and for the full amount claimed. While my paper is an account of the first trial, with which I am more familiar, the main points at issue and contentions were the same each time.

Smith & Co. (sub-contractors for the Panama Canal) ordered from Jones & Co. (who were gray-iron founders) certain sheave wheels which were about 8-in. in diameter and weighed about 30 lb. It was specified they were to be of gray iron, chilled and to meet U. S. specifications. A blue print was furnished with chill line shown, but without dimensions given. The foundry made the castings out of soft iron with a chill on the face. Of course, the castings did not chill appreciably, but only showed a closing of the grain and a faint surface chill. These castings were rejected by the U. S. inspector, and after a second attempt, which also failed, they were successfully made by Robinson & Co. (who were carwheel founders) at a much higher price.

Jones & Co. sued Smith & Co. for the price of the castings furnished and rejected. It was conceded by both sides that gray iron had been ordered, and that a chill was to be used. The foundrymen (Jones & Co.) contended that they had never received the U. S. specifications, knew nothing about them, and that the blue print furnished was indefinite, as no chill dimensions were given.

VERDICT GIVEN FOR PLAINTIFF

The case turned on what is gray iron, and resulted in a verdict for the plaintiffs (Jones & Co.) for the full amount. It was contended by them that they had tried faithfully to fulfill an impossible contract; that gray iron in the commercial world had a certain definite meaning; that it was a soft, fluid iron suitable for stoves, radiators, light machinery, etc.; that such iron could not be chilled by any ordinary foundry practice. In short, if they furnished gray iron it was impossible to chill it; as subsequent evidence showed the U. S. specifications required, and on the other hand if they furnished an iron that would chill as required it was not gray iron. The defendants (Smith & Co.) claimed that there were only two kinds of iron, namely, white and gray; and further, that gray iron could be chilled, as the Pennsylvania Railroad in its carwheel specifications called for gray iron in the center. This being the fact, they claimed that the foundry should have known the proper variety of gray iron to use; that is, carwheel iron. The claim of the defendants was supported by their principal witness, who was manager for Robinson & Co. and a man of long experience in the iron trade.

The contentions about the depth of chill and whether the U. S. specifications were forwarded by Smith & Co. to Jones & Co. are not germane to this discussion, but the widely divergent views on what is gray iron certainly suggest the question of one of our statesmen, "Mr. Chairman, where am I at?"

GRAY IRON INCLUSIVE TERM

It is my own belief, and as witness for the plaintiff I so testified, that gray iron has a definite meaning in the trade. How shall we define it and what are its limitations? When does a casting cease to be gray and begin to be something else? I think a glance over the advertisements and market reports in the trade papers will show the following facts: There is a class of foundries advertising as gray-iron foundries who use soft, fluid iron, usually No. 1 or No. 2X, with scrap from castings of a similar composition, and who make therefrom castings such as stoves and radiators and various small articles, such as parts of small machines and toys. There is also a class of foundries who make a heavier work, and in this we may include castings such as engine beds, flywheels, machine-tool castings, roll housings, sugar machinery and the like. These are all gray iron, but when we turn to market reports and read the pig-iron sales, one begins to note a difference in terms. Instead of No. 1 and No. 2X we read "Special No. 2X," "analysis iron," or "pipe iron." I do not intend this as a slur on the pipe foundries, which usually also produce other heavy work. What they do is simply this. As large buyers they can purchase "misfit" iron from various sources. They employ chemists trained in their line of work, and can thus balance the deficiencies of one lot against the excesses of another, producing therefrom a suitable mixture. Proceeding a step further, that is, toward a class of castings still lower in silicon, such as carwheels, chill rolls, etc., we have a class of castings that, while relatively soft in the center and capable of being machined, are entirely distinct in composition from either of the preceding classes. To my mind they cannot be considered as gray iron by any ordinary use of the word. We have then three classes of castings, which may be roughly classed as follows:

Light castings with silicon, from.....	2	to 2.50
Light castings with phosphorus, from...	0.5	to 0.80
Heavy castings with silicon, from.....	1	to 2
Heavy castings with phosphorus, about..	0.50	
Chilled castings with silicon, from.....	0.50	to 1.00
Chilled castings with phosphorus, from..	0.20	to 0.40

Referring again to pig-iron quotations, we have the anomalous conditions that, as dealt in, many irons are gray that are never known as such. To illustrate my point, malleable Bessemer, when sand cast, is gray, and so is No. 2 charcoal. It might be urged that castings could be classified by the amount of graphite. Ordinary small castings are usually wanted as soft as possible, very often too soft for the purpose. This is on account of the demands on the machine shop where various automatic machines are geared at their highest speed to give a big output.

As matters stand, there is much confusion in all branches of the iron trade. So far as I know there is no generally accepted definition of steel; the same may be said of wrought iron. It ought not to be difficult to agree on a fairly satisfactory definition for gray iron.

New Steel Casting Plant at Akron

The Acme Steel Company, Akron, Ohio, recently incorporated, will establish a plant for the manufacture of converter steel castings of medium weight, beginning with a capacity of about 10 tons per day. John H. Davis, formerly of Cleveland, and now superintendent of the Chester Steel Casting Company, Chester, Pa., will take charge as superintendent Nov. 15. The company has leased the former power buildings of the Northern Ohio Traction & Light Company, in Akron, and these are now being remodeled and equipped. They are twin buildings, of brick and steel construction, over 200 ft. in length, each about 50 ft. wide, and equipped with a 25-ton traveling crane. A Baltimore & Ohio siding is laid into one of the buildings. The company has an initial capital stock of $60,000. The officers are H. H. Whiting, president and general manager; James H. Miller, vice-president, and C. A. Spencer, secretary and treasurer. Offices have been opened in the Medford Building, Akron.

The Lehigh Valley Railroad has recently completed the laying of a spur track from its Bound Brook & Perth Amboy branch to the outskirts of New Brunswick, N. J., about a mile distant, giving that city valuable additional freight facilities.

Questionnaire on British Iron Works Practice

An attempt is to be made to ascertain what steps are necessary to improve the economy and efficiency of blast furnaces and steel works in Great Britain. At the recent meeting of the British Association at Newcastle-upon-Tyne, the metallurgical committee brought in a report stating that a series of questions had been submitted to the iron and steel manufacturers of the country, the answers to be based as far as possible on pre-war practice. The following are the questions:

Blast Furnaces

Coke required to make one ton of pig—

1.—Foundry iron (Lincolnshire, Staffordshire, Cleveland, etc., No. 3 quality)

2.—Basic pig

3.—Hematite (Nos. 1, 2 and 3).

4.—Ferromanganese (80 per cent).

5.—Spiegel (11 to 20 per cent silicon).

6.—Silico-spiegel.

7.—What is the loss of gas and heat caused by lowering the bell when charging the furnace, per ton of pig?

8.—What is the loss of heat in the burnt gases from stoves and boilers, and how is this calculated?

9.—What is the temperature and analysis of waste burnt gases, and how is this determined?

10.—Has the heat of pig and slag been applied to any useful purpose?

11.—Has dry air been applied to the blast furnace; if so, has economy resulted and to what extent; if not, have you any evidence on coke consumption during frosty weather and damp summer weather?

12.—Has the gas from furnaces been cleaned from dust, and if so, has economy followed the use of clean gas in stoves and boilers?

13.—Are steam or gas engines employed for blowing the air into furnaces?

14.—If gas engines are used, how is the surplus furnace gas utilized?

15.—What kind and quality of fuel is required to calcine Cleveland and other ironstones per ton of pig?

16.—Is furnace gas used for calcination; if not, what kind of fuel is employed?

17—Is it necessary to use coal for steam raising or other purposes in the production of pig-iron?

18.—Is coal used in the blast furnace; if so, how much per ton of the pig introduced is required?

19.—Is the exhaust heat from the steam engines utilized?

20.—What is the total of coal and coke used per ton of pig?

Steel Works

21.—What is the total amount of coal per ton of steel ingots produced in Siemen's furnace? State capacity of furnaces and whether basic or acid.

22—If using cold pig and cold scrap give amount of each in cwts.

23.—If using liquid iron and cold scrap, give amount of each in cwts.

24.—What weight of coal per ton of ingots is used: (*a*) for heating furnaces; (*b*) for heating ladles; (*c*) for metal mixers; (*d*) for other purposes.

25.—What is the temperature and composition of the waste gases at chimney base of steel-melting and heating furnaces?

26.—What coal is used for steam raising: (*a*) For working producers; (*b*) for locomotives, cranes and other powers in connection with steel production only?

Steel Mills

27.—What weight of coal is used for steam rolling mills per ton of ingots rolled, giving sizes of ingots and amount of work done, with particulars as to sections rolled?

28.—What coal or equivalent in gas is used in soaking pits?

29.—What coal or equivalent in gas is used for reheating bars and blooms, giving size of blooms reheated?

30.—What is the temperature and composition of the escaping gases (stating number of samples over week) (*a*) from soaking pits; (*b*) from reheating furnaces?

31.—What is the temperature and composition of the waste gases from steam-raising boilers?

32.—Is the heat in the exhaust from steam engines utilized; if so, in what way and to what extent?

33.—Is Mond gas, or gas produced by any modified process used for steel melting; if so, state: (*a*) The amount of steam used for producers; (*b*) the amount of coal used per ton of steel ingots; (*c*) the saving in coal and loss of gas compared with coal used in ordinary practice; (*d*) the cost of coal used; whether or not steel sheets, plates, etc.

BRITISH STEEL EXPORTS

September Shipments Lowest for More Than a Year—Imports Declining

Exports of iron and steel from Great Britain in September, made up mostly of supplies sent to the Allies, were 231,335 gross tons, excluding iron ore and including scrap. This compares with 319,928 tons in August. The September exports are the smallest since February, 1915, when they were 198,804 tons. Government prohibitions are having more and more effect. The average for the first nine months of this year was 303,708 tons, comparing with a monthly average in 1915 of 270,858 tons.

Pig-iron exports for September were 65,110 tons, against 43,183 tons in August this year and 46,494 tons in September, 1915. To Oct. 1, 1916, total pig-iron exports were 647,475 tons, as compared with 298,-359 tons to Oct. 1, 1915. Of this year's total France took 438,011 tons and Italy 104,373 tons.

Ferromanganese exports in September were about 7500 tons, against 6500 tons in September, 1915. To Oct. 1, 1916, they were about 99,000 tons, contrasting with 73,000 tons to Oct. 1, 1915. The present export rate is therefore about 11,000 tons per month as compared with only about 8000 tons per month in the same period a year ago.

Steel-bar exports in September were 31,486 tons (24,384 tons going to France), against 35,853 tons in September, 1915. The total to Oct. 1, 1916, was 498,-073 tons as compared with 343,647 tons to Oct. 1, 1915. France has taken 420,210 tons this year. Rail exports in September were only 2712 tons, in contrast with 15,800 tons in September, 1915. The total rail exports to Oct. 1, 1916, were only 36,458 tons, against 205,952 tons for the same period in 1915.

The movement in galvanized sheets continues at about 50 per cent of last year's. The total for the first nine months of this year was 110,332 tons; for the same months in 1915 it was 238,480 tons. Tin-plate exports continue about the same. In September they were 19,226 tons against 20,002 tons in September, 1915. The total exports to Oct. 1, 1916, were 280,122 tons against 280,437 tons to Oct. 1, 1915. France took 57,867 tons this year.

Imports of iron and steel in September, excluding iron ore and including scrap, were unusually small—66,657 gross tons against 72,033 tons in August, 1916, and 144,360 tons in September, 1915. The record month for 1916 was May with 86,303 tons. The monthly average for 1915 was 107,944 tons.

Blooms, billets and slabs imported in September were 10,802 tons, comparing with 20,104 tons in August of this year and 43,091 tons in September, 1915. The total to Oct. 1, 1916, which was 117,800 tons, was only one-third of that for the same period last year—359,867 tons. Of the former total the United States supplied 95,259 tons against 289,220 tons last year.

Iron-ore imports in September were large—602,288 tons against 469,879 tons in September, 1915. The total to Oct. 1, 1916, was 5,481,509 tons compared with 4,709,046 tons to Oct. 1, 1915.

The valuation of the steel exports for the first nine months of this year is reported at £45,147,916 against £28,923,683 for the same nine months of 1915. The valuation of steel imports for the first nine months of this year is put at £8,889,530 against £8,121,431 to Oct. 1, 1915.

The Moore & Scott Iron Works, whose shipyard is at Oakland, Cal., launched its first large steel vessel Oct. 14. It is intended for carrying freight, has a cargo capacity of 7100 tons, is being built for Norwegian interests and is named Capto. The launching was made the occasion of a great gathering of the [illegible] people, and the wife of Mayor [illegible] performed the christening. The vessel was launched five weeks ahead of the contract time. The [illegible] one of a type which the shipbuilding company is [illegible] plants.

Westinghouse Electric Company's Welfare Work

Some of the activities of the Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa., in its endeavor to take care of its employees are briefly described in a pamphlet which has just been issued entitled, "The Worker and the Works." The company has taken the stand that there is no inherent reason why a man's occupation, the comfort of his home life and the development and education of his children should not go hand in hand. It has therefore made an earnest endeavor to afford its employees opportunities for social and educational advancement. These include among other things the use of guards, inclosures and warning signs to lessen the danger of accidents in the plant; the publication of a shop magazine containing safety and health hints, accounts of social activities, suggestions for methods of improvement in the works, descriptions of processes and systems employed in the shop and other items of general interest; a club and technical night school for the employees; relief, compensation and pension plans; a suggestion system; a savings fund; picnics; lunchrooms and counters, and a number of other features which, although in a sense outside of the general scope of manufacturing, have contributed in a large measure toward the building up of desirable communities in which to live. All of the various activities are described at some length and the pamphlet is illustrated with a number of views taken in the shop, at the Westinghouse Club and in the technical school. The work of the relief department of the company was described at some length in THE IRON AGE, Dec. 31, 1914.

Pennsylvania's Annual Safety Congress

The Fourth Annual Welfare and Efficiency Conference of the State of Pennsylvania will be held in Harrisburg, Nov. 21, 22 and 23 under the auspices of the Department of Labor and Industry and with the cooperation of the Engineers' Society of Pennsylvania. A paper, "Nine Months of the Workmen's Compensation Law in Pennsylvania," by Harry A. Mackey, will be discussed by A. B. Farquhar, president A. B. Farquhar Company, York, Pa., from the standpoint of the manufacturer. "Hiring and Firing—An Economic Waste" will be presented by Magnus W. Alexander, General Electric Company, West Lynn, Mass., on Tuesday, Nov. 21, at the evening session. Other papers include: "The Accident Problem in the Iron and Steel Industries," by J. H. Herbert, superintendent safety department, Cambria Steel Company, Johnstown, Pa.; "The Employer's Duty Toward Accident Prevention," by George T. Fonda, safety engineer, Bethlehem Steel Company, South Bethlehem, Pa., with the general discussion opened by Lew R. Palmer, chief of bureau of inspection, Pennsylvania Department of Labor and Industry, both on Wednesday morning, Nov. 22. "Medical Supervision of Workmen and Its Relation to the Prevention of Industrial Accidents," by Dr. Loyal A. Shoudy, Bethlehem Steel Company, South Bethlehem, Pa., and "The Relation of the Industrial Physician to the Problems of Modern Industry," by Dr. J. W. Schereschewsky, United States Public Health Service, Pittsburgh, are scheduled for Thursday morning, Nov. 23.

Standard Roller Bearing Company's Loss on Shellwork

The answer of Robert S. Woodward, Jr., and S. Lawrence Bodine, receivers of the Standard Roller Bearing Company, Philadelphia, to a petition filed in the United States District Court by John S. Stanton, Frederick P. Fiske and Merrill Bishop, stockholders of the company, showed specifications in hand Sept. 30, 1916, for $1,400,000 worth of products besides $1,000,000 worth, sold for delivery next year, on which specifications have not been received.

In June, 1915, the receivers entered into a contract with Gaston, Williams & Wigmore, New York, for the machining of shell bodies. After some time the labor situation suddenly changed, due to the large increases in wages for this class of work. It was necessary to train employees specially in the work and it was found that after receiving their instruction many left to accept positions with munition manufacturers at greatly increased wages. The receivers were unable to meet these wages. Had they done so a general increase throughout the plant would have been necessary, which would have caused a loss in the conduct of the general business. It was decided best to sublet the contract upon such terms as would relieve the receivers from any further liability. The receivers deny that the loss was $100,000 on this undertaking and say that it was $25,000.

The plant is operated day and night to its capacity, and inasmuch as the profits from Oct. 21, 1913, to Sept. 30, 1916, have been nearly $750,000 the receivers believe the best interests of the stockholders and creditors would be served by continuing it as a going business until an acceptable plan of reorganization is proposed.

Present Condition of Copper Exports

While the exports of copper from the United States as pigs, ingots, bars, etc., since the war has at no time attained the proportions before the war, when about one-third reached Germany, the present export rate very nearly approximates that of the large outgo in 1913 and 1914. In May, June and July, this year, the exports were 33,104 tons, 35,772 tons and 34,270 tons respectively, the average of which is 34,382 tons or at the rate of 412,584 tons per year. This compares with the following data, compiled from Government figures:

Period	Total, Gross Tons	Per Month, Gross Tons
To Aug. 1, 1916 (seven months)	203,377	29,054
Fiscal year ended June 30, 1916	317,672	26,473
Fiscal year ended June 30, 1915	302,300	25,191
Fiscal year ended June 30, 1914	435,130	36,260
Calendar year, 1915	304,443	25,370
Calendar year, 1914	375,036	31,253
Calendar year, 1913	413,500	34,458
May, June and July, 1916	103,146	34,382

It is seen that the rate for the last three months is very close to that of the record in 1913.

Of exports to Aug. 1, 1916, France took 95,671 tons; the United Kingdom, 49,654 tons, and Italy 25,767 tons.

Exports of brass and manufactures of to Aug. 1, 1916, were valued at $157,883,598, which contrasts with exportations to Aug. 1, 1914, valued at $4,248,656, revealing an extensive outgo of copper in this form.

Firms on the British Blacklist

The number of foreign firms with which, according to the British statutory list (made up to and including Sept. 29, 1916), trading is prohibited is 1853, distributed in the following numbers among the various countries: Argentina and Uruguay, 115; Bolivia, 34; Brazil, 171; Central and South America (all countries), 5; Chile, 50; Colombia, 16; Cuba, 10; Denmark, 36; Ecuador, 74; Greece, 63; Iceland and Faroe Islands, 5; Japan, 93; Liberia, 13; Morocco, 91; Netherlands, 162; Netherland East Indies, 95; Norway, 97; Paraguay, 2; Persia, 56; Peru, 48; Philippine Islands, 50; Porto Rico, 2; Portugal, 77; Portuguese East Africa, 76; Portuguese West Africa, Portuguese Guinea, Fernando Po and Rio Muni, 12; Spain, 201; Sweden, 90; United States, 81; Venezuela, 28.

It is announced that the Texas Iron & Steel Company, Beaumont, has obtained "the exclusive right for Texas to employ the Bradley process of ore reduction" and that it plans to build furnaces at some point in eastern Texas within convenient distance of the natural gas field at Caddo, La. The company is reported to own extensive deposits of iron ore in Cass, Marion, Anderson and other counties.

A chart entitled "Steel Hopper Bottom Coal Car" has just been issued by the Norman W. Henley Publishing Company, New York. It was prepared by George L. Fowler and shows the anatomy of a steel hopper bottom coal car, having every part of the car numbered, with its proper name given in a reference list.

Pittsburgh and Nearby Districts

The Petroleum Iron Works Company, Sharon, Pa., has let contracts for a new steel main building and equipment that will increase its capacity about 25 per cent. The new addition will be 120 x 150 ft., and will be built by the Fort Pitt Bridge Works, Pittsburgh. A new heating system is also being installed in the present plant.

The Youngstown Sheet & Tube Company, Youngstown, has given notice that on Jan. 1, 1917, it will redeem all outstanding bonds, consisting of $1,250,000 first and collateral series dated July 1, 1905, and $455,000 sixth serial on its Struthers, Ohio, plant, which consists of rod, wire and wire nail mills, and which it bought from the Morgan Spring Company, Worcester, Mass., some years ago. The company will pay $105 for the bond, par value being $100, as they are to be taken up before the date of maturity. The entire sum to be paid for the bonds will be $1,790,000.

The Standard Car Construction Company, which is erecting a large plant at Masury, near Sharon, Pa., for the manufacture of steel tank cars, expects to have it completed in December. The company states it has already received enough orders to take its entire output for the first quarter of 1917. C. H. Todd, who was formerly president of the Petroleum Iron Works Company at Sharon, is president of the Car Construction Company.

The American Steel & Wire Company will build a large office building at its works at Sharon, Pa. An addition will also be made to the galvanizing plant.

The board of directors of the Standard Sanitary Mfg. Company, Pittsburgh, has decided to increase its capital stock from $10,000,000 to $20,000,000. Of the increase $4,000,000 will be preferred and $6,000,000 common.

The Pittsburgh Visible Spark Plug Mfg. Company has been incorporated with a capital of $50,000 to manufacture spark plugs. The incorporators are William Boyd Winloft and Charles H. Jones of Wilmington, Del.

Record outputs for production of steel were made in October in the Bessemer and open-hearth steel plants at the Ohio works of the Carnegie Steel Company, also by the Youngstown Sheet & Tube Company and Republic Iron & Steel Company, and in the open-hearth department of the Brier Hill Steel Company. It is stated the output of ingots at the Ohio works of the Carnegie Steel Company that month was 137,000 tons. It is also said that the Carnegie Company's plants in the Youngstown district broke no less than 35 output records in October. Its 43-in. mill on a 12-hr. turn rolled 943 ingots, or an ingot about every 43 seconds. The Brier Hill Steel Company turned out over 50,000 tons of ingots and the Bessemer and open-hearth plants of the Youngstown Sheet & Tube Company turned out 121,526 tons of Bessemer and open-hearth ingots. It is also said that the Republic Iron & Steel Company turned out close to 100,000 tons of Bessemer and open-hearth steel ingots.

Ground was broken last week at New Castle, Pa., for the new plant of the Pull-More Motor Truck Company, which is capitalized at $800,000. The plant is expected to be ready for the manufacture of motor trucks for commercial purposes early in the new year.

The Union Electric Steel Company, recently organized at Pittsburgh, with a capital of $350,000, has bought a site of three acres at Carnegie, Pa., on which it will build a plant and expects to be making steel by April 1. It will install at the beginning a 6-ton Heroult electric furnace, but the plant will be arranged to make extensions later on. The furnace is being built for the company at the Ambridge, Pa., works of the American Bridge Company. The site at Carnegie adjoins the plant of the Alloy Steel Forging Company, and it is said the latter will take part of the product of the new plant. James D. O'Neil, formerly connected with the United Coal Company, is president; H. O. Murphey, secretary and treasurer, and W. J. Walker, formerly connected with the electric steel plant of the Universal Rolling Mill Company, Bridgeville, Pa., is general manager.

It is stated that the Jones & Laughlin Steel Company, Pittsburgh, in order to insure an adequate supply of coal for the winter months, has closed contracts for large quantities with independent mining companies. The Vesta Coal Company and other smaller coal-mining properties are owned by the company, but it was feared their output would not be sufficient for its requirements.

The November meeting of the Pittsburgh Section of the Association of Iron and Steel Electrical Engineers will be held on Saturday evening, Nov. 18, in the Fort Pitt Hotel, Pittsburgh, preceded by a dinner. David Wright will talk on "Variable Speed Alternating Current Motors for Mill Drive." W. O. Oschmann, 2417 Osgood Street, Pittsburgh, is secretary of the section.

The Youngstown Foundry & Machine Company, Youngstown, recently made a shipment of three lathes for machining 18-in. rolls, having some new features, to the Crescent works of the Crucible Steel Company of America, at Pittsburgh. All gears in the head stocks of these lathes are inclosed in a cast-iron housing filled with oil.

The business of Samuel Trethewey & Co., Ltd., Pittsburgh, manufacturer of solid steel shear knives, has been incorporated as the F. Tinker & Sons Company. There has been no change in officers. Francis Tinker is president, and W. R. Tinker secretary and treasurer.

The Ohio Automatic Sprinkler Company, Youngstown, Ohio, will make large additions to its plant which will increase its output about 50 per cent. It makes such equipment as is installed by the Automatic Sprinkler Company of America, of which it is a subsidiary interest. The engineering force of the parent company will be assembled at Youngstown, and a new office building to cost about $25,000, three stories, will be erected to house the engineering department and the office force.

The Standard Seamless Tube Company, Economy, Pa., is in the market for a 50-ton crane for prompt delivery.

The Penn Bridge Company, Beaver Falls, Pa., has taken a contract for the erection of a one and two-story building, 162 x 219 ft., for the Atlas Car & Mfg. Company, Cleveland. About 200 tons of steel will be used in the new building.

Standard Chain Company Sold

The Standard Chain Company has been sold to the American Chain Company, Bridgeport, Conn. The Standard Company is estimated to have a capacity annually of 30,000 tons of finished product. It was organized in 1900 and owns and operates plants in York, Carlisle and Braddock, Pa.; Columbus, St. Marys and Mansfield, Ohio, and Marion, Ind. Since its incorporation the principal offices of the company have been located at Pittsburgh, with John C. Schmidt president. W. B. Lasher, Bridgeport, Conn., is president of the American Chain Company.

At the regular meeting of the Detroit Foundrymen's Association, Detroit, Mich., to-night, Nov. 9, there will be a debate on green sand vs. dry sand molds in making automobile cylinder castings. The use of green sand molds will be advocated by a team at the head of which will be Robert Crawford, president Atlas Foundry Company. Emil Horne, manager of the foundry and forging departments of the Packard Motor Car Company, will be captain of the dry sand team.

An industrial safety congress under the auspices of the State Industrial Commission of New York State will be held at the Hotel Onondaga, Syracuse, on Dec. 11, 12, 13 and 14. Addresses are to be made at morning and afternoon sessions on fire prevention, factory sanitation, safeguarding of machinery and other factors entering into industrial safety.

BUYERS LIMIT PURCHASES

High Prices Block Machinery Sales

Orders Held Down to Small Lots and Single Tools—Present Needs Not Entirely Met, Enhancing Machine-Tool Outlook

All machine-tool centers report a distinct tendency for purchasers of equipment to meet their requirements gradually by contracting only for single tools or small lots up to a half dozen. In many cases early delivery is wanted, indicating that only imperative needs are considered. Deliveries, especially on certain standard lines, continue to ease off; but in spite of this, high prices are a deterrent to much business.

The absence of excited buying is not anywhere taken to indicate that demand is decreasing. Predictions are, on the contrary, being offered that current purchases are but a fraction of what the trade needs and that the business withheld because of present prices is merely postponed. This is taken by some to mean that there will be no recession of buying for many months, and by others that it will outlast the war. Right now one of the leading milling machine builders is booking orders for delivery next September and a maker of radial drills for next July.

The Russian Government is buying scattered lots of special lathes at Chicago. Cincinnati reports that Spanish importers have bought more machine tools lately than ever before. Business to Canada is slowing down; but munition makers there continue to order single tools steadily. Otherwise, export trade displays the same quieter aspect shown by the domestic trade.

The Standard Shipbuilding Corporation is buying against its recent list, and the Pusey & Jones Company, Wilmington, Del., is about to buy heavily for its new shops.

No noticeable distress from non-delivery of fuel or raw materials to manufacturing plants has as yet been reported. Foundries in Ohio are operating to full capacity; but some factories in the northern part of the State are inconvenienced by a soft coal shortage.

New York

NEW YORK, Nov. 8, 1917.

Deliveries continue to improve, although they are still many months away on some types of machines. Radial drills, for instance, are being ordered for next July. Considering the market as a whole it is somewhat quieter, although the volume of small, scattered orders is large.

Collections on machine tools are fair, but there is some wonderment as to why they are not better, the only answer is that manufacturers are using a great deal of capital in their operations, also making liberal distributions of stock dividends, both regular and extra, while a great deal of money is going into labor.

The Lehigh Valley Railroad has lately purchased a few tools for delivery at its Sayre shops. It recently issued a large list against which it was expected to buy slowly. The Pennsylvania Railroad occasionally buys one or two tools for delivery at Altoona, which it favors as its chief manufacturing point. Its other shops are known to be in need of tools.

The estate of J. K. Stewart is bringing from Chicago machinery which was purchased by the late J. K. Stewart, also buying some additional tools, all of which will be installed in a plant at Jackson Avenue and Second Avenue, Long Island City. Automobile accessory parts will be manufactured.

The Pusey & Jones Company, Wilmington, Del., is about to buy heavily for new shops which it has erected. One of the company's engineers has been making a trip through the West for the purpose of selecting the machines desired. It also has placed with the Norton Company an order for a roll grinder which will cost about $40,000.

The Standard Shipbuilding Corporation has begun to place orders against the list it issued recently.

The General Electric Company continues to place orders.

The Treadwell Engineering Company, Easton, Pa., is extremely busy in manufacturing rolling-mill equipment. It has been in the market for a few planers.

The Brady Brass Company, Jersey City, N. J., has added a few machines to its equipment. The brass-working trade in Baltimore and Wilmington, manufacturing plumbing goods, principally, is extremely busy, but like other lines has been greatly hampered by the lack of skilled men. Lately there has been a little more ease in this respect and orders have been placed for a few machines.

The Linde Air Products Company, Forty-second Street Building, New York, is preparing plans for factory buildings to be erected in the Central Manufacturing District, Chicago, Ill. W. F. Barrett is works manager.

The American Locomotive Company, 30 Church Street, New York, advises that it has not purchased an acreage at Pittsfield, Mass., as the site of a new plant.

The Creighton Valve Company, 116 Grand Street, Maspeth, Long Island, N. Y., has been incorporated with a capital stock of $10,000 to manufacture automatic and hand-operated cut-off gas valves for fire prevention. William E. Woodwill, is president; Robert Kunze, secretary, and George S. Jervis, treasurer. The company proposes for the present to use an existing plant.

The Militaire Motor Vehicle Company of America, Buffalo, N. Y., recently increased its capital stock from $250,000 to $650,000.

The Sanitary Brass Works Company, 1805 First Avenue, New York, has increased its capital stock from $5,000 to $10,000.

The United States Alloys, Inc., Buffalo, recently organized, has purchased a site of 16 acres on the River Road and the New York Central Railroad on which it will build an extensive plant for the production of alloys used in the manufacture of steel. The new plant adjoins plant No. 3 of the International Graphite Company, now under construction, and in the immediate vicinity of the steam-electric power plant of the Buffalo General Electric Company on the Buffalo River, now being completed, with a capacity of 100,000 hp.

The American Body Company, Buffalo, N. Y., is building a two-story brick addition to its factory at Niagara and Breckinridge streets.

The Commercial Electrolytic Corporation, Buffalo, has commenced construction of a two-story reinforced concrete factory at Colgate Avenue and the South Buffalo Railroad to cost $25,000.

The Jacob Dold Packing Company, Buffalo, has purchased property, 90 x 500 ft., at Fillmore Avenue, William Street and the New York Central Railroad, on which it will build an addition, including a four-story office building. The additional site will also enable the company to increase its elevated railroad storing and shipping facilities to a total of 30 cars.

The Ferguson Steel & Iron Company, Buffalo, is further enlarging its steel fabricating plant at Bailey Avenue and the New York Central Railroad by the erection of a building to cost $20,000.

The Barcalo Mfg. Company, Louisiana and Republic streets, Buffalo, is building a further addition to its plant for the manufacture of iron and brass beds.

The American Metal Bed Company, Newark, N. J., has filed plans for alterations and improvements in its plant on Clifton Street.

The Grimes Engineering Company, Hudson Street, Jersey

City, N. J., operating the Atlas Iron Company, is negotiating with the City Commission for property in the South Cove section for the construction of a new drydock.

The Brunswick Motor Car Company, Maywood, N. J., has been incorporated with a capital of $500,000 to manufacture automobiles, engines, etc. Alden V. Meeks, Maywood; James T. Burt, Norwood, and Russell Smith, New York, are the incorporators.

The Newark Tube & Metal Works, 360 Ferry Street, Newark, N. J., has taken out a permit to make alterations and improvements in its plant.

The Kent Motors Corporation, 1790 Broadway, New York City, recently incorporated, has increased its capital stock from $100,000 to $2,000,000, to provide for the erection of its proposed automobile manufacturing plant on property acquired on Washington Avenue, Belleville, N. J.

New England

BOSTON, MASS., Nov. 6, 1916.

Embargoes are once more beginning to be a part of the daily news of New England. The Boston & Albany Railroad has placed an embargo, with the usual exceptions, on freight originating in Albany or further west destined to points on the New Haven lines. This has not been heavily felt yet, but indicates the increase in pressure upon the transportation lines. The shortage of coal is beginning to assume serious aspects in some localities and prices are sky-rocketing according to reports in every district.

The North & Judd Mfg. Company, New Britain, Conn., has increased its capital stock from $1,000,000 to $1,250,000.

The Scovill Mfg. Company, Waterbury, Conn., has secured permits to build a factory on Silver Street, 125 x 220 ft., one story, and another factory building on the same street, 50 x 170 ft., one story.

The Waterbury Mfg. Company, Waterbury, Conn., has awarded a contract for a six-story building, 62 x 147 ft., and 62 x 142 ft., to the Aberthaw Construction Company.

The Chase Metal Works, Waterbury, Conn., has secured a permit to erect a storehouse on Thomaston Avenue, 62 x 200 ft., one story.

The United Aluminum & Smelting Company, New Haven, Conn., has bought a tract of land in North Haven and will erect there five buildings, the largest 100 x 200 ft., one story. The new plant will be used for smelting aluminum, and it is expected to be ready by Jan. 1.

The New Haven Malleable Iron Company, New Haven, Conn., is contemplating an addition, 75 x 300 ft., to be constructed early in the spring.

The Standard Mfg. Company, Bridgeport, Conn., has increased its capital stock from $75,000 to $500,000.

The J. O. Smith Mfg. Company, Middletown, Conn., has awarded a contract for an addition to its plant in Westfield, 26 x 52 ft., three stories.

The Bridgeport Steel Company, Stratford, Conn., has been incorporated with capital stock of $100,000 to deal in steel and iron. The incorporators are Clarence R. Hall, Stratford; John T. L. Hubbard, Fairfield, and Mabelle K. Pederson, Bridgeport.

The Capitol File Company, Hartford, Conn., has been incorporated with capital stock of $50,000 to manufacture files, tools, etc. The incorporators are Matthew F. Moskey, Benjamin J. Moskey, Stephen Moskey, Theodore E. Clark and Stanislaw Wisnieski.

The Rockwell-Drake Company, Plainville, Conn., has increased its capital stock from $300,000 to $350,000.

The United Metal Company, Norwich, Conn., is to build an addition, 30 x 60 ft., one story.

The Terry Steam Turbine Company, Hartford, Conn., is adding one story to its office building.

The Waterbury Farrel Foundry & Machine Company, Waterbury, Conn., is to build a factory on Bank and Meadow streets, 40 x 180 ft., two stories, and 35 x 150 ft., one story. Traveling cranes will be installed.

The A. H. Wells Company, Waterbury, Conn., is having plans drawn for a power house, 45 x 50 ft., to be erected at its new plant on East Aurora Street.

The Chase Rolling Mill Company, Waterbury, Conn., is to build an addition to its storehouse on East Farm Street, 68 x 93 ft.

The Rider Bagg Company, Springfield, Mass., has awarded a contract for an addition, 30 x 56 ft., one story, to its foundry.

The Stanley Steel Wheel Company, Portland, Me., has been incorporated with capital stock of $750,000. The officers are Eugene L. Bodge, president, and Scott Wilson, treasurer and clerk.

The Reed-Prentice Company, Worcester, Mass., is building [illegible] to its Gold Street plant for [illegible] purposes.

The Grant Gear Works, West Lynn, Mass., is reported to be contemplating the erection of a steel foundry, [illegible] ft., one story, and a manufacturing building, 60 x [illegible] ft. It has also been receiving bids for a pattern shop at its Everett, Mass., plant, 115 x 200 ft., one story.

The New England Drawn Steel Company, Mansfield, Mass., expects to occupy a new factory in about four months.

The Washburn & Garfield Mfg. Company, Worcester, Mass., is to build a factory, 61 x 90 ft., three stories.

The New York Smelting & Refining Company, Bridgeport, Conn., has been incorporated with capital stock of $100,000. Abraham Rachelson is president; I. Kaspdon, treasurer, and Philip Norvitz, secretary.

The Mansfield Foundry Company, manufacturer of gray-iron castings, Mansfield, Mass., recently incorporated, has a capital stock of $15,000, not $150,000 as stated in THE IRON AGE of Oct. 12, 1916.

Philadelphia

PHILADELPHIA, PA., Nov. 6, 1916.

The Hamburg Boiler Works, maker of pneumatic and storage tanks and air receivers, Hamburg, Pa., requires a good second-hand belt-driven angle bending roll with a capacity of 4 in. x 4 in. x ½ in. angles. The company is extending its side track 170 ft. and extending its main shop 50 ft. and will require a 4-ft. drill press and set plate bending rolls later on. Henry A. Seiders is proprietor.

The Kutztown Foundry & Machine Company, 1421 Chestnut Street, Philadelphia, has altered its power system to provide for the operation of 45 motor-driven units of from 3 to 45 hp. The company is now shipping two carloads of castings per week to Japan.

The Economy Refrigerating Company, Philadelphia, has been incorporated with a capital of $25,000 to manufacture refrigerating machinery. A. C. Middleton, Philadelphia, is president.

Smith, Drum & Co., Philadelphia, will build an addition to their machine shop on Alleghany Avenue.

John H. Ferguson, 3855 North Nineteenth Street, Philadelphia, will build a new one-story brick machine shop, 36 x 150 ft., on Broad Street.

The Philadelphia Enameling Mfg. Company, Philadelphia, has awarded a contract to C. H. Swartz for the erection of a new one-story plant, 120 x 200 ft., on Eighty-second Street, at a cost of $12,000.

The Midvale Steel Company, Nicetown, Pa., has awarded a contract to Barclay, White & Co., for the erection of an addition to its machine shop, about 75 x 155 ft., on Wissahickon Avenue, at a cost of $40,000. The company will also build a one-story addition to its press plant.

The Joseph Stokes Rubber Company, Trenton, N. J., manufacturer of hard rubber goods, will build two additions to its plant on Taylor Street, comprising one and two-story structures.

The Anchor Pottery Company, Trenton, N. J., manufacturer of general pottery ware, will build a one-story brick addition to its plant on New York Avenue.

The Luzerne Rubber Company, Trenton, N. J., manufacturer of hard rubber specialties, will build a two-story factory on Muirhead Avenue, to cost about $10,000.

The Doyle-DaCosta Mfg. Company, Trenton, N. J., has been incorporated in Pennsylvania with a capital of $50,000 to manufacture insulated wire. A plant will be established at Easton, Pa. William L. Doyle and Robert C. DaCosta, Trenton, are incorporators.

Heister A. Bowers, Reading, Pa., and associates, will establish a plant for the manufacture of adding machines. A company with capital of $200,000 has been organized.

The United States Radium Works, Sellersville, Pa., is making improvements and additions in its plant and will increase the capacity.

The Lehigh Valley Railroad is considering the erection of new machine shops and roundhouse at Hazelton, Pa. It is reported that $200,000 has been appropriated for the purchase of machinery and equipment. The company is also planning for the installation of new equipment at its roundhouse at Delano, Pa.

The Metal Products Company, Lancaster, Pa., will increase the capacity of its plant.

The Gross Mfg. Company, West Hazelton, Pa., will build an addition to its brass molding plant.

The Benjamin Iron & Steel Company, Hazelton, Pa., will install equipment at its plant at Hazelton Heights for the manufacture of coal-mining machinery, steam shovels, etc.

The Baltimore Peach Bottom Slate Corporation, manufacturers of roofing and structural slate, Delta, Pa., not the Peach Bottom Slate Company of Delta, Pa., was organized recently, as reported in THE IRON AGE of Sept. 28. C. R Gray, the president, is son of the president of the Western Maryland Railway Company, who is a director.

Pittsburgh

PITTSBURGH, PA., Nov. 6, 1916.

Conditions in the iron and wood-working machinery trades, and also in heavy machinery for iron and steel plants in this district continue remarkably active, and very high prices are being paid for second-hand tools of all kinds that are in good repair and in condition to be operated. The large companies here that build heavy rolling mill and steel works machinery, such as the United Engineering & Foundry Company, Mackintosh, Hemphill & Co., the A. Garrison Foundry Company, the Lewis Foundry & Machine Company, the Mesta Machine Company and others, all report they have very much more work on their books than ever before, and that on many desirable inquiries they are compelled to refuse to quote, not being able to make the deliveries wanted. One leading manufacturer who makes a specialty of iron and steel works equipment has lately refused to quote on any inquiries, stating the entire capacity of all its plants is sold up for the next 15 to 18 months. Other companies cannot quote on new business for delivery inside of 9 to 12 months, and in some cases are quoting what they know are prohibitive prices, as they cannot possibly furnish material within the time wanted by the customer.

Machinists, brass finishers and other labor employed by large shops are hard to find and for months the Westinghouse Electric & Mfg. Company, Westinghouse Machine Company and others have been advertising for hands. It is said that on a recent inquiry for a large blooming mill, two or three builders refused to quote and one made a price of 15c. per lb. erected, an unheard of figure for such equipment. A large demand exists for 8, 9 and 10-in. mills. Prospective buyers are willing to take second-hand mills if in good condition, but are unable to find them. One leading electric steel company just outside of Pittsburgh is in the market for a 10-in. mill, and willing to pay almost any price to get it, but so far has not obtained it.

Recently the National Tube Company sent out a large list of tools needed for extensions it is making to its works at Lorain, Ohio. This list has just been supplemented by another for tools for its works at Ellwood City, Pa., including, one 36-in. planing machine, one 24 x 16 ft. lathe, two 20 x 10 ft. lathes, one 30-in. vertical drill press, one horizontal centering machine and one 2 x 24-in. turret lathe. The company has been a heavy buyer of machine-tool equipment for some months and will likely need additional tools for extensions now being planned.

The Pittsburgh & Lake Erie Railroad, whose large pattern department in its McKees Rocks shops in the Pittsburgh district was destroyed by fire recently, has bought in the last two or three weeks some 25 or more wood-working tools to replace those destroyed by fire. A good part of the equipment was placed through the Pittsburgh office of Manning, Maxwell & Moore, Inc.

The Trumbull Steel Company, which will build a new open-hearth steel plant at Warren, Ohio, is in the market for a 42-in. lathe and a 5-ft. radial drill.

Baltimore

BALTIMORE, MD., Nov. 6, 1916.

At a cost of about $500,000 the Bethlehem Steel Company, Sparrows Point, Md., will have a gas-driven electric generator house and a gas-driven blowing-engine house constructed.

Samler Brothers, Inc., East Falls Avenue and Stiles Street, Baltimore, has been incorporated with $10,000 capital stock to deal in machinery, rails, cars, boats, motors, etc. The incorporators are James W. Hill and William and Benjamin Samler.

George W. and John F. Deal, 1516 North Regester Street, Baltimore, plan the construction of a three-story factory for the manufacture of iron and wire goods.

The Atlantic Iron Works, Norfolk, Va., has been incorporated by C. A. Marwitz, Jr., secretary, and others, with $25,000 capital stock.

E. P. Seifert, Richmond, Va., is understood to be interested in the construction of an iron foundry.

The Rogers & Madison Truck Corporation, Petersburg, Va., is planning the construction of factory building to cost $15,000.

Chicago

CHICAGO, ILL., Nov. 6, 1916.

The Russian Government is still buying special lathes, not in large single orders but in scattered lots where the best deliveries are obtainable. Inquiry for some heavy pattern lathes for munition work is still active. That which has the greatest significance in the situation from the standpoint of business to come following the war is the apparent policy of the general manufacturing trade. As has been noted, a fair volume of orders for general purpose tools is being received from manufacturers in staple lines, consisting of from one to a half dozen machines. The equipment being purchased is but a fraction of what the trade needs and because of prohibitive prices many purchases are not being made but postponed. If, as is now generally expected, a period of good business will follow the war, upon the basis of an adjusted level of prices, this demand for machine tools will not be the least part of it.

The Ghent Motor Company, 20 East Jackson Boulevard, Chicago, advises that it will be in the market for equipment for the manufacture of radiators and sheet metal parts for its cars and also equipment suitable for the manufacture of both front and rear axles.

The Great Northern Railway Company is planning for the electrification of more than 300 miles of its main line between Spokane and Seattle, Wash. The project includes raising the level of Lake Chelan, near which a main power plant will be established. It will be some time before the company is in the market for any material.

C. R. Bronson, 305 North Menard Avenue, Chicago, will build a one-story factory, 58 x 90 ft., to cost $4,000.

The city of Chicago, Charles W. Kallal, architect, is about to erect a power plant for which an expenditure of $120,000 is estimated.

The Crane Company, Chicago, has awarded contracts for the erection of a two-story machine shop, 80 x 220 ft., to cost $65,000.

F. Bromer, through the Thomas G. Gage Company, general contractor, will erect a one-story shop to cost $5,000. It will be 50 x 65 ft.

The Chicago Hardware Foundry Company, North Chicago, Ill., will add an additional foundry unit 105 x 135 ft. to its plant. Part of this will be used as a machine shop.

The Pechstein Iron Works, Keokuk, Iowa, advises that it will complete a new foundry, pattern shop and office building this fall, costing $20,000 to $25,000, and that in the spring its machine shop will be enlarged and additional equipment installed.

The American Fork & Hoe Company, Fort Madison, Iowa, is constructing a new plant consisting of six buildings. Consideration is now being given to the purchase of elevators, while the buying of machinery will come a little later.

Milwaukee

MILWAUKEE, WIS., Nov. 6, 1916.

Industrial expansion, particularly that which furnishes the bulk of the demand upon machine tool builders, is being carried on in ever-increasing volume, and opinion appears to be that if they were in a position to make deliveries more promptly, shop extension work would assume a much larger aspect. The willingness of metal-working shops to continue to enlarge facilities in the face of the high cost of building materials and equipment, is taken as due proof of confidence in the future. The Milwaukee tool business has been confined almost exclusively to domestic requirements for a good many months, and export business really has been accepted as a favor, so that the rise or fall of European demand is an insignificant factor. There is hardly a line of industrial effort that is not sharing in the general wave of good feeling of full occupation. It is noted that the labor situation, which long ago became acute in the metal-working industry, is assuming a like condition in practically every other line of manufacture, notably in lumbering, which up to eight or ten months ago was still suffering from stagnation. Manufacturers of logging, lumbering, sawmill and other wood-working equipment say that they have never before known of a better or larger demand for their products as at present.

The Koehring Machine Company, Thirty-first Street and Concordia Avenue, Milwaukee, manufacturing power concrete mixers and pavers, is enlarging its plant by the erection of an addition to its main shop, 54 x 118 ft.

The Rotary Gas Engine & Pulverizer Company, Antigo, Wis., recently organized to manufacture power farm machinery, has contracted with Mayer Brothers, Antigo, founders and machinists, for the complete manufacture of its machines for the present.

Joseph Stone, foundry [illegible] Algoma, Wis., has purchased the factory which he has occupied for [illegible] years, together with additional acreage, and will remodel and enlarge the plant.

The Allis-Chalmers Mfg. Company, Milwaukee, is building a garage service station and small repair shop for the convenience of employees at its main works in West Allis. It will be 60 x 120 ft., and adjoin the company's club house.

The Overland-Madison Company, Madison, Wis., has been granted a permit to build a garage, warehouse and service building at East Wilson and King streets, to cost $50,000.

The Thomas Machine Shop, New London, Wis., is now building fire escapes, and its plant probably will be enlarged to accommodate this department.

The Dornfeld Iron Works, Watertown, Wis., which have been producing farm tractors in conjunction with the Brillion Iron Works, Brillion, Wis., for eight months or more, have been taken over by the Monarch Tractor Company of Chicago, a $250,000 corporation. The chief product will be a tractor, in 6 x 30-hp. capacities, for which orders aggregating more than $400,000 are said to be already booked. The manufacture of sugar cane harvesting machines will also be conducted on a large scale on contracts with the Luce Sugar Cane Harvester Company of New Orleans. The force of workmen in the Dornfeld works will be increased.

The Automatic Cradle Mfg. Company, Stevens Point, Wis., expects to take occupancy of its new plant at Portage and North Third streets, Dec. 15. At that time the present plant will be released for the tire protector manufacturing business conducted by J. J. Buckolt, general manager of the company, and the output of steel shod protectors is to be 300 pairs daily. The Automatic Company is already having preliminary plans for further extensions, to consist of a four-story brick structure, 80 x 200 ft., which may be erected next spring.

The Lake Superior Electric Company, Superior, Wis., is now settled in its new plant at Third Street and Grand Avenue, and is increasing its output of electric operating compressors, steering gear units and other [illegible] operated marine devices. The design is by M. B. Benson, president and chief engineer.

The Wisconsin Wire Works, Appleton, Wis., specializing in screens and looms for paper mill machinery, is building a factory and stock room addition, 30 x 150 ft.

The Chicago & Northwestern Railroad Company, which is building a [illegible] ore dock, known as No. 3, at Ashland, Wis., is reported to be contemplating the construction of a fourth dock, of reinforced concrete and steel.

The Bonnell Fuel Saver Company, Milwaukee, has been organized with a capital stock of $10,000 to manufacture automobile carburetion appliances. The corporators are Albert A. Giese, Alfred J. Melms and Max J. Elsner.

The Anger Engineering Company, 301-303 Sixteenth Street, Milwaukee, specializing in custom built automobiles, etc., will build a larger plant at once at Twenty-sixth and State streets. Klug & Smith, consulting engineers, Mack Block, Milwaukee, are preparing plans for a one-story structure, 120 x 130 ft. B. F. Anger is general manager.

The Electric Steel Castings Company, Milwaukee, is making progress in the erection of its foundry in West Allis. It is now hoped to start operations April 1, 1917. Leo G. Smith is president and general manager.

The Northern Furniture Company, Sheboygan, Wis., has been purchased for approximately $500,000 by Jacob L. Reiss, New York, and Edward Hammett and August Westermeyer, Sheboygan, from Gustave Huette, who will devote his entire attention to the management of the Falls Motors Corporation, Sheboygan Falls, Wis. Mr. Reiss is the eldest of the Reiss brothers, Sheboygan, coal, dock and Great Lakes steamship operators.

The A. O. Smith Company, Milwaukee, maker of pressed steel products and motor trucks, has increased its capital stock from $1,000,000 to $3,000,000, with an additional issue of 100,000 shares without par value, to accommodate the increase in its business, which has grown from a volume of $500,000 in 1905 and $2,000,000 in 1910, to more than $7,000,000 in 1916. Considerable new equipment is being installed in the main works at Twenty-seventh and Hopkins streets and the old works at Park and Clinton streets, abandoned in 1909, will be transformed from a warehouse into a branch works to handle the overflow. The new equipment includes a 2000-ton press, said to be the largest ever built, which does the work of four ordinary presses for pressing steel frames for automobiles and motor trucks. L. Raymond Smith, who succeeded his father, Arthur O. Smith, as president and general manager upon his death in 1912, continues to hold the chief interest and the active management of the business.

Detroit

DETROIT, MICH., Nov. 6, 19[illegible]

With the month of October one of the best in the history of the machinery trade, indications are that November will set a new record. Milling and grinding machines are especially in demand, [illegible] months. Small lot orders are coming in, but the total is unusually large.

The Commercial Body Company, [illegible] been organized by W. H. Fitzgerald, [illegible] Woodsworth, A. E. Hubbell and others, to manufacture automobile body business. A factory will be erected at once.

The G. H. Wood Paper Company will [illegible] warehouse at Monroe, Mich., in the spring. Much new machinery will be installed.

The Howell Electric Motors Company, Howell, Mich., has increased its capital stock from $30,000 to $100,000, and plans an addition to its factory, 40 x 100 ft. New machinery will be installed which will double the output of the plant.

The Buhl Stamping Company, Detroit, which recently sold its plant to the Pennsylvania Railroad for $[illegible], is preparing plans for a factory on [illegible] Avenue, which will have 150,000 sq. ft. of floor space. Lawrence D. Buhl is president.

The Porcelain Insulator Company, Hastings, Mich., recently incorporated for $25,000, will open its factory for the manufacture of all kinds of porcelain insulators within a few weeks. Machinery and a large kiln will be installed.

The Standard Machine Company, Owosso, Mich., is selling stock to secure money to erect a modern plant. The plan of the company, of which H. W. Brown is secretary and treasurer, is to build a two-story machine shop, 40 x 120 ft., and a foundry 40 x 80 ft.

The Original Mfg. Company, Greenville, Mich., has leased a plant for the manufacture of toys. L. B. Hart is the organizer.

Production of 200 universal joints per day will be started [illegible] by the Michigan Wheel Company, Grand Rapids. New equipment will be added.

The Kalamazoo Sanitary Mfg. Company, Kalamazoo, Mich., capitalized for $250,000, will immediately begin the erection of a plant to turn out porcelain bowls and tanks, [illegible] plumbers' supplies.

The Swan Mfg. Company, Port Huron, Mich., will [illegible] William Swan is president.

John L. Cook, recently elected president of the Wadsworth Manufacturing Company, Fenton, Mich., will open a factory at Fenton and has secured orders from several Flint [illegible]

The Hayes Wheel Company, Jackson, Mich., has increased its capital stock from $1,000,000 to $[illegible], and is preparing to manufacture wire wheels in addition to its present output of 1,000,000 sets a year. C. B. Hayes is president and general manager.

The Duplex Power Car Company, Charlotte, Mich., is planning to increase its output. Leroy H. Brown is manager.

G. Moeke & Sons, Zeeland, Mich., whose planing mill was damaged by fire recently, are in the market for [illegible] hp. and 1-hp. motors and a three-drum sander and blower system.

Cleveland

CLEVELAND, OHIO, Nov. 7, 1916.

A steady demand is coming from manufacturing plants for small lots of machine tools. While cash buyers are worked in most cases, orders have been placed for the best deliveries that can be secured. Shipments on some standard lathes and milling machines have eased up somewhat. One leading builder of milling machines, however, is taking orders for delivery next September. The supply of second hand machinery appears to be somewhat more plentiful than for some time. Some northern Ohio plants are experiencing by the soft coal shortage but none is reported to have been compelled to shut down for lack of fuel. The natural gas supply was cut off from the large consumers in this section last week, the gas companies asserting that they could supply for domestic purposes. Manufacturers were given several months' notice of the contemplated action and had ample time to arrange for other fuel supplies.

The Republic Structural Iron Works, [illegible] has purchased the plant of the Avery Company, [illegible] Avery and Fifty-third Streets, covering [illegible] acres. The [illegible] for [illegible]

steel for a complete building and after this is fabricated it can be kept in storage and sent to the job as needed.

The Abbott Corporation, Cleveland, will shortly begin the erection of its new automobile plant on East 152d Street. The first building to be erected will be 110 x 680 ft.

The Standard Signal Tail Light Company, Cleveland, has been incorporated with a capital stock of $50,000 by A. A. Stambaugh, S. C. Ellitt and others to manufacture vehicle signals.

The American Steel & Wire Company, Cleveland, will erect an addition to its American works, to enlarge the capacity of its fine wire department, at a cost of $75,000.

The Cleveland Steel Valve Company, Garfield Building, Cleveland, will establish a plant in Dover, Ohio, in addition to the plant it now occupies in Kent, Ohio.

The Chatelain Machine Company, Akron, Ohio, has been incorporated with a capital stock of $75,000 by Alexander Chatelain and others and, it is announced, will build a machine shop next spring.

Paul Maiwurm is heading a company that will establish a plant in Ashland, Ohio, for the manufacture of aluminum ingots and die castings. It is stated that an aluminum foundry 40 x 160 ft. will be erected.

The Dall Motor Parts Company, Vermillion, Ohio, has been organized and will erect a building, 40 x 83 ft., to manufacture pistons and other automobile parts. W. E. Derr is president and L. A. Dall, general manager.

The Trumbull Mazda Lamp Division of the General Electric Company, Warren, Ohio, will build an addition 60 x 144 ft., three stories and basement.

It is announced that the Westgard Tire & Rubber Company, Warren, Ohio, will shortly begin the erection of the first unit of its new plant which will be 100 x 240 ft., two stories and basement, and a power plant. W. C. Owen & Co., Cleveland, are the engineers.

The Foster Bolt & Nut Mfg. Company, Cleveland, is erecting a new two-story brick addition which will about double the present floor space of the company.

The Sidney Tool Company, manufacturer of wood-working machinery, Sidney, Ohio, is constructing a two-story brick addition, 60 x 100 ft., to be devoted entirely to the use of an erecting shop for its machine-tool department.

Indianapolis

INDIANAPOLIS, IND., Nov. 6, 1916.

The newly-organized National Motor Car & Vehicle Corporation of New York will take over the National Motor Vehicle Company, Indianapolis, and will enlarge the plant in addition to a three-story reinforced concrete building 60 x 380 ft. now in course of erection. Property has been purchased for the other additions, the main building of which will be 140 x 328 ft. These improvements will increase the capacity of the plant to 6000 cars a year. The new corporation at present is only a holding company for the entire capital stock, but it will eventually take over the company as a going concern. A. C. Newby, president; W. G. Wall, vice-president, and George H. Dickson, secretary-treasurer, all identified with the company since its establishment in 1900, will hold similar positions with the new corporation.

The J. C. Vaughn Mfg. Company, Indianapolis, has been incorporated with $10,000 capital stock, to manufacture whiffletree hooks and clips. The directors are James C. Vaughn, William F. Reynolds and W. A. Vaughn.

The Kramm Foundry Company, Indianapolis, has been incorporated with $50,000 capital stock. The directors are Harry D. Kramm, W. S. Wilson and Charles B. Hauk.

The Fletcher Savings and Trust Company has been appointed receiver for the Indianapolis Foundry Company. It is stated the company is not insolvent, having assets of $298,670 and liabilities of $164,362, but it suffered in the flood of 1913 and from a three months' strike this year and lacks working capital.

The Kilo Electric Meter Company, Indianapolis, has been incorporated, with $40,000 capital stock, to manufacture electrical appliances. The directors are Claude L. Marshall, Gustave A. Schaffer and William T. Wann.

The Richmond Malleable Iron Foundry Company, Richmond, Ind., has been organized, with $100,000 capital stock, with John M. Lontz as president and Harry Lontz, secretary-treasurer. Mr. Lontz is president of the F. & N. Lawn Mower Company, Richmond. One of the buildings formerly occupied by the M. Rumely Company will be taken over [illegible] work on another unit near the F. & N. plant has been begun.

The Wabash Valley Electric Company, Clinton, Ind., has been incorporated with $250,000 capital stock, to supply electricity for light and power. The directors are H. C. Dies, J. W. Robb and M. V. Robb.

The Bell Mfg. Company, Fairmount, Ind., has taken a munitions contract for the United States and is erecting an addition to its plant.

The Peru Auto Parts Mfg. Company, Peru, Ind., has increased its capital stock from $200,000 to $300,000.

E. V. Brigham, general manager of the Union Sanitary Mfg. Company, Noblesville, Ind., has been elected vice-president of the newly organized Kalamazoo Sanitary Mfg. Company, Kalamazoo, Mich., manufacturer of enamel and earthenware, and Rolla Evans, also of the Union Company, has been appointed secretary.

The F. & M. Mfg. Company, Cambridge City, Ind., has been incorporated with $25,000 capital stock, to manufacture woodenware. The directors are P. E. Fisher, V. E. Martindale and G. W. Fisher.

The Sefton Mfg. Company, Anderson, Ind., manufacturer of paper boxes, etc., has been sold to Edwin J. Nergard, Chicago, for $3,000,000. The company has two other plants, one at Chicago and the other at Brooklyn, N. Y.

The Marion Metal Products Company, Marion, Ind., has been incorporated with $50,000 capital stock, to manufacture automobile accessories. The directors are W. E. Plummer, G. A. H. Shideler, C. A. Williams, Gus C. Condo and John R. Browne.

Fire recently damaged the auto parts factory of G. W. Millikan, Muncie, Ind., to the amount of about $20,000. It will be rebuilt.

The Beuscher Band Instrument Company, Elkhart, Ind., has been sold to C. D. Greenleaf, W. H. Foster and J. A. Bell. The transaction involves a consideration of $175,000.

The Metal Auto Parts Company, Connersville, Ind., has increased its capital stock from $50,000 to $150,000.

The Quality Broom Company, Evansville, Ind., has been incorporated with $5,000 capital stock, to manufacture brooms. The directors are S. Cunningham, Dr. Jeremiah Jackson, and S. Chapman.

The Thread Mills Company, Monticello, Ind., is planning an extension to its plant, to cost $40,000.

The Wheat Paper Company, Elkhart, Ind., will resume operations in its plant at Petoskey, Mich., which was recently burned. For a time the production will be limited to pulp. New fire proof buildings will be erected and new machinery installed.

Cincinnati

CINCINNATI, OHIO, Nov. 6, 1916.

Quite a number of orders for portable electric drilling machines have lately been received for export to Spain. Spanish importers have also bought more machine tools than at any previous period. Some fair-sized shipments are also scheduled to go to Italy. Canadian business is slowing down somewhat, but a number of single tools are in demand from munition makers in that country.

The domestic demand for machine tools is keeping up well, and it is stated on good authority that the present year will witness the largest volume of business ever booked by local and nearby machinery manufacturers. A somewhat disconcerting feature is the high cost of material and labor. The foundries are practically operating to full capacity and the threatened car shortage has not inconvenienced any of them so far as a supply of coke and pig iron is concerned. Wood-working machinery is in better demand. Boiler and tank makers are very busy. Electric generators and motors are also in good demand, but the smaller units are being sold.

Work on the new plant of the R. K. Le Blond Machine Tool Company, Hyde Park, Cincinnati, is progressing rapidly, and the buildings will be ready for installation of the necessary equipment early in the spring. No information has been given out as to the disposition of the company's plant in East End.

Considerable local interest is taken in the reports that an industrial center will be established at Winton Place. The only firm that has officially announced its intention of building a plant there is the Champion Tool Works Company, now located on Spring Grove Avenue, Cincinnati. No plans have yet been made up for the new plant.

The Collin Gardner Paper Company, Middletown, Ohio, has commenced work on a new power plant addition estimated to cost $200,000. Most of the equipment has been provided for.

The Dayton Screw Company, Dayton, Ohio, whose plans were previously mentioned, will have its new plant in full operation before Dec. 1.

The Ohio State University, Columbus, Ohio, will make application to the State Legislature for an appropriation of $[illegible],000 to be used for building a new power plant for which [illegible] have been prepared.

The Corrugated Container Corporation, Columbus, Ohio, is reported contemplating adding special equipment for increasing the capacity of its plant. Details are not yet available.

The C. A. S. Products Company, Columbus, Ohio, maker of automobile gears and other specialties, has recently received some large orders that will require increasing its manufacturing equipment.

The Sidney Mfg. Company, Sidney, Ohio, has commenced work on two additions to its plant, 45 x 100 ft., four stories, mill construction.

The Marietta Mantel Company, Marietta, Ohio, is contemplating the erection of a new plant. Details are lacking at this time.

The Pioneer Window Glass Company, Marietta, Ohio, will soon be incorporated to erect a glass plant at that point. Information may be obtained from the Marietta Chamber of Commerce.

Birmingham

BIRMINGHAM, ALA., Nov. 6, 1916.

Wholesale machinery dealers fully share the prosperity in other industrial lines. The rush for hydroelectric and other apparatus in the Alabama graphite field is a leading feature, owing to the rapid succession of new companies undertaking operations. Every line is reported as active. Deliveries alone are cause for worry.

The Semet-Solvay Company has purchased 7300 acres in Tuscaloosa County near the Yolande Company coal mines of the Alabama Company for $500,000. By-product plants are said to be contemplated. The company already has plants at Ensley and Holt, Ala.

L. J. Bugg, Monroeville, Ala., and others, are figuring on establishing a hydroelectric power plant for several towns, at a cost of $40,000.

The Atlantic Paper & Pulp Company, Savannah, Ga., will establish a paper pulp mill of 50 tons per day capacity. I. H. Fetty, president of Savannah River Lumber Company, is president. The company is capitalized at $1,000,000.

The Pasco Tool Company, Atlanta, Ga., has opened a tool store at 56 North Broad Street and will not manufacture small tools, as has been stated.

The Central South

LOUISVILLE, KY., Nov. 6, 1916.

Something of a lull is reported for the week, ascribed to the car, coal and labor shortages. Both buyers, manufacturers and dealers seemed to be holding up action. A more critical situation than had been expected was uncovered at the beginning of the inquiry into the car shortage at Louisville last Friday. Numerous industrial plants are on the verge of suspension for lack of coal. Metal-working concerns, especially copper working plants, are taking rather extensive orders from distillers in preparation for resumption of operation, which has been delayed because of increased costs of grain.

The Visible Measure Gasoline Dispenser Company, Louisville, Ky., has increased its capital stock from $40,000 to $50,000.

Louis Coe, Jeffersontown, Ky., is building a concrete garage at Jeffersontown, 50 x 100 ft.

The Mowbray & Robinson Company, Cincinnati, Ohio, holding 60,000 acres of timber properties in Clay, Leslie, Knott and Perry counties, Ky., has executed a mortgage for $1,000,000 and will develop its holdings.

The Owensboro Ditcher & Grader Company, Owensboro, Ky., has booked an order for shipment of sixteen carloads of its machines, or a total of 1630 units.

The Columbian Iron Works, Chattanooga, Tenn., is completing a contract for 6-in. forged shells for the British Army, and begins at once the execution of a second contract said to total $2,000,000.

The Chickasaw Cooperage Company, Memphis, Tenn., will rebuild its plant destroyed by fire at a loss of $300,000. A complete cooperage equipment will be required. Walker L. Wellford is secretary and treasurer. The machinery destroyed included power machinery, four sets of barrel machinery, 10 sets of stave jointers, 15 sets of heading jointers and one set of pail and tub jointers.

St. Thomas Hospital, Nashville, Tenn., will erect a power house at a cost of $22,000.

Charles E. Bower & Co., Memphis, Tenn., are asking for prices on a good second-hand 3-drum hoisting engine, 8 or 9 x 10 in., without boiler, for use with derrick with bull wheel.

The Standard Jellico Mining Company, Knoxville, Tenn., [illegible]

The John G. Duncan Company, Knoxville, Tenn., is asking [illegible]

St. Louis

ST. LOUIS, MO., Nov. 6, 1916.

The demand for machine tools continues good and dealers are making contracts for far ahead delivery. One transaction closed the past week was for equipment for a new industry calling for delivery Jan. 1, 1918. Other late deliveries are reported on orders for new tools, which are being taken in a very satisfactory aggregate. Second-hand tools are not appearing in any quantity in this market. All buying is of the negotiatory type, rather than through sending out lists, it having become apparent that nothing could be gained by attempting to develop competition among dealers. The outlook for the remainder of the fall and winter as well as the early spring continues optimistic.

The Ever Tight Piston Ring Company, St. Louis, has increased its capital by $47,500 in order to enlarge its manufacturing capacity.

The Newsom Valve Company, St. Louis, has been incorporated with a capital stock of $250,000 by J. N. Newsom, A. J. Kessinger, A. F. Weber and A. B. Lewis to manufacture a patented tire valve.

The Barry Motor Company, St. Louis, Mo., has been incorporated with a capital stock of $13,000 by C. J. and Frank X. Barry and C. L. Hyner to equip a garage and machine shop.

The Turner Tire Company, St. Louis, has been incorporated with a capital stock of $13,000 by F. E. Turner, Muskogee, Okla., Charles Neimeyer, Little Rock, Ark., and N. W. McLeod, H. V. Stevens and S. T. G. Smith to manufacture vehicle tires.

The Sunshine Chemical Company, St. Louis, has been incorporated with a capital stock of $10,000 by Henry C. Henley, D. H. Isch and Albert U. Johnson to do a general chemical manufacturing business.

The Bickell Construction Company, Kansas City, Mo., will equip a filter plant at Paris, Mo., to include two electrically driven centrifugal pumps. George C. Blakey, Paris, is superintendent of the plant.

E. J. Sweeney, Kansas City, Mo., 1112 East Fifteenth Street, will erect a large automobile school 85 x 116 ft., ten stories. Necessary equipment for practical education in all branches will be installed. The total cost is estimated at $200,000.

An electric light plant will be built at Dumas, Ark., by the Improvement District No. 2, B. C. Bowles, secretary, at a cost of $15,000. Bids will be received until Nov. 28. H. W. Wright, McGehee, Ark., is engineer.

The England Public Service Company, England, Ark., has been incorporated with a capital stock of $100,000 by M. D. Goldsby, C. L. Emerson and R. L. Buffalo to equip an electric light and power plant.

The Arkansas Hydro-Electric Development Company, Little Rock, Ark., A. R. Amos, president, has bought the plant of the Heber Springs Light Company, Heber Springs, Ark., and will enlarge the plant and install new machinery.

The White Cliffs Lime Co., White Cliffs, Ark., has been incorporated with a capital stock of $100,000, by F. B. Lane, W. Y. Foster and A. D. Dulaney, to secure an existing company, which will be enlarged and new machinery installed.

The Stout Lumber Company, Thornton, Ark., will rebuild its planing mills recently burned with a loss of $100,000.

Sewer and Water District No. 1, Walnut Ridge, Ark., will modify its sewer and waterworks plans to provide for two pumping stations instead of one, the total cost to be about $80,000. Herman Phillips, St. Louis, is engineer.

The Ottawa County Ice Company, Miami, Okla., is receiving bids to equip an ice plant of 800 tons and storage building. It will install two 60-hp. boilers and two 50-hp. Corliss engines and other machinery.

The Texas Company, Houston, Tex., will equip a branch plant at McAlester, Okla., requiring about $7,000 worth of machinery

Stroud, Okla., will improve its sewage plant and waterworks at a cost of about $30,000.

The Oklahoma Prepay Fan Company, Oklahoma City, Okla., has been incorporated with a capital stock of $30,000 by J. H. Collier, M. Blake and others to manufacture fans.

The cotton gin of L. S. [illegible] burned with a loss of $40,000. The equipment will be replaced.

The Beaumont Hardwood Lumber Co., Beaumont, Miss., [illegible]

Coffeeville, Miss., is receiving bids on waterworks equipment, including pumping unit, etc.

The Hattiesburg Pulp & Paper Co., Hattiesburg, Miss., has been incorporated with a capital stock of $1,500,000 by George R. Wright and G. H. Wood, Fort Dearborn Bank Building, Chicago, and others, and will equip a plant. Friend & Webbre, New Orleans, La., are engineers in charge.

The Dickinson Sales & Garage Co., Shreveport, La., will equip a machine shop, service station and garage to cost $50,000.

The Union Petroleum Company, Westwego, La., will equip a can manufacturing plant with a capacity of 12,000 cans daily.

The Stern Foundry & Machinery Company, New Orleans, La., will erect and equip a foundry and machine shop, in addition to its present plant, to cost $100,000.

Texas

AUSTIN, TEX., Nov. 4, 1916.

The water power committee of the Manufacturers' Club of San Antonio is promoting the construction of a large hydroelectric plant to be located on either the Colorado, the Guadalupe or the Devil's River within convenient transmission distance of that city. A survey discloses that 100,000 hp. of electrical energy could be disposed of in San Antonio.

The Guadalupe River Power Company, Gonzales, has finished construction of a dam across the Guadalupe River and will install a hydroelectric plant.

The El Paso Sash & Door Company, El Paso, will build a factory at a cost of $100,000.

The Interlocking Cement Stave Silo Company, Waco, incorporated with a capital stock of $40,000, will manufacture cement blocks for building silos. W. R. Anderson is a stockholder.

The Texarkana Ice Company has merged its ice plant at Texarkana into the ownership of similar plants at Paris, Corsicana, Tyler, Terrell, Big Springs and Nacogdoches, Texas; Sapulpa,, Hartshorne and McAllister, Okla., and Vivian, La. C. W. Dawley of Dallas is manager of the consolidated interests. Improvements will be made to some of the plants.

The Gulf Refining Company has purchased 450 acres adjacent to its refinery at Port Arthur as a site for new terminals which it will build to meet the demands of its growing shipping interests. John W. Tyron is manager.

The Livingston Light & Power Company, Livingston, will [illegible]

San Francisco

SAN FRANCISCO, CAL., Oct. 31, 1916.

The situation as to deliveries in many lines of machine tools is becoming distinctly easier. The high prices still block a great deal of business, but with abundant indications that there will be no recession within the next year, buyers show gradually increasing confidence. Even the larger buyers, as a rule, are placing their orders singly, but a number of large groups of tools are being figured on. Many garages and small repair shops are being established, for which considerable machinery is required. Such shops are looking for second-hand tools, but such equipment of desirable character is getting hard to find. A moderate activity is noted in hydroelectric development, with several large projects being developed slowly. Motors are in good demand. The call for wood-working and logging machinery is increasing. Mining development in Nevada and Arizona is exceptionally active, and is giving rise to many important orders.

The Judson Mfg. Company, which is starting work on additions to its plants in Oakland and Emeryville, is preparing to change its power from steam to electricity.

The Atlas-Imperial Engine Company is building an addition to its plant in Oakland, 80 x 360 ft. A 40-ton crane 40-ft. span, will be purchased for the new shop, and the company is figuring on a large list of special tools. It has commenced the manufacture of true Diesel-type marine engines.

The Southern Pacific Railroad is preparing to build extensive yards on the bay shore south of San Francisco, including a roundhouse and small machine shop.

Owners of the Walker copper mine, near Portola, Cal., are planning to build a hydroelectric plant of about 1100 hp. capacity.

Plans and specifications will be ready shortly for the improvements to Machine Shop No. 1 at the Mare Island Navy Yard, Cal.

The C. L. Best Gas Traction Company, San Leandro, Cal., has just moved into its new plant. The old plant is now occupied entirely by the Best Steel Casting Company, which has added a new converter and a 10-ton [illegible]

The Pacific Northwest

SEATTLE, Oct. 31, 1916.

Marine machine and repair plants in this section are experiencing a remarkably prosperous season. Some of the larger plants are running both night and day shifts. Repair work is especially brisk. The Doud-McFarlane Machinery Company, Tacoma, handling marine machinery, and manufacturer of gasoline pumps and logging machinery, has been working two shifts steadily for several months, and has not yet caught up with orders.

The car shortage in Oregon and Washington is steadily becoming more acute, and heavy losses have already been sustained in the handling of fruits and grains in the eastern part of these states. It is estimated that 10,000 cars are now short in the two states.

Reports covering 85 per cent of the lumber mill capacity of the Pacific Northwest show shipments of lumber 23 per cent below orders and orders exceeding production by 7.29 per cent, all co-incident with a horizontal advance of $1 in prices on lumber, and also advances on shingles. Further tightening in car supply and increased severity in the shortage of cars to ship lumber is the assigned cause of the sudden change in lumber conditions. West coast mills are accepting only such part of the business offering as may be shipped in a reasonably short time, and are not loading up on contracts calling for delivery a month or two in advance. The advance of $1 right through the lumber list has done much to improve the price values since May.

The Seattle Construction & Dry Dock Company, Seattle, has awarded to the McAteer Shipbuilding Company, Seattle, contract for the first four sections of the floating drydock it will build. Two sections will be added later, giving a total capacity of 20,000 tons. The work now under way will cost $500,000. The machinery to equip the drydock will be built by the Seattle Construction & Dry Dock Company.

The Eugene Iron Works, Eugene, Ore., will erect a machinery room 40 x 68 ft.

The Anderson Steamboat & Shipbuilding Company, Seattle, has received contract for construction of two 8800-ton ships to be built for Hannevig Brothers of Norway. The contract was awarded by Capt. Louis Hannevig, recently in Seattle. The order means that a shipbuilding plant will be constructed on Lake Washington that will employ 1000 men.

The Oregon Shipbuilding Company, Portland, Ore., has been incorporated for $500,000, and will establish a plant to construct steel steamships. It will be located near the Northwest Steel Company's plant. The company now has contracts for four 8800-ton steel freighters for Norwegian interests. The incorporators are Carlton E. Spencer, George E. Hobson and C. A. Sheppherd. The vessels contracted for will cost $4,000,000.

William Cornfoot of the Albina Engine Works, Portland, Ore., who plans the establishment of a shipyard at his plant, has secured contract for two 3300-ton steel steamships.

Work has started on the sugar factory to be built in Missoula, Mont., at a cost of $2,000,000, by Great Western Sugar Company. George B. Stone of the Dyer Construction Company, Salt Lake City, Utah, is in charge.

Canada

TORONTO, Nov. 4, 1916.

Manufacturing in Canada in most lines continued active throughout the past month. Where any slackening of activity was noticeable it was due to lack of labor or delay in receipt of material. Metal-working establishments continue busy. The value of unfilled orders for the Canadian Car & Foundry Company is said to be about $15,000,000. Steel-working companies the past two weeks did not give voice to complaints as to the supply of steel forgings and other parts to the same extent as in preceding weeks. It would appear that the additional equipment of foundries is now beginning to tell, and in future machine shops may have decidedly less cause for complaint. A readiness still exists among Canadian companies to complain of the prices obtained on government business, and the root of this is the difficulty in securing efficient mechanics. Slightly more men are offering now, but not of the class that has had the necessary training. The automobile industry here is also making big strides.

Many manufacturers and boards of trade throughout Canada and the United States visited the government exhibit of German and Austrian samples at Toronto. They came 300 a day to study the collection. Among the better grade articles displayed are small tools and hardware.

The erection of a plant at Hamilton, Ont., for the Hamilton Steel Wheel Company, to cost $200,000, will start [illegible]

[illegible] contemplates the erection of an addition to its plant at Montrose, Ont., of steel and concrete construction. E. J. Call is engineer in charge.

The Perfection Tire & Motor Company, 615 Marquette Building, Chicago, Ill., [illegible] Niagara street, Buffalo, N. Y., [illegible] $100,000.

The Foundation Company, Montreal, is making preparations for the erection of the Interprovincial Coal Company, Ont., for the International Nickel Corporation, at a cost of $500,000. The company will put 800 men to work immediately on the reinforced concrete foundations. The labor situation is causing the company some concern. M. J. Barry, representative of the company at Toronto, stated that the company is paying 27½c. per hr. for common labor. The Foundation Company holds the contract for all construction work; and does not sublet any portion.

The Saguenay Light & Power Company has commenced the erection of a power plant at St. Alexis, Que.

The Manitoba Pulp & Paper Company, Winnipeg, Man., will build a power plant at Grand Rapids, Man.

The Steel Furnishing Company, Ltd., New Glasgow, N. S., is in the market for three turret lathes, suitable for steel sockets and three millers suitable for milling outside thread of sockets.

The British America Nickel Company is making preparations for the erection of a refinery, probably in the Welland, Ont., district. The company has secured E. P. Matheson as general manager. E. R. Wood and James P. Dunn, London, Ont., are stockholders in the company.

The Perfect Machinery Company, Galt, Ont., has commenced the erection of a foundry. It will be ell-shape, 24 x 60 ft., and 20 x 26 ft., of concrete and brick

John A. Campbell, Leamington, Ont., is in the market for a 50 to 100-hp. gas engine.

The Gold Lion Brewery at Valleyfield, Que., was practically destroyed Nov. 1 by fire starting in the engine room. The loss will amount to approximately $150,000.

The John Hillock & Co., Ltd., 154 George Street, Toronto, manufacturer of refrigerators, etc., is in the market for a jointer.

G. A. Black, 359 Davenport Road, Toronto, is in the market for a 35 to 50-hp. fuel oil engine.

The British Munition Company, Verdune, Que., has let the contract to the Atlas Construction Company, 37 Belmont Street, Montreal, for the erection of an addition to its plant.

The Toronto Laundry Machine Company, Dundas Street and Sorauren Avenue, Toronto, will have an addition erected, to be of brick construction. The contract has been awarded to Brown & Cooper, 397 Carlton Street, Toronto. The company has received a number of orders from the Imperial Munitions Board for the manufacture of shells.

The Hamilton Gear & Machine Company, Van Horne Street, Toronto, has commenced the erection of an addition to its plant to cost $7,500.

The St. John Machine & Tool Company's foundry and machine shop at St. John, Que., was destroyed by fire with a loss of $16,000.

The Reliance Motor & Tool Company, Ltd., Toronto, has been incorporated with a capital stock of $60,000 by William B. Sturrup, 6 Adelaide Street East; John S. Duggan, and others.

The Van der Linde Rubber Company, Ltd., Toronto, has been incorporated with a capital stock of $350,000 by Lester M. Keachie, 11 Edgar Avenue; William A. McFarlane, V. T. A. Foley, and others to manufacture rubber tires, etc.

The Dominion Crucible Company, Ltd., Montreal, has been incorporated with a capital stock of $200,000 by Francis G. Bush, George R. Drennan, Alexander G. Yeoman and others to manufacture crucibles, graphite, etc.

The Continental Construction Company, Ltd., Montreal, has been incorporated with a capital stock of $10,000 by Leopold Choquette, George E. Chart, Lorne C. Herdman and others to build ships, etc.

The A. R. Whittall Can Company, Ltd., Montreal, has been incorporated with a capital stock of $500,000 by Albert R. Whitall, Westmount, Que., David S. Whittall, Montreal, and others.

The Machine Builders, Ltd., Montreal, has been incorporated with a capital stock of $50,000 by John W. Cook, Theodore B. Heney, Herbert R. Mulvena and others.

La Campagnie de Pneus Roger, Ltd., Montreal, has been incorporated with a capital stock of $250,000 by Wilfrid J. G. Roger, Telesphore Leduc, Charles R. Lasalle and others to manufacture automobiles, etc.

Government Purchases

[illegible] for one 50 [illegible], T. H.

Propo[illegible] Dock, N[illegible] for three ventilating systems, including blowers, motors, etc.

The [illegible] Washington, [illegible] 26 for [illegible]

The names of the bidd[illegible] they are designated [illegible]

Schedule [illegible]

Class 14, Bro[illegible] $5[illegible] 76, $9[illegible] 78, $7[illegible] 144, $8[illegible] 149, $8[illegible]

Class 15, Mare Island—One [illegible] Bid 7, $872; 76, $1[illegible] 79, $[illegible] 144, $955; 149, $81 and $1,0[illegible]

Schedule 151, Ordnance

Class 151, Newport—Steering engine valve rods, upper collars, etc., for torpedoes—Bid 167, $1,815.50; 176, $10, [illegible] items 3, 6, 10, 11, 12 and 18, $19, $2,012.80.

Class 152, Newport—Ten metal-slitting saws—Bid [illegible] $4.93, 80, $6.60, 99, $5.65; [illegible] $8.10, 15[illegible], $7.50, [illegible] $[illegible] 180, $6.18; [illegible] 253, $5.67; 258, $[illegible].91

Class 153, Newport—One inserted tooth circular saw and 40 extra high speed teeth to fit above saw—Bid 99, $240.80; 149, $470; 180, $218.20; 253, $145.

Class 154, Newport—One metal-sawing machine—Bid 113, $550.60; 144, $622, $637, $616 and $477; 149, $644, $639 and $624; 155, $600 and $616.20.

Class 155, Newport—One motor-driven high speed saw—Bid 8, $355; 113, $336.80; 144, $275; 155, $1,230.

Schedule 255, Construction and Repair

Class 161, Norfolk—One pipe and nipple-threading machine—Bid 75, $743; 122, $1,408.30; 253, $555.

Schedule 256, Construction and Repair

Class 162, Philadelphia—One electric spot welder—Bid 157, $1,167; 197, $1,135; 222, $4,000.

Schedule 243, Yards and Docks

Class 171, New Orleans—One steam hoisting engine—Bid $5, $2,000; 113, $1,164.50; 118, $1,763 and $1,497; 124, $1,630; 129, $1,650; 130, $1,310, $1,500 and $1,690; 164, $1,240.

Class 172, New Orleans—One steam ram pile hammer—Bid 129, $760; 143, $915 and $1,640; 220, $770.

Schedule 244, Construction and Repair

Class 181, Norfolk—Five hydraulic lifting jib—Bid 189, $1,100; 225, $1,397.50; 229, $1,340; 243, $1,050.

Class 182, Norfolk—One hydraulic beam bending press—Bid 189, $3,500; 225, $3,250; 229, $5,520; 243, $3,100.

Schedule 245, Construction and Repair

Class 183, Boston—One outside molder—Bid 10, $600, 77, $867.41; 79, $731.50; 93, $918; 220, $1,000.

Schedule 247, Steam Engineering

Class 191, Norfolk—One cutter-grinding machine, 1 engine lathe and 1 center grinder—Bid [illegible] $536.67, [illegible] 76, $2,185, items 1 and 2, $1,895, items 1 and 2; 78, $826, items 1 and 2; 149, $961 and $[illegible] 150, item 1, $1,070.

Schedule 248, Steam Engineering

Class 192, Boston—One heavy automatic tapping machine—No bid.

Bid [illegible] Armstrong Bros. Mfg. Company; 10, Wood Working Machinery Company; 37, P. Irvin Cheyney; 73, Federal Sales & Service Company; 75, Fairbanks Corporation; 76, Fairbanks Company; 77, Wm. H. Field Company; 78, E. L. Fraser; [illegible] Glover Machine Works; 93, Hall & Brown Wood Working Machine Company; 113, Kemp Machinery Company; 118, Lidgerwood Mfg. Company; 122, Landis Machine Company; 124, Lenher Engineering Company; 129, J. S. Mundy Hoisting [illegible]; 138, Machinery Merchants, Inc.; 143, McKieman-Terry Drill Company; [illegible] Machinery Company; 155, Nutter & Barnes Company; 156, Niles-Bement-Pond Company; 157, National Electrical Supply Company; [illegible] Screw Company; 197, W. F. [illegible] 222, Union Iron Works; [illegible] Company; 235, W. H. [illegible] Woods Machine Company; 243, Watson-Stillman Company; 253, Manhattan Supply Company.

NEW TRADE PUBLICATIONS

Hammers and Heating Forges.—C. C. Bradley & Son, Syracuse, N. Y. Collection of circulars. Cover a line of hammers which are made in the helve and trip types, a belt-driven outfit for use where the amount of floor space available is limited and heating forges using hard coal or coke for fuel. The circulars relating to the hammers are practically identical in form and contain engravings of the particular hammer described and a description of its general construction, supplemented by views of the various parts. Another one of the circulars shows the great variety of forgings that can be made with the hammers. The last circular is concerned with a forge for heating iron and steel preparatory to working under the hammer. The various styles are illustrated and briefly described. Lists of the quantity of brick required for each of the furnaces are given under the illustrations and an engraving of a blacksmith's forge using soft coal is presented.

Steel Sash.—David Lupton's Sons Company, Allegheny Avenue and Tulip Street, Philadelphia, Pa. Catalog No. 9. Relates to a line of steel sash for lighting and ventilating foundries, forge shops, blast furnaces, power houses, machine shops, textile mills, multiple-story and office buildings, etc. The catalog has been rewritten since the last edition was issued and a number of interesting views of installations of the Pond truss roof and sash are included. In the revision an effort has been made to present the information in a form that will be understood by the average factory owner, as well as the architect and engineer. In each of the sections into which the catalog is divided a general description of the particular product covered is presented, followed by diagrams of details and arrangements of units, tables of widths and heights and numerous views of installations. Mention is also made of other products of the company, such as steel partitions, steel tube doors, rolled steel skylights and sheet metal fireproof windows. A list of recent installations is included.

Steam Hammers.—Sherritt & Stoer Company, Inc., 603 Finance Building, Philadelphia, Pa. Bulletin No. 1. Treats of a single frame guided ram type of hammer for miscellaneous forging and blacksmiths' use with either steam or compressed air. The description of the hammer is supplemented by an engraving and a cross-section showing the valves, valve motion and distribution of metal in the frame. One of the features upon which emphasis is laid is the thickness of the wall of the frame in the throat. A condensed table of specifications for the 11 sizes built, which range from 250 to 4000 lb., is included.

Grinding Wheels.—Star Corundum Wheel Company, Detroit, Mich. Catalog No. 9. Shows a line of cup, cylinder and special grinding wheels. The last includes wheels for all of the standard grinding machines, as well as for such work as tool, knife and hollow ware grinding and saw gumming. In connection with the illustrations of the wheels for the various machines, dimension tables are included. Instructions on mounting the wheels, the safe speeds and the selection of grades for different work are presented and a number of tables giving useful information are included.

Tote Boxes.—New Britain Machine Company, New Britain, Conn. Two bulletins. The first, No. 1224, is devoted to a nesting tote box which was illustrated in THE IRON AGE, April 13, 1916. A description of the box, which is of one-piece construction, is presented and a table of specifications for the three sizes made is included. The other bulletin, No. 1224-A, illustrates and describes a stacking type of box which was illustrated in THE IRON AGE, Oct. 26, 1916.

Trucks and Turntables.—Whiting Foundry Equipment Company, Harvey, Ill. Catalog No. 124, superseding No. 78. Pertains to a line of standard steel trucks for shop use in which the frame is made entirely of steel, the only wooden portion being a flooring of matched hardwood and a turntable for use with industrial tracks in plants of all kinds. The special feature of the turntable is the absence of a center bearing, the entire load being carried on chilled rollers turning on a path near the outside of the table. A number of engravings of the turntable are presented and mention is made of a line of charging, dump, core oven and transfer cars, all of which are illustrated.

Water Controlling Apparatus.—Rodney Hunt Machine Company, Orange, Mass. Catalog No. 30, section W C A. Refers to water control apparatus, which includes flumes, penstocks, relief valves, gages, gates, hoists, stands and trash racks. The catalog is divided into sections dealing with each general class of this apparatus and the first page of every section is given over to an index of the different types. A number of tables of useful information are included and a detailed table of contents supplements those given at the beginning of each of the catalog sections.

Dies.—National Machinery Company, Tiffin, Ohio. Forging machine talk No. 17. Calls attention to the use of additional dies in the company's forging machines to eliminate the necessity of using a bulldozer in making a clevis for a brake chain. A brief description of the operation and the dies employed is presented, together with a number of engravings of the dies.

Coal and Ash Handling Machinery.—Link-Belt Company, Thirty-ninth Street and Stewart Avenue, Chicago, Ill. Two booklets. The first, No. 288, describes the installation in the woolen mill of the William H. Grundy Company, Bristol, Pa. The apparatus installed is described at some length and the text is supplemented by a number of engravings of the different pieces and a diagram of the complete apparatus. The other booklet, No. 296, describes and illustrates the coal handling equipment in the plant of the Victor Talking Machine Company, which includes a locomotive crane with grab bucket, pivoted bucket carrier and a traveling weighing hopper. The description of the system is supplemented, as in the case of the other booklet, by numerous illustrations and diagrams. In both mention is made of a traveling water intake screen for keeping out driftwood, vegetation and miscellaneous trash from the intake pipe lines to condensers.

Power Transmission Equipment.—Medart Patent Pulley Company, St. Louis, Mo. Pamphlet. Lists a line of power transmission equipment which includes steel rim, cast-iron and wood split pulleys; friction clutches, rope driving and hoisting sheaves, couplings, bearings, set collars, shafting, gearing, belt tighteners and countershafts. All of the various members of the line are illustrated, but the descriptions in most cases are short, reliance being placed upon the engravings to tell the story. The line is described in more detail in the company's general catalog and its pamphlets, each dealing with a single one of the members. A number of tables of useful information as to the horsepower transmitted by shafting and belting are included.

Steam Gages and Valves.—American Steam Gauge & Valve Mfg. Company, 208 Camden Street, Boston, Mass. Catalog No. 65. Supersedes the company's general catalog issued in 1908 and all other catalogs, price lists or pamphlets supplementary thereto. Illustrations and descriptive matter are presented of an extensive line of gages, valves, indicators, steam traps and kindred appliances for governing, indicating,, measuring, recording and controlling steam, water, air, gas, oil, ammonia and other pressures. In a number of cases tables giving the prices for the various sizes that can be supplied are presented. Dimension diagrams and tables of a number of the fittings are presented. Lists of boiler fittings approved for use in Canada and a number of tables of useful information are included.

Cold Metal Sawing Machines.—Newton Machine Tool Works, Twenty-third and Vine streets, Philadelphia, Pa. Catalog No. 51. This is the company's catalog describing and illustrating an extensive line of cold saw cutting-off machines. The general specifications for the line, which is divided into bar, I-beam, combination, crankshaft, rail, steel foundry and vertical sawing machines, according to the respective table, saddle or spindle arrangements, are presented. This is followed by engravings and dimension tables of the different types and classes of machines, all of which are of the spindle-driven type. In each case the variations, if any, from the standard specifications are noted under the engraving. A number of engravings of the different machines in use are included. Other products of the company, including milling, slotting, planing, rail drilling and locomotive rod boring machines are illustrated and very briefly described.

Electrical Distributing System.—L. K. Comstock & Co., 30 Church Street, New York City. Bulletin No. 2. Mentions the advantages of the company's electrical distribution system for machine shops from the standpoint of flexibility, ease of installation and the securing of ample reserve capacity. A number of engravings of plants in which the system has been installed are presented, with brief descriptions of the work that was done.

Magnetic Switch Control Apparatus.—Cutler-Hammer Mfg. Company, Milwaukee, Wis. Booklet M. Describes alternating and direct current types of magnetic switch control apparatus for the iron and steel industry. The control systems are explained in some detail and there are a number of illustrations showing both the apparatus itself and installations of it. A new magnetic lockout switch is described, as well as switches in which the arc produced when the circuit is opened is either quenched in oil or blown out by air.

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World Trade Readjustments After the War

Export Business Will Be on a New Basis Then—How It Can Help the Domestic Manufacturer to Tide Over

BY STERLING H. BUNNELL

It is a common remark among shop men that it is always "a feast or a famine." A history of trade conditions in the United States would chronicle a succession of periodic alternations between too much business and too little business. The manufacturer has never been able to plan his work, schedule his output and proceed at a regular pace, without the uncomfortable knowledge that he would soon find himself oversold or overbought, in a market rapidly going the wrong way for his interests. Prosperity in the business world is followed by demands for higher wages, then labor troubles multiply, prices rise, purchasing diminishes accordingly, retrenchments in manufacturing programs ensue, with decreasing demand for labor, and soon the majority of workers decide to wear their best suits of clothes a little longer, and put off the purchase of everything not immediately necessary. The effect is to pull down the whole edifice of prosperity through the simultaneous but unconcerted cutting down of purchases. The cycle is completed when the resulting fall in prices brings out the savings effected by economies and again purchasing begins to increase.

EUROPE'S NEEDS TURNED THE TIDE

Many men seem to have forgotten that a serious business depression followed the slashing of import duties on manufactured goods a year before the European war commenced. Whether a coincidence or a consequence, the depression continued without any sign of an upturn in the summer of 1914, when it merged in the general crash of values which followed the outbreak of the great conflict.

For a few weeks it seemed that there could be nothing ahead but greater business stagnation in the United States. But soon some few of the financial and business leaders perceived the necessities which confronted those of the European nations who had entered the war without adequate preparation, and must buy at any cost. These men filled the shops which they already controlled or were able to engage, with orders for war supplies of every kind, at a scale of prices which rapidly advanced as the demand grew. In the course of time the increase in European buying lifted the United States from one of the worst of its business depressions, where home production and consumption had shrunk to the minimum, to the extreme limit of industrial prosperity as an exporting nation. This effect was brought about without the slightest effort on the part of American concerns to provide facilities for conducting export business. The foreign purchasers were obliged to come to this country, seek out the sources of supply and put up cash in advance with their orders.

The curtailment of production in Europe by the withdrawal of workmen to enlist as soldiers has caused a continued decrease in the supply. We have reached the point where all prices are set by European needs, and the home market must pay what is asked or go without. Manufacturing in the United States has been forced to the limit. All producers are sold up to capacity, some have booked sales for months ahead, and many have fallen so far behind with their deliveries that they will not even attempt to schedule them. Tracers from assembling shops wait in testing rooms to lay hands on and ship parts the instant they are finished, so that their shops in turn may be able to complete the machines that are waiting.

PRICES RISE EASILY

The peculiar feature of the present trade situation is the ease with which prices can be raised. In normal times men have certain principal index figures in mind, like dollar wheat, 10-cent cotton, and unskilled labor at $1.50 a day. Any considerable advance in the normal average of prices meets strong resistance, decreases purchases and so tends to bring about its own cure. During the past year, and at present, this counter check has been ineffective. Every increase in wages or material is a cause for a perfectly cheerful upward revision of the manufacturer's price-list, and forms a link in a whole chain of corresponding increases by others whose costs are affected.

If all price increases had been exactly proportional, the market would now be in much the same condition as if by common consent the value of the dollar had been cut in two, and everywhere a dollar passed for half a dollar only—with all foreign coins, of course, undergoing by common consent a similar change in value. However, though price changes have been often disproportionate, they tend to equalization in the course of time. But it is not at all an indisputable proposition that prices will eventually return to near their former figures, instead of remaining at some new and hitherto unheard-of level.

Great readjustments, however, are certain to take place whenever the present trend changes.

The close of the European war will be preceded by a slackening of purchases for European government account. The sensitive market will respond by a decrease in inquiry from all home sources in the expectation of a fall in prices. Manufacturers will not object to a relief from the tension under which they have been operating, and will use the opportunity to revise their lists of employees and their pay-rolls, retaining the useful workers and dropping the inefficient. The period of retrenchment will set in, and sharp contraction will follow in all lines of trade. The unknown factor is the time that the reverse movement will endure.

WHEN THE TURN COMES

The tide will be turned by the buying power of Europe after the war—at present a matter of conjecture. Much has been destroyed in battles and campaigns, and a large proportion of the equipment of trade workers and farmers has been worn to the point of necessary replacement. There will be a tremendous demand for building materials, tools and farm machines. It seems probable that the resumption of manufacturing in these lines, in countries now at war, will be delayed for months, while the first purchases after the war embargoes are lifted will be made in the countries not engaged in the conflict.

When this opportunity occurs, those manufacturers in the United States who have already provided export connections will obtain the advantage over the others who have not. Unlike a government at war, the civilian purchaser can take his time and make his choice of terms. It is certain that he will not consent to hand over his funds to an American bank to lie idle for months while his purchases are being ordered, manufactured and delivered. He will, as before the war, buy at home if possible, from a local agency or importing firm. He will want to order the goods from catalogs or samples, and to have them delivered at his place of use without further attention on his part. He will expect to pay for his purchase on an extended credit. If he cannot buy American made goods a little more easily than the goods offered by manufacturers in nations whose fortunes have been cast with his own in the war, he will place his orders elsewhere than in the United States.

PREPAREDNESS FOR THE NEW EXPORT BASIS

Export business is going to be of an enormous assistance to manufacturers in the readjustment period which will follow the first signs of the end of the present conflict. It will probably continue to be an important factor in our industrial prosperity, in spite of whatever may be done, through trade alliances between other nations than ours, to tend to confine trade to nations within such alliances. But in order to get both early and continued benefit from export trade, it is necessary for the American manufacturer to get ready for it in advance. He should inform himself as to the suitability or adaptability of the goods he makes, for foreign use. He should work out the best means of packing his product for export, and the details necessary in invoicing and clearing through customs. He should obtain the foreign catalogs of competitors previously established in the trade of the country where he wishes to sell, and decide what is good and bad in their sales presentation, and what is therefore to be imitated, improved, or avoided in putting forth his own lines. He should employ and train in his own business the necessary correspondents, at least a well-educated stenographer of the nationality of the prospective buyers, who can act in the capacity of translator. Most important of all, the manufacturer should arrange banking connections abroad, so that his sales may be made on terms convenient to the buyer.

It has been the great fault of the American business world, that almost nothing has been done to develop and promote convenient methods of export trade. Great Britain and other countries, Germany above all, have developed their enormous trade with foreign countries through the direct efforts of commercial houses which combine banking, shipping, and sales functions at both ends of every export route. Such firms act as convenient bridges between seller and buyer, making it exactly as easy for a European manufacturer to effect a sale to a buyer in Singapore or Cape Town, as to his neighbor trading within five miles of the factory. We in America have had one such firm where England, for instance, had hundreds.

SERVICE OF EXPORT HOUSES

It is often said that Russia has been awakened by participation in the great war so that she is certain to develop a huge foreign trade. It may be said as truly that the war has also awakened the United States to the possibilities of foreign trade. Already several new American exporting corporations have been organized, which offer the same facilities for export sales to foreign countries that developed the export business of England, Germany and other trading nations. The services of such houses make it possible for any manufacturer in the United States to make profitable sales abroad. They provide banking connections for financing sales on long terms of credit, while paying cash against documents to the manufacturer. They have shipping, invoicing and insurance departments; engineering offices, with purchasing departments in the exporting country and technical sales departments at the importing end. They provide for translating and preparing advertising matter in the foreign language. They afford means for exhibiting samples, showing machinery in operation, and carrying the necessary stocks of repair parts abroad. They also furnish the services of specialists with broad experience in the peculiarities of export trade. To perform all these functions would cost a prohibitive amount to any but the largest of corporations, but the export house carries its expense over an enormous amount of business at a trifling expense for each sale, far less than the smallest sales commission customary in domestic business.

For the future prosperity of our country it is to be hoped that the large majority of American manufacturers will make use of the export facilities which are being offered. It is time now to begin to develop the details necessary for a sales campaign after the war, which will help to maintain a balance of trade favorable to the United States.

Steel tires for motor cars are now being used in Germany because of the scarcity of rubber. They consist of dozens of fine steel threads woven together and fixed over an inner band of rubber. After running about 3500 miles the steel cover is worn out and has to be replaced. The rubber inner band remains intact. It is stated that the effect of the steel tires is to retard the speed and make the riding rough.

The Lackawanna Iron & Steel Company has blown in the North Cornwall furnace, near Lebanon, Pa. This stack was practically abandoned years ago when the Lackawanna Company took over the three furnace plants of the Freeman estate at Cornwall.

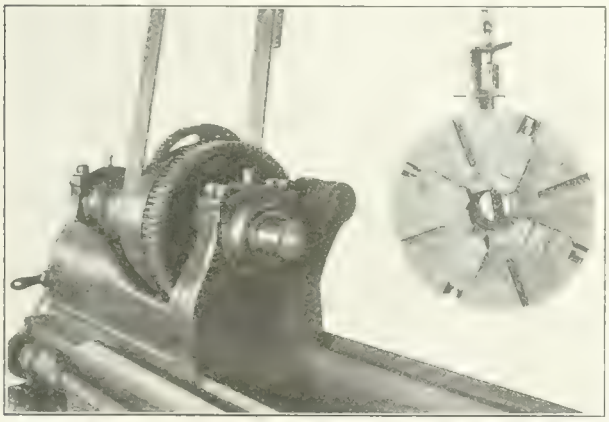
TWO LABOR-SAVING SCHEMES

Results of Recent Plant Rehabilitation by the Newton Machine Tool Works

The growth of the business of the Newton Machine Tool Works, Inc., Twenty-third and Vine streets, Philadelphia, Pa., has necessitated a number of changes in the arrangement of machines to expedite successive machining operations and permit the grouping of like tools for departmental supervision. This was made necessary by the fact that the expansion of the works in the past, following an increase in the size of the metal-working machines built, was accompanied by the addition of new equipment in individual units and resulted in irregular grouping of like machines that compelled an indirect routing of work through the shops.

In making these changes the lathes were divided into two departments, one for medium-sized work on the third floor with the heavier tools on the first floor. In the former department the units were grouped according to their adaptability to turn steel or cast-iron gear blanks, shafting, screws, bushing or chuck work, and the earlier ones were equipped with modern lubricating facilities. In this department suspension chains with a turnbuckle were mounted over each chucking lathe to eliminate the necessity of the operator, and possibly a helper, lifting the chuck from the floor to the lathe and vice versa.

In connection with these changes in the productive departments, the engineering and administration departments are also being equipped with labor-saving devices. At the present time the change in the former department, from the second floor at the west end of the building to the third or



In the Lathe Department the Chucks Are Suspended as Shown by a Chain and Turnbuckle to Eliminate Lifting from the Floor

top floor at the opposite end where the benefit of overhead lighting from skylights can be enjoyed, is under way. The large blackboard shown in one of the accompanying illustrations will be retained by the engineering department in the new location. This board is used for the drawing of new developments in machine-tool design to a full-size scale, which gives a better idea of the proportions.

The shop proper extends along Vine Street from Twenty-third to Twenty-fourth, a distance of 400 ft. The heavy material is received at the Twenty-fourth Street end of the first floor and travels through the plant, coming out finally at the shipping department at the opposite end of the building, which has a railroad siding. The shop is divided into three sections from west to east, the heavy planing and floor boring machines being located in the first one. The middle portion of the shop contains port-



The Large Blackboard at the Right of the Drafting Room Is Employed for Full-Size Sketches of New Developments

able floor boring, drilling, milling and slotting machines, mounted on a system of floor plates, and the heavy lathes, spur and bevel gear and worm cutting and milling machines; key seating, milling and slotting machines; vertical boring and turning mills; tire-expanding machines and worm and worm wheel sand-lapping machines are located on either side in adjacent bays. The remaining section is devoted entirely to erecting, the main and two side bays being equipped with traveling cranes. The cranes in the main bay travel from one end of the plant to the other. In addition to the lathes on the third floor, the thread milling, combined bushing boring and spiral oil grooving and screw machines are placed there with a service elevator at the west end and a delivery elevator at the opposite one, connecting with key seating and gear cutting departments on the first floor adjacent to the assembly department.

Device for Calculating Drawing Die Sizes

A modified form of circular slide rule has been developed by Otto H. Jensen, 44 Horton Place, Buffalo, N. Y., for calculating the dimensions of double-action drawing and combination dies. It consists of three circular pieces of celluloid, one of which is graduated around the entire periphery, while the graduations on the other two cover a much smaller portion. The device is designed to give the maximum draw obtainable whether a blank is to be drawn into a shell or the shell thus formed reduced to one of smaller diameter. By manipulating the different dials in accordance with instructions furnished with the calculator, it is a simple matter to determine the diameter of the dies required for drawing and redrawing work from different gages of sheet metal. A table of thicknesses for various gages of sheet steel and tin plate is given on the back of the calculator.

Several railroads have filed suit in the Federal courts at various points to test the constitutionality of the eight-hour law recently passed by Congress and known as the Adamson act. The bill of complaint alleges that the law is unconstitutional because it is not a proper regulation of interstate commerce, because it violates the guarantees of the fifth amendment to the constitution, and because it is unworkable as applied to existing conditions under which the trainmen are operating.

Heat Balance of a Blast-Furnace Stove*

Results of the Operation of Cowper Stoves at a British Plant—Details of the Heat Produced, Absorbed and Lost

BY R. S. G. KNIGHT

THE work recorded in this report was carried out at the blast-furnace plant of the Skinningrove Iron Company, Ltd., Skinningrove, Yorkshire, England. Unfortunately, owing to the disposition of the plant, which did not permit a direct measurement of the gas supplied to the stove being made, it was not possible to obtain as complete data for a heat balance as was hoped for. Nevertheless, by assuming a certain reasonable radiation loss, and averaging the results of the analyses of the products of combustion, it is possible to deduce from the experimental figures an approximate heat balance.

THE PLANT

The stove selected for these experiments was one of a battery of 13 Cowper stoves used for driving five furnaces. At the time of this investigation, however, three stoves and one furnace were down for repairs, so that the four furnaces were being driven from ten stoves.

The stoves draw their gas from a common underground main into which the whole of the gas from the furnaces is led, the surplus gas being used on other parts of the plant. The hot blast from the batch of stoves is led into a common main, running along the back of the furnaces and communicating with each of these by the horse-shoe main. In practice the stoves are worked as a whole, there being no rigorous division between them for any furnace. Of the 10 stoves in use for the four furnaces, six are on gas and four on blast at the same time, each furnace being blown from one stove. The stove is usually kept on gas for about one and a half hours, and on blast for one hour, but these times vary with the working of the furnaces and the condition of the stoves. As a general rule each stove blows for half an hour on one furnace and for the remaining half hour on another furnace, so that No. 11 stove usually blew No. 5 furnace during the first half hour and was then changed over to No. 4 furnace, a fresh stove taking its place on No. 5. The whole working of the stoves, however, has to be run according to the requirements of the furnaces, so that no hard and fast rules can in any way be laid down.

THE STOVE USED FOR THE TRIAL

The stove is 60 ft. 6 in. high and 23 ft. diameter, and is lined with firebrick to a depth of 1 ft. 6 in. in the regenerator portion and 2 ft. 8 in. in the flame flue. This flue is elliptical instead of circular. The gas enters the stove from the underground main through the gas nozzle at the bottom of the flame flue, the supply being regulated by a plate valve at the base of the nozzle. The air for combustion is drawn from the atmosphere through the air port situated about 7 ft. from the ground and a little to the left of the gas inlet. The products of combustion travel to the top of the flame flue and then pass down the regenerator portion, composed of firebrick checker work, through the valve box into the flue leading to the stack.

On the reversal the air enters from the cold blast main through two smaller mains (each 21 in. in diameter), one on each side of the valve box. The air travels in the reverse direction to that previously taken by the gas, passing first through the regenerator and then down the flame flue to the hot blast main, which is situated 14 ft. 6 in. from the ground level and immediately above the air port. The hot blast valve is water cooled.

ITEMS IN THE BALANCE SHEET

The several items comprising the balance sheet may be set out as follows:

Debit Side

1. The heat produced by the combustion of the gas.
2. The sensible heat contained in the gas.
3. The heat contained in the dust entering the stove with the gas.
4. The heat contained in the moisture entering the stove with the gas.

Credit Side

1. The heat carried away as sensible heat in the flue products.
2. The heat required to raise the temperature of the blast.
3. The heat used in raising the temperature of the moisture contained in the blast to the hot blast temperature.
4. The heat carried off by the dust swept from the stove into the flue.
5. The heat carried off by the water vapor leaving the stove.
6. The heat lost from the stove by radiation, conduction, and convection.

The above balance is valid only when the condition of the stove is the same at the end of the trial as at the beginning. During the period of the stove is on gas the checker work is heated up to a certain extent. The flue temperature, as may be seen from Fig. 1, becomes nearly constant after about half

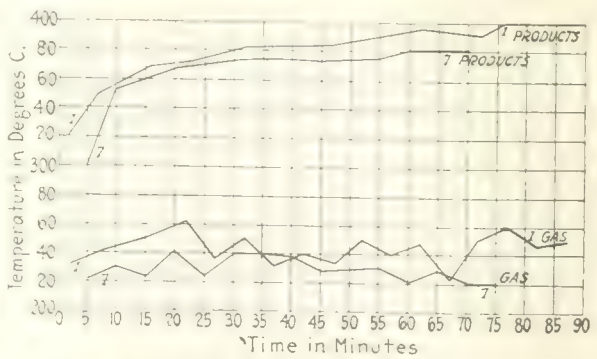


Fig. 1. Records of Gas and Flue Temperatures

an hour. This shows that the larger the amount of gas put into the stove the greater is the amount of checker work raised up to the average temperature; that is, the greater is the heat reserve of the stove. In a single reversal it is quite possible to

*From a paper which was granted a Carnegie Scholarship memoir by the Iron and Steel Institute in May, 1916.

get more heat out of the stove than was put in during the period the stove was on gas. Therefore, in order to obtain a reliable heat balance, it is absolutely necessary to carry the test over as many consecutive reversals as possible, the longer the trial the greater, *ceteris paribus*, being the accuracy.

In this investigation the test was run for a period of about 24 hours, comprising nine complete reversals. The methods and apparatus used in the evaluation of the several items of the balance sheet to which special attention was given are described in detail as follows:

1. HEAT PRODUCED BY THE COMBUSTION OF THE GAS

The determination of this factor involved the following:

(*a*) The temperature and pressure of the gas.
(*b*) The calorific value of the gas.
(*c*) The amount of gas at N.T.P. entering the stove.

(*a*) The temperature of the gas was taken by a Hoskins base metal couple and indicator supplied by the Foster Instrument Company, and previously calibrated in the Fuel laboratories of the Imperial College of Science, London. A rivet was removed from the gas nozzle near the plate valve and the couple fixed in at this point. In this position the effect of direct radiation from the wall of the flame flue was less than it would have been had the couple been inserted on the side of the bend near the gas inlet. A pressure gage was fixed near the mouth of the nozzle through a similar rivet hole. Fig. 1 shows the records of both the gas and flue temperatures obtained in experiments 1 and 7 of the test.

(*b*) The calorific value of the blast-furnace gas was obtained by calculation from its analysis. Since the gas varies but little in its composition three samples only were taken, and these at equal intervals during the trial. Each sample was continuous over the period the stove was on gas, and was drawn from the nozzle into a gas holder over glycerine and water (1 : 1) and analyzed at the completion of the test.

(*c*) The measurement of the amount of gas entering the stove involves the determination of its velocity, but after many attempts it was found impossible to obtain

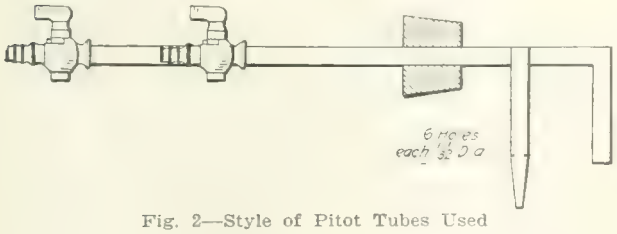


Fig. 2—Style of Pitot Tubes Used

this directly. The method tried was to fix specially designed Pitot tubes in the mouth of the nozzle, connect these to a recording differential pressure gage, and from the average dynamic pressure to calculate the velocity.

The Pitot tubes were bound securely in position and the space between the nozzle and the opening in the stove was closed up with clay to prevent the entrance of air, which would produce eddy currents and so vitiate the records. The differential recorder used in conjunction with the tubes had a range of only ½ in. pressure of water. The records thus obtained were altogether unsatisfactory, showing a velocity head of very much less magnitude than was reasonable, and corresponding in no way with the variations of the gas pressure. Careful search showed that the cause of failure was due to the fact that the gas entered the stove with an eddying motion almost at right angles to the direction of flow.

In those stoves where a portion of the air for combustion is drawn through an inner tube fixed in the gas nozzle, this eddying motion can be readily seen, as the flame is quite black in the center but increases in luminosity toward the circumference, the dust having been thrown outward by the circular movement. In No. 11 stove the eddy was indicated by the stream lines on the dust in the mouth of the nozzle, which lay parallel to one another in a direction about 70 deg. from that of the gas flow.

The eddying motion is undoubtedly due to the change of pressure occurring at the plate valve, caused by the rush of gas through a restricted opening. The pressure on the furnace side of the plate valve was approximately 3 in. water gage, while in the nozzle the gas was under a suction of about 1½ in. water gage.

It will be seen from the drawing of the stove that under existing conditions at no point between the mouth of the nozzle and the underground gas main could any reasonable measurement of the velocity be made except by fully opening the plate valve and fixing an adjustable diaphragm at the mouth of the nozzle. Even in this case the measurement would have had to be taken as far as possible from the diaphragm, as the effect of the reversal of pressure would be apparent for some distance on the furnace side of the diaphragm.

The amount of gas passing into the stove might be determined indirectly either from the quantity of flue products or from the amount of air used for combustion. Both these methods were impossible on account of the disposition of the plant.

2. THE SENSIBLE HEAT IN THE GAS ENTERING THE STOVE

The experimental data required for the calculation of this item, namely, the measurement of the temperature, pressure, and quantity of gas used in each test, have already been considered in the previous paragraph.

3. THE HEAT CARRIED OFF IN THE FLUE PRODUCTS

The evaluation of this factor requires a knowledge of the temperature of the products of combustion, together with the average analysis and quantity passing into the flue during each period the stove is on gas.

The temperature was taken by a base metal thermo-couple inserted in the short length of main between the stove and the valve box, and connected to an indicator from which readings were taken at five minute intervals. During each run a continuous sample of the products was drawn into a gasholder containing glycerine and slightly acid water (1 : 1), from a tube fixed in the valve box. These samples were analyzed at the completion of the test.

The determination of the quantity of products and of the excess air used in the combustion is best found by calculation from the amount of gas used, on the basis of the carbon content of the gas and of the products. Since, however, the amount of gas used could not be directly measured, it is impossible to get either the quantity of products or the amount of excess air by direct methods.

4. HEAT REQUIRED TO RAISE THE TEMPERATURE OF THE BLAST

In order to find the heat taken up by the blast it is necessary to determine the temperature and pressure of the cold blast, the temperature of the hot blast, and the quantity of blast blown per hour.

The temperature of the cold blast was read at intervals from a mercury thermometer placed in one of the two inlet mains. The blast pressure was taken from a Bristol recording gage permanently connected up to the cold blast main.

The hot blast temperature was taken by a base metal couple fixed in the hot blast main directly behind the stove valve, and connected up to a calibrated recorder from which readings were taken at intervals of five minutes.

The quantity of blast used was calculated from its velocity in each of the two inlet mains. For this purpose Pitot tubes of the form shown in Fig. 2 were employed. These tubes were fixed in each of the mains with the tips facing the air stream, the dynamic tip being about one-sixth of the diameter of the main from the circumference. The two tubes were connected up to the differential pressure recorder which consists of a float moving in water contained in a closed cylindrical iron vessel. The static pressure acts on the upper

side of the float and the combined static and dynamic pressures act on the under side, so that the movement of the float is caused by the difference between these, namely the dynamic pressure of the air. This difference is recorded by a pen attached to the float marking on the chart affixed to the revolving drum. The instrument was designed to work at 5 lb. pressure and to have a range of 1½ in. with a magnification of 4 : 1. The velocity of the blast is calculated from the average dynamic pressure during the test, using Grigg's formula:

$$V = 0.997 \sqrt{\frac{2gh}{1.2d}}$$

where

- V = The velocity in ft. per sec. at the temperature and pressure of the main
- g = Acceleration due to gravity (32.2 ft. per sec.)
- w = The weight of 1 cu. ft. of water = 62.4 lb.
- h = The dynamic pressure in inches water gage
- d = The weight of 1 cu. ft. of the gas at the temperature and pressure of the main

DETAILS OF THE TRIAL

The trial was commenced at 11.53 a. m. on March 11, 1915, when the stove was put on gas, and was continued during nine reversals ending at 11.48 a. m. on March 12.

A summary of the results obtained is given in the two following tables:

Table 1.—Stove on Gas.

Experiment	Time	Average Gas per Hour	Average Heat Value of Gas	Average Blast Pressure in Lb. per Sq. In.	Average Blast Temp.	Average Air per Hour	Average Heat per Hour	Analysis of Gas	Analysis of Products of Combustion
	H. M.								
1	1 24	245	380	3.4	1720			CO_2 9.2 CO 25.0 H_2 1.0 N_2 64.8	CO_2 12.4 O 0.0 N_2 87.6
2	1 28	249	374	4.1	1800				CO_2 12.2 O 0.0 N_2 87.8
3	1 19	256	369	4.5	1750				CO 14.0 O 0.0 N_2 86.0
4	1 18	266	373	4.3	1810	6.1		CO_2 9.7 CO 25.2 H_2 1.0 N_2 64.1	CO 15.4 O 0.0 N_2 84.6
5	1 34	248	356	4.4	1720				CO 17.0 O 3.4 N_2 79.6
6	1 34	238	374	4.5	1750				CO 16.2 O 3.0 N_2 80.8
7	1 18	229	367	4.4	1720			CO_2 9.4 CO 25.1 H_2 1.0 N_2 64.5	CO 15.4 O 0.0 N_2 84.6
8	1 23	225	350	4.2	1810 (a) 1834	7.5			CO 14.6 O 2.7 N_2 82.7
9	1 30	222	340	4.3	1715				CO 16.0 O 0.1 N_2 83.9

Table 2.—Stove on Blast.

Experiment	Time	Average Hot Blast Temp.	Average Cold Blast Temp.	Average Blast Pressure in Lb. per Sq. In.	Hygrometer		Pitot Tube Head in Ins. W. G.	
					Wet	Dry	Right-Hand Main	Left-Hand Main
	H. M.							
1	1 16	737	25	4.75	13.2	14.2	1.60	1.750
2	1 4	743	26	4.75	10.7	10.8	0.947	1.518
3	1 8	723	24	4.5	9.4	9.1	0.910	0.721
4	1 18	709	22	4.6	9.4	9.4	0.956	0.741
5	1 2	703	22	4.5	9.3	9.4	0.832	0.714
6	1 1	743	21	5.0	9.4	10.0	0.610	0.490
7	1 7	722	22	4.6	9.7	10.3	0.788	0.650
8	0 57	730	23	4.5	10.1	10.8	1.07	0.85
9	0 53	727	24	4.2	10.2	11.4	0.863	0.718

CALCULATIONS

1. *The Heat taken up by the Blast*

It is first necessary to find the average velocity of the blast in each of the two mains during each experiment.

Considering the right-hand main in Experiment 1, we have:

Pressure of blast = 4.75 lb. per sq. in.
Temperature of blast = 20 deg. C.

The weight of 1 cu. ft. of air at this temperature and pressure = 0.07488 lb.

By Grigg's formula

$$V = 0.997 \sqrt{\frac{2ghw}{1.2d}}$$

g = 32.2 ft. per sec.
h = 1.60 in. water gage
w = 62.4 lb.
d = 0.07488 lb.

$$V = 0.997 \sqrt{\frac{64.4 \times 1.60 \times 62.4}{1.2 \times 0.07488}}$$

= 58.37 ft. per sec.

Since the area of each main = 2.81 sq. ft. and the duration of Experiment 1 was 1 hr. 16 min. (= 4560 sec.), the amount of blast blown through the right-hand main

= 58.37 × 4560 × 2.81 = 748,000 cu. ft.

and the amount of blast blown through

the left-hand main = 642,300 cu. ft.

Total = 1,139,100 cu. ft.

= 1,380,000 cu. ft. at N.T.P.

The mean specific heat of air between 0 and 727 deg. C. = 6.3354.

1 cu. ft. of air at N.T.P. requires 0.2935 cal. per deg. C. rise in temperature.

The heat required to raise 1 cu. ft. of air from 25 deg. C. to 727 deg. C.

$$= \frac{6.3354 \times 0.2935}{1000} = 0.00186 \text{ K.C.U.'s}$$

The heat required to raise the temperature of the blast blown in Experiment 1:

= 1,380,000 × 6.3354 = 8,744,000 K.C.U.'s.

The results for each experiment are given in the following table:—

Table 3.—Results of Heat Experiment.

No. of Experiment	Volume of Air per Sec. Cu. Ft. Right-Hand Main	Volume of Air per Sec. Cu. Ft. Left-Hand Main	Average Blast Pressure Right-Hand Main	Average Blast Pressure Left-Hand Main	Total Cubic Feet	Total at N.T.P.	No. K.C.U.'s Required to Raise Temp. of Blast
1	58.33	50.17	646,800	492,300	1,139,100	1,380,000	8,744,000
2	50.91	43.95	480,400	443,300	923,700	1,116,000	7,119,000
3	54.75	52.50	520,500	463,300	983,700	1,181,000	7,347,000
4	56.13	50.13	608,200	535,300	1,143,500	1,390,000	8,498,000
5	45.27	40.75	452,200	418,800	871,000	1,053,000	6,380,000
6	41.04	30.29	377,000	334,700	711,700	885,000	5,690,000
7	53.50	46.00	474,200	430,800	905,000	1,100,000	6,852,000
8	61.93	51.04	483,300	428,700	912,000	1,098,000	6,908,000
9	56.54	49.05	405,200	363,200	768,400	908,000	5,682,000
				Total	10,111,000	63,220,000	

2. *The Heat taken up by the Moisture in the Blast*

The average humidity of the air, deduced from the wet and dry bulb hygrometer readings taken during the test = 0.95,

whence—

The amount of water vapor per cubic meter of air = 9.0 gram.

The amount of water vapor per cubic foot of air = 0.255 gram

The amount of water vapor per cubic foot of air at N.T.P. = 0.265 gram

The total volume of air used = 10,111,000 cu. ft.

∴ The amount of water entering the stove with the blast = 2679 kilogram.

The heat required to raise 2679 kg. of water from 25 deg. C. to 100 deg. C. = 75 × 2679 = 200,900 K.C.U.'s.

The heat required to evaporate 2679 kg. of water from and at 100 deg. C. = 536 × 2679 = 1,436,000 K.C.U.'s.

The heat required to raise 2679 kg. of steam from 100 deg. C. to 727 deg. C.

= 0.627 × 2679 × 627 = 816,000 K.C.U.'s

Total = 2,452,900 K.C.U.'s.

3. *The Sensible Heat of the Gas per Cubic Foot at N.T.P.*

The average composition of the gas is

	Per Cent
Carbon dioxide, CO_2	2.5
Carbon monoxide, CO	30.0
Hydrogen, H	1.0
Nitrogen, N_2	59

The mean specific heats of these gases between 0 C. and 250 deg. C. are:

Carbon dioxide, CO_2	0.222
Carbon monoxide, CO	0.243
Hydrogen, H_2	3.410
Nitrogen, N_2	0.241

whence the heat required to raise 1 cu. ft. of this gas 1 deg. C.

= 8.984 calories = 0.008984 K.C.U.'s.

The average temperature of the gas = 240 deg.

The sensible heat of the gas per cubic foot at N.T.P.

= 240 × 0.008984 K.C.U.'s

= 2.156 K.C.U.

4. *The Heat of Combustion of the Gas per Cubic Foot at N.T.P.*

The heat of combustion of hydrogen per gram-molecule

= 68.36 K.C.U.'s

The heat combustion of carbon monoxide per gram-molecule

= 67.96 K.C.U.'s

Whence the heat of combustion of blast-furnace gas of the composition given above

= 27.54 K.C.U.'s per cu. ft. at N.T.P.

5. *The Heat carried off by the Products per Cubic Foot (at N.T.P.) of Gas Burnt*

The average analysis of the products of combustion is

	Per Cent
Carbon dioxide, CO_2	15.2
Oxygen, O_2	4.1
Nitrogen, N_2	77.4

For perfect combustion we should have

Gas		Products	
CO_2	9.5	CO_2	9.5
CO	30.0 + [15 O_2 + 60 N_2]	CO_2	30.0 + N_2 60.0
H_2	1.0 + [½ O_2 + 2 N_2]		N_2 2.0
N_2	59.5		N_2 59.5
	100.0	CO	39.5 + N_2 121.5

15.2 cu. ft. of CO_2 are contained in 100 cu. ft. of products

39.5 cu. ft. of CO_2 are contained in 260 cu. ft. of products

∴ every 100 cu. ft. of gas burnt yields 260 cu. ft. (at N.T.P.) of products.

But for perfect combustion every 100 cu. ft. of gas gave 161 cu. ft. of products

∴ Excess air per 100 cu. ft. of gas = 99 cu. ft.

(A) *The Heat required to raise the Temperature of the Excess Air*

Initial air temperature..... = 15 deg.

Average temperature of flue products..... = 366 deg.

The heat required to raise the temperature of the excess air

= 0.99 × 28.32 × 1.2931 × 0.237 × 0.351

= 3.015 K.C.U.'s per cu. ft. (at N.T.P.) of gas burnt.

(B) *The Heat contained in the Theoretical Products of Combustion*

Every 100 cu. ft. of gas burnt yields

39.5 cu. ft. of CO_2 } at N.T.P.

121.5 cu. ft. of N_2 }

The sensible heat contained in these at 366 deg. C. is:

CO_2 39.5 × 28.32 × 1.9651 × 0.227 × 0.366 K.C.U.'s.

N_2 121.5 × 28.32 × 1.2514 × 0.242 × 0.366 K.C.U.'s.

Total = 5.641 K.C.U.'s.

∴ The total heat carried off by the products of combustion = 8.656 K.C.U.'s per cubic foot (at N.T.P.) of gas burnt.

Now if x = the number of millions of cubic feet (at N.T.P.) of gas burnt during the whole trial

Then the total heat put into the stove is made up of:

The sensible heat in the gas..	2.156x million K.C.U.'s
The heat of combustion of the gas	27.54x million K.C.U.'s
Total	29.696x million K.C.U.'s

The total heat obtained from the stove is made up of:

The sensible heat in the products	8.656x million K.C.U.'s
The heat taken up by the blast	63.226 million K.C.U.'s

[illegible]

Flue losses for the best [illegible] of the stove

Credit Side	Per Cent	*Debit Side*	Per Cent
Sensible heat in the gas.	7.3	Heat taken by blast....	63.3
Heat of combustion [illegible] the gas	92.1	Heat taken by moisture in blast	2.6
		Heat taken out by products	29.1
	100.0	Heat [illegible] to radiation	5.0
			100.0

New Electric Welded High-Speed Tools

In addition to the tool holder with an inserted Stellite cutter which was illustrated in THE IRON AGE, Oct. 28, 1915, the Ready Tool Company, Bridgeport, Conn., has placed on the market two new tools in which the high-speed steel or Stellite used as a cutting point is welded to a shank of ordinary steel.

One of the tools is made by the electric butt welding process, while the other is made by the fusion type of weld in which a piece of Stellite is welded on the



Two Recently Developed Tools Made by Electrically Welding a Piece of Stellite or High-Speed Steel to an Ordinary Steel Shank by the Butt or Fusion Process

end of the shank by the electric fusion process and the nose of the tool is supported by the heel, which is in line with the base. In making the cutters for both tools the Stellite is cut off with the grain, which, it is pointed out, enables full use of the outside cutting edge to be secured. This, it is stated, has proved more effective than the center of the material. In sharpening the tool it is only necessary to grind the top, all clearances being assured by the angles of the tool.

Every shape of tool can be welded so that lathes, boring mills and planing, cutting-off, screw and milling machines can be equipped with these new tools. The Stellite tools can be supplied in three grades and in four stages, viz.: welded, welded and rough ground, welded, ground and heat treated and in a finished tool ground to form ready for use. If desired special shapes can be welded for customers, which enables short pieces of high-speed steel or Stellite to be entirely used.

Five courses for shop men have been announced by the Shepard Electric Crane & Hoist Company, Montour Falls, N. Y., including blue print reading and shop sketching, mechanical drawing, mathematics, mechanics and practical electricity. The company assumes all expenses except for implements which will be provided at cost.

An amendment to the San Francisco charter, prohibiting picketing, appears to have been adopted at the recent election by about 3000 majority. The amendment was fathered by the Law and Order Committee of the Chamber of Commerce.

Employing Men for the Steel Mill*

The Methods Followed by the Illinois Steel Company in Hiring, Keeping Records of and Discharging Men

BY A. H. YOUNG†

The employment bureau of to-day has responsibilities far outweighing the mere supplying of labor and maintenance of service records—when properly functioning it will provide an employee peculiarly fitted for each of varying occupations served; it will discover the worker not fitted for his task, and, having done so, will find the task fitted for the worker. Not only must job and man harmonize, but also must it be assured there will be no discord when *many* men are fitted to a single task. Thus, Turk, Serb, Greek, Croat, Dalmatian, Montenegran, Russian, or Pole may each be found desirable as laborers in a blast furnace plant; but a wise employment agent will not try to blend them all into one "gang" lest the accident rate rise.

The mere maintenance of an adequate service record —the most elementary function of an employment office —is in itself a peculiar service. It demands that every change of occupation, every promotion, every disciplinary act or especially meritorious service, be recorded consecutively, and be quickly available on demand.

So, too, when an employee leaves the service, must the true cause of his action be made a matter of record, and on this point alone can the competent employment agent make himself a most valuable factor in conserving desirable, experienced workers to the plant. Except for his vigilance, foremen may improperly exercise the power of discharge, or unfair conditions, easily adjusted, cause an employee to resign.

SUPERINTENDENT MUST HAVE ABILITY

First of all, the superintendent of employment must be a keen student of human nature, quick to judge the faker, and patient in uncovering ambition from beneath the immigrant's cloak of ignorance and awkwardness. An adequate force of interpreters and clerks, housed in an office containing a large and attractive waiting-room, are necessary to properly care for the details of office routine. The superintendent should be free to spend all of his time on the larger responsibilities of the office, unfettered by clerical duties. He must not only be aware of the location of all the groups of foreign settlements in the community, but he must become personally acquainted with the individual boarding bosses, steamship agents, clergymen, and other influential agents with whom the immigrant maintains a close contact. These are his supply depots, and only by perpetual, personal reconnoitering can he remain familiar with the quality and quantity of available applicants.

No less exacting is the duty of keeping closely in touch with all the foremen in the plant which he serves. A proper distribution of new employees requires the agent to know the varying character of the duties of each job in each department, and the more marked idiosyncrasies of foremen and superintendents. He must know the ability of foremen and gang leaders to speak foreign languages and be familiar with the seeming ineradicable racial antipathies and factional disturbances of the polyglot stream of humanity which passes through his department.

In the most progressive of our modern business organizations the manager of the employment department is given very extensive and final authority. In hiring laborers and men for occupations of relatively minor importance he passes final judgment on the applicant's fitness and hires or rejects him directly. In other cases he retains jurisdiction as to eligibility in all details, except as to skill, and passes the applicant on to the foreman or superintendent for judgment as to this latter trait. If found acceptable he is returned to the bureau and required to furnish references before being hired.

Physical examination of employees is properly another item of employment detail. The results should be on file with service record of the employee. Usually the complete report of the physical examination is kept in the surgeon's files, and only a grade symbol used in the employment office. Thus, instead of filing the complete test report, a small card is prepared, giving date of physical test, surgeon's file number, and a symbol—A, B, C, or D.

"A" indicates that the applicant passed all tests satisfactorily, is fit for any class of employment and has no permanent disabilities.

"B" indicates the same as "A," except that some permanent disability is possessed, such as a scar, a missing toe, or stiff joint. The value of this classification is found when the files are consulted in connection with personal injury settlements, as they prevent the collection of compensation for disabilities falsely claimed as the result of an accident subsequent to employment.

"C" indicates that the applicant has disabilities which may prohibit his employment at certain occupations. Whenever this classification is assigned the employment manager is required to obtain the approval of the surgical dspartment for the particular job involved, and cannot subsequently transfer the employee to another department or change his occupation without such approval. Should a department head assign new duties to such an employee the change immediately comes to the notice of the employment office through the payroll department, which is required to send a copy of alterations of occupation to the bureau, and miscarriage of the plan is thus corrected.

"D" signifies complete disqualification in the case of a new applicant and a very special consideration of all relative facts when assigned to a present employee.

EMPLOYMENT ROUTINE

The first routine of the employment office, following the acceptance of the applicant after physical examination, is the preparation of the "service record" card. This is usually about 5 x 7 in. and on one face is entered the employee's full name and address and personal signature. Provision is also made for the name and address of the person to be notified in case of sickness or accident. The balance of that side of the card is ruled off for entering the date and cause of beginning and ending service in each occupation. Causes may be coded, thus: "T" transferred; "Q" quit; "D," discharged; "C" commenced; "R," re-employed; a complete entry reading, say, "C-7-21-15-Trans-Switchman-8-14-16-T T-8-14-16-No. 1 R. M.-Craneman." Each successive pay roll number is recorded on the card as soon as issued.

On the reverse of the card is entered: Country of birth and race of the employee and same of parents; number of years in this country (if foreign-born); whether or not naturalized; whether married or single; number of children and whether or not family is in this country; age; ability to talk, read and write English, and read or write native language.

A "register" number is assigned to each card in the "live" file. This is a permanent number and does not change with shifts in occupations or employment. Each new employee is assigned the next consecutive number. An ex-employee returning retains his old number.

*From a paper presented at the annual congress of the National Safety Council at Detroit, Oct. 19.

†Supervisor of Labor and Safety, Illinois Steel Company, South Works, South Chicago, Ill.

The complete record card can be prepared in less than two minutes by our experienced interpreter, who then makes out an employment slip which is given to the man. This shows his name, register number, occupation, and the name of the foreman to whom he is to report. He is also given a book of rules in his native language and personally conducted by a uniformed patrolman to his new foreman. On the way the patrolman takes him to the clock house and shows him how to ring in and out, then to the locker and wash room, so that he may be familiar with the sanitary equipment of the plant. He is also carefully directed over the proper route to follow to and from the gate nearest his department.

The employment slip given to the man is taken up by the timekeeper, who has it signed by the superintendent of the department. He then uses it as the basis of his time-book entries and marks a pay roll number on it. Then it goes to the addressing machines to be entered on the printed pay rolls, and is returned to the employment office with a proof of the typed pay roll entry. Much care is given to correctly spelling each name and checking the final typesetting, as the substitution of an "i" for an "e" would practically lose a name in the files.

An employment slip issued and entered in this manner is the only authority recognized for placing a name on the pay rolls. Periodically, the complete pay rolls are checked against the "live" files, with which they must exactly coincide.

TRANSFER OF EMPLOYEE

Should an employee desire to transfer from one department to another, he is required to obtain the written consent of his superintendent on a special form. This is presented to his prospective new superintendent, and, if approved, is honored at the employment office as an order to transfer and the records changed accordingly.

Every encouragement is offered to employees to freely consult the employment agent on all questions affecting his relations with the company or for advice on other matters. These items are treated in absolute confidence by the labor department, and if complaint is made of improper conditions or equipment, or wrong acts of foremen, a full investigation is promptly made and followed through to a proper adjustment.

RECORDS KEPT UP TO DATE

From time to time the service record of the employee is corrected by a history of his negligence or diligence, as the case may be. For instance, a monthly report is submitted by each department, showing the reprimands or lay-offs administered during the month, with the circumstances attendant thereto. This report is abstracted and filed in the envelope containing the record card. When an employee is injured that fact is entered in like manner, showing date, casualty department file number, and classification as to responsibility for the accident. If another similar entry is made on the same card the details of the cases are at once made known to the head of the safety department, who may thus be put on the trail of an habitually careless workman. This particular item of coöperation between employment and safety divisions has proven of real value. It does not follow that an employee twice injured through carelessness is removed from service, but it has been found advisable to shift an awkward workman from billet loader to caretaker. In two cases it revealed defective eyesight in men occupying hazardous positions, who had grown old in service. The very knowledge that he will be quizzed about recurring accidents is a stimulus to the worker to avoid them.

DISMISSALS AND QUITTING.

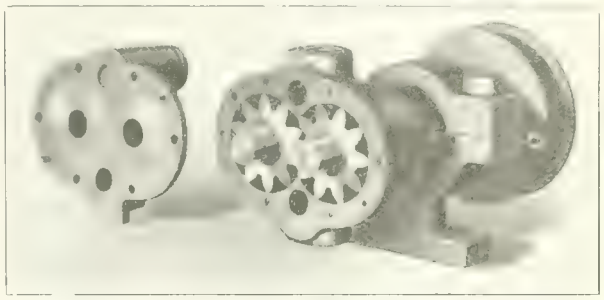
Every practicable inducement is offered to retain an employee in the service, and the matter of issuing a pay-off slip, either because of resignation or dismissal, is especially scrutinized. These pay-off slips are made in sheets perforated in three sections and padded in book form and issued to superintendents.

The top section is the stub retained by the department head, and records such data as he may wish. The second, or middle section, is required to be sent promptly to the labor department, and gives name, pay roll number, and the true cause for leaving the service. The third, or bottom section, is an order on the accounting department to pay off the employee. This he is required to bring in person to the employment office, where record is made on his service card, which is then transferred to the "dead" file. He is courteously asked his reasons for leaving, and an attempt is made to get an expression of his view of employment with the company.

The head of the labor department has authority to review all cases of discharge, and if, after full investigation, he does not feel satisfied that the best interests of the company are served by the dismissal of the employee, he reinstates him—usually by transfer to some other department. Likewise, if a man quits because of peculiar conditions in one mill which are not present in another a transfer is suggested.

Rotary Machine-Tool Lubricating Pump

The Goulds Mfg. Company, Seneca Falls, N. Y., has developed a line of rotary pumps for supplying cutting compounds and oils to metal working machines. The pumps are built in two styles, one of which is reversible and the other non-reversible. The first is



A Recently Developed Oil Pump for Lubricating Machine Tools with the Cover Removed to Show the Cams That Handle the Oil or Cutting Compound and the By-Pass Arrangement Used to Prevent the Building Up of Excessive Pressures

adapted for screw and automatic machines in which the direction of rotation is reversed, while the other is suitable for gear cutting and chucking machines and in general for any machine tool operating in one direction only. Two different arrangements for mounting the pumps are provided, both being capable of swiveling around the pump through a complete circle. This feature, it is pointed out, enables the pump to be located on practically any style of machine tool.

As will be noted from the accompanying engravings, the pump operates by the rotation of two metal cams, which are generated on a gear shaping machine and mesh or roll together. The toes of these cams engage closely and fit the case snugly, it is emphasized, thus reducing the amount of slip considerably. The accuracy with which the case and the cams are machined, it is pointed out, gives a high vacuum and it is possible to operate the pump on high suction lifts.

A constant, steady flow of oil or compound is supplied by the pump and the demand on the driver for power does not fluctuate. Practically any of the ordinary methods of drive can be employed, and the driver can be either belt or direct-connected, as may be desired.

Both styles of pump are equipped with a relief valve and by-pass built in the cover, emphasis being laid upon the fact that they are part of the pump and not accessories. This feature, it is explained, enables the operator to control the amount of oil or cutting compound being handled, and also protects the pump against any excess pressure that might be built up as the result of the oil pipe or valve closing.

The pumps are built in two styles, one having a capacity of from 1½ to 4 gal. per min., while the other will pump from 4 to 10 gal. Both of the pumps are regularly furnished with a single tight pulley for belt drive.

SAFETY AROUND COKE OVENS*

Mechanical Safeguards and Careful Selection of Men and Education the Necessities

The Government Bureau of Mines has issued a report on "Coke Oven Accidents" in the United States during the year 1915. The liability for injury at coke plants is not great. Outside of the shops there is comparatively little moving machinery connected with coke oven operations. For this reason, it may be, that at some plants when they have installed the usual mechanical safeguards they have been inclined to think that they have done all that is required. There perhaps has been a tendency to consider that, as it is essentially a hand-labor operation, the safety of the workmen depends entirely on themselves.

In order to be assured of a knowledge of causes of injuries, the writer has made an analysis of the records of his own plant. As it employs between eight and nine hundred men and has a by-product department, including the recovery of benzol, it is safe to assume that a statement of the causes of injuries at this plant is fairly indicative of the causes of accidents at all by-product plants.

ACCIDENT RECORD

The analysis developed that, of the total number of accidents, the percentage of causes was as follows:

	Per Cent
Hand Labor:	
About the ovens	17.47
About shops	3.25
About coal handling department	1.82
About by-product department	2.61
About coal handling department	1.41
Burns:	
Steam and hot water	7.83
About charging holes	4.71
Electricity	1.41
Hot tar, lime, etc.	1.80
Stand pipes and mains	1.80
Acid	1.80
About doors of ovens	1.20
Falls:	
Slipping or tripping (ground level)	1.83
Slipping or tripping (above ground)	0.92
From ladders, scaffolds, etc.	1.41
Into unprotected holes	0.60
Particles in the Eye	
From wind	11.14
From tools or work	0.60
Machinery:	
About batteries	3.01
About by-products department	2.41
About shops	1.21
Railroad: About engines or cars	2.41
Falling material	1.60
Miscellaneous	1.82

Hand labor accidents head the list. Hand-labor accidents are virtually all due to carelessness. A large percentage of injuries were burns of one kind or another. This is to be expected, of course, but investigation showed, that practically every injury due to burns would have been prevented by proper care. In fact, with the exception of the injuries to eyes due to flying particles, at least 90 per cent of the accidents were due to lack of care on the part of the injured workmen or to careless acts of others. In this connection, it is proper to state that our plant has been active in its efforts to make conditions as safe as possible. It is a possible explanation of the fact that the statement of causes shows a low percentage of accidents due to machinery.

A few of the provisions for safety at this plant are as follows: At the coal unloading station derails are installed to prevent bumping cars on which unloading crews are working. As it is necessary for men at times to poke down the coal in the cars, steel platforms are provided at the sides of the tracks from which much of this work can be done and which furnish a safe and easy way for men to get onto and into cars. Cables are stretched across the hoppers. As the cables are not rigid, they allow the coal to pass through readily and at the same time accomplish their purpose of preventing men from falling into the hoppers. Wrenches for use in opening the doors of the hopper cars are so made that if, when the ratchet dog is released and the pressure of coal upon the doors causes the shaft to spin, the wrench will automatically release. Open lights are not allowed in the crusher buildings or in the coal conveyor enclosures. Provision is made by which, at any of a number of convenient places, the snapping of an electric switch will at once stop the conveyor. On the ovens the larry cars are equipped with fenders and automatic bells. The operator's cab is located so that he always has an unobstructed view ahead. The chutes on the cars are so constructed that, when charging, a hinged extension swings into place. This reduces to a minimum the amount of coal spilled around the charging hole. The lid men wear leggings, use a long-handled hook for removing lids, a long-handled broom for sweeping spilled coal into the ovens, and are, of course, instructed to work always on the *windward* side of the hole. The walks on both the pusher side and the coke side are wide. The coke is not quenched at the ovens but is taken in transfer cars to a quenching station, removed from the ovens. The quenching station structure is so enclosed that the steam is carried upward. This reduces the possibility of accidents due to steam-obstructed vision.

MECHANICAL SAFEGUARDS EXCELLENT

Of course, these are but a few of the mechanical safeguards which are in addition to the stairways, walks, railings, gear guards, and other conventional safety provisions.

As it is shown that coke-oven accidents are not due to lack of physical protection, the conclusion is obvious that men employed in coke-oven operations must be very careless. The reason for this must be one of two things: Either it is because of labor conditions or because of a lack of proper education.

The work about the ovens is mostly of a routine nature. It does not require especial training or skill. Therefore a large percentage of unskilled labor is employed. The work is dirty, and about the ovens it is hot and unpleasant, especially in the summer months. Largely, as a result of these conditions, the percentage of change in operating forces is high. Accident rates are always high when and where there is a high percentage of new men. Safety in coke-oven operations, then, must begin with the employment of the men. Care in the selection of men can be made a great factor in assuring permanent forces.

Of course, the plants should be made safe along the lines of mechanical safeguards and safe working conditions. At the same time it is impossible to give too much attention to working conditions that affect the welfare and comfort of the men. As a suggestion along these lines I would call attention to the excessive heat on top of the ovens. It comes largely from the standpipes. It would be well to insulate them so that the amount of heat radiated will be reduced to a minimum. Water closets, urinals, wash and locker rooms and shower baths should be provided. They should be convenient, light and well ventilated, and, above all things, should be kept clean. The mere providing of sanitary equipment is not sufficient—the equipment should be maintained in a manner to make it attractive and inviting. In short, one of the best ways to assure a permanent force is to make conditions as comfortable and attractive as possible.

Above all things, every effort should be exerted to educate the workmen into habits of caution. It is indispensable that every workman should be carefully instructed by his foreman regarding his work and the dangers attached to it. It is particularly necessary that the foreman should give complete instructions in safety to the non-English speaking workman, and that he take pains to be sure that the man fully understands and appreciates what has been told. He should insist that each man under him does his work as he has been instructed to do it. He should be held responsible for each accident that occurs to them and should thoroughly understand that he will be called upon to explain it. An effective means of education is that afforded by safety committees. But the fact that safety committees are active should under

*From a paper presented to the annual congress of the National Safety Council at Detroit, Oct. 20, by Kenneth M. Burr, safety inspector, Illinois Steel Company, Gary, Ind.

no circumstances be permitted to allow the foreman to forget his personal responsibility.

The most important function of the safety committeee is to impress upon each man that he must be careful at all times, that he must think and act safety. I believe that the most good can be secured by meetings held with groups of workmen. There cannot be too many of these meetings. I think that it is highly important that written reports be made of each meeting. From these written reports much information is gotten which is of value to others.

PERSONAL WORK OF SUPERINTENDENT

The operating head of the plant must put all the power of his position and all the force of his personality behind the demand for accident prevention. If he is inclined to delegate safety matters to others and is not willing to take an active personal interest in it, the results are sure to be disappointing. He must impress upon his entire organization that he is sincere in his interest and that he will rigidly discipline those who fail to do their full duty in matters regarding safety.

Education in safety naturally begins with telling men of things to be avoided, with instructions as to the safe way of working. But there is a broader field for this work. It is the duty of those who, either by endowment of nature or through better opportunities of education or training, have superior reasoning powers, to teach those less fortunate to think for themselves—to do their best to get them to exercise their own powers of observation and to encourage them to develop and use their own reasoning powers. It is a duty they owe to themselves and to their fellow man.

Safety in coke-oven operations calls for mechanical safeguarding, safe methods, care in the selection of workmen, agreeable surroundings, capable foremen, and above all things—education.

German High Speed Steel

Good high speed steel for lathe tools may have the following composition, according to the German journal, *Elektrotechnische Rundschau:*

	Per Cent		Per Cent
Carbon	0.15 to 0.80	Chromium	2.50 to 5.00
Silicon	Trace to 0.20	Molybdenum	None to 2.50
Manganese	0.10 to 0.50	Vanadium	None to 1.50
Tungsten	8.00 to 18.00	Cobalt	None to 5.00

Wide variations in these proportions make possible a large number of steels, rendering selection difficult. Such steels must be forged at temperatures not less than 1000 deg. C., or cracks will be formed which though invisible will lead to fracture in hardening. Annealing is effected by prolonged heating at 800 deg. C. According to the composition and intended application of the steel, it may be hardened at temperatures between zero and 700 deg., an oil bath being used for temperatures up to 300 deg., beyond which it should be replaced by one of molten lead, or preferably barium chloride solution maintained at uniform temperature by the passage of low-tension electric current. Large tools must be heated to 800 deg. before being plunged into the bath. This treatment sometimes causes the formation of a superficial layer of low resistance, through the action of the liberated chlorine on the carbon of the steel, and not, as formerly supposed, through the oxidizing effect of an adherent film of air. To prevent this defect it is proposed to immerse the tool first in a saline bath of lower temperature in order to moisten the surface thoroughly.

A recreation association, known as the Simplex Recreation League, has been organized by the directors of the Simplex Automobile Company, New Brunswick, N. J., for the benefit of its employees and their families. The old Middlesex Club house in Highland Park has been acquired and renovated, providing an attractive community house for the organization. In addition to its use as a social center, it will also be the headquarters of the employees' athletic teams.

Portable Electric Drills for Tapping Blast Furnaces

Several devices are in use for the tapping of blast and other furnaces, these including the electric arc, the oxy-acetylene flame and the portable electric drill. Some of the large blast-furnace companies of the country have adopted the last named method and find it quick and economical. The drill is allowed to penetrate to within an inch or two of the iron and tapping is completed as usual with a long steel bar. About five minutes is required for tapping in this way, actual drilling time being about two minutes.

The drills used are 10 ft. long with about 3 ft. twisted, the diameter of the drill being 2½ in. The adaptability of such drills to this class of work rests in the fact that they are of sufficient power to drill 2½-in. holes without any chance of stalling. The switch is located at the end of the long handle and the



The Van Dorn Portable Electric Drill As It Appears When Used in Tapping a Blast Furnace

operator, in letting go of the handle, instantly cuts off the power and the drill swings to one side.

The Van Dorn Electric Tool Company, Cleveland, Ohio, has designed a drill for tapping blast furnaces, known as Type D-C-5. The illustration shows one of these tools in operation.

A Four-Plunger Horizontal Hydraulic Pump

The Hydraulic Press Mfg. Company, Mount Gilead, Ohio, has added a horizontal four-plunger type to its line of high-pressure hydraulic pumps. It is designed to supply a large volume of water or other fluid against a high pressure and may be equipped with 16 different sizes of plungers ranging from 1 to 5 in. in diameter, the difference between the successive sizes of plunger being ¼ in. The pressures range from 700 to 9500 lb. per square inch and the water capacity from 326 to 24 gal. per minute. The pump is driven by a 150-hp. motor through either spur or herringbone reduction gearing to reduce motor speeds of 450 to 750 r.p.m. to 60 r.p.m., which is the speed of the pump crankshaft. The stroke of the plunger is 16 in. The floor space occupied is approximately 7 x 19 ft.

Because of the stoppage of tin imports, Germany is reported to have prohibited the use of solder containing more than 30 per cent of tin and the tin so used must have been recovered from dross or scrap. The making of soldered joints has to be restricted to cases where lapping, riveting and electric or autogenous welding are impracticable. It is stated that a usable solder can be prepared from 10 parts of tin, 80 of lead and 10 of cadmium. Although the cadmium is three times as expensive as tin, the extra cost is considered of no consequence because of the necessity of using sufficient tin as raw material.

Handling Iron and Steel Export Shipments

Manufacturers Now Largely Working Through Outside Selling and Shipping Organizations—How Problems of War Time Have Been Met

BY F. A. KELLY*

A good many American manufacturers, by reason of the extent to which their output has been absorbed by domestic consumers and the difficulties, real or otherwise, in making deliveries abroad, have been content either not to look for extension of their trade in other countries or to curtail their direct reach and leave shipping details to export houses or to expert foreign freight forwarders. Lately such concerns have had their attention more strongly directed to the foreign field, not only by the demand from abroad, but by the concerted effort of those who would make clear the desirability of increasing exports so that the nation may take its rightful place in the world's commerce.

In view of the intricacies of shipping to foreign countries, especially since the war started, it is not strange that manufacturers, aside from the very few that do a large business abroad and therefore find it advisable to maintain export shipping departments, should not want to carry transactions further than the seaboard, securing payment for their goods on delivery alongside ship. Since the war started important new organizations have been formed specifically for selling American goods abroad, buying them on a domestic basis, thereby relieving the maker of all the details of customs tariffs in the purchasing countries, constantly changing freight rates, marine and war insurance, steamship sailings, consular invoices, lighterage, trucking, etc.

STEEL BUSINESS MUST BE SOUGHT LATER

A peculiarity of the present abnormal condition is that steel export sales are largely made without solicitation, with the demand coming faster than the mills can handle it. After the war it will be another story, and sellers will have to solicit if they would have the business. This would mean the maintenance of efficient selling and service forces to meet shipping expenses, and a large business would be necessary.

Therefore as a rule producers of iron and steel in the United States will find it an advantage to use organizations which with capable agents are qualified to distribute throughout the world, disposing of surplus steel stock at a time when export sales will be especially desirable. In normal times, even large steel companies are not inclined to reserve a stipulated tonnage for foreign markets that would justify the maintenance of an export department with its heavy overhead, largely contributed to by foreign representatives, heavy traveling expenses, cable tolls, etc. Another point is that no one mill makes the variety of products, with one or two exceptions, that might be embraced in one foreign inquiry. Again, their attention to the foreign markets, for reasons stated, is likely to be spasmodic.

Manufacturers who are shipping through one or another of the agencies referred to will find interesting some of the conditions affecting export shipments, particularly of iron and steel. Incidentally it may be remarked that conditions have greatly multiplied the number of freight brokers who handle exports, many of whom are doing a profitable business and will remain in the field, while others will disappear as conditions become normal.

Sales abroad are usually subject to c.i.f. terms (cost, insurance and freight). Legally a quotation for export might be construed as including both forms of insurance—the ordinary marine risk, on which the rates are stationary, and the war risk, on which rates fluctuate and are governed by conditions at the time a steamer is loading. A little submarine activity in any territory will send the rate for that zone skyward, as was illustrated by a recent Mediterranean operation which caused the war risk premium to advance to 10 per cent and over. That means a cost of $10 per ton or more, a very appreciable item. Shippers generally are excluding the war risk cost in their delivered quotations, which adds it to the price the buyer has to pay for his delivery. Buyers are recognizing the justice of this course since the actual cost cannot be predetermined when sales are made three and four months in advance of shipment.

GREAT BRITAIN'S LETTERS OF ASSURANCE

Shipments to all Scandinavian ports and to Holland are subject to the supervision of the British Embassy Trade Department, Washington, D. C., which grants, on satisfactory statements by the shipper, what are called letters of assurance. These so-called letters are not a guarantee that the goods shipped will reach their destination, or not be interfered with en route, but are an evidence that Great Britain is satisfied of the good faith of the shipper and that none of the shipment is intended for Great Britain's enemies. The shipper must be of recognized standing and the name of the ultimate consignee given. Russia has somewhat similar regulations. The British Government some time ago placed an embargo on the export of wire to Greece, evidently because of fear that it might reach one of the Central powers, but recently this restriction was modified.

Structural shapes have not been regarded as attractive freight, particularly by the regular steamship lines, because of their length and wastage of space, and when a line has its choice of freight it usually penalizes shapes. Plates and bars are regarded more favorably because they permit of close stowing. The greater density and uniformity in size of billets, ingots, slabs and pig iron make them desirable as freight, but copper is frequently given preference over any of these.

The freight rates to England on plates, shapes and bars range from $14 to $25 per ton, the spread resulting from the character of cargo a vessel is taking and the degree to which it needs compact heavy cargo. Incidentally, it is to be remembered that loading and trimming a ship with a miscellaneous cargo which fills her to the water line and uses the space correctly is a science calling for careful figuring and judgment. Measurement cargo, or

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that which is bulky, and dead-weight cargo, or that which is dense and compact, have to be carefully considered. A ship would not be entirely loaded with cotton, for instance, nor with tobacco nor with machinery, as her weight capacity would not then be utilized and she would not sink to the water line, technically known as the Plimsoll line.

RATES ON FINISHED PRODUCTS AND PIG IRON

On plates, shapes and bars the freight to France is $15 to $20 per ton, and to Italy $25 to $40 per ton. The rates to Italy have been made higher by reason of the congestion in the ports of that country. With a steamer worth $3000 or $4000 per day, it can readily be seen that any unnecessary detention is expensive both to the ship owners and to shippers. The rates to Sweden are high, running up to $45 and $50 per ton. The cheapest freight on heavy cargo is often secured from South Atlantic or Gulf ports, unless tramp steamers that need freight are loading in the north. As an indication of the need of carefully scrutinizing the available cargo space it may be said that quite recently there were ten steamers between Norfolk and Boston which would take on iron and steel products for Europe at about $14 per ton, whereas the regular lines wanted $25 and over.

Pig iron fills 10 cu. ft. to the ton. On this product the following line rates were effective around Nov. 1:

To Italy, from North Atlantic and Gulf ports, $30 per gross ton, minimum, with some lines asking $33.

To England, $1 per 100 lb. was the maximum.

To French ports, Havre, Marseilles and Bordeau, $22.50 to $25.

To Gothenburg, Sweden, $33 per ton, and possibly $30 on a good-sized tonnage.

To Holland, about $32 per ton.

Very little freight room is available for Italy, Liverpool or Sweden, but a fair tonnage for France is in the market. The rates to Holland are up $7 to $10 a ton as compared with those of a few weeks ago; those to Gothenburg are about the same as one month ago, and the French rates have been the same for the past two months. Those to Italy were as low as $25 a short time ago.

Most of the pig-iron shippers employ foreign freight forwarders, and naturally employ only one on a shipment, for the reason that if several were looking for the space required by one consignment they would be bidding against each other for the same space.

RAILROAD CONGESTION PUZZLES FOREIGN BUYERS

The railroad situation at Atlantic ports and in the interior is something the foreign buyer does not comprehend, and representatives have been sent over here to "clean it up." But a little insight into the actual conditions which prevailed last winter and spring caused the foreign representatives to change their minds, and the reports they sent home prompted a little more patience on the part of their principals.

For the approaching winter a car shortage has already begun and it will have an important effect on export as well as domestic shipments. The railroads have begun to clean house by placing some ports under embargo, thereby relieving the lines and the terminals, so that they can better care for the business which is in prospect—an action which is based on wise foresight, even if it brings temporary inconvenience to shippers. The situation later on would be far worse if a car accumulation at the seaports should seriously impair all operations when bad weather sets in, as happened last winter.

A Year of War in the French Steel Trade

A conspicuous statement in the report of Joseph G. Butler, Jr., on "The French Industry in War Time," published in THE IRON AGE, Nov. 2, 1916, was this:

In spite of the fact that at the beginning of hostilities France lost [illegible] the Germans got 90 per cent of her normal pig iron [illegible] and 80 per cent of her steel products, [illegible] the production of lower grades of [illegible] not exceed to [illegible] the total production of the country [illegible]

The report of the Comité des Forges de France for the fiscal year 1915-16 contains some interesting data in line with the above. The Comité, in agreement with the Chambre Syndicale du Material de Guerre, has not only assisted in the development of its own members, but has also sought out all others who, while not being constituents of the association, were yet capable of taking an important part in the production of material and munitions. The results have been so favorable that at present the output of shells meets all requirements and has for months past. The manufacture of shells of large calibre, a task more difficult than the making of smaller ones, is developing excellently.

The large iron and steel plants have undertaken extensions and established new branches and equipment which previously would have required years of time. The making of small arms, also organized by the Comité, has surpassed expectations.

The lack of supplies of steel is pointed out as one of the early difficulties. When the war broke out certain blast furnaces and open-hearth furnaces in non-invaded territory had been shut down for various reasons and had not been restarted in May, 1915. Since then, however, the Comité has not only endeavored to get such plants operating again, but has tried to establish new plants. The result has been that the production of steel has been doubled in 12 months.

To insure a supply of raw materials a common organization has been established, with service organized in Paris and England for the supply of refractory materials, ordinary and special quantities of pig iron and iron and steel products which it seemed best not to ask French makers to furnish. The needs of private consumers have had to be neglected as works cannot deliver iron and steel without the government's permission.

A suspension of import duties had been suggested as a remedy for procuring iron and steel, but the Comité opposes this and claims it has not considered any narrow or immediate interests. As all production was ear-marked in advance for war purposes, a temporary abolition of duties would not bring about an increase of a ton in output, but would merely be for the profit of the foreign seller and a detriment to the French treasury.

After the war a recasting of the tariff will be one of the first questions, says the report, for the purpose of procuring for the state much needed resources as well as assuring a vigorous development to the national industry and protecting it from unfair competition from Germany.

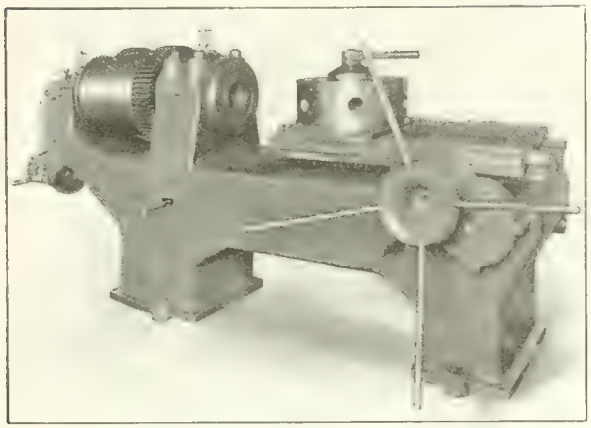
The professional re-education of those incapacitated by the war has had the active attention of the Comité. The labor crises due to the war have made it necessary to organize workshops for instructing men. In conjunction with coal owners, the engineering, textile, sugar and distilling works in the invaded districts, the Comité has formed an association to attend to the reconstruction of plant and stocks in those districts and to devise means to set the plants in operation quickly.

At a meeting of the Executive Committee of the Associated Advertising Clubs of the World, presided over by President Herbert S. Houston, in St. Louis, Oct. 31, the date for the annual convention of 1917 was fixed for June 3 to 7, inclusive. Arrangements were completed for the opening session of the convention to be held at Washington University, while the departmental sessions will be held in the Municipal Courts building and at other points in the down-town section of the city.

A Turret Lathe for Boring Shells

A turret lathe designed especially for boring the inside of 4 to 8 in. high-explosive shells has been built by the Reliance Machine Company, Toronto, Ontario, Canada. The lathe is massive in construction, the bed, legs and lower headstock bearings being cast in one piece. This design, it is emphasized, provides a rigid machine and one that will stand up under the heavy cuts and feeds required for rapid and continuous production.

The front headstock bearing has been made large, being 8½ in. in diameter and 12 in. long. This bearing, in common with the rear spindle bearing, is fitted with self-oiling rings. The spindle is made large enough for the bearing to take the shell completely inside and is made in one piece with the 15-in. heavy flange to which the chuck is bolted. The chuck is of the collet sleeve type and has three self-centering hardened steel jaws, which are relied upon to grip and drive the shell. The main driving gear measures 4½ in. across the face and the back gearing has a ratio of 9 to 1. The face width of the back gear, which is driven from a cone pinion of special electrical cast steel, is 3½ in. The cone pulley has two steps measuring 15 and 18 in. in diameter respectively, the steps being of sufficient width to take an 8-in. double belt. A special self-adjusting thrust bearing fitted with a dustproof, self-oiling cast-iron case and capable of a continuous working load of 8400 lb., is provided to take the thrust of the tool.



The Bed, Legs and Lower Headstock Bearings of This Recently Developed Canadian Heavy Boring Turret Lathe for High-Explosive Shells Are All Cast in One Piece

The carriage is 42 in. long and runs on flat shears each 3 in. wide. The power is applied by a steel rack 3 in. wide placed in the center of the carriage and this, together with the length of the carriage, is relied upon to prevent twisting and secure great accuracy. The center of the boring bar is only 6 in. above the shears, a feature which it is emphasized adds greatly to the stability of the turret. The feeds provided are four in number and range from 1/64 to ⅛ in. per revolution of the spindle, thus covering all roughing and finishing cuts. The feed gears do not have faces narrower than 1⅞ and 1 9/16 in. and the worm gear on the power feed meshes with a steel worm having a ratio of 50 to 1, the thrust being taken up by ball bearings and transmitted to the frame. Hand feed is provided through a capstan wheel having bars 24 in. long. The gearing provides a thrust of 79 lb. on the tool for each pound applied to the capstan bars.

The turret, which is of heavy construction, is of circular design and measures 20 in. outside diameter. Six holes, 3 5/16 in. in diameter, are provided and are fitted with ½-in. square keys on the under side and two ⅞-in. set screws for holding the boring bars. Although a heavy central stem has been provided on the carriage, the turret is spigotted at its outer edge, which, it is pointed out, gives a wide base to resist the pressure of the tool. A hole through the center stem has been provided for driving out the boring bars. A hardened steel ring, tempered and ground and having a hardened steel key fitted into it, is used to hold the turret in any desired position. The clamp on the top of the turret is heavy, the stud having a diameter of 1¾ in. The weight of the complete lathe, including this equipment, is 8000 lb.

Pressure Oil Film Lubrication

The advantages of pressure oil film lubrication were discussed in a paper by H. B. Newbiggin at the meeting of the British Association at Newcastle-upon-Tyne, Sept. 7. The following is a condensed abstract of the paper.

A lubricant alters the nature of the rubbing surfaces, thereby reducing friction, and it also, under favorable conditions, generates a high pressure oil film between the surfaces, entirely eliminating metallic contact and enormously reducing the friction. This latter action is known as pressure oil film lubrication. It occurs to a limited extent in most journal bearings, but is absent in ordinary collar thrust bearings.

It has been shown by A. G. M. Michell of Melbourne, Australia, that a rectangular block, pivoted at its point of resultant pressure, will automatically assume an angle to an opposing lubricated surface, this depending on the speed of rubbing, viscosity of the oil and the pressure. On this principle was founded the now well-known Michell thrust bearings, the essential feature of which is the subdivision of the stationary surface into a number of blocks or pads, each pivoted at its back and free to assume a slight angle with the contracting surface. The bearing has a single collar, in contra distinction to the multiplicity of collars in the older type of thrust bearing, which were made necessary by the low carrying capacity of parallel rubbing surfaces, compared to the high capacity of those where the surface is subdivided and free to assume the angle with the opposing collar required for the formation of oil pressure within the film.

The Michell bearing automatically generates a pressure oil film between the surfaces, has a coefficient of friction of about 0.0015 as against 0.03 in the older type of bearing, and carries from 200 to 300 lb. per sq. in. pressure with a greater factor of safety than the primitive form has at 50 lb. per sq. in. pressure. Upward of 800 such bearings are running in Great Britain, the sizes varying from 1 to 15 in. diameter. They are rapidly becoming standard practice in steam turbine work. The same principle is now being applied to journal bearings.

Chipped Rolls Repaired by Arc Welding Process

A rather interesting repair of a roll used for producing special shapes of sheet steel piling, which had become chipped, was recently made by an electric arc welding set built by the Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa. The application of this process has resulted in the saving of a number of rolls that had chipped out in service in this plant. In repairing the defective part with an electric arc welding outfit, the chipped portion is first filled in and welded, after which it is ground or filed to the proper shape. It is stated that after the work has been completed it is practically impossible to detect the point at which the weld has been made except by very close examination and the repairs are apparently permanent. The same company is also repairing worn wobblers and rebuilding broken teeth in gears and pinions in the same way.

A public hearing on the boiler code of the American Society of Mechanical Engineers is to be held on Friday afternoon, Dec. 8, at 2 o'clock in the Engineering Societies Building, 29 West Thirty-ninth Street, New York, continuing into Saturday and the next week if necessary. The hearing is held under a recommendation of the boiler code committee of the council of the society to the effect that revisions are to be made to the rules as the state of the art advances and that hearings for this purpose should be held at least once every two years.

THE PRESSURE ON SHIPYARDS

Marine Authority Estimates That Restoration Will Require Ten Years' Activity

Records compiled by *Marine Engineering*, New York, show that over 1,500,000 tons of vessels are under contract in American shipyards, comprising 198 freighters, 91 tankers, 12 passenger and freight steamships, 35 towboats, yachts, river boats and other small steam craft, 60 or more sailing vessels, most of them with auxiliary power, 150 or more car floats, barges, etc.; and contracts are sought for 100 or more vessels if shipbuilders can find the steel and launching ways. During the past 15 years the average tonnage built in American shipyards has been about 250,000. To be added to the activity in merchant ships is the Government naval program which calls for the building of over $600,000,000 worth of war vessels in the next five years.

Manufacturers of navy-yard supplies and equipment have been requested, through *Marine Engineering*, to furnish information concerning their products to Commander Julio Dittborn, naval attaché, Chilean Embassy, Washington, D. C., whose government is planning to build a navy yard.

The Bethlehem Steel Company, South Bethlehem, Pa., has five steamships designed for its own use under construction at the Maryland Steel Company plant, Sparrows Point, Md., and its complete program calls for 25 vessels of about 17,000 gross tons each, for bringing ore from Chile, Cuba and other countries.

Those who attempt to foretell the length of time in which American shipyards will continue busy have steadily extended the period over which they believe the boom will last. A few months ago they were predicting two to five years, but now some of them believe that American yards will be filled with work nearly 10 years, basing their prediction on the destructive effects of the war and the rapid deterioration of commandeered and interned vessels. In its November issue the journal already referred to sums up the situation as follows:

EFFECT OF WAR ON MERCHANT TONNAGE

When the war broke out in August, 1914, the gross tonnage of the merchant marines of the world was approximately 50,000,000 tons.

Great Britain was credited with 21,045,049 tons. She has lost through destruction over 2,734,106 tons, leaving a balance of less than 18,310,943 tons. The government commandeered over 50 per cent of the larger and more efficient vessels. Counting these as about 9,000,000 tons, it leaves only about 9,000,000 tons of British merchant vessels still in commercial service. The government is running the ships for all they are worth, so that if the war lasts two years more the commandeered ships will be fit for little else than scrap, except at enormous expense for repairs. The 9,000,000 tons of vessels still in the ocean trade will be largely old vessels of comparatively small carrying capacity, and more or less uneconomical and inefficient.

Germany was credited with 5,134,720 tons. She has lost over 600,000 tons, leaving a balance of less than 4,534,720 gross tons interned. These ships are deteriorating at the rate of 15 to 20 per cent a year. Many of these are old vessels, so that this merchant marine will not be of much value at the end of two years more of war, except at enormous cost for repairs.

France began the war with 1,922,286 tons. She has lost over 309,023 tons, leaving a tonnage of something under 1,613,263. Like the other merchant marines, this one will require enormous expenditures to restore it.

The merchant marines of the other belligerents are correspondingly reduced in tonnage and efficiency.

At the outbreak of the war the United States was credited with 7,928,688 tons. Over 600,000 tons were added by foreign vessels coming under the American flag. Vessels under construction in shipyards to-day and those that have been delivered since the war broke out approximate 1,750,000 tons. American vessels lost during the war aggregate 63,580 gross tons, making the total American merchant marine in commission and under contract at least 10,215,108 tons.

PRESENT STRENGTH OF WORLD'S MERCHANT MARINE

Up to date the belligerent merchant marines have been reduced in tons about as follows:

Commandeered by other belligerents....3

Two more years of war must of necessity result in the destruction of considerable more tonnage.

What might be called the tonnage-efficiency of the 16,400,000 tons of commandeered and interned vessels will be enormously reduced and require very large expense to keep any of it from the scrap heap.

It is apparent that with two years more of war the world's merchant marines will be considerably under 25,000,000 tons, and in tonnage-efficiency much below the standard of Aug. 1, 1914.

How much new tonnage has been built outside of American shipyards since Aug. 1, 1914, is only conjectured, but it is undoubtedly very small. No one can even approximate the tonnage that will be built in the next year or two.

According to Capt. Robert Dollar, the shipyards of the world during the past 15 years have built approximately 2,500,000 tons per year. Accepting this as an average capacity of the shipyards of the world, it will be seen that it will require pretty nearly 10 years to bring the world's merchant fleets back to a sufficient tonnage to handle its commerce.

Addition to Adams-Bagnall Electric Factory

The Adams-Bagnall Electric Company, Cleveland, is completing an addition to its factory, consisting of a complete vitreous or porcelain enameling plant. The primary object of the addition is to improve further the quality and service of its Abolite line of porcelain enameled reflectors for industrial lighting, etc. The high grade of the porcelain enamel finish has always been an important feature of these reflectors, and with its own enameling plant, the company will be in position to strengthen this characteristic through personal factory supervision. It is understood that this company will be the only manufacturer of electrical apparatus manufacturing porcelain-enameled, steel reflectors complete in its own factory.

The enameling plant is being equipped for all classes of high grade vitreous enameling. A battery of four 12-ft. furnaces will be supplemented with a complete equipment of mixing vats, furnaces, drying ovens and handling apparatus capable of producing a large output and in charge of men with thorough experience in vitreous porcelain enameling. The equipment is new and of the latest design to secure uniform results. In addition to enameling all Abolites and associate equipment, the Adams-Bagnall plant will be capable of handling a considerable output of other vitreous enameling work. It will be in full operation before Jan. 1.

The Warren Steel Castings Company, St. Louis, has completed the installation of an electric furnace, the first in that city to be used in making castings. The furnace, which is of the Heroult type, is operated by power from the dam in the Mississippi River at Keokuk, Iowa. In installing the electric furnace, the company discards a crucible furnace which also was the first of its type to be installed in St. Louis.

A new form of file handle has been placed on the market by the Strong-Hold Mfg. Company, 307 Arch Street, Philadelphia, Pa. This handle is of the conventional wooden type with the material slotted at one end. The file end is inserted at this end, which is wire wound. This wire, which is in the form of a close coiled spring, causes the file end to be gripped securely, the slots giving free play to the coiled spring.

Crucible Steel Company's Report

Brief allusion was made last week to the appearance of the report of the Crucible Steel Company of America for the fiscal year ended Aug. 31, 1916. Following is a statement showing the disposition of net profits for the year:

Net profits	$13,223,655.05
Cash dividends on preferred stock, 8½ per cent	2,125,000.00
Increase in current assets, in bills and accounts receivable in excess of bills and accounts payable, in inventories and in taxes and insurance unexpired, etc., $19,775.14, less decrease in cash	10,060,288.66
Invested in additional property	2,879,680.77
Reduction of coal land purchase notes	307,000.00
Assets reserved for dividend scrip redemption fund	211,435.65
Deduct:	
Additional stock issued, 4216 shares of common	421,600.00
Decrease in investments and construction advances to associated companies	[illegible]
Increase in reserve funds	[illegible]
Balance carried to surplus	$1,038,366.39

The condensed balance sheet, as of Aug. 31, 1916, is as follows:

Assets

Real estate, plant, equipment, goodwill, trademarks, etc.	$49,505,848.34
Investments in and construction advances to associated companies	9,157,972.67
Other investments	100,000.00
Scrip redemption fund assets	211,435.65
Cash in banks and on hand	1,161,920.35
Accounts receivable, less reserve	10,548,841.68
Bills receivable	[illegible]
Inventories	10,516,330.94
Taxes and insurance unexpired, etc.	[illegible]
Total	[illegible]

Liabilities

Preferred stock	$25,000,000.00
Common stock	25,000,000.00
Coal land purchase notes	309,000.00
Dividend scrip due June 30, 1920	1,637,404.00
Accounts payable, including advance payments on contracts	3,385,434.78
Bills payable	675,000.00
Accrued taxes and interest	314,079.95
Dividends on preferred stock payable Sept. 30, 1916	750,000.00
Reserves:	
Depreciation and renewal of plants	1,210,927.49
Contingent	500,000.00
Fire and marine insurance	500,000.00
Workmen's compensation [illegible]	500,000.00
Appropriated surplus:	
Invested in additions to property and working capital	15,000,000.00
Unappropriated surplus	[illegible]
Total	[illegible]

The Crucible Steel Company of America is guarantor of the principal and interest of $7,470,000 five per cent bonds of associated companies.

At Aug. 31, 1916, the dividends undeclared on the preferred stock aggregate 23¼ per cent.

From the accompanying remarks of Herbert DuPuy, chairman of the executive committee, the following extracts are taken:

"Crucibles, the backbone of our business, of which the company has a capacity for manufacturing 250,000 per annum, are necessarily used in connection with the production of all high grade steels. They are made from a mixture of German clays and plumbago, the latter known in the arts as graphite. During the present war, our supply of German clay has been entirely suspended. No new clays yet discovered produce a crucible as durable as that made from clay found in Germany. The character of the available supply reduces the life of the crucible to such an extent that it has tremendously increased the latter's cost. Plumbago has advanced in price over 200 per cent, which additional item, added to the reduced life and reduced output of a crucible, has made the production of our high grade steels cost very materially more than ever before. All of our plants have been constantly short of crucibles, it requiring fully three times as many now to produce the same tonnage of steel as heretofore.

"To operate your plants under present pressure, of course, requires very largely increased working capital and increased outlay in raw materials. The conservatism displayed by the management in the matter of back dividend payments is due not alone to the company's extensive building program and the modernization of certain of its existing plants, but to this requirement of increased working capital as well. In the development of its business the company is spending several millions of dollars in the erection of new additions to its plants and improving those already built. Consequently, our statement must show large construction charges.

"The intention of your officials is to eliminate, as far as possible, the production of smoke from our city plants. To do this requires heavy expenditures of money for new boiler-plant units and for the necessary mechanical attachments to heating furnaces. Regardless of these heavy charges against income, progress is being steadily made, and in the course of a reasonable time the production of smoke should be practically at a minimum.

"*Syracuse Crucible Works.*—This large construction is now receiving considerable installation of machinery and during the coming year will begin to produce steel. This will require an expenditure of $500,000. Gradually afterward, as demands require, additional machinery will be added, so that, when completed, this plant will, without exception, be the most modernly constructed crucible steel works in the world. Its power operations will be controlled entirely by electricity, steam only to be used for heating the buildings and for forging purposes.

"*Sanderson Works.*—Owing to the contracted space in which this plant is located, without opportunity to expand on its present site, recently, additional land in the outskirts of Syracuse has been secured, upon which it is intended to erect all future extensions to this works. Already several buildings have been erected and machinery is now being installed in them. The expenditure required to make a beginning will be in the neighborhood of $500,000. Electricity will be solely used except for heating.

"*Pittsburgh Crucible Steel Company.*—The billet mill, for which contract was made in August, 1915, is expected to be completed before Dec. 31, 1916. Its installation will aid materially in helping the crucible steel plants secure an ample supply of steel billets. Contracts have been let for the construction of an addition to its open-hearth furnace building to accommodate two additional open-hearth furnaces, all of which should be completed during the coming spring. A large steel building for the production of castings required at the various plants of the Crucible Steel Company has been bought and will be speedily erected. Through its use, your company will be largely independent of outside foundries. Contracts for other large buildings have been made, so that it is expected that the improvements at this plant to be completed during the coming year will cost upward of a million dollars.

An Anticorrosive Grease

An anticorrosive grease, readily soluble in benzine even at the end of several months, can be prepared by emulsifying an aqueous solution of chromic acid or chromates with hydrocarbons, saponifiable fats and oils or the like, according to the *Wochenschrift für den Oeffentlichen Baudienst.* The fatty constituents serve as an adhesive, while the chromic solution prevents rusting, it is claimed. Equal parts of fat and a 5 per cent solution of sodium bichromate are triturated in a mortar. This makes a viscous paste which keeps iron plates bright for several months and is easily removable with benzine.

The Kruse Forgings Company, 2515 South Artesian Avenue, Chicago, has changed its name to Atlas Forgings Company.

The Uses, Output and Market for Molybdenum

After discussing the history of molybdenum, its geology and metallurgical treatment in "A Treatise on Molybdenum," published in July issue of the Colorado School of Mines *Quarterly*, Golden, Col., Herman Fleck treats of its uses, the market for it, the output and statistics as follows:

USES FOR MOLYBDENUM

Molybdenum is used in form of oxides, ammonium salt and metal. Several tons a year are used in the United States in form of ammonium molybdate as laboratory reagent in the determination of phosphorus in iron ores, their products and in fertilizers. The salt finds a further use in fire-proofing fabric. The metal is used in self-hardening steel; from 5 to 10 per cent is introduced and the resulting steel is raised in elastic limit and tensile strength, and possesses greater toughness in addition to the former property. Wire made from it is said to have greater elongation and high tensile strength.

Other uses are in large castings; in gun barrels in which it is prized for its resistance to corrosive gas action; in armor plate; in armor piercing shells (the last two uses contradicted in the United States) in motor car steel and in magnets.

Equal parts of molybdenum and chromium introduced into steel are proclaimed more preferable for many of the above uses, especially self-hardening steel. Two to 5 per cent of molybdenum and 10 per cent chromium with little or no carbon are said to make steel acid resisting to a great degree. Nickel-molybdenum-ferroalloys also find use. The tensile strength of molybdenum wire is given at 200,000-270,000 lb. per sq. in. as compared to tungsten with 480,000,-580,000 lb. per sq. in.

Molybdenum wire wound electric furnaces have special claims made for them. A thermo-couple which uses the metal has been described recently. The lower oxides of molybdenum are highly colored. Their use is recorded in coloring leather, rubber and porcelain. A soluble variety is used as a substitute for indigo.

In some form molybdenum is added as a preservative to certain smokeless powders.

MARKET, OUTPUT AND STATISTICS

Prior to 1900 little use was made of the metal. From 1900 to 1905 a gradual increase in the production of molybdenum took place. Then there was a decline until the opening of the war, when demand increased rapidly with rising prices and to-day astonishing figures record a marked advance.

Not long ago a prominent engineering journal scoffed at the alleged importance of molybdenum, but recently the same journal published an appeal from the Imperial Engineering Institute of England to Canadian producers of molybdenum ore. This is the history of the rare metals. Their growing utility cannot be denied. It must be remembered that all useful metals had their modest industrial beginning.

It has been stated frequently that dull markets were due to uncertain output. This may have been so before modern concentration methods were used, but this reason is no longer valid. When consumers consent to pay the price which makes the mining and concentrating enterprise worth while, the supply will prove adequate to the demand.

The principal production has been as follows:

The Australian output in 1902 was 15 tons, valued at £1841; in 1903 it was 29 tons, valued at £4450; and in 1904 it was 25 tons, valued at £2726.

The New South Wales output in 1911 was 20.65 tons, valued at £2591; in 1912 it was 56.5 tons, valued at £3706 and in 1913 it was 73 tons, valued at £6400. The New South Wales output in 1914 was 61 tons.

The Queensland output in 1911 was 99.5 tons, valued at £13,279; in 1912 it was 102.3 tons, valued at £17,349, and in 1913 it was 57 tons, valued at £16,185.

In 1915 Australian ores rose to $28 a unit.

Not counting the small annual production of Norway and scattering parcels, the above figures represent most of the best years of molybdenum production.

There is little doubt that 1915 and 1916 will show astonishing figures, record output and prices together with considerable development in hitherto neglected fields.

It is not safe to predict a continuation of these, however, for an indefinite period. Substantial prosperity in rare metals has been marked by a slower growth

Melting Aluminum Chips

The Bureau of Mines, Department of the Interior, has just issued Bulletin 108, "Melting Aluminum Chips," by H. W. Gillett and G. M. James. It gives an account of experiments made to compare the recovery of metallic aluminum in melting down chips such as are obtained in the automobile factories in machining aluminum castings. As aluminum has sold at three times its normal price for the past year, and as a recovery of but 60 per cent of the metal in the chips is common, and a 90 per cent recovery is commercially possible, the preventable loss is of considerable magnitude. The bulletin discusses the causes of the high loss in the usual method of melting chips, and shows that the difficulty of getting the tiny globules of molten metal, resulting from the fusion of the very fine chips, to coalesce when covered with a skin of oxide and dirt, is apparently the main cause for low recoveries.

Two methods of melting can be successfully used to promote coalescence. In one method the chips are kept just above the fusion point and the globules made to coalesce by hand puddling, which breaks through the skin and makes the globules unite. In this method, melting is best done in an iron pot heated by oil. The other is by the use of a flux which dissolves off the skin of dirt and oxide, producing clean globules which can unite. The flux suggested is 85 per cent common salt, 15 per cent fluorspar, used in large amount (20 to 30 per cent of the weight of the chips), and mixed with the chips before charging. Much higher temperatures are required by this method than by the puddling method, so the iron-pot furnace is not practicable, and melting is best done in graphite crucibles or in a reverberatory furnace. The flux method does not require the constant hand puddling of the other method.

Since the presence of dirt and oxide causes low recoveries, the necessity for care and cleanliness in the collection and storage of chips is emphasized. Chips wet with cutting compound will oxidize superficially on storage, but by drying the chips by centrifuging this can be prevented.

A copy of this bulletin may be obtained free of charge by addressing the Director of the Bureau of Mines, Washington, D. C.

British Use of Coke for Steam Raising

Coke is being successfully used under steam boilers in England with forced draft apparatus, with boilers having little or no modification as regards the draft, and in connection with mechanical stokers using a fuel containing up to 50 per cent coke. When used with forced draft an apparatus is employed which has been developed by what is known as the London Coke Committee. At one institution of the London Metropolitan Asylums Board, 3000 tons per year were burned with an average evaporation of 10 lb. of water from and at 212 deg. Fahr. per lb. of coke as fired, and the overall thermal efficiency is figured at 78 per cent, assuming the average calorific value of coke at 12,000 B.t.u. The emphasis is that a great saving is accruing to the nation in that by utilizing the by-products of gas making, substituting coke for raw coal, ammonium sulphate, high explosive compounds and the numerous products obtainable from the coal tar are secured.

The Woodward Iron Company, Woodward, Ala., beginning Nov. 1, has advanced all wages and salaries 10 per cent. It is also announced that the company will have labor agents to look after its employees on account of the general exodus of laborers from the district. This is the third raise the company has voluntarily given its employees since pig iron began to advance.

A New National Industrial Organization

To Advise the Public, the Government and Employer and Employee in Industrial Problems—Announcement a Feature of National Founders Meeting

THE announcement of the formation of the National Industrial Conference Board, a co-operative body composed of representatives of national organizations of industrial employers, to provide a clearing house of economic information, a forum for constructive discussion and machinery for co-operative action on matters that affect the industrial development of the country, was a feature of the annual meeting of the National Founders' Association in session at the Hotel Astor, New York, as this issue goes to press. Reference to the movement was made in the address of the president of the association, William H. Barr, Lumen Bearing Company, Buffalo, N. Y., but the announcement in detail was made by Magnus W. Alexander, General Electric Company, West Lynn, Mass., who has been prominently identified with, if not largely responsible for, the conference boards of co-operating associations on safety and sanitation and on apprenticeship training, not to mention illuminating and startling studies which he has made on the cost of hiring and firing employees and a recent contribution in these columns on the cost of medical and surgical supervision in industry.

Mr. Alexander summarized the purposes of the National Industrial Conference Board under seven heads, as here separately noted; and emphasized that these proposals are based on the fact "that in this country there is an enlightened public opinion toward fair-minded, progressive employers and reasonable, efficient employees, and that this opinion furnishes a stable foundation on which to build an enduring industrial prosperity." His address substantially in full was as follows:

The National Industrial Conference Board

BY M. W. ALEXANDER

The primary purpose in the formation of this conference board is to study the problems which confront the manufacturer in this country; problems which will arise, dealing with changing world conditions, affecting all industries. Heretofore, to a substantial extent, each manufacturer has studied only the problem directly affecting himself, ignoring the fact that all industry is inter-related and that there is a vital need for co-operative action and united effort. The war has brought many new problems, and peace will bring many more. These must be studied and solved.

MISUNDERSTANDING BETWEEN MANUFACTURER AND THE PUBLIC

The conference board will be a clearing house of information. Its purpose will be to analyze and present the essential elements in the situation, suggest methods and inspire united and intelligent action. Industry in this country must have the sympathetic support of the public. It must have the co-operation of the Government and it must act intelligently and definitely on its own account. The life of the nation is bound up in its industries and a broad patriotic purpose on the part of manufacturers and employers of labor will bring about increased prosperity and greater prestige for the country itself.

There have been times when the public and the manufacturing industries have misunderstood each other; when the manufacturer assumed an antagonism on the part of the public which did not exist; when the public took the position that the manufacturer was indifferent to the public welfare and solicitous only for his own prosperity. Such a situation should never have developed and would not have developed except for the lack of information of each party of the purpose and intent of the other. It is part of the work of this conference board to promote a clear understanding between the employer of labor—the manufacturer—on the one side and the public on the other, and this can be best accomplished by a presentation of actual facts and a public announcement of purpose.

MISUNDERSTANDING BETWEEN MANUFACTURER AND GOVERNMENT

During the past few years there have been occasions when there was either open or concealed antagonism between manufacturers and the Government, and this was also due to a lack of understanding; to a lack of

Purposes of National Industrial Conference Board Summarized

1. To stimulate to the keenest interest and active assistance of employers [illegible] able solution of economic issues in industry.
2. To foster [illegible] the Government.
3. To assist in the formulation and enactment of sound [illegible] publicly to legislators the fundamental facts involved in the legislation and their effect.
4. To bring about [illegible] Government and industry so that legislation hampering [illegible]
5. To present to the public facts showing the national [illegible] employers and employees and consumers, and to stimulate, by accurate and truthful publicity intelligent sympathy for all proper efforts for industrial development.
6. To stimulate the employer to maintain good conditions of work; to provide fair treatment for his workers and to take a personal interest in them.
7. To develop among the employees a reasonable attitude [illegible] inspire a sense of fair play, efficiency and loyalty.

The essential point in connection with all of this is the purpose of the conference board to study every problem and its development, to resolve it, if possible, into its essential facts for the information of the public, of the Government, of labor, and all the members of the various associations represented on the board.

Personnel of the National Industrial Conference Board

Frederick P. Fish, chairman, of Fish, Richardson, Herrick & Neave, Boston.

Magnus W. Alexander, [illegible] Company, West Lynn, Mass.

MEMBERSHIP AND REPRESENTATIVES

National Founders' Association, William H. Barr, president of the association, Lumen Bearing Company, Buffalo, N. Y. Magnus W. Alexander, General Electric Company, West Lynn, Mass.

National Metal Trades Association, W. H. Van Dervoort, president of the association, president Root & Van Dervoort Engineering Company, East Moline, Ill. Herbert H. Rice, General Motors Company, Detroit.

National Council for Industrial Defense, John Kirby, Jr., chairman of the association, president Dayton Mfg. Company, Dayton, Ohio. James A. Emery, general counsel of the association, Washington, D. C.

National Association of Manufacturers, George Pope, president of the association, Hartford, Conn. Stephen C. Mason, secretary McConway & Torley Company, Pittsburgh.

National Erectors' Association, S. P. Mitchell, chairman of the association, president Seaboard Construction Company, Philadelphia. Walter Drew, general counsel of the association, New York.

National Association of Cotton Manufacturers, A. Farwell Bemis, president of the association, president Bemis Brothers Bag Company, Boston. Albert Greene Duncan, treasurer Harmony Mills, Boston.

American Cotton Manufacturers' Association, John A. Law, president of the [illegible] Mills, Spartanburg, S. C. [illegible] Pelzer Mfg. Company Greenville, S. C.

National [illegible] P. Wood, president of the [illegible] Abbottsville Mfg. Co. [illegible] zel, president George C. Hetzel Company, Chester, Pa.

Silk Association of [illegible] dent of the [illegible] South Manchester, Conn. Robert J. F. Schwarzenbach, Schwarzenbach, Huber & Co., New York.

United Typothetæ and [illegible] Albert W. Finlay, president of the association, president George H. Ellis Company, Boston, president Franklin Printing [illegible]

American Paper [illegible] Daniels, president of the [illegible] Brown Paper Company, [illegible] president Crocker-McElwain Company, Holyoke, Mass.

Rubber Club of America, Harvey S. Firestone, president of the association, president [illegible] ber Company, New York. [illegible] Hood Rubber Company, Watertown, Mass.

publicity, and either the suppression of facts or the failure to present them properly. No government in the world deliberately utilizes its legislative machinery to hurt the industries of the country. No government and no legislator who thoroughly understands all the circumstances in the case will support legislation which hampers or cripples industry and indirectly hampers and cripples the prosperity of the country. This fact does not warrant argument.

Therefore, when legislation has been enacted which is in effect dangerous to industry, or which hampers the existence of our manufacturers, it is plain that it has been due to misunderstanding or lack of information. It is true that there are certain fundamental policies on which men disagree, and there are different opinions as to the effect of these policies. In the working out of these policies there is a chance to demonstrate their weakness or strength, but this demonstration can only be made by a clear presentation of the effect, and such a presentation of facts that there can be no dispute as to their accuracy.

BOARD TO REPORT ON PROPOSED LEGISLATION

The National Conference Board will seek to influence legislation only by the presentation of facts and arguments carefully studied and of a character leaving no doubt as to their accuracy. Whenever legislation is proposed it will be analyzed and its effect shown after careful study. The legislator charged with the enactment of this legislation will be presented with the findings of the conference board, and the public will be given the statement of facts, and in precisely the same way that they have been given to the legislator. There will be nothing concealed or suppressed, and there will be no presentation of arguments except in the full light of day and for the benefit of the whole people.

It is the belief of the founders of this conference board that in this way a large amount of available information can be collected and presented to Congress, or to the State legislatures, where industrial legislation is under consideration, and there is no doubt in their minds that this information will be welcome and utilized by those who are concerned with proper legislation. The obvious purpose of this work is to produce co-operation between the manufacturer and the legislator and the public. Resulting laws will be judged for themselves and will undoubtedly be effective from the point of view of all concerned.

AMERICANIZATION OF EMPLOYEES AN OBJECT

An important feature of the policy to be followed will be the education and training of apprentices. Every effort will be made to study and develop a plan or plans by which every boy will be given an opportunity to gain a livelihood. An industrial nation should provide industrial training. We should make men as well as commodities.

The conference board also will give attention to the Americanization of workingmen, believing that the factory should be the training school not only for industrial efficiency but also for citizenship in all that the term implies.

TO BRING PUBLIC INTO LABOR DISPUTES

One of our great industrial problems is the satisfactory adjustment of labor troubles. That adjustment can only be brought about by co-operative effort and co-operative effort can be attained only by a complete understanding between the parties vitally concerned, the employer, the wage earner and the public. The inclusion of the public is absolutely necessary because, after all, it is the public which has the final and compelling voice in the adjustment of many labor troubles. It is the public which is most directly concerned, and the purpose of this conference board in all phases of its activity is to bring about a public understanding on all problems involved in industry.

The census of manufacturers for the year 1914 shows that there are 7,036,337 wage earners in the manufacturing industry. This is exclusive of 964,217 who are classed as salaried employees. Taking the wage earners only and assuming that each one has dependent on him or her in some way, two others, it is plain that more than 20,000,000 persons are dependent on the prosperity of the manufacturing industry for their comfort and their livelihood. This illustrates the stupendous stake which the manufacturing wage earner has in the industries of the country and the necessity that he co-operate in every way in bringing about the maintenance of the prosperity of this industry. His co-operation is not only essential to success, but it is necessary from a purely selfish point of view.

It is unfortunate, but true, that employers in the past have not taken a direct and intelligent interest in all of the vital problems involved in the industries with which they are identified. Some have been antagon[illegible] to change and insisted on going their own way even when that way led to industrial strife and Governmental interference. Others have been apathetic and indifferent as to developments, while some have been entirely irresponsive to the ideas of progress proposed by their associates in business.

THE ASSOCIATIONS FORMING THE ASSOCIATION

Twelve national associations of industrial employers have organized the National Industrial Conference

Board. These associations comprise over 15,000 employers, who furnish industrial employment to about 7,000,000 workers in the United States. It is planned to bring other associations of a similar character into the co-operative work until the National Industrial Conference Board on Safety and Sanitation some years dustrial movement throughout the country.

All members of the board are intimately connected with the industrial development of the nation and bring to their deliberations on vital questions a broad knowledge, practical experience and a full realization of their responsibility. Reinforced by comprehensive study of the questions at issue, their combined judgment is intended to furnish a proper guide for individual and collective action and to serve as a potent force in influencing policies of constituent associations and other organizations of a like character.

The board is developing the necessary machinery through which to utilize this knowledge and experience already accumulated and to enlarge on it by extensive research and study. The scope of the board's work is as broad as the field of the influences which tend to promote or retard industrial progress. The program embraces many intricate problems that demand solution, but these are still within the bounds of practical achievement. The board asks for the co-operation of the Government and the public, of its own members, and of the wage earners of the country.

Achievements of the National Founders' Association

BY WILLIAM H. BARR

The annual report of William H. Barr, as president of the National Founders' Association, was in part as follows:

The National Founders' Association is numerically larger and financially stronger than at any time in its history.

As we review the labors of our Association for the past 20 years, it is apparent that the absorbing study of industrial preparedness, in its every phase, is not a new thought. Perhaps, without realizing it, we have contributed to that establishment of manufacturing freedom and privilege, which has accelerated the more recent development of our national resources.

FAILURE OF COLLECTIVE BARGAINING

When our Association was formed and its first policy established, it was in the belief that it was possible amicably to adjust disputes between our members and the union, and place foundry practice on a more stable basis; but the Iron Molders' Union, as always, under unwise leadership, refused to make concessions or arbitrate differences. After holding over 2500 fruitless conferences, during a period of seven years, your council recognized the necessity of adopting a new and more militant policy. Thus failed an early and earnest attempt at collective bargaining, which demonstrated as clearly then as to-day the absolute economic futility of the plan.

THREE YEARS' WORK ON SAFETY AND SANITATION

Unquestionably, the present and future policy of our Association is, and should be, one of open opportunity for the material advancement of employees, with watchful interest for their physical comfort and safety. That we recognized this development of our policy was first indicated in the research work that has been done during the past three years by our committee on safety and sanitation. The ensuing investigation of foundry hazards resulted last year in the publishing of a graphic handbook exhaustively treating of the elimination or correction of these possible industrial dangers.

This handbook describes both original and existing methods in order that our members may be able to properly introduce corrective practices in the safety and sanitation of their plants. No other such comprehensive publication of a similar kind has ever been introduced. The work has been done along broad humanitarian lines, that health and benefit may accrue to all foundry employees.

The joint publication of the *Spirit of Caution* by the co-operating associations in the conference board is spreading the story of the constructive activities of these associations, in the safety field; while the individual bulletins are recognized as chapters of a textbook in the making, dealing with the most important phase of accident prevention, namely, the exercise of personal caution and effective methods of securing it.

Through the Conference Board of Physicians in Industrial Practice, which was organized by the Conference Board of Safety and Sanitation some years ago, much quiet effort has been made to induce employers to establish medical service in their plants, particularly to inaugurate a system of physical examination that safeguards employees against their own ailments and helps them to improve their health and efficiency.

Association endeavors have also been continued with respect to the revival of apprenticeship systems in industry. The joint conference board, during the year, investigated existing apprenticeship conditions in the major industries, and on the facts thus ascertained is planning action intended to stimulate and assist employers in various lines of manufacture to adopt apprenticeship systems that fit their needs. It is hoped to outline a fundamental plan that will be adopted more or less universally in plants of like character and size. Every foundryman understands that the need for developing skilled and intelligent journeymen, foremen and superintendents is of prime importance. The board points with pride to the approval with which their bulletins entitled "Practical Apprenticeship" is being received. The first number, dealing with "The Necessity of Apprenticeship," has been widely distributed and the second number on "Fundamentals of Apprenticeship" is now in preparation.

The most important development of the year in conference board work has recently been launched. The employers of the country may well look forward with keen anticipation to the work of this newly constituted Industrial Conference Board, whose efforts, to be carried out along the lines determined upon, should prove a boon to industrial development in the country, and of inestimable benefit to all concerned.

THE MANUFACTURER PLAYING A LONE HAND

During the past year some manufacturers not in our industry have helped the cause of labor materially by weakly granting demand after demand for increased wages or decreased hours, with no thought of the future, and having in mind only the filling of contracts which may have come to them because of the war in Europe. We do not blame a manufacturer for attempting to secure as much business as possible, but should insist that he look forward and try to realize the effect of his action on the future of his own business as well as on that of industry in general. No manufacturer should attempt to play a lone hand. He must recognize his own relationship to the great economical development, and he must not individually attempt practices which, if generally adopted, would have a destructive influence.

The point I wish to emphasize is that manufacturers who granted an uneconomic 8-hr. working day, or who increased wages out of all proportion to normal conditions, have sowed seed which will have a disastrous fruition.

LESS WORK WITH MORE PAY

We have had more strikes in the past year than ever before in the history of the country, but the disturbance, the agitation and the unrest which has developed has been the result, not of poverty but of prosperity. This again emphasizes the fact that organized labor is never satisfied, and is eternally bent on wrecking that structure of industry which has been erected

through the patience, persistence and patriotism of business men in this country, and which is the support and livelihood of labor itself.

In a recent union publication the attitude of socialistic labor, and this includes every trade union, is boldly and clearly stated. Quoting from this publication, this point is definitely made: "The effect of the labor unions is for less work, with more pay. Labor will not make any equivalent return for what capital concedes in wages. The unionist knows that the very essence of his fight is that he gives too much."

GOVERNMENT FIGURES ON INCREASED COST WITH SHORTENED DAY

Again, I direct your attention to the assertion made in connection with the commission which has been appointed to investigate the working of the so-called 8-hr. day, to the effect that there is no way of telling at the present time whether an 8-hr. day will increase the cost of production or not. That statement should be flatly contradicted, and one need not depend on the figures of manufacturers, the figures submitted by employers of labor, or by the railroads, to emphasize the contradiction. The United States Government investigated this very question, on increased cost of production as a result of decreased hours of labor, by direction of the Secretary of Commerce and Labor in 1904. That investigation reported that out of 336 establishments investigated, 297, or almost 89 per cent, showed that the cost of manufacture had been increased by the shorter working day. The increase ranged from 7 to 8 per cent, and in 110 establishments exceeded 10 per cent.

There is also a fallacy that shorter hours means greater efficiency, and that what is lost in time is made up in increased output. This fiction is also dissipated by the official figures of the same investigation, for 303 out of 334 plants, or almost 91 per cent, showed a decrease in product as result of reduced working hours. This curtailment ranged from 4 to 20 per cent, and in 159 establishments it was 11 per cent.

The Bureau of the Census of the Department of Commerce has furnished some additional food for thoughtful manufacturers. The bureau has given a summary of the manufacturers in the United States showing that in 275,793 establishments 8,265,426 persons are engaged in manufacturing. Of these there are more than seven million wage earners, and nearly a million salaried employees; that the capital employed is nearly twenty-three billion dollars; that the annual value of material used is more than fourteen billion dollars; the value of products more than twenty-four billion dollars; the value added by manufacturing nearly ten billion dollars; that one billion, three hundred million is paid in salaries, and more than four billion dollars in wages. Consider these figures and realize the importance of the manufacturing industry to the United States. Realize the value of manufacturing to the wage earners, and realize again the fact that the owners of that twenty-three billion dollars of capital are entitled to some consideration under the law.

What is the answer to the activities of labor and to the subservience of Congress to labor during the past year? The answer, gentlemen, is to study that report of the Bureau of Census, to realize your power for organization, to act patriotically for the good of the whole country, and to demand the rights which are granted you by the Constitution of the United States.

It was never intended that this country should be directed and dominated by the leaders of less than two million workers out of a total thirty millions, nor was it intended that the men and women who invested their money in industrial development should be deprived of their rights. The developments of the past year, politically and industrially, emphasize as never before the need of more comprehensive co-operative action in industry.

The United States Magnesite Corporation, 11 Pine Street, New York, has been organized to mine, mill and ship all grades of magnesite, including crude, calcined and dead burned also calcined and ground. The company deals in both foreign and domestic magnesite.

Proposed Consolidation of Engineers in the Tractor Field

Believing that standardization will prove as useful in the development and production of large numbers of tractors for farm and other work, as it has proved in the case of the automobile, committees of the Society of Automobile Engineers are working on subjects which relate to the production of tractors, such as anti-friction bearing sizes, carburetor fittings, silent chains, electrical equipment, engines and transmissions and iron and steel, as well as other materials. The work of engineers engaged in the motor car, tractor, aeronautic, motor boat and in some degree the internal combustion engine fields is closely interwoven, as each is concerned with the internal combustion engine. The aeronautic and motor boat engineers have decided to consolidate with the Society of Automobile Engineers and it is believed that the tractor engineers also will amalgamate with the same organization. It is also expected that the American Society of Agricultural Engineers and the National Gas Engine Association will co-operate in the work of a combined organization.

It has been proposed that the name of the combined society shall be the Society of Automotive Engineers, the word automotive meaning self-propelled and describing generally the engineering activities of the enlarged organization. It is planned that the board of governors of the organization shall include vice-presidents representing specially in each case motor car, aeronautic, tractor, marine and stationary combustion engineering. It is believed that the plan will bring about the quickest possible proper engineering development of tractors and that it is a markedly patriotic one as against international trade or other possible wars.

The technical papers to be presented at the one-day professional session of the winter meeting of the Society of Automobile Engineers in New York on Jan. 11, 1917, will be representative of the enlarged activities of the society. The papers committee, of which K. W. Zimmerschied is chairman, is making the arrangements. Capt. Virginus E. Clark, U. S. A., will present a paper on airplanes with special relation to engines. This paper is to deal also with the experiences of the Army aviators on the Mexican border and suggest improvements in construction. It is also hoped that a detailed description will be given of a foreign airplane engine, which has recently been produced commercially in this country. A paper is promised on the design of engines for farm tractors, and one on motor trucks, with reference particularly to the proposed military specifications.

Engineering Co-operation

The engineering co-operation movement is still progressing. According to information from C. E. Drayer, secretary of the Cleveland Engineering Society, the sub-committee on plan created by the conference in Chicago last April will meet at the rooms of the Cleveland Engineering Society on Nov. 21. The sub-committee consists of F. H. Newell, Morris L. Cooke, Hunter McDonald, Isham Randolph and Mr. Drayer. On the evening of that day a meeting of the Cleveland Engineering Society will be held. Mr. Newell will speak on "A Practical Plan of Co-operation;" Mr. Randolph on "What the Established Professional Man Owes to the Beginner," and Mr. McDonald on "Mussel Shoals as a Proposed Location for the Government Nitrate Plant."

E. C. Atkins & Co., saw manufacturers, Indianapolis, Ind., will buy the surplus artificial gas of the local Citizens' Gas Company at 10 cents per 1000 cu. ft. There are times when the usual consumers do not use all the gas the company manufactures and the firm named agrees to take all the excess, no matter how much, at any time.

De Camp & Sloan, Inc., is now the name of the De Camp & Sloan Mfg. Company, contract manufacturer and maker in general of special machinery, dies and tools, 420 Ogden Street, Newark, N. J. The corporation has taken over the property, assets and liabilities of the former partnership.

Larger Munitions Plants Will Get Orders

Not Likely That Smaller Companies Will Receive Much of the Government's Appropriation for Equipment

WASHINGTON, D. C., Nov. 14, 1916.—The extent to which the War Department will utilize the authority given it by the last annual military appropriation bill to purchase munitions in open market or by contract and the policy to be pursued by the Ordnance Bureau in equipping private plants with dies, gages, jigs, tools, fixtures and other special appliances for the manufacture of arms and ammunition on United States army standards, are the subjects of numerous inquiries now reaching Washington. While the plans of the officials have not yet been fully worked out, the correspondent of THE IRON AGE is able to present certain facts that will be of interest to all manufacturers desiring to make war materials for the Government.

AVAILABLE FOR PURCHASES, $16,500,000

Under the terms of the military appropriation bill the Secretary of War can spend no less than $16,500,000 in the purchase of munitions either in the open market or by contract. The expenditure of a large part of this sum has already been planned and the arsenals are now engaged in placing contracts for very substantial quantities of material, chiefly artillery ammunition in more or less complete form. It is the opinion of the ordnance experts that in most cases it will be to the advantage of the Government, in point of securing speedy deliveries as well as a superior product, to contract for finished parts of shells, shrapnel, etc., the assembling and loading being done at the Government arsenals. Some purchases of completed rounds will be made from time to time, however. The details of all contract purchases have been left to the officials in charge of the arsenals, the department merely ordering certain quantities of ammunition, leaving it to the arsenal heads to manufacture or contract for the material, as circumstances and conditions may dictate. Manufacturers desiring information as to the Government's purchases of ammunition should address their inquiries to the commanding officer of the Frankford (Pa.) Arsenal.

The adherence by the War Department to its time-honored policy with respect to making payments on contracts is causing considerable dissatisfaction among relatively small manufacturers, who are anxious to obtain orders for ammunition, small arms, etc. In accordance with this policy payments on contracts are usually made only after the material has been received and tested. In the case of shells, for example, payment is made for each lot on the delivery thereof, and such delivery is held to have taken place only when the lot has been inspected, accepted and boxed for shipment. Should the specifications call for a ballistic test, the sample shell must be fired with satisfactory results before acceptance. Under the present practice with respect to contracts for guns and gun carriages, partial payments are made when the process of manufacture has advanced to a point where the material might be taken over by the government and completed without the possibility of loss, and in these contracts it is specifically provided that when payments on account have been made title to the material covered thereby immediately vests in the United States.

The comparatively modest needs of the Government in the way of war material have heretofore been provided by a few relatively large manufacturers to whom terms of payment have not been of vital concern. The European war, however, has brought into existence a large number of small munition factories, operating with limited capital and stimulated by the fact that the American agents of the European allies have been willing to make substantial payments upon the placing of each contract, in most cases making final payment upon the delivery of the goods after inspection at the factory. The making of these terms has undoubtedly enabled the Allies to procure large quantities of material which they could not otherwise have obtained.

WHY LARGE PLANTS MAY BE FAVORED

Should the War Department adopt a policy similar to that of the Allies, it would unquestionably develop considerable competition for contracts which is not now in evidence; but two opinions diametrically opposed to each other are entertained by experienced officials on the one hand and by public men in Congress on the other, as to whether it is to the advantage of the Government to encourage a large number of small manufacturers to bid on contracts or to place the business with a few big concerns. From a political standpoint, and perhaps from that of the industrial interests at large, the popular plan would be for the Government to keep in running condition the largest possible number of small plants in order that they might be in shape to assist in meeting any emergency that might arise. On the other hand, the weight of opinion among the most experienced ordnance experts, especially those who have devoted considerable attention to studying the lessons of the European war, appears to be in favor of the placing of the great bulk, if not all, of the Government's business with a few large concerns equipped with up-to-date engineering organizations, as well as superior manufacturing facilities. The success that has attended the upbuilding of such concerns as the Krupps in Germany, the Creusot Works in France and the Armstrong plants in England is emphasized by these experts who also point to the fact that this concentration of business during times of peace has not prevented the speedy development of a large number of relatively small concerns when an emergency actually arose.

Under the hard and fast requirements of the army appropriation acts with respect to competition the War Department has not been able to frame a policy on broad lines, but while the ordnance experts are gratified at the increased competition which has been developed as the result of the placing of so much foreign business in the United States, it is doubtful that any one in the department would look with favor upon encouraging manufacturers who actually need financial assistance unless an emergency should be imminent. To do so would be to assume a heavy responsibility, in the opinion of the officials, for the future development of national preparedness must depend upon the whim of Congress, which, after the elections are over, and especially if the European war should be speedily terminated, may return to its former policy of niggardly treatment of both army and navy.

FOR PLANT EQUIPMENT, $1,500,000

The War Department at an early date will determine the details of the project authorized by the military appropriation act for the equipment of private plants with dies, gages, jigs, etc., for the production of munitions on United States army standards. For this work there will be available about $1,500,000 which, it is roughly estimated, will equip six or eight plants. Judging by inquiries received here there is a very general misapprehension as to the character of the equipment which the government will supply to private concerns under this appropriation. Certain small manufacturers have received the impression that the government will furnish all the tools necessary to make small arms or ammunition, or both, and will look to the manufacturer to supply only a factory site, the necessary buildings and motive power. As a matter of fact the department does not contemplate fitting up shops for the production of arms or ammunition, but merely to supply gages, dies, jigs and certain special attachments to be used in connection with plants

adequately equipped for doing general munitions work.

A single set of gages, dies, jigs, etc., for the manufacture of the service rifle is estimated to cost approximately $250,000 and to require several months for its production. With sufficient funds to provide only half a dozen special equipments it goes without saying that the department will use great care in selecting the particular plants to which they are to be assigned and will give weight to a number of considerations, including location, permanence, labor market, transportation facilities and feasibility of protection in case of war.

W. L. C.

EMPLOYMENT AND SERVICE

An Outline of the Functions of Such a Department

In a paper describing the scope of an employer's service department, presented at the annual congress of the National Safety Council at Detroit, Oct. 18, Dr. Otto P. Geier, Cincinnati Milling Machine Company, Cincinnati, laid down a series of principles to govern the work of such a department. The service department, according to him, must be more than an employment bureau if it is to do the most good. Dr. Geier's rules are as follows:

EMPLOYMENT SERVICE

Meet the applicant for a job with courtesy. You owe him something for the time and money he has spent in coming to you. The Employment Department is the workman's first impression of your methods of doing business. A cheap, surly employment clerk adds to your annual labor turn-over and shifting of the force.

LOCKER ROOM SERVICE

Having hired the man give him something in your plant which he can call his own. A locker will encourage personal dress and hygiene. The dirtier his work the more necessity for good washing and bathing facilities, and opportunity for change of clothes. Don't make your workman carry your shop dirt to his home.

MEDICAL SERVICE

Physical examinations used as a means merely to eliminate the unfit will fail lamentably. Give the employee the benefit of your physical findings. Begin his education as to the value of health and care of his body at the time of physical examination.

Raise the hygienic standards of your workmen in their homes by teaching them that cleanliness in the work-shop pays. Good toilet facilities encourage good habits, and prevent much intestinal intoxication. Good drinking fountains are factors of good health and deterrents of alcoholic habits. Good light and ventilation further increase the comfort, contentment and health of the worker.

No better method of engendering a good spirit in your shop can be found than by showing your employee that you value his fingers, toes and eyes above his productive efficiency.

Prompt, considerate, intelligent, professional attention by the plant physician, in properly equipped treatment rooms, bids fair to replace all "first aid jars," "handy men" and "quick eye pickers," in most industries. The employment of the right type of a full-time physician is economically sound in plants employing 500 men or more. Nurses should not be entrusted with surgical work unless under constant supervision. The time lost from disability will be reduced by at least one-half through such service.

Lost time from preventable sickness is greater than the loss of time from accidents. Stop this waste by supplying the workman with the advantages of an all-day clinic. You will thus supply one of his most fundamental needs. He has not been trained, like you, to seek a physician in the early stages of disease. It is only when invalidism has set in that the average workman seeks the advice of the right type of physician. But then it is usually too late. He has lost his earning capacity and you have lost a trained man whose instruction has cost you considerable money. Can you check your chronic absentees, intelligently and with justice, without the help of a physician and visiting nurse? The plant physician can forcibly teach the men that it pays to be healthy, steady and of good habits. The man of low earning capacity is a drag on industry. Your all-day dispensary acts as a medical and surgical clearing house, so that your men may be advised to seek out reputable surgeons and physicians, not only for themselves but for their families.

DENTAL SERVICE

The cost of this necessary service to the industrial groups can be materially lowered to them through the employment of a dentist by the mutual benefit association of the plant. The company can well afford to grant the time necessary for inspection, cleaning, prophylactic treatment and advice.

SICKNESS AND DEATH BENEFITS

The employees' health and insurance association is a further step in cementing a good feeling in the shop as well as providing this service at minimum cost. These associations should be organized so as to prevent sickness and accidents. Each department should have a committee on "health and safety" which shall feel free to make recommendations regarding both.

LUNCH ROOM SERVICE

Good clean food at low cost can be supplied by organizing the shop force and by having a committee supervise the operation of the kitchen and dining room. The company may provide the space and equipment, just as it should supply the dental equipment. No arguments need be advanced for this service. No mention need be made of its advantages over the saloon lunch room method.

BANKING AND LOAN SERVICE

Thrift is worth encouragement. We must provide a substitute for the loan shark. A savings account has been the making of many a workman. You men of business are all borrowers—you should not object therefore to be lenders of money to your own employees. A little advice, along with a small loan, frequently relieves a great mental strain under which no one can be productive. Join with your force in organizing a building and loan association. Invest your funds in the Good Housing movement by building homes through this association. Encourage your men in home ownership—labor needs its stabilizing influence.

RECREATION FACILITIES

Recreation facilities are valuable, but they heretofore have been over-emphasized by industry in comparison with the more fundamental factors mentioned above. Our educational work should give the employee a power of selection of the proper types of recreation which the community itself affords or can be made to afford its citizens. The formation of a base-ball team, a shop band, choral societies, giving of entertainments, are all useful in their way and can be made to contribute to this feeling of good-will and co-operation between employer and employee.

None of the advantages accruing to the worker through the operation of service departments should in any way substitute for a fair scale of wage, which must be made to keep pace with the ever increasing cost of living.

The Underwood Typewriter Company, Hartford, Conn., has adopted a profit-sharing plan under which it is believed that $250,000 will be distributed next year to all employees who have been with the company two years or more. Under the plan 20 per cent of the company's net earnings is to be given in stock to its employees. Each employee may add to the amount set aside for his account, and as soon as a sufficient sum is held to his credit it will be used to buy stock of the company, which will be delivered to him.

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Industrial Preparedness at Home

In THE IRON AGE of Nov. 9 descriptions were given, with details of retail prices and selling terms, of a number of the products of German shops which were shown at the recent Toronto "Exhibit of Enemy Samples." More than two years ago British consular agents throughout the world began a collection of goods manufactured in Germany and Austria and found in various countries in competition with British products. At the Toronto exhibition these thousands of samples of textiles, clothing, hardware, tools and machinery which originally were brought together in England were shown again. The revelation thus given of the extent to which German products were used in British possessions and in neutral markets, the low prices at which they were sold and the studied efforts of the German manufacturers to adapt their product and prices to the demands of consumers in all parts of the world, opened the eyes not only of Canadians but of a good many visitors from the United States.

We are referring again to the article printed last week to show that whatever the indifference of Great Britain to the inroads of commercial competitors in other years, the war period has brought a great awakening which is to be looked on as but the beginning of a new era in British industry. Probably no question has been more frequently asked in the continued discussion of this country of the effect upon our commerce of the decisions reached at the Paris conference of Allies than that of the effect the Allies' trade agreements will have upon the export and home trade of the United States.

Highly significant in this connection is the statement in our British letter, printed elsewhere, that the iron and steel sub-committee of Lord Balfour's committee to recommend measures giving practical effect to the Paris conference decisions has urged the entire prohibition of iron and steel imports into the United Kingdom, at least through the period of demobilization and reconstruction. Such a prohibition, while aimed at Germany, would be highly detrimental to the steel trade of the United States. Whether so sweeping a proposal will be adopted may be questioned, but the fact that it is even considered should provoke serious thinking on the future of our own steel industry when we come to the end of the war prosperity that has been thrust upon us.

That Great Britain and other belligerent countries, in the midst of a war calling upon their every resource in men and in wealth, should be giving such earnest consideration to questions bearing on the future of their industries is in striking contrast with the attitude toward these questions in some quarters in the United States. From a high Administrative source the manufacturers of this country have been told that they are only exhibiting timidity to ask that any measures be taken by the Government to safeguard our industries in the period of readjustment following the war. They have been assured, on the same authority that promised a reduction in the cost of living through a reduction of the tariff, that they have nothing to fear from any quarter in the world. Though they are paying the highest wages in our history, they are accused of raising the cry of wolf in suggesting the possibility of hurtful competition from foreign goods in this market after the war.

One of the members of the British committee referred to above—John Hodge, M.P.—in a recent address in South Wales said:

> I have been in the past a free trader. In the steel trade all over the country we find employers who were ardent free traders who now believe that our trade must be protected—not from the point of view of the interest of the employers, but from the point of view of the national interest. It is only as the war has gone on that our national defect in the production of steel has been demonstrated. It seems to me necessary that our steel trade should be stimulated to the utmost possible extent, so that in the case of our sons or our sons' sons having to go through this dreadful ordeal once more, we may leave them a heritage of the material that will be useful to them. And that, as far as I have been able to see and gage, is almost the unanimous opinion of the steel trade from north, south, east and west.

The calamities of war are bringing to the people of Great Britain an appreciation of their common interests in a new policy for the development of their industries. Is it because the United States is so drunk with unearned prosperity that efforts to safeguard business after the war are attacked? Now that the exigencies of a political campaign need not be served, there may be more chance of dealing with the question on its merits.

Fire Prevention Making Good

Effective work is being done throughout the country in the removal of causes which lead to the destruction of property by fire. The question of fire prevention has been agitated for years, but only recently has this agitation taken the form of practical measures. For instance, in some cities the fire department now collects from property owners the cost of extinguishing a fire after an investigation has shown that the owner was negligent in guarding against danger from this source.

The National Board of Fire Underwriters, whose headquarters are in New York City, has published some interesting statistics showing the extent to which education on the subject of fire prevention has diminished the number of fires in the principal cities. New York City is stated to have had 1010 fewer fires in 1915 than in 1914, with a decrease of $2,460,793 in aggregate losses, while the loss per fire was $140.50 less than the lowest previous record. Chicago in 1915 had 1238 fewer fires and $906,605 less in total fire losses than in 1914. Cincinnati had 430 fewer fires and $333,903 less in losses in 1915 than in 1914. Milwaukee had 682 fewer fires and $290,837 less losses in 1915 than in 1914. The Boston metropolitan district, which includes the city and 25 neighboring towns, has made a remarkable showing since appointing its fire prevention commissioner in 1914. In the month of June, 1916, 605 alarms were reported against 1337 in the corresponding month of 1914, which is a decrease in two years of 64 per cent.

While quoting these figures with some degree of satisfaction, the National Board of Fire Underwriters calls attention to the fact that after all only a beginning has been made in reducing the tremendous losses which this country annually suffers from fire. In the year 1915 the single item of dwelling house fires in the United States resulted in the enormous total of $35,591,227. It is therefore demonstrated that a great deal of educational work and more drastic supervision by authorities are needed to bring fire losses into what might be considered reasonable limits.

The Tonnage of Tin Plate

Recent developments in the tin-plate trade direct attention to that once relatively unimportant branch of the steel industry. The independents have built a great many additional tin mills in the past twelvemonth, while the Steel Corporation, after a period of years in which it dismantled tin-plate plants rather than built new ones, has completed a 24-mill plant at Gary and has started building 20 additional mills, ten at the Farrell works and ten at the Shenango works. The various extensions are evidently predicated upon expected heavy demand for tin plate in future years, in both the domestic and export markets. The export demand that exists at present is special, owing to the reduced output in South Wales occasioned by the war. The British Government, instead of exempting the Welsh tin-plate workers from military service, as desired by most of the manufacturers, has placed great restrictions upon the export of tin plate. The tin-plate exports of the United States in recent months, averaging 20,000 gross tons per month since August, 1915, are not a measure of the export demand, since they represent only the amount of tin plate that could be spared, and perhaps illy spared at that. A much larger quantity would have been taken by foreign buyers had it been offered.

Another interesting development in the industry is the rise in tonnage wages due to the higher prices ruling. While only a few of the mills are governed by the Amalgamated Association's scale, which provides for a bi-monthly adjustment of wages according to the prices actually realized on shipments, the non-union mills pay substantially the same wages as the union mills. On the common weight the tonnage labor at the hot mill received $9.28 per gross ton, after the reduction that occurred in the spring of last year. The settlement just made to fix wages for this month and next gives the men 12 per cent over the basis rates in the advanced scale of 1916-7, equal to a rate of $11.50 per gross ton, and representing a total advance from the recent low point of 24 per cent.

It will be recalled that years ago there were many efforts to make tin-plate and sheet rolling more or less automatic, so as to dispense with the expensive hand labor. It is perfectly correct to say that all such efforts have failed, in the particular direction in which they were exerted, for to-day more men instead of fewer men are employed per mill. The job formerly held by one man was later held by the man and his helper, while now the more common case is for two men to work on equal terms at that one job, all in the eight hours prescribed for a turn. At the present time the average mill, even with a fair sprinkling of idleness in the year, will readily turn out 3500 gross tons, involving about $40,000 a year paid in wages to the tonnage men, or several times the cost of the mill which it was desired to replace by automatic machinery. In no other important steel-rolling operation does such a proportion obtain, the investment per dollar of wages spent being much higher.

The attainment of this proportion, nevertheless, represents success on the part of the tin-plate industry rather than failure. The effort was made to reduce investment per ton of output by making the stand of rolls as productive as possible. The original turn limit was 5250 lb. for 30 gage, and the men often failed to make it, a mill doing well if it averaged 1700 gross tons per year, so that the output has been more than doubled.

For a number of years the increased output per mill furnished the chief increase in the total output, the number of mills increasing but slowly, but of late the number of mills has been undergoing a substantial increase, resulting in a double increase in tin-plate making capacity.

In 1902 and 1903 the American Tin Plate Company had 264 tin mills, while there were 71 independent mills. The output in the two years was estimated at 360,000 and 480,000 gross tons respectively, indicating average outputs per mill of 1075 tons and 1430 tons respectively. Then the leading interest dismantled mills until just before the recent completion of the Gary 24-mill plant it had only 196 mills, although with those mills it produced last year 569,879 gross tons of tin plate.

The number of independent mills has increased to about 240, precisely the number the leading interest will have when its Farrell and Shenango additions are completed, probably about the middle of next year. With its 480 mills the induustry will be able to produce more than 1,600,000 gross tons of tin plate in a year, provided no large part of the tin mill capacity is used for the production of black-plate specialties, not tinned. That would be a larger tonnage than the structural mills produced prior to 1905, suggesting that in tonnage the tinplate industry is only about a dozen years behind the structural mills.

Tin and terne plate production has been as follows, in gross tons:

1891.....	999	1905.....	493,500
1895.....	113,666	1910.....	722,770
1900.....	302,665	1915.....	1,055,936

From 1900 to 1905 the increase in output was 63 per cent. In the next five years it was 42 per cent, while in the next five years the increase rose to 46 per cent. The output for this year is forecasted at 1,350,000 gross tons, which would represent a 72 per cent increase over that of 1911, five years earlier.

Ten Trade Commissioners to Be Named

WASHINGTON, D. C., Nov. 14, 1916.—The Bureau of Foreign and Domestic Commerce announces that ten suitable men are wanted to serve as trade commissioners and special agents to investigate foreign markets for American goods, including metal-working machinery and prime movers in Russia and in Brazil; motor vehicles in Russia and the Far East; hardware in Africa, the Near East and India; mineral resources in the Far East; investment opportunities in Russia; furniture in South America; jewelry and silverware in South America; fancy groceries in South America, and ports and transportation facilities in Russia and the Far East. These agents will receive salaries not to exceed $10 per day with all transportation expenses paid and $4 per day allowance for subsistence. Examinations to secure the best men will be held in the larger cities of each State on Dec. 6.

Persons who meet the requirements and desire this examination should at once apply for Form 375, stating the title of the examination for which the form is desired, to the United States Civil Service Commission, Washington, D. C.; the secretary of the United States Civil Service Board, postoffice, Boston, Mass; Philadelphia, Pa.; Atlanta, Ga.; Cincinnati, Ohio; Chicago, Ill.; St. Paul, Minn.; Seattle, Wash.; San Francisco, Cal.; customhouse, New York; New Orleans, La.; or old customhouse, St. Louis, Mo. Applications should be properly executed and filed with the commission at Washington in time to arrange for the examination. Those who are appointed are expected to present the data obtained in straightforward, readable reports which will enable American manufacturers and exporters to plan campaigns for the sale of American goods in the markets investigated. Applications for the South American investigations will be expected to know Spanish and extra credit will be given for Portuguese. In the investigations including Russia, French is required and an extra credit given for Russian. No person will be admitted to any of these examinations who has not had previous training which would qualify him as an expert in the particular line to be investigated. Those who pass the civil service examination will be given oral tests later.

It is reported that the Interstate Commission's majority report on the Australian iron and steel industry recommends a substantial duty and the prohibition of exports of iron ore. The minority report urges the payment of a bounty.

CORRESPONDENCE

Securing Employee Loyalty and Interest

To the Editor: We note with some interest the leading article in THE IRON AGE of Oct. 26. This falls so nearly in line with a little idea that we had developed that we are taking the liberty of bringing it to your notice, thinking possibly it may help others along these same lines.

The basic idea in our case, however, was an endeavor to instill an interest in and loyalty to the company on the part of a new working force. In July, 1915, we had a general strike of all our boiler makers, helpers, etc., because we declined to renew a closed shop agreement, preferring to go on an open shop basis. For nearly a year we were practically shut down. Last spring, however, we began operations again with new men, practically none of whom were mechanics, but under the supervision of a new foreman we are making competent workmen out of raw material. None of them having ever been connected with this company before and a large number of them never having worked at any time steadily, we wanted to give them a feeling of permanency by making them realize that we have an interest in keeping them, and that their interest lies in staying with us.

Up to date nine folders have been issued, together with a special one put in the pay envelopes just prior to the enactment of the so-called Adamson law that undoubtedly averted a nation-wide railroad strike on Sept. 4.

E. R. FISH,
Vice-president and secretary, Heine Safety Boiler Company.
St. Louis, Oct. 27, 1916.

[The leaflets have four pages and when folded measure 2¾ x 5¼ in., a size calculated to slip into the pay envelope readily. They are entitled, "Talks on the Boiler Business." The first three dealt with the subject of costs, being divided into general, labor and material costs, special emphasis being laid upon the fact that co-operation on the part of the shop force would result in a decrease in the cost of production with a resulting increase in the amount of work that would come in the shop and the wages that would be paid. Safety first, good workmanship, care of tools and the factors entering into selling the company's products were described in the next four, and here, too, the idea of co-operation was emphasized. The importance of the carrying of accident and health insurance by the employees was emphasized in leaflet No. 8, those who had policies being urged to continue and those who did not to take one out. In the words of the leaflet, "It (insurance) relieves the employee of mental worry and to that extent makes him a happier man. Contented men do better and more work than those who are worried or discontented. It is good business, even if you are fortunate enough never to have to make a claim." The ninth leaflet was issued just prior to the installation of a cost keeping system and contained instructions on how the time card that was to be used should be filled out. Here, too, the idea of co-operation was given prominence, reference being made to the previous leaflets on the subject of costs, and closing with the statement, "The men in the shop are as much a part of the business as the salesmen, draftsmen, clerks or officers. We are all necessary to each other."—EDITOR.]

The Cyclops Steel Company, Titusville, Pa., of which Carl F. Baker is president, is erecting additional buildings and making many improvements in equipment. A new 10-in. mill will be installed in a building 75 x 110 ft.; steel melting furnaces will be located in a building 60 x 130 ft.; annealing furnaces in another, 60 x 70 ft.; blacksmith and heat-treating shop, 60 x 80 ft., and machine shop, 40 x 70 ft. An iron puddling department is to be added, as well as a chemical laboratory. The capacity of the plant, which produces high grade tool steel, will be quadrupled.

Naval Award Difficulties

WASHINGTON, D. C., Nov. 14, 1916.—The Navy Department is having great difficulty in determining the relative merits of the exceedingly varied proposals received for the construction of those vessels of the new naval program for which bids have been opened. On Nov. 10 contracts for the construction of four 35-knot destroyers were awarded to the Bath Iron Works, Bath, Me., at a cost of $1,150,000 per vessel for hull and machinery. Contracts for 16 additional destroyers are yet to be awarded, but while bids apparently within the statutory limit of cost were received for all these vessels the proposals were so complicated by conditions that Secretary Daniels finally decided to request all the bidders to send representatives to Washington to take part in a conference that will be held to-morrow in the hope of reaching a common basis upon which awards can be made.

Experts of the various bureaus have diligently scanned the proposals for the four battleships, four scout cruisers and 29 submarines recently opened by the department, but as yet no recommendations have been made concerning any of these vessels. The scout cruisers in particular present difficulties which the department will probably not be able to solve without additional legislation. The failure of the contractors to submit bids within the limit of cost fixed by law leaves the department with the alternative of applying for an additional appropriation, estimated at about 10 per cent, or of so modifying the plans for the vessels as to render them unfit to perform the special function for which they are designed. The power plant of these vessels, as designed by the Bureau of Steam Engineering, is the largest ever installed in a vessel of equal tonnage and estimates made since the bids were opened indicate that unless the horsepower is substantially reduced it will not be possible to bring the vessels within the cost limit fixed by Congress. It is the best opinion, therefore, that the President will be requested to ask for a larger appropriation and to request Congress to include the necessary sum in the urgent deficiency appropriation bill, which will be one of the first measures to be enacted at the coming short session.

The uncertainty with regard to the political control of the Sixty-fifth Congress will probably result in a determined effort on the part of the Administration to secure, during the coming winter, the authorization of as large a part as possible of the remainder of the new naval program. The House Committee on Naval Affairs will begin the consideration of the new naval appropriation bill at an early date and it is understood that the measure will be reported to the House immediately after the holiday recess. W. L. C.

The Steel Corporation's Largest Order Book

The largest unfilled orders in the history of the United States Steel Corporation were shown in the statement for Oct. 31, orders on the books then being 10,015,260 tons. This is an increase of 492,676 tons over the unfilled orders on Sept. 30. The previous high level was reported last May, when the unfilled orders amounted to 9,937,798 tons. A year ago on Oct. 31 the unfilled tonnage was 6,165,452 tons. The total this year is nearly three times that at the end of October, 1914. The following table gives the unfilled tonnage at the end of each month from January, 1913:

	1916	1915	1914	1913
January	7,922,767	4,248,571	4,613,680	7,827,368
February	8,568,966	4,345,371	5,026,440	7,656,714
March	9,331,001	4,255,749	4,653,825	7,468,956
April	9,829,551	4,162,244	4,277,068	6,978,762
May	9,937,798	4,264,598	3,998,160	6,324,822
June	9,640,458	4,678,196	4,032,857	5,807,317
July	9,593,592	4,928,540	4,158,589	5,390,356
August	9,660,357	4,908,445	4,213,331	5,223,468
September	9,522,584	5,317,618	2,787,667	5,002,785
October	10,015,260	6,165,452	3,461,097	4,513,767
November	.....	7,189,489	3,324,592	4,396,347
December	.....	7,806,220	3,836,643	4,282,108

Spain's iron-ore output in 1915, according to a recent report of the country's Mineral Census, was 5,617,839 tons. The pyrites output was 730,568 tons; iron-ore briquettes, 555,357 tons, and manganese ore, 14,328 tons. Wolfram ore mined was 511 tons.

Canadian Industrial Notes

TORONTO, Nov. 11, 1916.—According to a statement made by the Imperial Munitions Board, Ottawa, the Canadian manufacturers at work on munitions will be kept busy on the basis of present orders until June 30, 1917. Some orders expire Dec. 31 and others March 31. Those making the best records in deliveries are likely to receive the biggest share of the renewed orders. All necessary raw material to maintain the deliveries required is contracted for well ahead, and the board is in a good position in regard to the supply of steel. No uneasiness is caused by the reported shortage in the United States, because the board made large purchases of steel during the spring and summer months. The policy adopted some time ago whereby Canadian manufacturers would supply fuses, primers, brass disks, cartridge cases, and other component parts of shells is well established, and smaller quantities of these supplies are now being received from the United States. Many of these parts will in the near future be secured exclusively in Canada.

Despite the fact that the Canadian Government has permitted the Canadian railroads to import rails free of all duty except the war tax, the imports of rails have been so far very small. The government action was taken as a means of relieving what was represented as a serious shortage of steel, due to the fact that Canadian mills were so largely engaged in the manufacture of war munitions. The railroads wanted rails in order to move the crops, especially from some of the more recently settled districts.

The contract for 1000 tons of steel for the transmission line standards on the Dundas-Toronto power line has been awarded by the Hydro Commission to the Canadian Bridge Company, Walkerville, Ont. The amount involved is about $110,000.

The statement is credited to Phelps Johnson, president Dominion Bridge Company, Walkerville, in an interview, that 20 per cent of the work being done by his company consists of bridge work, the balance being munitions. As to the outlook after the war, he states that the company is looking forward to foreign rather than domestic markets. In particular he is looking toward Russia as a field for large requirements.

Mark Workman, president Dominion Steel Corporation, has returned from an inspection trip over the properties of the corporation in Cape Breton. He was accompanied by D. H. McDougall, general manager, and returned much impressed with the improved conditions at the plant in regard to organization. He further stated that he was extremely gratified with the output of the steel works, every department of which is operating to full capacity. President Workman announced, in recognition of the high cost of living, a voluntary increase in wages in the form of a war bonus to the corporation's many employees, making the second advance since the beginning of the year.

The copper refinery of the Consolidated Mining & Smelting Company of Canada, Trail, B. C., which has been in operation for some weeks, is now in shape for the shipment of electrolytic copper. The plant will turn out about 5 tons daily—the first product of its kind in Canada.

David Milne, of Victoria, and G. R. Kennedy, Medicine Hat, B. C., are at the head of a syndicate which plans the construction of a rolling mill in South Vancouver, B. C., to cost $150,000, and with capacity of 30 tons of bar iron per day.

It is announced that a permit has been received by the Dominion Government for the construction of merchant ships in Canada for Norway. Contracts for three vessels valued at $3,500,000 have already been signed by Vancouver firms, two with the Wallace Shipbuilding Company and one with Coughlan & Co. Orders for seven or eight more vessels will be placed soon, and the total will reach not less than $10,000,000. S.

The Leland-Gifford Company, Worcester, Mass., manufacturer of drilling machines, announces the opening of an office at room 418, Singer Building, 149 Broadway, New York, in charge of Walter F. Henly, formerly with the Fairbanks Company.

MANAGER AND WORKMEN*

Twenty-five Years of the Capital and Labor Problem—Lesson of the War

BY H. L. GANTT

About twenty-five years ago the financiers of this country discovered a new and seemingly a very important principle. They realized that, in many cases at least, the larger factories were making a larger percentage of profit than small ones, and conceived the idea of uniting the small ones under one system of management. By this move they certainly did give the small factories a better financial standing, at the same time reducing what might be called the financial or business expense.

By this they also reduced competition and decreased the cost of selling, which has always been a large element of expense. Under these conditions business prospered rapidly. The illustrated magazines were filled with the pictures of the "captains of industry" who had engineered these combinations, and it was freely predicted that the economies to be obtained were so great that it would only be a question of time before Europe would be flooded with American goods.

Our internal trade grew at an astounding rate, but the American invasion of Europe did not materialize, and it was not very long before we began to hear complaints of the increasing inefficiency of labor. Wages began to rise, but the output of the workmen did not rise correspondingly. The financier had undoubtedly effected economies in those portions of business directly under his control, but had not succeeded in producing a similar effect in those with which he did not come in direct contact.

AN EPIDEMIC OF COST KEEPING

As a result of this condition, the necessity for knowing factory costs became urgent, and there was such a great demand for people capable of installing cost systems that we had what might be called an epidemic of cost keeping in this country, during which time any reasonably intelligent clerk with a good address could get the job of installing a cost system somewhere. Undoubtedly, much that was done was beneficial, but in the desire to learn costs many people gave more prominence to their cost system than they did to their production methods. Systems of production were modified to conform with the cost-keeping methods.

Only the better of these systems survived, and many manufacturing concerns are to-day still without cost systems, due to the doubt on the part of the managers as to the value of such systems as have been installed.

EFFICIENCY THEN THE SLOGAN

About the time this epidemic began to wane the word "efficiency" became the slogan, and many of the cost accountants having read the writings of Mr. Taylor, Mr. Emerson and others bought stop watches and set up as efficiency engineers. They preached the doctrine, "if we could only make the workmen efficient all would be well." Undoubtedly much good would have been done if they could have accomplished their purpose.

Through these periods the relations between employer and employee have not improved, but have grown progressively worse, until to-day the industrial conditions of this country are, in many respects, deplorable, and we realize that neither cost control of manufacturing plants, which has been so strongly advocated by some, nor the type of efficiency control which has generally been preached, offers any solution for the troubles which beset our industrial relations.

The workman bears the same relation to the management that the soldier in the ranks bears to the officers. No amount of bravery on the part of the soldier or efficiency on the part of the workman can amount to very much if he is improperly directed. Leadership in industry and war is equally important.

The facts in military history have their exact counterpart in industrialism, and the real problem of to-day is how to select and train, or rather how to train and select, our industrial leaders.

LESSON TAUGHT BY GERMANY AND ENGLAND

There is a general feeling, however, that because our industries have in the past been directed in an autocratic manner that autocracy will continue to be the rule and that there is apparently no escape from it. The feeling seems to be quite widespread and to be substantiated by the marvelous industrial development of Germany under autocratic rule. While it is possible that autocracy in industry is the final stage, I do not think the case is by any means proved, although the contrast which democratic England and autocratic Germany presented at the outbreak of the war seems at first sight conclusive.

Although we have talked efficiency in this country for several years and many books have been written on the subject, many of us feel that the actual results so far have been lamentably small, and that we should be much more nearly in the class with England at the breaking out of the war than with Germany if we were suddenly confronted with her problems. It would seem, therefore, that we should find the fundamental reasons why England presented such a strong contrast to Germany and see if we cannot learn something therefrom.

It is only a short time since England led the world in the arts, but recently Germany has demonstrated her superiority to both England and France.

We must ask ourselves how this happened. It would seem to be something in this wise: The financiers of England, feeling that wealth could purchase whatever was needed for themselves and their national life, devoted their energies for a number of years to securing the wealth which was produced by others rather than to making strenuous efforts to produce it themselves. In this attempt they sent abroad millions of dollars to develop industries in foreign lands, which brought them great returns.

The leaders of Germany, on the other hand, not being able to exploit foreign peoples to the extent which was possible in England, turned their attention to developing their own resources, and the ability of their own people. Military autocracy forced business and industry to see that men were properly trained and that their health was safeguarded. In other words, because of the necessity of the military state for such men, the state saw to it that industry was so organized as to develop high grade men, with the result that a kind of industrial democracy was developed under the paternalistic guidance of an autocratic military party. Under such influences, the increase of education and the development of men went on apace, and were soon reflected in an industrial system which bid fair to surpass any other in the world.

In England, on the other hand, the business system was developed by an autocratic and "socially irresponsible finance," which, to a large extent, disregarded the interests of the workman and of the community. At the breaking out of the war the superiority of the industries of Germany over the industries of England was manifest, not only by the products of the industries, but by the feeling of the people and their loyalty to the national Government, which had so cared for, or disregarded, their individual welfare.

This superiority became so rapidly apparent that, in order to make any headway against Germany, England was obliged to imitate the methods which had been developed in Germany, and to say that the industries (particularly the munition factories) which were needed for the salvation of the country, must serve the country and not the individual. The increased efficiency which England has shown since the adoption of this method is most marked and in striking contrast with the inefficiency we are still displaying in similar work.

OUR INDUSTRIES MANAGED FOR AUTOCRATIC FINANCE

Confessedly our industries are managed in the interests of an autocratic finance. In Germany it has been proved beyond doubt that an industrial system, forced by military autocracy to serve the community,

*From an address before the Associated Industries of Massachusetts, Springfield, Mass., Sept. 23. Mr. Gantt is a consulting management engineer, 149 Broadway, New York.

is vastly stronger than an industrial system which serves only a financial autocracy.

England is beginning to demonstrate the same thing; for had England not been more efficient in the production of munitions than we have been in this country, it would have been indeed a sad day for the British Empire.

In considering these facts we should ask ourselves if there is not some fundamental fact which is accountable for the success of industry under such control. The one thing which stands out most prominently is the fact that, in the attempt to make the industries serve the community, *an attempt has been made to abolish industrial privilege and to give every man an opportunity to do what he can and reward him correspondingly.*

This is the most perfect form of democracy, and the facts that at first sight seem to indicate that autocracy produced greater efficiency than democracy really prove the contrary when we get real democracy.

EFFICIENCY IN MANAGEMENT THE GREAT NEED

In order to reward every man according to his deserts, we must have some means of measuring the efficiency of the service rendered.

So far the only efforts that have been made in this direction have been applied to the workman and they have apparently not helped us to solve our industrial problem. It is absolutely necessary for us to measure the efficiency of those in control, for without efficiency in management, efficiency of the workmen is relatively useless, even if it is possible to get it. With an efficient management there is but little difficulty in training the workmen to be efficient. This has been proved so many times and so clearly that there can be absolutely no doubt about it. Our most serious trouble is incompetency in high places. As long as that remains uncorrected no amount of efficiency in the workmen will avail very much.

Can we find a measure, or even a correct indication, of that efficiency? I think we can, but we shall have to revise our methods of cost accounting, for those at present in vogue are not designed for that purpose.

Waukesha Co-operative Industrial School

The Waukesha Motor Company, Waukesha, Wis., builder of automobiles, trucks and tractors, is cooperating with the local board of education in supplying facilities for industrial education. A plan which involves no investment or maintenance cost has been developed. The company has permitted the school authorities to establish a school organization within its plant, open to any person who qualifies by being 16 years of age or over. Part of each working day will be devoted to actual instruction and teaching of the rudiments of gas engineering, civics and general subjects, and the remainder of the time to practical work within the factory. The company pays full wages for the time devoted to schooling as for employment to all who take advantage of the course. Two cents per student hour is charged by the company to the school board of Waukesha as a nominal fee.

Safety Discipline

A recent pointed safety bulletin notice of the Youngstown Sheet & Tube Company, covering the discipling of an employee for an infraction of a rule, was as follows:

There is a stringent rule in our plant that cars being loaded, unloaded and under repairs must be protected by blue flags during the day and blue lights at night.

These flags or lanterns can only be removed by orders of the foreman, who placed them, or the foreman who succeeds to the job.

On Oct. 8, there were three cars being unloaded; they were protected by the regular blue lights. A member of a railroad crew took the lights away without authority and coupled onto the cars. Fortunately no one was injured; that, however, was not the fault of the trainman.

This man is no longer in our employ. He was discharged. We want no man to work for us who has so little regard for the life and limbs of his fellow employees.

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Henry Ford to Build Two Blast Furnaces

The Ford Motor Company, Detroit, Mich., has placed a contract with the Riter-Conley Company, Pittsburgh, for two blast furnaces to be built in Springwell Township, southwest of Detroit. They will be about 90 x 25 ft., and the output will be used in large foundries the Ford Motor Company also proposes to erect. Julian Kennedy, Bessemer Building, Pittsburgh, is consulting engineer.

The location selected for the new furnaces is on the River Rouge, which empties into the Detroit River at Delray, just south of Detroit. As announced some months ago, it is the plan of the Ford interests to use metal direct from a mixer in the making of castings, and it is stated that the company's metallurgists expect, as the result of the experiments of the past two years, to produce a casting in this way having unusual strength, though no publication has been made as yet of the method by which this will be made possible. The plans for the operations to be carried on at the River Rouge site, which is 18 miles from the present Ford works, include an extensive plant for the manufacture of tractors.

Compromise on Transcontinental Freight Rates

WASHINGTON, D. C., Nov. 14, 1916.—A tentative decision was reached by the Interstate Commerce Commission to-day to cancel the proposed general increases in freight rates by transcontinental roads on traffic from and to the Pacific coast and intermountain points. In place of the proposed tariffs a compromise schedule will be permitted to be filed, providing for a maximum increase of 10c. per 100 lb., carloads, and 25c. on less than carloads, to Pacific coast terminals.

The decision operates to reduce the existing discrimination in rates against intermountain points; but as the rates authorized to-day are tentative only, and subject to protest by shippers, the final adjustment of the intermountain controversy may depend upon the outcome of the hearings on the petitions filed under the fourth section of the interstate commerce act, which prohibits lower rates for long than for short hauls, except under certain circumstances. W. L. C.

The Colorado Plan of Employee Representation

That the industrial representation plan of the Colorado Fuel & Iron Company, first put into effect a year ago at the mining properties and later adopted at the Minnequa Steel Works, promises to settle satisfactorily all disputes between the company and its employees, is the opinion expressed by the company's publication, the *Bulletin*. More than 50 grievances, covering a wide range of matters pertaining to living and working conditions have been presented to the president's industrial representative, while many of minor importance have been righted by local officials. Under the joint agreement the industrial committee consists of 30 representatives of the employees chosen by secret ballot and 25 delegated by the president. This committee, which meets at intervals of a few months, inaugurated the system of appeal and provided the machinery for equitable adjustments.

German Steel Shipments Still Lower

Shipments of the German Steel Works Union for September were 244,212 metric tons, the lowest in any month this year and the lowest since November, 1915, when they were 241,750 tons. The average for 1915 was 270,510 tons per month. There has been a decided decline since May, this year, when the total was 311,620 tons, the largest for 1916. The September shipments were made up of 79,935 tons of semi-finished steel, 85,542 tons of railroad material and 78,735 tons of shapes.

The San Francisco branch of the Orenstein-Arthur Koppel Company reports an exceptionally large business the last few months from the Hawaiian Islands, owing to the rapid development of sugar plantations.

National-Acme to Be Reorganized

Plans for the reorganization of the National-Acme Mfg. Company, Cleveland, including an increase in its capital stock, are under way and will doubtless be carried out shortly. The company has entered into an agreement with Eastman Dillon & Co., bankers, 71 Broadway, New York, who are to purchase the stock for themselves and associates. The syndicate will pay for each share of stock $150 in cash and five shares in stock with a par value of $50 in a new company of similar name to be organized to acquire the assets of the present company. The Cleveland Trust Company has been designated as depositary of the stock and agent to handle the transaction. The company recently called for redemption on Jan. 1 its $1,500,000 in preferred stock and has outstanding $5,000,000 in common stock, which is quoted around 290 on the Cleveland Stock Exchange. Under the terms of the agreement the present management will continue for five years and the stockholders of the present company will retain a large interest in the new company. The reorganization plans will be carried out as soon as they are approved by the holders of a sufficient amount of stock, but it is expected that this approval will be readily secured.

The National-Acme Company, in addition to its Cleveland plant, operates one in Windsor, Vt., formerly the plant of the Windsor Machine Tool Company, which it acquired early in the year, and another in Montreal. It recently acquired a new site in Cleveland on which it will erect a large plant for its machine screw products department, having no room for the required further expansion at its present location.

Output of Australia's Steel Plant

The statement of the Broken Hill Proprietary Company, Ltd., of Sydney, Australia, for the six months ended May 31, 1916, showed a profit of about $1,717,000 after deducting depreciation, interest and sinking fund charges. The pig iron produced in the six months was 53,974 tons, but it is stated that the furnace is capable of making more iron if more coke were available. Construction of 33 more coke ovens was proceeding and the fourth open-hearth furnace was completed in March, 1916. The steel ingot output for the period was 49,089 tons which will be materially increased when the 1000-ton mixer is installed. The commercial steel rolled was 36,862 tons. It is also stated that completion of the 18-in. mill was delayed because of inability to obtain parts, but that it would probably be ready early in October. The 12 and 8-in. mills would be completed probably before the end of 1916. The rod mill had not yet been shipped from the United States. The duplication of the blast furnace and coking plant is under consideration.

Electrolytic Ferromanganese in Washington

Electrically made ferromanganese, tungsten and other alloys have been made at Tacoma, Wash., for about a year. Henry O. Marcy, in an article "Ferromanganese Smelting in Electric Furnaces," in the *Engineering and Mining Journal*, says that a $50,000 electric furnace utilizes hydroelectric power at Tacoma for this purpose and that the ores are delivered at economical rates. The manganese ore is a silicate of manganese running 20 to 50 per cent in manganese and it is found in the foothills of the Olympian range of mountains near Stair Case in Mason County.

The power forging of chain cables is the subject of a paper to be read at a meeting of the Society of Naval Architects and Marine Engineers to-night at the Engineering Societies Building, 29 West Thirty-ninth Street, New York, by Naval Constructor F. G. Coburn, U. S. N.

Tin exports from the Federated Malay States were 3636 tons in September against 3732 tons in August. The total to Oct. 1, 1916, was 32,610 tons, against 34,840 tons to Oct. 1, 1915, and 36,698 tons to Oct. 1, 1914.

Riter-Conley Large Contracts

The Riter-Conley Company, Pittsburgh, has been awarded a contract by the Bethlehem Steel Company to erect at Sparrows Point, Md., four complete 500-ton blast furnaces. The contract comprises the structural steel, furnace plate work, furnace castings, stoves, piping, gas washers, cast houses, skips, buggies, etc. It will require about 10,000 tons of plates and shapes. The same company also has a contract now under way for furnishing and erecting for the Bethlehem Company at Sparrows Point the structural steel for buildings to contain 24 hot tin mills. This includes the main mill building, tin mill building, carpenter and blacksmith shop and store room. This work was contracted for by the Baltimore Sheet & Tin Plate Company, taken over some time ago by the Bethlehem Company, and it involves about 4000 tons of structural steel.

Several months ago the Vaccum Oil Company contracted with the Riter-Conley Company for a large amount of oil refinery work, consisting of storage tanks, stills, condensers, agitators, etc. This contract, taking about 11,000 tons of plates, has been about half completed. The refinery will be located at Paulsboro, N. J., and when completed will be one of the largest in the country. The Riter-Conley Company will make final shipments soon of the material, about 2000 tons, for the erection of a 3,000,000-cu. ft. gas holder for the Detroit City Gas Light Company, Detroit.

A recent addition to the plant of the Riter-Conley Company, at Leetsdale, Pa., is a tool equipment building, 140 x 220 ft. This building will house the erection tools of the company, and is equipped to take care of their repairs and upkeep. A 15-ton crane runs the entire length of the building.

Pacific Coast Steel Company Changes

E. M. Wilson and William Pigott of Seattle, Wash., have purchased all the interests of D. P. Doak and his associates in the Pacific Coast Steel Company. D. P. Doak and F. M. Doak, now directors, will retire as soon as their successors are elected. The company is operating open-hearth steel plants and rolling mills at both Seattle, Wash., and South San Francisco, Cal., employing at each place about 800 men. All operations at San Francisco are under the management and control of E. M. Wilson, president. The company denies the report that it is manufacturing munitions of any kind, though it is doing considerable Oriental business in steel bars.

Condition of Locomotive Orders

Orders for 30 locomotives have been placed in the last week with the Baldwin Locomotive Works. Of these, 20 Pacific and five switching locomotives are for the Atlantic Coast Line. Inquiries were 37, of which 35 are from the Missouri, Kansas & Texas. Orders in November to Nov. 13 were 157, of which 100 are for export. In October 779 locomotives were ordered, which is the largest for any month this year, the next largest having been 565 in February. For the second half of this year to Nov. 1 orders for 1271 locomotives have been placed, comparing with 2124 for the first six months. In 1915 only 1972 locomotives were ordered.

Rogers, Brown & Co., Cincinnati, say in their last market letter: "The decision of the railroads south of the Ohio to prohibit their cars leaving their own tracks will have a very marked effect on the coke market and many now under contract for cokes produced on those lines may, because of this decision, be forced to buy spot coke from other districts to keep their plants going." Similar restrictions as to cars are being imposed by various other roads.

Profits of the Prague Iron Industry Company, one of the principal Austrian steel makers, show a net of about $3,150,000 as against $1,962,000 in the previous year, with a dividend of 38 per cent against 24 per cent. Other Austrian and German companies show similar results.

The Car Shortage Hearing

Necessity for action to bring relief from the prevailing car shortage confronts the Interstate Commerce Commission, the railroads, shippers and consignees, according to developments at the commission's hearing last week at Louisville, Ky. That an emergency order may soon be issued has been intimated by Commissioner Charles C. McChord, who presided at the hearing, in view of the apparent inability of the railroads to effect a remedy themselves.

It became evident as soon as the hearing was begun at Louisville that the condition is critical. The unusually heavy traffic of the past several months and the eastward movement and congested condition on the coast have tended to accumulate an excess of cars on the Eastern railroads, many of them held for unloading and more of the empties being retained by the Eastern roads for their own use. North Central and Western roads, in an endeavor to keep their equipment up to a sufficient basis, were shown to have begun appropriating any foreign cars that came on their lines, at the same time attempting to hold their own equipment. Southern roads, which ship out more than they bring back, presently began to be under equipped, and more or less general wholesale embargoes have been declared by the Louisville & Nashville, Illinois Central, Chesapeake & Ohio, Norfolk & Western, Atlantic Coast Line and others.

During the last two years the coal operators having mines in Kentucky, West Virginia, Virginia and Tennessee have shipped largely into Northern markets, and last summer, during the labor troubles in the Ohio and neighboring fields, booked numerous contracts. After the Louisville & Nashville coal car equipment on its lines had fallen to 39 per cent, and after the Chesapeake & Ohio had "lost" more than 20,000 of its coal cars, these roads declared embargoes, the previous rate of deliveries having been slow. Immediately the North Central industries began to face a coal famine or the extremely advanced prices on the open market.

It developed at the hearing that roads which hold large numbers of Southern-owned coal cars are using them in a large part for hauling ore from northern Michigan and the Northwest, while at the same time it is testified that these very operations are in need of coal these cars should be hauling. Not only are coal and ore cars affected similarly, but all kinds of equipment until, according to evidence given at the hearing, the car shortage is perhaps the most serious factor that is limiting business.

Efforts are being made to arrange for a supply of coal equipment from the Northern roads to the Southern coal carriers for return, in order to relieve a condition, which in Michigan, for instance, is said to threaten a coal famine inside of 30 days. Millions of tons of coal are said to be badly needed in the Lake region and must be delivered before shipping closes Nov. 25.

Not only is the hearing endeavoring to discover some means by which immediate relief can be given, but means by which recurrence can be prevented. Increased demurrage rates, increased per diem charges and strict exchange rules to be enforced by a body clothed with authority have been favored by practically all the expert witnesses.

Germany's September Pig-Iron Output

The daily output of pig iron in Germany for September was 37,225 tons, the highest rate since the war started. The August rate was 36,945 tons. The total for September, 1,116,752 tons, was made up of 169,102 tons of foundry iron, 11,302 tons of Bessemer iron, 725,142 tons of basic or Thomas iron, 195,744 tons of steelmaking iron and spiegeleisen and 15,462 tons of forge or puddle iron. The production for the first nine months was 9,890,000 tons against 8,660,000 tons to Oct. 1, 1915.

Iron-ore exports from Spain for the first six months of this year were 3,001,877 tons against 2,593,185 tons in the corresponding half of 1915. Manganese ore exports declined from 5120 tons to 3667 tons for the same period.

Iron and Steel Markets

A $5 ADVANCE IN RAILS

Pig Iron and Finished Steel Higher

Mills Continue to Turn Away Business for Next Year—Large British Rail Inquiry

The higher prices of pig iron and of steel products go, the more easily new advances are made. The ultimate effect of the new high levels on the trade of manufacturing buyers of finished steel counts for little in the pell-mell rush to get the steel.

The crippling of railroad service is more serious. Car shortages are now no more marked than the scarcity of motive power and there is the certainty of worse troubles later in the year. With 10,000 cars awaiting transfer to its lines west of Pittsburgh, the Pennsylvania Railroad has embargoed westward shipments originating east of Pittsburgh, and iron and steel works are chief sufferers. Frequent bankings of blast furnaces because of coke car shortages are to be expected.

An advance of $5 a ton in rail prices was announced by the Steel Corporation Nov. 15, applying to all deliveries. This puts Bessemer rails at $38 and open-hearth rails at $40. Other rail makers also quote the new prices. On May 1 the previous advance of $5, or to $33 and $35, went into effect, after large tonnages for 1917 had been placed at $28 and $30. In angle bars an advance of $5 a ton was also made this week.

With demand pressing them on every side for steel products carrying 50 to 200 per cent larger profits than rails, the kind of deliveries mills will make on rails taken for the first half of 1917 at $10 less than to-day's prices is already in question.

There is no small stir over a British inquiry for nearly 1000 miles of 75-lb. rails. Practically American specifications will be accepted, and the profit is attractive, but it is doubtful, even with the 1917 delivery permissible, if the 135,000 tons involved, including accessories, can be placed in this country.

In the pig-iron market the effect of the large October sales of Southern iron for export is still cumulative and estimates of the extent to which the advance will go take a wide range. On Southern No. 2 iron $20 Birmingham was established as the market at the end of last week, though at the same time sales at $18.50 and $19 were reported. Early this week $19 iron was still to be had for delivery in the second half of 1917.

Demand for spot pig iron is still relatively small. The possibility of a shortage next year is the dominant influence, and the buying, which has been less than in the previous week, has been largely for first and second half of next year. Some consumers have not been driven in by the rapid advances, but pending inquiry is considerable and higher prices are indicated.

Bessemer iron has advanced $3 in the week or to $30 at Valley furnace, and basic iron $2, or to $25 at furnace. A sale of 4500 tons of Bessemer iron was made at $28 on Nov. 11; this week the advance to $30 was made on smaller sales. A sale of 10,000 tons of basic for the second half of 1917 is reported at $24, and one of 7000 tons for the first quarter at $25. There is a 20,000-ton inquiry for basic iron at Youngstown.

After an advance of $2 a ton on lap weld iron and steel pipe two weeks ago, both lap and butt weld sizes are $2 a ton higher this week. Sheets both black and galvanized have gone up $3 a ton, and sheet mills are rapidly developing the sold-up condition of tin-plate producers for the first half of 1917.

Sales of steel to the Allies for the second half of 1917 thus far include 200,000 tons placed with Eastern mills, chiefly shell steel. Other transactions, also covering the second half, include rails, plates and billets for the Allied governments.

A leading steel interest has sold plates for delivery extending to the middle of 1918. The call for ship plates is insatiate and as high as 4.50c. for forward delivery has been done, while for several hundred tons for early delivery 5.50c. was paid. Japan has bought 7000 to 10,000 tons of plates this week and a Canadian car works has just placed 15,000 tons of plates and shapes in eastern Pennsylvania.

The disposition of mills to defer consideration of business offered for next year is more marked. Each week large tonnages both export and domestic appear to go begging. Chicago reports the whole market for steel products becoming more restricted and abnormal. A feature there is the large demand for tie plates, two railroads having just placed 17,000 tons.

Lake Superior ore prices for 1917 may be established any day. It is likely that non-Bessemer ores will be $1 higher while the advance in Bessemer ores may be quite a little more. The sudden coming on of zero weather has cut down shipments from Lake Superior mines in the past few days.

Pittsburgh

PITTSBURGH, PA., Nov. 14, 1916.

Prices on pig iron, some steel products and scrap moved up faster the past week than probably in any week since the phenomenal rise started. Bessemer pig iron, which sold a week ago at $27, Valley furnace, sold on Monday at $30; basic went up $2 and foundry iron from $1 to $2 per ton. Reports are that soft steel billets for fairly prompt shipment have sold at $57.50, maker's mill, a heavy premium having been paid because the mill promised some shipments this year. Both butt and lap weld black and galvanized iron and steel pipe have been advanced $2 per ton; minimum prices on black and galvanized sheets are up about $3, and nearly all grades of scrap $1 or more. Furnace coke has held steady, but no contracts are being placed, buyers being scared off on account of the high prices asked. The insistent heavy export demand for pig iron, billets, sheet bars and many kinds of finished steel is mainly responsible for the dizzy level that prices have reached. One local mill states it has turned down the past week more than 200,000 tons of finished material which it could have taken at very profitable prices, but is so congested with orders that it could not possibly make the deliveries wanted. The railroad situation, which is deplorable, is steadily getting worse. The Pennsylvania Railroad has declared an embargo on all freight routed over its Western lines, originating at any point east of Pittsburgh. This has shut off shipments to im-

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton.	Nov. 15, 1916.	Nov. 8, 1916.	Oct. 18, 1916.	Nov. 17, 1915.
No. 2 X, Philadelphia	**$25.00**	$24.00	$20.50	$17.25
No. 2, Valley furnace	**25.00**	24.00	20.00	15.75
No. 2 Southern, Cin'ti	**22.90**	20.90	18.40	16.40
No. 2, Birmingham, Ala.	**20.00**	18.00	15.50	13.50
No. 2, furnace, Chicago*	**26.00**	25.00	19.00	17.50
Basic, del'd eastern Pa.	**26.00**	25.00	20.00	17.50
Basic, Valley furnace	**25.00**	23.00	20.00	16.00
Bessemer, Pittsburgh	**29.95**	27.95	23.95	17.70
Malleable Bess., Ch'go*	**26.00**	25.00	19.50	17.50
Gray forge, Pittsburgh	**25.95**	23.95	20.45	15.95
L. S. charcoal, Chicago	25.75	25.75	20.25	17.25
Rails, Billets, etc., Per Gross Ton.				
Bess. rails, heavy, at mill	**38.00**	33.00	33.00	28.00
O.-h. rails, heavy, at mill	**40.00**	35.00	35.00	30.00
Bess. billets, Pittsburgh	**52.50**	50.00	45.00	27.00
O.-h. billets, Pittsburgh	**52.50**	50.00	45.00	27.00
O.-h. sheet bars, P'gh	**52.50**	50.00	45.00	28.00
Forging billets, base, P'gh	**76.50**	75.00	69.00	48.00
O.-h. billets, Phila.	**55.00**	50.00	50.00	34.00
Wire rods, Pittsburgh	**65.00**	60.00	55.00	37.00
Finished Iron and Steel,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Iron bars, Philadelphia	2.659	2.659	2.659	1.769
Iron bars, Pittsburgh	2.85	2.85	2.75	1.60
Iron bars, Chicago	**2.65**	2.40	2.25	1.50
Steel bars, Pittsburgh	2.75	2.75	2.75	1.70
Steel bars, New York	2.919	2.919	2.919	1.869
Tank plates, Pittsburgh	**4.25**	4.00	4.00	1.70
Tank plates, New York	**4.419**	4.169	4.169	1.869
Beams, etc., Pittsburgh	**2.80**	2.75	2.75	1.60
Beams, etc., New York	**2.969**	2.869	2.869	1.769
Skelp, grooved steel, P'gh	2.70	2.70	2.50	1.60
Skelp, sheared steel, P'gh	2.80	2.80	2.60	1.70
Steel hoops, Pittsburgh	**3.10**	3.00	3.00	1.75

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire,	Nov. 15, 1916.	Nov. 8, 1916.	Oct. 18, 1916.	Nov. 17, 1915.
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh	**3.65**	3.50	3.30	2.25
Sheets, galv., No. 28, P'gh	**5.25**	5.00	4.40	4.00
Wire nails, Pittsburgh	2.85	2.85	2.70	1.90
Cut nails, Pittsburgh	2.80	2.80	2.60	1.80
Fence wire, base, P'gh	2.80	2.80	2.65	1.75
Barb wire, galv., P'gh	3.70	3.70	3.55	2.75
Old Material, Per Gross Ton:				
Iron rails, Chicago	**$25.00**	$23.00	$20.00	$15.00
Iron rails, Philadelphia	**23.00**	21.00	21.00	17.50
Carwheels, Chicago	**16.50**	16.00	13.00	13.25
Carwheels, Philadelphia	**18.00**	17.00	15.50	14.00
Heavy steel scrap, P'gh	**21.00**	20.00	18.50	16.00
Heavy steel scrap, Phila.	**19.50**	17.00	16.00	14.50
Heavy steel scrap, Ch'go	**20.50**	19.75	16.75	13.50
No. 1 cast, Pittsburgh	17.00	17.00	16.00	14.00
No. 1 cast, Philadelphia	**18.00**	17.00	16.00	14.50
No. 1 cast, Ch'go (net ton)	15.50	15.50	13.50	12.00
No. 1 RR. wrot, Phila.	23.50	23.50	22.00	16.00
No. 1 RR. wrot, Ch'go (net)	**21.00**	20.00	17.75	13.25
Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	$7.50	$7.50	$5.00	$2.25
Furnace coke, future	*8.75*	4.00	3.50	2.50
Foundry coke, prompt	7.00	7.00	3.75	3.00
Foundry coke, future	7.00	7.00	4.00	3.00
Metals,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	**32.50**	29.50	28.50	19.00
Electrolytic copper, N. Y.	**32.50**	29.50	28.50	18.87½
Spelter, St. Louis	**11.25**	10.50	9.50	17.12½
Spelter, New York	**11.50**	10.75	9.62½	17.37½
Lead, St. Louis	**6.90**	6.87½	6.85	5.15
Lead, New York	7.00	7.00	7.00	5.25
Tin, New York	**44.12½**	42.25	40.75	42.75
Antimony (Asiatic), N. Y.	**13.00**	12.75	13.00	37.50
Tin plate, 100-lb. box, P'gh.	$6.00	$6.00	$5.75	$3.30

portant consuming centers. A leading sheet mill, whose plant is about 30 miles east of Pittsburgh, has had several cars of sheets rejected that were for delivery to points less than 100 miles west of Pittsburgh. There is not only a great scarcity in the supply of cars but also in motive power. The car situation will no doubt get worse if snow and bad weather come, and this will mean still further delayed deliveries.

Pig Iron.—Prices are steadily going up, and from all appearances the end is not yet. Two sales, aggregating 15,000 tons or more of Bessemer iron, have been made for first quarter at $29, Valley furnace. Negotiations are now on for probably 25,000 tons. It is doubtful whether any could now be picked up under $30. Early last week basic sold at $23 at furnace, while this week it has sold in large lots at $25. Foundry iron is also higher, No. 2 having sold at $25 to $26 at furnace. An inquiry is in the market for 6000 tons of Bessemer for delivery in Canada in the second half of 1917, but it is doubtful if any part of this iron can be obtained in this market. We note a sale of 4500 tons of Bessemer for delivery in first half at $28, Valley furnace, made on Saturday, Nov. 11. This iron will be shipped to an ingot mold plant in this city, to be made into ingot molds for delivery to a large open-hearth steel plant in western Ohio. We also note a sale of 1000 tons of Bessemer iron at $28, Valley, made late last week. A sale of 3000 tons of Bessemer was made at about $27 and 10,000 tons of basic iron to the same consumers on Friday, Nov. 10, at $24, Valley furnace, all this iron being for delivery in the second half. A sale of 7000 tons of basic was made for first quarter at $25, Valley furnace, and 2000 tons of basic for delivery this year at $24. A sale is also reported of 600 tons of Bessemer for second quarter of 1917 at $30, Valley furnace. A Youngstown open-hearth interest is reported in the market for about 20,000 tons of basic for delivery over first half. There is a very great scarcity of Bessemer and basic iron, and predictions are freely made that prices are going much higher. We quote: Standard Bessemer iron, $29 to $30; basic, $25; malleable Bessemer, $27 to $28; No. 2 foundry, $25 to $26, and gray forge, $25, all at Valley furnace, the freight rate for delivery in the Cleveland and Pittsburgh districts being 95c. per ton.

Ferroalloys.—A local interest reports a sale of 100 tons of 10 per cent ferrosilicon at $35 for delivery in first quarter. New inquiry for ferromanganese is heavier, a leading consumer being in the market for 600 tons, equal deliveries in first half. We quote 80 per cent English at $162 to $164, seaboard, and 80 per cent domestic at $160 to $162 at furnace, freight added to point of delivery. We quote 18 to 22 per cent spiegeleisen at $50 to $55, and 25 to 30 per cent at $65 to $75, delivered. We quote 50 per cent ferrosilicon for delivery next year in lots up to 100 tons at $100; 100 tons to 600 tons, $99, and over 600 tons, $98, all per gross ton, f.o.b. Pittsburgh. We quote 9 per cent at $32; 10 per cent, $33; 11 per cent, $34; 12 per cent, $35; 13 per cent, $36.50; 14 per cent, $38.50; 15 per cent, $40.50, and 16 per cent, $43. We quote 7 per cent silvery at $26.50; 8 per cent, $27; 9 per cent, $27.50; 10 per cent, $28; 11 per cent, $29, and 12 per cent, $30. These prices are f.o.b. furnace, Jackson or New Straitsville, Ohio, and Ashland, Ky., all of which have a freight rate of $2 per gross ton to the Pittsburgh district.

Billets and Sheet Bars.—It is not believed that any soft Bessemer or open-hearth billets or sheet bars could be picked up at this time at less than $55 per gross ton at mill. It is reported, but not confirmed, that the leading steel interest has about closed a contract for upward of 300,000 tons of forging billets for shells for the Allies, British specifications to apply. It is also stated that another order for 200,000 tons was taken last week by an Eastern mill, and that these two orders are part of an inquiry for 900,000 tons of forging billets that came out about two weeks ago for the Allies, either British or French specifications to apply. A sale of 1000 tons of open-hearth sheet bars for fairly prompt shipment is reported at $57.50, maker's mills. The $50 price on billets and sheet bars rolled from soft Bessemer or open-hearth steel seems to have disappeared.

We note a sale of 50 tons of ordinary carbon forging billets for delivery this year at $76.50, f.o.b. Pittsburgh. We quote base sizes and base carbons of Bessemer and open-hearth billets and sheet bars at $52.50 to $57.50 at maker's mill, Youngstown or Pittsburgh. We quote forging billets at $76.50 for sizes up to, but not including, 10 x 10 in. and for carbons up to 0.25.

Plates.—New orders for steel cars came out very freely the past week. The Pressed Steel Car Company has taken 500 tank cars for the Santa Fé, 500 gondola repairs and 120 box car repairs for the Chesapeake & Ohio, and 350 ore cars for the Northern Pacific. The Cambria Steel Company has taken 1000 steel hoppers for the Philadelphia & Reading and 1000 for the Cambria & Indiana. The Southern Railway has placed about 1300 gondola cars with the Pressed Steel Car Company, and is inquiring for 1500 box cars. The New York Central has applied for authority to issue $12,000,000 in equipment trust certificates, and the equipment to be purchased includes 4000 steel box cars, 3000 all-steel coal cars, 100 steel passenger coaches, 100 steel baggage cars, 30 multiple unit cars and 10 electric locomotives. The H. C. Frick Coke Company is reported in the market for 1100 steel coke cars and the Baltimore & Ohio Railroad for 5000 cars. The congested condition of the plate mills is steadily getting worse. Local fabricators say they have placed orders for sheared plates with Eastern mills at 4.75c. at mill for delivery in four to six months. The mill price of the Carnegie Steel Company on sheared plates is 3.25c. at mill, but it has no plates to sell for delivery before at least the first quarter of 1918. Other plate mills that can ship in four to six months are quoting 4.50c. at mill, and have taken orders at this price for delivery in second and third quarters of next year. For delivery in two to three months, ¼-in. and heavier sheared plates have sold at 5c. at mill, and in small lots as high as 5.50c. at mill. Any mill that can make the deliveries wanted can get practically any price it asks.

Steel Rails.—Fairly large orders for standard sections are being placed with the Carnegie Steel Company for delivery at its convenience, which means about the third quarter of 1917. The demand for light rails is more active than for some time, the coal companies buying quite freely. We quote 25 to 45 lb. sections at $47; 16 and 20 lb., $48; 12 and 14 lb., $49, and 8 and 10 lb., $50, in carload lots, f.o.b. at mill, the usual extras being charged for less than carload lots. We quote standard section rails of Bessemer stock at $33 and of open-hearth $35, per gross ton, Pittsburgh.

Structural Material.—The chief trouble of fabricators continues to be that of getting material rather than orders. Some fairly large jobs were placed in the past week. The American Bridge Company has taken two steel car floats for the New York, Pennsylvania & Norfolk Railroad at Cape Charles, Va., about 600 tons; 4000 to 5000 tons for new steel buildings for the Firestone Tire & Rubber Company, Akron, Ohio, and has also taken the steel for extensions to buildings of the American Sheet & Tin Plate Company at Farrell and New Castle, Pa. The McClintic-Marshall Company has taken a bridge over the Kennebec River for the Maine Central Railroad 3500 tons; about 2000 tons for additions to the mills of the Inland Steel Company, Indiana Harbor, Ind., and 650 tons for a steel building for the General Electric Company, Lynn, Mass. The Penn Bridge Company has taken 400 tons for a new building for the Co-operative Stove Company, Rochester, Pa., and the Riverside Bridge Company, 400 tons, for a new building for the National Tool Company. We quote beams and channels up to 15 in. at 2.80c. to 3c. at mill, depending on deliveries, while small lots from stock for fairly prompt shipment are quoted at 3.25c. to 3.50c., Pittsburgh.

Sheets.—There is an abnormally heavy demand for all grades, especially galvanized, and prices have advanced sharply. There is a great scarcity in galvanized sheets, and consumers that are not covered for first quarter are having trouble in finding mills that will agree to take their orders. The nominal price on No. 28 galvanized sheets of the American Sheet & Tin Plate Company is 5c. at mill, but it is oversold for the first quarter. Some independent mills are quoting 5.50c. and higher for No. 28 galvanized, and the minimum of the market is 5.25c. at mill. On Bessemer black sheets none of the independent mills is quoting less than the price of the leading interest, and some are quoting higher. A distinct shortage in the supply of all kinds of sheets is looming up and promises to be as acute as that which exists in tin plate. Several large sheet mills have allotted their output for the first quarter and sales agents are not permitted to sell more than the quantity named to them. Minimum prices now ruling on sheets in carloads and larger lots are as follows: Blue annealed sheets, Nos. 3 to 8, 3.50c. to 3.60c.; box annealed, one-pass, cold-rolled sheets, No. 28, 3.65c. to 3.75c.; No. 28 galvanized, 5.25c. to 5.50c., and No. 28 tin-mill black plate, 3.40c. to 3.50c., all f.o.b., Pittsburgh.

Tin Plate.—Three or four of the largest makers, in addition to the American Sheet & Tin Plate Company, are out of the market as sellers of tin plate for delivery in the first half, having their entire output sold for that period. For the second half a large amount has been sold by the mills, but at no fixed price, this to be at whatever prices hereafter agreed upon. Some important consumers have not yet fully covered their needs for the first half, and have inquiries out for very large quantities. We quote bright plate, 14 x 20, at $6 to $6.25 per base box, f.o.b., Pittsburgh, for delivery in the first half, while small lots from stock bring as high as $6.50.

Shafting.—Makers are catching up on deliveries to some extent and the discount of 20 per cent off is growing more common. Most large consumers have covered for the first quarter and some for the first half. Specifications against contracts are coming in freely. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots and 10 per cent off in less than carload lots for first quarter and first half of 1917, f.o.b., Pittsburgh, freight added to point of delivery.

Wire Products.—The advance of $3 per ton on wire nails and wire, effective from Nov. 6, is not only being firmly held, but there is strong talk of another advance that will put wire nails on the basis of $3 per keg. The domestic demand for wire and wire nails is abnormally heavy, and all the mills are far back in deliveries. The shortage in cars and motive power is holding back shipments and some of the large hardware jobbers are badly in need of larger supplies of both nails and wire. The export demand is also heavy, but the mills are largely passing this up in order to give their full output to their domestic trade. Prices now in effect are as follows: Wire nails, $2.85, base, per keg; galvanized, 1 in. and longer, including large head barbed roofing nails, taking an advance over this price of $2, and shorter than 1 in., $2.50. Bright basic wire is $2.90 per 100 lb.; annealed fence wire, Nos. 6 to 9, $2.80; galvanized wire, $3.50; galvanized barb wire and fence staples, $3.70; painted barb wire, $3; polished fence staples, $3; cement-coated nails, $2.75, base, these prices being subject to the usual advances for the smaller trade, all f.o.b., Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing are 55 per cent off list for carload lots, 54 per cent for 1000-rod lots and 53 per cent for small lots, f.o.b., Pittsburgh.

Railroad Spikes and Track Bolts.—The spike trade is quiet, the only new inquiry of note being from the Norfolk & Western for 8000 kegs for delivery in the first half. Specifications against contracts are dull and some local spike makers are running only a few machines. The demand for track bolts is fair and prices are firm. We quote track bolts with square nuts at 4.50c. to 4.75c. to railroads and 5c. to 5.25c. in small lots to jobbers, base. Track bolts with hexagon nuts take the usual advance of 15c. per 100 lb. Prices on spikes are as follows:

Standard railroad spikes, ½ x 9/16 in. and larger, $2.65 to $2.75; railroad spikes, ½ to 7/16 in., $2.75 base; railroad spikes, [illegible] $3.05 base; boat spikes, $2.80 base, all per 100 lb., f.o.b. Pittsburgh.

Rivets.—New demand is heavy, and makers say they cannot get out their full output on account of slow

deliveries of steel and shortage in labor. The export demand is also heavy. A shipment of two carloads for the other side of the Atlantic was made last week by a local maker. Prices are likely to be advanced this week. Makers' quotations are: Buttonhead structural rivets, ½ in. in diameter and larger, $4 per 100 lb., base, and conehead boiler rivets, same sizes, $4.10 per 100 lb., base, f.o.b. Pittsburgh. Terms are 30 days net, or one-half of 1 per cent for cash in 10 days.

Iron and Steel Bars.—The Carnegie Steel Company is still quoting 2.70c. on steel bars, but is reported to be filled up for all of 1917. Other makers that can ship in the second and third quarters of next year are quoting steel bars all the way from 2.75c. to 2.90c. at mill. The serious car shortage is interfering with shipments and all the mills are much behind in deliveries. We quote merchant steel bars at 2.70c. at mill, with no promise as to delivery, and from 2.75c. to 2.90c. for specified delivery in the second and third quarters. The new demand for iron bars is still heavy and mills are back in shipments. We quote refined iron bars at 2.85c. to 2.90c., and railroad test bars at 2.90c. to 3c., f.o.b. Pittsburgh.

Nuts and Bolts.—It is likely that this week prices will be advanced 10 per cent or more, due to the heavy demand and to the higher cost of steel bars. The export demand is also heavy, but local makers say they need their entire output for domestic consumers. Heavy premiums over regular prices are still being paid for fairly prompt shipment. Discounts in effect at this writing are as follows, delivered in lots of 300 lb. or more, where the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days:

Carriage bolts, small, rolled thread, 60 and 5 per cent; small, cut thread, 40, 10 and 5 per cent; large, 35 and 5 per cent.

Machine bolts, h. p. nuts, small, rolled thread, 50 and 10 per cent; small, cut thread, 50 per cent; large, 40 and 5 per cent.

Machine bolts, c. p. c. and t. nuts, small, 40 and 10 per cent; large, 35 per cent. Blank bolts, 40 and 5 per cent. Bolt ends, h. p. nuts, 40 and 5 per cent; with c. p. nuts, 35 per cent. Rough stud bolts, 15 per cent. Lag screws (cone or gimlet point), 50 and 5 per cent.

Forged set screws and tap bolts, 10 per cent. Cup and round point set screws, case-hardened, 60 per cent. Square or hexagon head cap screws, 55 per cent. Flat, button, round or fillister head cap screws, 30 per cent.

Nuts, h. p. sq., tapped or blank, $2.70 off list; hex., $2.70 off. Nuts, c. p. c. and t. sq., tapped or blank, $2.40 off; hex., $2.80 off. Semi-finished hex. nuts, 60 and 5 per cent. Finished and case-hardened nuts, 60 and 5 per cent.

Rivets, 7/16 in. in diameter and smaller, 45, 10 and 5 per cent.

Hoops and Bands.—The nominal price of the Carnegie Steel Company on steel hoops is still 3c. and on steel bands 2.70c., with extras as per the steel bar card, but with no promise whatever as to deliveries. Other makers that can ship during the first half of 1917 are quoting steel hoops from 3.10c. to 3.25c., and steel bands from 2.75c. up to 3c. at mill.

Cold-Rolled Strip Steel.—Further contracts have been made by large consumers for their supply of cold-rolled strip steel for delivery in the first quarter of 1917. None of the makers is willing to sell for delivery beyond that period because of the uncertainty of prices of raw steel and of the labor supply. There is a continued active export demand, for which local makers are not quoting, as their entire output will be needed to fill contracts already taken from domestic trade. We quote on contracts for first quarter delivery $6.50 to $7, while on small lots for fairly prompt shipment from $7 to $7.50 is quoted. Terms are 30 days net, less 2 per cent off for cash in 10 days, delivered in quantities of 300 lb. or more when specified for at one time.

Merchant Steel.—Some makers have again advanced prices about 10 per cent; others have not yet done so, but it is likely that they will by the end of the week. The new demand is abnormally heavy and all the mills are back in deliveries 8 to 10 weeks or longer. It is said that some large consumers have covered their needs for the first quarter of 1917, but at a very stiff advance over present prices, probably $5 per ton or more. Nominal prices on small lots are as follows: Iron-finished tire, ½ x 1½ in. and larger, 2.75c., base; under ½ x 1½ in., 2.85c.; planished tire, 2.90c.; smooth channel tire, ¾ to ⅞ and 1 in., 3c. to 3.10c.; 1⅛ in. and larger, 3.10c.; toe calk, 3.25c. to 3.50c., base; flat sleigh shoe, 2.75c; concave and convex, 2.85c.; cutter shoes, tapered or bent, 3.50c. to 3.75c.; spring steel, 4c. to 4.10c.; machinery steel, smooth finished, 3.10c. to 3.25c., all f.o.b. at mill.

Wrought Pipe.—Effective Wednesday, Nov. 15, the National Tube Company lowered discounts on black and galvanized butt and lap weld iron and steel pipe 1 point, equal to an advance of $2 per ton. The same advance was also made on all sizes of line pipe. On Nov. 1 discounts on lap-weld sizes of black and galvanized iron and steel pipe had been lowered 1 point, an advance of $2 per ton, but no change was then made on butt weld. The abnormal demand and the constantly increasing costs of the making of tubular goods of all kinds are the main reasons for the advance. Inquiries are in the market for several oil lines for the Oklahoma district, and for gas lines for the West Virginia and Kansas fields. It is doubtful, however, whether any large contracts for line pipe for reasonably prompt delivery could be accepted at this time as the mills are sold up far ahead. They are restricting quotations on lap-weld iron and steel pipe to regular customers only, being sold up for five to six months, but on butt-weld sizes can make deliveries in a month to six weeks. Two of the larger pipe mills report they have already taken orders this year for double the quantity of tubular goods they sold during all of 1915. Discounts now effective on black and galvanized iron and steel pipe are given on another page.

Wire Rods.—Owing to the heavy demand and the great scarcity in supply of wire rods, mills that can ship out fairly promptly can get almost any prices they ask. We note a sale of 3000 tons of soft steel rods for forward delivery at $65 per ton, and this is, no doubt, minimum of the market. The domestic demand is heavy, and there is a good deal of export inquiry, much of it from Canada. As high as $85 has been quoted on high carbon rods. We quote soft Bessemer, open-hearth and chain rods at $65 to $70 per gross ton, f.o.b. Pittsburgh.

Boiler Tubes.—Makers of iron and steel locomotive and merchant tubes report they are sold up for six to eight months or longer, and that specifications are very heavy. Premiums over regular prices are freely offered for fairly prompt delivery. Another advance in prices is looked for. Discounts now in effect are given on another page.

Coke.—Some furnace companies that have not yet covered for their supply of coke for the first half of 1917 are still holding off, waiting for lower prices. However, producers and dealers say that coke will be higher before it is lower. A Mahoning Valley furnace interest that has some coke ovens is in the market for 3000 tons per month for the first half, the quantity needed being over what its ovens produce. There are unconfirmed reports that high grade blast-furnace coke has sold for the first half at $4.25 per net ton at oven. About a month ago some contracts were made at $3.75, and later one contract for 10,000 tons per month for the first half was reported at $4. It is not likely that any high grade furnace coke could now be bought on contracts at less than $4, some producers asking more. Prompt furnace coke continues to command high prices; a sale of 30 to 40 cars has been made at $7.50 per net ton at oven. Coke labor is still very scarce, one leading producer having 40 ovens idle for lack of men. The scarcity of cars is also getting worse. An accumulation of loaded coal and coke cars on the main lines of the Pennsylvania Railroad between the Connellsville regions and the Pittsburgh district is adding to the shortage in cars, this road evidently needing more motive power. We continue to quote high grade blast-furnace coke for prompt shipment at $7.50 to $8 per net ton at oven, and on contracts from $3.75 to $4; best grades of 72-hr. foundry coke, $7 to $8 for spot shipment, and on contracts from $5 to $6. The Connellsville *Courier* gives the output of coke in the upper and lower Connellsville regions for the week ended

Nov. 4 as 408,282 net tons, a decrease over the previous week of 22,049 tons. This decrease was largely due to labor shortage. The high prices ruling for coal are also restricting the output of coke. Several sales of run-of-mine coal have been made at $6 per net ton at mine. Coal at this price shows a larger profit than coke at $7.50 to $8 per ton.

Old Material.—Prices on nearly all classes of scrap have gone up from 50c. to $1 per ton, and the market shows signs of going higher. A leading consumer has bought 5000 to 6000 tons of selected heavy steel scrap, specifications for which require that no pieces weighing less than 15 lb. will be accepted for delivery at Sharon, Pa., and Alliance, Ohio. It is said the price was $21 and higher. We also note sales of 500 tons and 300 tons of cast-iron borings at $8.50; about 1000 tons of old carwheels at $16.50, and 600 tons of low phosphorus melting scrap at $25, all per gross ton, delivered at consumers' mills. It is said the available supply of scrap of all kinds is light, and dealers that have it stocked in their yards are holding it for higher prices. Prices now being quoted by dealers for delivery in Pittsburgh and points that take the same rates of freight, per gross ton, are as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	$21.00 to $22.00
No. 1 foundry cast	17.00 to 17.50
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	21.50 to 22.00
Hydraulic compressed sheet scrap	16.50 to 17.00
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	13.50 to 14.00
Bundled sheet stamping scrap	13.00 to 13.50
No. 1 railroad malleable stock	17.50 to 18.00
Railroad grate bars	12.50 to 13.00
Low phosphorus melting stock	24.50 to 25.00
Iron car axles	42.00 to 43.00
Steel car axles	42.00 to 43.00
Locomotive axles, steel	44.00 to 45.00
No. 1 busheling scrap	16.00 to 16.50
Machine-shop turnings	8.50 to 9.00
Old carwheels	16.50 to 17.00
Cast-iron borings	10.00 to 10.50
*Sheet bar crop ends	21.50 to 22.00
No. 1 railroad wrought scrap	21.00 to 21.50
Heavy steel axle turnings	13.00 to 13.50
Heavy breakable cast scrap	16.00 to 17.00

*Shipping point.

Chicago

CHICAGO, ILL., Nov. 15, 1916.—(*By Wire.*)

With prices climbing steadily, and the available supply of materials falling short of consumers' demands by continually widening margins, the market becomes daily more restricted and abnormal. The mills report another week of bookings greatly in excess of shipments. While the principal orders were for car steel, two railroads bought 17,000 tons of tie-plates and contracts for fabricated building steel totaled 5000 tons. There was less buying of cars than in the preceding week, the largest purchase being 2400 cars by the Illinois Central. The resumption of rail buying for 1918 delivery seems to be imminent, and, as not more than 120,000 tons has already been placed at Chicago, further buying will doubtless run into large figures. The limited supply of plates and sheets is being more keenly felt. Buyers are finding it necessary to content themselves with a fraction of the quantities they undertake to buy. Store prices of sheets have been advanced $2 per ton. Iron bars are now quoted by the leading mills at 2.65c., Chicago. Following the $1 advance of last week, cast-iron pipe is up an additional $3. For No. 2 foundry pig iron $26 is now asked at Chicago and $20 at Birmingham, though for last half Southern iron can be had at $19. Scrap prices are changing daily and are jumping upward at a rate which threatens shortly to outdistance the related prices of finished materials.

Pig Iron.—Inquiry for pig iron, while not so voluminous as at the height of the buying movement, has continued in sufficient quantity to crowd the selling interests. Opportunity is still presented to take orders in amounts up to 5000 tons, and one inquiry contemplates the purchase of 10,000. It is a question whether any maker at Chicago could now sell as much as that to any one customer. For standard No. 2 foundry, malleable and basic, $26 is being quoted at Chicago, and higher phosphorus irons are held at $25 to $25.50. For the first half the South has very little iron to offer and is asking $20, Birmingham, but among the large Southern producers there is a disposition to book some iron for the last half and for this delivery $19 has been done. Sales at Chicago for last half shipment from the South already exceed 10,000 tons. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of $1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5	$25.75 to $26.25
Lake Superior charcoal, No. 1	26.25 to 26.75
Lake Superior charcoal, No. 6 and Scotch	26.75 to 27.25
Northern coke foundry, No. 1	26.50
Northern coke foundry, No. 2	26.00
Northern coke foundry, No. 3	25.50
Northern high phosphorus foundry	25.00 to 25.50
Southern coke No. 1 f'dry and 1 soft	24.50 to 25.00
Southern coke, No. 2 f'dry and 2 soft	24.00 to 24.50
Malleable Bessemer	26.00
Basic	26.00
Low phosphorus	40.00
Silvery, 8 per cent	34.50 to 35.50
Bessemer ferrosilicon, 10 per cent	40.50 to 42.50

(*By Mail*)

Rails and Track Supplies.—It is understood that consideration is being given this week to the question of rails for 1918 delivery by some of the leading mills which, after having booked a few orders, have more recently declined to entertain similar inquiry. The decision to reopen the books is expected to bring with it the announcement of a new price. Buying of track fastenings is going on apace. The Atlantic Coast Line has added 7000 tons of tie-plates to its previous purchase at Chicago, making its total order 13,500 tons, and the Northern Pacific has ordered 10,000 tons. While unable to accept further orders for track bolts, local mills are receiving sizable tonnages of spikes and angle bars. Quotations are as follows: Standard railroad spikes, 2.75c., base; track bolts with square nuts, 3.25c. to 3.50c., base, all in carload lots, Chicago; tie-plates, $52 to $54, f.o.b. mill, net ton; standard section Bessemer rails, Chicago, $33, base; open-hearth, $35; light rails, 25 to 45 lb., $40; 16 to 20 lb., $41; 12 lb., $42; 8 lb., $43; angle bars, 2.25c., Chicago.

Plates.—There is no essential change in the plate situation. It is less easy to place business in the desired quantity, and frequent instances are noted where buyers have had to content themselves with half of the quantity for which inquiry was made. We quote for Chicago delivery of plates from mill at its convenience 3.439c. For prompt shipment we quote 3.689c. to 3.939c. in widths up to 72 in., and for wide plates 4.439c. to 4.689c.

We quote for Chicago delivery of plates from jobbers'

Structural Material.—The flood of car buying was somewhat moderated last week, though the placing of 1000 cars each with the Haskell & Barker and Pullman companies by the Illinois Central and its further purchase of 400 ballast cars, the ordering of 1000 cars from Haskell & Barker by the Soo Line, the purchase of 750 additional cars by the Baltimore & Ohio, added to the large number of cars placing of which is imminent, sustain interest. A wider market for fabricated steel appears to have developed, and reports from bridge shops indicate much heavier bookings in October, running up in some instances to 150 per cent of capacity. This condition is also reflected in further buying of plain material by fabricators who had thought themselves fully covered. Contracts reported closed last week included 1450 tons of bridge steel for the Great Northern Railroad, 1200 tons for the Northern Pacific, 325 tons for ore-handling bridges for the Buffalo Union Furnace Company, and 500 tons for a like purpose for the Ford Motor Company, Detroit, all taken by the American Bridge Company; 1100 tons of bridge steel for the Great Northern, placed with the Wisconsin Bridge & Iron Company, and two smaller contracts of 250 tons each. The Harroun Motor Com-

pany, Detroit, has placed a contract for its buildings with the Pan-American Bridge Company, New Castle, Ind. A tighter situation in the supply of plain material is indicated in the substitution in delivery quotations of six months instead of three, by a large independent interest, and the advancing of its price to the basis of 3c., Pittsburgh. We quote for Chicago delivery of structural steel from mill 2.989c. to 3.189c.

We quote for Chicago delivery of structural steel from jobbers' stocks 3 ... c.

Sheets.—There remain but a limited number of mills that have any kind of sheets to sell for the first quarter, and the amount of business that is being declined daily is emphatic evidence of the abnormal situation. For such business as the prompt shipment mills are still able to accommodate, prices vary over a considerable range. We quote, for Chicago delivery, blue annealed, No. 16 and heavier, 3.439c. to 3.589c.; box annealed, No. 17 and lighter, 3.839c. to 3.939c.; No. 28 galvanized, 5.689c. to 6c.

Store prices for sheets have been advanced and we quote for Chicago delivery out of stock, nothing prices applying on bundles of 25 or more, as follows: No. 10 blue annealed, 3.80c.; No. 28 black, 4c. to 4.10c.; No. 28 galvanized, 5.50c. to 5.60c.

Bars.—The makers of bar iron have advanced their price to 2.65c., Chicago, and one mill rolling rail carbon steel is quoting 2.75c. for its product, though 2.60c. can still be done. The activity on the part of the implement interests in respect of mild steel bars appears to have run its course. We quote mill shipment, Chicago, as follows: Bar iron, 2.65c.; soft steel bars, 2.889c.; hard steel bars, 2.60c.; shafting, in carloads, 20 per cent off; less than carloads, 15 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 3.35c.; bar iron, 3.35c.; reinforcing bars, 3.35c. base with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting net list.

Rivets and Bolts.—One of the anomalies in the market is found in connection with recent railroad contracts for nuts. Lower prices are stated to have been made for the first half than were made on the contracts for the half year period now drawing to a close. For bolts, the prices are much firmer and the generally prevailing discounts appear to be regularly observed. Recent sales of rivets, among them orders for some 3000 tons, have been made at approximately 4c., Pittsburgh. We quote as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 50-5; cut thread, 40-10-2½; larger sizes, 35-2½; machine bolts up to ⅜ x 4 in., rolled thread, with hot pressed square nuts, 50-10; cut thread, 50; large size, 40-5; gimlet-point coach screws, 50-5; hot pressed nuts, square, $2.70 off per 100 lb.; hexagon, $2.70 off. Structural rivets, ¾ to 1¼ in., 4c. to 4.15c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

Store prices for rivets have been advanced and we quote as follows: Structural rivets, 4.25c.; boiler rivets, 4.35c.; machine bolts up to ⅜ x 4 in., 50; larger sizes, 10-5; carriage bolts up to ⅜ x 6 in., 40-10; larger sizes, 35-5; hot pressed nuts, square, $3, and hexagon, $3 off per 100 lb.; lag screws, 50-5.

Cast-Iron Pipe.—A sharp advance of $3 per ton in the price of cast-iron pipe is announced here this week. New business includes inquiries for 300 tons at Winnipeg, Can., and 1500 tons at Duluth. We quote as follows, per net ton, Chicago: Water pipe, 4 in., $38.50; 6 in. and larger, $35.50, with $1 extra for Class A water pipe and gas pipe.

Wire Products.—The careful avoidance of all but the most necessary sales by the principal makers of wire products is limiting activity in these lines. We quote as follows per 100 lb.: Plain wire, Nos. 6 to 9, base, $3.089; wire nails, $3.039; painted barb wire, $3.189; galvanized barb wire, $3.889; polished staples, $3.189; galvanized staples, $3.889; all Chicago.

Old Material.—Trading is general. While none of the principal consumers appears to be in need of any considerable quantities of scrap, little is offered to them at prices approximating the market level that is not taken. The general scarcity of old material is inconsistent with the offering to consumers of any large amounts. Dealers are finding it necessary to observe considerable caution, in view of the rapid advances in price, and short sales are practically eliminated. An especially pronounced scarcity is noted in rerolling rails. Wrought scrap is again decidedly higher, and busheling has been even more sharply advanced. Quotations are changing so rapidly that the market range is represented by a much wider spread in prices than ordinarily rules. Offerings of railroad scrap continue much below [illegible] this week being those from the Big Four and Chicago & Alton. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
Shoveling steel	13.00 to 13.50
Steel axle turnings	10.00 to 10.50

Per Net Ton

Iron angles and splice bars	[illegible]
Iron arch bars and transoms	[illegible]
Steel angle bars	18.50 to 19.00
Iron car axles	[illegible]
Steel car axles	[illegible]
No. 1 railroad wrought	[illegible]
No. 2 railroad wrought	[illegible]
Cut forge	[illegible]
Pipes and flues	14.50 to 15.00
No. 1 busheling	[illegible]
No. 2 busheling	[illegible]
Steel knuckles and couplers	23.50 to 24.50
Steel springs	[illegible]
No. 1 boilers, cut to sheets and rings	12.50 to 13.00
Boiler punchings	[illegible]
Locomotive tires, smooth	25.00 to 26.00
Machine-shop turnings	7.00 to 7.50
Cast borings	[illegible]
No. 1 cast scrap	[illegible]
Stove plate and light cast scrap	12.25 to 12.75
Grate bars	[illegible]
Brake shoes	[illegible]
Railroad malleable	[illegible]
Agricultural malleable	[illegible]

Philadelphia

PHILADELPHIA, PA., Nov. 14, 1916.

Pig-iron is quieter, largely because of the greater reluctance of furnace managers to dispose of their product too far into next year, in view of the uncertainties which confront them, particularly with regard to coke. One furnace in the past week bought 50 cars of prompt coke at $7.50, at oven, and those who have not suffered from interruptions to deliveries are beginning to become apprehensive. The general quotation for any delivery of No. 2 X foundry iron is $25, though for November or December this might be shaded. Basic has sold for delivery near New York at $26, delivered. The embargoing by the railroads of New England, Philadelphia and other points is a further source of worriment. In steel the overwhelming demand for plates continues the feature, with 4c., Pittsburgh, still the dominant quotation for tank plates. Ship plates are scarce, and quoted up to 5.50c., Pittsburgh. Shapes are strong at 3c., Eastern mill, or Pittsburgh, according to place of delivery. Sheets are active and higher at 3.659c., Philadelphia, for No. 10 blue annealed. The scrap market has advanced sharply, with most grades moving actively. Only one nearby mill has purchased heavy steel scrap to any considerable extent, but prices outside of this territory are having their effect. For one lot, at least, $20 was paid, and dealers are asking $2.50 to $3 per ton above last week's prices.

Pig Iron.—The market is quieter, not only for the reason that consumers are less excited, but also because producers are even more unwilling to sell far into next year than they were a week ago. Strong in their minds are the uncertainties as to their fuel supply, the cost and supply of ore and securing adequate labor. Were it not for these considerations they would be selling more for last half of 1917 delivery. Some makers are holding back on their first-quarter business, "marking time" as one expressed it, until a more definite policy for the future is determined. As a matter of fact, some of the sellers are as much at sea with regard to the market as are consumers. One furnace was obliged to buy 50 cars of spot coke at $7.50, at oven, and even those whose coke deliveries have been regular are worried over the outlook. The situation is made more tangled by the Pennsylvania Railroad placing an embargo against Philadelphia, certain New York and Brooklyn terminals and other points, while the New

York, New Haven & Hartford has embargoed its territory, at least so far as Virginia iron is concerned, the latter becoming effective Nov. 9. The Merchants' & Miners' steamers, Norfolk to Boston, also are refusing to take iron. Meanwhile it is not difficult to secure November or December iron at recently quoted prices. As a rule sellers are not differentiating between deliveries in the matter of prices, but concessions might be obtained where spot iron is involved. Both eastern Pennsylvania and Virginia No. 2 X have been taken at $25, furnace, or $25.79, Philadelphia, for Northern iron, and $27.75, Philadelphia, for the Virginia product. One maker of Virginia is reported to be still taking business at $24, furnace, but a maker of Pennsylvania iron wants $25.50, furnace, or $27.40, Philadelphia. No large inquiries are before the trade, but the aggregate of those ranging from 50 to 250 tons is excellent. The last sale of charcoal iron here was made at $32, Philadelphia, and the makers are out of the market for the first half. Standard low phosphorus has continued extremely active, and the quotation is now up to $45, Philadelphia. In the past week one interest placed probably 20,000 tons, but must soon call a halt. The result of the national election had no effect on the buying. For delivery near New York, 1000 tons of basic was placed at $26, delivered. Quotations for standard brands delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa. No. 2 X foundry	$25.50 to $26.00
Eastern Pa. No. 2 plain	24.50 to 25.00
Virginia No. 2 X foundry	26.75
Virginia No. 2 plain	26.50
Gray forge	23.50 to 24.50
Basic	26.00
Standard low phosphorus	45.00

Iron Ore.—In the week ended Nov. 11 the following arrivals of foreign ore were reported at this port: From Chile, 3400 tons; Sweden, 4946 tons. An effort has been made in the week to place a cargo of North African ore, with what success has not been ascertained. It is a question who can buy with ocean freights where they are.

Ferroalloys.—Domestic 80 per cent ferromanganese can be had at $165, delivered over the remainder of the year, and around $160 for the first half. No prompt imported is being offered, but for the first half $164, seaboard, continues to be quoted. Imports which are used to fill contracts are coming with fair regularity. Spot ferrosilicon is scarce, and contract terms have not been entirely formulated. It is expected that they will range from $100 to $110, Pittsburgh. An importation of a quarter of a ton of ferrotantalum arrived here last week.

Plates.—Most of the mills continue to quote 4.159c., Philadelphia, for tank plates, a figure which might be shaded under the right circumstances. Ship plates are stronger than ever, and the demand is more insistent for deliveries far into next year. One mill quotes 4.909c., Philadelphia, on tank steel, and 10.40c., Pittsburgh, for marine boiler steel. For ship plates, 5.50c., Pittsburgh, or 5.659c., Philadelphia, is quoted. Many large inquiries, more or less tentative in character, specify deliveries through 1917, and in a few cases into 1918. In one case 6c., Pittsburgh, was quoted on 6000 tons for last half delivery, with the idea of keeping business away. The many recent car contracts have comfortably filled the mills with orders for universal plates.

Bars.—Quotations for steel bars range from 2.859c. to 3.159c., Philadelphia, the lower figure applying only to business done with old and preferred customers. Iron bars are unchanged at 2.659c., Philadelphia, for carload lots.

Billets.—Open-hearth rerolling billets are stronger because of the sold-up condition of the makers and are now held at $55. Forging steel is unchanged at $65 to $75.

Sheets.—The market is very active, and No. 10 blue annealed sheets are stronger at 3.659c. to 3.909c., Philadelphia.

Structural Material.—Quotations are quite uniform at 3.159c., Philadelphia, although one mill regulates its base of 3c., in accordance with the territory to which delivery is made, using either Pittsburgh or mill as the freight rates are favorable or unfavorable. The demand for miscellaneous material is good. The Victor Talking Machine Company, Camden, N. J., will require 400 to 500 tons, on which bids are to be taken Nov. 15.

Coke.—Spot furnace coke is quoted at $7.50 to $8 per net ton at oven, and noteworthy sales have been made at the lower price. A contract for the first half is reported to have been placed at $6.50 per ton, while the nominal quotations for the next year are $3.75 to $4 per ton. Spot foundry ranges from $9 to $10 per net ton at oven. Makers are not desirous of contracting, at the nominal level of $6 to $7 per ton. As disclosed by the iron market, the situation is a most disquieting one. Freight rates from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Old Material. — Though as yet there have been but moderate sales of heavy melting steel, with only one mill active in the market, the demand outside of this district continues strong, and dealers are buying. Advances have been sharp and up to $20 has been paid for heavy steel. The entire list is active, and still higher prices are predicted. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$19.50 to $20.00
Old steel rails, rerolling	24.00 to 25.00
Low phos. heavy melting steel scrap	27.00 to 28.00
Old steel axles (for export)	40.00
Old iron axles (for export)	40.00
Old iron rails	23.00 to 24.00
Old carwheels	18.00 to 19.00
No. 1 railroad wrought	23.50 to 24.00
Wrought-iron pipe	17.00 to 17.50
No. 1 forge fire	14.00 to 14.50
Bundled sheets	14.00 to 14.50
No. 2 busheling	10.50 to 11.00
Machine-shop turnings	9.50 to 10.00
Cast borings	11.50 to 12.00
No. 1 cast	18.00 to 18.50
Grate bars, railroad	14.00 to 14.50
Stove plate	14.00 to 14.50
Railroad malleable	16.50 to 17.00

Birmingham

BIRMINGHAM, ALA., Nov. 13, 1916.

Pig Iron.—The long-predicted $20 iron became a reality in several purchases during the week ended Nov. 11, and on that day the price was made minimum for all deliveries by the leading interest. The largest foundry iron producer having already marked its price up to that, and these two being the only concerns in the open market, this thoroughly established the $20 basis. As much as 10,000 tons for Middle Western delivery sold at $19 around Thursday, while a lot of high silicon went at $23, the equivalent, based on the analysis of the metal, of $21 for No. 2 foundry. The formal advance to $20 was made Saturday at noon. Charcoal iron joined the advancing column by rising to $25, with sales made at that figure. What the spot price may be at any time depends upon the status of the consumer and the attitude of the furnaceman. It is not at all unlikely that there will be sales in the immediate future at from $22 to as high as $25 if the seller chooses. Sales during election week averaged around $18.50 to $19. The formal rise from $18.50 to $20 as a general market basis took place from Friday afternoon, 10th, to Saturday noon, 11th. The iron movement is much better. Two of the largest interests report stocks going down as compared with output. This will serve to do away rapidly with the something over 200,000 tons of free foundry iron in yards at the beginning of the month. As a rule, makers appear to have sold between 50 and 60 per cent of capacity through the first half of 1917—some more than that. One interest declines to make quotations at all. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	$20.50
No. 2 foundry and soft	20.00
No. 3 foundry	19.50
No. 4 foundry	19.25
Gray forge	19.00
Basic	20.00
Charcoal	25.00

Cast-Iron Pipe—Very little new business has been received, although several contracts are reported under consideration (in apprehension of further rises in price)

on the part of those who must have pipe soon. Prices have been marked up $1 per ton with some reluctance, owing to the fear of cutting down business, but further advances may ensue. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., $30; 6-in. and upward, $27, with $1 added for gas pipe and special lengths.

Coal and Coke—Steam coal is going readily at $2.50 to $3 per ton on new business, sometimes higher. Territory never taking Alabama coal heretofore has applied for it. Mexico has taken several hundred cars of smelter coke. Contract foundry coke is still moving at $4.25 to $4.50 per net ton at oven, but when the makers have a surplus over specifications on delivery, they get as much as $5. Consumers heretofore slow about taking Alabama makes are becoming used to them. Furnace coke is selling at $3.50 to $3.75 per ton.

Old Material—There is much activity in the market, with an all round demand for all kinds of material. Resumption at a local rolling mill has eaten up the wrought scrap supply, and mills in Chattanooga, Atlanta and Alabama City, Ala., are taking most of the steel scrap. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old steel axles	$26.00 to $30.00
Old steel rails	13.00 to 13.50
No. 1 wrought	17.00 to 18.00
Heavy melting steel	12.50 to 13.00
No. 1 machinery cast	12.00 to 12.50
Carwheels	11.50 to 12.00
Tram carwheels	11.00 to 11.50
Stove plate and light cast	10.50 to 10.50

Cincinnati

CINCINNATI, OHIO, Nov. 15, 1916.—(*By Wire.*)

Pig Iron.—The national election had only a temporary effect on the market and prices continue to advance. A leading maker in southern Ohio to-day named $25, Ironton, on basic, malleable and No. 2 foundry. This is an advance of $2 over prices quoted Nov. 3. Southern iron has also gone up, and while some business was done last week as low as $18.50 for first half shipment, $20, Birmingham, is the present usual quotation. Iron can be bought for shipment through the last half of next year at this figure. Quite a number of sales have been made of Southern iron for last half delivery, and a number of fortunate buyers were lately able to cover for their requirements next year at prices ranging all the way from $18.50 to $21, Birmingham, and some special iron has been sold as high as $22. In the Hanging Rock district the furnaces are filled for the first half, and the Virginia furnaces on that delivery have withdrawn from the market entirely, so that Southern producers appear to have control of the situation for at least eight months hence. Indiana melters have contracted for different tonnages of Southern iron and have also bought some Northern iron for last half shipment. A southern Ohio foundry purchased 1000 tons of Northern iron for last half, and 2000 tons of malleable was bought by a central Ohio manufacturer, while a like quantity went to an Indiana consumer, all for the delivery mentioned. Lake Superior charcoal has been more active, but the largest reported sale is 500 tons to a Michigan firm. Recent purchases of Ohio silvery irons have put the furnaces in that district in a more independent position, and based on an 8 per cent analysis quotations range all the way from $30 to $32 at furnace. Conflicting reports are given as to stocks in the South but it is known that they are lower than for some time. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft.	$23.40 to $23.90
Southern coke, No. 2 f'dry and 2 soft.	22.90 to 23.40
Southern coke, No. 3 foundry	22.40 to 22.90
Southern coke, No. 4 foundry	21.90 to 22.40
Southern gray forge	21.40 to 21.90
Ohio silvery, 8 per cent silicon	32.26 to 33.26
Southern Ohio coke, No. 1	25.76 to 26.26
Southern Ohio coke, No. 2	25.26 to 25.76
Southern Ohio coke, No. 3	24.76 to 25.26
Southern Ohio malleable Bessemer	25.26 to 25.76
Basic, Northern	25.26 to 25.76
Lake Superior charcoal	24.20 to 25.20
Standard Southern carwheel	26.40 to 26.90

(*By Mail*)

Coke.—As far as prompt coke is concerned, the market has so many different angles to consider that a proper determination of prices is almost impossible. No buying of either furnace or foundry coke has been reported lately, except by consumers who have not been able to get shipments on existing contracts on account of car shortage. Some Connellsville foundry coke has sold in this way as high as $8.50 per net ton at oven for prompt shipment, and it is reported that $1 above this was paid for coke loaded on cars. A few sales of furnace coke were also made on almost an equal basis. From $5 to $6 a ton is generally named on foundry coke at oven in all districts for shipment next year.

Finished Material.—The local store price on No. 10 blue annealed sheets has been advanced to 3.90c., and the nearby mills are quoting No. 28 galvanized at 5.65c. and No. 28 black at 4.15c., f.o.b. Cincinnati or Newport, Ky. Some business is reported at the advanced quotations, and it is yet simply a question of being able to make deliveries. Jobbers are now quoting wire nails at $3.15 per keg base and barb wire at $4.10 per 100 lb. Plates are unchanged at 4.10c. from stock; steel bars, 3.45c., with 15c. per 100 lb. added for twisted reinforcing concrete bars; rounds and hexagons, 2 in. and over, 4c.; small structural shapes, 3.35c.; cold-rolled shafting, 10 per cent plus list, but in some cases it is not possible to make prompt shipment of orders received for rush shipment. Hoops and bands are hard to get at any price for nearby delivery. This is also the case on many finished material articles. The railroad track supply business is good, but new orders are mainly for rush supplies.

Old Material.—Further advances have been made averaging about 25c. per ton on all classes of scrap. Business is good and buying has been stimulated instead of retarded by advancing prices. The foundries are substituting more scrap for pig iron. The rolling mills are also buying quite heavily, as compared with this time last year. Taken as a whole the market is now more in the sellers' hands than at any period for some time. The following are dealers' prices, f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton

Bundled sheet scrap	$12.75 to $13.25
Old iron rails	20.00 to 20.50
Relaying rails, 56 lb and up	24.00 to 25.00
Rerolling steel rails	20.25 to 20.75
Heavy melting steel scrap	13.00 to 13.50
Steel rails for melting	17.50 to 18.00

Per Net Ton

No. 1 railroad wrought	$18.25 to $18.75
Cast borings	7.75 to 8.25
Steel turnings	7.75 to 8.25
Railroad cast	17.00 to 17.50
No. 1 machinery cast	16.25 to 16.75
Burnt scrap	14.00 to 14.50
Iron axles	25.00 to 25.75
Locomotive tires (smooth inside)	24.00 to 24.50
Pipes and flues	12.00 to 12.50
Malleable and steel	13.75 to 14.25
Railroad tank and sheet	11.00 to 11.50

St. Louis

ST. LOUIS, MO., Nov. 13, 1916.

Pig Iron.—The excited state of the market at this point continued through the past week. Buying was less in volume, chiefly because of the difficulty in closing transactions rather than because of a slacking up of demand. Foundrymen are coming into the market for large and small amounts and for nearby as well as deferred deliveries. Furnaces are accepting little beyond the first half of 1917. Sales of the week aggregated close to 15,000 tons, mostly No. 2 foundry iron. Sales were made as high as $21.50 for No. 2 Southern, Birmingham basis, with $21 practically accepted as the general price.

Coke.—Sharp calls for coke for immediate delivery appeared, partly because of urgent need and in part to assure against irregularity of delivery owing to car shortage. On such transactions as were closed $8.50 per ton, Connellsville ovens, was paid for 72-hr. coke. To-day the price of $9.50 for 72-hr. foundry coke was being made. Efforts of foundrymen to obtain anticipation of shipments of coke contracted for first half were futile. In one case a foundryman with a contract at

$3 paid $8.50 for some spot coke. By-product coke is being held on parity with bee-hive product and with as little disposition to contract ahead.

Finished Iron and Steel.—There was plenty of desire to enter orders and make contracts, but the mills refused to take on new business except under special circumstances growing out of past relations with the customer or other particular features. Warehouse business is very good and we quote for stock out of warehouse as follows: Soft steel bars, 3.40c.; iron bars, 3.30c. to 3.35c.; structural material, 3.40c.; tank plate, 4.05c.; No. 10 blue annealed sheets, 3.85c.; No. 28 black sheets, cold rolled, one pass, 4.35c.; No. 28 galvanized sheets, black sheet gage, 5.95c.

Old Material.—The scrap market, due to the sharp demand and the apparent shortage of material, is excited and strong at better prices in many instances. Steel mills, rolling mills and foundries are taking all they can get, while dealers are in short supply and bidding freely for all that is offered. Something of a flurry in carwheels developed, and investigation showed that about all the local supply was in consumers' hands, probably three-quarters of that in one consumer's possession. The total holdings are about 100,000 tons, with little if any more than 5000 tons in dealers' hands and practically none coming out from the railroads. Lists out include 200 tons from the Cotton Belt; 600 tons from the Chicago & Alton; 400 tons from a local industry; 1800 tons from the Big Four; 3000 tons from the Southern Railway, and 600 tons from the Nashville, Chattanooga & St. Louis, and 2500 tons from the Missouri, Kansas & Texas. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton

Old iron rails	$22.00 to $22.50
Old steel rails, rerolling	21.00 to 21.50
Old steel rails, less than 3 ft.	22.00 to 23.00
Relaying rails, standard section, subject to inspection	25.00 to 27.00
Old carwheels	16.00 to 17.00
No. 1 railroad heavy melting steel scrap	20.00 to 21.00
Heavy shoveling steel	16.00 to 17.00
Frogs, switches and guards cut apart	20.00 to 21.00
Bundled sheet scrap	14.00 to 16.00

Per Net Ton

Iron angle bars	$21.00 to $21.50
Steel angle bars	18.00 to 19.00
Iron car axles	30.00 to 32.00
Steel car axles	30.00 to 32.50
Wrought arch bars and transoms	25.50 to 26.00
No. 1 railroad wrought	20.00 to 21.00
No. 2 railroad wrought	19.00 to 19.50
Railroad springs	19.00 to 19.50
Steel couplers and knuckles	22.00 to 22.50
Locomotive tires, 42 in. and over, smooth inside	24.00 to 25.00
No. 1 dealers' forge	17.00 to 17.50
Cast iron borings	8.00 to 9.00
No. 1 busheling	17.00 to 17.50
No. 1 boilers, cut to sheets and rings	13.50 to 14.00
No. 1 railroad cast scrap	13.00 to 14.00
Stove plate and light cast scrap	10.00 to 10.50
Railroad malleable	14.00 to 14.50
Agricultural malleable	12.00 to 12.50
Pipes and flues	14.00 to 15.00
Heavy railroad sheet and tank scrap	13.50 to 14.00
Railroad grate bars	11.00 to 12.00
Machine shop turnings	9.00 to 9.50

Cleveland

CLEVELAND, OHIO, Nov. 14, 1916.

Iron Ore.—No action has yet been taken toward establishing next season's prices. They may be announced within a day or two or the matter may be delayed until navigation closes. The ore movement has slowed up as a result of cold weather on the ranges. Zero temperature was reached at some points, and certain railroads have held up shipments from the mines, not allowing the ore to go forward unless a boat would be available without delay to take on the cargo. There is no improvement in the car situation at the lower Lake docks, boats still being delayed considerably. There has been some additional chartering at the $1 rate. With only about three weeks before the close of navigation, ore firms will keep boats in operation as long as the weather permits, to clean up their shipments. We quote 1916 prices as follows, delivered lower Lake ports: Old range Bessemer, $4.45; Mesaba Bessemer, $4.20; old range non-Bessemer, $3.75; Mesaba non-Bessemer, $3.55.

Pig Iron.—Further advances have been made on all grades. Sales of considerable tonnages of foundry iron were made during the week by Cleveland and Valley furnaces at $25, at furnace, and quotations now range from $25 to $26 for both first and last half deliveries. Prices still show an upward tendency, and it is possible that a quotation lower than $26 can no longer be secured from local furnaces. Sales of Bessemer were made late in the week at $28 but present quotations range from $29 to $30, Valley furnace. Basic sales are reported at $25, both for early shipment and first half. A northern Ohio consumer reported in the market for 4000 tons of basic for early shipment is understood to have covered for at least part of this iron. Some producers are now asking $26 and higher for basic. Furnace companies are showing considerable anxiety over the car situation, and the fear is expressed that it might be necessary to slow down or possibly bank some furnaces because of the inability to secure coke for furnaces or coal for by-product plants. Southern iron is fairly active. Sales of a considerable tonnage in small lots are reported at $20, Birmingham, for last half. Some furnaces have withdrawn from the market for delivery before July, and one Tennessee interest is now asking $23 for last half. Southern producers are behind on shipments owing to their inability to secure cars, some of the Southern railroads refusing to allow cars to leave their own lines. In silvery iron we note the sale of 1500 tons of 6 per cent to a northern Ohio consumer for the last half, at $29, at furnace. We quote, delivered Cleveland, as follows:

Bessemer	$29.95
Basic	25.30
Northern No. 1 foundry	$25.30 to 26.30
Southern No. 1 foundry	24.00
Gray forge	24.95
Jackson Co., silvery, 8 per cent silicon	31.62
Standard low phos., Valley furnace	43.00 to 44.00

Coke.—Corrigan, McKinney & Co., Cleveland, started up half of their new by-product coke plant last week, placing in operation two batteries of 102 ovens. The remaining two batteries will be started shortly. Foundry coke is generally quoted at $8 to $8.25, per net ton at oven, for prompt shipment. However, it is stated that some makes can be secured at about $7.50.

Finished Iron and Steel.—The heavy buying by railroads is making the situation tighter in finished products. A large volume of new business could be placed with the mills in position to take on additional tonnage. The Nickel Plate Railroad has bought 1000 box cars, and is in the market for 500 automobile cars in addition to those recently placed, and for 10 Mikado type and 10 switching locomotives. The New York Central Lines have an inquiry out for 11,000 car and tender axles for replacements. A Cleveland company has taken an additional order for portable railroad track for the French Government, and has placed 2500 tons of light rails to be used in filling that order. The situation in the Lake shipyards that are handicapped by the non-delivery of steel has become more serious. With yards well filled for 1917, a large number of inquiries are pending for boats for 1918 delivery, mostly for use on the Eastern coast. The demand for plates has increased, being particularly heavy from the shipyards. Local prices are higher, quotations by Cleveland mills now ranging from 4c., Pittsburgh, for lighter gages, to 4.50c. for heavy plate. Some business is being taken by a local selling agency in first quarter plate contracts at 3.50c. In structural lines a great deal of new work is in prospect, although none has been placed recently requiring round tonnages. Local fabricating shops are well filled, and fabricating material here is being quoted at $100 to $110 a ton, erected. The demand for sheets for early shipment is heavy, but few consumers want to contract at present prices for future requirements. Black sheets are quoted as high as 4.25c. to 4.50c., and one Ohio mill has advanced its price on galvanized sheets to 6c., the same as its warehouse price. We quote sheets at 3.75c. to 4c., Ohio mill, for No. 28 black; 3.50c. to 3.75c. for No. 10 blue annealed, and 5.50c. to 5.75c. for No. 28 galvanized. Bar iron is firmer, and is now quoted at 2.75c. to 2.80c., Pittsburgh. Warehouses are buying material wher-

ever they can, at high prices, to fill up their stocks, which are badly depleted. Warehouse prices are: Steel bars, under 2 in., 3.50c.; over 2 in., 4c.; plates, 4.10c.; structural material, 3.60c.; iron bars, 3.45c.; No. 28 black sheets, 3.90c.; No. 10 blue annealed sheets, 3.75c.

Bolts, Nuts and Rivets.—Bolt and nut specifications are heavy, and considerable business is still being placed for first half. An advance this week is not improbable. Rivet prices are unchanged at 4c., Pittsburgh, for structural and 4.10c. for boiler. Bolt and nut discounts are as follows:

[illegible] or shorter, rolled [illegible] larger or longer, [illegible] machine bolts with h. p. nuts, ⅝ x 4 in., smaller and shorter, rolled thread [illegible] cut 10, cut thread, 50 larger and longer, 10 and 5; lag bolts, gimlet or cone point, 70 and 5; square h. p. nuts, blank or tapped, $2.70 off the list; hexagon h. p. nuts, blank or tapped, $2.70 off; c. p. c. and t. sq. nuts, blank or tapped, $2.40; hexagon nuts, all sizes, $2.80 off; cold pressed semi-finished hexagon nuts, all sizes, 60 and 5.

Old Material.—The market is strong, and further advances have been made on grades that are in any way active. Most consumers have large stocks, and are not actively in the market. However, there is considerable trading between dealers who are covering on short contracts. Dealers are also contracting for the output of large producers who are allowing their material to go at present prices. Heavy melting steel scrap has advanced 50c. per ton in the local market, and is quoted at $20 to $20.50 for delivery to Valley mills. Busheling, which recently stiffened up, has further advanced, and local sales have been made as high as $16 per net ton. Borings and turnings are in better demand than for some time, and have further advanced about 25c. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton

Steel rails	$19.50 to $20.00
Steel rails, re-rolling	[illegible]
Old steel rails under 3 ft.	22.00 to 22.50
Iron rails	23.00 to 24.00
Steel car axles	40.00 to 42.00
Heavy melting steel scrap	19.00 to 19.50
Carwheels	15.50 to 16.00
Relaying rails, 50 ft. and over	[illegible]
Agricultural malleable	14.50 to 15.00
Railroad malleable	19.00 to 19.50
Steel axle turnings	12.50 to 12.66
Light bundled sheet scrap	12.00 to 12.25

Per Net Ton

Iron car axles	$36.00 to $37.00
Cast borings	7.25 to 7.50
Iron and steel turnings and drillings	6.25 to 6.50
No. 1 busheling	15.75 to 16.00
No. 1 railroad wrought	19.50 to 20.00
No. 1 cast	14.00 to 14.25
Railroad grate bars	13.50 to 13.75
Stove plate	12.50 to 13.00

Buffalo

BUFFALO, N. Y., Nov. 14, 1916.

Finished Iron and Steel.—The last week has shown some slackening in market activity. Prices are nominal, and it is found that where sales are made advances are asked in many instances over the nominal market price. Large additional inquiries for wire rods developed in the Canadian market during the week; but as far as can be learned, manufacturers on this side of the line were unable to entertain any of the inquiries. Jobbers who were recently reporting heavy stocks of nails on hand are now pressing the mills for deliveries, stating that there is a more pronounced demand than they have known for many years.

Pig Iron.—Sales the past week were not so large as the previous week—not on account of diminishing interest or demand, but owing to diminution of unsold capacity of furnaces. While inquiries are being received in large volume, the iron required is not available. Buffalo producers are now in such shape that they cannot even supply the territory tributary to their furnaces, which causes consumers to go to other producing districts in search of their pig-iron requirements. The inquiries received cover practically all periods from now over the year 1917, and one producing interest has several inquiries for deliveries extending into 1918. The price range varies according to the forward sold-up conditions of furnaces. The interest having the lowest range reports it as from $25 to $27.50 at furnace for the various grades of foundry iron, with Bessemer and basic ruling at higher prices. The other producers state they are holding at $27 to $27.50 minimum, according to delivery. One furnace reports the sale of some high sulphur malleable at $25, furnace. The bulk of sales made were for first half delivery, with some running into second half. We quote as follows for last quarter and first half delivery, f.o.b. furnace, Buffalo:

High silicon irons	$24.00 to $28.00
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
Bessemer	30.00 to 31.00
[illegible]	[illegible]
[illegible]	27.00 to 27.50

Old Material.—The heavy demand from Western markets has caused prices to be again advanced on practically all grades. One local consumer of steel scrap has purchased 15,000 to 20,000 tons of various grades, covering requirements for some months ahead. No. 1 cast scrap is strong. Some small business has been done in carwheels, but stocks in yards are held for higher prices. Borings and turnings are moving freely at advanced prices. We quote dealers' asking prices as follows, per gross ton, f.o.b. Buffalo:

Heavy melting steel	[illegible] to $20.00
Low phosphorus billet and bloom ends	24.00 to 25.00
No. 1 railroad wrought	21.50 to 22.25
No. 1 railroad and machinery cast	19.00 to 20.00
Steel axles	[illegible]
Iron axles	[illegible]
Carwheels	17.00 to 18.00
Railroad malleable	[illegible]
Machine shop turnings	[illegible]
Heavy axle turnings	[illegible]
Clean cast borings	[illegible]
Iron rails	[illegible]
Locomotive grade bars	[illegible]
Stove plate (gross ton)	[illegible]
Wrought pipe	[illegible]
No. 1 busheling scrap	16.00 to 16.50
No. 2 busheling scrap	[illegible]
Bundled sheet scrap	[illegible]

San Francisco

SAN FRANCISCO, CAL., Nov. 7, 1916.

The small consuming and jobbing trade is comparatively quiet, and local activities were interrupted by election day, when most large shops and warehouses closed. The latest mill advances have disturbed this market considerably, causing general uncertainty as to resale values; and most important orders are put up to the mills before acceptance. Some activity is noted on the part of large buyers whose requirements can be calculated far into the future, but in most quarters new buying is limited. Export demand shows no abatement.

Bars.—Foreign demand continues very strong, and the jobbing movement in nearby territory shows some improvement, though the call for reinforcing bars is falling off a little with the approach of winter. Manufacturers' requirements are comparatively large, both in steel and iron bars, and specifications are coming out well.

Plates.—New business is not especially active, though some export business is going through, and more could easily be taken if it were desired. Consuming industries continue extremely busy, but their principal requirements are covered by contracts for some time to come. Deliveries on contracts are large, both for shipbuilding and tank work.

Sheets.—The activity in corrugated sheets appears to be about over for the season, and flat galvanized also are rather quiet at present, though there was some movement in anticipation of the last advance. The high prices greatly hamper the consuming trade in general, though purchases of both galvanized and blue annealed for manufacturing purposes keep up in good shape.

Structural Material.—A number of small fabricating contracts have recently been placed with local shops, but few important jobs are appearing. Fabricators are fairly well covered as regards work now in hand, but have not anticipated their needs very far ahead. The price of steel has for some time tended

strongly to retard building operations. The Baker Iron Works, Los Angeles, has a 1000-ton contract for a 12-story office and theater building, at Third Street and Broadway, and a small job on Winston Street. Provision has been made for a steel bridge on the Lewis River at LaCenter, Wash., and bids will be taken Nov. 15 for a 180-ft. span at Marshfield, Ore.

Wrought Pipe.—The new advance on lap-weld pipe has had little effect on conditions here, as the oil situation is favorable for further development, and the oil field movement keeps up fairly well, though much less active than in September. Butt-weld sizes remain dull, owing apparently to lack of building activity.

Cast-Iron Pipe.—Prices have again advanced, being quoted here at $38 per net ton for 6-in. and over; $41 for 4-in., and $1 extra for class A and gas pipe. Santa Barbara, Cal., has let a small contract for 4 and 6 in. pipe, and small orders from private interests have been fairly numerous for the last fortnight, but there is nothing of special importance in the market.

Pig Iron.—Foundries in practically all parts of the State are quite busy, the local plants being more steadily occupied than before, and the tonnage of iron used is large. Stocks on hand, however, are sufficient to cover the remainder of the year, and little new business is going through, notwithstanding the prospect of higher prices. Values are already advanced quite sharply, No. 1 Southern being quoted at $28 to $29 per gross ton.

Coke.—Local prices are entirely nominal, owing to the sudden changes in prices at the ovens. Some consumers have placed large contracts, but most of the foundries still have a fair supply, and are disposed to hold off.

Old Material.—The larger buyers of steel scrap, while getting some material on old contracts, are taking more interest in the market, with indications of larger purchases shortly. This, with the Eastern situation, has caused a much stronger feeling, and holders of large stocks are asking as high as $14, with some business, for the most desirable offerings, while $10 per gross ton is about the inside figure. Cast-iron scrap also shows a little more firmness, with an active demand from melters, ordinary offerings being quoted at about $16 per net ton.

New York

NEW YORK, Nov. 15, 1916.

Pig Iron.—New export call for 25,000 to 30,000 tons of foundry and steel-making irons, chiefly for France, and two inquiries for 1917 iron from large consumers, together amounting to 30,000 to 35,000 tons, are the chief features of pending business. Export Bessemer iron, on $30 to $33 ocean freight, now comes to $62 to $65 at European port. Of the three lots of iron, together amounting to about 5000 tons, which were pending last week in this district, two have been closed. In one case about 2000 tons was taken by an agricultural foundry on the Hudson River, in another 1500 to 1800 tons, delivery in the second and third quarters of next year, was bought by a New Jersey melter. A Jersey City inquiry for about 2000 tons for second half is still pending. On Virginia iron the leading producer is again out of the market after having made sales in the past week of $23.50, $24 and $25 at furnace for No. 2 X. Pennsylvania furnaces have been in better shape than those of other districts to take on business and their quotations have ranged from $23.50 to $24.50 at furnace for the first half, while some of them are now asking $26 for second half. There is no particular demand for spot iron. On the surface of things, considering that the New Haven road announced an embargo on pig iron, effective Nov. 10, it might be expected that early delivery iron would be in demand; but the New England foundries with their plentiful experiences of New Haven embargoes this year are carrying good stocks in their yards. Buffalo furnaces have relatively little iron to sell for forward delivery. Some sales have been made there at $27.50 and $28 at furnace. In Virginia a considerable lot of iron held by banking interests is coming out a little at a time. Prices on Alabama iron vary. Up to Saturday one interest there was selling at $18 to $19 for No. 2 foundry. On warrants $19.50 was due late last week, but $20 to $21 is asked to-day, with little doing. One of the large pending lots is the renewal of the International Steam Pump Company's inquiry of more than two months ago for about 16,000 tons for the second half of next year. On spot foundry coke sales have been made in the past week at $9 to $11 and even higher. We quote at tidewater for early delivery: No. 1 foundry, $25.50 to $26.50; No. 2 X, $25 to $25.50; No. 2 plain, $24.50 to $25; Southern iron at tidewater, $25 to $26 for No. 1 and $24.50 to $25.50 for No. 2 foundry and No. 2 soft.

Ferroalloys.—The ferromanganese market is quiet but firm at $164, seaboard, for the British and $160 to $165, delivered, for the domestic product. There have been a few inquiries and sales of small lots in the past week. Arrivals are reported to be normal under present conditions. A large importer of the British alloy has contracted to sell the output for all of 1917 of a western Pennsylvania furnace making ferromanganese. Spiegeleisen is more active with sales for both nearby and forward delivery. The quotation for 20-per cent is now $47 to $50, furnace, against $45 a week ago. Ferrosilicon, 50 per cent, is in active demand, with deliveries on specifications hard to meet.

Structural Material.—A fair amount of work has been put under contract; fabricators still have several months operations arranged for, but new inquiries have let down. In spite of this last fact, the 2.70c. Pittsburgh price for any delivery has disappeared, following the uptrend of other forms of steel and because of the pre-emption of steel for other purposes in the case of some mills and the use of structural rolls for billets in the case of other mills. The McClintic-Marshall Company has been awarded 3300 tons for a bridge over the Kennebec River for the Maine Central, 1200 tons for the Joseph Dixon Crucible plant in Jersey City and 750 tons for the General Electric Company at Lynn, Mass. The American Bridge Company has been awarded 1000 tons for the Watervliet Arsenal, 300 tons for the General Electric at Pittsfield, Mass., and will probably supply the 7000 tons for the Thames River bridge of the New Haven road. The Phoenix Bridge Company is to furnish the 1200 tons for the Jersey Central station at Newark and has closed for 250 tons for the Philadelphia Suburban Gas & Electric Company. Other awards embrace 2200 tons for the Broad No. 2 telephone exchange to Eidlitz & Ross; 600 tons for the Kenyon pier, Brooklyn, to Post & McCord; 1200 tons for the Rodin studio building, Fifty-seventh Street and Seventh Avenue, to Hinkle Iron Company; 400 tons for the Kings County Court House to the Guerber Engineering Company; 700 tons for the Southern Railway to the Virginia Bridge & Iron Company; 500 tons for a Baltimore factory to Dietrich Brothers, and 200 tons for the Carpenter Steel Company, Reading, Pa., to Lewis F. Shoemaker & Co. Including 2500 tons for the Pennsylvania also put under contract, and 300 tons for the Krueger brewery, Newark, and 200 tons for the Driver-Harris Wire Company, the awards in the East exceed 23,000 tons for the week. One new project is an apartment for H. E. Mitler, 500 tons. We now quote mill shipments of plain material at 2.969c. to 3.169c., New York, the price depending as much on the mill selling as on the delivery. From warehouse we quote 3.50c., New York, as minimum.

Steel Plates.—A sale of 650 tons of ship plates at 5½c., Pittsburgh, subsequent quotations of 6c. on this class of material that are regarded as likely to eventuate into definite business, and a stiffening of universal plates to 3.50c. and 3.75c., depending on the mill, tell briefly the story of plate market conditions. So numerous are inquiries, mostly for export, that they are unwelcome. One such was for 30,000 tons for Norway. In cars there has been a lull in the heavy buying of the last few weeks, but early decision is expected in the case of 2000 cars for the Burlington, 2000 cars for the Great Northern and 1000 cars for the M., K. & T. The New York Central is expected to buy 5000 to 7000 more cars, and the Baltimore & Ohio is a prospect. Probably 4000 cars in all were bought since last week's report. Several thousand cars are wanted

for France, and the settlement of the Russian car purchases is shortly expected. We quote universal plates at 3.669c. to 4.169c., New York, with 3.669c. to 3.919c. minimum for earliest shipment, and sheared plates up to 84 in. and in about three months at 4.169c., New York, and the widest plates at 4.419c. to 5.669c. for what may be obtained in the first half of 1917. Plates from warehouse range from 4.25c. to 4.50c., New York, for what is available.

Bars.—The 17,000 tons of angles for France, and for that matter the 27,000 tons of beams, have not been bought at this writing, nor has the last half shell steel, estimated at upward of 750,000 tons, been covered. The early delivery required has resulted in some declinations to consider the business. In general far-forward buying for domestic consumption is still discouraged and in the face of the uptrend in price, some mills evidently plan to hold as much capacity open as possible for expected better prices, thus at the same time minimizing any speculation in material by buyers. One interesting sale was for 16,000 axles for Russian cars, at a price said to be better than 4c. per lb. Export buying of bar iron has lately been of unusually large proportions and slightly better than 2.50c., Pittsburgh. We quote steel bars at 2.869c. to 3.019c., New York, the higher price for the earlier shipments. We quote mill shipments of iron bars at 2.669c., New York. From warehouse steel bars are 3.50c., New York, and iron bars, 3.40c.

Cast-Iron Pipe.—The predicted advance has taken place, and pipe is now $5 per ton higher than a week ago. Carload lots of 6-in., class B and heavier, are quoted at $37.50 per net ton, tidewater, with $1 per ton extra for class A and gas pipe, while corresponding advances have been made in other sizes. The Warren Foundry & Machine Company has been awarded the contract for about 2100 net tons of 6 to 36 in. pipe on which the city of Newark, N. J., opened bids Nov. 2. No public lettings of importance are announced, but plenty of private buyers are in the market for spring delivery.

Old Material.—The market is more active, with prices higher and still advancing. Consumers of heavy melting steel scrap in eastern Pennsylvania are not generally buying, but dealers there are accumulating material in the expectation that buying by consumers in that territory cannot much longer be deferred. Iron rolling mills are free buyers of all kinds of material except wrought pipe, which is comparatively neglected. Much scrap is being taken from this district to western Pennsylvania. Brokers quote buying prices about as follows to local dealers and consumers, per gross ton, New York:

Heavy melting steel scrap (for Eastern Pennsylvania shipment)	$16.50 to $17.00
Old steel rails (short lengths) or equivalent	18.50 to 19.00
Relaying rails	29.50 to 30.00
Rerolling rails	22.50 to 23.00
Iron and steel car axles (for export)	41.50 to 42.00
No. 1 railroad wrought	22.00 to 22.50
Wrought-iron track scrap	19.50 to 20.00
No. 1 yard wrought long	17.50 to 18.00
Light iron (nominal)	3.50 to 4.00
Cast borings (clean)	9.00 to 9.25
Machine shop turnings	7.50 to 8.00
Mixed borings and turnings	7.50 to 8.00
Wrought pipe	14.50 to 15.00

Cast scrap is considerably higher, partly in sympathy with advancing prices of pig iron and partly due to the improving demand from foundries. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

No. 1 cast (machinery)	$19.00 to $20.00
No. 2 cast (heavy)	17.50 to 18.00
Stove plate	14.00 to 14.50
Locomotive grate bars	14.00 to 14.50
Old carwheels	20.00 to 20.50
Malleable cast (railroad)	16.00 to 16.50

The Fuller Engineering Company, Allentown, Pa., is furnishing a complete pulverized coal plant and furnace equipment for eight 50-ton open-hearth furnaces for the Donora works of the American Steel & Wire Company, Donora, Pa.

British Steel Market

Deliveries to Domestic Consumers Restricted—Exports in General to Be Refused

LONDON, ENGLAND, Nov. 15, 1916—(*By Cable*).

Makers of steel, corrugated sheets, tin plates and black plates are forbidden to make deliveries to domestic consumers or for export except against government orders. General export permits will in most cases be refused. Pig-iron makers are reticent owing to the congestion of orders. Tin plates are unsettled. American 4-in. billets have sold for $65 to $68, c.i.f. Liverpool, for January-March delivery. We quote as follows:

Tin plates, coke, [illegible] sheets, [illegible] f.o.b. Wales, [illegible]

Steel black sheets, No. 28, export, f.o.b. Liverpool, £20.

Steel ship plates, Scotch, delivered local yards, £13 17s. 6d.

Steel rails, export, f.o.b. Welsh ports, £[illegible]

Hematite pig iron, f.o.b. Tees, 142s. 6d., compared with about 140s. a week ago.

Sheet bars (Welsh) delivered at works in Swansea Valley, £15 5s. nominal.

Steel bars, export, f.o.b. Clyde, £18.

Ferromanganese (nominal), [illegible]

Ferrosilicon, 50 per cent., c.i.f. [illegible]

To Prohibit Steel Imports After the War—Manganese Ore Prices

(*By Mail*)

LONDON, ENGLAND, Oct. 24, 1916.—It is reported that the iron and steel subcommittee of Lord Balfour's Committee, which was appointed to make recommendations on the basis of the Paris Conference economic proposals, has presented a report urging the entire prohibition of iron and steel imports into the United Kingdom during at least the period of demobilization and reconstruction after the war. No further information, however, is available.

A new official order has been issued by the British authorities prohibiting deliveries of steel and iron to home consumers except against orders certified as Class A work. This order has aroused considerable apprehension among Cleveland iron makers and users, for it is probable that the execution of numerous orders entered under Class B work will be temporarily hung up, which is the more curious considering that Class B directly or indirectly refers to military requirements.

The export trade in pig iron continues restricted, makers only selling as far as circumstances permit. There is a keen demand for prompt warrant iron, and the reserve stocks in public stores, which have been further considerably reduced, may disappear entirely. Furnaces in blast in the East Coast district are now 72, of which 28 are of Cleveland iron, 31 on hematite and 13 on special irons.

American material has shown considerable irregularity though a distinctly easier tendency. Notable concessions have been made, down to about $63 for 4-in. billets for November shipment, while $63 to $65 is asked for January-March shipment. Two-inch material afloat has been offered at £14, all c.i.f. Liverpool. A fair tonnage has been sold to France for immediate shipment including 2-in. billets at £15 10s. and special soft wire rods in coils at £20 5s., c.i.f.

There has been a hitch regarding imports of steel wire rods from America, it having been maintained by certain authorities here that the material constitutes "hardware," and as such came within the restrictions of import regulations. In one or two cases considerable inconvenience has been caused by delays in shipping wire rods, but the matter has been satisfactorily adjusted by the recognition that whatever steel wire rods may be, they are certainly not hardware in any business acceptation of the term.

The tin-plate market has been exceedingly dull and prices have been shaded further even for stock plates. The output of the mills is now only at about 40 per cent of normal and some makers are complaining loudly of the inadequate deliveries of steel.

Ferromanganese shows a steady tone but no special feature.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c. Denver, pipe, 76.1c., minimum carload, 46,000 lb.; structural steel and steel bars, 83.6c.; minimum carload, 36,000 lb. Pacific coast (by rail only), pipe, 65c.; structural steel and steel bars, 75c., minimum carload, 50,000 lb.; structural steel and steel bars, 80c., minimum carload, 40,000 lb. No freight rates are being published via the Panama Canal, as the boats are being used in transatlantic trade.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 2.75c. to 2.85c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs	.10
Angles, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truss and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.70
Handrail tees	.55
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Plates.—Tank plates, ¼ in. thick, 6 in. up to 100 in. wide, 3.50c. to 4.25c., base, net cash, 30 days, or ½ of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras

	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers)	.10
Boiler and flange steel plates	.15
"A. B. M. A." and ordinary firebox steel plates	.20
Still bottom steel	.30
Locomotive firebox steel	.50

Marine steel, special extras and prices on application.

Gage Extras

Rectangular, ¼ in. thick, over 6 in. wide to 100 in. wide	Base
Lighter than ¼ in., to 3/16 in., up to 72 in. wide	.10
*Lighter than ¼ in., including 3/16 in., over 72 in. to 84	.30
*Lighter than ¼ in., including 3/16 in., over 84 in. to 100	.40
*Lighter than ¼ in., including 3/16 in., over 100 in. to 120	.50
Lighter than 3/16 in., including No. 8, up to 72 in. wide	.15
*Lighter than 3/16 in., including No. 8, over 72 in. to 84	.25
*Lighter than 3/16 in., including No. 8, over 84 in. to 96	.35
Lighter than No. 8, including No. 10, up to 60 in. wide	.30
Lighter than No. 8, including No. 10, over 60 in. to 64	.35

Up to 72 in. and not less than 10.2 lb. per sq. ft. will be considered ¼ in.
Over 72 in. must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.
Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.
Over 72 in., ordered weight 3/16 in., take No. 8 price.
Over 72 in., ordered weight No. 8, take No. 10 price.

Width Extras

Over 100 in. to 110 in. inclusive	.05
Over 110 in. to 115 in. inclusive	.10
Over 115 in. to 120 in. inclusive	.15
Over 120 in. to 125 in. inclusive	.25
Over 125 in. to 130 in. inclusive	.50
Over 130 in.	1.00

Length Extras

Universal plates 80 ft. long up to 90 ft. long	.05
Universal plates 90 ft. long up to 100 ft. long	.10
Universal plates 100 ft. long up to 110 ft. long	.20

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over.

Lengths under 3 ft. to 2 ft. inclusive	.25
Lengths under 2 ft. to 1 ft. inclusive	.50
Lengths under 1 ft.	1.55
Circles 3 ft. in diameter to 100 in.	.30
Circles over 100 to 110 in. (width extra)	.35
Circles over 110 to 115 in. (width extra)	.40
Circles over 115 to 120 in. (width extra)	.45
Circles over 120 to 125 in. (width extra)	.55
Circles over 125 to 130 in. (width extra)	.80
Circles over 130 in. (width extra)	1.30
Circles under 3 ft., to 2 ft., inclusive	.55
Circles under 2 ft., to 1 ft., inclusive	.80
Circles under 1 ft.	1.85

Half circles take circle extras.

Sketches not over four straight cuts, inc. straight taper	.10
Sketches having more than four straight cuts	.20

Plates sheared to a radius take complete circle extras.

*Including extra for width.

Wire Rods.—Including chain rods, $65 to $70.

Wire Products.—Prices to jobbers effective Oct. 19: Fence wire Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, $2.80; galvanized, $3.50. Galvanized barb wire and staples, $3.70; painted, $3. Wire nails, $2.85. Galvanized nails, 1 in. and longer, $2 advance over base price; shorter than 1 in., $2.50 advance over base price. Cement-coated nails, $2.75. Woven wire fencing, 55 per cent off list for carloads, 54 off for 1000-rod lots, 53 off for less than 1000-rod lots.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from Nov. 15, 1916, all full weight:

Butt Weld

Steel			Iron		
			Inches	Black	Galv.
⅛, ¼ and ⅜	61	34½	⅛ and ¼	50	23
½	65	50½	⅜	51	24
¾ to 3	68	54½	½	55	37
			¾ to 1½	58	42

Lap Weld

2	61	48½	1¼	44	29
2½ to 6	64	51½	1½	50	36
7 to 12	61	47½	2	51	37
13 and 14	51½	..	2½ to 4	53	40
15	19	..	4½ to 6	53	40
			7 to 12	52	39

Reamed and Drifted

1 to 3, butt	66	52½	¼ to 1½, butt	53	36
2, lap	59	46½	1¼, lap	39	23
2½ to 6, lap	62	49½	1½, lap	45	30
			2, lap	46	31
			2½ to 4, lap	49	34

Bat Weld, extra strong, plain ends

⅛, ¼ and ⅜	37	39½	⅛, ¼ and ⅜	50	33
½	42	42½	½	55	42
¾ to 1½	60	55½	¾ to 1½	59	44
2 to 3	67	61½			

Lap Weld, extra strong, plain ends

2	59	47½	1¼	46	31
2½ to 4	62	50½	1½	51	37
4½ to 6	61	49½	2	53	40
7 to 8	57	43½	2½ to 4	55	43
9 to 12	52	38½	4½ to 6	54	42
			7 to 8	48	36
			9 to 12	43	31

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts on less than carloads, freight to destination added, effective from Nov. 1, 1916, are as follows:

Lap-Welded Steel		*Standard Charcoal Iron*	
1½ in.	.31	1½ in.	.23
1¾ and 2 in.	.43	1¾ and 2 in.	.35
2¼ in.	.40	2¼ in.	.32
2½ and 2¾ in.	.46	2½ and 2¾ in.	.38
3 and 3½ in.	.51	3 and 3½ in.	.43
3½ to 4½ in.	.52	3½ to 4½ in.	.44
5 and 6 in.	.45	5 and 6 in.	.37
7 to 13 in.	.42	7 to 13 in.	.34

Locomotive and steamship special charcoal grades bring higher prices.

1¼ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Sheets.—Makers' prices for mill shipments on sheets of U. S. standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Blue Annealed Sheets

Nos. 3 to 8	3.50 to 3.60
Nos. 9 to 12	3.15 to 3.25
Nos. 13 and 14	3.25 to 3.35
Nos. 15 and 16	3.30 to 3.40

Box Annealed Sheets, Cold Rolled

Nos. 17 to 21	3.45 to 3.55
Nos. 22 and 24	3.50 to 3.60
Nos. 25 and 26	3.55 to 3.65
No. 27	3.60 to 3.70
No. 28	3.65 to 3.75
No. 29	3.70 to 3.80
No. 30	3.80 to 3.90

Galvanized Sheets of Black Sheet Gage

Nos. 10 and 11	4.25 to 4.35
Nos. 12 to 14	4.35 to 4.45
Nos. 15 and 16	4.50 to 4.60
Nos. 17 to 21	4.65 to 4.75
Nos. 22 and 24	4.80 to 4.90
Nos. 25 and 26	4.95 to 5.05
No. 27	5.00 to 5.10
No. 28	5.25 to 5.35
No. 29	5.40 to 5.50
No. 30	5.55 to 5.65

Tin Mill Black Plate

Nos. 15 and 16	3.20 to 3.30
Nos. 17 to 21	3.25 to 3.35
Nos. 22 to 24	3.30 to 3.40
Nos. 25 to 27	3.35 to 3.45
No. 28	3.40 to 3.50
No. 29	3.45 to 3.55
No. 30	3.45 to 3.55
Nos. 31 and 32	3.50 to 3.60

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin,	Lead		Spelter	
Nov.	Lake	Electrolytic	New York	New York	St. Louis	New York	St. Louis
8	30.00	30.00	42.75	7.00	6.90	11.00	10.75
9	31.00	31.00	42.87½	7.00	6.90	11.25	11.00
10	32.00	32.00	43.25	7.00	6.90	11.37½	11.12½
11	32.25	32.25	....	7.00	6.90	11.37½	11.12½
13	32.25	32.25	43.87½	7.00	6.90	11.40	11.15
14	32.50	32.50	44.12½	7.00	6.90	11.50	11.25

NEW YORK, Nov. 15, 1916

The anxiety of consumers to cover their requirements has created a scarcity of both prompt and future copper and caused prices to advance to the highest level of years. Tin has been active and quotations are higher. Lead is inactive. Spelter has advanced moderately under a fair and steady demand. Antimony remains quiet.

New York

Copper.—The recent tremendous buying for export, with reports of negotiations for additional large quantities, coupled with large domestic purchasing, is responsible for a rush to buy copper which has sent its price to the highest level since 1872. As a result there is a genuine scarcity, not only of prompt metal but of any that can be delivered in the first quarter, and there is none too much available for the second quarter. Consumers who have been in need have seemingly been willing to pay any price, with the result that there has been considerable variance in the prices paid. Conservative predictions are that the price will go at least to 35c. this week. At the present time the buying is not widespread, but those who are in the market appear eager to take any odd lots that may be offered. The stocks of dealers are understood to have been wiped out, but the metal can be obtained if high enough prices are paid, some of it probably being released by consumers who can realize a big profit. On Nov. 11 reports came out that the French Government was negotiating for 225,000,000 lb. for delivery in the last half of next year, and this increased the anxiety of consumers to buy. On Nov. 8, February electrolytic sold at 30c.; Nov. 9, nearby sold at 31c., first quarter at 30c. and second quarter at 29.50c.; Nov. 10, late November sold at 31c.; Nov. 13, second quarter sold at 30c. early in the day and 30.50c. at the close; Nov. 14, second quarter sold at 30.50c., and a sale of spot was reported at 33c., December at 32c., and January and February at 32.75c. The aggregate of buying in all quarters is extremely large. Lake is at the same level as electrolytic. Spot electrolytic was quoted in London yesterday at £152, against £144 a week previous. The exports of the month, including yesterday, are moderate, amounting to only 7202 tons.

Tin.—On Monday an extremely heavy business was done, at least 500 tons having been sold, with unsatisfied inquiry amounting to at least 700 tons. Both dealers and consumers were the buyers, the former for the reason that they were short of metal wherewith to fill contracts. Some of them have met with poor success in getting licenses to ship from England. The market was quiet Nov. 8 and 9, but on the 10th it was fairly active and dealers seeking forward deliveries. Preference was given to tin on steamers which were actually named, these being considered as giving some assurance of arrival. The market was quieter on the 14th than on the preceding day, although even so probably 300 tons was dealt in. The arrivals this month tend to strengthen the situation, as they total but 500 tons. There is afloat 4202 tons. The quotation yesterday was 44.12½c.

Lead.—Throughout the week the market has been quiet, but firm at 7c., New York. At St. Louis the leading interest continues to quote 6.92½c., but independents have taken business at 6.90c. There is nothing to indicate the development of any weakness in the near future. The London quotation for spot lead is £30 10s., where it has stood for two weeks. The exports this month, including yesterday, total 1022 tons.

Spelter.—The market is strong and prices are gradually working upward. Business has been steady, with brass mills the most active buyers since the price left 10.50c., up to which time the galvanizers were interested. Export buyers have also taken a considerable quantity. Aside from these influences, the market has been strengthened by an advance of $10 in the price of zinc ore at Joplin, making its cost $90 per ton. In consequence, it is costing the producers of spelter about 10½c., St. Louis, to make the metal. Prompt was quoted yesterday at 11.25c., St. Louis, and 11.50c., New York; December at 11.12½c., St. Louis, and first quarter at 11c., St. Louis. The greater part of the recent business has been for first quarter delivery, with some for the second quarter. Prices are expected to hold firmly until some time next March. Cold weather has seriously interfered with the gas supply in the West and hampered production, a condition which is likely to grow worse as winter weather becomes more intense. The exports continue on a large scale, amounting this month, including yesterday, to 6996 tons. The London quotation for spot yesterday was £56, against £53 5s. a week previous. Sheet zinc has been advanced to 17c., f.o.b. mill, for carload lots.

Antimony.—The demand is quiet but the price continues firm at about 13c., duty paid.

Aluminum.—This metal shows a little additional strength. No. 1 virgin metal, 98 to 99 per cent pure, is quoted at 64c. to 66c. For small lots of ingots jobbers are asking 75c.

Old Metals.—The market is higher and demand very good. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible	27.50 to 28.50
Copper, heavy and wire	26.00 to 26.50
Copper, light and bottoms	22.50 to 23.50
Brass, heavy	16.00 to 17.00
Brass, light	13.00 to 13.75
Heavy machine composition	22.00 to 23.50
No. 1 yellow rod brass turnings	15.75 to 16.50
No. 1 red brass or composition turnings	17.00 to 18.00
Lead, heavy	6.625
Lead, tea	6.125
Zinc	8.50 to 8.75

Chicago

Nov. 13.—The rapid advance in prices of copper, supported by increases in the prices of tin, spelter and zinc, presented suggestive indications of a runaway market. The non-ferrous metals reflect the generally prevailing conditions applicable to all metals of unceasing inquiry and sales and limitation of supply. Scrap metals are likewise quoted at substantial advances over the prices of a week ago. We quote: Casting copper, 30c. to 30.50c.; Lake copper, 32.50c. to 33c.; tin, carloads, 44.50c., and small lots, 46.50c.; lead, 6.95c.; spelter, 11.25c.; sheet zinc, 17c.; Cookson's antimony, 50c.; other grades, 15c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 25.50c.; copper bottoms, 22.50c.; copper clips, 24.50c.; red brass, 20c.; yellow brass, 16c.; lead pipe, 6c.; zinc, 8c.; pewter, No. 1, 25c.; tinfoil, 30c.; block tin pipe, 35c.

St. Louis

Nov. 13—Non-ferrous metals were stronger and higher during the week, with lead quoted to-day, carload lots, at 7c.; spelter, carload lots, 10.50c. to 10.75c., according to delivery. In less than carload lots, quotations to-day were: Lead, 7.25c.; spelter, 12.50c.; tin, 48c.; Lake copper, 31c.; electrolytic copper, 30.75c.; antimony, Asiatic, 16c. In the Joplin ore district zinc blende was higher, reaching $90 per ton basis of 60 per cent metal, at the close of the week, with the range downward, on second grade ores, to $75. The average for the week for the district was $83. Calamine ranged from $45 to $50, basis of 40 per cent metal, with the average for the week for the district $47.50. Lead ore was firm, with the bulk of the sales at $87, with the district average for the week also at that figure. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 9c.; heavy yellow brass, 12c.; heavy red brass and light copper, 17c.; heavy copper and copper wire, 19c.; zinc, 6c.; lead, 5c.; tea lead, 3.50c.; pewter, 25c.; tinfoil, 31c.

OBITUARY

Edward Thomas Hendee, secretary of Joseph T. Ryerson & Son, Chicago, died suddenly at Minneapolis, Nov. 12, having been taken seriously ill while on a business trip. Mr. Hendee had attained to a position of foremost responsibility in the Ryerson organization, and was prominently known in the railroad supply and



EDWARD T. HENDEE

machine-tool field. He was 36 years old when he died, having been born in 1880 at Claremont, N. H. He was graduated from New York University in 1900, where he was later assistant professor of mechanical engineering, and took his M.E. and M.S. degrees. He also had the degree of doctor of science from Columbia University. His association with Joseph T. Ryerson & Son began in 1902 as advertising manager. He later built up and became manager of the machinery and railroad supply departments. Mr. Hendee was also vice-president of the Lennox Machine Company, and a director of the American Glyco-Metal Company. While in his business connections he had been known as especially energetic, he found time for other associations to which college and club life had led. He leaves his widow and two sons.

WILLIAM COOPER CUNTZ, of whose death brief mention was made last week, died at Auburndale, Mass., Nov. 2, aged 45 years. He was on a visit for the benefit of his health, which had been impaired by an operation for appendicitis a year ago. Mr. Cuntz was general manager and director of the Goldschmidt Thermit Company, 120 Broadway, New York. He was born in Hoboken, N. J., in 1871. His maternal grandfather, William Cooper, was a well-known naturalist and one of the founders of the New York Academy of Science. Mr. Cuntz was educated at the Hoboken Academy and at Stevens Institute of Technology, graduating from the latter in 1892, with the degree of mechanical engineer. He then became connected with the Pennsylvania Steel Company, Steelton, Pa., first with the bridge and construction department, which he represented as resident engineer in Boston, Mass., and as European resident engineer in London, England. In these capacities he rendered many important services to his company. He then entered the sales department, serving as assistant general manager of sales in Philadelphia and later as district sales manager at Steelton, Pa. At the outbreak of the Spanish-American War in 1898 he volunteered for service in the artillery. In 1910 he was appointed by President Taft a delegate to the International Railway Congress at Berne, Switzerland. In the same year he severed his connection with the Pennsylvania Steel Company, to become a director and the general manager of the Goldschmidt Thermit Company. Under his management the business of the company not only increased greatly, but equal progress has been made in the technical development of the thermit process. His wide experience in the steel industry naturally caused him to take a particular interest in the manufacture of carbon-free metals, and it is largely due to his perseverance and initiative that these metals and alloys are coming into such general use. He leaves his widow and two sons. He was a member of some 20 clubs and societies, including the American Iron and Steel Institute and India House.

Neil Robinson, Charleston, W. Va., died at the Jewish Hospital in Cincinnati, Nov. 11, aged 63 years. He had been suffering for some time with heart trouble. He was president of the LaFollette Coal & Iron Company, LaFollette, Tenn., and was widely known in the iron and coal trades. He took an active part in the development of the West Virginia coal fields and, years before the Chesapeake & Ohio Railway was built, made shipments of coal from his mines to Huntington and



NEIL ROBINSON

transshipped from there. He was the designer of the great West Virginia coal column which attracted so much attention at the Jamestown Exposition. He was president of the Citizens National Bank of Charleston and was interested as a director in many manufacturing and mining enterprises. He was prominent in Masonry, having been Grand Master of Masons of West Virginia and the first Potentate of the Mystic Shrine at Charleston.

Mr. Robinson was born at Gallipolis, Ohio, went to Cincinnati when very young, and moved from Cincinnati to Charleston about 30 years ago. He leaves his widow.

ROBERT G. VALENTINE, commissioner of Indian Affairs under President Taft, and more recently known as an industrial counselor in settling labor disputes, died suddenly from heart disease Nov. 14, at the Hotel Manhattan, New York. He was a member of the firm of Valentine, Tead & Gregg, Boston, doing a business as efficiency experts. He was born in West Newton, Mass., and was in his forty-fifth year.

CHARLES H. DAKER, Pittsburgh, died in the Suburban Hospital, Bellevue, Pa., Nov. 8, from pneumonia, aged 38 years. He was connected with the Pittsburgh office of Eaton, Rhodes & Co., having charge of sales of semi-finished and finished steel. He had previously been Pittsburgh representative for Matthew Addy & Co. for several years, and before that was connected

with the Pittsburgh office of Hickman, Williams & Co., his identification with the iron and steel business in the Pittsburgh district covering about 15 years. He leaves his widow, one son and one daughter.

FREDERICK W. GERDES, president Hall Steam Pump Company, Pittsburgh, died suddenly at his home in that city, Nov. 9, aged 75 years. He had been ill for some months, but was thought to have fully recovered, and was attending to business a part of the day on which he died. He was born in Alpena, Germany. He leaves four daughters.

CARL OSCAR LILJEROS, an organizer and officer of the Athenia Steel Company, Athenia, N. J., died Nov. 8 at his home in Clifton, N. J., aged 45 years. He was the inventor of many specialties for machine shop service, the best known of which is probably the "knock-down" elevator for lifting heavy material. He leaves his widow and five children.

WILLIAM J. BURLEE, shipbuilder, died Nov. 7 at his home in Port Richmond, Staten Island, N. Y., aged 55 years. He was born in Parkesville, Pa., but had been a resident of Staten Island for 31 years. He organized the Staten Island Shipbuilding Company, of which he was president at the time of his death, in 1898.

THOMAS BARNETT MILLER, for many years a member of the shipbuilding firm of Alexander Miller & Brothers, in Jersey City, N. J., died Nov. 8 at his home in Brooklyn, aged 52 years. He leaves his widow and two daughters.

NEWTON P. MCKEAN, president Cleveland Co-operative Stove Company, Cleveland, died Oct. 21.

PERSONAL

Sydney Dillon on Nov. 1 was appointed chief mechanical engineer of the Carnegie Steel Company, at Pittsburgh, succeeding John Hulst, whose appointment as assistant to the vice-president and chief engineer of the United States Steel Corporation was noted in these columns a few weeks ago. Mr. Dillon began his career at the Edgar Thomson works of the Carnegie Company at Bessemer, Pa., in 1889 as a messenger boy, going in the engineering department one year later. In 1901 he succeeded E. E. Slick as chief engineer at the Edgar Thomson works, when Mr. Slick was transferred to the general offices of the company in Pittsburgh. He was in charge of the engineering in the Edgar Thomson organization in connection with the large amount of new construction, rebuilding and improvement work made at that plant in recent years. He is a member of the American Iron and Steel Institute.



SYDNEY DILLON

C. M. Power, for some years general manager of sales of the Standard Chain Company, Pittsburgh, will continue in the same capacity for the welded chain department of the American Chain Company, which recently absorbed the Standard Company. The general sales of the combined production will be under the supervision of Walter M. Taussig, general sales director of the American Company.

Dr. William H. Tolman was removed from the directorship of the American Museum of Safety by the trustees Oct. 30, and since then A. A. Hopkins has been acting director. The cause is not stated. Dr. Tolman has been director of the museum since its foundation, and has done extensive work here and in Europe for the promotion of the use of safety devices in industrial plants. On Nov. 13 he filed suit to recover $2,596 from the institution, alleging breach of contract.

W. F. Davidson, until recently connected with the Reliance Steel Casting Company, Pittsburgh, has resigned to become works engineer of the Granite City, Ill., works of the American Steel Foundries.

J. R. Morehead, who has been connected with the Pittsburgh office of Rogers, Brown & Co. for about 15 years, has been transferred to the firm's Cleveland office.

Stanley Sheldon, assistant purchasing agent, Stanley Works, New Britain, Conn., has resigned to develop the mill supply department of the Rackliffe Brothers Company in the same city.

August B. Seelig, secretary Chase Rolling Mills Company, Waterbury, Conn., has resigned. It is reported that he is to go into business for himself.

Edwin K. Morse has been appointed transit commissioner of Pittsburgh by the mayor of that city, instead of Morris Knowles, as recently stated.

The Waterbury Iron Works, Waterbury, Conn., has secured the services of Leonard Kipp, consulting engineer, formerly chief mechanical engineer of the Chase Metal Works. This accession to its staff will enable the company to take care of steel work on a larger scale.

The Modern Tool Company, Erie, Pa., manufacturer of grinding machines and threading tools, announces the appointment of R. H. Wood as manager of its district office, 32 North Clinton Street, Chicago. He was for a number of years connected with the Buffalo office of the Warner & Swasey Company.

B. A. Brennan, formerly contract manager of the Westinghouse Machine Company, and later sales manager of the power department of the Bethlehem Steel Company, has resigned the vice-presidency of Mercantile Trust Company, St. Louis, to accept the presidency of the Citizens Company, Inc., Baltimore, to which office he has just been elected. The Citizens Company is an investment banking institution.

Clarence W. Marsh has opened an office at 101 Park Avenue, New York, for engineering investigations, plant design and construction for industrial, chemical and electrochemical enterprises.

Harold R. Wade, manager of the Pittsburgh branch of the Electro Galvanizing Company, has been appointed general manager of the jobbing plants of the United States Electro Galvanizing Company, Brooklyn, N. Y. T. T. Diehl, formerly with Hubbard & Co., has been appointed to succeed Mr. Wade. C. E. Mool, of the credit department, has been promoted to the position of superintendent.

John U. Byrd, a well-known pig-iron and coke salesman in the Central West, has opened offices in the Commercial Tribune Building, Cincinnati. In addition to handling pig iron, coke and coal, he has been appointed

sales agent for the Louisville Fire Brick Works, whose plant is located at Grahn, Carter County, Ky., and of the Ohio Marble Company, maker of fluxing stone.

A dinner in honor of President Charles M. Schwab of the Bethlehem Steel Corporation is to be given on Tuesday, Nov. 21, by Mayor Preston of Baltimore in that city. Announcement of important additions to the Sparrows Point plant will then be made.

Ernest S. Cox, who resigned July 1 as Pittsburgh representative of R. K. Carter & Co., New York City, has engaged in business on his own account as direct representative of manufacturers of mill supplies and hardware specialties, with offices at 326-328 Diamond Street, Pittsburgh.

Pittsburgh and Nearby Districts

The strike of the molders of the Pittsburgh district, which started in November, 1915, is practically over, the molders having been defeated. The sole contention in this strike was an 8-hr. day, which Pittsburgh founders insisted they could not grant. At the outset an effort was made to settle the impending strike by giving the molders an advance in wages, which they refused to accept. All the foundries in the Pittsburgh district are now operating to practically full capacity. While the strike has not been officially declared off, many of the striking molders have returned to work on a 9-hr. day basis.

At the annual meeting of stockholders of the Carbon Steel Company, held in its offices in Pittsburgh, Nov. 13, directors were elected as follows: Charles McKnight, George S. Macrum, Dean R. Wilson, Charles E. Middleton, Raymond S. Baldwin, C. D. Blue, Jr., and Holland S. Duell. The directors organized by electing Charles McKnight, president; Dean R. Wilson, vice-president and treasurer; C. F. Blue, Jr., vice-president and general sales agent, and W. W. Noble, secretary. The executive committee consists of Charles McKnight, Dean R. Wilson and Charles E. Middleton.

The Youngsville Radiator Company, Youngsville, Pa., builder of automobile radiators, will increase its capital stock from $25,000 to $50,000. The company now occupies 8600 sq. ft. of floor space, but will likely erect additional buildings early next spring.

The American Sheet & Tin Plate Company has decided to add 10 more hot tin mills at its Farrell works at Farrell, Pa., and 10 more at its Shenango works at New Castle, Pa. The Farrell works will then have 30 hot mills and the Shenango 40. Work will be pushed as fast as possible, and it is hoped to have the new mills ready for operation early next summer. Most of the contracts have already been placed, but some of the machinery will be built by the company itself. At present the American Sheet & Tin Plate Company has a total of 196 hot tin mills, and has nearly completed the building of 24 mills at its new Gary, Ind., plant These, with the 20 to be built at Farrell and New Castle, will give the company a total of 240. It will then have about the same number of hot mills as all the independents.

Due to recent advances in mill prices on plates, shapes and bars, warehouses at Pittsburgh are now quoting these materials for prompt shipment as follows: Structural shapes, 3.50c.; plates, 4c. to 4.50c.; bars, small shapes, flats, rounds and squares, under 2 in., 3.40c.; over 2 in., 4.05c. The demand for these products from warehouses is heavy, many of the smaller fabricators thus getting the greater part of their supplies, paying premiums in preference to taking long deliveries from the mills. Sales managers of warehouses state they are having great trouble in keeping stocks up to the standard, owing to the congested condition of the order books of the mills.

Twenty-seven new type forced draft high reserve capacity stokers of the underfeed type have been sold by the Westinghouse Electric Export Company, East Pittsburgh, Pa., for service in Japan. The stokers are for use with 600-hp. boilers. Twenty of them were sold to the Osaka Electric Light Company, two to the Nogola Electric Light Company and five to the Imperial Steel Company. The orders also included engines for operating the stokers, turbine and motor-driven forced draft fan units, controllers and other auxiliaries.

The machinists' strike in Youngstown seems to have passed over rather uneventfully. The new men employed to fill the places made vacant when the strikers were let out are taking up their residences in the city permanently. The machinists made demands that were deemed unreasonable by the employers, the principal ones being closed shop and an 8-hr. day.

The Braddock Mfg. Company, steel founder and machinist, Braddock, Pa., has let a contract for an addition to its open-hearth building to the McClintic-Marshall Company, Pittsburgh, calling for about 125 tons of steel. It will install a second 20-ton furnace and other new minor equipment and expects to have the new furnace ready for operation in January.

The Brier Hill Steel Company, Youngstown, will likely start a new open-hearth furnace in December and another in January. These will then make a total of 12 90-ton furnaces. The company intends to build a new jobbing mill, but work on it will not start while the present abnormal demand for billets and sheet bars continues.

The Youngstown Sheet & Tube Company, Youngstown, which will build three more 100-ton open-hearth furnaces, is in the market for 14 electric traveling cranes, including one 175-ton and two 100-ton ladle cranes, also charging and stripping machines and standard lifting equipment.

The Pittsburgh & Lake Erie Railroad has bought two large shears and several punches for its shops at Struthers, Ohio.

The report that Mary furnace of the Ohio Iron & Steel Company at Lowellville, Ohio, has been blown out for relining is incorrect. It is not expected that this stack will have to be blown out for some time. In October it made over 11,000 tons of basic iron.

At Youngstown, on Nov. 10, the prices obtained for shipments of bar iron in September and October by mills that sign the Amalgamated scale were found to have been on the basis of 2c. per lb. This entitles puddlers to a rate of $9.55 per gross ton for puddling for the months of November and December, the highest ever paid for puddling in the history of the trade, against $9.30 paid in September and October.

The plant of the Canonsburg Steel & Iron Works, Canonsburg, Pa., maker of iron and steel sheets, which has been closed for several months owing to labor troubles, is now in practically full operation, the company having reached an agreement with its men.

In October the Valley Mold & Iron Company, Sharpsville, Pa., made and shipped 28,855 tons of ingot molds and stools, the largest month's output in the history of this company.

The Concrete Steel Company, Youngstown, has received a contract for the complete Havemeyer steel fabrication for the new buildings of the Fisher Body Company, Detroit, Mich. This is one of the largest concrete steel construction contracts placed for a long time. The Concrete Steel Company has made large additions to its plant at Youngstown recently, consisting of a machine shop, storage house and extension of the fabricating plant.

Reports are in circulation that several Detroit automobile builders are contemplating building a plant at Kittanning, Pa., about 45 miles from Pittsburgh, for the manufacture of steel sheets. It is said a tract of 30 acres has been secured on which the new plant will be built, but the report cannot be confirmed.

The Bakewell Motor Car Co., Pittsburgh, with a capital stock of $50,000, has been incorporated by Frank S. Delf, Pittsburgh; George L. Walter, Jr., Sharpsburg, and Grayson M. Metz, Aspinwall, Pa., to buy, sell, repair and deal in automobiles, motor trucks and machinery of all descriptions.

Furnace No. 4 of the Shenango Furnace Company, Sharpsville, Pa., was blown in on Sunday, Nov. 12. It had been completely relined, the bosh and hearth en-

larged, and other improvements made in just six weeks, which is a remarkable record when present conditions in the supply of labor and deliveries of material are considered. It was blown in on Bessemer iron, and is expected to make about 325 tons per day.

At Youngstown, Ohio, the bi-monthly examination of sales sheets of tin plate and sheets showed that sheet and tin mill hands are entitled to an advance of 1 per cent in November and December over wages paid in September and October. The sheet settlement is made by using as a basis the sales of sheets by the Brier Hill Steel Company, Newport Rolling Mill Company and Trumbull Steel Company. The tin-plate settlement is based on prices of the National Enameling & Stamping Company, Carnahan Tin Plate & Sheet Company and Trumbull Steel Company. Sheet and tin mill workers are now receiving the highest wages that have ruled for some years.

The new 500-ton blast furnace of the Republic Iron & Steel Company, Youngstown, will be completed about next April, and the new pipe mill to roll lap-weld pipe up to 16 in. is expected to be ready in January. The company is installing Hughes gas producers at two of its bar mills to replace natural gas as fuel.

The George J. Hagan Company, 401 People's Bank Building, Pittsburgh, builder of heating and annealing furnaces and stokers, has opened a branch office in 406 Garfield Building, Cleveland.

Moorhead, Brother & Co., Sharpsburg Station, Pittsburgh, have arranged to put their 16-in. mill in operation, beginning Dec. 1, for a long run.

Joint Meeting of Employers' Associations

The officers and executive boards of the employers' associations of Worcester, Hampden and Berkshire counties of Massachusetts and New Haven, Hartford and Litchfield counties of Connecticut, together with representatives from similar associations in Rhode Island, Newark, N. J., Cincinnati, Ohio, and other places, gathered at the Allyn House, Hartford, Conn., Nov. 10, in afternoon and evening sessions. The afternoon session took the form of a conference on the conditions in each section represented and many interesting reports were given on the open shop campaigns in the various districts. The evening session was attended by about 500 members of the different organizations and interesting speeches were made by speakers representing different sections of the country.

The chief speaker at the evening session was Judge Spear, of Newark, N. J. Other speakers were men of prominence in machine-tool building and other industrial lines, and there was keen interest in all that was said. The various addresses emphasized the keynote of the whole movement that is resulting in the rapid organization of employers' associations, which is best expressed in the words of one interested head of a large industry: "These men are all speaking of what can be done for the workingman, not what can be done to him. How different from the olden times."

The John Obenberger Forge Company, drop and hammered forgings, has discontinued its office at 608 Majestic Building, Milwaukee, and in the future the general offices will be located at the plant on Fifty-third Avenue, at Burnham Street, West Allis, Wis. On Oct. 27 the company made the first shipment of drop forgings from its new plant, and it is now operating day and night.

The Cutler-Hammer Mfg. Company, Milwaukee, maker of electric controlling devices, lifting magnets, etc., is preparing to build a new administration building to cost nearly $150,000. It will be 50 x 283 ft., six stories and basement, of fireproof construction.

Better living accommodations for workmen are to be provided by the Bethlehem Steel Company, which has arranged to erect 90 cottages on a tract recently purchased at Steelton, Pa.

Luxemburg's Steel and Pig-Iron Output in 1915

The statistics of iron and steel output for 1915 were recently issued by the Chamber of Commerce of the Grand Duchy of Luxemburg. Owing to reduced imports of iron and ore and heavy demand for pig iron, the Rhineland and Westphalian districts in Germany were compelled to turn to the oolitic ores of Luxemburg and Lorraine. Prices rose in consequence from the usual average of 2.5 to 3 francs per ton to 3.16 francs in 1914 and 3.17 francs in 1915, reaching a maximum of 5 francs. The German demand has slackened since July, this year, owing to the competition of ores imported from occupied French territory. The Luxemburg ore and pig-iron output is given as follows in metric tons:

	Iron Ore Output	Ton Iron		Ore Consumed by Blast Furnaces
1913	[illegible]	2.99	[illegible]	[illegible]
1914	[illegible]	[illegible]	[illegible]	[illegible]
191	6,130,121	[illegible]	[illegible]	[illegible]

Blast furnaces numbered 47 in 1915, of which 40 worked a total of 1639 weeks. Of the ore consumed, 58,389 tons was foreign, and the coke used was 1,908,684 tons.

The steel plants produced 967,821 tons of ingots besides 12,563 tons of castings and electrically refined steel. Nine foundries produced 16,649 tons of iron and steel castings. The rolling mills turned out 246,533 tons of semi-finished steel and 543,371 tons of finished products. The pig-iron output in 1915 consisted of 1,418,247 tons of basic Bessemer iron, 171,106 tons of foundry iron, 246 tons of puddled iron and 1174 tons of miscellaneous iron, at an average price per ton of 71.59 francs.

The Semet-Solvay's Coal Land Purchase

Birmingham advices state that the impression in industrial circles in Alabama is that the Semet-Solvay Company, which recently purchased 7300 acres of coal land of the Alabama Company, adjoining the properties of the Yolande Coal & Coke Company, proposes more than a by-product plant, a steel mill being among the reported probabilities. It is believed very probable that when the Semet-Solvay Company's contract with the Tennessee Coal, Iron & Railroad Company expires, the latter will probably not renew, having an immense by-product plant of its own. In that case the Semet-Solvay Company would be without its largest customer for its Ensley plant. Denial is made of the report that the Semet-Solvay Company intends to consolidate with the Alabama Company, although it is understood that such a thing was at one time contemplated.

The Honolulu Chamber of Commerce on Nov. 7 declared for the open shop at a largely attended meeting. A resolution was adopted by a ten to one vote declaring that it would be the fixed and permanent policy of the chamber to support the free right of every employee and every individual to enter into contracts of employment without interference or dictation from outside parties or organizations, and to insist that Honolulu be maintained as an open shop. Employers and trade unions have been waging a contest over this question for seven months.

The Kalamazoo Malleable Iron Company, Kalamazoo, Mich., expects to have its foundry in operation in February. It will be a two-furnace plant. The dimensions are 235 x 285 ft., with a coal pulverizing plant in connection. The officers are as follows: President, George E. Bardeen; vice-president, W. S. Dewing; treasurer, C. A. Dewing; secretary, A. H. Dane; general manager, D. R. Curtenius; superintendent, W. T. Howell.

H. S. Matthews, Birmingham, Ala., former president of the Alabama Company (when it was the Alabama Consolidated), is president of the Matthews Iron & Mfg. Company, which has taken over the old Silver Run furnace, Rome, Ga., with ore lands attached. The company will begin on basic iron, for which it already has orders. Repairs are to be made at once.

Iron and Industrial Stocks

NEW YORK, Nov. 15, 1916.

In the period beginning with Wednesday of last week the stock market has fluctuated widely. On Wednesday morning United States Steel common reached a new high record, selling up to 126, while a number of other industrial stocks made great gains. The conflicting reports on the result of the Presidential election caused recessions, with alternations of advancing prices. The general trend of the period has, however, been downward except in the case of a few stocks. Republic common has been notably strong, selling up to 84⅝ on Monday of this week. Some attention is being paid in speculative circles to the possibility of early negotiations for peace, which would have an effect on the business of quite a number of important manufacturing establishments. Attention is also given to disquieting news from Mexico and the possibility of a fresh exchange of notes with Germany over its submarine activity. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com.	28½ - 34	Int. Harv. of N. J., com.	117 -118
Allis-Chal., pref.	85⅝ - 92	Int. Harv. of N. J., pref.	121⅛
Am. Can. com.	62¼ - 65	Int. Harv. Corp., com.	[illegible]
Am. Can. pref.	113½-115	Int. Harv. Corp., pref.	111 -112
Am. Car & Fdy., com.	68 - 72½	La Belle Iron, com.	79¼ - 81¾
Am. Car & Fdy., pref.	117	Lacka. Steel	86 - 88
Am. Loco., com.	91¾ - 98¼	Lake Sup. Corp.	23⅜ - 24¼
Am. Loco., pref.	107½-109	Midvale Steel	68 - 71
Am. Rad., pref.	134	Nat. En. & Stm., com.	32 - 35½
Am. Ship, com.	66 - 70½	Nat. En. & Stm., pref.	99
Am. Ship, pref.	94	N. Y. Air Brake	158 -175
Am. Steel Fdries.	64½ - 66	Pitts. Stl., pref.	104½-104¾
Bald. Loco., com.	82½ - 90½	Pressed Stl., com.	81 - 80¾
Bald. Loco., pref.	106½-107	Pressed Stl., pref.	105½-106½
Beth. Steel, com.	640 -684	Ry. Stl. Spring, com.	53¼ - 56⅝
Beth. Steel, pref.	149 -152	Ry. Stl. Spring, pref.	101¼-101⅞
Carb. Steel, com.	112 -115	Republic, com.	75 - 84¾
Case (J. I.), pref.	87 - 88	Republic, pref.	115 -115½
Central Fdy., com.	17 - 18	Sloss, com.	75 - 80½
Central Fdy., pref.	31 - 33	Sloss, pref.	101 -101¾
Chic. Pneu. Tool	72 - 73½	Un. Alloy Steel	48½ - 49½
Colo. Fuel	52¼ - 56¼	U. S. Pipe, com.	25 - 26¾
Cruc. Stl., com.	86¼ - 95¼	U. S. Pipe, pref.	65 - 67
Cruc. Stl., pref.	123 -124½	U. S. Steel, com.	120¼ -126
Deere & Co., pref.	96⅛ - 96¾	U. S. Steel, pref.	121⅝ -122
Driggs-Seabury	87 - 96¾	Va. I. C. & Coke	52 - 59½
Gen. Electric	179 -184	Warwick	10
Gt. No. Ore Cert.	42¾ - 46¼	Westing. Elec.	63⅞ - 67½
Harb-Walk. Refrac., com.	127		
Harb-Walk. Refrac., pref.	106		

Dividends

The Pratt & Whitney Company, regular quarterly, 1½ per cent on the preferred stock, payable Nov. 15.

The Niles-Bement-Pond Company, regular quarterly, 2½ per cent on the common stock, payable Dec. 20, and 1½ per cent on the preferred, payable Nov. 15.

The Harbison-Walker Refractories Company, regular quarterly, 1½ per cent, and extra, 2 per cent, on the common stock, payable Dec. 1.

The Studebaker Corporation, regular quarterly, 1¾ per cent on the preferred stock and 2¼ per cent on the common, payable Dec. 1.

Deere & Co., regular quarterly, 1¾ per cent on the preferred stock, payable Dec. 1.

The International Nickel Company, regular quarterly, $1.50 on the common stock, payable Dec. 1.

The Moline Plow Company, regular quarterly, 1¾ per cent on the first preferred stock, payable Dec. 1.

The Dominion Steel Foundry Company, Hamilton, Canada, regular quarterly, 1¾ per cent on the preferred and 2 per cent on the common stock, together with a bonus of 8 per cent on the common, payable Dec 1. This makes 32 per cent on the common for the year.

Corrosion of Condenser Tubes

Causes of the corrosion of marine condenser tubes are to be investigated by the corrosion committee of the Institute of Metals (British) at the committee's condenser plant now about to be installed by the Brighton Corporation in the Brighton Electricity Works. Two salaried investigators have been appointed, Dr. G. D. Bengough and Dr. O. F. Hudson, and the Government Research Council has granted £1000 a year toward carrying on the research. The plant will be operated under ordinary industrial conditions, the microscopical and other examinations of the metal being carried out in the metallurgical laboratories of the Imperial College of Science and Technology, South Kensington.

New England Power Company's Savings Plan

An opportunity to subscribe for shares of the preferred stock of the New England Power Company, Worcester, Mass., is afforded by a recently announced savings plan which it is offering to its own officers and employees and those of its subsidiary or affiliated companies who have been employed at least one year. The stock is to be paid for at the rate of $2 per month per share, with the proviso that the amount paid each month shall not exceed 20 per cent of the subscriber's monthly salary. Additional payments can be made from time to time to reduce the unpaid balance, and until the stock is fully paid for interest on the partial payments at the rate of 6 per cent will be credited quarterly to the subscriber, the dividends which the stock would be entitled to being reserved by the company. In addition extra payments commencing Dec. 15, 1917, will be made to the employees subscribing for stock. These payments will begin with 1 per cent on the face value of the stock subscribed for and increase by ½ per cent each year up to 1923, when 4 per cent will be paid and for each year thereafter. This provision is irrespective of whether the stock is fully paid up or not. In the event of permanent disability or death the employee or his heirs will receive the amount which had been paid in for the stock, plus its accrued interest, and in addition the par value of the shares subscribed for. In case the shares have been fully paid for the stock will, of course, be retained by the employee or his heirs and a cash payment equivalent to the par value of the stock will be made.

Substitutes for Tin in Germany

The tin scarcity in Germany has been the cause of numerous attempts to find a substitute for tin oxide in white enamels for sheet and cast utensils. Sodium antimonate, largely used in some countries, is not permitted in Germany for cooking utensils. A non-poisonous zirconium preparation called "Terrar" has been introduced by the Chemisch-Metallurgische Industriegesellschaft, applicable to enamels on both sheet and cast metal utensils. Cerium compounds, which replace cobalt in the priming enamel, have been introduced and enable a white ground to be obtained. A cheap white for enamels consisting of zinc sulphide has also been proposed, the proportion being 5 per cent of the material, mainly suitable for very fusible enamels. Other suggested substitutes for tin oxide are mixtures of magnesium and aluminum oxides or of zinc and aluminum oxides, heated to a sufficiently high temperature to form spinels, the covering power being improved by the addition of up to 10 per cent of tin oxide, zirconium oxide, titanic acid or other refractory white pigmentary materials.

French Imports and Exports of Steel and Ore

French imports and exports of iron and steel for the first half of 1916, according to statistics of the Board of Trade, were as follows, compared with the same period in 1915 in metric tons:

	Imports		Exports	
	To July 1, 1915	To July 1, 1916	To July 1, 1915	To July 1, 1916
Pig iron and semi-finished steel	419,276	1,258,908	.....	.....
Iron and steel cast or wrought	.....	.....	66,190	91,506
Manganese ore	6,407	33,216	.....	.....
Iron ore	101,178	277,466	49,508	37,247

The large imports this year of semi-finished steel include steel bars from England and billets from the United States. The increase in imports of manganese ore and iron ore are interesting.

Free night schools have been opened for foreign workmen of the Bethlehem Steel Company at South Bethlehem, Pa. Lehigh University students will be instructors. There are more than 2000 Greeks and as many more of other nationalities at South Bethlehem. About 500 Greeks have already registered. The purpose of the school is to teach the English language.

CONDITIONS ARE HEALTHY

Election Had Little or No Influence

Big Lot of Resale Tools Absorbed by One Purchaser—Car and Automobile Builders Buying on Long Deliveries

The presidential election does not appear to have caused even a ripple in the flow of business. Reports from every section indicate a healthy condition of trade, despite a little slower activity in one or two cities and apprehension over the car shortage and new railroad embargoes.

Second-hand machines are exerting no injurious effect as some members of the trade had feared. The large lot of tools valued at $1,500,000 which was offered in New York a few days ago has been absorbed in its entirety by a large firm with foreign connections. Shell contracts are being concluded in the Central West, and new ones are not coming out, with consequent conjecture as to what will be done with the used equipment.

Cincinnati has been active with large lathes leading the demand. In that city both railroad car and automobile makers have been quietly buying for replacements, despite long deliveries. Business in Detroit is greater in the aggregate because of the influx of small orders. A conservative trend is observable on the part of sellers in that city.

Automobile builders are buying in Cleveland, also contracting for deliveries late next year to care for their 1918 output. The Norfolk & Western Railroad is inquiring for about 35 machines.

The Pullman Company, Chicago, is contemplating extensive purchases for the enlargement of its car shops.

New England points are again embargoed by the New York, New Haven & Hartford Railroad, the restriction being on shipments from the West, via Maybrook, Harlem River and Brooklyn terminals.

In the East the Government orders for ordnance and munitions continue to bring successful contractors into the market for machines of various types. Some large inquiries for turret lathes are out.

New York

NEW YORK, Nov. 15, 1916.

It can be definitely reported that the large number of machine tools, the value of which was estimated at $1,500,000, which were offered for sale about two weeks ago, have been absorbed, the entire lot having been taken by a large firm with foreign connections, making it probable that they will be exported.

While some large dealers assert that the market is a little slower, though still active, others find no lessening in the number of inquiries and sales of miscellaneous machines. Domestic shell contracts are making business, particularly for turret lathes, both large and small.

Boring mills are in good demand, and the price of some makes shows a tendency to advance. A foreign inquiry calls for 44 mills.

The Worthington Pump & Machinery Corporation, which has a Government contract for shell parts, has inquired for nine No. 4 hand screw machines, for delivery at Hazleton, Pa.

The Bethlehem Steel Company is [illegible] about $160,000 worth of machine tools for the Maryland Steel Company shipbuilding plant at Sparrows Point, Md.

The Standard Shipbuilding Company, Shooters Island, New York, has continued to buy against its recent list. Orders also have been placed by the New York Central Railroad and the Wheeler Condenser & Engineering Company, Carteret, N. J.

The New York & Hagerstown Metal Stamping Company, Hagerstown, Md., has made inquiry for nearly 100 hand screw machines, presumably for munitions work. Its inquiry calls for 40 machines with 1-in. spindle capacity, 39 for ⅛-in. stock and 16 for ½-in. stock. An export inquiry is for 500 small turret lathes.

The Warner & Swasey Company, Cleveland, Ohio, was the successful bidder on 112 No. 4 universal turret screw machines for the Newport Torpedo Station, bids on which were opened Nov. 3.

Makers of forging machinery continue under a great strain because of backward deliveries. One or two railroads have again revived inquiries for this class of machine, only to find prices higher than when they inquired previously.

The Celluloid Company, 290 Ferry Street, Newark, N. J., is having plans drawn by the Stone & Webster Engineering Corporation, 147 Milk Street, Boston, Mass., for 12 two-story factory buildings for its plant at Newark, estimated to cost about $1,000,000.

The American Synthetic Dyes, Inc., Avenue R, Newark, N. J., has had plans completed for a one-story pumping station, 24 x 39 ft., to cost about $4,000 and an auxiliary boiler house, one-story, 21 x 30 ft., to cost about $500.

H. C. Fischer, 500 Huron Street, Brooklyn, N. Y., has awarded contract for the construction of a one-story brick foundry, 50 x 100 ft.

The American Locomotive Company, Schenectady, N. Y., has awarded contract to D. Bennett & Son, Schenectady, for the construction of a one-story addition to its foundry, 100 x 175 ft., estimated to cost $42,000.

The Air Reduction Company, 50 Broad Street, Newark, N. J., has awarded contract to the H. D. Best Company, 52 Vanderbilt Avenue, New York, for a one-story factory building, 30 x 100 ft., and a four-story building, 45 x 100 ft., to cost about $75,000.

The Driver-Harris Wire Company, Union Building, Newark, N. J., has let contract for the construction of a three-story addition to its rolling mill, 75 x 80 ft., to cost about $20,000.

The New Brunswick Iron Works, New Brunswick, N. J., has awarded contract to the Hughes-Foulkrod Company, Philadelphia, for the erection of a one-story foundry, 80 x 120 ft., to cost about $14,000.

The Manhattan Rubber Mfg. Company, Passaic, N. J., is preparing to erect a four-story addition to its plant, 100 x 297 ft., to be used in the manufacture of rubber products.

The Highlander Machine Company has removed from Rochester, N. Y., to Spencerport, N. Y., where it is equipping a factory for the manufacture of household laundry equipment, such as motor-driven washing machines, electric ironers, heaters, etc. The company recently increased its capital stock from $20,000 to $50,000. Within 30 days it plans to finish the installation of its equipment and start running. F. J. Couch is general manager.

The Oxweld Acetylene Company, 646 Frelinghuysen Avenue, Newark, N. J., manufacturer of acetylene apparatus, will build two one-story additions to its foundry, about 42 x 64 ft., and 50 x 55 ft., at a cost of $15,000.

The National Silencer Company, 495 High Street, Newark, N. J., has been incorporated with a capital of $50,000 to manufacture combustion engines. Samuel D. Polsen, Edmund Schmitt and Louis Miller are the incorporators.

The Automatic Vending Machine Company, 9 Clinton Street, Newark, N. J., has been incorporated with a capital of $35,000 by H. Hartman, Nathaniel and Samuel K[illegible]

The Metal Products & Machine Company, 763 Broad Street, Newark, N. J., has been incorporated with a capital of $100,000 to manufacture [illegible]

Leonard L. and Robert S. Terhune and Carey S. Thomas are the incorporators.

The Alphaduct Company, Jersey City, N. J., manufacturer of conduit tubing, will build a four-story plant at 134-42 Cator Avenue.

Goodwill Brothers, Falconer, N. Y., have let contract for a boiler house, 50 x 100 ft., one story.

The Eclipse Machine Company is ready for bids on a machine shop, one story, 40 x 100 ft. Edward J. Dunn is president.

The Buffalo Foundry & Machine Company, H. D. Miles, president, will build a three-story pattern shop, 50 ft. square, at its plant at East Ferry Street and the New York Central Railroad Belt Line.

The department of public works, Rochester, N. Y., R. H. Pierce, commissioner, is having plans prepared for a powerhouse, 40 x 80 ft., one story, to be erected at Irodequoit, a suburb.

The Schoellkopf Aniline & Chemical Company, Buffalo, will build a steel and tile pump house at its new dye works on Abbott Road and the Buffalo Creek Terminal Railroad.

Work has been commenced on the new plant of the United States Alloys, Inc., on the River Road and New York Central Railroad, North Buffalo. The cost, with equipment, will approximate $300,000.

The Buffalo Copper & Brass Rolling Mill Company, Buffalo, is building a die shop at its plant at Military Road and New York Central Railroad.

Langer & Rosenberg, Port Chester, N. Y., will add a welding shop to their plant, 30 x 70 ft.

The Dutchess Mfg. Company, Poughkeepsie, N. Y., will build a three-story and basement addition, 41 x 95 ft., to its plant on Mill Street to cost $25,000.

The General Carbonic Gas Company, 887 Seneca Street, Buffalo, will build an addition to its plant at Seneca and Smith streets and the Erie Railroad.

A boiler house, 30 x 75 ft., one story, is to be built and equipped for the House of the Good Shepherd, Genesee Street, Utica, N. Y.

The Erie City Iron Works, Erie, Pa., has completed plans for a plant addition, 38 x 220 ft., one story, for a cleaning room and storage bins.

Philadelphia

PHILADELPHIA, PA., Nov. 13, 1916.

The T. K. Bell Engineers, Inc., Harrison Building, Philadelphia, has been established by Thomas K. Bell and others and has leased the former Rittenhouse foundry and machine shop on Main Street, Norristown, Pa. It will be devoted to the production of iron and steel specialties now being manufactured in Philadelphia.

On Oct. 14 a fire at the 126-in. plate mill of the Central Iron & Steel Company at Harrisburg, Pa., known as mill No. 1, completely destroyed the electric controller equipment for the mill tables and run-out table, and the electric light distributing station and roll shop, serving that mill. Considerable damage was done to the building and the adjoining waste heat boiler house, steam mains, mill operating platforms, etc. The fire, which was of undetermined origin, started just after closing time Saturday. In spite of extensive damage the mill started operation Monday morning on regular time.

The Sanitary Refrigerator & Heater Company has been organized and has purchased 6 acres in Portage, Pa., on the line of the Pennsylvania Railroad. It has had plans drawn and started the construction of a plant for the manufacture of a take-down type of refrigerators, ice-water shelving, etc. Six buildings, including a boiler house, a foundry, etc., are planned. The first structure will be 75 x 300 ft., of brick and tile, one story. W. R. Myton, Johnstown, Pa., is the architect. The company has been incorporated with a capital stock of $3,000,000. Robert Pearce, Portage, is president; Wallace Sherbine, president First National Bank, Portage, is first vice-president; J. Howard Crosby, Haverstraw, N. Y., is second-vice-president; C. W. Partridge, New York, is treasurer, and William T. Yeckley, Portage, assistant treasurer. H. Douglas Layman of New York; Alvin Sherbine, Johnstown, Pa., and M. E. Baird of New York, are also directors. H. W. Layman is manager.

The Jenkins Interlock Mfg. Company, Philadelphia, Pa., has been incorporated with $25,000 capital stock to manufacture interlocking devices and other metal specialties. The incorporators are Thomas W. Jenkins, 905 Forty-eighth Street; Frank C. Holberg and Jennie A. Jenkins.

The Leeds & Northrup Company, Philadelphia, manufacturer of electrical instruments, has filed plans for a five-story reinforced concrete building, 55 x 110 ft., at 4901 Stenton Avenue, estimated to cost $120,000.

The Atlantic Steel Castings Company, Chester, Pa., has given a contract to Camp & Zahniser, Inc., contractors, for alterations and additions to its plant at Sixth and Lloyd streets, Chester.

The Beacon Light Company, Chester, Pa., operated by the Philadelphia Electric Company, has awarded a contract for a new six-story electric power plant, 300 x 420 ft., to cost about $2,500,000. The Chester Construction & Contracting Company, Heed Building, Philadelphia, is the contractor.

W. O. Young, Philadelphia, is interested in a company which is planning for the establishment of a plant at Pottsville, Pa., for the manufacture of celluloid specialties.

The Albro-Clem Elevator Company, Philadelphia, has acquired property on East Erie Avenue as a site for a large manufacturing plant.

The John A. Roebling's Sons Company, Trenton, N. J., manufacturer of wire and wire rope, is building a four-story brick addition to its plant on Hanover Street. A one-story structure is also being built on Elmer Street. The work is estimated to cost $55,000.

The John E. Throop Sons Company, Trenton, N. J., manufacturer of machinery, is building a machine shop on Lewis Street to cost about $25,000.

The Ajax-Grieb Rubber Company, Trenton, N. J., manufacturer of automobile tires, is building a four-story brick and steel addition to its plant, at a cost of about $300,000.

The Victor Talking Machine Company, Camden, N. J., has had plans prepared for a one-story reinforced concrete addition to its plant, about 80 x 670 ft.

The Wilmot Engineering Company, Hazleton, Pa., is building a plant at White Haven, Pa., for the manufacture of a patented chain.

The American Car & Foundry Company, 165 Broadway, New York, has awarded contract for the construction of a boiler riveting building, one story, 22 x 82 ft., estimated to cost $7,000 and for an addition to the test shop, one story, 24 x 264 ft., estimated to cost $4,500 at its plant at Midland, Pa. B. B. Cannon is local manager.

New England

BOSTON, MASS., Nov. 13, 1916.

Another embargo was placed in effect Nov. 10 by the New Haven Lines which affects all carload and less than carload lots from the West via Maybrook, Harlem River and Brooklyn terminals. This embargo has the usual exceptions. New York Central and Boston & Albany shipments via piers 31 to 37 on the East River are also barred.

The Merrow Machine Company, Salem, Mass., will build an addition to its machine shop, 20 x 100 ft., one story.

The Bernhard Boiler Company, Boston, Mass., has been incorporated with a capital stock of $25,000 by Frederick N. LeBaron, West Newton, president and treasurer, L. S. LeBaron and G. L. LeBaron.

The Eastern Motors, Inc., Hartford, Conn., has been incorporated with a capital stock of $1,000,000 to manufacture motor cars. The incorporators are Willis D. Upson, Fred A. Law and John R. Turk.

The General Electric Company, Pittsfield, Mass., is to build three additions to plant No. 7, 75 x 175 ft., one story.

The William Klein Company, Enfield, Conn., has been incorporated with a capital stock of $25,000 to manufacture casket hardware. The incorporators are William, Edward S. and Lawrence Klein of Thompsonville.

The Kilborn & Bishop Company, New Haven, Conn., has awarded a contract for an addition to its plant on River Street.

The Silvertown Cycle Mfg. Company, Worcester, Mass., has been incorporated with a capital stock of $500,000 to manufacture bicycles. The directors are Charles A. Persons, president; Albert D. O'Donnell, clerk; and Orville A. Jones. Plans for a factory have not yet matured, but it is the intention of the company to begin manufacturing soon so that its product may be on the market next summer.

The G. S. Youngs Company, North Avenue, Bridgeport, Conn., has awarded a contract for an addition to its foundry, 72 x 96 ft., one story.

The Electric Cable Company, Bridgeport, Conn., has awarded a contract for a new building, 45 x 130 ft., four stories.

The Fairbanks Hammer Company, Boston, Mass., has been incorporated with a capital stock of $10,000. The directors are I. L. Jameson, president; Archibald Parsons, Chelsea, treasurer, and F. M. Whitman.

The Stanford Steel Products Company, Milford, Conn., is building an addition to its factory on Buckingham Avenue.

The Metallic Auto-Tire Company, Lynn, Mass., has been

incorporated with a capital stock of $500,000. The directors are A. O. Szeitz, president; Joseph Lazarus, Winthrop, treasurer, and C. P. Govostes.

Joseph Cotter, North Union Street, Somerville, Mass., has taken out a permit for the erection of a machine shop, 45 x 45 ft., one story.

The Superior Mfg. Company, Bridgeport, Conn., has been incorporated with a capital stock of $75,000 by E. P. Hyde, D. J. Sullivan, and Bessie M. Hyde.

The Springfield Tool Company, Springfield, Mass., has been incorporated with a capital stock of $50,000. The incorporators are W. J. Roy, president; John A. C. Stevenson, 6 Temple Street, treasurer, and William Thompson.

The Cape Mfg. Company, Augusta, Me., has been incorporated with a capital stock of $25,000 to manufacture threshing machinery. The directors are E. M. Leavitt, Winthrop, president and treasurer; Ernest L. McLean, Augusta, clerk; Frank E. Southard, E. J. Noble and Pauline Lowell.

The Universal Valve Company, Boston, Mass., has been incorporated with a capital stock of $5,000. The incorporators are Carleton K. Berger, Roxbury, president and treasurer; J. J. Berger and H. R. Berger.

The United States Electric Generator Company, Providence, R. I., has been incorporated with a capital stock of $200,000. The incorporators are Arthur P. Manchester, 363 Black Street; Harry W. Spooner, 164 Arnold Avenue; and Eli A. Wilcox, 89 Ontario Street, all of Providence.

The New Haven Malleable Iron Company, New Haven, Conn., will operate a jobbing foundry exclusively, but owing to delay in receiving equipment will probably not start operation until after Jan. 1.

Chicago

CHICAGO, ILL., Nov. 11, 1916.

The past week has been one of exceptionally large business, the sales by nearly all of the local dealers exceeding those of any week in a number of months. This activity was occasioned by an increase in both domestic and export transactions. Inquiry from domestic manufacturers does not as a rule embrace any single lots of large size, though a notable exception to this rule is reported in the contemplated purchases of equipment by the Pullman Company to broaden the scope of its car shops. From abroad the renewal of interest is especially noticeable with respect to small swing lathes. Further sales are reported to Canada and to Japan, and the shipyards of the world are buying steadily. Some increase in railroad buying of machinery is noted, but for the most part they are still lagging behind. The Elgin, Joliet & Eastern Railway is in the market for a small list and the Missouri, Kansas & Texas Lines have let the contract for the erection of its new shops.

The Ajax Forge Company, 2499 Blue Island Avenue, Chicago, has awarded contracts for a one-story addition to its shops, the building to cost $35,000.

Charles J. Menely, 2702 Warren Avenue, Chicago, will build a one and two-story factory, for which contracts have already been let at a cost estimated to be $5,000.

Roger C. Sullivan, 122 South Michigan Avenue, Chicago, will erect a one-story brick shop at 121 North Curtis Street at a cost of $5,000.

The Weaver Mfg. Company, Springfield, Ill., in addition to the erection of a manufacturing building will also add a new heating plant and an office building.

The Wabash Railroad advises that its new shop building at Decatur, Ill., may be held over until spring. E. F. Needham, Decatur, is superintendent.

The Vortex Mfg. Company, Chicago, has acquired a building at Western and Austin avenues which will be equipped to manufacture soda fountain apparatus.

The All-Steel Equipment Company, Aurora, Ill., will shortly let contracts for the building of a factory, 80 x 300 ft.

The McGuire-Cummings Company, Paris, Ill., suffered a loss estimated at $100,000 as a result of fire which destroyed a section of its car shop.

The Stoever Steel Tank & Mfg. Company, Freeport, Ill., is planning the erection of an addition to its shop.

George G. Bayne, organizer of the Bayne Mfg. Company, Quincy, Ill., formed to manufacture automobile specialties, has completed arrangements for the erection of a factory at Bushnell, Ill.

The Silo Specialty Mfg. Company, Clinton, Iowa, is in the market for one set of 10-ft. bending rolls and one 10-ft. squaring shear having a capacity up to No. 12 gage steel and one second-hand punch press.

The Universal Hoist Company, Cedar Falls, Iowa, has begun the construction of a one-story factory. It is expected that the new capacity will be in operation by Jan. 1.

The Manchester Spoke Company, Manly City, Iowa, has purchased through W. G. C. Bagley, trustee, the plant of the Chase Mfg. Company in that city, which it will operate for the manufacture of its own product.

The Northwestern Malleable Iron Works, St. Paul, Minn., [illegible] expenditure of $7,000 is contemplated.

Indianapolis

INDIANAPOLIS, IND., Nov. 13, 1916.

The Jackson Shovel & Tool Company, Hartford City, Ind., has been sold by the receiver to H. Christen, Chicago, for $23,000.

The Motor Parts Company, Newcastle, Ind., is building an addition to its plant, 80 x 180 ft.

The P. I. Post-Mold Company, Marion, Ind., has been incorporated with $7,500 capital stock to manufacture machinery. The directors are J. A. Searles, William Thorn and John W. Harvey.

Fire gutted the assembling room of the car works of the McGuire-Cummings Mfg. Company, Paris, Ill., Nov. 6, causing $50,000 loss, destroying valuable drills, lathes, motors, etc.

The Gary Foundry & Machine Works, Gary, Ind., is planning extensions that will double the capacity of its plant.

The Muncie Cap & Set Screw Company, Muncie, Ind., has been incorporated with $20,000 capital stock. The directors are John Stetter, William Wuthenow and Abe Feinberg.

The Indiana Power & Water Company, recently organized at Bloomfield, Ind., with H. L. Clarke and E. M. Simon, Chicago, in charge, has taken over the Indiana Light & Power Company, Worthington; the Home Light & Power Company, Bloomfield; the Elnora Light & Power Company, Elnora; the Myers Light & Power Company, Ogden; the Bicknell Light & Power Company, Bicknell, and the Linn Coal Company, Bicknell. The company has been authorized to issue $240,000 in bonds and $80,000 in stock.

The Meixell Company, Indianapolis, has been incorporated with $10,000 capital stock to manufacture automobile and vehicle parts. The directors are B. F. Meixell, Thomas E. Madden and Thomas J. Gannon.

The Periscope Spark Plug Company, Kokomo, Ind., has been incorporated with $150,000, to manufacture spark plugs. The directors are A. E., J. M. and L. Long.

The Wheatland Light Company, Wheatland, Ind., has been incorporated with $2,000 capital stock, to supply heat, light and power. Anderson C., John S. and Andrew E. Nicholson are the directors.

The Clo-Mix Company, Elkhart, Ind., has been incorporated with $25,000 capital stock, to manufacture warm air registers. The directors are A. H. Beardsley, C. A. Mixer and H. E. Clover.

Detroit

DETROIT, MICH., Nov. 13, 1916.

Increasing activity has been noted in the machinery market and an unusually large number of small orders were placed last week. The tendency of the manufacturer seems to be to catch up as much as possible on back orders before taking many new ones. Collections are being asked in many cases on part shipments, and a growing conservatism is noticeable in supplying the trade. October was one of the largest months for construction work Detroit has ever known, and wood-working machinery has been in great demand.

The King Works, Detroit, tool manufacturer, has bought the building formerly leased by the Detroit Pneumatic Chuck Company, which is 35 x 115 ft., at Pollard and St. Aubin streets.

The Joliet Auto Specialties Company has been removed to St. Joseph, Mich., where it will be known as the Auto Specialties Company, occupying a factory with 75,000 sq. ft. of floor space. It manufactures a special automobile top holder and proposes to manufacture 4,000,000 in 1917.

The Clipper Belt Lacer Company, Grand Rapids, Mich., has decided to build a two-story addition to its factory on Front Avenue, 65 x 100 ft. A garage, 25 x 100 ft., will also be built.

The Monorail Company of America, Detroit, has been incorporated by John C. Frost, Richard G. Lambrecht and Louis A. Ewald, with $50,000 capital.

The Lansing Stamping & Tool Company, Lansing, Mich., has increased its capitalization from $50,000 to $100,000.

G. F. Conway, general manager, states that the business has increased to such an extent that the present quarters will not take care of it, and ground will be broken shortly for a new factory.

The International Metal Stamping Company, Detroit, announces that it will build a new factory soon. O. L. Currier is president.

The Baker-Vawter Company, Benton Harbor, Mich., manufacturer of loose leaf and steel filing equipment, is erecting concrete and steel buildings to add 60 per cent more floor space for the manufacture of its metal cabinet filing line. The capitalization of the company has been increased from $800,000 to $1,500,000. William A. Vawter is president and William A. Vawter, 2d, formerly secretary, also becomes treasurer.

Cleveland

CLEVELAND, OHIO, Nov. 13, 1916.

Automobile manufacturers in the Central West are buying machinery, delivery in about a year, for making their 1918 cars. Some orders have been placed for drilling machines for delivery next November and for lathes to be shipped about September. The question as to the future use of plants that sprang up to handle munition work is becoming one of considerable interest in view of the fact that some of this work is being cleaned up and new orders are not forthcoming. Apparently no additional munition work has been placed here for some time, although manufacturers expect new orders to come out within the next few weeks. The plant of the Cuyahoga Stamping & Machine Company, Cleveland, built for munition work, has completed its contract and shut down, the management announcing that it expects to let it remain idle for some time. The Premier Brass & Forging Company, Cleveland, has finished work on a large shell order and has disposed of most of its machinery. Manufacturers claim that plenty of shell work is still to be had, providing steel could be secured at prices that would make it possible to take the orders. Among new machinery inquiries is one from the Norfolk & Western Railroad for about 35 machines. The American Steel & Wire Company, Cleveland, has revived an inquiry for about 15 machines it put out several months ago. The general demand for small lots of standard machine tools continues very active. Deliveries on turret lathes have improved and some makers are now able to make fairly prompt shipments on some sizes. Pneumatic tools are in heavy demand and considerable export business in this line is coming from England and Russia.

Plans for extensive plant and equipment improvements in the factory of the Hydraulic Press Mfg. Company, Mount Gilead, Ohio, have been completed. The erection of one building and extensions to the machine shop, power house, stock room, tool room and erecting shop buildings are provided for in order to meet increased demand. The machine shop will be enlarged by an addition 60 x 100 ft. Considerable new shop equipment will be needed for this, including a 20-ton electric traveling crane, a large motor-driven horizontal boring mill and a heavy duty motor-driven planer. A structural shop about 50 x 60 ft. will be erected, and a new high-speed cut-off saw and traveling crane installed. The plans also include the future extension of the erecting shop 47 x 130 ft. A 20-ft. extension will be added to the power plant and a 300-hp. Corliss engine and a 225-kw. generator. Two new steam boilers and stokers for three boilers will be added to the boiler equipment. An oil-storage building will be erected in which will be installed oil tanks with pumps, as well as steam-heating pumps, boiler feed pumps, etc. The main stock room will be extended and another story added for the storage of hydraulic valves, fittings, packings, repair parts, etc. The tool room will also be extended. For all of the building extensions brick and concrete construction with steel for the substructure work will be used.

The Atlas Bolt & Screw Company, Cleveland, has disposed of its plant on Marquette Avenue, and will erect a new plant on Ivanhoe Road, adjoining that of the Atlas Car & Mfg. Company. A factory, 160 x 600 ft., and an office building will be erected. New equipment will be required.

The National Tool Company, Cleveland, manufacturer of milling cutters, will enlarge its plant by the erection of a three-story addition, 30 x 190 ft. Some additions to its line of products are contemplated.

The Osborn-Crew Mfg. Company, Cleveland, maker of metal stampings and specialties, has acquired a site at East Thirty-ninth Street and the Pennsylvania Railroad, on which it will erect a new plant. W. S. Lougee, Cleveland, is the architect.

The American Shipbuilding Company, Cleveland, will enlarge the machine shop at its Cleveland yards by the erection of a one-story addition, 60 x 120 ft., and at its Lorain yards will build additions to the forge and boiler shops, 60 x 120 ft. and 40 x 110 ft. It is in the market for lathes, drill presses, forging presses, planing machines and cranes.

The P. & W. Machine Company, Cleveland, has moved its plant from Brownell Court to East Sixty-second Street near Euclid Avenue, and contemplates the erection of a new plant.

A new plant will be established in Cleveland by the Steel Car Company which has been organized with a capital stock of $500,000 to build and repair steel and wooden freight cars. P. S. Joyce, president of the Illinois Car & Mfg. Company, Chicago, will be at the head of the company.

The Champion Stove Company, Cleveland, Ohio, on Nov. 1 passed to new ownership and management, C. H. Miller, president, and John A. Herbst, secretary and treasurer, selling their interests and retiring from the business. A. B. duPont and Fred C. Alber have purchased these, together with other interests in the company. A. B. duPont is president and Fred C. Alber is secretary and treasurer of the new board. The company proposes to broaden the lines and increase the output.

The Canton Auto Parts Mfg. Company, Canton, Ohio, recently incorporated, has secured temporary factory space in the building of the Ohio Automobile Company, 317 Court Avenue, and will begin operations shortly. It expects to start the erection of a permanent plant within a few weeks to manufacture piston rings.

It is announced that the building plans of the Buckeye Engine Company, Salem, Ohio, will result in practically the entire present plant being replaced by a new structure. A brick and steel machine shop, 120 x 380 ft., will be built and three or four more buildings are contemplated.

The Bryan Pattern & Machine Shop, Bryan, Ohio, has been incorporated with a capital stock of $25,000. It will build a plant, 50 x 120 ft., to manufacture metal patterns for automobile parts and for other castings. E. C. Hagener will be the principal owner.

The Mathews Engineering Company, Port Clinton, Ohio, has purchased the plant of the Boley Wire Fence Company, Sandusky, Ohio, and will move to that city shortly. An addition, 33 x 100 ft., will be erected. It builds small electric light plants for residences.

The Bauer Mfg. Company, Marshallville, Ohio, has been organized with a capital stock of $25,000 and will establish a plant to manufacture ladders and roof jacks. T. E. Steiner is president and J. J. Frazer secretary and treasurer.

Milwaukee

MILWAUKEE, WIS., Nov. 13, 1916.

A feature of the local general machinery demand the last week or two has been the unusually large requirement of flour and feed milling equipment. Makers of this equipment have not known so brisk a demand as now for 5 or 10 years and regard the buying movement as bringing this once important Milwaukee industry back into its own. Although orders for machine tools booked the first week in November have not been abnormally large, demand continues brisk and of a nature similar to that noted in recent months. All shops are sold a long time ahead and production continues at a high level without appreciable catching-up on deliveries. If no orders should be booked in November or December, tool builders would still be assured of capacity production until the middle of 1917, at least. Milwaukee building operations for the first ten months of 1916 were approximately $12,000,000, or $1,713,502 larger than for the corresponding period of 1915. The figures include an inconsiderable part of the industrial expansion in this district, inasmuch as only work within the city limits enters the building inspector's office, and a large part of industries are just beyond the limits. Local bank clearings are establishing new high records and are expected to approach the $1,000,000,000 mark for 1916, compared with $836,385,000 last year.

G. W. Buttles, general manager of the Silent Washer Mfg. Company, Appleton, Wis., is promoting the organization of a company to establish a malleable foundry to specialize in small castings. The capital stock of the proposed organization will be $100,000.

The New London Motor Car Company, New London, Wis., has awarded contracts for the erection of a garage and repair shop, 50 x 80 ft.

The Universal Tool & Apparatus Company, Milwaukee, has been organized with a capital stock of $15,000 by Oscar Werwath and William Baum.

The Wittlin Garage Company, Cedarburg, Wis., will build a repair shop addition, 40 x 70 ft.

The United States Glue Company, Carrollville, Wis., will build a new refrigerator building and ice machine room, 40 x 80 ft., two stories and basement, of reinforced concrete. The architect is Herman J. Esser, Camp Building, Milwaukee.

Welke Brothers, Allen, Eau Claire County, Wis., will build a garage and repair shop, 40 x 80 ft., one story and basement.

The Wood Products Company, Ladysmith, Wis., is building a new enameling house, 20 x 30 ft., to contain four ovens, and is installing 7 lathes, doubling its production facilities. J. C. Young, Jr., is general manager.

A report from Kenosha, Wis., announces the organization of the Winther Motor Truck Company, with a capital stock of $330,000, which will establish a plant at the outskirts of Kenosha. The promoter is Martin P. Winther, motor truck engineer. Further details have not been made public.

The Ladish-Oberlberger Company, Cudahy, Milwaukee County, Wis., broke ground Nov. 15 for a one-story addition, 50 x 200 ft., to its drop forge works. The engineers are Klug & Smith, Mack Block, Milwaukee.

The machine shop of the New London Iron Works, New London, Conn., has been purchased from A. G. Tuma by Edward Brusch, DePere, Wis., who has taken possession and will be in active charge of the business.

The Diamond Match Company will enlarge its plant at Oshkosh, Wis., by the erection of a building, 160 x 165 ft., four stories and basement, of reinforced concrete, brick and steel. Old buildings are being razed and contracts for the new one will be awarded at once. L. Frank Gates is the local manager.

The Ashland Light, Power & Street Railway Company, Ashland, Wis., is preparing to erect a power house, 40 x 80 ft., to accommodate four 600-hp. boilers and one horizontal Curtis turbine engine of 8333 hp. capacity.

The Spencer Sign Service Company, Steevns Point, Wis., electric sign manufacturer, has incorporated its business. The initial capitalization is $5,000. The works have been removed to the new quarters at Union and Portage streets. Spencer E. Swancutt is president.

Cincinnati

CINCINNATI, OHIO, Nov. 13, 1916.

The inquiry for machine tools is excellent, with the larger sized lathes leading. Not many orders, however, were placed last week by either foreign or domestic buyers. Leading car manufacturers are reported to be quietly inquiring for a varied class of machine tools, but have not lately placed any large orders. It appears that the machines wanted are for replacement purposes and not for enlarging the capacity of their plants. This same condition exists with the automobile manufacturers. Low pressure boilers and tanks are in excellent demand, and all manufacturers are very busy. The difficulty in obtaining prompt shipment on plates has had some adverse effect on this particular business.

No manufacturing plants in this part of the country have yet been compelled to shut down on account of the shortage in coal cars, as has been currently reported, and indications are now that they will be able to keep their power plants operating without let up during the winter.

The Charles Boldt Glass Company, Cincinnati, has taken out permit for a one-story brick, steel and concrete building to be erected at Red Bank at an estimated cost of $50,000. It will be used partly for storage purposes.

The proposed plant of the Carlton Machine Tool Company, Cincinnati, will be located at Spring Grove Avenue and Meeker Street. The company recently acquired the plant of the W. E. Gang Company in West End.

The Bourne-Fuller Company, Cincinnati, will erect a warehouse addition at 617 West Front Street, estimated to cost $12,000.

The John Douglass Company, Cincinnati, maker of sanitary pottery, has let contract for two additional brick kilns to be installed in its plant in West End.

The Comport Tool & Machine Company, Dayton, Ohio, has been incorporated with $30,000 capital stock by William A. Hoffman and others to make dies and other machine-tool specialties.

The Alexander-Kramer Company, Dayton, Ohio, has been incorporated with $15,000 capital stock to manufacture toys and small metal specialties. J. G. Alexander is one of the incorporators.

The Crown Hardware Mfg. Company, Dayton, Ohio, recently increased its capital stock from $32,000 to $60,000 and is having plans prepared for a large addition to its plant.

The Acme Carbureter & Mfg. Company, Dayton, Ohio, has increased its capital stock from $10,000 to $15,000 and will add to its manufacturing facilities.

The Foos Gas Engine Company, Springfield, Ohio, has lately received several large domestic orders for internal combustion engines, and is now operating its plant with a night shift.

The Central Glass Company, Springfield, Ohio, is remodeling the former plant of the Eagle Glass Company. Practically all the extra equipment has been ordered.

The Phelps Mfg. Company, Columbus, Ohio, maker of wire wheels, intends to increase its capital stock at an early date and will add to its manufacturing facilities.

The Bryan Pattern & Machine Company, Bryan, Ohio, has been organized for the purpose of making wood and metal foundry patterns, and also machine-tool products. The company is now erecting a factory building that will be completed before Jan. 1. C. L. Newcomer is one of the organizers of the company.

Baltimore

BALTIMORE, MD., Nov. 13, 1916.

A. W. Gieske, 3 East German Street, Baltimore, has purchased the property of the Spedden Shipbuilding Company, Boston Street, Baltimore, and plans to install modern equipment. Included in the plant are machine shops, marine railways, etc.

J. J. Mott and R. L. Jenkins, Radford, Va., are interested in the formation of a company which will manufacture bricks.

An addition to cost about $5,000 will be built by the O. K. Foundry Company, Richmond, Va.

The Norfolk Shipbuilding & Drydock Company, Norfolk, Va., has been organized with $1,500,000 capital. Harry G. Skinner, 1414 Continental Building, Baltimore, is president. The company is understood to be contemplating the construction of a plant on the Elizabeth River.

Woodward & Son, Stockton and Fourth streets, Richmond, Va., are seeking prices on machinery for the manufacture of excelsior.

The Baltimore Gas Appliance & Mfg. Company, Bayard and Hamburg streets, Baltimore, will build an addition at Bayard and Nanticoke streets to cost $10,000.

The Central South

LOUISVILLE, KY., Nov. 13, 1916.

Expectation that a means of relief from the car shortage situation will be provided shortly has resulted in increasing confidence of customers of local dealers and manufacturers in most lines. Manufacturers of bars, sheets, plates, tubes, etc., note inquiries from all sections of the country and refer to standing orders from numbers of customers who say they are in the market for anything in the line at all times. Numbers of communities in this part of the country have just passed bond issues for lighting plants and water systems or both, and the demand for these classes of equipment is larger. Inquiries for ice manufacturing machinery have increased, although a disposition is apparent to await lower prices.

B. F. Avery & Sons, manufacturers of agricultural implements, Louisville, Ky., have increased their capital stock from $1,500,000 to $2,300,000. Charles F. Huhlein is president.

The Baltimore & Ohio Railroad, it is reported, is making preparations to build new freight terminals at Louisville, estimated to cost $200,000.

A bond issue of $10,000 for installation of a municipal lighting and water plant has been voted by Olive Hill, Ky.

The city of Murray, Ky., has voted a bond issue of $20,000 and will purchase or install a city water and light plant.

The city of Winchester, Ky., has voted $180,000 in bonds to buy the plant of the Winchester Water Company, or build a new one, and to extend the mains to a pumping station to be erected on the Kentucky River.

The city of Versailles, Ky., has voted $20,000 in bonds for improving the municipal water system.

The city of Lancaster, Ky., has voted $250,000 in bonds for extension and improvement of its water system, proposing to take water from the Dix River. R. C. Anderson is the engineer.

Chattanooga, Tenn., is [illegible] pairing the city fire and motor-driven equipment.

The factory of the L. F. Moore Carriage Company, [illegible] ville, Tenn., was destroyed by fire with [illegible] $11,000.

The Poe Cotton Seed Products Company, Memphis, Tenn., proposing to manufacture cotton seed products, has been incorporated with [illegible] Jr., Robert Wilson, W. M. Swift and others.

Birmingham

BIRMINGHAM, ALA., Nov. 13, 1916.

Wholesale machinery remains very active, with an especially large demand for and heavy sales of wood-working machinery, owing to the activity of the lumber mills. Trade is good in every direction and deliveries occupy attention. Collections are comparatively prompt.

A. S. Bacon & Sons, Savannah, Ga., have been incorporated with a capital stock of $150,000, to manufacture lumber. A. S., Hal H. and Oliver T. Bacon are interested.

Meritas Mills, Columbus, Ga., will build a $250,000 addition.

W. L. Cleveland and C. V. Truitt, La Grange, Ga., and others propose to build a meat-packing plant to cost $200,000.

Wilson & Co., Chicago, will build a meat-packing plant in Jacksonville, Fla., at a cost of $125,000.

The National Lock Company, Rockford, Ill., it is reported, contemplates building a plant at High Point, N. C., but final action has not yet been taken.

The Carolina Woodenware Company, Fayetteville, N. C., incorporated with a capital stock of $50,000, proposes to manufacture lard tubs, candy pails, etc. H. W. Lilly is president and J. C. Cowell, secretary.

The Southern Desk Company, Hickory, N. C., will build a foundry for the manufacture of desk castings and is seeking prices on cupola, fan and tumbler. It will be of mill construction, 75 x 160 ft.

St. Louis

ST. LOUIS, MO., Nov. 13, 1916.

The buying of machine tools continues steadily, with an aggregate of business which maintains a really high level. No recession in transactions has been apparent even through the election period. Deferred deliveries are taken calmly by buyers and 9 to 12 months are not infrequent terms of shipment. Second-hand tools are not affecting the market at all, although a few are now and then to be picked up as long deliveries are met and replaced equipment is released. General business conditions, both manufacturing and retail, are reported excellent, with collections extremely good and money very easy for both permanent investment and for commercial loans.

The A. Leschen & Sons Rope Company, St. Louis, is now constructing an administration building adjoining its wire rope plant at a cost of $100,000. It is to be 75 x 115 ft., three stories. The general offices will occupy the first two floors, while the third floor will contain dining rooms, kitchen, and rest rooms. In the basement will be recreation rooms and shower baths. The factory buildings since 1903 have occupied a 33-acre site in the northwest section of St. Louis, while the offices have been in the downtown district.

The Electrograph Company, Kansas City, Mo., has been incorporated with a capital stock of $1,000,000 by J. F. Rudd, A. L. Landsberg and M. T. Miller to manufacture electrical advertising apparatus, etc.

The Ever Tight Piston Ring Company, St. Louis, Mo., has been incorporated with a capital stock of $75,000 by J. W., Roland R. and J. W. Reinholt, Jr., to operate the business formerly owned by R. Koehler & Son, which will be increased in capital.

The F. C. Schwaner Machinery Supply Company, St. Louis, has been incorporated with a capital stock of $10,000 by L. E. and E. P. Schwaner, M. B. Stewart, E. E. Reed, and others.

The Fulton Iron Works, St. Louis, Mo., will build an addition for a steel forgings plant at a cost of about $500,000.

The American Fixture & Show Case Mfg. Company, St. Louis, has leased new quarters at 1010 Lucas Avenue and will increase its wood-working plant capacity. Milton D. Mendle is president.

The Moon-Hopkins Billing Machine Company, St. Louis, Mo., is planning manufacturing plant extensions, details of which have not been completed.

The Riehl-Miller Company, Webster Groves, Mo., has leased quarters at 1507 Olive Street, St. Louis, which it will equip for machine work, etc.

The Winter Garden & Ice Company, St. Louis, Mo., has increased its capital from $125,000 to $350,000 and will equip its ice-making and refrigerating plant for maintaining an ice skating rink as well as an ice-making and refrigerating plant for general purposes. H. C. Wood and M. E. Springer, both of Cincinnati, are the principal owners.

The Empire District Electric Company, Joplin, Mo., will improve one of its electric generating plants, installing equipment to cost $25,000. B. C. Adams is manager.

A mill and grain elevator of 5000 bbl. of flour per day capacity will be built at St. Joseph, Mo., by the Larabee Flour Mills Corporation, Hutchinson, Kan., at an estimated cost of $500,000.

L. J. Goodrich, Mountain Home, Ark., is in the market for one 100-kw. 3300-volt three-phase turbine, a water turbine, etc.

S. E. Lasley will install at Enola, Ark., a cotton-seed oil mill of 20 tons daily capacity, including presses, seed cleaner, cake mill, etc.

The Baxter Electrical Utilities Company, Cotter, Ark., will equip an electric light and power plant at Cotter and also a hydroelectric plant on White River, developing about 10,000 kw.

The McGehee Water & Light Company, McGehee, Ark., will install a Diesel engine and generating machinery to cost about $12,000.

The oil mills at Little Rock, Ark., of the Southern Cotton Oil Company, which have been burned with a loss of $25,000, will be replaced.

The automatic coal chute of the Iron Mountain Railway at McGehee, Ark., has been burned with a loss of $30,000. It will be replaced. E. A. Hadley, St. Louis headquarters, is chief engineer.

The Oklahoma Oxygen Company, 406 North Hudson Street, Oklahoma City, Okla., T. S. Chambers, president, will install machinery to manufacture oxygen and is also in the market for internal combustion engines.

The Ardmore Specialty Company, Ardmore, Okla., R. B. Wright, president and manager, is in the market for boilers, electric motors, gas engines and other equipment.

The Machinery Mfg. Company, Henryetta, Okla., has been incorporated with a capital stock of $20,000 by C. J. Tanquary, W. J. Caldwell and F. H. Blackford.

Van Dunham and W. E. Whittaker, Chickasha, Okla., will equip a machine shop, 25 x 100 ft.

A steel car building plant to cost about $500,000 is to be equipped at New Orleans, La., by the Southern Car Company, High Point, N. C.

Texas

AUSTIN, TEX., Nov 11, 1916.

The Post City Water Company will construct a waterworks plant at Post City to cost about $170,000. Lawrence I. Montgomery is an incorporator.

The Knox Lumber Company will install an electric light and power plant at East Mayfield, where its lumber mill is situated. It will build a transmission line to Hemphill and furnish light and power for that town.

The Stark Lumber Company, Memphis, Tenn., plans to build a hardwood sawmill at Beaumont. W. A. Stark is president.

The City Council of Wellington will award the contract soon for the construction of a waterworks plant to cost about $27,000.

The City Council, Miami, will award the contract soon for the installation of an electric light and power plant.

A. F. Trautwein, Cuero, and associates, plan to build a cotton gin to cost about $25,000.

Power Brothers, who recently bought the brick-making plant of the Abilene Press Brick Company at Abilene, will install additional machinery.

The Chambers Auto Supply Company, Cameron, will build a garage and machine repair shop.

The Pacific Northwest

PORTLAND, ORE., Nov. 7, 1916.

The demand for machinery in outside construction has been good owing to the fine weather. Many plants that usually close a month earlier are still operating and considerable new construction and development work has been undertaken. Mining machinery is less brisk, although considerable machinery for mill equipment has been under inquiry. Agricultural implements are active.

While the situation in the coast lumber and shipping districts is favorable, car and vessel shortage is still a serious drawback. Reports from the eastern parts of Oregon, Washington, Idaho and Montana, indicate a condition of unparalleled prosperity which is bringing out a heavy demand for small equipment, building accessories, farm implements, etc., as well as for large units required in mining, hydroelectric development, irrigation work, etc. Some expansion is taking place in both the large and small manufacturing industries. Exports of machinery, railroad equipment and steel products through Pacific ports continue heavy.

The Peninsula Shipbuilding Company, Portland, will build two new sets of marine ways, and will begin work on several auxiliary schooners.

The Eugene Iron Works, Eugene, Ore., is starting work on a new shop 40 x 68 ft. and will soon add another building, 40 x 40 ft.

Plans are being drawn for a suction dredge for the Port of Bandon, Ore., to cost about $30,000.

The Seattle Construction & Drydock Company, Seattle, Wash., has placed a contract with the McAteer Shipbuilding Company for constructing the hull of a floating drydock of 12,000 tons capacity.

The International Harvester Company will build a five-story distributing warehouse and branch factory at Salt Lake City, Utah, to cost about $100,000.

The merger of the Pacific Alaska Navigation Company and the Pacific Coast Steamship Company under the name of the Pacific Steamship Company became effective Nov. 1. Headquarters have been established in Seattle in the building of the Pacific Coast Steamship Company.

Robert Armstrong, Victoria, B. C., plans the establishment of a machine shop at 134 Kingston Street, to cost about $3,000.

The Oregon Box & Mfg. Company, Bay City, Ore., recently purchased a tract of 3,000,000 ft. of timber, which will be immediately utilized.

The Pacific Coast Shipbuilding & Drydock Company, Tacoma, Wash., has been incorporated by a number of Tacoma business men, including J. H. Hyde, and will construct a shipbuilding plant and drydock. It is capitalized at $500,000.

The J. F. Duthie Shipbuilding Company, Seattle, has recently received a contract from Hannevig & Johnson, New York brokers for Norwegian interests, for the construction of a steel steamship of 8800 tons. This is the sixth vessel which the company has under contract to be completed within 15 months.

F. C. Harley, Astoria, Ore., is at the head of a syndicate which plans the establishment of another shipbuilding plant in Seattle and holds contracts for four wooden ships costing about $1,000,000. A plant will be constructed as soon as a site has been obtained.

The City of Portland Motorship Company, Portland, Ore., has been incorporated with a capital stock of $227,500 by Hamlin F. McCormick, Ernest H. Meyer, William B. Wiggins, and others, and plans the establishment of a shipbuilding plant nearby.

The E. I. du Pont de Nemours Company recently secured a site of 40 acres in Wallace, Idaho, on which it is reported a plant for the manufacture of explosives will be located.

The Winslow Marine Railway & Shipbuilding Company, Eagle Harbor, Wash., plans to resume shipbuilding work and will construct a wooden hull steam freighter to cost $200,000. The plant has been engaged in repair work since July 1. A number of improvements and extensions will be made.

The Hansen Packing Company, Butte, Mont., has started construction on a four-story packing plant, 125 x 250 ft., to cost more than $500,000.

The Western Gear Works, 1706 Fourth Avenue South, Seattle, will erect a two-story brick factory at Ninth Avenue South, which will house its proposed gear-cutting and special manufacturing plant.

The Puget Sound Boiler Works, 3442 Twelfth Avenue South, Seattle, Wash., has recently awarded contract for a one-story addition to its plant, 40 x 90 ft.

The Ames Shipbuilding & Dry Dock Company, Seattle, has been incorporated for $800,000 by Edgar Ames, president of the Seattle General Contract Company, and plans the erection of a shipbuilding plant in Seattle and a drydock of 7000 tons capacity. The company has contracts for three steel steamships of 8800 tons each.

The Northern Pacific Railway plans to begin work immediately on the proposed improvements to its carshops and yards at Laurel, Mont., to cost about $15,000.

Canada

TORONTO, ONT., Nov. 13, 1916.

The Utilities Board, London, Ont., proposes to install an auxiliary pumping plant at a cost of $25,000. E. V. Buchanan is general manager.

The City Council, Sault Ste. Marie, Ont., has appointed a committee to report on the purchasing of two motor-driven pumps with a capacity of 5,000,000 gal. per day each.

J. W. Cline, Aylmer, Ont., proposes to erect an implement shop at a cost of $4,000. A site has been secured.

Tenders are being received for the erection of a brick addition to the plant of the Galt Brass Company, Macadamized Road, Galt, Ont. J. Evans, 30 Water Street, is the architect.

The Munder Tungsten Lamp Company, Ltd., Guelph, Ont., will build a brick addition to its plant to cost $15,000. J. S. Wheeler is [illegible].

Mr. Berger, [illegible] West Toronto, is in the market for [illegible] vertical drilling and tool grinding machines.

W. H. Banfield & Sons, [illegible] Avenue, Toronto, manufacturer of [illegible], has commenced the erection of an addition to their plant to cost $10,000.

The Central Motors, Ltd., Toronto, has been incorporated with a capital stock of $50,000 by George W. Beake, 487 Brunswick Avenue; Edsell B. Dyer, Continental Life Building, Bay Street; Joseph Boucicault and others, to manufacture automobiles, etc.

The William Candler Company, Ltd., Toronto, has been incorporated with a capital stock of $10,000 by William Candler, 89 Stephenson Avenue; Robert T. Watt and others, to manufacture wagons, carriages, etc.

The Shell-Bar Grate Company, Ltd., Toronto, has been incorporated with a capital stock of $40,000 by Joseph M. Bulle, 21 Grenadier Road; Harold L. Steele, 437 Broadview Avenue; Wendell Osborne and others, to manufacture grate bars, etc.

McMullen & Lee, Ltd., Toronto, has been incorporated with a capital stock of $40,000 by Harold S. McMullen, 73 Lonsdale Road; William H. Lee, 84 Oriole Road; John F. MacGregor, and others, to manufacture motor cars, machinery, etc.

The Dominion Porcelain Corporation, Ltd., Preston, Ont., has been incorporated with a capital stock of $150,000 by Gideon Grant, 632 Traders' Bank Building; Mervil MacDonald, 72 Alexander Boulevard, Bruce Williams and others, to manufacture porcelain and clay products.

The Breen Motor Company, Winnipeg, is erecting a garage to cost $35,000.

The Willys-Overland Company, Winnipeg, has commenced the erection of a reinforced concrete and brick garage on Portage Avenue to cost $60,000.

The Ontario & Manitoba Cold Storage Company, Winnipeg, proposes to build a cold-storage plant to cost $100,000.

The Sterling Engine Works, Ltd., Winnipeg, has been incorporated with a capital stock of $25,000 by Vincent C. Maddock, Roy M. Wolvin, William J. Leaney, and others, to manufacture steam and gasoline engines, boilers, agricultural implements, etc.

The Foundry Products, Ltd., Calgary, has been incorporated with a capital stock of $500,000 by Daniel L. Redman, Charles W. Coole, Peter D. McAlpine and others.

The Dominion Fire Brick & Clay Products, Ltd., Moose Jaw, Sask., has been incorporated with a capital stock of $500,000 by Arthur Hitchcock, Edward C. Mathews, Alfred R. Turnbull and others.

M. J. O'Brien, Renfrew, Ont., has commenced the erection of a power plant at Calabogie, Ont., at a cost of $500,000. It is the intention to build dams and erect a power house for the generation of 5000 hp. Mr. O'Brien is removing his head office from Montreal to Renfrew, and will establish additional industries at the latter place.

The William Davies Company, Ltd., Toronto, will erect a cold-storage plant at the corner of Cypress and Front streets, at a cost of $100,000.

The Colonial Pulp & Paper Mills, Ltd., Quatsino Sound, will erect a sulphite mill with a capacity of 120 tons a day. The first unit will have a capacity of 60 tons. It is expected that the plant will be completed in about a year.

The American La France Fire Engine Company, Toronto, will erect an addition to its plant at Westport Avenue and Weston Road, to cost $6,000.

The McLaughlin Motor Car Company, London, Ont., will erect an addition to its plant on Richmond Street, to cost $6,500.

The Canadian Carbon Company, Toronto, will erect a three-story factory on Paton Road, to cost $23,400.

Tenders are being received for an addition to the plant of the Booth Coulter Copper & Brass Co., Ltd., 76 Sumach Street, Toronto, to cost $[illegible]. Hunt & Strickland, 24 Wilton Avenue, Toronto, are the architects.

Work will be commenced [illegible] of an addition to the Loudon Machinery Company, Guelph, Ont., to cost $6,000.

The Metal Drawing Company, Mill Street, St. Catharines, Ont., has let contract to Robert William[illegible] for the [illegible].

The Canada Stove & Furniture Company, Ltd., St. Laurent, Que., will build a factory to cost $16,000. William Mahoney, Guelph, Ont., is the architect.

The Exolon Company, Thorold, Ont., will build an addition to its plant there to cost $100,000.

The London Machinery Company, 699 Bathurst Street, London, Ont., proposes to install electric equipment and machinery for the manufacture of munitions. W. Yates is manager.

The Frederickhouse & Abitibi Pulp Wood Company, now being organized at Cochrane, Ont., proposes to build saw mills and a wood-working plant at a cost of $150,000 and later to erect a rosser plant. J. A. McAndrews, Lumsden Building, Toronto, is a stockholder.

H. Deltman, Kinmount, Ont., is in the market for a 60-hp. engine and 75-hp. boiler for a sawmill.

The Universal Smokeless Heat Generator Company, Victoria, B. C., has been incorporated for $50,000. It will acquire patents held by its stockholders for improvements in heat-generating processes and furnaces.

The New Westminster Foundry Company, Ltd., incorporated in New-Westminster, B. C., to carry on a general business of iron founders, boilermakers, etc.

Government Purchases

WASHINGTON, D. C., Nov. 13, 1916.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until date not set, schedule 362, for one surface grinding machine and one universal milling machine for Washington; schedule 363, for one oxy-acetylene machine for Norfolk; schedule 364, for two turbo-generating sets for Charleston; schedule 365, for one 24-in. turret lathe for Boston; schedule 376, for one 30-ton steam locomotive crane and two 5-ft. universal radial drilling machines, all for Washington; schedule 378, for two turbine bucket-cutting machines for Newport.

Bids will be received by the Bureau of Yards and Docks until 11 a. m., Dec. 11, under specification 2259, for one 250-ton floating revolving crane for Mare Island, extending time set from Nov. 11. Similarly the time of opening proposals on specification 2261 for one 50-ton locomotive jib crane for Pearl Harbor, T. H., has been extended to 11 a. m., Nov. 27.

The general purchasing officer of the Panama Canal will receive bids until 10.30 a. m., Dec. 2, under circular 1100, for a boring machine, a milling machine and a lathe.

Bids were received by the Bureau of Supplies and Accounts, Navy Department, Washington, Nov. 7, for supplies for the navy yards as follows::

Schedule 219, Steam Engineering

Class 1, Puget Sound—One jaw riveting machine—Bid 98, $1,575; 166, $1,250.

Schedule 262, Construction and Repair

Class 32, Mare Island—One thread rolling machine—Bid 98, $3,260.

Schedule 280, Construction and Repair

Class 91, Norfolk—One toggle press—Bid 26, $2,790; 134, $2,850; 135, $2,873.

The names of the bidders and the numbers under which they are designated in the above list are as follows:

Bid 26, E. W. Bliss Company; 98, Manning, Maxwell & Moore, Inc.; 134, D. H. Stoll Company, Inc.; 135, Sherritt & Stoer Company; 166, Watson-Stillman Company; 168, White Company; 180, Frank O. Renstrom Company.

Ferroalloys from German Slags

An invention which may have some bearing on one phase of Germany's manganese supply is found in a patent (U. S. 1,196,185, Aug. 29, 1916) recently granted to Friedrich von Holt of Georgsmarienhütte, Germany. Taking furnace slags, comparatively low in phosphorus and often containing manganese, the inventor makes a specular iron rich in phosphorus which he suggests can be used in making steel as a substitute for the usual additions, introducing the required amount of manganese and phosphorus for certain steels and producing ferrophosphorus directly, if little manganese is present. The phosphatic slag is added to the charge of a gas producer. According to the inventor, the heat causes the basic constituents of the slag to combine with the silicates of the ash, while the phosphorus forms with the iron the desired ferrophosphorus. The operation of the producer is not unfavorably affected, it is claimed. High manganese slags, it is stated, produce the specular iron rich in phosphorus.

NEW TRADE PUBLICATIONS

Electric Industrial Truck.—Samuel L. Moore & Sons Corporation, Elizabeth, N. J. Bulletin No. 103. Points out the advantages of the company's type F electric industrial truck, which includes a strong and simple construction, ready accessibility to all parts for making mechanical adjustments and the use of a spur and worm drive which is completely inclosed, thus eliminating chains or exposed gears that are likely to break or pick up dirt or loose material from the runways. The construction is described at some length, the text being supplemented by a number of engravings. A condensed set of specifications and a diagram giving the principal dimensions are included. A number of views of the truck handling pig iron, castings, oil barrels and cement are presented.

Electric Hoists.—Shepard Electric Crane & Hoist Company, Montour Falls, N. Y. Bulletin M-1. Refers to a line of electric floor-operated hoists which are made in three sizes ranging from 500 to 2000 lb. A brief description of the hoists is given and dimension diagrams and tables and a condensed table of specifications are included. A view of the hoist in use in a machine shop is presented.

Steam Turbines.—Moore Steam Turbine Corporation. Wellsville, N. Y.—Bulletin No. 1. Presents illustrations, diagrams and brief descriptions of a line of single and multi-stage turbines which are built in sizes ranging from 5 to 1000 hp. The turbines consist of a single velocity stage, coupled with two or more single pressure stages. The description of the construction is quite extensive and is supplemented by a number of line drawings and halftone engravings. Mention is made of other products upon which the company is prepared to quote, such as double helical reduction gears, turbo generator and blower units, turbine-driven pumps, exhaust steam and geared belted turbines, etc.

Sand and Gravel Pumps and Wearing Parts for Dredges.—American Manganese Steel Company, McCormick Building, Chicago, Ill. Bulletin No. 72. Covers a line of manganese steel sand and gravel pumps and wearing parts for pump dredges. A brief description of a centrifugal pump for handling sand and gravel in which manganese steel is used largely is briefly described, the text being supplemented by a number of views of parts of the pump and installations. Views of the liners and runners that can be supplied are presented, as well as engravings of the manganese steel cutters, spurs and cutter blades which are employed to remove material where the formation is too solid for the suction power of the pump to remove it.

Reflectors.—National X-Ray Reflector Company, 235 West Jackson Boulevard, Chicago, Ill. Volume II, No. 7, of the company's house organ, "Eye Comfort." With this issue a departure has been made from the stereotyped form of house organs. The new magazine consists of a series of 8 x 10 in. loose leaves, so that it will be possible for the readers to file the information given in which they are particularly interested without having to cut the magazine apart, and in some cases damaging other information that they desire.

Elevating Truck.—Lewis-Shepard Company, 262 Dover Street, Boston, Mass. Two circulars. Give general descriptions and specifications for an elevating truck used with platforms in the transportation of stock and material in industrial establishments. The various features of the truck are mentioned and illustrated, special emphasis being laid upon the fact that the load is raised either 2½ or 3 in. A condensed table of specifications is included. An illustrated description of the truck appeared in THE IRON AGE, May 4, 1916.

T-Squares and Drawing Boards.—Emmert Mfg. Company, Waynesboro, Pa. Pamphlet. Gives illustrations and brief descriptions of a line of vertical and horizontal T-squares and drawing boards. The advantages of using vertical drawing boards from the standpoint of speed and health are touched upon, with a diagram showing the 12 operations required to draw two measured lines at right angles with T-square, triangle and scale and the two operations with the company's T-square. General descriptions of the boards, one of which was illustrated in THE IRON AGE, May 11, 1916, are included.

Turbo-Undergrate Blower.—B. F. Sturtevant Company, Hyde Park, Boston, Mass. Bulletin No. 1022. Treats of a turbo-undergrate blower for increasing the draft and thus enabling more steam to be produced with the present boiler equipment. The advantages of using the blower are pointed out and a number of plants in which they have been installed are illustrated, with brief statements of the work that has been done. A partial list of users is included.

THE IRON AGE

New York, November 23, 1916

ESTABLISHED 1855 VOL. 98. NO. 21

Cast-Iron Pipe Manufacture in the South

Continuous Operation and Other Innovations Have Put the Industry on a New Basis of Economic Production

BY Y. A. DYER

There is no branch of the foundry trade in the South that has forged ahead with such speed of manufacture under the adoption of improved methods as the high-pressure cast-iron pipe industry. The consumption of this class of pipe in the United States in round numbers is 1,000,000 tons per annum. Of this quantity, 33 1/3 per cent is manufactured within a radius of 75 miles of Birmingham, Ala., and about 50 per cent of the total is manufactured in the South proper.

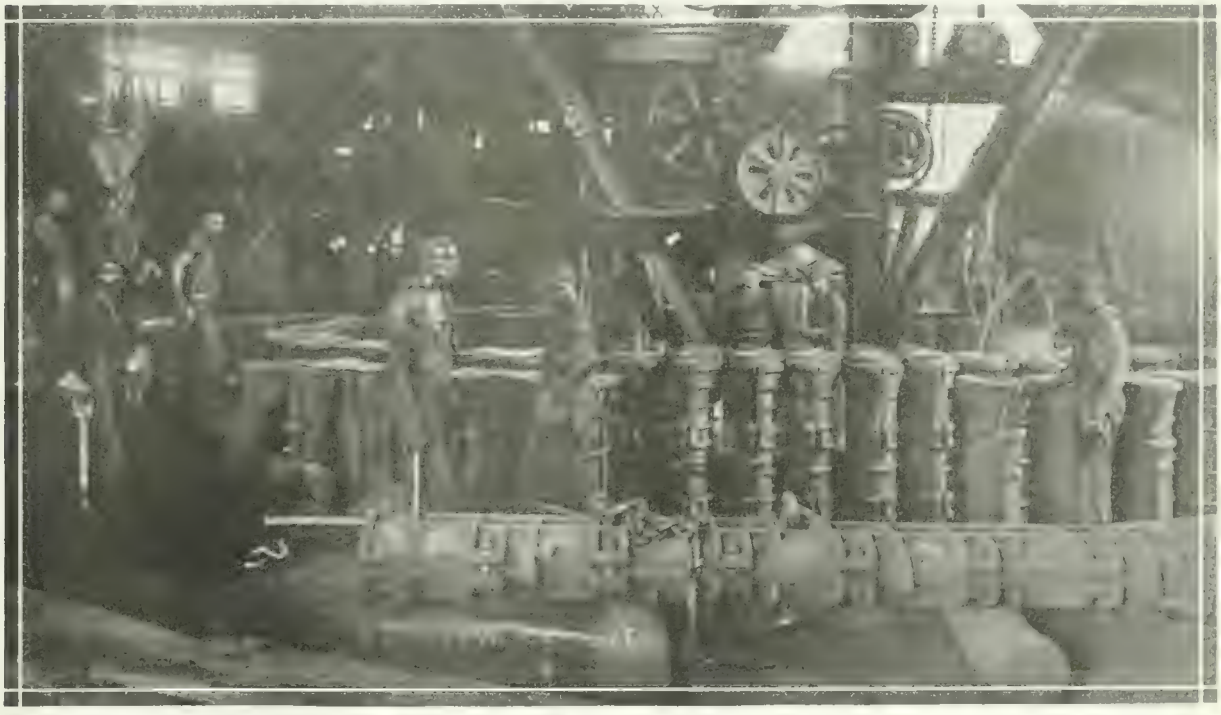


Fig. 1—General View of Modern Cast-Iron Pipe Plant

The present state of high efficiency in the manufacture of pipe has necessarily been a system of eliminations and innovations, and by the very nature of the business it has had to work itself out of the small unit class into large productive capacity and extensive organizations in order to cope successfully with the demands of modern times. As illustrating the progress made in the manufacture of pipe and the present tendency, recent Government statistics disclosed a rather remarkable condition of affairs. During a period of five years, from 1909 to 1914, the productive capacity for the manufacture of bell and spigot cast-iron pipe increased 16 per cent, while the consumption of such pipe increased only 9 per cent. No explanation of this situation is given in the Government's report, but the explanation made by manufacturers is that much of the present plant capacity was provided to care for an accumulated demand made possible by towns and cities which had sprung up in various parts of the country in rather "mushroom-like" manner. Some of these towns and cities had poor water and gas works and some of them had none. A wave of civic pride and public necessity seemed to sweep the country, and in centers of population where it was possible gas and water-works systems were installed. As a consequence, for a while there was an enormous demand for pipe material, and small unit plants sprang up at various places without much reference to the supply of raw material or labor. This demand has now been largely supplied, and at the present time there are not so



Fig. 2.—Making 16-Ft. Cores

many new pipe installations as there are enlargements and extensions of existing plants.

Most of the early pipe plants were small, and only built with the idea of taking care of local or sectional demand. The tendency now in the cast-iron pipe industry is to concentrate on larger plants. Fig. 1 gives a general view of modern cast-iron pipe pit served by three-motor jib cranes. This is one of a series of pits which contain two sets of molds, A and B, and are operated continuously day and night, producing four times the average output of nine years ago. This is an innovation that keen competition has brought into existence, and as a result the smaller unit plants are gradually disappearing, and the business is being concentrated in the plants most favorably located with reference to material and labor. It is generally understood that the largest pipe interest in the country has adopted in recent years the policy of concentration in a few large units, and is gradually abandoning some of its small and poorly located plants. One of these large units is located in the Birmingham district, the original plant having been rebuilt entirely on ampler lines.

It has long since been proved that the lowest cost and highest efficiency can only be obtained by large output. Realizing this necessity, and in order to meet it, one of the pipe plants in the Birmingham district began several years ago to experiment on the plan of continuous operation. Finally, such changes in equipment and organization were effected as to make possible day and night operation —from Monday morning until midnight Saturday— and this system has been in effect for the past five years. Thus a new pace was set, and there is no question that the successful pipe plant of the future will have to be built for continuous operation.

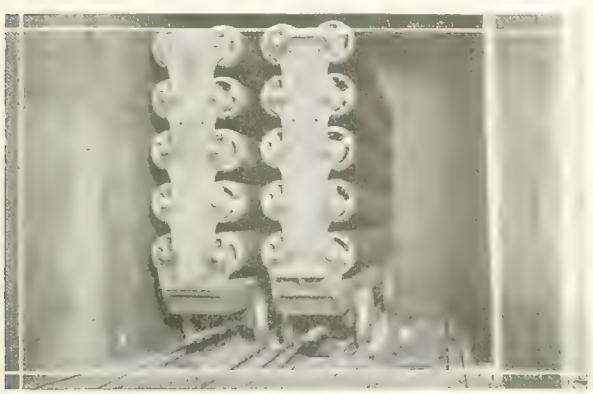


Fig. 3—Gas-fired Core Oven



Fig. 4—Setting Cores

The larger plants are developing engineering organizations which are creating and putting into effect modern efficiency methods of manufacture, going into all possible economies. Fig. 2 shows the making of 16-ft. cores for the manufacture of



Fig. 2.—Welfare Sleeping Quarters



Fig. 5.—Drawing Patterns

16-ft. length pipe. Here is another innovation in the method of manufacture put into effect by one of the large cast-iron pipe interests of the Birmingham district. The standard length since foundries first began to cast pipe vertically has been 12 ft., yet 35 per cent of the sales of this company for the present year have been of 16-ft. pipe. The adoption of the 16-ft. length was a logical step in the development of the industry and the economies that have resulted are too obvious to require amplification. It can be readily seen that it has effected the saving of every fourth joint and the cost of material and labor necessary to make the joint.

Hay for the making of cores has been replaced by excelsior for the larger cores, and a mixture known as "skilley" for the smaller cores. This last-named core preparation, made largely of disintegrated waste paper, mechanically adheres to the heated core barrels, thereby making it unnecessary to dry the first coating in the core oven.

The modern pipe company has a gas-producing plant and overhead mains leading to all points in the foundry for the distribution of gas to the core ovens, pits, etc. This advanced practice has replaced the old method of building coke fires under the molds and core ovens. Coke braize is used as fuel in the manufacture of water gas. The core oven in Fig. 3 is fired with gas.

Figs. 4, 5 and 6 illustrate the method of drawing patterns, setting cores, and shaking out pipe. As will be noticed, this work is largely performed by electric cranes, which have been developed to the highest state of efficiency.

The charging of cupolas by the old "rule of thumb" method has given way to the analysis basis. The charges are apportioned according to chemical analysis of the various pig irons and scrap metal used, and all heats are subjected to chemical analysis and physical tests in the laboratory, thereby minimizing shop losses and producing maximum quality metal. The antiquated and expensive scrap screening method for the reclama-



Fig. 6.—Shaking Out Pipe

tion of sprues, shot iron, etc., has been replaced by mechanical methods. The overcoke, skull and slag iron are run through a mechanical washing plant and separate reclamations made. The shot iron and sprues are separated from the sand by electric concentrators.

Fig. 8 shows the advanced method of loading pipe from the yard, or "acres of pipe," as familiarly known around the plant. This mechanical innovation has replaced the old, slow and expensive hand-skidding method.

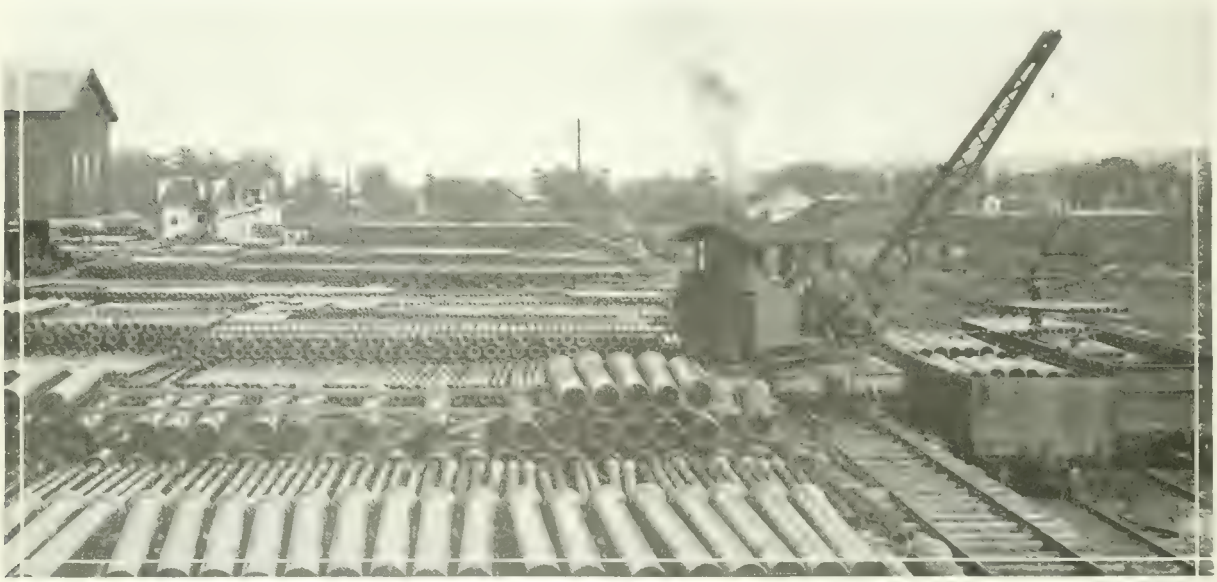
By the very nature of pipe manufacture, it is an uncomfortable work—largely due to excessive heat and dust. For this reason it has always been a difficult task to engage and retain steady, satisfied, competent labor. The inauguration of welfare departments has contributed very materially to the solving of this problem, and this work is now considered a potent factor in the operation of a pipe plant. Fig. 7 is a view in the welfare building at a large plant in the Birmingham district. In these sleeping quarters a bed is to be had at "5c. per night, or 20 sleeps for 50c." The welfare buildings are equipped with shower baths and lockers, lunching, reading, recreation and airy sleeping quarters for both white and colored labor. The same plant has an operating room and a medical dispensary. For a charge of 50c. per month for single men and $1 per month for married men, all medicines are supplied to employees, as well as the services of physician, surgeon, dentist and trained nurses. The families of employees are also cared for under the same charge.

In recent years, cast-iron pipe manufacturers have instituted an educational campaign, working through what is known as the Cast Iron Pipe Publicity Bureau. This bureau is vigorously stressing the lasting qualities of cast-iron pipe compared with other materials for like purposes, its corrosion resisting qualities, etc.

Still further economies and innovations are under consideration in the pipe industry, such as the transfer of hot metal direct from the blast furnace in hot pot ladles to a mixer plant at the pipe shop, thereby making possible a substantial saving in the cost of remelting at least one-half of the metal that is to be poured. There are also the plans for the laying out of model industrial cities and the building of comfortable and economical homes for the employees. Therefore, on account of these tendencies toward larger output, improved methods of manufacture and the providing and maintenance of welfare institutions—all needed to insure an adequate supply of trained and efficient men—the capital necessary for engaging in such business will be increasingly larger in order to keep pace with the future developments.

The Lyons Sample Fair

A committee representing some of the strongest business interests in the United States has been formed to further and foster American exports by means of the Sample Fair or exposition to be held in Lyons, France, in March, 1917. Working with the American organization are committees in France, Great Britain, Italy, Spain, Russia, Switzerland and other allied and neutral countries, whose aim it will be to bring together manufacturers and wholesale buyers from all over the world. In March of this year the Fair had 1342 different exhibitors, but not a single American manufacturer was represented, and it is now hoped to correct erroneous impressions that were entertained as a result. At the last exposition over $10,000,000 in actual wholesale business was done, and $8,000,000 more was refused because of inability on the part of manufacturers to make deliveries. The expenses of an exhibit are stated to be small. The booths are open to wholesalers only.



Loading Pipe from Yard.

The American Committee was organized by M. P. Peixotto, president American Chamber of Commerce in Paris, and Francis E. Drake of Paris, who came to this country for that purpose. Headquarters have been opened at 1790 Broadway, New York. The committee consists of the following:

Henri E. Gourd, president French Chamber of Commerce of New York.

A. E. Outerbridge, president New York Chamber of Commerce.

E. M. Herr, president Manufacturers' Export Association.

William Fellowes Morgan, president Merchants Association of New York.

C. F. Weed, president Boston Chamber of Commerce.

William M. Coates, president Philadelphia Board of Trade.

Edwin Denby, president Detroit Board of Commerce.

Col. William B. Melish, president Cincinnati Chamber of Commerce.

F. J. Koster, president San Francisco Chamber of Commerce.

Robert Garland, president Pittsburgh Chamber of Commerce.

Frank B. Baird, president Buffalo Chamber of Commerce.

William Sheldon, president Minneapolis Civic and Commerce Association.

George H. Van Cleve, chairman Van Cleve Company of New York.

STATUS OF NAVAL AWARDS

Four Battleships and Fourteen Destroyers Thus Far Awarded

WASHINGTON, D. C., Nov. 21, 1916.—As the result of a series of conferences between the Secretary of the Navy and representatives of the leading shipyards of the country, held at the Navy Department the past week, it has been decided to award contracts for two of the four battleships authorized by Congress to the New York Shipbuilding Company and for the other two to the Newport News Shipbuilding & Dry Dock Company. It has also been decided to allot eight of the 20 destroyers to the Fore River Shipbuilding Corporation, Quincy, Mass., and six to the Union Iron Works, San Francisco, Cal. Four of the destroyers were some time ago awarded to the Bath Iron Works, Bath, Me. It has not yet been determined whether the remaining two destroyers shall be built by contract or at a navy yard.

It is believed that a basis will be secured upon which contracts can be let within the statutory limit of cost for the 29 submarines included in the new construction program. The joint efforts of the officials of the Navy Department and the shipbuilders have failed, however, to devise a method by which the plans of the four 35-knot scout cruisers could be so modified as to bring their cost within the appropriation without sacrificing essential features in their construction. Secretary Daniels has therefore confirmed the intimation in this correspondence last week that Congress will be asked to increase the limit of cost of these vessels and presumably to embody the authorization in the urgent deficiency bill, which will be the first appropriation measure to be taken up.

ELECTRIC DRIVE ON BATTLESHIPS

The bids submitted for the four battleships were all unsatisfactory to the Department for one or more reasons, although a sufficient number were within the cost limit to permit contracts to be awarded. The chief bone of contention between the Department and the builders was the power plant, the experts of the Bureau of Steam Engineering having committed themselves unreservedly to the electric drive system. The representatives of the shipyards expressed their entire willingness to install electric systems but not to guarantee the satisfactory performance of the ships, stating frankly that they were without experience with this style of drive. The Secretary of the Navy took the position that the Department could not under the law accept the vessels on the basis of dock trials and must insist that the contractors assume full responsibility for the speed and general performance of the vessels. He also drew attention to the fact that the leading electrical companies were prepared to guarantee the engines built by them, three of which are now being installed in battleships under construction in Government navy yards. After much discussion, and when it had been made clear that the Department under no circumstances would change the type of propulsion, representatives of the New York Shipbuilding Company and the Newport News Shipbuilding & Dry Dock Company agreed to build two battleships each in accordance with the Department's plans and to give the desired guarantees.

GOVERNMENT ASKED TO CARRY OWN INSURANCE

Practically all the bidders for destroyers objected to the Government's form of contract, and the Department therefore solicited from each yard submitting proposals suggestions for the revision of the standard contract form. Most of the objections were technical, but in addition nearly all bidders for these and the other vessels drew the Department's attention to the difficulty of securing adequate insurance and suggested that in view of the size of the present building program the Government might well carry its own insurance. In the case of a battleship certain bidders reported that it was impossible to find companies willing to write full indemnity, while premiums on the amounts of available insurance were put at prohibitory figures. It was pointed out that, inasmuch as the item of insurance must be included in the contract price, the Government could easily figure the advantages of carrying its own insurance. This interesting question will receive further consideration.

The obstacle to the prompt awarding of contracts for the submarines, for which an adequate number of bids within the cost limit were received, has been the great variety of stipulations added by the bidders to the usual form of proposals. The Government is anxious, in view of the large number of vessels of this type that will undoubtedly be purchased in the future, to standardize plans, specifications and contracts; hence it has been decided to lay the proposals for the 29 submarines, two of which will be of a sufficient size to accompany fleets on extended cruises, before the Naval Board of Review composed of Admiral Benson, Chief of Operations, Chief Constructor Taylor and Engineering Chief Griffin. The bidders for the submarines have already conferred with the board and will hold other consultations from time to time.

Officials of the Navy Department are sanguine that Congress will grant the additional appropriation for the scout cruisers, and in asking for these funds the refusal of the shipbuilders to present bids within the cost limit will be inferentially defended on two grounds: First, because of the rapid increase in the cost of materials and labor since the plans for these vessels were prepared, and, second, because of the technical difficulties presented by the enormous power plants which are the largest the Government has ever undertaken to install in vessels of equal tonnage. The Department appears recently to have adopted a new and altogether commendable policy of refraining from criticising shipbuilders and manufacturers of material because of their inability to control the upward trend of prices which has marked every enterprise dependent in any way on the iron and steel industry during the past 18 months. In fact, the officials have been at pains the past week to express their appreciation of assurances received from representatives of the United States Steel Corporation and other producers of structural steel, plates, etc., that Government requirements will receive their best attention and will be given precedence wherever possible.

W. L. C.

Bids and Awards for U. S. Shells

Bids were received by the chief of the Bureau of Ordnance, Navy Department, Washington, for furnishing 4800 14-in. armor-piercing projectiles, and 2800 14-in. class B projectiles, as follows:

The Midvale Steel Company, Philadelphia, 2000 14-in. armor-piercing, $53 each; 500 class B projectiles, $332 each.

The Bethlehem Steel Company, South Bethlehem, 3000 14-in. armor-piercing shells, $545 each; 2300 class B projectiles $310 each.

The Crucible Steel Company, Pittsburgh, 3000 14-in. armor-piercing shells, $[illegible] each; 500 class B shells $305 each.

The Washington Steel & Ordnance Company, Washington, 300 14-in. class B shells, $320 each.

The following bids were opened by the commanding officer, Frankford Arsenal, Philadelphia, under proposal 157, Nov. 4, for furnishing 23,950 common steel shells for 6-in. siege howitzer: Item 1, prescribed hydraulic test to be made by contractor under Government inspector; item 2, hydraulic test by Government:

The Bethlehem Steel Company, South Bethlehem, item 1, $20.78 each, completed Dec. 31, 1917; awarded 12,000.

The E. W. Bliss Company, Brooklyn, item 1, $22.50 each, delivery, 11,950 in April, 1917; 12,000 in May, 1917; accepted for 11,950.

The Tredegar Company, Richmond, [illegible], delivery by Jan. 1, 1918.

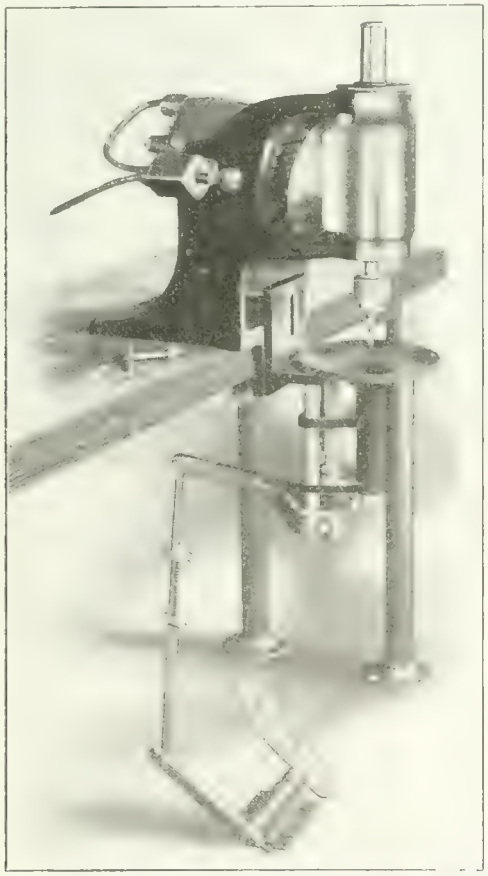
The Washington Steel & Ordnance Company, [illegible] item 1 $[illegible] each on 12,000 only, [illegible] from sole forgings, delivery [illegible]

The Bullard Machine Tool Company, Bridgeport, Conn., has joined the list of manufacturing establishments which have taken out insurance for their employees. The aggregate amount is over $500,000.

A Vertical Tapping Machine for Dies

A die-tapping machine in which the cutting speed can be varied without affecting the time per operation has been developed by the Anderson Die Machine Company, Bridgeport, Conn. This result is secured by increasing the speed at which the tap is reversed to compensate for the necessarily slower rate at which it does its work. The machine is motor driven and the power is supplied from an adjacent lighting socket.

High-carbon steel, which is first turned and then finished by grinding, is employed for the spindle. S. K. F. radial ball bearings are used for both the top and bottom spindle bearings. The inner ball race in which the spindle moves up and down has been increased in length by forcing a high-carbon steel sleeve 1½ in. long into it. The friction disk driving the spindle has a spherical face and is mounted directly on the armature shaft of the motor. This arrangement eliminates all intermediary transmission devices, the spherical face being relied upon to overcome the slipping tendency sometimes found where a flat face friction operates on a flat disk. The weight of the spindle and the various related parts is balanced by a spring at the upper end, which is capable of adjustment and is inclosed to eliminate danger to the operator.



A Vertical-Spindle Machine for Tapping Dies in Which the Increased Speed of Reversal Compensates for the Slower Cutting Rate and Gives a Constant Time for Each Operation

The driving motor can be of any standard type provided it does not exceed 6 in. in diameter, and two brackets or lugs are provided for mounting it. The motor is pivoted in the frame of the machine on the center of the spherical face of the friction disk driving the spindle. Tilting the motor is relied upon to give various cutting and return speeds, it being pointed out that if the speed is reduced in one direction it will be increased in the opposite one. If, for example, the motor is placed to give a spindle speed of 1000 r.p.m. in either direction, the sum of the two is 2000 r.p.m. If the motor is tilted to provide a cutting speed of 500 r.p.m., the reverse movement will be at the rate of 1500 r.p.m. If the rate of tapping is reduced still further to 250 r.p.m., the tap will be reversed at 1750 r.p.m., thus maintaining the combined figure of 2000 r.p.m. and enabling the tapping speed to be varied without affecting the time required to complete an entire operation.

The work table of the machine is circular in form and measures 7 in. in diameter. A movement of 1¾ in. on two way-rods spaced far enough apart to give a rigid and easy movement is provided, and there is an adjustment of 3 in. for the way-rods and table, which is relied upon to give space between the chuck and the table when fixtures and lugs are employed. As was the case with the spindle, a spring under the table is employed to balance the weight. As it is capable of adjustment, the movement toward and away from the tap is made sensitive for the use of small tools. The table is operated by a foot treadle which, if desired, can be removed readily by simply loosening a single screw. The connection from the floor to the machine is adjustable, and a safety spring, which is relied upon to prevent the lead of the tap from being disturbed by the sudden application of pressure on the treadle, is furnished. The treadle is located 8 in. away from the center of the machine, so that the operator's knees will not be interfered with.

A large-diameter hollow column supports the table. This interior chamber is filled with oil into which the tap dips when through holes are being threaded. In this way the tap is lubricated, and in addition, it is pointed out, the chips are washed off so that the thread will not be injured when the tap is backed out through the work. The oil level is maintained as the chamber becomes filled with chips, and when these become too numerous the chamber can be cleared by removing the plug at the bottom.

The following table gives the principal dimensions and specifications of the machine:

Minimum size of tap, in.	1/16
Maximum size of holes tapped in cast iron, in.	¼
Maximum size of holes tapped in steel, in.	3/16
Depth of holes, in.	1½
Distance between spindle center and slide, in.	4
Diameter of spindle, in.	¾
Diameter of table	7
Vertical adjustment of table, in.	3
Size of motor, hp	1/6
Speed of motor, r.p.m.	1,750
Current consumed, amp.	2
Net weight, lb.	115
Domestic shipping weight, lb.	175
Export shipping weight, lb.	200
Size of case, cu. ft.	[illegible]

The equipment furnished with the machine includes a switch of special design, a reinforced cord, an attachment plug, the necessary wrenches, guards to protect the operator from personal injury and oil which might soil his clothing and a chuck. Unless otherwise ordered the last is of the two-jaw positive drive type.

The Champion Iron Works, Kenton, Ohio, is placing on the market a complete line of electric traveling cranes. The cranes have been designed by R. W. Valls, who is now engaged with the Kenton plant as engineer and designer. He was formerly employed in a similar capacity by the Shaw Crane Company, Muskegon, Mich., and recently severed his connection with that company to take a position with the Champion. The Biggs-Waterson Company, Guardian Building, Cleveland, will have the exclusive selling agency of the Champion Iron Works cranes.

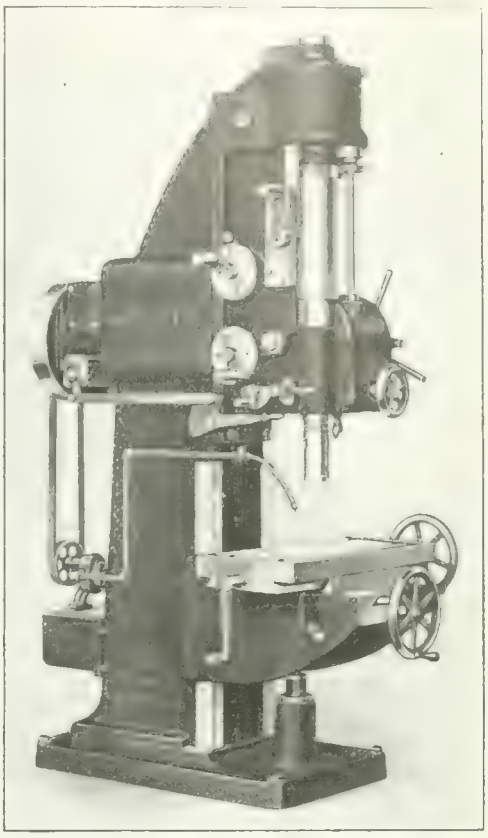
Heavy-Duty Vertical Drilling Machine

A vertical drilling machine equipped with a plain table and designed for heavy-duty work has been placed on the market by the Minster Machine Company, Minster, Ohio. It is designed to drive a 2½-in. high-speed drill in solid steel at speeds and feeds in keeping with modern shop practice. A large number of changes for both are provided which enables the machine to handle a wide range of work. It is thus possible to drill small holes at high rates of speed, as well as to handle heavy work such as enlarging holes in steel and cast iron.

The machine is driven through a single pulley 20 in. in diameter with a 3½-in. face at a constant speed of 550 r.p.m. From this shaft the drive is continued through stub tooth transmission gearing to the main spindle. A gear box of rather simple construction provides six initial changes through sliding gears, the engagement of the various ones being controlled by the two cranks engaging the holes in the dials on the left side of the head. The crank handle, mounted on the rectangular block in front of and slightly above the upper dial, engages the direct drive or the back gear and thus doubles the number of speeds available to give 12 changes in all, ranging from 30 to 550 r.p.m. All of the high speeds are obtained through a smaller gear on the spindle sleeve which, it is pointed out, does away with tooth velocities in excess of 800 ft. per min. The lever below the speed dials operates an expanding band friction inside the gear box which, together with the transmission gears, runs in oil. The direction of the rotation of the drill spindle is controlled by the up and down movement of this lever, thus, it is pointed out, giving a convenient braking device as well as a tapping attachment. The oil in the gear box is circulated over the gears by a gravity feed system of oiling, and an opening in the gear box closed by an oil-tight cover provides a means for adjusting the driving friction readily.

The transmission is of either the rear or side drive, as may be specified by the purchaser, and either style can be applied without difficulty even after the machine has been placed in service. When the side drive is employed, the upper plate at the rear of the main housing is removed to provide room for a flanged bearing carrying the side drive pulley mounted on annular ball bearings. The entire transmission gear box, including the rear or side drive arrangement, the tapping attachment and the six initial gear changes, are contained in a single casing fastened to the back of the main housing and having the forward end pilot directly into the main head casing. The main spindle drive consists of a sleeve 4 in. in diameter and 24 in. long driven directly by gearing. Wide and deep keyseats at diametrically opposite points on the sleeve engage two hardened driving keys mounted into the driving head and keyed rigidly to the main spindle, but at the same time capable of vertical movement within the sleeve. This arrangement is relied upon to overcome binding of the spindle when sliding under heavy pressures. The spindle is a piece of high-carbon steel, with a minimum diameter of 2¼ in., finished by grinding and provided with a ball thrust bearing. It is bored to receive a No. 5 Morse taper socket and is cross-slotted at the end for heavy driving.

For regular work 12 feed changes, ranging from 0.006 to 0.069 in. per revolution of the spindle, are provided. This gearing is of the steel stub tooth type, located within a feed box cast integral with the head at the right of the spindle, and is of the sliding gear type, no pull pins being used. From the gear box power is transmitted to a large worm-wheel keyed to the pilot shaft at the right of the spindle, upon which is cut a coarse, wide-face pinion engaging a rack cross-keyed to the spindle sleeve. The changes are obtained by small levers and an index plate designates the proper position



Vertical Drilling Machine Equipped with a Plain Table and Either Rear or Side Drive

for both the feeds and speeds. An automatic knock-out is provided to serve as a depth gage for drilling, while a safety stop is relied upon to prevent the spindle from feeding beyond its proper traverse. Pilot handles are provided for rapid traverse of the spindle. If it is necessary to suit the feed to some special lead for a particular piece of work, the gearing mounted upon a swinging quadrant at the upper end of the spindle sleeve is changed.

The plain table illustrated has a working surface measuring 20 x 26 in. with an oil groove. The table has a vertical adjustment of 18 in., secured by telescopic screws, and is gibbed to a wide bearing on the housing. Provision is made to pass a 3-in. boring bar entirely through the table. If desired, a compound table measuring 17 x 38 in. over all can be supplied. This is of heavy construction and gibbed to provide for wear. A tongued taper gib adjusted from the front is provided for the cross-saddle, and all adjustments are made by screws of 1-in. lead provided with micrometer collars and large handwheels and engaging bronze nuts. The compound table adds 600 lb. to the net weight of the machine, which is 5300 lb. An oil pump, reservoir and the necessary flexible steel tubing for a lubricating system can be supplied at an extra cost, and motor drive can also be furnished for either the rear or side driving arrangement.

The Wellman-Seaver-Morgan Company, Cleveland, has taken an order from the Alan Wood Iron & Steel Company, Philadelphia, for a standard car dumper.

The Electric Motor in the Steel Mill*

The Dangers Which May Arise from Improper Control Arrangements of Mechanically Connected Direct-Current Motors

BY H. F. STRATTON†

MECHANICALLY connected motors are those in which any change in speed of rotation of any one motor must be accompanied by the same proportionate change in speed of rotation of each of the other motors, and also, a change in the direction of rotation of any motor must be accompanied by a change in direction of rotation of each of the other motors. The majority of cases claiming attention include two or more motors of the same horsepower and speed, all rotating in the same direction at the same time. The mechanical connection between motors may consist of gearing, pulleys and belts, sheaves and cables, or it may be through track and track-wheels as on the bridge motion of a traveling crane.

Steel mills furnish frequent illustration of two or more mechanically connected motors, and it is logical to inquire why preference is given to several mechanically connected motors instead of one large motor having a horsepower rating equivalent to the sum of the smaller motors. In some cases, two or more motors have been used because the frame of the smaller motors fitted more easily in the available space or that it appeared to be considerably easier to change armatures. Sometimes the horsepower requirements are quite large, and if one large motor instead of several small ones were used, it might introduce into the mill an entirely new size of motor, thereby complicating the spare part situation.

Another reason for the use of two or more mechanically connected motors is the need of continuing to operate some machine, if one of the motors burns out. In this case the remaining motor, or motors, are made of sufficient capacity to maintain operation, although perhaps at a reduced speed. A metal mixer is a good illustration of a machine coming under this classification, as it is obviously necessary to be able to tilt the mixer even if one motor is disabled. The hoist on a ladle crane is another common illustration of the same character.

MOTOR TROUBLES

The practice of using two or more mechanically connected motors in the place of one large motor has raised

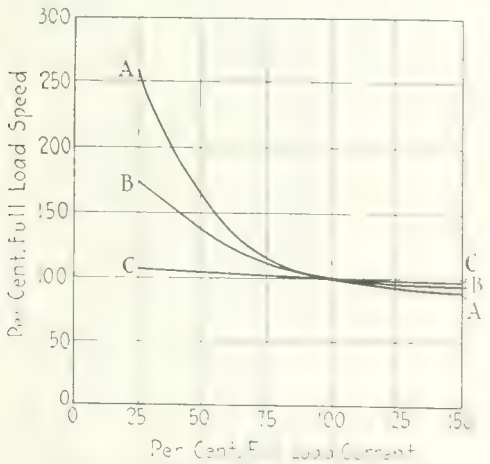


Fig. 1—Relation Between Speed and Current of Various Types of Motors. *AA*—Series motor. *BB*—Compound motor. *CC*—Shunt motor.

new difficulties. Some of these can easily be explained by theoretical considerations; others, however, are brought to our attention forcibly only by the difficulties experienced in service and sometimes it is puzzling to find the true explanation of the difficulties which have developed. I suggest that we consider first the electrical problems which are very largely the questions of circulating currents and the unequal division of the total motor current.

The general equation of a direct current motor is: The speed rotation is equal to the voltage divided by the product of the number of effective armature conductors and the amount of magnetic flux which is cut by these conductors. Curves for series, shunt, and compound motors are presented herewith, illustrating the change in motor current with change in speed. The speed changes least in the case of shunt motors, more in the case of compound motors, and most in the case of series motors.

In Fig. 1, curve *AA* represents the relation between speed and current in the case of a series motor, *BB* in the case of a compound motor, and *CC* in the case of a shunt motor. These are curves expressing current as a function of speed; it must be remembered that such a curve represents only approximately the performance of any given motor, and as a matter of fact the speed-current curves of different motors—although

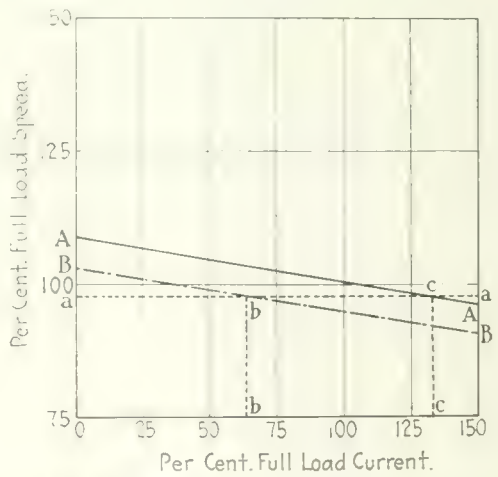


Fig. 2—Speed-Current Curves of Two Similar Shunt Motors

built commercially to be duplicates—will vary by several per cent. Take the case of any standard motor; undoubtedly all such motors built from the same drawings and patterns will have the same general physical dimensions. In each case the voltage may be the same, the armature and the field coils may be the same, but the total flux may vary considerably, because the reluctance of the iron circuit of the motor will depend on the character of iron employed and upon the lengths of the several air gaps.

In Fig. 2 *AA* is the speed-current curve of one shunt motor, and the dash line *BB* is the speed-current curve of another shunt motor which is its commercial duplicate. The only difference between these two curves is that at any given load the speed of one motor is 5 per cent in excess of that of the other. If two such motors are so connected that they must rotate at the same speed, there will necessarily be a heavy unbalancing of the total current. Thus, if the load is such that the speed of the two motors will be indicated by the line *aa* it will be seen that one motor will take 65 per cent of the full load current and the other motor 135 per cent of the full load current. The motors are together taking twice the full load current of one motor, but one motor

*From a paper read before the Association of Iron and Steel Electrical Engineers at Philadelphia, Nov. 4, 1916.

†General manager and chief engineer, Electric Controller & Mfg. Company, Cleveland.

is underloaded and the other motor so overloaded that it will burn out if the load is maintained.

Figs. 3 and 4 indicate similar conditions for compound motors and series motors, respectively. It will be noted that the unbalancing of mechanically connected series motors will be less than the unbalancing of either shunt or compound motors. The unbalancing of compound and series motors is least at high speed and low current and greatest at low speed and high current.

So far we have not considered the question of control, but have merely reached the conclusion that, due to imperfections in motor manufacture, two or more mechanically connected motors are apt to divide the load unequally, and that this difficulty is least serious with series motors, more serious with compound motors, and most serious with shunt motors. There are many other reasons why two or more mechanically connected motors—nominally duplicates—will make an unequal division of the total motor current.

THE CONTROL OF MOTORS IN PARALLEL

Two series motors are sometimes controlled by a single, standard, one-motor controller by connecting

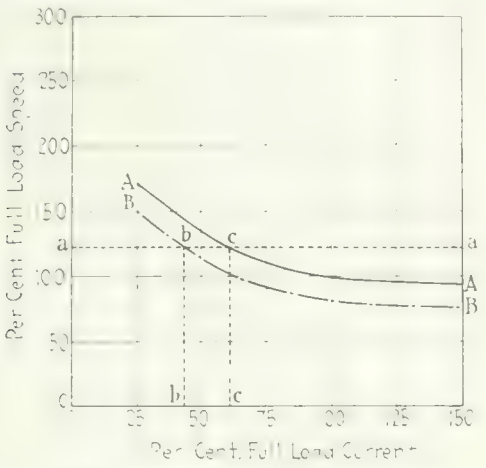


Fig. 3 Speed-Current Curves of Two Similar Compound Motors

the two series fields permanently in parallel and the two armatures permanently in parallel. As shown in Fig. 5 the series fields are represented by SF_1 and SF_2 respectively, and the armatures by A_1 and A_2. F_1 and F_2 are one pair and R_1 and R_2 the other pair of reversing contactors. S_1, S_2 and S_3 are the acceleration contactors which are used for short-circuiting the resistor. The entire motor current flows through the two series fields, which are of relatively low resistance, in parallel. As the current will divide inversely as the resistance of the two fields, it is difficult to balance these two circuits so that they shall divide the current equally, not only when the motors are cold but also when they are hot. The general result is that more current flows through the series field of one motor than through the series field of the other. The motor having the smaller portion of current through its series field will have less total flux to be cut by the armature conductors. It will therefore develop less counter-electromotive force than the other motor, and will permit a considerably higher current to pass through its armature. The motors will, therefore, be unbalanced, not only because of imperfections in manufacture, as shown in Fig. 4, but, in addition and more seriously, because the total flux of one motor will be larger than that of the other. Therefore, the operation of two mechanically connected series motors by one controller may lead to serious unbalancing of the current.

The first departure from this scheme of control is to employ one starting resistor, but to have individual reversing switches for each motor, as shown in Fig. 6. The designations are the same as in Fig. 5, with the exception that F_3, F_4, R_3 and R_4 represent an additional set of reversing contactors. With individual reversers for each motor, it is possible to connect the series field of the motors directly to their respective armatures. This connection eliminates the unbalancing due to unequal division of current through the series field, as explained in connection with Fig. 5. It is a satisfactory connection for two mechanically connected series mo-

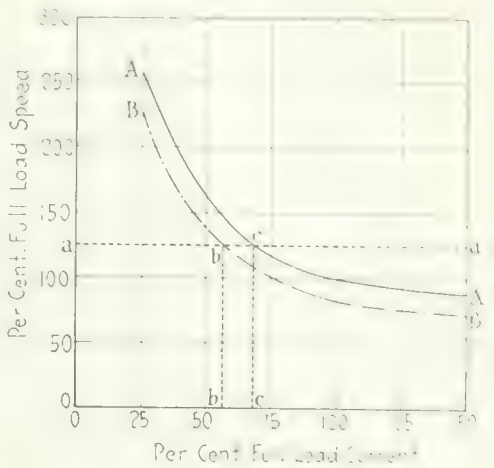


Fig. 4 Speed-Current Curves of Two Similar Series Motors

tors when these motors are merely started from rest and accelerated to receive full line voltage. The only unbalancing of load is that due to variations in the speed-current characteristics of the two motors. These connections are not satisfactory for rapid reversing or "plugging," the difficulty being one of circulating currents at the moment of reversing.

Fig. 7 indicates two mechanically connected motors operated by this scheme of control and receiving full line voltage. The direction of the current through the series field and armature of each motor is indicated by solid arrows and that of the counter-electromotive force developed in each armature by the dotted arrows. If these motors are running at full speed and the controller is reversed, the connections in Fig. 8 are immediately established. The direction of current through the series field, the direction of rotation of the armatures and the direction of the counter-electromotive force remain the same; but the connections between the armature and the series field of each motor have been reversed so that now the direction of the current through the series field and the direction of the counter-electromotive force of each motor are the same. The series fields and the armatures are connected in a closed path, whose resistance is relatively low. If the starting resistor is designed to allow the passage of 50 per cent overload at reversal, the counter-electromotive force developed in each armature is somewhat in excess of line voltage. Each armature then acts as a booster assisting the line voltage to force current through its series field. The counter-electromotive force of one motor, say the upper one in Fig. 8, will probably be, at least, slightly greater than that of the other, and more current will pass through the series field of the upper motor than through that of the lower one. The effect of this will be to further increase the counter-electromotive force of one and decrease that of the other. The fields become still further unbalanced, and presently, due to the predominance of the upper motor, a local current circulates through the series fields and armatures of both, reversing the series field of the lower motor. The direction of the counter-electromotive force of the lower motor is then reversed, and we have two series generators in series with each other, generating current in the same direction with no external resistance in the circuit. The result is an amount of current which is not only inconvenient but positively dangerous. Therefore, where only one acceleration resistor is used, it is advantageous to identify each series field with its armature in starting from rest, but on rapid reversal these connections are dangerous, and should not be employed.

These circulating currents are prevented by the connections shown in Fig. 9, an individual acceleration resistor for each motor being provided. The local path through which the circulating currents flowed has now

been made to include such high total resistance that the circulating currents cannot get started and, with these connections, rapid reversal is smooth and normal.

Fig. 9 represents, in the writer's judgment, the only satisfactory way to control two or more mechanically connected motors permanently in parallel. There is in reality a controller for each motor. In order that the controllers should function simultaneously, two-pole contactors for two motors, three-pole contactors for three motors, etc., should be used. This assures that all important circuit changes, such as reversal or short-circuiting portions of the acceleration resistors, will occur at the same time in each motor circuit.

EFFECT OF FAULTY BRAKING

Fig. 10 represents an interesting example of unbalancing, not of current, but of braking effort in the hoist of a ladle crane. Motors Nos. 1 and 2 are permanently in parallel and geared to the hoisting drums Nos. 1 and 2. Each motor was equipped with a magnetic brake, but, due probably to unequal adjustment, one brake would act more quickly than the other after the cessation of current through its coil. If the ladle is being hoisted, the motors and drums would rotate as indicated by the arrows. On bringing the controllers to the "off" position the brake on motor No. 2 locks the armature of that motor before the brake on motor No. 1 locks that armature. In this case the point *c* must remain stationary, but motor No. 1 exerts a force upward on the drum No. 1 at *a*. This produces a downward thrust at *b* on the drum No. 2, but as the mechanism is rigid in this direction, drum No. 2 does not move. The result is that drum No. 1 tends to rotate upward about *b*. The bearing caps, while of liberal proportions, were probably not designed to take an upward thrust, since it would appear that the weight of the ladle would always keep the drums resting heavily on their bearings. The final result was that the bolts holding down the bearing caps of drum No. 1 were stretched or broken. In this particular mechanism, if one brake locks before the other, there is always a tendency to lift one of the drums, no matter which brake locks first, and no matter whether the load is being hoisted or lowered. This is an actual difficulty which has occurred in several instances, and has led to the use of larger cap bolts.

NUMBER OF ACCELERATION CONTACTORS

Generally speaking and within reasonable limits, the larger the motor, the greater will be the number of acceleration contactors employed in the controller. For instance, in rapid reversing controllers, it is common practice to employ three acceleration contactors for a 50-hp. and four for a 100-hp. motor. With two mechanically connected motors permanently in parallel, the question arises whether the number of acceleration contactors should be determined by the horsepower of the individual motors or by the total horsepower. Probably the best way to answer this question is first to decide why we use more acceleration contactors with large motors then with small. One reason is to flatten out the acceleration curve so that the current peaks will not be so large. A current peak of 175 per cent on a 500-hp. motor might cause serious line disturbance, whereas a similar overload of a 25-hp. motor would be negligible as far as line disturbance is concerned. Another consideration is that a small motor generally commutates high current peaks better than a large motor.

Perhaps the leading reason for increasing the number of acceleration contactors on larger motors is to get a characteristic which we may call controllability. It is usually satisfactory if a small motor accelerates from rest to full speed almost before the operator is aware of it, but in the case of large motors, operating heavy and important machines, the operator must have more sensitive and responsive control. Bearing these three ideas in mind, the number of acceleration contactors can be determined somewhat in the following manner: If the motion is merely one of rapid reversal, and line disturbances need not be considered, select the number of acceleration contactors from the standpoint of the size of one motor; if the question of line disturbance or controllability is important select the number of acceleration contactors from the standpoint of the total horsepower.

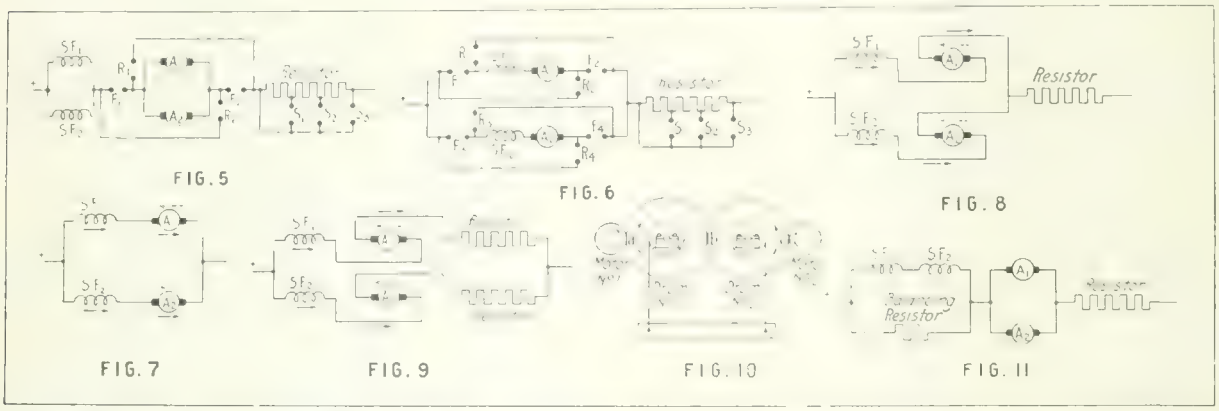
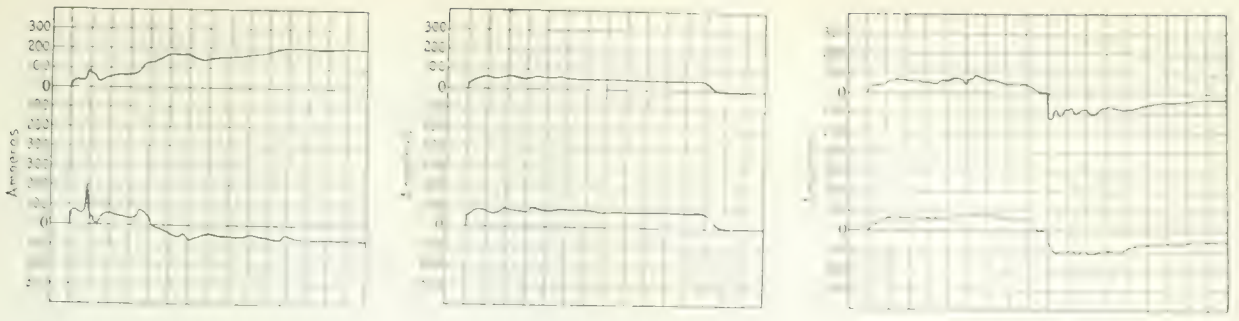


Fig. 5—Control arrangement of two series motors by surge controller. Fig. 6—Control arrangement of two series motors with single starting resistor and separate reversing contactors. Fig. 7—A dangerous arrangement of series motors. Fig. 8—Another dangerous arrangement. Fig. 9—An approved method of controlling two reversing series motors. Fig. 10—Arrangement of two mechanically connected motors on ladle crane. Fig. 11—Method of controlling two motors with one set of reversers and one acceleration resistor.

CONTROLLER FEATURES

Fig. 11 represents a scheme for controlling two motors with one set of reversers and one acceleration resistor. The two fields are in series with each other and in parallel with a balancing resistor. This connection assures the same current in each of the series fields, but there is no assurance that the correct amount of current will flow through the series fields. In installing a controller of this kind, cast grid resistors are generally used for the balancing resistor, having a cold ohmic resistance equal to the cold ohmic resistance of the two fields in series. During operation the balancing resistor and the fields both become heated, but the change in resistance will probably be unequal. Consequently the series fields receive considerably more or less than half of the total motor current, leading respectively to overheating or diminished torque.

When it is necessary to insure uninterrupted operation of a machine driven by several motors some engineers have preferred an entirely separate controller for each motor rather than the two-pole or three-pole controller advocated above. They have argued that in the event of an overload, both motors would be stopped with the double-pole method of control, but with separate controllers, only one motor would be stopped. As a modern controller can be reset in one or two seconds after operation of the overload device, this is not a serious objection. Another argument has been that if a control circuit or an operating magnet failed on a double-pole controller, then the entire controller was temporarily useless, whereas with the same accident with two entirely separate controllers, the undamaged controller could be maintained in operation. While this



Figs. 12, 13 and 14—Speed Current Curves of Two 25-Hp. Series Motors on Bridge Motion of Crane, Showing Respectively, Original Condition, Series Field Currents and Corrected Condition

contention has some merit, there are just twice as many coils and control circuits on the two separate controllers as there are on the one double-pole controller.

With two separate controllers there is no certainty that the important circuit changes will occur in each motor circuit at precisely the same time. There is danger, therefore, of unbalancing and of circulating currents, although it is true that these will exist for only a brief period of time. They constitute a menace, however, which should weigh heavier as a possible cause of motor trouble than the two above mentioned arguments in favor of the use of an individual controller for each motor.

THE CONTROL OF MOTORS IN SERIES

We may now consider motors permanently in series. Two motors permanently in series require only the amount of current normally demanded by one motor of the same size. Each motor exerts full torque up to half speed, but at any greater speed the performance of two motors permanently in series is entirely different from that of two motors permanently in parallel. The motors in series will have a diminishing torque, whereas those in parallel can maintain full torque up to full speed. This has sometimes been considered an advantage for roller table service, the important consideration being reversing and acceleration up to perhaps half speed, and that was thought a positive advantage if the motors did not have so much disposition to race if allowed to run in one direction for a considerable period of time. In several mill tables series connections were substituted for parallel connections. This stopped racing of the motors and made reversal easier. It was found, however, that the table was slowed down somewhat, that is, it did not have as large a capacity to move steel. Of course, with motors permanently in series there is no danger of circulating currents or unbalanced load. The mechanical connection precludes the possibility of one motor reaching high speed while the other motor slows down. Therefore, from an electrical standpoint, permanent series connections must be regarded as satisfactory.

The capacity of the controller for motors permanently in series can be decided from the standpoint of the size of one of the motors. However, the heating of the reversing contactors and the line contactor is due more to the arcing at the contacts than to the passage of current when the contactors are closed. The inductive quality of the circuits to be interrupted largely decides the severity of the arc at the point of interruption. In the case of a series motor, this inductive effect is represented mostly by the series field, and with two series fields in series, there results a much hotter arc than with only one series field. Therefore, it is erroneous to determine the size of arcng contactors for motors permanently in series, from the horsepower rating of only one motor.

Another consideration is the amount of resistors that must be supplied. If two motors in series reach full speed and are then suddenly reversed, there is

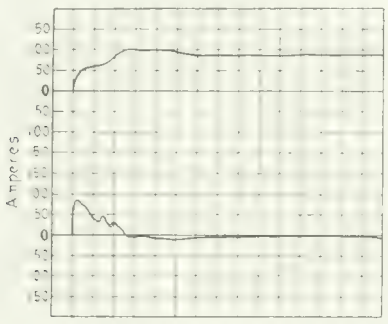


Fig. 15—Speed Current Curves of Two 20-Hp., 230-Volt Field Series Motors

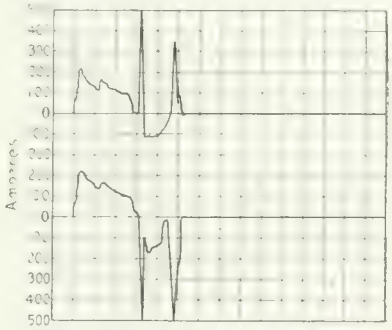


Fig. 16—Speed Current Curves of Two 25-Hp. Series Motors Controlled by Arrangement Shown in Fig. 6

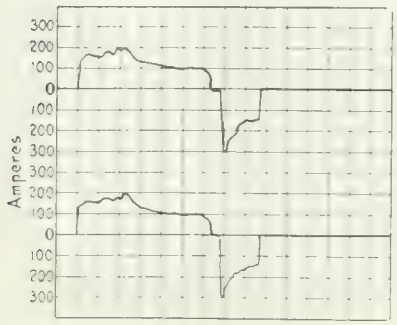


Fig. 17—Motors of Fig. 16 Controlled by Arrangement Shown in Fig. 5

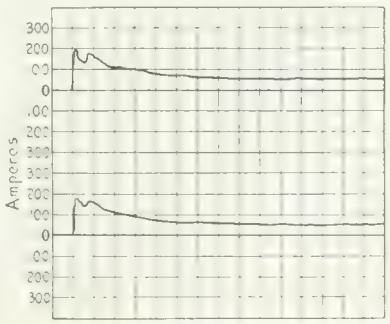


Fig. 18—Speed-Current Curves of Two 30-Hp. Series Motors Controlled as in Fig. 9

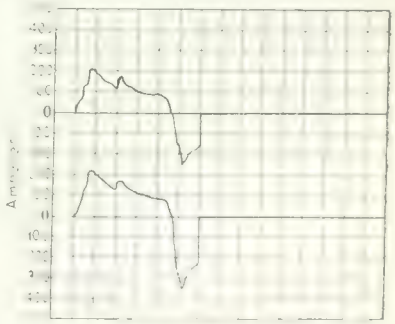


Fig. 19—Speed-Current Curves of Two 30-Hp. Series Motors Controlled as in Fig. 9

a voltage at the moment of reversal, equal to the sum of the line voltage, and the counter-electromotive forces of the two motors. Roughly speaking, this is about three times line voltage, which demands more resistors for reversal than in the case of one motor.

It has been held by some that it is easier to accelerate two motors than one motor of equivalent rating. The writer has made a thorough investigation of mill type motors to determine in a variety of cases, the time required to accelerate the armature from standstill to rated full load speed, supplying the motor with the usual acceleration current, but he cannot find any support of the theory that a small motor can be accelerated to full load speed more rapidly than a large motor, assuming in each case the usual acceleration current and taking account of the fact that the normal speed of large motors is less than that of small motors.

CURRENT CHARACTERISTICS

Figs 12 to 19 are current curves of two mechanically connected motors permanently in parallel, which show graphically the simultaneous variations of current in two entirely separate circuits. They are believed to be the first curves of this kind ever made. Each figure shows the current changes in the two motors, which for brevity will be known as the top and bottom motors, meaning thereby, the motors whose curves are shown respectively at the top and bottom of the illustrations.

Fig. 12 represents two 25-hp., 230-volt, series motors operating the bridge motion of a crane having a 116-ft. span. The controller is identical with that shown in Fig. 5. To our surprise, we found that the current in the top motor rose to 200 amp., whereas the current in the bottom motor actually reversed and reached a value of 80 amp. The bottom motor, therefore, was acting as a generator and retarded the crane to the extent of 20 hp. One motor alone would drive this crane faster than the two in parallel. It was surmised that this condition was due to unequal currents flowing through the series fields and the instrument was connected to measure the currents in them, the resulting curves being shown in Fig. 13.

To correct the unbalanced condition, additional resistance was placed in series with the field taking the largest current, making the division of current as nearly equal as possible. Fig. 14 shows the motor currents after the fields had been equalized. One motor takes about 60 amp. running current and the other about 40 amp., but by comparison with the conditions shown in Fig. 12, the installation could be regarded as fairly satisfactory. The current, at least, flows in the same direction in each motor.

Fig. 15 relates to two 20-hp., 230-volt, series motors driving another machine. The controller was the same type that was used in the previous test. When acceleration was completed, the top motor took 90 amp., whereas about 5 amp. passed through the bottom motor in the reverse direction. The point which is emphasized is that these two motors would have had a liberal surplus of capacity had they been controlled in a correct manner. They were originally made larger than seemed strictly necessary in order to provide just this capacity for emergency, but due to the poor method of control, one of the motors was made to take so much current that there was no safety margin left.

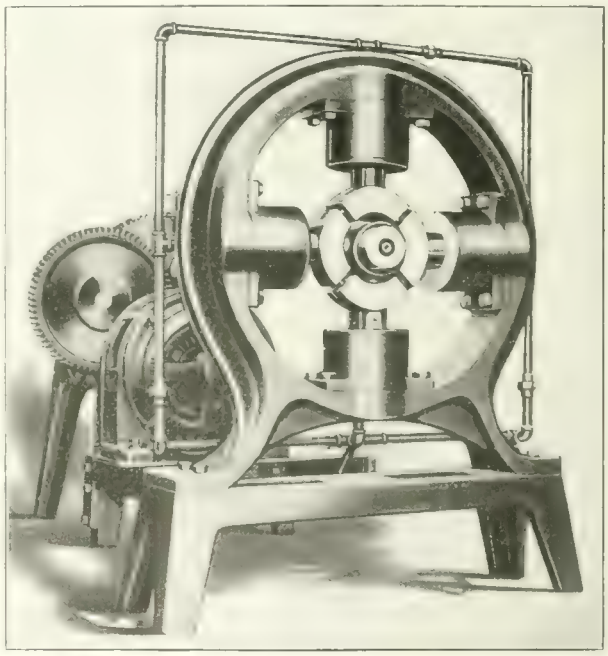
Fig. 16 relates to two 25-hp. series motors regulated by a controller of the type shown in Fig. 6. It has been pointed out that this type of control is satisfactory for acceleration from standstill, but at the moment of reversal heavy circulating currents come into existence. Fig. 16 is a striking confirmation of this theory. The acceleration is satisfactory, but at reversal, the bottom motor reverses the polarity of the top motor and a circulating current of at least 500 amp. flows through the two motors in series.

An attempt was made to correct this difficulty by connecting an equalizer from the junction of the series field and armature of the top motor to the junction of the series field and armature of the bottom motor. This was merely a reversion to the type of controller shown in Fig. 5, with the fields permanently in parallel and the armatures permanently in parallel. The danger of circulating currents on reversal, was removed, but the division of load was not good, the results being indicated in Fig. 17.

Figs. 18 and 19 show the operation of what the writer considers the correct method of control. The connections are those of Fig. 9. The controller is made up of two-pole contactors throughout, one pole of each contactor being in one motor circuit and the other pole being in the other motor circuit. Fig. 18 shows the acceleration of two 30-hp.-series motors. Fig. 19 shows the acceleration and reversal of two 50-hp. series motors. There is little comment to be made on these curves except to say that they are all right. The currents during acceleration, reversal, and during normal running are almost the same in each circuit; each motor is doing its fair share of the work, and the only uneven division of load is due to imperfections in the motors themselves.

A Universal Flue Welding Machine

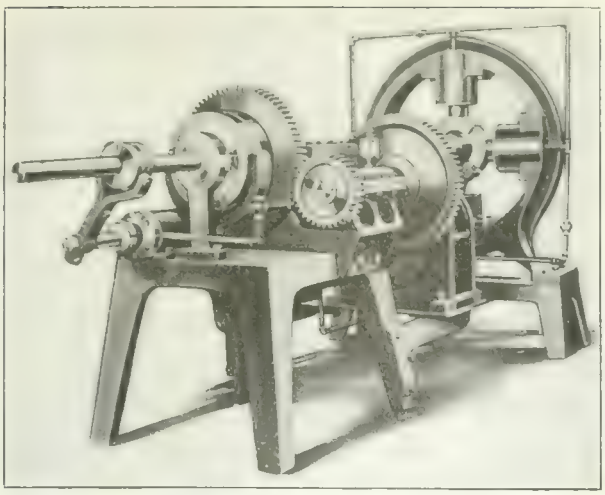
The Southwark Foundry & Machine Company, Philadelphia, Pa., has developed a universal machine for welding flues up to 5½ in. in diameter that is designed to meet the conditions which have arisen since the general adoption of superheaters for use on locomotives. With this machine, it is emphasized, it is possible to take safe ends of greater length than has been the custom in the past which has introduced the complication of making it necessary to support the end while it is being heated and avoid any unusual movement in the transmission from the heating furnace to the welding operation. This has been overcome by locating the furnace in front of the welding mandrel with resultant savings in time and heat in transferring the flue to the welding machine. Another feature of the machine is the working of the weld on the inside instead of on the outside of the tube.



The Air-Actuated Mechanism for Clamping the Flues to be Welded Consists of Four Cylinders Connected to a Single Air Line and Operated Simultaneously by a Foot Valve

The machine consists of two main parts, apart from the furnace, the clamping head at the front and the driving mechanism at the back. The former is a single circular casting with four air cylinders mounted on the inside. Metal snap rings are provided for the piston instead of leathers of the ordinary cup type, and the front end of the rods are provided with sectional dies that are clamped to the outside of the flue at the line of the weld. As all four cylinders are connected to a single compressed air line carrying a pressure of from 80 to 100 lb., they operate simultaneously when the valve is opened.

Extending longitudinally through the center of the head is the welding mandrel fitting the inside of the



The Locomotive Flues Which Can Be as Large as 5½ In. in Diameter Are Supported during the Welding Operation by the Inserted Mandrel Shown at the Left That Begins to Rotate as Soon as the Flue Is Clamped in the Head at the Right

flue. This mandrel is hollow and has four rollers assembled in its body which can be moved radially by inserting a taper mandrel that reaches through the middle of the welding mandrel from the back of the machine. This taper mandrel is operated by an air cylinder which is controlled by the main foot valve that actuates the clamping system. The main mandrel is driven at a speed of 100 r.p.m. through two gear reductions by a 1½-hp. motor mounted on the framework underneath the gearing as shown. The gears employed are of the cut type.

An adjustable platform in front of the welding head supports the welding furnace and gives the proper location for safe ends of different lengths. The welding head is protected from the heat of the furnace by a cast-iron tank or water back. The mandrel back of the welding rollers approximates the inside diameter of the flue that is being worked on and supports the weight of the safe end while the latter is being heated and moved to the welding position.

When the machine is in use the operator stands at some distance from the furnace and uses a foot valve which controls the entire operation of the machine. The piping is arranged so that the clamping heads close in on the outside diameter of the flue before the taper mandrel expands the rollers to make the weld. The mandrel is started by an air chuck operating automatically with the clamping of the flue. Some type of roller table is ordinarily placed in front of the machine to support the flue. With this equipment one crew can turn out 120 superheater flues in a 10-hr. day.

Inclosed Headstock Roll Turning Lathe

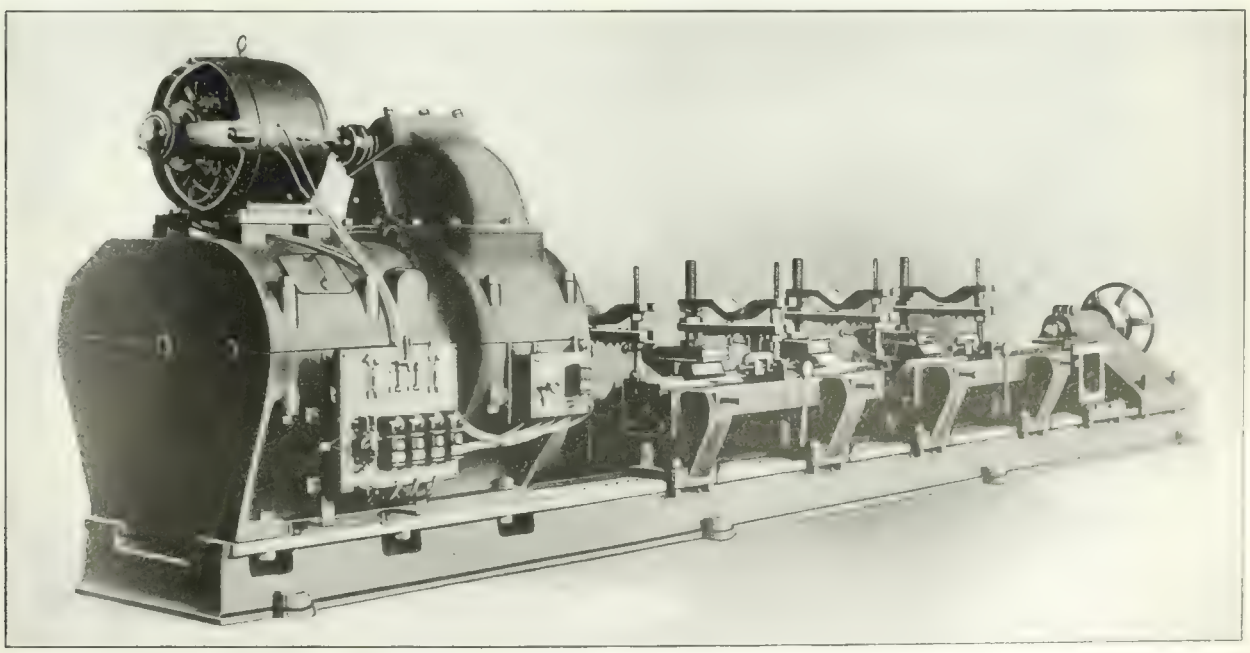
The Youngstown Foundry & Machine Company, Youngstown, Ohio, builder of sand and chilled rolls, ingot cars, shearing machines, roll lathes and spike machines, has lately placed on the market an inclosed type of roll turning lathe. It embodies some new features, such as the use of a closed box section for the bed, push button control for the motor and numerous holes in the gear guards for inspection purposes.

The headstock is of the inclosed type, all gears being thus covered in a more sightly manner than in the open-type machine where separate gear guards must be constructed. All gearing, including the internal gear of the face plate, is of steel with cut teeth, and may be run in a bath of oil if desired. All bearings have solid brass bushings, held in place by removable caps. If it is not desired to run in a bath of oil, all bearings may be lubricated from the outside, through pipes arranged for that purpose. Large handholes make inspection of the gearing easy, without the removal of headstock cap, which acts as a support for motor drive. The headstock cap and motor may be removed as one unit, exposing all gearing, in the event of repairs being necessary. The headstock cap itself does not hold the shaft bearings in place, all of these being separate.

The main spindle of the lathe on which face plate turns is a hollow forging, facilitating the easy removal of the center, in the event of breakage. Massive general construction is used throughout, the bed plate being a closed box section, which is relied upon to eliminate chatter and give the rigidity essential in this class of machine.

The lathes, which are built in five sizes ranging from 18 to 42 in. in swing, are operated by adjustable-speed motors, directly connected through Francke flexible couplings. Speed ratios of either 4 to 1, or 8 to 1, may be furnished. The lathe illustrated is equipped with push button electric control, mounted directly on machine, and is one of three machines recently shipped by the builder to the Crescent works of the Crucible Steel Company of America at Pittsburgh.

Shipment to Norway from the United States of 3000 tons of copper has again been arranged by the Norwegian and British governments, provided an equivalent amount of Norwegian copper pyrites is shipped.



In This Motor-Driven Roll Turning Lathe the Gears in the Headstock Are Entirely Inclosed, but Handholes in the Covers Are Provided for Inspection Purposes

National Founders' Association Meeting

Featured by the Inauguration of the National Industrial Conference Board and of a Service Bureau on Approved Foundry Methods

The big promising movement centered in the National Industrial Conference Board, to educate employer, employee, the public and the legislator, and, by enlisting the active support of nationally respected industrial leaders, to influence legislation believed to be for the greatest good for the greatest number, at least industrially, was the outstanding contribution to industrial progress offered by last week's annual meeting of the National Founders' Association. Besides this, the meeting was the occasion for announcing the establishment of a committee on foundry methods, this having an aim no less ambitious than to "investigate the appliances which will improve foundry practice." The meeting was the largest yet held by the association.

The first session of the meeting, which was held, as usual, at the Hotel Astor, New York, occupied Wednesday forenoon, Nov. 15. The address of the president, William H. Barr, dealing in part with statistics showing an increased cost with the shortened work day, was reviewed in last week's issue. The reports of Commissioner McClintock and Secretary Taylor are given below. An address on "Industrial Legislation" was made by George F. Monaghan, general counsel of the association; the year's work of the committee on safety and sanitation was told by A. F. Corbin, chairman, and the announcement of the new service to members, and, indeed, to the foundry industry, inaugurated through the organization of the committee on foundry methods, was described by the chairman of the committee, Joseph J. Wilson, Cadillac Motor Car Company.

The first formal announcement of the existence of the National Industrial Conference Board was made at the Wednesday afternoon session. The present composition of the board and the purposes were detailed at length in last week's issue, on the basis of a long statement made by Magnus W. Alexander, manager of the board, but Mr. Alexander's actual presentation before the meeting was in the nature of the tale of an observer of a meeting of the board five years hence. Thus he added to the formal paper by drawing the picture of specific achievements likely in the succeeding several years and by suggesting his own belief that men of highest caliber will be vigorously engaged in the work throughout that time. At the Wednesday afternoon session also addresses, reviewed below, were made by E. W. Rice, Jr., president General Electric Company; Frank A. Vanderlip, president National City Bank, New York; and Ely Griswold, Griswold Mfg. Company, Erie, Pa.

The annual banquet, held Wednesday evening, continued the serious strain expected, of course, in the day sessions, and Frederick P. Fish, of Fish, Richardson, Herrick & Neave, bankers, Boston, and chairman of the National Industrial Conference Board, and James A. Emery, counsel National Association of Manufacturers, were the speakers. President Barr presided as toastmaster.

The concluding session, held on the morning of Nov. 16, was devoted in part to the Pittsburgh and Bridgeport strike situations. Edward Kneeland, United Engineering & Foundry Company, Pittsburgh, discussed the former, contributing some astonishing figures of output realized with workmen only a short time in a foundry. Edward K. Nicholson, counsel, Bridgeport Manufacturers' Association, Bridgeport, Conn., explained how damage suits in Bridgeport were promising to give relief from union delegate domination. W. H. Van Dervoort, president of the National Metal Trades Association, addressed the meeting briefly on the work of the joint conference board on apprentices.

RESOLUTION ON ADAMSON LAW

The association took cognizance of the attitude of the railroads toward the Adamson law, and passed the following resolution backing the railroads in their fight:

> Whereas, a serious question of grave national importance has arisen relative to the conflict between the Constitution of the United States and the so-called Adamson law, which law seeks to compel railway systems of the country to raise the wages of certain of their employees under the pretense of compelling an eight-hour work day, and
>
> Whereas, the railway systems of the country have indicated their opposition to the enactment and operation of that law, claiming said law to be in violation of rights guaranteed all citizens by the Constitution of the United States, and
>
> Whereas, further, the Constitution of the United States guarantees to every citizen the right to test through the courts of the land any act designed to deprive him of life or liberty or property without due process of law, now, therefore, be it
>
> Resolved, that we, the National Founders' Association manufacturers and shippers of products in the various States of the United States, declare that this right to have their cause determined by judicial proceedings should be secured to the railway systems of the country and that this association approve of their attitude in the maintenance of that right.

Achievements of the Industrial Conference Board Forecasted

Mr. Alexander, who was introduced as the temporary manager of the National Industrial Conference Board, abandoned the formal statement which he had prepared and which was printed practically in full in last week's issue; instead he had the courage to engage in prophecy and asked his audience to project itself into a period five years hence. He then undertook to relate some of the happenings of a meeting of the conference board on the third Thursday of May, 1921. He located the board in a commodious office in one of New York's skyscrapers. The meeting had already been in session for five hours, save for a short time for luncheon, and ne had fifty-five in all participating, seated around a U-shaped table. Of these forty-eight represented in pairs twenty-four national employers' associations and in addition there was a prominent banker and two manufacturers, one from the South and one from the West, members of the board's advisory council, and also the chairman and manager and secretary of the board. As observer, he noted the big minds identified with the advisory council, men who regarded the work not only as a pleasure and duty, but a privilege to render the

national service. The association of bankers had become identified with the movement, he discovered, though at first that Association was loath to recognize the industrial movement.

Mr. Alexander had himself admitted to the board room at a time when the secretary was reading a communication from the White House, asking for suggestions for membership in the Federal Trade Commission. A card index of qualified people for Federal and State governmental commissions, it appears, had been compiled, and it was an easy matter to pick out twelve names which the board proceeded to submit in the order of preference. Whereas, he said, it might earlier have seemed questionable to approach the board on such a subject, there was now no suspicion aroused in the method of appointment, largely because of the unapproachable character and non-political bias of the advisers. Even at this early period cabinet officers had availed themselves of the information in possession of the board. No single case of a bad selection or misplaced confidence had resulted and business men were now receiving co-operation and not hostility as before.

As observer of this imaginary meeting he discovered that the board had the support of a noted constitutional lawyer as a representative to argue before the Senate judiciary committee against a bill which was not approved and his effort was supplemented by the chairman of the board's advisory economic committee, who had presented a clear picture of the harmful consequences of the proposed bill. The result, it appeared, had been that the bill was refused sanction and a joint committee had been appointed by the Houses of Congress to study and report at the next session. The board was thus stimulated by the fact that a bill of unsound character had been prevented of passage in part by the unbiased, competent criticism of the board's economic and legal committees.

Through such study of economic and legal matters, it appears that sound laws had been enacted three years previously in relation to social insurance in the United States, and it had come to be an axiom that society should assume the direct supervision over the morals, health and safety of the people. It appeared that the managing director of the advisory board, after studying the subject and issuing a monograph to the members, had brought about a unanimity of opinion based on the experience in this and in foreign countries. After the board had expressed itself, other associations were led into similar channels of economic thought and in turn various state associations, so that there seemed to be no reason for surprise that a bill should be passed so well fortified with arguments simmering down from the board and through the various national and state associations.

Mr. Alexander then discovered that the board took up the question of the progress of the last few years in the industrially growing states of the South and the Middle West in respect to boy and girl labor. An appropriation of $50,000 additional was made to the trades training committee for the training of teachers and the stimulation of manufacturers to do their duty by their country and industry. Some of the committees, it was noted, made a practice of bringing in outsiders to assist in the work of the board and zeal and earnestness were conspicuous.

Mr. Alexander found the board at this time publishing a weekly journal, the "Industrial Economist," which at this meeting, it was directed, should have an addition of pages to cover a digest of congressional and state legislature bills. The paper was now sold at newsstands and means were taken to send it free of charge to stockholders of companies so that owners of factories could get an idea of the necessities and requirements of industry. The influence of the paper, he felt, was shown in a tendency to interest a better type of men to enter legislative halls and a tendency to propose bills less absurdly hostile than heretofore.

The observer imagined some brief discussions at the meeting. One board member described his discovery of the craving by some employees for his personal interest. While his efforts were first scoffed at, they resulted in improved working conditions and increased efficiency and now he could talk frankly with employees who were loyal because they believed in the honesty and good judgment of the employer. It was also brought out at the supposititious meeting that large corporations had sent emissaries into foreign countries but the corporations of other countries had the co-operation of their governments in that these emissaries had been given a statutory recognition, and accordingly the board was asked to consider what could be done in this connection with the representatives of American business houses.

The After-the-War Struggle

Following Mr. Alexander's presentation, an address was made by E. W. Rice, Jr., president General Electric Company, on "How Shall Manufacturers Contribute to American Industrial Progress?" What he said was in part as follows:

"There are many indications that when the great war ends our troubles in this country will begin. We have received ample notice that the principal actors in the present struggle will then begin what has been termed an industrial war. This industrial war will not permit us to remain neutral, because it will be aimed to a large extent at us and we will become involved, whether we like it or not. It is evident, therefore, that we as a people, and especially those directly interested in our manufacturing industries, will be faced with new, complex and even menacing conditions.

"It is certain that the great industries of England have not only remained intact up to the present, but have been enormously enlarged and improved. England bitterly regrets her attitude of indifference towards science and the industries, and is now headed in the right direction. She is certain to be a more powerful and efficient competitor in the world's industrial markets than before the war. She is, moreover, copying as rapidly as possible whatever seems to be good in the German industrial system.

"German industries also are not only unimpaired, but are even improved and increased, and after the war, under the well-known system of governmental protection and assistance, will be in a position to compete more efficiently than ever for the world's markets.

ENERVATED BY PROSPERITY

"The men and women of industrial Europe, as a result of the war, are being trained in habits of discipline, economy and self-sacrifice, while we are being enervated by our great prosperity. The peoples of Europe are being taught by a life-and-death struggle the imperative necessity of co-operation in every detail of life. Their armies are now fighting, but after the war, even if they still continue the struggle commercially and industrially, the now contending groups will in effect be united to compete with us, not only in neutral markets, but if possible in our own market.

"It will not require a very exhaustive process of self-analysis to disclose that we are all relatively deficient in discipline and co-operation compared with the conditions which will exist in industrial Europe after the war.

DAY OF EXTREME INDIVIDUALISM IS PAST

"The day of extreme individualism is past. The problems pressing for solution are so great that no single manufacturer, no matter how powerful, or group of manufacturers, no matter how numerous, is able to stand alone to the exclusion of other manufacturers or groups of manufacturers. The time has come when co-operation in the broadest sense is essential to the maintenance of our industrial prosperity.

"There is to-day a serious lack of mutual understanding between the manufacturer and the wage-earner, and while considerable progress has been made in bringing about more harmonious relations, the situation leaves much to be desired. This lack of understanding and confidence is largely due to a lack of knowledge of each other, and this knowledge is lacking in the manufacturer as well as in the wage-earner. Employers are desirous to maintain good, healthful conditions of work and to provide fair treatment for their employees and to pay liberal but just wages, but the employer still needs to take an increased personal interest in his men as men.

GOVERNMENT HELP, BUT NO PATERNALISM

"The manufacturers of other countries will have the great advantage of the intelligent and sympathetic help of their Governments and of their people, and patriotism will be lifted to the highest plane. Our manufacturers, if we are to be successful in the coming struggle, must secure similar intelligent and sympathetic treatment from our Government and our people. We as manufacturers naturally think that we are entitled to such treatment and, in any event, we are making and shall continue to make an earnest endeavor to deserve it; furthermore, we intend to make continuous and, we hope, intelligent efforts to remove such defects in our business methods as may exist. In this process we will take the public and our employees into our confidence and deal with both in a spirit of absolute frankness and sincerity. We will endeavor to obtain constructive and helpful assistance from all sources, but we do not wish to encourage paternalism either in our relationship with our employees or on the part of our Government with us."

A WORD FOR THE INDUSTRIAL CONFERENCE BOARD

"The National Industrial Conference Board, recently brought into action as a co-operative force among manufacturers throughout the country, is the type of agency which under wise and efficient leadership will be most useful in the solution of the many vexing problems herein briefly outlined and of many more that are constantly arising with changing social, industrial and political conditions. We are fortunate in having such a body created at this time; the need is great."

ADDRESS BY FRANK A. VANDERLIP

The banker's relation to industry was discussed briefly by Frank A. Vanderlip, president National City Bank, New York. He made a plea for more statesmanship in business, arguing that business men take too little time to think in a broad way of the things which are affecting society. The very fundamental problem of all, he held, is that of government. He told of a conversation with an eminent French financier who believes that as great changes in forms of government will result from the European war as did from the French Revolution, that democracy, in putting mediocrity in legislative places, had been a failure, and conditions are such that whenever in a legislative assembly one appears strongly representative of any one interest, he is discounted as a special pleader for that interest. He agreed that we are going to see a co-operation in the relations between government and business in European countries that is now novel in business life. Unless there is co-operation in this country, at least a sympathetic co-operation, we are going to find ourselves handicapped in the new order of things. This country is no longer isolated and what the world does will affect us.

He emphasized that we shall see most adroit tariffs in European countries and these must be met not by log-rolling tariffs, but by equally adroit measures. He intimated the possibility of our seeing ownership of utilities such as shipping. The business of transportation, he added, has felt the hand of government more than any other branch, and in many respects properly, but any business so hampered does not attract investors and about the only credit it has is its capacity to borrow. All last year less than $13,000,000 was put into new construction and none so far this year. One of the troubles he felt is that railroad men, like those in charge of other lines of industry, are good operators, but too few of them are statesmen, looking at it in a broad way.

The Labor Troubles at Pittsburgh and Bridgeport

In introducing Mr. Kneeland to discuss the "Pittsburgh Strike Situation," President Barr emphasized that the Pittsburgh foundrymen had proved a barrier between the 8-hr. day and the foundry industry. Mr. Kneeland told some of the details of the strike which had been instituted eleven months ago against 33 foundries, with Pittsburgh selected as the point of attack in that it was the strongest center from the standpoint of the union in machinery casting work as distinguished from stove foundries. One of the difficulties was to secure accommodations for the men taken on in place of the strikers, this involving, for example, the rental of one entire hotel and the provision of automobile conveyances, particularly after a street railroad strike occurred. He reported that there were now thirty-two open shops in operation at 60 to 100 per cent of normal capacity, with at least one at better than 120 per cent of capacity.

MORE CASTINGS AT LESS COST

The most remarkable contribution to the subject made by Mr. Kneeland was, however, his figures to show that more castings were now being made and at less cost per man than before the strike and the men were not exploited either, but were getting better wages than the union paid, in spite of the fact that few of them were skilled in foundry practices. He paid a special tribute to the herculean tasks of the foundry foremen and superintendents to develop workers, and said that he could not say too much about the services of the president, commissioner and others of the National Founders' Association.

His figures for production in the case of one steel foundry, which prior to the strike had a record of 2000 tons per month as the maximum, were as follows: In September, 1915, the production was 1508 tons; in October, 2123 tons; in November, 2235 tons, while the December figure was 1097 tons, the strike having been declared about the middle of the month. The production figures after that were as follows: January, 1916, 1203 tons; February, 1508 tons; March, 1869 tons; April, 1990 tons; May, 2036 tons; June, 1925 tons; July, 2277 tons; August, 2083 tons; September, with furnace troubles, 1591 tons; but October no less than 2542 tons, against the former maximum of 2000 tons, as stated.

EFFICACIOUS DAMAGE SUITS IN BRIDGEPORT

What Mr. Nncholson had to say on the Bridgeport case was in part as follows:

"While injunctions had been granted in very many states and on very many different occasions restraining striking employees from picketing, threats, intimidation, etc., the injunctions were rarely successful, in that it was possible for the results to be accomplished by methods which did not openly violate the injunction. After considerable conference it was suggested that suit be brought by some of the founders against individual defendants asking for damages for injury to property." Four such suits were instituted by four foundry companies, each against the local union as a voluntary association, against J. R. O'Leary, a vice-president of the International Molders Union, recognized to be in charge of the Bridgeport strikes, against T. F. Duffy, the local representative of the American Federation of Labor, and against the financial agent of the local union. All were sued individually and not as officers of unions, and also a large number of individual strikers who had participated in acts calculated to injure the business of the plaintiffs. The suits asked each for $50,000 damages. The allegations covered a conspiracy to prevent the operation of the foundries; the threat to call a strike, the picketing, the acts of intimidation, all tending to prove the attempt to injure the founder's business.

"Under the attachment proceedings which are permitted in an action of this kind in the State of Connecticut," Mr. Nicholson explained, "there was attached the real estate of the defendants who owned real estate, the bank deposits, whether savings or national, of those defendants who had bank deposits, and in the case of Duffy, his body was attached and a bond given by a

surety company for his release pending the trial of the action. Defendants without property can be arrested and placed in the county jail, either to respond to judgment or take the oath prescribed for poor debtors, which is that they have not over $17 exempt from attachment. O'Leary remained out of the city until after the return day, and then upon the issuance of a supplementary attachment, left the city and has remained away, thereby removing from the strike the influence of the International Molders Union as represented by him. The body of Duffy was attached and he was released under bonds. Instructions were given to the sheriff that he should make no arrest where it would act, in his opinion, as a hardship upon the individual defendant or his family."

"The theory of the action," Mr. Nicholson said, "is that the reciprocal duties between the employer and the employed, that the employee is no more permitted to injure the property or affect the liberty of the employer than is the employer permitted to affect the property or the liberty of the individual employee. Whether or not judgment will be secured in these cases rests upon time and the court, but counsel for the plaintiffs, at least, believes that the position taken is correct." The Bridgeport shops are open, Mr. Nicholson added, some of them having their full quota of employees and others having a large percentage. There is still some picketing being carried on, with its attendant conditions.

AN INTIMATION OF SLAVERY TO THE UNION

One of the strange developments of the Bridgeport situation is that on Nov. 1 a number of founders who had re-employed men who had been on strike received letters from the attorney of the local union stating that these men had signed contracts with the union to work for it for a period of one year from Sept. 21, 1916. The notice further stated that if the founders continued to employ these men the union would seek "such redress as the law will permit." This seems to be a direct attempt by the union, Mr. Nicholson held, to interfere with the liberty of the individual employee to contract. The men with whom the contracts are supposed to have been made do not recall signing them. "If trade unionism in the United States," said Mr. Nicholson in conclusion, "has come to a pass where the individual employee can be so bound by his union as to be unable to secure employment except under its direction, and can so use the subterfuge of a contract to deprive the employer, under the orders of the union, from employing men who are willing and ready to work for him, then slavery is still in existence in this country."

THE STORY OF THE NATIONAL ELECTIONS

A contribution to the labor discussion of the meeting was also made by James A. Emery, Washington, D. C., in an address at the banquet. "San Francisco," he said, "has supplied the final evidence of the proposition which the recent national elections have demonstrated, that the American electorate cannot be organized and delivered in racial, religious or class groups. The leaders of organized labor undertook," he pointed out, "to commit their followers not merely to a national ticket, but to Congressional candidates who were presumed to represent a dominant trade union interest. The returns offer a conclusive proof that the effort has been as successful in the present as it has been in the past. The national vote gives no testimony of the separable delivery of organized labor's ballots to a presidential candidate. The Congressional returns reinforce this conclusion. Special contests to which organized labor addressed itself with exceptional vigor were lost. Mr. Tavenner, author of the anti-efficiency measures; Mr. Ralston, counsel for the American Federation of Labor; Mr. Buchanan, former president of the Structural Iron Workers, and a special spokesman of the Federation on the floor, were badly defeated in various Congressional districts, while Mr. Lewis, chairman of the House Labor Committee, was defeated for United States Senator by a comparatively unknown opponent in a state carried by the President, while, if it be said that the vote of San Francisco, which decided the election in California, was brought about through the political dominance of organized labor in that city, the idea is refuted by the fact that the electorate, whch carried that city for the President, gave a majority of 5000 against an anti-picketing ordinance.

A LESSON OF THE ERIE STRIKE

Ely Griswold, Griswold Mfg. Company, Erie, Pa., reviewed the experiences in connection with the Erie strike and from this pointed out how the National Founders' Association could be assisted by local associations. Such an association for each foundry center would help to eliminate sharp methods of securing business and would bring about a better general system of cost keeping. Such an association would, he urged, have means for keeping an active interest on the part of individual members, which interest is necessary no matter how efficient are the paid officials of the larger body. The advantage of the local association was shown in the case of Erie, which had five members in the National Association before the strike and now has fifteen. Local organizations of foundry foremen and pattern foremen were advised.

A Committee on Foundry Methods and Appliances

One of the important announcements of the meeting was that made by Joseph J. Wilson, chairman of the association's committee on foundry methods, telling of a plan to investigate appliances which will improve foundry practice. The committee is to report its discussions and findings to the members of the association. The committee, which held its first meeting on Aug. 4, is composed of the following: Joseph J. Wilson, Cadillac Motor Car Company, chairman; H. P. Parrock, Lumen Bearing Company, secretary; W. M. Gartshore, McClary Mfg. Company, London, Ont.; John Knickerbacker, Eddy Valve Company, Hartford, Conn.; D. W. Sowers, Sowers Mfg. Company, Buffalo; P. J. Flaherty, Johnson Bronze Company, New Castle, Pa.

The committee will constitute an advisory board and the service bureau of the association will be the means for investigation and reporting. Materials, tools, supplies and equipment; costs; melting, molding, core making and cleaning; inspection and shipping; planning and production, and patterns and flasks are to be taken up as time will permit. The committee has already issued a bulletin on the benefits to be derived from the use of molding machines and has in preparation bulletins on the selection and installation of molding machines, and on foundry costs, hand squeezers and power squeezers.

IMPROVEMENTS IN SAFETY DEVICES

The report of the committee on safety and sanitation was made by A. F. Corbin, chairman, of the Union Mfg. Company, New Britain, Conn. An improvement in safety goggles and in foundry shoes has been made in the year and a legging has been provided with a chain to fit under the arch of the shoe to prevent the legging slipping upward. The committee reported a largely increased sale of the safety appliances and in this respect alone a good sign of increasing interest. No profit of course is attempted, but the prices have been sufficient to cover the expenses of the safety inspector. Mr. Corbin paid a tribute to the work of Mr. Alexander, formerly in charge of the activities of the committee, and mentioned a small picture book of safety pictures lately issued which he advised putting in the hands of every employee.

The presentation of the report was made the occasion for the amusing episode of the convention. In this, as in some earlier like acts, the villain was Mr. Alexander and the hero President Barr. Mr. Alexander took the opportunity to say that the safety committee had recognized the increasingly important part taken by women in industry and had devised a N A S O first-aid jar made especially for women. He explained

that instead of the usual list of antidotes and first-aid instructions printed on the underside of the cover of the N A S O jar for men, the inside of the cover in this case was a mirrored surface, and it was about this moment that the audience began to appreciate the hoax, so it was quickly prepared for the demonstration that the body of the jar contained a gigantic powder puff and was filled with a goodly supply of powder. President Barr had been made to assist Mr. Alexander in removing the jar from its box, and while the latter finally tried to indicate that President Barr was the proper recipient for the jar, Mr. Barr quickly threw the burden of proof on Mr. Alexander.

WAGES AND THE HIGH COST OF LIVING

On the question of providing additional wages to compensate for the higher cost of living, a topic which was introduced just before the meeting came to a close, references were made to agreements to give a bonus for continuous employment. I. W. Frank, United Engineering & Foundry Company, told something of a contract of this kind which had been in operation for nine months. The agreement is made for six months and may be terminated on a 30 days' notice. It is intended as a reward for loyalty, and every month the amount due the individual is entered in a pass book to his credit. Julius Goslin, Joubert & Goslin Machine & Foundry Company, Birmingham, told of an agreement providing for a 10 per cent bonus, which was paid each month to those worthy and somewhat long in the employ of the company. It was not cheapened by being of general application but given to perhaps 60 per cent of the mechanics, who are of the substantial type and often owners of their own homes. None had taken the money and departed, but instead many had asked for a renewal of the contracts.

Other members told of efforts to buy on the wholesale for the benefit of individuals, such as canned goods, for example, an arrangement which could be specially well handled where a company had a store, the profits of which perhaps went into a general fund for employees. In one case coal was purchased for the men and retailed at the wholesale price.

THE OUTLOOK IN LEGISLATION

In reviewing legislation, the general counsel of the association, George F. Monaghan, said that in the past year 500 laws friendly to labor had been under consideration in the various States. In a word, he said, "Labor is deified and capital nullified." One trouble is that employers' associations have usually adopted the gumshoe method and have not always come from under cover, though they believe thoroughly in their propoganda. The employer's end of the contract, he said, is rarely put before the public.

The laws now likely to be attempted aim to establish further the minimum wage law and to secure an anti-injunction law like that of the Federal Government in all the States as well as to limit the number of employees in respect to apprentices and to provide unemployment and old age insurance, mothers' pensions and the like. He emphasized that employers should be represented in the membership of reform and other organizations taking an active interest in legislation and in which are representatives of unionized labor. If employers joined in constructive legislation, the public would gradually come to understand the issues. Then an effort could be made to repeal radical legislation now on the statute books without the contenders being kept on the defensive. Such fights should be continued whether there is a likelihood of winning at the moment or not. In this a lesson can be learned, Mr. Monaghan emphasized, from the American Federation of Labor, which has now succeeded with legislation which five years ago was laughed at. The most important point of private business, he added, is public business.

HIGHER WAGES IN OPEN-SHOP FOUNDRIES

The report of Commissioner A. E. McClintock showed that in the past year there had been no strikes where wages was the only issue. Members were quite willing to consider increases in pay. Taking advantage of the unprecedented conditions throughout the country, he said, the molders' union has put forth most strenuous effort to stimulate enthusiasm for increase in membership, but reports indicate that this campaign of the union has fallen far short of expectations. The apathy on the part of the independent molders toward unionism, he felt, was due to the fact that work has been exceedingly plentiful and the rate of pay offered by the open shop foundries has been in excess of what the closed union shops could afford to pay. The open shops, with their freedom of union restrictions on molding machines, apprentices, handymen, and output, have offered better inducements to the skilled molders and coremakers than the union shop, with its flat minimum wage and union rules and regulations. The independent molder, therefore, could see no advantage in joining the union and contributing 40 cents per week in dues and being subjected to numerous special assessments.

This inability to induce molders to join voluntarily has stimulated the union's demand for the closed shop, thereby attempting to compel the independent molders to come into the union or obtain employment elsewhere.

STRIKES LESS COSTLY TO CONDUCT

In some instances, he continued, strikes have been called in the shops of members without taking a vote of the men employed. Representatives of the union have appeared at the shop gates and notified the men that the national union had declared the shop struck, and all were warned to stay away. A few days later, and in some instances a week later, the firm would receive a communication, signed by some union official, stating that by establishing a minimum wage rate and recognizing the union, an adjustment of the strike could be made.

Many workmen, while still refusing to join the union, but wishing to avoid the annoyance and inconvenience, would immediately obtain employment elsewhere, and thus leave the union agitators and the radical element to carry on the strike at a comparatively small expense for strike benefits. This condition of general shortage of labor has enabled the union to carry on an extensive closed shop campaign at a very much less expense than during more normal times.

THE 8-HR. ISSUE IN PITTSBURGH

Mr. McClintock then touched on the 8-hr. day question as follows: The Pittsburgh foundrymen, in resisting the 8-hr. movement at its inception last December, have prevented its spread to other localities. At the time the issue was raised at Pittsburgh, the 8-hr. demand had already been made at Philadelphia, Syracuse and Detroit, and was in contemplation at a number of other points. Had the 8-hr. day been established in the Pittsburgh district, there is no question whatever but the issue would have been raised quite generally throughout the country.

Pig iron producers have estimated that foundry production for months past has been curtailed 25 to 30 per cent due to shortage of labor and the indifference and inefficiency of those on the payroll. A conservative estimate is that there are 100,000 molders and coremakers employed in the United States and Canada exclusive of stove shops. Fully one-half of them work on a 10-hr. basis. To place them all on an 8-hr. basis would mean a reduction in working hours of fully 150,000 per day. This means that 18,750 more molders would have to be employed to do the work now being done by the 100,000. These figures are startling, but convincing. It is not necessary to explain that the men to do this work are not available.

I am firmly of the belief that there should not and will not be an 8-hr. day if the foundrymen will stand together and loyally support this association. In considering this 8-hr. agitation it is well to keep in mind that the introduction within recent years of power cranes and improved equipment has greatly reduced the lifting and hard muscular labor formerly required of a molder. This is probably true to a greater extent in the foundry than in any other industry.

SECRETARY'S REPORT

Secretary J. M. Taylor reported that in the past

year 27 firms have been admitted to membership. A few applications were received which could not be accepted. The firms elected to membership are all representative firms and a substantial gain to the organization, both through their general business standing and the number of employees. The membership of 24 concerns was terminated. Of these, 5 went out of business; 7 resigned for financial reasons; and 12 gave no reason. None of the resignations, so far as Mr. Taylor could learn, was due to dissatisfaction with the policy of the association.

The number of molders and coremakers reported by our members increased 35 per cent over last year, the average for 1916 being the largest in the history of the association.

A new departure, this year, was the preparation of the booklet "Closed Shop Unionism." This was suggested by an inquiry from one of our members, whose men were being stirred up by the union agitators, and who wished a simple statement of the closed shop problem which would not be "over their heads." The booklet is not intended to be a learned discussion of unionism, but only a sort of first lesson, to set the workman thinking and lead him to further investigation.

PRESIDENT AND VICE-PRESIDENT RE-ELECTED

Not only was William H. Barr, Lumen Bearing Company, Buffalo, re-elected as president under circumstances which indicated unanimous hearty approval of his administration, but H. J. Boggis, Taylor & Boggis Foundry Company, Cleveland, was retained, much to his surprise, in the vice-presidency, this being, it is believed, the first time a vice-president has succeeded himself. J. M. Taylor was re-elected secretary, with headquarters at 29 South LaSalle Street, Chicago, and the Chicago Savings Bank & Trust Company, Chicago, remains as treasurer.

The following district committees were elected:

DISTRICT COMMITTEES.

First District—D. K. Bartlett, Builders' Iron Foundry, Providence, chairman; F. C. Fromm, Manufacturers' Foundry Company, Waterbury, Conn., vice-chairman; W. A. Stevenson, Norwood Engineering Company, Florence, Mass.; A. E. Newton, Reed-Prentice Company, Worcester; Enoch Shenton, Wm. Highton & Sons Company, Nashua, N. H.

Second District—Edward Norris, Utica Heater Company, Utica, N. Y., chairman; D. W. Sowers, Sowers Mfg. Company, Buffalo, vice-chairman; H. P. Macdonald, Snead & Co. Iron Works, Jersey City; James H. Caldwell, Ludlow Valve Mfg. Company, Troy; A. S. Blagden, American Malleables Company, Lancaster, N. Y.

Third District—Ely Griswold, Griswold Mfg. Company, Erie, chairman; Wm. S. Hallowell, Harrison Safety Boiler Works, Philadelphia, vice-chairman; C. S. Koch, Fort Pitt Steel Casting Company, McKeesport, Pa.; J. Turner Moore, Reading Steel Casting Company, Reading, Pa.; John E. Thropp, John E. Thropp's Sons Company, Trenton, N. J.

Fourth District—Joseph J. Wilson, Cadillac Motor Car Company, Detroit, chairman; Geo. O. Rockwood, Rockwood Mfg. Company, Indianapolis, vice-chairman; Charles F. Seelbach, Forest City Foundry & Mfg. Company, Cleveland; Samuel Blackburn, John B. Morris Foundry Company, Cincinnati; E. R. Frost, National Machinery Company, Tiffin, Ohio.

Fifth District—James F. Lardner, Rock Island Plow Company, Rock Island, Ill., chairman; H. T. Hornsby, United Iron Works Company, Springfield, Mo., vice-chairman; E. E. Baker, Kewanee Boiler Company, Kewanee, Ill.; W. H. Winslow, Winslow Brothers Company, Chicago; John B. Strauch, More-Jones Brass & Metal Company, St. Louis.

Sixth District—W. W. Coleman, Bucyrus Company, South Milwaukee, Wis., chairman; C. A. Luster, Clyde Iron Works, Duluth, vice-chairman; Max W. Babb, Allis-Chalmers Mfg. Company, Milwaukee; Fred M. Prescott, Prescott Company, Menominee, Mich.; John G. Osborne, Lakeside Malleable Castings Company, Racine, Wis.

Seventh District—John M. Taylor, Taylor-Forbes Company, Ltd., Guelph, Ont., chairman; W. F. Angus, Canadian Steel Foundries, Ltd., Montreal, vice-chairman; A. R. Goldie, Goldie McCulloch Company, Ltd., Galt, Ont.; Geo. W. Watts, Canada Foundry Company, Ltd., Toronto, Ont.; H. Cockshutt, Cockshutt Plow Company, Brantford, Ont.

Eighth District—W. D. Trabue, Phillips & Buttorff Mfg. Company, Nashville, Tenn., chairman; Z. W. Wheland, Wheland Company, Chattanooga, vice-chairman; W. D. Tynes, Hardie-Tynes Mfg. Company, Birmingham; E. Y. Hartwell, Hartwell Iron Works, Houston, Tex.; Geo. R. Lombard, Lombard Iron Works & Supply Company, Augusta, Ga.

A. E. McClintock, 29 South La Salle Street, Chicago, continues as commissioner of the association.

Book Reviews

Canadian Trade Index. Text pages, LXXIV + 400, 6½ x 10 in. Published by the Canadian Manufacturers' Association, Toronto. Price, $5.

For all buyers of Canadian manufactured good this index presents in alphabetical lists the most recent and complete information obtainable. It is divided into three parts, containing respectively the names of Canadian manufacturers, articles manufactured in Canada, together with the names of all firms producing them and an index in French of all such goods. This 1916-18 edition supplies over 2000 headings and nearly 3000 firm names not incorporated in other issues. To the name and address of every manufacturer appearing in the classified section have been added many valuable details, such as export representatives, branch offices, etc., not previously available. The index of French headings has been supplemented by the addition of the equivalent English headings, identical with those of the classified section. These have been altered in many cases to make them more descriptive and easier to find. Parts I and III are now printed on blue paper, making them easy to locate, which will be appreciated by hurried business men. Useful new features are the lists of Canadian trade commissioners, commercial agents and British consuls.

The Model T Ford Car. By Victor W. Pagé. Pages, 288, 4¾ x 7¼ in.; illustrations, 94. Published by the Norman W. Henley Publishing Company, 132 Nassau Street, New York City. Price, $1.

This book, which is designed to supplement the instruction book of the builder, explains in considerable detail the operating principles of all parts of the Ford car and gives complete instructions for driving and maintenance. It is based upon the author's experience as a driver and considerable of the information included in the book has been obtained from first-hand sources.

The book is divided into but five chapters, the first of which is given over to a general description of the car, its parts and their functions. How the engine and its auxiliaries work is described in the second chapter, and details of the chassis parts are contained in chapter three. Instructions on driving, maintenance, overhauling and repairing are given in the two remaining chapters. The table of contents is quite complete, and with a list of illustrations arranged in numerical order make it possible to locate almost any subject readily. A comprehensive index is included.

Oxy-Acetylene Welding and Cutting. Pages, 190; 6¾ x 4¼ in.; illustrations, 76. Published by Frederick J. Drake & Co., Chicago, Ill. Price, $1.

Every practical point in the process of welding and cutting with the oxy-acetylene flame has been carefully covered in this volume. The theory, however, has not been neglected. Illustrations have been incorporated in the book to cover every essential detail of the apparatus employed in these processes. It is a concise exposition of the field it covers and a valuable book for shop reference.

Edward Le Bas & Co., iron, steel and metal merchants and manufacturers, London, England, are issuing "the combination metric ready reckoner" for the purpose of facilitating the use of the metric system of weights and measures in foreign correspondence, etc. On a stout card are printed tables which enable the conversion to be readily made of practically all kinds of English weights and measures into metric equivalents or vice versa. These tables are ingeniously arranged so that the elements of conversion are found in small space. The card is designed for desk use.

The Stone & Webster Engineering Corporation, Boston, has issued a second edition of its brochure giving illustrations of industrial plants, office and educational buildings, power stations, warehouses, etc., which it has constructed. This edition comprises 56 plates, giving photographic reproductions of all kinds of construction, showing the wide scope of the engineering achievements of the company. The publication is bound in cloth and is a most creditable specimen of engraving and letter press.

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THE IRON AGE

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The New Movement of Employers

The formation of the National Industrial Conference Board, a new organization of employers, was announced in connection with the annual meeting of the National Founders' Association in New York last week and a session of the board was held on the second day of the foundrymen's convention. Public attention was directed to the new movement, which in reality was started more than six months ago, by newspaper headlines referring to 15,000 employing companies represented, having a capital of $8,000,000,000 and employing 6,000,000 workers. With the railroad eight-hour law looming up as the foremost labor issue, it was easy for the newspapers to say that the Conference Board had been formed to take an active part in nullifying that measure, but this like other surmises fell far short of gaging the intent of the prime movers.

A full statement of the purpose of the Conference Board was given in the address of M. W. Alexander before the National Founders' Association, which was reproduced in THE IRON AGE last week. Mr. Alexander's activities in getting the movement under way have been masterly and his address was a notable review of a great program. Twelve national organizations of employers are represented by two members each on the National Conference Board, which becomes in effect a federation of trades, including metal-working, printing, wool, cotton, paper, rubber and other manufacturing lines. In the metal trades are the National Founders' Association, the National Metal Trades Association and the National Erectors' Association, while other manufacturers in the same and kindred lines are also represented through the National Association of Manufacturers and the National Council for Industrial Defense.

Various phases of the work thus undertaken at so significant a time for industry are touched upon in Mr. Alexander's prospectus. The wisdom of the founders appears in the appeal that will constantly be made in the work of the board to the intelligence of the public and to its sense of fair play. A "constructive study and equitable solution of economic issues in industry" is aimed at, and the facts are to be presented openly to legislators and the public so as to secure "by truthful publicity, intelligent sympathy for all proper efforts for industrial development."

In concluding its outline of purpose, as put forth by its manager, the Conference Board asks for the co-operation of the Government, of the public, of the wage earners of the country and of the manufacturers who are members of the federated associations. The statement does not ignore the fact that many employers in the past have not taken a direct and intelligent interest in all the problems of labor and of industrial operations. The change of attitude of such employers certainly has come none too soon, and it is to be said of the whole movement, that has been so intelligently and effectively handled in its beginnings, that it comes at a most opportune time. It should exert no small influence for the right settlement of the economic questions involved in the momentous readjustment upon which the world is soon to enter.

Industrial questions are now at the front in national and State legislation. The cost of living, with all its complexities, is the crux of our national politics. When a small minority of railroad employees enforce their edict for higher wages through a law that means ultimately higher freight rates and higher commodities, the people should know just what has been done to them and how it came about. If limitation of output by labor union decree and the discarding of approved methods of manufacture through the influence of a small though well organized fraction of the workers of the country are imposing burdens upon the whole people, the responsibility for such high costs should become widely known, so that the people may apply the remedy.

The activities of the new federation should, and we believe will, enlist the co-operation of the best minds among the country's manufacturing employers. They have never had a greater call to service for their industries and their employees, nor for the rightly ordered prosperity of the whole people.

Speculation in Foundry Iron

The buying of foundry iron for delivery in the second half of 1917 at a 50 per cent advance over the price of three months ago represents a speculation that is scarcely matched in the market for finished steel. There have been large sales of rails for

that delivery, also considerable sales of ship plates, both for domestic consumption, and it is well known that the warring countries have bought steel here that will not be shipped until the second half of next year. But the average manufacturing consumer of steel products has bought little or nothing for so distant a delivery. He may not get in the next seven months all the material the mill has contracted to give him in that time, but, largely because steel makers have seen prices steadily climbing to unheard-of levels and now prefer to have next year's deliveries carry the prices of 1917 and not those of 1916, this is not a time of free buying in finished lines.

A good many foundry iron buyers have evidently been acting in the past four or five weeks on the belief that the pig-iron market is to repeat the performance of the steel market—to a degree, at least; that as in steel, foreign buying will be sufficient to cause a competition for the metal in place of the competition among furnaces for pig-iron orders which, in spite of a moderate advance in price, really describes the pig-iron market of 18 months previous to September. Southern iron in particular had dragged, at every effort of Northern foundry iron producers to get prices up. But just as soon as 250,000 tons of Alabama iron was sold for export, indicating a greater need abroad for our pig iron than had been suspected, the situation suddenly changed; domestic consumers started to cover, and under excited buying prices went up from $1 to $3 a week as has been seen throughout November.

In the steel trade the mills have long made an effort to confine forward contracts, in the case of manufacturers, to material covering work for which orders were actually in hand. Some of this month's buying of pig iron for the second half of next year has been by foundries which did not have on their books orders for castings for delivery in that period. The buyers reasoned that pig iron would go higher, perhaps stay higher for a good part of next year, and that castings would rise accordingly. There were, of course, buyers whose castings go into their own products for which they had orders ahead or counted on a continuing demand at profitable prices through next year. With such the speculative factor was not so great.

As foreign demand for our pig iron sent prices bounding up, partly from the fear that the unknown volume of foreign demand yet to come would cause a scarcity, so the extent of the foreign demand in 1917 will determine whether prices will advance farther. As in steel, the situation hinges on the continuance of the war. On its face the effect thus far produced upon prices has been large in proportion to the amount of the foreign buying. The case is not one of a present scarcity and of prices bounding up under prompt orders for iron for which the foundry is waiting. With steel steadily advancing, long after levels were reached which a year ago looked dangerous, there was the possibility that a world demand for American pig iron, following in the wake of the steel demand, would accentuate the advance already caused by the taking up of several hundred thousand tons of steel making and foundry irons for use abroad. Foundry users of pig iron, in other words, have at length come into the same sort of war speculation in their buying that consumers of steel encountered more than a year ago. But there is an added factor of seriousness in that pig-iron contracts are real contracts and not options and have no guarantees against declines.

Hostility as a Labor Union Asset

The various resolutions passed at the Baltimore convention of the American Federation of Labor last week bristle with signs of an increasingly belligerent attitude. The prompt passing of the Adamson law on demand has evidently convinced the militant unions that they have been too mild heretofore. It matters little that the President made the cause of the railroad brotherhoods his own and brought Congress to his way of thinking. The American Federation of Labor flouts his suggestion of legislation "making illegal any railroad strike or lockout prior to the investigation of the merits of the case." The resolutions on this subject say that "this effort to again subject wage earners to involuntary servitude has aroused the determined resistance of wage earners generally," and further along we are told that "problems of industrial justice and redress for industrial wrongs cannot be worked out by laws."

Organized labor in the saddle does not want any problem worked out by law except it be the law of the union's will. Samuel Gompers, in his profane reference to the Constitution and the courts, has expressed what is increasingly the attitude of the militant union. It refuses arbitration of the railroad brotherhood demand because it has the power to stop the wheels of traffic. Its leaders want no improvement in the relations between employers and employees, because the power of the leaders depends upon keeping workmen under the belief that hostility is the natural feeling an employee should entertain toward his employer. Hence antagonism is breathed in every utterance of the Baltimore convention. Even what is said of the course of commodity prices, due to the war, is no exception, the resolution declaring that "among the chief beneficiaries of this abnormal situation are the bitterest enemies of organized labor."

The determination of labor leaders to appeal to passion and to play upon prejudice can only tend to make the employer-employee problem more hopeless. No doubt the war has intensified all antagonisms. Race hatreds in the United States have been made more bitter, and with war feeling in the air labor union leaders find it easier than ever to fall into the speech of war. The hatreds they are engendering, if not allayed by counsels of moderation and reason, must have a fearful reckoning.

Among employers' associations in recent years, on the contrary, there has been an increasing disposition to cultivate fairness. The welfare and pecuniary interest of employees have never had more thought from the leaders in great industries nor more favorable action than has marked the last decade. It may be that the progress of the open shop and the response made by labor to the advances of fair-minded employers have all the more embittered the heads of labor unions; but whatever the incitement, they are no more in the way of gaining a lasting advantage to those they represent than

militarism is on the road to bringing good will to Europe.

Arbitration, co-operation, conference and conciliation one day had a place in the lexicon of organized labor. Their disappearance, under the rule of the leaders of to-day, is no hopeful sign.

Business Measures to Come Before Congress

Co-operation on Exports Likely to Be Made Lawful—More Railroad Legislation—Aid for Vocational Training

WASHINGTON, D. C., Nov. 21, 1916.—The Congress which will meet Dec. 4 will face a legislative program of unusual importance for a short session and one in which the business men of the country will be deeply interested. The measures to be taken up will be strongly urged upon both houses by the President in a brief but emphatic address which is already in course of preparation. The chief measures to which Congress will give consideration will be the Webb bill permitting combinations of exporters for the development of foreign trade, a more or less comprehensive bill extending the federal regulation of common carriers, a measure authorizing federal assistance and co-operation in providing for vocational education, a bill regulating immigration, several measures providing for the conservation of the mineral resources, of the forests and the water-power of the country, and a so-called corrupt practices bill intended to further limit the use of money in the elections. The regular annual appropriation bills will necessarily be given the right of way and those providing for the army and navy as well as the urgent deficiency bill, which will probably authorize increased limits of cost for a part of the new naval program, will contain provisions of unusual interest to the readers of THE IRON AGE.

WEBB BILL WITH THE ADMINISTRATION'S HELP

Every day that has passed since Congress adjourned has emphasized the importance of the enactment of the Webb bill amending the anti-trust laws so as to permit manufacturers and exporters to combine in their campaigns for foreign business. This bill was hurried through the House in the closing days of the last session, but failed of passage by the Senate. Since the adjournment of Congress the belligerent countries of Europe have given additional evidence of their intention to recoup their trade losses after the war and to employ the most drastic measures to that end. Administration officials who, while advocating the passage of the Webb bill in response to a widespread sentiment in its favor, were not particularly enthusiastic about it, are now determined to put behind it every possible influence to insure its final passage this winter. That the bill will be strongly opposed by certain Senators who have long made capital out of their opposition to every form of trade combination is fully anticipated here, and in view of the legislation to be crowded into less than three months it is recognized that the passage of the Webb bill will be no holiday task. Nevertheless, Administration leaders in the Senate express full confidence in their ability to put it through.

The character of the railroad legislation to be urged by the Administration will depend largely upon the work of the joint Congressional committee on railroad regulation, which began public hearings in this city yesterday. It will also be influenced somewhat by developments in the contest over the constitutionality of the Adamson act recently begun by the leading railroad systems of the country and the course that may be pursued by the labor organizations affected by that extraordinary statute. It is improbable that the conclusions of the joint Congressional committee concerning the broad questions relating to federal regulation of the carriers now before it will be formulated in time for consideration at the coming session, but inasmuch as the entire membership of the joint committee is taken from the Senate and House committees on interstate commerce, which will have jurisdiction of all railroad legislation to be attempted at the coming session, there can be no doubt that the measures enacted this winter will be strongly influenced by the joint committee's work. There is no expectation here that the constitutionality of the Adamson law will be determined by the courts in time for the enactment of amendatory legislation predicated on the court rulings, but it is quite probable that an attempt will be made by certain Congressional leaders to meet the attack on the Adamson bill already begun by the railroads.

FEDERAL AID FOR VOCATIONAL TRAINING

President Wilson is reported to be greatly interested in the subject of federal aid for vocational education and to have secured pledges from Administration leaders in Congress to make at least a beginning in this direction at the coming session. The general plan of providing for the co-operation of the national Government with the States in developing this important branch of the education of the young has been strongly indorsed by many organizations of business men, notably by the National Chamber of Commerce, which through a referendum has secured the almost unanimous approval of the many trade bodies affiliated with it. The appropriation now sought is not large, but is likely to be the forerunner of very considerable expenditures.

The convening of the new session will be the signal for the reopening of the struggle so bitterly contested during the past three years to force through a bill restricting immigration and providing a literacy test. This measure possesses international aspects especially with reference to the principal countries of the Orient, and on that account will encounter adverse influences of an unusual character. The Administration will again antagonize the literacy clause and there is every reason to believe that if it is included the President will once more veto the measure.

There is little or no opposition to the conservation measures to be urged at the coming session and their passage will therefore depend almost entirely upon the ability of those having them in charge to secure consideration for them. They are not of vital importance, but the Administration is very anxious to secure the early passage of the bill regulating the use of water-power, which is of considerable interest from an industrial as well as a conservation standpoint.

The Administration leaders are pledged to give early consideration to Senator Owen's corrupt practices bill, the purpose of which is to regulate and to some extent restrict the use of money in campaigns for the election of federal officers. The passage of the bill during the session seems probable.

MORE MONEY FOR SCOUT CRUISERS

The urgent deficiency appropriation bill, which will be one of the first measures to be considered by the House at the coming session, will probably contain an authorization to increase the allotments for the four scout cruisers provided by the last naval appropriation act, the Navy Department having found it impossible to secure bids for these vessels within the statutory limit of cost. As soon as this measure is disposed of work will be begun in earnest on the naval budget bill, which will probably precipitate a fight in the House committee to reduce the scale of expenditure inaugu-

rated at the last session. Whatever may be done with the naval bill in the House, however, it is the best opinion here that the Senate will successfully resist any attempt at curtailing the program.

The uncertainty as to whether the Republicans or the Democrats will control the organization of the House in the Sixty-fifth Congress, chosen Nov. 7, will be an important incentive to the Administration to secure the enactment of its entire legislative program at the coming session. On the face of the returns the Senate will be Democratic by a majority of 8 or 10, while in the House the Republicans will have a plurality of 4 or 5, but not a majority over all, the balance of power being held by a handful of nondescripts, including Socialists, Independents, Progressives, Progressive Protectionists, etc. W. L. C.

CORRESPONDENCE

What Is Gray Iron?

To the Editor: The paper on "What Is Gray Iron?" read at the November meeting of the Philadelphia Foundrymen's Association brought out considerable discussion. It was the sense of the meeting that a general expression of opinion was desirable. There will be a further discussion of the question at the next meeting of the association to be held at the Manufacturers' Club, Wednesday, Dec. 6, at 8 p. m. It would be much appreciated if those interested could be there and present their views, or, if that is not possible, if they will write to the undersigned or to Howard Evans, secretary, 1021 North Delaware Avenue, we will be glad to read their letters at that meeting.

GEORGE C. DAVIS.

39 South Tenth Street, Philadelphia, Nov. 14, 1916.

A Car Distribution Commission

Shortly before the adjournment of the Interstate Commerce Commission inquiry into the car shortage at Louisville, Ky., on Tuesday, Nov. 21, it was announced that a permanent commission, which hereafter will control the car-distribution problems, had been created, to sit at Washington and to work as a supplementary body to the Interstate Commission. George Hodges, chairman of the Committee on Relations Between Railroads of the American Railway Association, has been named chairman of this commission. Fayette B. Dow, attorney-examiner of the Commerce Commission, will be the Commerce Commission member, and five other members, executives of railroads, will complete the list. This body, findings of which will be given the approval of the Commerce Commission, will be authorized to control the distribution of freight cars, to fix per-diem charges for use by railroads of equipment of other roads, and to assess demurrage rates as may seem to it proper. It was called to meet Thursday, Nov. 23, and take action on the matter of increasing the present 45-cent-per-diem charge to $1.25 and on the proposed progressive demurrage charge. Hereafter it will be relied on to prevent the development of a situation so acute as that lately disclosed.

Increased Demurrage Tariffs Suspended

WASHINGTON, D. C., Nov. 21, 1916.—The Interstate Commerce Commission to-day suspended until March 31 tariffs filed by the railroads in official, Southern and Western classification territories proposing increased demurrage charges to check the freight car shortage. The present demurrage charge of nearly all the roads is $1 per day after free time allowance. The proposed tariffs increased the charges to $2 for the first day after free time, $3 for the second day, $4 for the third day, and $5 for the fourth and each succeeding day.

The R. E. Ellis Engineering Company, 549 Washington Boulevard, Chicago, announces its incorporation and the election of Frederick Fisher, formerly with the Bucyrus Company, as vice-president and treasurer. It is marketing various manufacturing tool attachments.

A THIRD WAGE ADVANCE

The Steel Corporation Announces a Ten Per Cent Increase

Following the meeting of the Finance Committee of the United States Steel Corporation on Tuesday, Nov. 21, Chairman E. H. Gary made the following statement:

"Ordinarily the question of wages would not come up for consideration or decision at this time of the year, but in consequence of the abnormal conditions now existing it has been decided to increase the wage rates of our iron and steel companies about 10 per cent, to take effect Dec. 15. As to other departments, increases will be equitably proportioned."

It has been estimated that the average increase under the new rate of pay will be around $9 a month for the 260,000 persons now employed by the Steel Corporation, the understanding being that employees in clerical positions will participate, which has not always been the case when steel works wages have been increased. The 10 per cent advance now made is the third of that amount for 1916, the first becoming effective Feb. 1 and the second on May 1. The hourly base rate for common labor went to 22c. on Feb. 1, to 24.2c. on May 1 and will now be 2.67c., or $2.67 for a 10-hour day. In the Pittsburgh and Valley districts 27½c. has been paid to many laborers for some time.

The New York *Times* gives the following statistics showing the Steel Corporation pay-roll and number of employees in the first six months of 1916, also the wages paid in the past five years:

1916	Employees	Payroll
January	[illegible]	[illegible]
February	[illegible]	[illegible]
March	[illegible]	[illegible]
April	[illegible]	[illegible]
May	[illegible]	[illegible]
June	[illegible]	[illegible]
Total wages for 6 months		$124,789,240

Wages for Last Five Years

1915	[illegible]	[illegible]
1914	[illegible]	[illegible]
1913	[illegible]	[illegible]
1912	[illegible]	[illegible]
1911	[illegible]	[illegible]

At Pittsburgh it is stated that independent steel manufacturers will make wage advances averaging 10 per cent and effective in December.

The Brier Hill Steel Company gave notice on Nov. 22 of an advance of approximately 10 per cent to all employees, effective Dec. 15.

Magnitude of the Mining Industry

In an address before the nineteenth annual convention of the American Mining Congress, at Chicago, Nov. 14, C. A. Tupper of the *Mining World* said that for the ten years preceding the European war the average value of mineral products in the United States was about $1,980,000,000 a year. In 1913, the last normal year, it reached $2,439,159,728. With the stress of war demand, and the rise in prices, it has increased to $4,300,000,000 (estimated) for 1916. Equipment and supplies utilized in mining aggregated not less than $7,200,000,000 in the decade previous to the war, and now equal $900,000,000 or more each year. About 1,825,000 men are employed in the mines and oil fields of the country. Only 167 companies make public their dividends. These divided among shareholders, between Jan. 1 and Oct. 31, this year, $184,830,127.

The Ford Motor Company, Detroit, Mich., has placed contracts for an ore-handling plant to be erected in connection with the two blast furnaces that it will build near Detroit to supply metal for castings for its automobile and tractor plants. The ore-handling plant will include two Hulett unloaders equipped with 12-ton buckets, that will be built by the Wellman-Seaver-Morgan Company, Cleveland, and two 10-ton bridges, to be furnished by the Mead-Morrison Mfg. Company, East Boston, Mass.

All Munitions Work by the Government

Purpose of the Investigation to Be Made by the Special Board Just Appointed by the Secretary of War

WASHINGTON, D. C., Nov. 20, 1916.—The announcement of the Secretary of War on Nov. 17 that a special board had been appointed "to investigate the advisability of complete Government manufacture of munitions" has aroused the liveliest interest here, and further investigation of the matter has developed an extraordinary situation. The board consists of five members as follows: Colonel Kernan, 28th Infantry; Lieutenant Summerall, Field Artillery; Major Fuller; Benedict Crowell of Cleveland, Ohio, and R. G. Rhett of Charleston, S. C. The three army officers are well known experts in ordnance matters, Mr. Crowell is a chemist and metallurgist with considerable experience industrially, while Mr. Rhett has long been prominent in banking and business circles, and is now president of the Chamber of Commerce of the United States.

The special board has been appointed by the Secretary of War in accordance with a provision of the national defense act of June 3, 1916, as follows:

> The Secretary of War is hereby authorized to appoint a board of five citizens, two of whom shall be civilians and three of whom shall be officers of the army, to investigate and report to him the feasibility, desirability and practicability of the Government manufacturing arms, munitions and equipment, showing in said report the comparative prices of the arms, munitions and equipment manufactured in Government plants and those manufactured in private plants, the amount of money necessary to build and operate Government plants for the manufacture of arms, munitions and equipment, showing also what the Government plants and arsenals are now doing in the way of manufacturing arms, munitions and equipment, and what saving has accrued to the Government by reason of its having manufactured a large part of its own arms, munitions and equipment for the last four years. And the Secretary of War is hereby directed to transmit said report to Congress on or before January 1, 1917.

The provision above quoted was incorporated in the national defense act at the instance of a contingent of members of the House of Representatives led by Messrs. Tavenner and Buchanan of Illinois, who have insisted that the Government should manufacture all the war material it may at any time require. The principal argument put forward in support of this policy has been that it would "remove the temptation" from private manufacturers of munitions to foment international discord "in order that they may make money out of war." The real reason behind this movement—at least so far as members of the Tavenner-Buchanan type are concerned—is the desire to make large increases in the forces of workmen employed at the Government arsenals. Organized labor has long favored this policy and can be relied upon, to some extent, to advance the political fortunes of Congressmen who advocate these theories. How fickle the favor of labor leaders is frequently found to be is aptly illustrated by the fact that both Mr. Tavenner and Mr. Buchanan were beaten in the recent Congressional elections.

APPOINTMENTS MADE SUDDENLY

Immediately upon the approval of the national defense act by the President, General Crozier, chief ordnance officer, made a careful study of its provisions to determine the scope of the additional responsibilities placed upon his bureau. Realizing the magnitude of the task intrusted to the proposed board authorized to investigate the big question of the manufacture of munitions, he at once prepared an estimate for an appropriation to cover the expenses of the board which he foresaw would amount to a comparatively large sum. This estimate was transmitted to Congress to be included in one of the deficiency appropriation bills, but Congress rejected the item, thereby leaving the department without funds with which to carry on the inquiry.

Examination of the terms of the provision of law relating to the board suggested that inasmuch as the Secretary of War was merely "authorized" to create such a body the statute was intended to be permissive and not mandatory. This view appears to have operated to postpone action under the statute, but it is understood that the attention of the Secretary of War having recently been drawn to the fact that he is "directed" to transmit the board's report to Congress on or before Jan. 1, 1917, a date but six weeks off, he thereupon decided to appoint the board without further delay.

Inquiry at the War Department elicits the statement that no plans have yet been formulated for the work of the board, and that the Government is without any appropriation from which to defray the cost of one of the most comprehensive and expensive undertakings ever attempted by the Ordnance Bureau. Huge engineering problems involving elaborate cost accounting systems are contemplated in the language of the law, and it goes without saying that it will be physically impossible adequately to perform the task in the allotted time. It seems more than probable that the board will be obliged to treat the whole subject academically and to make a report based upon a very superficial inquiry.

PRIVATE CONTRACTS FAVORED

The attitude of the Ordnance Bureau upon the main points which the board is instructed to investigate can be authoritatively stated. Both General Crozier and former Secretary of War Garrison, in the executive session hearings before the Military and Appropriations committees of the House and Senate at the last session, expressed themselves with great freedom and emphasis on the subject. All the manufacturing departments of the arsenals, they contended, should be developed by the installation of the most up-to-date equipment to capacities equal to the production of a substantial part of the munitions that might be required in any emergency. Having attained this degree of expansibility, however, the Government establishments should be operated only on a scale necessary to keep the equipment in good running order. The requirements of the Government, in addition to the output of the arsenals, should be met, both General Crozier and Secretary Garrison insisted, by placing orders with private concerns, which would thus be encouraged to maintain their plants and especially to study the problems involved in making munitions to United States army standards. Such a policy, the Congressional committees were told, would result in giving the Government a series of well-equipped establishments of its own capable of great expansion in an emergency, supplemented by the facilities of a considerable number of large private establishments fitted up to co-operate with the War Department on an enormous scale and on the shortest possible notice.

PRIVATE CONCERNS A CHECK ON ARSENALS

General Crozier has also furnished the committees of Congress with other cogent reasons for acquiring war material by purchase in the open market or by contract. "The stimulation which our officers receive from competition with private manufacturers," he said, "is very valuable; they are made keener and more alert along the lines of inventiveness, and the Government also profits from the fact that if private firms are encouraged to make munitions they compete among themselves to secure the production of superior articles at the most reasonable prices and the department gets the benefit." General Crozier also gave another reason for advocating the encouragement of private concerns to manufacture war material. "It is very difficult," he said, "in non-competitive manufacture, whether Government or private, to ascertain with any accuracy

whether production is carried on economically or not. It is almost impossible for anybody to say whether the Ordnance Department is manufacturing economically those things which it procures solely by manufacture or whether it is manufacturing extravagantly. I have been Chief of Ordnance for thirteen years, and I have never had an inspection which would be of the slightest utility in disclosing whether or not our manufacturing is carried on economically or extravagantly, except my own inspections which are carried on within the department, and not from the outside."

It is understood that the special board will meet in this city next week and begin its work immediately. The Ordnance Bureau is preparing to co-operate, and it is possible that private manufacturers may be called upon to furnish data. Much interest would attach to detailed statements showing cost of production in the larger well located plants which have had considerable experience in making munitions for the European belligerents. Whether the board will be able to secure such information remains to be seen. W. L. C.

Armor Plate Awards to Bethlehem and Carnegie Companies

The Secretary of the Navy has awarded contracts for the armor for the battleships Colorado, Maryland, Washington and West Virginia to the Bethlehem Steel Company and the Carnegie Steel Company, each receiving one-half the total of approximately 30,000 tons. The price submitted by the Bethelehem Company was $420 per ton for class A-1 armor, $485 for class A-2 and $466 for class B, while the bids of the Carnegie Steel Company were $425, $486 and $460, respectively. The Midvale Steel Company, which submitted bids of $427, $496 and $466, respectively, for the three classes of armor, received no award. All three companies submitted bids for more or less of the 15,000 tons of armor designed for the four battle cruisers, but contracts for this armor will not be awarded until after the bids for the construction of these ships are received on Dec. 6.

In dividing the contract for the battleship armor between the Bethlehem and Carnegie companies, Secretary Daniels could not resist a fling at the armor manufacturers. In an official memorandum he says that "it was when identical figures were submitted by all three armor manufacturers the first time armor bids were opened under this Administration that Secretary Daniels protested against the lack of competition, rejected all bids and finally obtained reductions which have saved the Government $1,110,084. The saving effected on the armor for these four new ships will further increase the savings on armor to about $2,000,000, or, in other words, $2,000,000 more would have been required for the construction of these vessels if the exorbitant demands of the armor manufacturers had been accepted."

Much interest will attach to the awards that are to be made covering the armor for the battle cruisers. The Bethlehem Company submitted a proposal for half the amount required while the Carnegie and Midvale companies each bid on one-fourth the total quantity. The price submitted by the Carnegie Company for the most important class of this armor was $420 per ton, that of the Bethlehem Company $435, and that of the Midvale Company $440. It is estimated that the battleship armor awarded to the Bethlehem and Carnegie companies will keep those two concerns busy for approximately eighteen months; hence the Navy Department will have an important incentive to allot at least a part of the battle cruiser armor to the Midvale Company notwithstanding the higher price submitted.

The Navy Department has transmitted to the House Committee on Naval Affairs an estimate of the appropriations that will be requested at the coming session aggregating $379,151,701, or more than $66,000,000 in excess of the amount appropriated at the last session. The construction program to be approved in the new naval appropriation bill will include 3 battleships, 1 battle cruiser, 3 scout cruisers, 16 destroyers, 4 fleet submarines, 14 coast submarines, 1 submarine tender and 1 destroyer tender. W. L. C.

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Durability of Stainless Steel

The way in which stainless steel has stood the test of use for more than two years has dispelled doubts as to its real and permanent value, says the London *Ironmonger*. The only criticism heard is that the cutting capacity, as in knives, is inferior to that of ordinary steel. Knives which have been in daily use for 16 to 18 months retain a surface as brilliant as when they left the polisher's hands although they have never been rubbed or cleaned by polishes. Prices of stainless cutlery have been advanced 15 or 20 per cent because of the advances in steel. The new steel, a chromium alloy steel, is not only expensive but it is costly to work up. The saving, however, is very considerable.

Preparation for Export Trade with Russia

Methods by Which the Manufacturers of the United States Can Secure a Permanent Footing After the War

BY STERLING H. BUNNELL*

The time is certain to come when the United States must again meet foreign competition for the markets of the world. Whenever the close of the war releases the thousands of men from the battle lines and the other thousands of munition makers at home, the present lines of flow of manufactured goods out of the United States and of gold and securities into the United States will be disturbed by opposing currents. Many far-seeing manufacturers are therefore studying the possibilities of developing an export business which can continue after the close of the war.

Of the trade rivals of America, Germany has been the most conspicuously efficient manufacturing nation, and will resume her place as a formidable competitor for foreign markets. France has always supplied most of her own wants in manufactured goods, but will probably be a heavy purchaser of machinery and metals for some time to come. England will continue to make and ship to all the world, buying raw materials only. One nation, however, will emerge from the struggle with tastes educated and needs developed, and with resources at hand to satisfy them. Russia will be a buyer of goods in enormous quantities, and will, therefore, offer the greatest opportunity of all for developing a profitable and enduring export trade. The chance of selling to Russia will be eagerly taken up by every exporting nation, so that if American manufacturers are to have a share of the business they must prepare in advance to withstand the competition which is sure to come.

GERMANY'S MONOPOLY

Before the war Germany held a practical monopoly of Russian trade. Since commercial relations between the two nations have been broken off it is probable that sentiment will operate to hinder their resumption after peace is declared. Sentiment will operate in favor of the allied nations rather than in favor of the United States, so that American-Russian trade can be developed only by successfully competing for it. This means that the American goods offered must be the best adapted to Russian tastes and desires, cheapest in price at destination, with all freight, insurance, duty and exchange included, and most attractively offered to the buyer so as to command his choice against the offerings of his French and English friends.

The Germans monopolized the Russian trade before the war because they went after it, as they did after everything else they wanted. While an occasional American house worked through an export agent in New York, who took an order now and then by mail, the Germans sent personal representatives into Russia to learn the language, establish themselves as Russian residents the year round, and find and offer anything made anywhere in the world which the Russian buyer might want. The German commercial representatives sold German goods when possible, and when they found opportunities for the sale of goods not made in Germany they saw to it that their own name plates were attached. It was then but a step to obliterating the maker's name on the next consignment, and another step to duplicating the goods in German shops when a profitable trade became certain. Many American-made machines are in use to-day in Russia, but they bear only the names of German manufacturers, so that their advertising value to the original makers is lost. The German trading house, however, was then put in position to secure the repeat orders.

Obviously, sale through middlemen using such methods should be avoided by every manufacturer who wants to develop an enduring trade in a foreign country. The manufacturer should always insist on the preservation of his trade name and trademarks on every article of his production where markings are in any way possible. A sales agency will, of course, develop a reputation of its own, and will derive credit from the sale of desirable or popular articles, but the sales agent should not be allowed to substitute his name for that of the manufacturer.

DIRECT AMERICAN REPRESENTATION

Since the personal representative was successfully employed in establishing the German trade in Russia, it is natural to inquire whether the American manufacturer will not get better results by sending his own salesman to Russia than by working through any intermediary. The answer to the query is found by considering the wide gap between the American factory and the Russian buyer. In domestic trade, the salesman forms a link in a very short chain of distribution. He follows the advertising, and closes the sale, and refers it to the credit department, which must accept or modify the terms. In export trade across the ocean, the chain is very much longer, while the trained salesman is still only one link. The German export representative had the advantage of special education for trade and practical training in the foreign language. Such training is only just beginning to be obtainable in the United States. In trade with Russia, English is of very little use, so that the business must be conducted by Russians. All the advertising and catalog description must be in the Russian language. The articles sold must be adapted to Russian use. The goods must be packed for export and invoiced or manifested in accordance with Russian customs requirements. The details of ocean shipment are not as simple as for railroad shipment, and include engaging suitable ship space from among those available, insurance against marine risks, and clearance through customs at the port of destination. There is also a final transportation by rail, or inland water route, to the purchaser. Payment must be made in rubles, usually on long term of credit, with interest; whereas the American manufacturer must receive dollars, cash against shipping documents. The services of a dozen specialists are needed to complete the chain, while the salesman forms one link only.

American-Russian foreign trade must necessarily be in the hands of banking and commercial houses

*Chief engineer, R. Martens & Co., New York.

adequately organized and financed for the purpose. The success of the houses formerly engaged in the Russian export trade—as has been said, principally Germans—was obtained because they gave complete export service, of which the actual sale was only a very small part. They were organized to sell, purchase, pay for, transport, insure, deliver and collect for the goods, and were in position to extend the service to unlimited lines of manufactured articles. To maintain such complete service is expensive, and can be made profitable only by doing a very large volume of business. On the other hand, the larger the business done the smaller the percentage of expense in handling it, and the wider the scope that may be given to the organization, in local branches, stocks in local warehouses, and advance orders for future requirements.

MORE RUSSIAN THAN AMERICAN

An American-Russian exporting house, in order to be successful, must be more Russian than American. It must have its own shipping departments in both countries; its own banking connections, ready to finance any transaction, no matter how large; its own technical men, of a type broad enough to see both buyers' and makers' sides of every question and work out the proper solution. Its equipment should include the most complete library of manufacturers' catalogs it is possible to get together, and these must be duplicated in every foreign branch. It must have translators and correspondents capable of putting any technicality of Russian or English into the other language and of producing copy for catalogs, advertisements, and business letters, which shall be idiomatically correct. All this obviously requires an organization of many specialists as well as large resources, available to take advantage of any trade possibility whereby the interests of buyer or manufacturer can be promoted.

With such an organization in operation on both sides of the world, the possibilities are unlimited for developing a successful export business. The Russian empire is enormous in area and lacking in railroad facilities. A single agency in New York would not be considered adequate to developing a business throughout the United States; much less can a single office in Moscow or Petrograd be capable of covering the Russian empire. Sales efforts must be extended by river and canal to the many locally important towns not located on railroads. Pictures and films must be used to tell the story to buyers who cannot read, or know nothing of foreign methods. Russian representatives must travel, and make the acquaintance of the local buyers, and prepare the way for the technical men who will select the proper machines for shop work, plan the details of power developments, or estimate the cost of new projects to be undertaken by local capital. The habits and customs of Russians in their undertaking of new work must be understood and conformed to in every particular if the greatest results are to be secured by the organization.

Through the work of such a trading corporation manufacturers can ascertain the patterns, weights and details of articles in use in Russia and the probabilities of successfully introducing improvements or new lines. Careful study should be given to a decision between taking a certain small profit by supplying identical goods and running the chance of getting a greater profit by introducing something different. Much knowledge is necessary in preparing descriptive matter. In this country, most buyers are already familiar with the uses of the articles to be sold, and are interested in details of materials and workmanship, but the Russian may need to be informed minutely regarding the use of the article and will probably care little about the construction if it does the work. Catalogs must usually be rewritten from beginning to end to get the story over effectively. For the same reason new illustrations must be required. Export business is not unlike mail-order business in the character of descriptive matter necessary, and much may be learned by examining the methods used in catalogs of large houses whose sales are made from the printed page only.

THE MANUFACTURER'S CO-OPERATION

It is not to be assumed that the extensive work done by the export trading corporation can provide the manufacturer with a market without active co-operation on his part. Technical salesmen are necessary in most lines, and the skilled sales specialist must be paid out of the profits of the business, whether he is employed by manufacturer or exporting concern. The salesman, however, can do little by himself; he needs the backing of the exporting house to carry the burden of the details which would otherwise absorb all of his time to the exclusion of his proper work. The detail of the division of the selling cost and the selling responsibilities between manufacturer and exporter should be worked out to suit the actual conditions. It will generally be found that the manufacturer should leave the first investigation and first few sales to the trading house, and while the business begins to come in train one or more salesmen to take places in the export organization later and devote their entire time to expanding the business already established in a small but sure way.

The close of the present war is going to be followed by a period of rapid development of Russian resources. The work to be done in that great empire is unbelievably enormous. It remains only to be seen whether manufacturers in the United States are awake to the opportunity to the extent that they will co-operate with the agencies which are being provided for bringing together the manufacturers in America and the purchasers in Russia who need their products.

An Italian Magnesite Deposit

A magnesite deposit of over 1,000,000 tons in Italy is referred to in a report of the government inspector made to the Association of Italian Metallurgical Works. The mine is now being worked by the Livorno Magnesite Company at Castiglioncello. The content of magnesium carbonate ranges from 88.11 per cent to 90.03 per cent, the silica averaging 2.06 per cent to 3.40 per cent and the oxide of iron 1.60 per cent to 2.30 per cent. The lime content is 2.68 per cent to 3.34 per cent. Bricks are being made from this product by a firm at Vado, Italy, which used magnesite from Greece and Styria before the war. This company is reported able to supply Italy's demand for such brick if the raw material is available. Other deposits reported in Italy are under investigation.

Russia's Railroad Needs After the War

Russia after the war will need to build not less than 7000 miles per year of railroads, requiring about 1,600,000 tons of rails and fastenings, or approximately 800,000 tons more than all existing Russian steel works are able to manufacture in a year. This is a conservative estimate based on a paper by I. Korzuhin in the *Commercial and Industrial Gazette*, a Russian journal. A victorious Russia, he states, cannot rest content with 1.2 kilometers of railroad to 100 sq. kilometers of surface, when in western Europe the ratio is 6.7 to 11.8 kilometers to the hundred.

Iron and Steel Markets

LAKE ORE ADVANCE $1.30

Prices for 1917 Established by Sales

Pig-Iron Market Active and Soaring—More Price Advances in Finished Steel

Many of the large reservations of Lake Superior iron ore for shipment in 1917 which have been going on the books of Cleveland ore firms for weeks virtually became contracts on Wednesday of this week on the announcement that some sales had been made at Pittsburgh at an advance of $1.30 a ton over this year's prices. This would put old-range Bessemer ores at $5.75 at lower Lake port, and Mesaba Bessemer at $5.50. The new non-Bessemer ore prices would thus be $5 for old-range and $4.85 for Mesaba.

For some time it has been urged by ore interests that if vessel charters went 50c. above the 1916 rate, the ore advance should be more than $1. In the past week the vessel rate has been established at $1.10, including unloading charge, or $1 net, which is the expected 50c. increase. With their higher labor, fuel and supplies, the ore companies figure an 80c. increase in their cost and consider that an added 50c. a ton would be but a fair share in the prosperity of pig iron and steel interests, making the total $1.30. At the same time some sellers have been disposed to hold for an advance of $1.50, particularly on Bessemer ores.

Bessemer ores have been rapidly taken up for next year, in view of heavy foreign buying of lower phosphorus pig irons, and some producers have little to offer. Estimates of next year's ore movement run from 65,000,000 to 67,000,000 tons. Apart from labor and fuel shortage, which will prevent pig-iron output from rising far above the present rate, there is the fact that Lake Superior stockpiles contributed largely to this year's shipments and that all next year's output must be newly mined.

The pig iron market has had another week of heavy buying and of rapidly mounting prices, foundry irons scoring the largest advances. Buyers are moved, not by an existing scarcity, and there is none of the excited buying for quick delivery that has marked all other rapid upturns. Fear of a scarcity next year is the impelling influence.

Alabama furnaces have sold most of their output for the first half and this week's transactions South as well as North have been chiefly for the second half. Some foundries are buying for that delivery without having their output under contract. Others will not buy in advance of sales of castings.

There has been a wide spread in prices in the week's heavy trading. Southern No. 2 foundry sold at $19 at furnace early last week and to-day the range is $21 to $23, near-by and first half deliveries bringing the highest prices. For Virginia iron prices run from $24 to $26. In eastern Pennsylvania $26 and $27 are named on No. 2 foundry for second half delivery, and Buffalo and Central Western furnaces have advanced to $27 for the second half, with earlier deliveries at $28.

In steel making irons the advance has been less spectacular. In the St. Louis district sales of 50,000 tons of Southern basic to steel foundry interests were made at $20, Birmingham, for delivery in the second half. Basic iron at Valley furnace has gone to $25.50 and $26, and Bessemer iron to $30, which is $1 advance in the week.

The general advance of 10 per cent in wages by the Steel Corporation, effective Dec. 15, was not expected until the first of the year, but it is in line with the drift at all iron and steel operations throughout the country. Some of the independent steel companies have already announced a similar advance effective in December.

No end is in sight to the advances in finished steel products. The world's demand for American steel is assuming larger proportions and is more insistent, and domestic consumers are paying prices that will hold the steel at home. Just now the British inquiry for 118,000 tons of rails for 1917, that of Russia for 33,000 tons of rails and a total of 100,000 tons of ship plates for foreign yards are outstanding items in the foreign demand. As high as $60 a ton has been asked for export rails and on some of the ship plates 6c. was quoted.

Norway has been trying to place four vessels at Pacific coast yards. Lake shipyards are inquiring for 12,000 tons of vessel plates and have been asked 4.50c. for hull plates and 10.40c. for marine steel.

At Pittsburgh the largest producer advanced contract plates this week $5 a ton or to 3.50c., and bars and shapes $4 a ton, or to 2.90c. and 3c. respectively. Bolts and nuts are up 5 to 7½ per cent and rivets $3 a ton.

Billets and sheet bars are now at a minimum of $55 for early shipment. An inquiry for 60,000 tons of sheet bars for an Eastern sheet and tin plate plant is before Central Western mills. Forging billets have sold as high as $78.

At Chicago out of 165,000 tons of rails for which Western roads have asked for 1918 about 50,000 tons has been placed at the $5 advance announced last week.

The Bridge Builders' and Structural Society reports a 77 per cent booking in October, or about 132,000 tons, the best month since May. The building trade is evidently getting used to the higher altitudes in prices.

Pittsburgh

PITTSBURGH, PA., Nov. 22, 1916.

Leading Lake Superior ore producers have named prices for the 1917 season, making a straight advance of $1.30 per ton on all grades. Their price on old range Bessemer ore for 1917 is $5.75; Mesaba Bessemer, $5.50; old range non-Bessemer, $5; Mesaba non-Bessemer, $4.85, per gross ton at lower Lake docks. The price for charters for 1917, as fixed by recent transactions, is $1.10 per gross ton, this including 10c. for unloading at lower Lake docks. The price of hauling coal up the Lakes for next season has been established in the same way at 60c. per net ton. These advances in ore mean a much higher cost of making pig iron. Most furnaces probably have enough ore to run up to June or July, so that the increased cost of making pig iron will not be effective until then. There is apparently no end to the advances in prices. During the week Bessemer pig iron

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton.	Nov. 22, 1916.	Nov. 15, 1916	Oct. 25, 1916.	Nov. 24, 1915.
No. 2 N. Philadelphia	**$25.50**	[illegible]	$21.00	$17.75
No. 2, Valley furnace	**26.00**	[illegible]	21.00	16.00
No. 2 Southern, Cin'ti	**23.90**	[illegible]	18.90	16.40
No. 2, Birmingham, Ala	**21.00**	[illegible]	16.00	13.00
No. 2, furnace, Chicago*	**27.05**	26.00	22.00	17.50
Basic, del'd, eastern Pa.	**26.00**	[illegible]	21.50	17.50
Basic, Valley furnace	**25.50**	[illegible]	20.00	16.00
Bessemer, Pittsburgh	**30.95**	[illegible]	24.90	17.95
Malleable Bess., Ch'go*	**27.00**	26.00	21.50	17.50
Gray forge, Pittsburgh	**26.95**	[illegible]	20.90	16.40
L. S. charcoal, Chicago	**26.75**	[illegible]	20.25	17.25
Rails, Billets, etc., Per Gross Ton				
Bess. rails, heavy, at mill	38.00	38.00	33.00	28.00
O.-h. rails, heavy, at mill	40.00	40.00	35.00	30.00
Bess. billets, Pittsburgh	52.50	[illegible]	[illegible]	28.00
O.-h. billets, Pittsburgh	52.50	52.50	50.00	29.00
O.-h. sheet bars, P'gh	52.50	[illegible]	50.00	29.00
Forging billets, base, P'gh	**78.00**	76.50	73.00	50.00
O.-h. billets, Phila	55.00	[illegible]	50.00	33.00
Wire rods, Pittsburgh	65.00	65.00	55.00	38.00
Finished Iron and Steel, Per Lb. to Large Buyers.	Cents.	Cents.	Cents.	Cents.
Iron bars, Philadelphia	2.60	2.650	2.150	1.850
Iron bars, Pittsburgh	**2.90**	2.85	2.35	1.65
Iron bars, Chicago	2.60	2.60	2.35	1.60
Steel bars, Pittsburgh	**2.90**	2.85	2.35	1.70
Steel bars, New York	**3.069**	2.919	2.919	1.869
Tank plates, Pittsburgh	1.90	1.90	1.90	1.90
Tank plates, New York	4.119	4.119	4.169	2.169
Beams, etc., Pittsburgh	**3.00**	2.80	2.35	1.70
Beams, etc., New York	**3.019**	2.969	2.869	1.869
Skelp, grooved steel, P'gh	**2.85**	2.70	2.30	1.70
Skelp, sheared steel, P'gh	**3.00**	2.80	2.60	1.80
Steel hoops, Pittsburgh	**3.25**	3.10	3.00	1.75

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire.	Nov. 22, 1916.	Nov. 15, 1916.	Oct. 25, 1916.	Nov. 24, 1915.
Per 100 lb. to Large Buyers	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh	3.65	3.65	3.40	2.90
Sheets, gal., No. 28, P'gh	[illegible]	[illegible]	4.75	4.25
Wire nails, Pittsburgh	2.85	[illegible]	[illegible]	1.90
Cut nails, Pittsburgh	[illegible]	[illegible]	[illegible]	1.85
Fence wire, base, P'gh	[illegible]	[illegible]	2.65	1.75
Barb wire, galv., P'gh	3.70	3.70	3.55	2.75
Old Material, Per Gross Ton				
Iron rails, Chicago	[illegible]	[illegible]	$22.00	$16.00
Iron rails, Philadelphia	**21.00**	[illegible]	[illegible]	[illegible]
Carwheels, Chicago	**18.00**	[illegible]	[illegible]	14.50
Carwheels, Philadelphia	**19.00**	[illegible]	[illegible]	14.00
Heavy steel scrap, P'gh	[illegible]	[illegible]	[illegible]	[illegible]
Heavy steel scrap, Phila	**21.00**	[illegible]	[illegible]	14.75
Heavy steel scrap, Ch'go	**21.00**	20.50	17.75	15.00
No. 1 cast, Pittsburgh	[illegible]	[illegible]	[illegible]	14.00
No. 1 cast, Philadelphia	**19.00**	[illegible]	[illegible]	14.00
No. 1 cast, Chgo. (net ton)	**16.00**	[illegible]	[illegible]	13.00
No. 1 RR. wrot, Phila.	**24.50**	[illegible]	[illegible]	17.00
No. 1 RR. wrot, Chgo. (net)	**22.00**	[illegible]	18.00	14.00
Coke, Connellsville, Per Net Ton at Ov.				
Furnace coke, prompt	[illegible]	[illegible]	[illegible]	$2.10
Furnace coke, future	3.75	3.75	[illegible]	[illegible]
Foundry coke, prompt	7.00	7.00	[illegible]	[illegible]
Foundry coke, future	[illegible]	[illegible]	4.50	3.00
Metals, Per Lb. to Large Buyers.	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	**34.00**	32.50	[illegible]	[illegible]
Electrolytic copper, N. Y.	**34.00**	[illegible]	[illegible]	[illegible]
Spelter, St. Louis	**12.25**	[illegible]	10.00	18.75
Spelter, New York	**12.50**	[illegible]	[illegible]	19.00
Lead, St. Louis	**7.00**	6.90	[illegible]	[illegible]
Lead, New York	**7.15**	7.00	[illegible]	5.25
Tin, New York	**45.12½**	44.12½	[illegible]	[illegible]
Antimony (Asiatic), N. Y.	**14.00**	[illegible]	[illegible]	39.50
Tin plate, 100-lb. box, P'gh	[illegible]	[illegible]	[illegible]	$3.40

went up $1 a ton, to $30 at Valley furnace; basic, 50c. a ton, to $25.50 at furnace; No. 2 foundry, $1, or to $26 at furnace. The Carnegie Steel Company advanced its price on plates $5 per ton and on steel shapes and steel bars $4 per ton, but is practically out of the market for 1917 delivery. Much higher prices are likely on wire rods, and several negotiations are on for rods for foreign delivery, which are expected to bring $75 at maker's mill. Nuts and bolts were advanced late last week about $5 per ton and rivets $3 per ton. The only decline in the market was on prompt coke, which went off about $1 per ton, with sales of high-grade furnace coke for spot shipment as low as $6.50 to $7 per net ton at oven. Tin plate promises to be at least $1 to $2 per base box higher for second half delivery, one leading maker predicting that the price will not be less than $8 per base box. New car orders are plentiful, and two of the leading steel car companies are reported to be well sold up to the latter part of next year.

Pig Iron.—Inquiries are in this market for 60,000 tons or more of Bessemer for shipment to Italy and France, mostly for Italy. As high as $34, seaboard, has been offered. As the freight rate from Pittsburgh and the Valley districts is $2.42, the iron would net Valley furnaces $31.58. It is not likely, however, that any of this iron will come from the Valley furnaces, as they are all oversold on both Bessemer and basic. Since Wednesday and Thursday of last week, there have been sales of 20,000 tons or more of Bessemer to domestic consumers at $30, Valley furnace, and most sellers now quote $30.50 and $31. One sale of 600 tons to a Sharon consumer is reported at $31 at maker's furnace. New inquiry for basic iron is heavy, and late last week several sales were made at $25.50, Valley furnace, while the chances are that before next week several sales now pending will be closed at $26 or higher. Inquiries are in the market for 60,000 to 70,000 tons of basic, one leading consumer wanting 30,000 to 40,000 tons. There is a fairly heavy demand for foundry iron, nearly all for delivery in first quarter and first half of 1917, and prices are strong. Some sales of No. 2 have been made at $26, Valley furnace, and several makers are now trying to get $27. We quote: Standard Bessemer iron, $30; basic, $25.50; malleable Bessemer, $28; No. 2 foundry, $26 to $27, and gray forge $26, all at Valley furnace, the freight rate for delivery in the Pittsburgh and Cleveland districts being 95c. per ton.

Ferroalloys.—The new inquiry for ferromanganese for first quarter and first half delivery is more active, and some quite large sales have been closed. One leading consumer has bought 600 tons of domestic ferromanganese, 100 tons a month, for delivery through the first half, at about $160 per gross ton at furnace. A sale of 200 tons of English 80 per cent for the same delivery is reported at $162, seaboard. We quote 80 per cent English at $162 to $164, seaboard, and 80 per cent domestic at $160 to $162 at furnace, freight added to point of delivery. We quote 18 to 22 per cent spiegeleisen at $50 to $55, and 25 to 30 per cent at $65 to $75, delivered. We quote 50 per cent ferrosilicon for delivery next year in lots up to 100 tons at $100; 100 tons to 600 tons, $99, and over 600 tons, $98, all per gross ton, f.o.b. Pittsburgh. We quote 9 per cent at $32; 10 per cent, $33; 11 per cent, $34; 12 per cent, $35; 13 per cent, $36.50; 14 per cent, $38.50; 15 per cent, $40.50, and 16 per cent, $43. We quote 7 per cent silvery at $26.50; 8 per cent, $27; 9 per cent, $27.50; 10 per cent, $28; 11 per cent, $29, and 12 per cent, $30. These prices are f.o.b. furnace, Jackson or New Straitsville, Ohio, and Ashland, Ky., all of which have a freight rate of $2 per gross ton to the Pittsburgh district.

Billets and Sheet Bars.—The assurance is stronger that it would be impossible to buy any soft Bessemer or open-hearth billets or sheet bars for reasonably early shipment at less than $55 per ton, f.o.b. maker's mill. In fact, small sales of both billets and sheet bars are reported to have been made as high as $57. The Bethlehem Steel Company is reported to be inquiring in this market for 60,000 tons of sheet bars for delivery to its Baltimore Sheet & Tin Plate Company, but it is doubtful whether any such quantity can be secured in this district as the obligations of local mills are so heavy. Sales of 300 to 400 tons of forging billets were made the past week at $78, Pittsburgh. We quote base sizes and base carbons of Bessemer and open-hearth billets and sheet bars at $52.50 to $57.50 at maker's mill, Pittsburgh or Youngs-

town. We quote forging billets at $78 for sizes up to, but not including, 10 x 10 in., and for carbons up to 0.25.

Plates.—Good orders for cars were placed the past week, and the new inquiry is very heavy. The Burlington ordered 1000 steel gondolas from the Pressed Steel Car Company, and 2000 box cars from the Haskell & Barker Car Company. The Erie has placed 1000 steel underframe, steel superstructure box cars with the American Car & Foundry Company. Inquiries include 1000 steel hoppers for the Delaware, Lackawanna & Western; 2000 steel gondolas for the Illinois Central; 2000 box cars for the Chicago, Rock Island & Pacific; 1000 stock cars for the Missouri, Kansas & Texas; 500 refrigerator cars, 1000 box cars, 500 automobile cars and 500 stock cars for the Great Northern, 1000 box cars and 500 automobile cars for the Northern Pacific, and 500 steel hoppers for the Nickel Plate. On Monday, Nov. 20, the Carnegie Steel Company advanced its price on sheared tank plates to 3.50c., or $5 per ton, but with no promise whatever as to deliveries; in fact, that company is practically sold out on plates of all kinds for all of 1917. Other mills are now quoting for delivery in second and third quarters from 4c. to 4.50c. at mill. For delivery in first quarter, prices range from 5c. at mill to as high as 5.50c. Last week a leading mill took an order for 6000 tons of sheared tank plates for shipment to Japan, 1000 tons per month, January to June, at 4c. at mill. We therefore quote sheared tank plates at 3.50c., with no promise of delivery; 4c. to 4.50c. for second to third quarters, and from 5c. to 5.50c. for delivery over the next three or four months, all these prices being f.o.b. at mill, Pittsburgh.

Structural Material.—Effective Monday, Nov. 20, the Carnegie Steel Company advanced its price on structural shapes from 2.80c. to 3c. at mill, or $4 per ton, but with no promise of delivery. The Jones & Laughlin Steel Company is quoting 3c. and up to 3.25c. for such deliveries as it can make, which would be in second or third quarters of next year. The American Bridge Company has taken 750 tons of steel shapes for extensions to the building of the Saxon Motor Car Company, 750 tons for an extension to the heating plant of the Detroit-Edison Company, Detroit, Mich., and 1000 tons for extensions to hot mill buildings at the Shenango works of the American Sheet & Tin Plate Company, New Castle, Pa. The McClintic-Marshall Company has taken 1000 tons for an addition to the plant of the Joseph Dixon Crucible Company, Jersey City, N. J. The railroads are buying structural steel quite freely for bridges and other work. The Pennsylvania Railroad placed 2500 to 3000 tons last week, divided among three independent shops. We now quote beams and channels up to 15-in. at 3c. at mill, with no promise of delivery, and from 3c. to 3.25c. for second and third quarter shipment in 1917. Prices from warehouse are higher, and we quote small lots from stock from 3.50c. to 3.75c., Pittsburgh.

Steel Rails.—As yet, local makers do not report any sales of standard sections at the new prices named Nov. 15. Nearly all railroads have covered their entire needs of rails for 1917 delivery. The new demand for light rails is quite active from the coal-mining interests, but from the traction companies and the lumber interests is quiet. Prices on light rails have not been advanced, but are firm. Some of the makers of frogs and switches have not covered on their needs of rails of next year, and will likely have to look to the railroads that place orders with them for frogs and switches for at least a part of their supply of rails. We quote 25 to 45 lb. sections at $47; 16 and 20 lb., $48; 12 and 14 lb., $49; and 8 and 10 lb., $50, in carload lots, f.o.b. at mill, the usual extras being charged for less than carload lots. We quote standard section rails of Bessemer stock at $38, and of open-hearth $40, per gross ton, Pittsburgh.

Sheets.—The very heavy demand for all grades of sheets that has been a feature of the market for the past month or more continues, and a decided shortage in the supply of blue annealed, Bessemer black, and galvanized sheets already exists. In fact, several mills have about adopted the plan of allotting their output, and are restricting sales by their agents to the amount set aside for them. The shortage in sheet bars is keeping down the output to some extent, but the great trouble is to get cars and to get them moved after they have been loaded. Shipments are badly delayed on this account, and there have been cases where loaded cars that ordinarily should reach destination in two or three days have been from ten days to three weeks on the road. The shortage in supply of galvanized sheets is greater than in the other grades, and prices seem certain to be higher. Minimum prices now ruling on sheets in carloads and larger lots are as follows: Blue annealed sheets, Nos. 3 to 8, 3.50c. to 3.60c.; box annealed, one-pass, cold-rolled sheets, No. 28, 3.65c. to 3.75c.; No. 28 galvanized, 5.25c. to 5.50c., and No. 28 tin-mill black plate, 3.60c. to 3.65c., all f.o.b. Pittsburgh.

Tin Plate—Nearly all consumers have covered their needs for the first half of 1917, and some have bought practically their entire requirements for the second half, on which the price is left open. It is stated that some contracts taken for delivery in the first half will probably run over into July or August next year, several mills having sold probably more than they can turn out in the first half. The export demand is heavy, and it is said as high as $7.50 per base box can be obtained by mills that are in position to quote and make the deliveries wanted. Two or three mills that recently increased their capacity to a large extent are about the only ones that are in position to take on any export business. Prices on current small orders have gone up, and primes and wasters from stock are being quoted from $6.50 to $7 per base box at mill. We quote bright plate, 14 x 20, at $6 to $6.25 per base box, f.o.b. Pittsburgh, on contract for delivery in the first half of 1917, and small lots of primes and wasters from stock at $6.50 to $7 per base box at mill.

Shafting.—Better deliveries of shafting are being made by several mills that have caught up on back orders to some extent. Nearly all large consumers are covered for the first quarter and some for the first half. On small current orders from 5 to 10 per cent off list is being quoted. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots and 10 per cent off in less than carload lots for first quarter and first half of 1917, f.o.b. Pittsburgh, freight added to point of delivery.

Wire Products.—For some time the American Steel & Wire Company has not been accepting contracts on either nails or wire, confining sales to specified orders, and another leading interest is now taking contracts only for one month. Several of the larger wire and wire nail makers have called their men off the road, quoting only to regular customers, and requiring sales offices to submit inquiries to the home office before any obligations are made. The domestic demand continues heavy and the export demand is also quite active. Several leading mills are quoting $3 on wire nails for delivery in the first half of 1917, but to regular customers only. The market on wire nails is fast getting to the $3 basis, and it is believed that not later than Dec. 1 regular prices will be on that basis. Prices now in effect are as follows: Wire nails $2.85, base, per keg; galvanized, 1 in. and longer, including large head barbed roofing nails, taking an advance over this price of $2, and shorter than 1 in., $2.50. Bright basic wire is $2.90 per 100 lb.; annealed fence wire, Nos. 6 to 9, $2.80; galvanized wire, $3.50; galvanized barb wire and fence staples, $3.70; painted barb wire, $3; polished fence staples, $3; cement-coated nails, $2.75, base, these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing are 55 per cent off list for carload lots, 54 per cent for 1000-rod lots and 53 per cent for small lots, f.o.b. Pittsburgh.

Railroad Spikes and Track Bolts.—The new demand for spikes is more active. Some makers are declining to sell at 2.65c., stating that the price is too low in view of the fact that steel bars are 2.90c., minimum, and it costs more to make spikes. One maker is quoting 2.75c., but as yet there has been no general advance. Prices on track bolts are firm and likely to be higher.

We quote track bolts with square nuts at 4.50c. to 4.75c. to railroads and 5c. to 5.25c. in small lots to jobbers, base. Track bolts with hexagon nuts take the usual advance of 15c. per 100 lb. Prices on spikes are as follows:

Standard railroad spikes, 4½ x 9/16 in. and larger, $2.65 to $2.75; railroad spikes, ½ to 7/16 in., $2.75 base; railroad spikes, ⅜ in. and 5/16 in., $3.00 base; boat spikes, $2.80 base, all per 100 lb., f.o.b. Pittsburgh.

Wire Rods.—Practically any price can be obtained that the mills care to ask if they can make the deliveries. A foreign inquiry is in this market, and it is not improbable that the business will be placed in a day or two on the basis of $75 per ton at mill for soft rods. The demand from Canada is heavy, and regular shipments are being made to that country. Domestic consumers that have not covered for the first quarter and first half of next year may have to pay prohibitive prices where their product enters into competition with mills that make their own rods. We quote soft Bessemer, open-hearth and chain rods at $65 to $70 per gross ton, f.o.b. Pittsburgh, and the higher price could likely be obtained if any mill has rods to spare for the shipments wanted.

Iron and Steel Bars.—Effective Monday, Nov. 20, the Carnegie Steel Company raised its price on steel bars from 2.70c. to 2.90c. at mill, an advance of $4 per ton. None of the other makers of steel bars is quoting less than 2.90c., and some are quoting 3c. to 3.25c., prices depending on quantities and deliveries. The Carnegie Company is practically sold up on steel bars for all of 1917, and other makers that can promise deliveries in the second and third quarters are not quoting, as a rule, less than 3c. The new demand for steel bars for reinforcing purposes is heavy, and prices are higher. Mills rolling iron bars also report the demand heavy, and prices are up fully $1 per ton. We quote merchant steel bars at 2.90c. at mill, with no promise as to delivery, and from 3c. to 3.25c. for delivery in the second and third quarters of 1917. We quote refined iron bars at 2.90c. to 3c., and railroad test bars 3c. to 3.10c., f.o.b. Pittsburgh.

Hoops and Bands.—The nominal price of the Carnegie Steel Company on steel bands is now 2.90c., with extras as per the steel-bar card, and on hoops 3.25c., but with no promises as to delivery. Other makers that can ship in the second or third quarters of 1917 are quoting steel bands from 3c. to 3.25c. and steel hoops 3.25c. to 3.50c. at mill.

Nuts and Bolts.—Late last week an advance of 5 per cent, or about $5 per ton, was made in prices of nuts and bolts. The steadily advancing prices of steel bars, the scarcity of labor, which is greatly reducing output, and the abnormal demand are the main reasons given for the advance. Makers state that they are getting further behind in deliveries, as it is impossible to keep their working forces up to the standard. The export demand is heavy, but not much attention is being given to this, as makers prefer to conserve their output for domestic consumers. The new discounts are as follows, delivered in lots of 300 lb. or more where the actual freight rate does not exceed 20c. per 100 lb.; terms 30 days net or 1 per cent for cash in 10 days:

Carriage bolts, small, rolled thread, 50 per cent; small, cut thread, 40 and 7½ per cent; large, 35 per cent.

Machine bolts, h. p. nuts, small, rolled thread, 50 and 5 per cent; small, cut thread, 40, 10 and 5 per cent; large, 40 per cent.

Machine bolts, c. p. c. and t. nuts, small, 40 and 5 per cent; large, 30 and 5 per cent. Bolt ends, h. p. nuts, 40 per cent; with c. p. nuts, 30 and 5 per cent. Lag screws (cone or gimlet point), 50 per cent.

Nuts, h. p. sq. and hex., blank, $2.60 off list, and tapped, $2.40 off; nuts, c. p. c. and t. sq., blank, $2.20 off, and tapped $2 off; hex., blank, $2.50 off, and tapped, $2.25 off. Semi-finished hex. nuts, 60 per cent. Finished and case-hardened nuts, 60 per cent.

Rivets, 7/16 in. in diameter and smaller, 45 and 10 per cent.

Rivets.—Due to the same conditions as those in the bolt and nut trade, an advance of $3 per ton has been made in rivets. It is said that many who formerly worked in rivet shops have gone into other lines in which much higher wages are being paid. The consuming trade is well covered through the first quarter, and, in some cases, over the first half, and specifications are heavy. Makers' prices are now as follows: Buttonhead structural rivets, ½ in. in diameter and larger, $4.15 per 100 lb., base, and conehead boiler rivets, same sizes, $4.25 per 100 lb., base, f.o.b. Pittsburgh. Terms are 30 days net or one-half of 1 per cent for cash in 10 days.

Cold-Rolled Strip Steel.—Nearly all consumers have covered their needs through the first quarter of 1917, but none of the makers is quoting for delivery beyond that period. The high prices ruling have apparently not had the effect of cutting down consumption to any extent, as the contracts placed for the first quarter are fully as large as were placed at this time a year ago. On current orders for fairly prompt shipment makers quote $7 for fair-sized quantities up to $7.50 per 100 lb. for small lots; on contracts for first quarter delivery, $6.50 to $7. Terms are 30 days net, less 2 per cent off for cash in 10 days, delivered in quantities of 300 lb. or more when specified for at one time.

Merchant Steel.—Prices are up fully 10 per cent, and some makers will not sell for delivery beyond the first quarter, owing to the uncertainty of future costs of pig iron and labor. In a few cases, to the very largest consumers, some contracts have been placed for delivery through the entire first half of next year. We quote small lots as follows, f.o.b. mill, Pittsburgh: Iron finished tire, ½ x 1½ in. and larger, 2.90c. base; under ½ x 1½ in., 3c. base. Planished tire, 3c. to 3.05c. Smooth channel tire, ¾ to ⅞ and 1 in., 3.10c. to 3.25c.; 1⅛ in. and larger, 3.25c. Toe calk, 3.40c. to 3.60c. base. Flat sleigh shoe, 2.90c. to 3c.; concave and convex, 3c. to 3.10c. Cutter shoes, tapered or bent, 3.75c. to 4c., depending on specification. Spring steel, 4.15c. to 4.25c. Machinery steel, smooth finish, 3.25c. to 3.40c.

Wrought Pipe.—The advanced prices are not only firmly held, but more advances are looked for before the first of the year. On lap-weld, iron and steel, mills are sold up practically to July 1, 1917, but on butt-weld they can make deliveries in four to six weeks. Several of the larger pipe mills have now entered more orders for tubular products twice over than they took in all of last year. An inquiry is in the market for 20 to 25 miles of 8-in. line pipe for delivery to a West Virginia gas company. It is not likely, however, that many large contracts for line pipe will be placed for a while, as the mills cannot make deliveries before March or April. Discounts now effective on black and galvanized iron and steel pipe are given on another page.

Boiler Tubes.—Local mills making iron and steel boiler tubes are completely sold up for eight or ten months into 1917, and state that consumers are specifying freely against contracts. Premiums are offered over regular prices for early deliveries on either iron or steel tubes. Another advance in prices is looked for before the first of the year. Discounts now in effect are given on another page.

Coke.—Last week there was a decline of $1 a ton or more in the price of furnace coke for prompt shipment, sales having been made as low as $6.50 per net ton at oven, and probably lower. Producers and dealers both say the supply of cars is not any better, and labor is still scarce, but the demand for spot coke fell off, and this probably explains the decline. One leading producer claims to have refused $4 for 10,000 tons of blast-furnace coke per month for the first half and is said to be quoting $4.50, but the market has not reached that price. Some furnace men who have not covered their coke needs for the first half are not willing to contract at present prices, feeling that the market may be lower. Higher prices are being paid for best makes of foundry coke, both for spot shipment and on contracts. We quote high grade blast-furnace coke for prompt shipment at $6.50 to $7 per net ton at oven, and on contracts from $3.75 to $4; best grades of 72-hr. foundry coke for spot shipment, $7.50 to $8, and on contracts $5 to $6. The Connellsville *Courier* gives the output of coke in the upper and lower Connellsville regions for the week ended Nov. 11 as 421,513 net tons, an increase over the previous week of 13,231 tons.

Old Material.—The local market is firm, with all signs pointing to higher prices, but the volume of sales

by dealers to consumers is not heavy. Dealers that have scrap piled in their yards are inclined to hold it for a higher market, one with an exceptionally heavy stock of old rails having decided not to sell any until after Jan. 1, in the belief that prices will then be several dollars a ton higher. There is a fairly heavy demand for low phosphorus melting scrap and for borings and turnings. A sale of 3000 tons of selected heavy steel scrap for delivery in the first four months of 1917 is reported at $21, delivered to consumers' mills; also a sale of 1000 tons of borings at $8.50 and 1000 tons of low phosphorus melting stock at $25, delivered at buyers' mills. Bids which have gone in on the Pennsylvania and Baltimore & Ohio scrap lists are said to be about $3 a ton higher on most grades of steel scrap than were bid on the previous lists. Prices now being quoted by dealers for delivery in Pittsburgh and points that take the same rates of freight, per gross ton, are as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	$21.00 to $22.00
No. 1 foundry cast	17.00 to 17.50
Relolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	24.00 to 25.00
Hydraulic compressed sheet scrap	16.00 to 17.00
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	13.50 to 14.00
Bundled sheet stamping scrap	13.00 to 13.50
No. 1 railroad malleable stock	17.00 to 18.00
Railroad grate bars	12.00 to 13.00
Low phosphorus melting stock	24.00 to 25.00
Iron car axles	42.00 to 43.00
Steel car axles	42.00 to 43.00
Locomotive axles, steel	44.00 to 45.00
No. 1 busheling scrap	16.00 to 16.50
Machine-shop turnings	8.00 to 9.00
Old carwheels	16.00 to 17.00
Cast-iron borings	10.00 to 10.50
*Sheet bar crop ends	21.50 to 22.00
No. 1 railroad wrought scrap	21.00 to 22.00
Heavy steel axle turnings	13.00 to 13.50
Heavy breakable cast scrap	15.00 to 15.50

*Shipping point.

Chicago

CHICAGO, ILL., Nov. 22, 1916.—(*By Wire.*)

Western railroads are being given the opportunity to cover for 1918 rails at the new prices of $38 and $40, and approximately 165,000 tons is under negotiation, with sales last week amounting to about 50,000 tons. Orders for car steel comprised the bulk of the week's business, which for one interest alone totaled over 135,000 tons. An advance of $2 per ton has been made on shapes, plates and bars and minimum sheet prices are higher by $5 to $8 per ton. Some of the independent interests are now regularly quoting 4c., Pittsburgh, for tank plates for first half. Bolt prices have been raised 5 per cent and rivets $3 per ton. Out of stock, prices for black and galvanized sheets have been again raised, to a minimum of 4.15c. for black and 5.80c. for galvanized. Prices of pig iron and scrap continue their rapid upward movement, with some limitation of business as a result of high prices and scarcity of materials. At Chicago an award of 18,000 tons of cast-iron pipe has been made.

Pig Iron.—The chief concern of buyers in the past week has had to do with the question of last half iron. Negotiations were inaugurated with the offering of a standard Southern iron at $19 for last half, $1 per ton less than the first half price. The furnaces have taken a round tonnage at that price, probably over 50,000 tons, and the price has now been advanced to $20 for the entire year. This activity has been almost entirely confined to Southern iron, though involving the competitive Northern high-phosphorus iron to some extent. The Northern furnaces are not considering last half sales of standard foundry and malleable irons, in view of the uncertainty regarding the proportion of capacity that will be employed in the manufacture of steel-making irons. There is still inquiry in the market for Bessemer iron in quantity. The furnace situation in the South is also being determined in considerable measure by the number of stacks that have been put on basic and Bessemer iron. For Southern foundry, the price is now definitely at $20, Birmingham, for sale in Northern markets, and Northern competitive iron is selling at 50c. to $1 per ton higher. For other Northern iron $27 is being quoted. Charcoal-iron prices have been advanced to a minimum of $26, and producers are requiring that all inquiry be submitted. The amount of iron of all kinds under negotiation is considerable, and buyers desiring to close find themselves under the necessity of moving quickly. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of $1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5	$26.75 to $27.75
Lake Superior charcoal, No. 1	27.25 to 28.25
Lake Superior charcoal, No. 6 and Scotch	27.75 to 28.75
Northern coke foundry, No. 1	27.50
Northern coke foundry, No. 2	27.00
Northern coke foundry, No. 3	26.50
Northern high phosphorus foundry	25.00 to 25.50
Southern coke No. 1 foundry and 1 soft	24.50 to 25.00
Southern coke, No. 2 foundry and 2 soft	24.00 to 24.50
Malleable Bessemer	27.00
Basic	27.00
Low phosphorus	40.00
Silvery, 8 per cent	35.50 to 36.00
Bessemer ferrosilicon, 10 per cent	40.50 to 42.50

(*By Mail*)

Rails and Track Supplies.—With the announcement of the advance in the prices of rails to $38 for Bessemer and $40 for open hearth, opportunity has been given the Western railroads to cover their needs for 1918. Of about 165,000 tons under negotiation, approximately 50,000 tons were booked last week at the new price, and the situation suggests that buying by other railroads will follow rapidly. Light rail sales have been exceptionally heavy, and prices for these sections have been advanced $4 per ton. Spike and bolt prices are also higher. Quotations are as follows: Standard railroad spikes, 2.75c. to 2.90c., base; track bolts with square nuts, 4c. to 4.50c., base, all in carload lots, Chicago; tie-plates, $52 to $54, f.o.b. mill, net ton; standard section Bessemer rails, Chicago, $38, base; open hearth, $40; light rails, 25 to 45 lb., $44; 16 to 20 lb., $45; 12 lb., $46; 8 lb., $47; angle bars, 2.25c.

Structural Material.—Steel for carbuilding purposes again constituted the bulk of the week's buying, but unless earlier deliveries can be had than are generally understood to be possible, the cars now being ordered will not contribute any relief to the shortage before next summer is well advanced. Better conditions obtain, however, in the matter of deliveries with respect to structural steel than is true of some other products. An advance of $2 per ton has been announced for shapes, and 2.90c., Pittsburgh, is now the minimum quotation. The Haskell & Barker Car Company took the large orders for cars last week, embracing 500 refrigerator and 500 stock for the Great Northern and 1000 box for the Chicago, Burlington & Quincy. Building contracts reported closed last week involved no large steel requirements. The principal lettings of the week include 2300 tons taken by the American Bridge Company, of which 1200 tons is for a Northern Pacific ore dock, 300 tons for the Great Northern, 200 tons for the Minneapolis & St. Louis, 200 tons for the Illinois Steel Company and 400 tons for the American Can Company. Wendnagel & Co. took a 400-ton building and the Gage Structural Steel Company a 150-ton job. We quote plain structural material, Chicago, from mill, 3.089c.

We quote for Chicago delivery of structural steel from jobbers' stocks 3.35c.

Plates.—The leading interest has advanced its price for plates $2 per ton to the basis of 3.35c., Pittsburgh, but for current orders, where near-by delivery is desired, quotations continue to range from 3.75c. for narow plates to 5c. for wide. The larger part of last week's business in plates was made up of car steel, there having been some falling off in the inquiry for ship plates. Orders from tank and boiler shops are generally small and for early delivery. We quote for Chicago delivery of plates from mill at its convenience, 3.539c. For prompt shipment we quote 3.939c. to 4.189c.

in widths up to 72 in., and for wide plates 4.689c to 5c.

We quote for Chicago delivery of plates from jobbers' stocks 4c.

Sheets.—The mills that have sheets to sell are asking from 4c. to 4.25c., Pittsburgh, for No. 28 black, and for blue annealed from 3.50c. to 3.75c. Galvanized sheets are quoted at various prices between 5c. and 6c., f.o.b., Pittsburgh Sheet makers report that the amount of inquiry they are under necessity of declining to consider is amazing. Few mills have anything to offer for the first quarter, and only a part of the demand for second quarter seems possible of being considered. We quote, for Chicago delivery, blue annealed, No. 16 and heavier, 3.689c. to 3.939c.; box annealed, No. 17 and lighter, 4.189c. to 4.439c.; No. 28 galvanized, 5.689c. to 6c.

Store prices for sheets, we quote for Chicago delivery out of stock, minimum prices apply on lots of 2c or more, as follows: No 10 blue annealed, 3.89c; No 28 black, 4c to 4.10c; No 28, galvanized, 5.60c to 5.80c.

Bars.—Aside from the announcement of the advance of $2 in the price of mild steel bars there is little of interest transpiring in respect to bars. The makers of rail carbon steel and of iron bars are more than comfortably situated, and their conservatism in the consideration of additional business is augmented by the uncertainty surrounding the cost and availability of scrap and fuel. We quote mill shipment, Chicago, as follows: Bar iron, 2.65c.; soft steel bars, 2.989c.; hard steel bars, 2.60c.; shafting, in carloads, 20 per cent off; less than carloads, 15 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 3.50c; bar iron 3.50c; reinforcing bars 3.35c base with 5c extra for twisting in sizes ½ in and over and usual card extras for smaller sizes; shafting net list

Rivets and Bolts.—An advance of 5 per cent in the prices of bolts and nuts, announced at the end of last week, was coincident with the placing of specifications for many millions of bolts against contracts at the previously ruling prices. Some of the irregularities in prices appear also to have been cleared up and with the increasing scarcity and cost of bars, rods, fuel and labor, concessions are considered by the trade as much less likely to recur. We quote as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 50; cut thread, 40-7½; larger sizes, 35; machine bolts up to ⅜ x 4 in., rolled thread, with hot pressed square nuts, 50-5; cut thread, 40-10-5; large size, 40; gimlet-point coach screws, 50; hot pressed nuts, square, $2.60 off per 100 lb.; hexagon, $2.60 off. Structural rivets, ¾ to 1¼ in., 4.15c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

Store prices are as follows: Structural rivets 4.25c; boiler rivets, 4.35c; machine bolts up to ⅜ x 4 in., 50; larger sizes, 40-5; carriage bolts up to ⅜ x 6 in., 40-10; larger sizes, 35-5; hot pressed nuts, square, $3 and hexagon, $3 off per 100 lb.; lag screws, 50-5.

Cast-Iron Pipe.—The advance in pipe prices of $3 per ton announced last week was followed two days later by another of $2 per ton and we have revised our quotations accordingly. At Chicago an award of 15,000 tons has been made to the leading interest at $35 per ton and of 3300 tons to the American Cast Iron Pipe Company at a slightly lower figure. The United States Cast Iron Pipe & Foundry Company will also furnish 1500 tons for Duluth. St. Paul is in the market for 1250 tons and Bay City, Mich., for 550 tons. We quote as follows, per net ton, Chicago: Water pipe, 4 in., $40.50; 6 in. and larger, $37.50, with $1 extra for Class A water pipe and gas pipe.

Wire Products.—Although the demand for wire nails and plain and barb wire seems to have abated but little, the reason for which is indicated in very complete reports recently received showing stocks in the hands of both jobbers and retailers as much below normal, the withdrawal of sales forces from the field has brought a noticeable decrease in fence sales. We quote as follows per 100 lb.: Plain wire, Nos. 6 to 9, base, $3.089; wire nails, $3.039; painted barb wire, $3.189; galvanized barb wire, $3.889; polished staples, $3.189; galvanized staples, $3.889; all Chicago.

Old Material.—The advances in the prices of scrap in the last week were hardly as radical as those of the week preceding, although still abnormal. But the quantity of old material coming into the market for sale continues so limited that each small lot of a few cars brings its own price. Of the several small lists of railroad scrap offered last week none exceeded 600 tons. Dealers are finding themselves unable to do business in many instances because of the disproportionate amount of money involved in the handling of scrap and because of the rapid changes in prices. Buyers of old material are for the most part taking all that is offered but are still using up their stocks more rapidly than they can be replenished. The uncertainty of the scrap supply is seriously affecting the question of new material sales in a number of lines. Foundry grades and old carwheels have advanced least rapidly, and some attention is being given to their use as substitutes for other materials. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Old iron rails	$ to $
Relaying rails	to
Old carwheels	to
Old steel rails, rerolling	to
Old steel rails, less than 3 ft	to
Heavy melting steel scrap	to
Frogs, switches and guards, cut apart	21.50 to 22.00
Shoveling steel	to
Steel axle turnings	to

Per Net Ton	
Iron angles and splice bars	to
Iron arch bars and transoms	to
Steel angle bars	to
Iron car axles	to
Steel car axles	to
No 1 railroad wrought	to
No 2 railroad wrought	to
Cut forge	to
Pipes and flues	to
No 1 busheling	to
No 2 busheling	to
Steel knuckles and couplers	to
Steel springs	to
No 1 boilers, cut to sheets and rings	to
Boiler punchings	19.50 to 20.00
Locomotive tires, smooth	to
Machine-shop turnings	to
Cast borings	to
No 1 cast scrap	to
Stove plate and light cast scrap	to
Grate bars	to
Brake shoes	to
Railroad malleable	16.50 to 17.00
Agricultural malleable	14.50 to 15.00

Philadelphia

PHILADELPHIA, PA., Nov. 21, 1916.

An interesting event of the past week was the purchase by a Coatesville plate mill of about 20,000 tons of Southern basic pig iron for which it paid $20, furnace, or $25.25, delivered, which is 75c. less than the furnace price asked by Northern producers. The latter quote $26, furnace. Standard low phosphorus is fast approaching the $50 level, makers now asking $47 to $49, delivered, according to analysis. The demand for material low in phosphorus is enormous, and presents a serious situation in view of its restricted production. The demand for plates is greater than ever, and turning business away is a common occurrence. Blue annealed sheets have been advanced. The structural mills in this territory have not contracted heavily into the second quarter of 1917, but they see that a large tonnage specified for the first quarter will extend into the second. Some of the railroads, as well as shipbuilders, are making efforts to reserve rolling capacity for 1918, the former for rails and the latter for plates. The domestic makers of ferromanganese are holding their product more firmly, concessions on prompt deliveries having practically disappeared. Blast-furnace ferrosilicon is becoming scarce. The old material market is active all along the line, and several thousand tons of heavy melting steel has been taken at $21, delivered.

Pig Iron.—In point of tonnage the greatest activity has been in basic, about 30,000 tons of which was taken by two consumers. A Coatesville plate mill closed for about 20,000 tons of Southern basic, first half delivery, at $20, furnace, or $25.25, delivered. At least two eastern Pennsylvania mills quoted $26, furnace. A central Pennsylvania consumer took 10,000 tons, second quarter delivery, at $26, furnace, about equal to $27.25 delivered. In view of their sold-up condition, the unsuccessful Northern bidders are expressing but little

regret over the loss of the business through the deal in Southern basic. Of equal interest is the continued activity in low phosphorus iron and the manner in which it is approaching the $50 mark. One furnace disposed of 12,000 to 15,000 tons for varied deliveries throughout next year at prices ranging from $45.75 to $46.75, delivered, and the makers are now asking $47 to $49, according to analysis. Lebanon low phosphorus is quoted about $2 less. The supply of low phosphorus available for any delivery is almost entirely absorbed, and the situation is regarded as grave by those interested. Important makers of foundry iron are not attempting to maintain any schedule of prices, and in view of the wide range involved in recent transactions it is difficult to place the market. For a couple of 100-ton lots of eastern Pennsylvania No. 2 X, $27, furnace, or $27.79, delivered, was paid. For other lots $26, furnace, was paid. One brand is held at $26.50, furnace, equal to $28.40 delivered. The coke problem continues serious, and is having a direct effect on prices. Foundry iron has been fairly active, almost entirely for future delivery, indicating that founders look for a big year in 1917. Several round lots of gray forge have been taken, and inquiry is still unsatisfied. Quotations for this grade range from $24 to $25. A local pipe works contracted for a round lot of iron. The leading Virginia maker withdrew from the market when quoting $24, furnace, or $26.75, delivered, and while sales are reported at $25 to $26, furnace, $24 would seem to bear about the correct relation to the quotations for eastern Pennsylvania iron. Southern iron would sell here were it possible to obtain deliveries. Quotations for standard brands delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa. No. 2 X foundry	$25.50 to $26.50
Eastern Pa. No. 2 plain	25.00 to 26.00
Virginia No. 2 X foundry	26.75
Virginia No. 2 plain	26.50
Gray forge	24.00 to 25.00
Basic	26.00 to 27.00
Standard low phosphorus	47.00 to 49.00

Iron Ore.—Imports in the week ended Nov. 18 consisted of 4295 tons from Spain and 6900 tons from Chile.

Ferroalloys.—Foreign 80 per cent ferromanganese is unchanged at $164, first half delivery. Domestic makers have been doing some prompt business under this figure, but their quotations are now stronger at $165, delivered. The quotation on forward 50 per cent ferrosilicon is pretty well established at $100, Pittsburgh, for carloads, and $1 less for 100-ton lots. Small lots for nearby delivery command from $110 to $115, Pittsburgh. A sale of 500 tons of 10 to 11 per cent ferrosilicon, last half delivery, was made at $36, furnace, or $39.44, delivered, but for prompt up to $44.44, delivered, is quoted. Blast-furnace ferrosilicon is unquestionably scarce. Spiegeleisen is quoted at $50, furnace, and is strong.

Plates.—Several hundred tons of tank steel have been purchased at 5c., Pittsburgh, or 5.159c., Philadelphia, for delivery in six months. For flange steel, eight weeks' shipment, 6.15c., Eastern mill, has been paid. An order for 10,000 tons of ship plates, delivery in the last quarter of 1917, at 4.50c., Pittsburgh, was declined, likewise 1300 tons to be shipped in the first quarter of 1917, for which 5c., Pittsburgh, was offered. The minimum quotation in this territory is 4.159c., Philadelphia, with a leading maker quoting 4.909c., Philadelphia, as his bottom price. On marine boiler steel, 10.40c., Pittsburgh, is quoted. The heavy demand for ship plates is without abatement, some of the shipbuilders trying to reserve capacity as far ahead as 1918. Quotations range from 5.159c. to 5.659c., Philadelphia.

Bars.—Makers in this territory quote 3.159c., Philadelphia, as their minimum for steel bars. The market is active. Iron bars are stronger and an advance from 2.659c., Philadelphia, carload lots, is predicted. There is a heavy export inquiry for iron bars.

Billets.—With deliveries in the next few months more difficult than ever to procure, open-hearth rerolling billets are strong at $55, with forging steel at $65 to $75.

Structural Material.—An eastern Pennsylvania mill continues to quote 3c., Pittsburgh, for Eastern shipment, and 3c., mill, for Western shipment, this level being its minimum. Another maker is almost out of the market for first half material, but names 3c., Pittsburgh, when it quotes. All of the mills find their bookings for the first quarter will run heavily into the second. In exceptional cases only have they sought second quarter business. Meanwhile inquiry continues heavy, although no important building propositions are mentioned.

Sheets.—No. 10 blue annealed are higher at 3.909c., Philadelphia.

Rails.—For odd lots of steel rails, ranging up to 250 tons, $50, mill, has been paid, a steel mill which rolls rails being a buyer at that price. Even at this price it is pointed out that steel is much more valuable for other purposes. Several of the railroads are feeling round, in the endeavor to reserve rolling capacity for 1918. It is considered very probable that some of the roads will not receive the 1917 deliveries for which they bargained. The Southern Railway is about to close for 200,000 patent rail joints. The Norfolk & Western and the Chesapeake & Ohio are in the market for spikes.

Coke.—High prices for coke continue to rule, with consumers who are not getting good deliveries on their contracts seeking new sources of supply. For spot furnace $7 per net ton at oven has been paid, and $7.50 to $8 is quoted. Contract furnace is nominal at $3.75 to $4. Prompt foundry is held at $9 to $10 per net ton at oven, and contract at $6 to $7. Freight rates from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Old Material.—The market is strong and active, consumers and not brokers doing the buying. An Eastern mill took about 15,000 tons of heavy melting steel at $21, delivered. Coatesville is again under embargo. An exporter has offered $25 for steel to be shipped to Italy. Low phosphorus scrap is none too plentiful and is correspondingly strong. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$21.00 to $21.50
Old steel rails, rerolling	24.00 to 25.00
Low phos. heavy melting steel scrap	28.00 to 30.00
Old steel axles (for export)	40.00
Old iron axles (for export)	40.00
Old iron rails	24.00 to 25.00
Old carwheels	19.00 to 20.00
No. 1 railroad wrought	24.50 to 25.00
Wrought-iron pipe	17.50 to 18.00
No. 1 forge fire	14.50 to 15.00
Bundled sheets	14.50 to 15.00
No. 2 busheling	11.00 to 11.50
Machine-shop turnings	10.50 to 11.00
Cast borings	12.00 to 12.50
No. 1 cast	19.00 to 19.50
Grate bars railroad	14.50 to 15.00
Stove plate	15.00 to 15.50
Railroad malleable	16.50 to 17.00

Cincinnati

CINCINNATI, OHIO, Nov. 22, 1916.—(*By Wire.*)

Pig Iron.—Southern iron for spot shipment has been sold in past years at higher prices than now prevail, but quotations for forward delivery have perhaps never been so high. Last week a large tonnage was contracted for at $19, Birmingham basis, for shipment in the last half of next year. To-day's prices are set at a minimum of $21, and some No. 2 foundry has been sold as high as $22.50 for that delivery, while the asking price of one sales agency is $23. Only a small tonnage of Southern iron is available for shipment this year, and a still smaller quantity is offered for movement in the first half of 1917. As far as Northern iron is concerned, $26, Ironton, is the lowest obtainable figure, and only business for the last half of 1917 is wanted at this price. The furnaces in the Hanging Rock district are sold up to July 1 and have only a few straggling lots of off-grade iron to sell for prompt delivery. Both Northern and Southern basic contracts reported as closed for the last half of next year run up to nearly 70,000 tons. About 50,000 tons of this goes to melters in St. Louis territory. Other lots were taken by nearby consumers. Another sale of approximately 12,000 tons was made to an Ohio user. Most of this iron will come from the South. Southern iron contracts for the last half of next year are too numerous to mention, some

noteworthy ones being 2500 tons to a southern Ohio melter, 1000 tons to a central Indiana consumer, and 1500 tons to a central Ohio foundry. The inquiry has slackened, except from melters who need some iron to carry them through the first half of next year and who prefer to let their regular merchants provide them with their requirements rather than send out general inquiries. Only a limited business is reported in the silvery irons lately, but more interest is taken in malleable. The Ohio silvery irons are quoted to-day at $31 to $32 at furnace, based on 8 per cent analysis, and 10 per cent Bessemer ferrosilicon ranges from $38 to $40 at furnace. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 fdry and 1 soft	$24.40 to $25.40
Southern coke, No. 2 fdry and 2 soft	23.90 to 24.40
Southern coke, No. 3 foundry	23.40 to 24.40
Southern coke, No. 4 foundry	22.90 to 23.90
Southern gray forge	22.40 to 23.40
Ohio silvery, 8 per cent silicon	32.26 to 33.26
Southern Ohio coke, No. 1	27.76
Southern Ohio coke, No. 2	27.26
Southern Ohio coke, No. 3	26.76
Southern Ohio malleable Bessemer	27.26
Basic Northern	27.26
Lake Superior charcoal	26.20 to 27.20
Standard Southern carwheel	26.90 to 27.40

(*By Mail*)

Coke.—For either prompt shipment furnace or foundry coke no exact prices can be quoted. Some rush lots of furnace coke have been sold as high as $8 and a little foundry coke has gone at $10 per net ton at oven. It is understood that last half business would be taken by some of the producers in the Connellsville district around $5 for 48-hr. coke and from $5.50 to $6.50 for 72-hr. The shortage of cars makes it difficult for the producers to take care of old customers for any shipment within the next two months, and this class of business is not solicited. In the Wise County and Pocahontas fields, foundry contract prices range all the way from $6 to $8 per net ton at oven. New River producers appear to be out of the market for the time being.

Finished Material.—The nearby mills have advanced No. 28 galvanized sheets to 6.15c. and No. 28 black to 4.40c., f.o.b. Cincinnati or Newport, Ky. The local store stocks of galvanized sheets are so limited that they do not influence the situation either way. Both the mills and jobbers are now only anxious to take care of their old customers. Warehouse prices on other commodities have not changed. We quote, from stock, wire nails, $3.15 per keg, base; barb wire, $4.10 per 100 lb.; plates, 4.10c.; steel bars, 3.45c.; twisted steel bars, 3.60c.; rounds and hexagons, 2-in. and over, 4c.; small structural shapes, 3.35c. The nominal quotation on cold-rolled shafting is 10 per cent plus list, but higher than this has been obtained where prompt shipment could be made.

Old Material.—The market is characterized as wild. Prices have been advanced on several classes of scrap within the past week over $2 per ton. The rolling mills and foundries are contracting heavily, as, even with the advances noted, there is a saving in using scrap in place of pig iron at the present cost of the latter. The following are dealers' prices, f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton	
Bundled sheet scrap	$13.25 to $13.75
Old iron rails	22.00 to 22.50
Relaying rails, 50 lb. and up	26.50 to 27.00
Rerolling steel rails	21.25 to 21.75
Heavy melting steel scrap	19.00 to 19.50
Steel rails for melting	19.00 to 19.50

Per Net Ton	
No. 1 railroad wrought	$19.25 to $19.75
Cast borings	6.00 to 6.50
Steel turnings	6.00 to 6.50
Railroad cast	15.00 to 15.50
No. 1 machinery cast	16.75 to 17.25
Burnt scrap	10.00 to 10.50
Iron axles	31.75 to 32.25
Locomotive tires (smooth inside)	25.00 to 25.50
Pipes and flues	13.00 to 13.50
Malleable cast	14.00 to 14.50
Railroad tank and sheet	11.50 to 12.00

The Iroquois Iron Company, Chicago, will equip two more of its blast furnaces with Brassert gas-washing and drying equipment, the order having been placed with Heinrich J. Freyn, Peoples Gas Building, Chicago.

Birmingham

BIRMINGHAM, ALA., Nov. 21, 1916.

Pig Iron.—The week closing Nov. 18 was featured by sales of second half iron by one large interest at $19, but by the middle of the week asked $20. The leading maker sold a fair tonnage, both of spot and first half, on the $20 basis, but declined to open its books for the second half. The Alabama Company booked 7000 to 8000 tons for second half at $21 and placed an equal tonnage of high silicon Clifton iron for the same delivery at $24. The premium on this metal is usually $2 per ton. On Monday of this week the largest foundry-iron interest, which had sold freely into the second half at $19 and then $20, advanced for that delivery to $21 and was quoting spot at $23. One consumer was asking for 10,000 tons for second half delivery and offering $23. Some spot sales at $24 were reported. The leading interest was asking around $23 for all deliveries. Probably 90 per cent of first half capacity has been entered on furnace order books and possibly 200,000 for second half delivery has been booked. The tone of the market is a little more conservative; not that the iron men could not get still more for the metal—but they are more careful as to forward bookings, the financial cream of the trade getting the best showing. Belated consumers in the North and Middle West, as well as the South, are hammering the market to get in. Shipments continue heavy. October car movements in Alabama totaled 87,156, an increase over September of 5000 and of 7000 cars over October, 1915. The output will be increased by one Tennessee and one Republic stack in the near future. Gossip of consolidations of Southern steel and iron interests, in which mention is made of the Sloss-Sheffield and the Gulf States, are without apparent foundation. Seekers after basic metal have made further offers to Southern furnacemen, but they cannot take on more basic under the circumstances. We quote for second half of 1917 and spot, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	$21.50 to $23.50
No. 2 foundry and soft	21.00 to 23.00
No. 3 foundry	20.50 to 22.50
No. 4 foundry	20.25 to 22.25
Gray forge	20.00 to 22.00
Basic	21.00 to 23.00
Charcoal	25.00

Cast-Iron Pipe.—Southern pipe makers were slow to make the advances warranted by the rise in the price of pig iron, but they finally did so, the advance of $1 marked up the week previous being raised by one of $3 to $5 more. Just prior to the advances sufficient business came in to justify the continuance of the present scope of operations, but it is more and more apprehended that high prices will curtail the output. The leading pipe company announced a scale of $35 and $32 for 4-in. and 6-in. and upward, respectively, while another large maker still quotes $30 and $27 respectively. We quote, per gross ton, f.o.b. pipe shop yards, as follows: 4-in., $34; 6-in. and upward, $31, with $1 added for gas pipe and special lengths.

Coal and Coke.—Steam coal averages around $2.50 to $3 per ton, and in some instances steam as well as domestic coal brings as much as $4.50 and $5. The railroads have been extremely watchful of cars. As a result, contract coal purchasers have been protected as to deliveries over rush and high-priced spot orders. Coke rules a little higher all the time, the low-priced contracts now being out of the way. The lowest contract coke, even to preferred customers, is around $4.25 to $4.50 per net ton at oven, with spot and new contract business ruling at $4.50 to $5 for standard beehive, and furnace coke at $3.50 to $4, according to circumstances. The Woodward Iron Company has let a contract to the Otto Coking Company, New York, for 60 by-product ovens of the Wilputte type.

Old Material.—All lines of scrap are active. Wrought has practically disappeared from the local yards, owing to renewal of operations at certain plants. Prices are firm at the advances of the previous week and, in instances, higher figures are secured. There is no exception in the demand. Southern mills secure most of the

material owing to propinquity to yards and activity of operations. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old steel axles	$26.00 to $30.00
Old steel rails	13.00 to 13.50
No. 1 wrought	16.00 to 17.00
Heavy melting steel	12.50 to 13.00
No. 1 machinery cast	12.00 to 12.50
Carwheels	11.50 to 12.00
Tram carwheels	11.00 to 11.50
Stove plate and light cast	10.00 to 10.50

Cleveland

CLEVELAND, OHIO, Nov. 21, 1916.

Iron Ore.—The vessel rate for carrying ore from ports at the head of Lake Superior to lower Lake ports has been fixed at $1 a ton net for 1917, an advance of 50c. over this season's contract rate, which was 50c. a ton net, or 60c. including the unloading charge. The $1 rate has prevailed for wild charters during the greater part of this season, and it has been expected for some time that it would be established as the rate for the coming season. The Escanaba rate has not been fixed. Shippers are holding out for the 80c. rate from this port. Chartering is not active, the large bulk of the vessel tonnage having been tied up before the rates were fixed. The new $1 rate, equivalent to $1.10 gross, is the highest that has prevailed since 1909, when the contract rate was $1.25 gross. However, the wild rate for the year was only 84½c. Reports from Pittsburgh indicate that ore sales have been closed at an advance of $1.30 on this year's prices, and while some ore companies have been disposed to ask $1.50 more than this season's prices, it is considered that the market for 1917 ore is practically established on the following basis: Old range Bessemer, $5.75; Mesaba Bessemer, $5.50; old range non-Bessemer, $5; Mesaba non-Bessemer, $4.85.

Because of the cold weather during the past few days, and the frozen condition of the ore, shipments from upper Lake ports were practically at a standstill for a week, and a large number of boats are now at the upper Lake ports, and will be delayed some time in getting cargoes. Due to this delay, some of the shippers will be unable to bring down all their contract ore unless weather conditions are very favorable.

Pig Iron.—The market continues fairly active in spite of the advance in prices. Sales of a considerable tonnage of foundry and malleable iron for first and last half of next year were made during the week at $25 by northern Ohio furnaces and following an advance in prices some foundry-iron sales were booked at $26. The Cleveland price has been advanced to $27 for No. 2 foundry and one Cleveland interest is now asking $28. Sales of foundry iron are reported at $27 for first half and malleable iron at the same price for this year's delivery. Southern pig iron is fairly active, with the tendency still upward. A number of sales are reported at $20, Birmingham, for No. 2 for last half and one interest that was selling at this price in this territory last week has advanced to $22. Southern iron for delivery before July appears scarce, and for prompt shipment and first half deliveries $22 and higher are being asked. We quote, delivered Cleveland, as follows:

Bessemer	$[illegible]
Basic	[illegible]
Northern No. 2 foundry	[illegible]
Southern No. 2 foundry	$24.00 to [illegible]
Gray forge	[illegible]
Jackson County silvery, 8 per cent silicon	31.00
Standard low phos., Valley furnace	43.00 to 44.00

Coke.—There is some demand for prompt shipment foundry coke, which is quoted at $9.25 to $10 per net ton at oven for standard Connellsville makes. Producers generally are declining to quote for first half. One foundry has covered for its requirements for the entire year of 1917 at $7.50.

Finished Iron and Steel.—The demand for steel for early shipment continues heavy, and one mill that has been taking orders for fairly early delivery is now unable to make shipments of steel bars within two to four months and on structural material within four to six months. Some of the local fabricating shops have placed contracts for first quarter at 3c., Pittsburgh, for bars and structural material and 4c. for plates. The Carnegie Steel Company has advanced its prices to 2.90c. for bars, 3c. for structural material and 3.50c. for plates and has made an advance of $4 a ton on light rails. Plates continue in heavy demand and are quoted by local mills at 4c., Pittsburgh, for light gages and 4.50c. for heavy plates. An Eastern mill is quoting universal plates at 3.75c. to 4c. and sheared plates at 4.75c. to 5c. An inquiry is pending for about 12,000 tons of steel for boats to be built by the Lake shipyards. On this inquiry 4.50c. has been quoted for the hull plates and 10.40c. for the marine boiler plates, U. S. specifications. One Eastern mill has withdrawn from the forging billet market in this territory, having nothing to sell for the first half. Prices on hard steel bars for reinforcing purposes have stiffened up to 2.65c. and 2.75c., at mill. Local bar-iron mills have withdrawn from the market, being unwilling to pay the present prices for scrap. The sheet situation is growing worse. There is a heavy volume of inquiry and some mills that are not entirely sold up are unwilling to book additional orders, their withdrawal from the market being particularly due to their inability to secure deliveries on sheet bars and the unsatisfactory situation resulting from the coal and car shortage. Sales from the Cleveland warehouse of a Valley mill are being made at 4.60c. to 4.75c. for black sheets and 6c. for galvanized. We quote mill prices at 4.25c. to 4.50c., Ohio mill, for No. 28 black; 3.75c. for No. 10 blue annealed and 5.50c. to 6c. for No. 28 galvanized. The Brier Hill Steel Company will begin operation Jan. 1 of the plant of the Western Reserve Steel Company, Warren, Ohio, which it purchased last week and will specialize in this plant on finished sheets for automobile and metal furniture trade. Warehouse prices are: Steel bars, under 2 in., 3.50c.; over 2 in., 4c.; plates, 4.10c.; structural material, 3.60c.; iron bars, 3.45c.

Bolts, Nuts and Rivets.—Bolt and nut prices have been advanced from 5 to 7½ per cent and rivet prices $5 per ton. The demand for bolts and nuts is heavy. Contracts for the first quarter are now being taken from the jobbers. Rivets are now being quoted at 4.25c., Pittsburgh, for structural and 4.35c. for boiler rivets for delivery through the first half. In new bolt and nut prices a differential has been provided between blank and tapped nuts, which have been commanding the same prices. Bolt and nut discounts are as follows:

Common carriage bolts, ⅜ x 6 in., smaller or shorter, rolled thread, 50; cut thread, 40 and 7½; larger or longer, [illegible] Machine bolts with h.p. nuts, ⅜ x 4, smaller or shorter, rolled thread, 50 and 5; cut thread, 40, 10 and 5; larger or longer, [illegible] Lag bolts, gimlet or cone point, 50. Square and hexagon h.p. nuts, blank, $2.60 off the list; tapped, $2.40 off. C.p.c. and t. hexagon nuts, all sizes, blank, $2.50 off; tapped, [illegible] off. Cold pressed semi-finished hexagon nuts, 60 off.

Old Material.—Further advances in prices of from 50c. to $1 and more a ton have been made on most grades. The market is very firm and dealers expect still higher prices. There is considerable activity, mills taking about everything offered. Dealers claim the supply is scarce. It is stated that the New York Central Lines have decided to place no more scrap on the market for the present and that some of the other railroads are holding back on their scrap. However, the Baltimore & Ohio has a list out for 15,000 tons or more. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton

Steel rails	$19.50 to $20.00
[illegible]	22.00
Steel rails under 3 ft	23.00 to 23.25
Iron rails	24.00 to 25.00
[illegible]	40.00 to 42.00
Heavy melting steel scrap	20.50 to 21.00
Carwheels	15.50 to 16.00
[illegible]	25.00
[illegible]	15.50 to 16.00
[illegible]	19.50 to 20.00
[illegible]	12.50 to 13.00
Light bundled sheet scrap	12.25 to 12.75

Per Net Ton

Iron car axles	$36.00 to $37.00
Cast borings	8.50 to 9.00
Iron and steel turnings and drillings	8.00 to 8.50
No. 1 busheling	17.00 to 17.50
No. 1 railroad wrought	21.00 to 21.50
No. 1 cast	17.00 to 17.50
Railroad grate bars	13.25 to 13.50
Stove plate	13.25 to 13.50

St. Louis

ST. LOUIS, MO., Nov. 20, 1916.

Pig Iron.—The larger foundrymen have covered for the first half at least. Business offered for the second half of 1917 is being handled gingerly by the furnaces. There is a considerable inquiry for low-phosphorus iron, wanted for making ingot molds. Important transactions include one of 1000 tons of Bessemer ferrosilicon at $36. Between 800 and 1000 tons of ferromanganese, price withheld, was bought by one of the largest open-hearth steel-casting concerns. Of No. 2 Southern foundry iron possibly 8000 tons was bought. Inquiries outstanding include 1000 tons of basic Northern and 400 tons of No. 2 Southern foundry. Other tonnages are known to be in negotiation.

Finished Iron and Steel.—The prices here, although they are nominal in view of the present inability to deliver, are: Shapes, 2.90c.; bars, 2.80c.; plates, 3.35c., Pittsburgh base. The advance in steel rails of $5 per ton has increased the interest in standard section material, bringing nearly all of the railroads in this territory into the market with tentative inquiries but without specific tonnage or delivery mentioned. Movement out of warehouse continues free; for stock out of warehouse we now quote as follows: Soft steel bars, 3.40c.; iron bars, 3.30c. to 3.35c.; structural material, 3.40c.; tank plate, 4.05c.; No. 10 blue annealed sheets, 3.85c.; No. 28 black sheets, cold-rolled, one pass, 4.50c.; No. 28 galvanized sheets, black sheet gage, 6.20c.; this last quotation having been sharply influenced by the advance in zinc ore and spelter.

Old Materials.—The scrap market is sharply higher as a result of a big demand, much of which comes from dealers who have contracts to fill and are without the materials to deliver. The largest consumer in this market is also an active buyer, and all of the plants in this vicinity are using scrap rapidly. The conditions point to still higher prices in the opinion of the best informed, particularly on steel scrap. There has been some particularly sharp inquiry for rerolling rails and also for the heavy melting steel scrap, which has prompted disproportionately higher prices on these than on some of the other items in the list. Relaying rails are very badly wanted, with no supply available, and this applies both to standard section and light materials. The lists out during the week were one of 600 tons from the Chicago, St. Paul, Minneapolis & Omaha and 500 tons from the Vandalia. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton

Old iron rails	$[illegible] to $[illegible]
Old steel rails, rerolling	24.50 to [illegible]
Old steel rails, less than 3 ft.	24.50 to 25.00
Relaying rails, standard section, subject to inspection	[illegible] to [illegible]
Old carwheels	17.00 to 17.50
No. 1 railroad heavy melting steel scrap	21.50 to 22.00
Heavy shoveling steel	17.00 to 17.50
Ordinary shoveling steel	16.50 to 17.00
Frogs, switches and guards cut apart	21.00 to 22.00
Bundled sheet scrap	11.50 to 12.00

Per Net Ton

Iron angle bars	$22.50 to $[illegible]
Steel angle bars	20.00 to 20.50
Iron car axles	34.50 to 35.00
Steel car axles	35.50 to 36.00
Wrought arch bars and transoms	26.00 to 26.50
No. 1 railroad wrought	21.50 to 22.00
No. 2 railroad wrought	20.00 to 20.50
Railroad springs	21.00 to 21.50
Steel couplers and knuckles	22.50 to 23.00
Locomotive tires, 42 in. and over, smooth inside	25.50 to 26.00
No. 1 railroad forge	18.50 to 19.00
Cast-iron borings	9.50 to 10.00
No. 1 bushelling	17.75 to 18.25
No. 1 boilers, cut to sheets and rings	14.00 to 14.50
No. 1 railroad cast scrap	14.75 to 15.25
Stove plate and light cast scrap	10.50 to 11.00
Railroad malleable	15.00 to 15.50
Agricultural malleable	13.00 to 13.50
Pipes and flues	15.50 to 16.00
Heavy railroad sheet and tank scrap	14.00 to 14.50
Railroad grate bars	12.00 to 12.50
Machine shop turnings	10.00 to 10.50

Coke.—An excited condition prevails. Melters, unable to get deliveries on contracts, buy for prompt shipment. Sales have been made of 72-hr. best selected Connellsville foundry at $8.50 per net ton, with 48-hr. coke for furnace use at $8. There is no willingness to make contracts at the present time. All sales have been in small quantities, but one inquiry is for 15,000 tons of furnace coke for smelter use. By-product coke, so far as it is available for delivery, is being held on a parity with Connellsville product.

New York

NEW YORK, Nov. 22, 1916.

Pig Iron.—There has been an active market on the basis of the higher prices established in the past week. Southern iron was sold in good-sized lots in the Hudson River valley and in New England on the basis of $19 to $19.50 at furnace for No. 2 foundry in the first half of last week. For delivery in the second half of 1917 sales of Alabama iron have been made at $20 to $21, Birmingham, this week, and for early delivery at $21 to $22. For warrants $20, Birmingham, has been bid and transactions have ranged from $21 to $23. The amount of warrant iron has been reduced considerably in the past month. Speculative holders are not inclined to sell freely, holding for still higher figures. The International Steam Pump Company was in the market recently for the second half of 1917, asking for a total of 25,175 tons. It is understood the purchases were not made within the time for which bids were asked, and new quotations were taken on which awards were to be made this week. A large soil pipe interest is in the market for 5000 to 10,000 tons for second half of 1917 and may buy an additional 5000 to 10,000 for first half. Considerable buying of malleable iron for New England for all of next year is expected, as some buyers have yet to cover a relatively large portion of their needs for 1917. Virginia furnaces have been alternatively selling and withdrawing from the market, and the range of quotations in that district now is $24 to $26 at furnace for No. 2 X iron. The quotations of Pennsylvania furnaces for next year run from $26 to $27 for No. 2 X. One Pennsylvania furnace has made a sale of 10,000 tons of foundry iron for export in the next two or three months. As high as $28 has been paid for export foundry iron. Buffalo producers ask $27 to $28 at furnace for No. 2 X, and as high as $30 has been quoted in that district. Quite a price range appears in all transactions from the various districts in the past week, but the scale of buying has been larger than was expected and sellers predict still higher prices. The perplexity of buyers is greatest in respect to second half requirements. Some of them are disposed to cover for only part of their iron for that period, and some have not covered at all. The New Haven embargo was removed Nov. 18 and New England foundries are again taking measures to maintain the former size of their stocks. Japan is about closing for 4000 tons of low-phosphorus pig iron. Export low phosphorus has sold at $45 to $46. We quote at tidewater for early delivery: No. 1 foundry, $28 to $28.50; No. 2 X, $27 to $28; No. 2 plain, $27 to $27.50; Southern iron at tidewater, $27.50 to $28 for No. 1 and $27 to $27.50 for No. 2 foundry and No. 2 soft.

Ferroalloys.—Sales of domestic ferromanganese in the past week have reached considerable proportions, probably 5000 tons, and it is understood that $164 to $165, delivered, was generally obtained as against sales at $160 not long ago. In some cases the delivery extends well into 1917. Inquiries for about 2000 tons are before the market and the demand is rather more active than for some time. The British alloy is quoted at $164, seaboard, and a few sales have been made at this price. One interest at least would shade this quotation for delivery late in 1917. Arrivals continue at the pace recently maintained, over 7900 tons having been imported in October. Spiegeleisen, 20 per cent, is firmer and $50 to $55, furnace, is now asked, as against $47 to $50 a week ago. Bessemer ferrosilicon is in strong demand, the 10 to 12 per cent grade commanding $35 to $40 per ton, furnace. Contracts for 1917 are being made for 50 per cent ferrosilicon at $100 per ton delivered for carload lots and less and $99 per ton for larger quantities. There are only two prices instead of three formerly. Domestic producers are sold well into 1917. Inquiry for nearby delivery is

very active with little material available. There are also numerous inquiries from foreign countries, such as Italy and Great Britain. One foreign consumer desires 300 tons of 50 per cent ferrosilicon, 200 tons of 75 per cent and 30 tons of 90 per cent ferrosilicon. Considerable business has been done.

Structural Material.—The 27,000 tons of 6, 7 and 8-in. beams for France appear to have all been closed, and apparently the business was done at about 3.40c., Pittsburgh basis. The leading event is an advance by the United States Steel Corporation to 3c., Pittsburgh, and the best price for the most attractive lot for building work is now minimum at 2.85c., Pittsburgh. Bridge building of large portions for railroads, forecasted weeks ago in this column, seem imminent, following recent pretty generous buying for this kind of structures. Several thousand tons for the Lehigh Valley may be mentioned. A considerable volume of additions to buildings is constantly moving, though large building projects are hardly conspicuous in number. The report of the Bridge Builders' and Structural Society, noted elsewhere, is a close indication of the surprising total made up of numerous unadvertised jobs. It is understood that the McClintic-Marshall Company, through the Riter-Conley Mfg. Company, has closed for 10,000 tons for the Maryland Steel Company, and for 4800 tons for the Youngstown Sheet & Tube Company. A large amount of work is expected in connection with expansion and changes at the yards of the Newport News Shipbuilding & Dry Dock Company. A garage on West Sixty-sixth Street, involving 250 tons, has been awarded to the Guerber Engineering Company; the H. E. Mitler apartment, 500 tons, to the Belmont Iron Works; transportation towers, several hundred tons, to Milliken Brothers, Inc.; and it is reported that the Sheffield Farms creamery, 600 tons, has been placed with the Levering & Garrigues Company. New building projects include an apartment for A. S. Cochran, 21 West Fifty-eighth Street, 400 tons; Studio Building, Fifty-ninth Street and Sixth Avenue, revised, 800 tons; and a Bing & Bing hotel, 48 West Forty-seventh Street, 500 tons. We now quote mill shipments of plain material at 3.019c. to 3.169c., New York, and from warehouse at 3.50c., minimum.

Steel Plates.—Another advance of $5 by the Steel Corporation, bringing plates to 3.50c., Pittsburgh, and higher warehouse prices are indicative of conditions. The prodigious buying of railroad cars is making itself felt in the demand for universal and the narrower sheared plates, and at this writing buyers are making efforts to place round lots for delivery over the next few months at less than 3.75c., Pittsburgh. On ship plates, even for the third quarter, 6c. has been quoted, but no considerable business has been done at higher than 5.50c. Following the statement reported a month ago that car plates would be 4c. by the first of the year, one shipbuilder owns to expecting that 5c. will be ruling for shipbuilding purposes by that time; and certain it is that little can be obtained now in the first half at 4.75c. for the wide plates. Norwegian interests are having difficulty in placing some 12,000 to 15,000 tons for the last half for four ships to be built on the Pacific coast. Some 2000 tons is under consideration for the Staten Island Shipbuilding Company. Incidentally, it is stated that further ship contracting for Norway ownership is not to be expected, as that country has already purchased a total vessel capacity of 1,200,000 tons. Some 9000 to 10,000 cars have been bought, 2000 each of the New York Central, Burlington, Illinois Central, and Great Northern. We quote universal plates in some weeks, and sheared plates up to 84 in., and in about three months, at 3.919c. to 4.169c., New York; sheared plates wider than 84 in., with little available in the first half, at 4.419c. to 5.669c.; and all plates for indefinite delivery at 3.669c. New York. Out of store we now quote 4.5c. to 4.75c., New York.

Bars.—Some last-half-of-1917 shell-steel contracts are now being settled, it is confidently asserted, and at 4c. to 4.50c. The 17,000 tons of 2½-in. and smaller angles for France are believed to have been bought, but it is not known from what mills. Along with plates and shapes, an advance has been announced by the Steel Corporation of $4 per ton, or to 2.90c., Pittsburgh. Bar iron is strong, and some purchases on foreign account of bar-iron products are under quiet consideration. We quote mill shipments of steel bars at 3.069c. to 3.169c., New York, with small quantities available, in 60 to 90 days, and iron bars at 2.669c., New York. From warehouses we quote steel bars at 3.50c., and iron bars at 3.40c., New York.

Cast-Iron Pipe.—The city of New Bedford, Mass., opens bids to-day on 760 tons of 6 to 30 in. pipe and 60 tons of castings. This is the only public letting of importance that has recently come out. Private buying for spring delivery continues brisk. Export inquiries are coming out in good volume but the difficulty of securing vessel room presents a formidable obstacle to the closing of contracts. The market is firm. Carload lots of 6-in., class B and heavier, are quoted at $37.50 per net ton, tidewater, with $1 per ton extra for class A and gas pipe.

Old Material.—Conditions are very different from those prevailing only a short time ago. Buying is active and dealers say that anything can now be sold. The demand is not only urgent from domestic consumers but large inquiries have appeared for export. Offers of $21 to $22 have been made for heavy melting steel scrap for shipment abroad. Brokers quote buying prices about as follows to local dealers and consumers, per gross ton, New York:

Heavy melting steel scrap (for eastern Pennsylvania shipment)	$17.50 to $18.00
Old steel rails (short lengths) or equivalent	19.75 to 20.00
Relaying rails	31.50 to 32.00
Rerolling rails	24.50 to 25.00
Iron and steel car axles (for export)	41.50 to 42.00
No. 1 railroad wrought	22.50 to 23.00
Wrought-iron track scrap	20.00 to 20.50
No. 1 yard wrought, long	17.50 to 18.00
Light iron (nominal)	3.50 to 4.00
Cast borings (clean)	9.50 to 9.75
Machine shop turnings	8.00 to 8.50
Mixed borings and turnings	8.00 to 8.50
Wrought pipe (not galvanized or enameled	15.50 to 16.00

Cast scrap has been purchased much more freely at advancing prices. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

No. 1 cast (machinery)	$20.50 to $21.00
No. 2 cast (heavy)	19.50 to 20.00
Stove plate	15.50 to 16.00
Locomotive grate bars	15.50 to 16.00
Old carwheels	20.50 to 21.00
Malleable cast (railroad)	17.50 to 18.00

Buffalo

BUFFALO, N. Y., Nov. 21, 1916.

Pig Iron.—There is some restriction in buying owing to the inability of consumers to obtain deliveries desired. One inquiry before the market is for 25,000 tons of basic for delivery in the last half of 1917, for which negotiations are still pending. One of the largest producers here has retired temporarily from the market owing to the filled-up condition of order books. Prices appear to range according to untaken capacity which different producers have available, and at least one interest is still quoting $25 to $27 for extended 1917 delivery, while another is holding out for a minimum of $30 on any grade for such delivery as it is able to make. We quote as follows for last quarter and first half delivery, f.o.b. furnace, Buffalo:

High silicon irons	$27.00 to $28.00
No. 1 foundry	27.00 to 28.00
No. 2 X foundry	27.00 to 28.00
No. 2 plain	27.00 to 27.50
No. 3 foundry	27.00 to 27.50
Gray forge	27.00 to 27.50
Malleable	27.00 to 28.00
Basic	30.00
Bessemer	30.00 to 31.00
Charcoal, according to brand and analysis	27.00 to 27.50

Finished Iron and Steel.—There appears to be a greater divergence in prices than has prevailed at any time. Higher prices than usual Pittsburgh quotations on definite offers (practically all contract tonnage) have been declined by sellers in several instances. There is evidently greater reluctance on the part of sellers to quote prices at all. The agency of one of the largest

independent mills announces that it is now out of the market on iron bars, due partly to the shortage of scrap. There is a decidedly strong demand for sheets, and prices are being held firmly, with frequent further advances reported.

Old Material.—Local consumers appear to have covered their requirements for the present. There are no tonnages of heavy melting steel available, and attention is now turning to the cheaper grades of scrap, particularly borings and turnings. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	$20.00 to $20.50
Low phosphorus billet and bloom ends	24.00 to 25.50
No. 1 railroad wrought	22.00 to 22.50
No. 1 railroad and machinery cast	19.00 to 20.00
Steel axles	35.00
Iron axles	35.00
Carwheels	18.00 to 18.50
Railroad malleable	18.00 to 18.50
Machine shop turnings	9.00 to 9.25
Heavy axle turnings	14.00 to 14.50
Clean cast borings	9.50 to 10.00
Iron rails	20.50 to 21.00
Locomotive grate bars	14.00 to 14.50
Stove plate (gross ton)	14.25 to 14.75
Wrought pipe	14.50 to 15.00
No. 1 busheling scrap	17.50 to 18.00
No. 2 busheling scrap	12.50 to 13.00
Bundled sheet scrap	13.00 to 14.00

British Steel Market

Pig Iron Firm and Active--American Billets at $70

(*By Cable*)

LONDON, ENGLAND, Nov. 22, 1916.

The pig-iron market is firm and the demand is active. Black sheets are quoted at £19 15s. Tin plates are irregular, but clearances from makers' stocks are better. For American 4-in. billets $70 is asked and for wire rods £20 is bid, both for January-March delivery c.i.f. Liverpool. We quote as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 33s.

Steel black sheets No. 28, export, f.o.b. Liverpool £19 5s against £20 a week ago.

Steel ship plates, Scotch, delivered local yards, £13 17s. 6d.

Steel rails, export, f.o.b. works, £10 17s. 6d.

Hematite pig iron, f.o.b. Tees, 142s. 6d., compared with about 140s. a week ago.

Sheet bars (Welsh) delivered at works in Swansea Valley, £15 5s. nominal.

Steel bars, export f.o.b. Clyde, £18

Ferromanganese (nominal), £33.

Ferrosilicon, 50 per cent, c.i.f., £27.

Pig-Iron Output Increasing—Less Demand for Billets—Manganese Ore Firmer

(*By Mail*)

LONDON, ENGLAND, Oct. 31, 1916.

The pressure in pig iron is such that current production is being rapidly absorbed, and manufacturers would welcome additional deliveries. The efforts made to add to the output are fairly successful. Four more blast furnaces having started operations in the East coast district, and this should make itself felt.

Export business has been decidedly more restricted, but f.o.b. terms have hardened, while surplus quantities in producers' hands are still extremely small. Hematite export licenses are practically unobtainable. The requirements of steel works are as great as ever, and the demand continues rather in excess of current output. There has been practically no further change in the home maximum prices, Cleveland iron remaining at 87s. 6d., and East Coast hematite at 122s. 6d.

The great bulk of productive iron and steel capacity is under close official control. The labor problem is as difficult as ever, and the prosecution of operations on a scale sufficient to cope with running contracts is not an easy matter, inasmuch as the supply of raw material is not too plentiful. The use of steel for ordinary or mercantile enterprise has been further curtailed, so that merchant business is being cut down to unimportant dimensions. The tendency of prices is as firm as ever in view of the abnormally high cost of production.

Inquiries for billets are few even at the reduced rates quoted lately in various quarters, despite the firmer tendency in America. Consumers have presumably secured their needs over the end of the year. Four-inch material can still be had rather below $65 for January-March shipment, c.i.f. Liverpool, but there is virtually nothing doing. This also applies to wire rods and sheet bars, quotations for which are purely nominal. There is a steady inquiry for finished steel, especially for shipbuilding. Prices have risen again materially, while big premiums are being paid for anything like near shipment of steel plates.

With the further reduction of the output of tin plate and galvanized as well as black steel sheets, export business has fallen off further, for the output is not such as to leave any big surplus for export. The fact that an attempt is being made to fix a minimum basis price for tin plate against A certificates has served to strengthen the market, though a confirmation of this has yet to be awaited. This figure is fully justified by the cost of production, though the position is complicated by the lack of new orders.

There has been a little more life in ferromanganese for shipment in the early months of next year chiefly to Italy at about £33 to £34 f.o.b., while the quotation for this year is quite nominal, makers having nothing more to sell. Indian manganese ores rule firmer.

Fabricated Steel Work in October

The bridge and structural shops of the country took contracts in October corresponding in the aggregate to 77 per cent of their capacity. This represents about 132,000 tons, and is more than any month since May, when about 137,500 tons was put under contract. In the four months of the interim the rate of contracting has been about 95,000 tons, so there would seem to be an almost 40 per cent improvement since the temporary lull which occurred in steel buying toward the end of the first half of this year. The average rate of contracting in the 20 months since February, 1915, when the improvement after the shock of the European war was first felt, has been about 130,000 tons per month.

Manganese Ore Imports at Record Rate

Manganese ore imports into the United States continue at a phenomenal rate, and now exceed similar imports into Great Britain. Those for September were 73,536 gross tons. The imports in July, August and September have been 232,199 tons. The total to Oct. 1, 1916, is now 469,222 tons, against 173,992 tons to Oct. 1, 1915, and 215,274 tons to Oct. 1, 1914. The British imports to Oct. 1, 1916, were only 348,394 gross tons. The monthly rate for the first nine months of this year is 52,136 tons, against the previous record of 28,757 tons per month in 1913.

Rogers, Brown & Co. say in their weekly market report, referring to export demand: "Sweden has been an important factor. It has recently placed through one agency alone 6500 tons of Southern foundry iron and 650 tons of Southern high silicon high phosphorus iron. Italy is inquiring for 5000 tons of low silicon foundry iron, 3000 tons of Bessemer ferrosilicon and in addition there is an inquiry on the market for 50,000 tons of standard Bessemer for export shipment beginning promptly and running through the first quarter of next year."

Spanish iron and steel companies are purchasing their own ships, as a result of high freight rates, so as to transport their coal and raw materials. The Sociedad de Altos Hornos de Vizcaya, of Bilbao, besides having recently bought five large steamers, two with a capacity of 4000 tons each, has placed a contract with a Spanish shipbuilding company for two more at a cost of about $400,000 each. This company has invested lately about $3,000,000 in steamships. The Sociedad Metallurgica Duro-Filguera has ordered two steamers also.

The Chicago Steel & Wire Company, 1123 West Thirty-seventh Street, Chicago, has purchased a plot 190 x 310 ft., on which it will erect a manufacturing building to cost $40,000.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c. Denver, pipe, 76.1c., minimum carload, 46,000 lb.; structural steel and steel bars, 83.6c.; minimum carload, 36,000 lb. Pacific coast (by rail only), pipe, 65c.; structural steel and steel bars, 75c., minimum carload, 50,000 lb.; structural steel and steel bars, 80c., minimum carload, 40,000 lb. No freight rates are being published via the Panama Canal, as the boats are being used in transatlantic trade.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs ¼ in. thick and over, and zees 3 in. and over, 3c. to 3.1c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in. on one or both legs	.10
Angles, 3 in. on one or both legs, less than ¼ in. thick (except steel furnished for ship purposes)	.20
Tees, structural sizes (except elevator, handrail, car truck and concentrator tees)	.10
Channels and beams under 3 in. deep, or under 1 lb. per foot, Sept. 1, 1916	.10
Deck beams and bulb angles	.10
Handrail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Plates.—Tank plates, ¼ in. thick, 6 in. up to 100 in. wide, 3.50c. to 4.25c., base, net cash, 30 days, or ½ of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras

	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers)	.10
Boiler and flange steel plates	.10
"A. B. M. A." and ordinary firebox steel plates	.20
Still bottom steel	.30
Locomotive firebox steel	.30

Marine steel, special extras and prices on application.

Gage Extras

Rectangular, ¼ in. thick, over 6 in. wide to 100 in. wide	Base
Lighter than ¼ in., to 3/16 in., up to 72 in. wide	.10
*Lighter than ¼ in., including 3/16 in., over 84 in. to 96 in.	.20
*Lighter than ¼ in., including 3/16 in., over 96 in. to 100 in.	.40
*Lighter than ¼ in., including 3/16 in., over 100 in. to 110 in.	.60
Lighter than 3/16 in., including No. 8, up to 72 in. wide	.15
*Lighter than 3/16 in., including No. 8, over 72 in. to 84 in.	.25
*Lighter than 3/16 in., including No. 8, over 84 in. to 96 in.	.35
Lighter than No. 8, including No. 10, up to 60 in. wide	.30
Lighter than No. 8, including No. 10, over 60 in. to 64 in.	.35

Up to 72 in. and not less than 10.2 lb. per sq. ft. will be considered ¼ in.
Over 72 in. must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.
Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.
Over 72 in., ordered weight 3/16 in., take No. 8 price.
Over 72 in., ordered weight No. 8, take No. 10 price.

Width Extras

Over 100 in. to 110 in. inclusive	.05
Over 110 in. to 115 in. inclusive	.10
Over 115 in. to 120 in. inclusive	.15
Over 120 in. to 125 in. inclusive	.25
Over 125 in. to 130 in. inclusive	.50
Over 130 in.	1.00

Length Extras

Universal plates 80 ft. long up to 90 ft. long	.05
Universal plates 90 ft. long up to 100 ft. long	.10
Universal plates 100 ft. long up to 110 ft. long	.20

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over.

Lengths under 3 ft. to 2 ft. inclusive	.25
Lengths under 2 ft. to 1 ft. inclusive	.50
Lengths under 1 ft.	1.55
Circles 3 ft. in diameter to 100 in.	.30
Circles over 100 to 110 in. (width extra)	.35
Circles over 110 to 115 in. (width extra)	.40
Circles over 115 to 120 in. (width extra)	.45
Circles over 120 to 125 in. (width extra)	.55
Circles over 125 to 130 in. (width extra)	.80
Circles over 130 in. (width extra)	1.30
Circles under 3 ft., to 2 ft., inclusive	.55
Circles under 2 ft., to 1 ft., inclusive	.80
Circles under 1 ft.	1.85

Half circles take circle extras.

Sketches not over four straight cuts, inc. straight taper	.10
Sketches having more than four straight cuts	.20

Plates sheared to a radius take complete circle extras.

*Including extra for width.

Wire Rods.—Including chain rods, $65 to $70.

Wire Products.—Prices to jobbers effective Oct. 19: Fence wire Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, $2.80; galvanized, $3.50. Galvanized barb wire and staples, $3.70; painted, $3. Wire nails, $2.85. Galvanized nails, 1 in. and longer, $2 advance over base price; shorter than 1 in., $2.50 advance over base price. Cement-coated nails, $2.75. Woven wire fencing, 55 per cent off list for carloads, 54 off for 1000-rod lots, 53 off for less than 1000-rod lots.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from Nov. 15, 1916, all full weight:

Butt Weld

Steel Inches	Steel Black	Steel Galv.	Iron Inches	Iron Black	Iron Galv.
⅛, ¼ and ⅜	61	34½	⅛ and ¼	50	23
½	65	40½	⅜	51	24
¾ to 3	68	44½	½	55	37
			¾ to 1½	58	42

Lap Weld

2	61	48½	1¼	44	29
2½ to 6	64	51½	1½	50	36
7 to 12	61	47½	2	51	37
13 and 14	51½		2½ to 4	53	40
15	49		4½ to 6	53	40
			7 to 12	52	39

Extra and Drifted

⅛ to ¾, butt	66	52½	¾ to 1½, butt	53	36
2 lap	49	40½	1¼, lap	39	23
2½ to 6, lap	62	49½	1½, lap	45	30
			2, lap	46	31
			2½ to 4, lap	49	34

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	57	39½	⅛, ¼ and ⅜	50	33
½	62	44½	½	55	42
¾ to 1½	66	50½	¾ to 1½	59	44
2 to 3	67	54½			

Lap Weld, extra strong, plain ends

2	56	45½	1¼	46	31
2½ to 4	62	50½	1½	51	37
4½ to 6	61	49½	2	53	40
7 to 8	57	43½	2½ to 4	55	43
9 to 12	52	38½	4½ to 6	54	42
			7 to 8	48	36
			9 to 12	43	31

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts on less than carloads, freight to be added, effective from Nov. 1, 1916, except 3 to 4½ in. steel from Nov. 20, are as follows:

Lap-Welded Steel		Standard Charcoal Iron	
1½ in.	31	1½ in.	23
1¾ and 2 in.	43	1¾ and 2 in.	35
2¼ in.	40	2¼ in.	32
2½ and 2¾ in.	46	2½ and 2¾ in.	38
3 and 3¼ in.	46	3 and 3¼ in.	43
3½ to 4 in.	46	3½ to 4½ in.	44
4½ and 5 in.	45	4½ and 5 in.	37
7 to 13 in.	42	7 to 13 in.	34

Locomotive and steamship special charcoal grades bring higher prices.

1¾ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger over 22 ft., 10 per cent net extra.

Sheets.—Makers' prices for mill shipments on sheets of U. S. standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Blue Annealed Sheets

Nos. 3 to 8	3.50 to 3.60
Nos. 9 to 12	3.15 to 3.25
Nos. 13 and 14	3.25 to 3.35
Nos. 15 and 16	3.30 to 3.40

Box Annealed Sheets, Cold Rolled

Nos. 17 to 21	3.45 to 3.55
Nos. 22 and 24	3.50 to 3.60
Nos. 25 and 26	3.55 to 3.65
No. 27	3.60 to 3.70
No. 28	3.65 to 3.75
No. 29	3.70 to 3.80
No. 30	3.80 to 3.90

Galvanized Sheets of Black Sheet Gage

Nos. 10 and 11	4.25 to 4.35
Nos. 12 to 14	4.35 to 4.45
Nos. 15 and 16	4.50 to 4.60
Nos. 17 to 21	4.65 to 4.75
Nos. 22 and 24	4.80 to 4.90
Nos. 25 and 26	4.95 to 5.05
No. 27	5.00 to 5.10
No. 28	5.25 to 5.35
No. 29	5.40 to 5.50
No. 30	5.55 to 5.65

Ten Mill Black Plate

Nos. 15 and 16	3.40 to 3.45
Nos. 17 to 21	3.45 to 3.50
Nos. 22 to 24	3.50 to 3.55
Nos. 25 to 27	3.55 to 3.60
No. 28	3.60 to 3.65
No. 29	3.65 to 3.70
No. 30	3.65 to 3.70
Nos. 31 and 32	3.70 to 3.75

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin,	Lead		Spelter	
		Electro-	New	New	St	New	St
Nov	Lake	lytic	York	York	Louis	York	Louis
15	33 00	33 00	44 00	7 00	6 92½	11 75	11 50
16	33 50	33 50	44 12½	7 00	6 92½	12 00	11 75
17	34 00	34 00	45 25	7 00	6 92½	12 12½	11 87½
18	34 00	34 00		7 00	6 92½	12 25	12 00
20	34 00	34 00	45 12½	7 00	6 92½	12 37½	12 12½
21	34 00	34 00	45 12½	7 00	7 00	12 50	12 25

NEW YORK, Nov. 22, 1916

In copper a runaway market practically exists, although the demand is lighter. An exceptionally heavy business has been done in tin at higher prices. Lead has been active this week and quotations have advanced. Brass mills have bought spelter on a large scale, and the upward trend of prices has continued. Antimony is stronger, although the demand is light.

New York

Copper.—November and December copper, both Lake and electrolytic, is quoted at not less than 34c. Buying is lighter, principally because there is very little metal to be had for any of the nearby positions, and such offerings as are made are quickly snapped up if the price is at all reasonable. It is reported, but not confirmed, that Lake copper has been sold at 35c. The high prices and unusual conditions combine to make the trade nervous. Sellers would not be surprised to see prices go higher, nor would they be surprised if the market should break sharply. There is still unsatisfied demand which ordinarily would not be regarded as large, although it looms up big in view of the small supplies. Quotations have advanced even on so-called quiet days, and business has been done within a few hours at prices wide apart. On Nov. 15, early in the day, April, May and June were offered at 32c., but later other lots sold at 31c. For the same position 31.50c. was paid, and at the close 32c. was paid. On the same day some business in March, April, May and June was done at 31.30c. Persons who ordinarily are sellers were buyers. A temporary halt came over the market Nov. 16 and it has lasted more or less since, although the wire mills and other domestic consumers have done some buying. On Nov. 17 first quarter was offered at 33c., second quarter at 32c., and November and December at 34c. On Nov. 20, December alone, also January, February and March, was offered at 34c., with second quarter at 32.50c., sales being made at the latter price. This week the market has shown renewed activity. A suggestion that occurs repeatedly in the minds of the trade is that some of the large quantities of copper which were purchased for export at comparatively low prices may be offered for resale, and they do not exempt at least a part of the 448,000,000 lb. which Great Britain bought at 25.50c. Sheet copper at the mills has been advanced to 41c., base. The mid-monthly statistics showed that European stocks are steadily decreasing. The London quotation yesterday was £163 for spot electrolytic, against £152 a week ago. The exports were not exceptionally heavy this month, amounting to 13,210 tons, including yesterday.

Tin.—In the past 10 days buying of tin has been unusually heavy. Quotations are higher, but only moderately so, the price yesterday for spot Straits being 45.12½c. On Nov. 15 about 350 tons was taken and on Nov. 16 between 300 and 400 tons was sold, principally for future delivery. On Monday of this week the market was quiet until late in the day, when it took a spurt and between 400 and 500 tons changed hands, mostly for futures. Yesterday was called a quiet day, yet about 200 tons was taken by consumers. A peculiarity of the market has been that it has appeared quiet on the surface at nearly all times, even when large negotiations were under way. Obtaining permits to ship from England continues a serious question. The arrivals this month total 1275 tons and there is afloat 3852 tons.

Lead.—Until the end of last week the market was dull but strong. This week an excellent demand developed, and it has carried prices higher. Independents ask from 7.15c. to 7.25c., New York, and 7c. and upward, St. Louis. Up to yesterday afternoon the leading interest was still quoting 7c., New York, and 6.92½c., St. Louis, but an advance is expected at any moment. It is understood that the big producer has not been selling at 7c., while outsiders have been taking business at higher levels. Prompt lead is not easy to find. The London quotation yesterday for spot lead, as compared with a week ago, was unchanged at £30 10s. The exports this month, including yesterday, are 1318 tons.

Spelter.—The brass mills have been active buyers at steadily advancing prices. Prompt prime Western was quoted yesterday at 12.50c., New York, and 12.25c., St. Louis. December was around 12.12½c., St. Louis; first quarter, 12c., and second quarter, 11.50c. Consumers are buying further into the future, sales having been made quite extensively into the second quarter and in a few cases up to October. The premium for brass mill special is higher again, now ranging about 1½c. over the price of prime Western, the premium, however, including delivery. It is repeatedly pointed out that the buying of spelter has not been proportionate to the activity in copper. No explanation is forthcoming, but the trade hesitates to believe that all of the copper bought in recent months is going into purely copper products. The exports continue heavy, amounting this month, including yesterday, to 10,587 tons. The spot quotation at London yesterday was 10s. higher than a week ago at £56 10s.

Antimony.—On the strength of the slight increase in business, quotations have been advanced about 1c., and Asiatic brands are quoted at 14c. to 14.50c.

Aluminum.—The quotation for No. 1 virgin aluminum, 98 to 99 per cent pure, is unchanged at 64c. to 66c. in large lots.

Old Metals.—The market is strong, with very heavy demand for material in some quarters. Prices show a wide variation, depending upon how badly the buyer needs metal. Stocks of old metal are very low. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible	28.50 to 30.50
Copper, heavy and wire	26.50 to 28.50
Copper, light and bottoms	23.50 to 25.00
Brass, heavy	16.50 to 19.00
Brass, light	13.50 to 14.50
Heavy machine composition	22.00 to 24.00
No. 1 yellow rod brass turnings	16.00 to 18.00
No. 1 red brass or composition turnings	17.50 to 18.50
Lead, heavy	6.625
Lead, tea	6.125
Zinc	8.75 to 9.25

Chicago

Nov. 20.—Continued buying of the non-ferrous metals, particularly for early delivery, adds strength to the already feverish market. Prices have been rising steadily, and advances are recorded without exception in copper, tin, lead, spelter and zinc. Prices of scrap metals are also mounting daily. We quote: Casting copper, 32.25c. to 32.50c.; Lake copper, 33.75c. to 34c.; tin, carloads, 45.50c., and small lots, 47.50c.; lead, 6.95c.; spelter, 12.25c.; sheet zinc, 18c.; Cookson's antimony, 50c.; other grades, 16c. to 17c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 27c.; copper bottoms, 23.50c.; copper clips, 26c.; red brass, 22c.; yellow brass, 18c.; lead pipe, 6c.; zinc, 8.50c.; pewter, No. 1, 25c.; tinfoil, 32c.; block tin pipe, 37c.

St. Louis

Nov. 20.—The non-ferrous metal markets have moved upward steadily the past week, with lead closing to-day at 7c. bid for carload lots and no offerings at that figure. Spelter closed strong, with 11c. to 11.50c. bid for carload lots but no sellers willing to take the offers. Prices on less than carload lots are: Lead, 7.25c.; spelter, 13.50c.; tin, 48c.; copper, 35c.; antimony, 16c. In the Joplin district zinc blende was marked up $5 per ton, reaching a top price of $95 for the choice ores. The average for the week for the district was $91. Calamine was firm at $45 to $50, with a district average of $48. Lead ore ranged from $85 to $87.50 with the average for the district $87. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 9c.; heavy yellow brass, 12c.; heavy red brass and light copper, 17c.; heavy copper and copper wire, 10c.; zinc, 6c., lead, 5c.; pewter, 25c.; tinfoil, 31c.; tea lead, 3.50c.

THE WORLD'S PIG-IRON OUTPUT

Production in 1915 and This Year Less Than in 1913

Despite the fact that the pig-iron output of the United States in 1916 will far exceed that of any previous year, the world's output this year will probably fall short of that for 1913, when it was over 79,000,000 tons. The 1916 total may fall between 76,000,000 and 77,000,000 tons.

A table of statistics compiled in Germany giving the world's production by countries was recently published in the London *Ironmonger*. This table is given below, except that the figures for Canada have been changed to gross tons, having been given in net tons in the original, and those for the United States and Great Britain to gross tons instead of metric:

The World's Output of Pig Iron by Countries

	1913	1914	1915
United States	30,966,301*	23,332,244*	29,916,213*
Germany	19,309,172	11,789,547	11,790,139
Great Britain	10,481,917*	9,005,898*	8,793,685*
Three leading producers	60,757,390	46,727,689	50,500,071
France	5,311,316	3,025,000	1,500,000
Russia	4,548,396	4,261,008	3,696,560
Belgium	2,484,690	1,560,000	
Austria Hungary	2,369,864	2,020,000	1,960,000
Canada	1,008,006*	656,253*	815,820*
Sweden	730,300	632,100	767,600
Italy	426,755	285,114	397,000
Spain	424,474	420,000	414,000
Other countries	550,500	490,000	480,000
Total	78,811,991	62,243,164	63,284,051

*Gross tons; others, metric tons (2204 lb.).

The figures for France are entirely a German estimate and apparently represent both occupied and unoccupied territory. Before the war, or in July, 1914, according to a French trade paper, there were 116 furnaces in blast in France, producing 420,000 tons of pig iron per month. At present the same authority states that there are 48 furnaces now operating in non-occupied territory with 8 more ready to be blown in. Their aggregate output is from 110,000 to 120,000 tons per month. It is probable that the German estimate of 4,750,000 tons as the output of blast furnaces in both occupied and unoccupied French territory is excessive.

While the 1915 world's output gained but little on that for 1914, the effect of the war is seen in the greatly reduced output in both years as compared with 1913. While in 1913 the three principal producing countries made 77 per cent of the world's total, in 1915 they furnished over 79 per cent of this total.

THE OUTPUT THIS YEAR

In estimating the 1916 output for comparison and taking the output of all the countries outside of the three leading producers as the same as in 1915, the following estimate is arrived at for 1916:

United States	39,500,000*
Germany	13,100,000
Great Britain	10,000,000*
All other countries	13,500,000
Total	76,000,000

*Gross tons; others, metric tons.

This total is 96.6 per cent of the 1913 production. While the output for the United States this year will exceed any ever recorded, that for all the other countries is likely to show a falling off unless Great Britain should show an increase over the 1913 output.

PIG-IRON AND STEEL OUTPUT COMPARED

In connection with this analysis it is interesting to note that an outgrowth of the war's effect has been to place Germany in the same category with the United States as a greater producer of steel than of pig iron. Before the war the United States was the only country that made more steel than pig iron and this has been the record since 1911. In 1914 for the first time Germany's steel output was larger than that of pig iron but only by about 560,000 metric tons. In 1915 the difference in favor of steel was nearly 2,400,000 tons.

While in England the pig-iron output is still larger than that of steel, a decided change has taken place. In 1914 the difference between the pig-iron and steel outputs was about 1,171,000 tons in favor of pig iron but in 1915 the difference was reduced to less than 450,000 tons.

New York Shipbuilding Company Sold

The properties of the New York Shipbuilding Company have been bought by the American International Corporation, in association with the International Mercantile Marine Company, the Pacific Mail Steamship Company and W. R. Grace & Co.

The New York Shipbuilding Company owns a plant at Camden, N. J., with 160 acres of land and 4200 ft. of water front on the Delaware River. It has $5,000,000 of stock outstanding, but the purchase involved about $15,000,000. The present company will be liquidated and a new one formed. The principal owners were A. W. Mellon, Pittsburgh; Henry C. Frick and Henry Walters of the Atlantic Coast Line and Louisville & Nashville. S. M. Knox, now president of the company, will be elected president of the new company, and the existing organization will be kept intact.

The shipyard has a capacity of 100,000 tons per year, and contracts have been booked to handle that tonnage through 1917. The immediate construction of two shipways 150 x 1000 ft. will be undertaken. These will give an additional capacity of at least 50 per cent. Otherwise in the plant as it now stands but little change in machinery and equipment is necessary. It is expected that at least 2500 men will be added to the present force of 5000.

Orders of American Shipyards Nov. 1

Steel merchant vessels building or under contract in private American shipyards on Nov. 1, 1916, number 417 of 1,479,946 gross tons, according to builders' returns to the Bureau of Navigation, U. S. Department of Commerce. This is an increase of 25,676 tons over returns for Oct. 1. In October American yards finished 17 steel merchant ships of 52,491 gross tons and made new contracts for 17 of 77,877 gross tons. Of the 417 ships, 314 are scheduled to be launched during the fiscal year ended June 30, 1917, and 103 during the same fiscal year of 1918.

James Whalen, Port Arthur, Ont., Canada, confirms the report that he has acquired the American interests in the Western Dry Dock & Shipbuilding Company of Port Arthur. Preparations are being made for large additions to the plant. Berths will be installed sufficient to allow for the construction of four boats at one time. Not only has Mr. Whalen acquired the American controlling interests, but, in conjunction with John Burnham, Chicago, Ill., he has purchased the plant outright and it will be operated under his direct management.

The main buildings of the Sun Shipbuilding Company, Chester, Pa., have been completed and machinery is being installed. It is planned to start on the first keel about the middle of December. The foundations for the boiler shop, which will be 200 x 400 ft., will be started in the near future. The company will take good care of its employees. They will have a separate building fitted with shower baths and other conveniences, and each man will have his own locker. The plant will employ about 2000 men when in full operation.

The Ferguson Steel & Iron Company, Buffalo, N. Y., in completing the steel work of the 18-story addition to the Ten Eyck Hotel, Albany, N. Y., has put 2000 tons of steel in place in five weeks. The structural material for this building has been delivered as needed, despite the great scarcity of steel, which has interfered with the business of most large fabricators. The company was able to make immediate delivery of the steel it required because of the large stock carried in its warehouses.

Spring and Tubing Makers Consolidate

Plans for the consolidation of the Perfection Spring Company and the Standard Welding Company, Cleveland, which have been under way for some time, have been completed. They will be merged under the name of the Standard Parts Company, which will have an authorized capital stock issue of $35,000,000. This will include $10,000,000 of 7 per cent cumulative preferred, only half of which will be issued at present, and $25,000,000 common, of which $8,000,000 will be issued. Of the preferred stock, $1,000,000 will go to the shareholders of the Perfection Spring Company and $4,000,000 will be placed on the market. The common stock has been underwritten by a syndicate and will not be publicly offered. It is stated that the new company will be the largest maker of automobile springs in the world and one of the world's largest producers of light gage steel tubing, automobile rims, bands and bases for solid tires and bicycle and motorcycle parts. The manufacture of Perlman demountable rims will be continued under an agreement with the Perlman Rim Corporation. It is expected that Christian Girl, president Perfection Spring Company, will be the active operating head of the new company. The directorate will include Christian Girl, F. F. Prentiss, H. P. McIntosh, Sr., H. P. McIntosh, Jr., T. E. Borton and Ernest W. Farr of Cleveland and Arnold H. Goss of New York.

The net sales of the Perfection Spring Company increased from $907,384 for the year ended June 30, 1913, to $3,142,587 for the year ended June 30, 1916. The net sales of the Standard Welding Company increased in the same period from $2,660,333 to $5,123,722.

Locomotive Orders

Orders for locomotives in the past week have been 209 and inquiries for 26 have been reported. The Baldwin Locomotive Works will build 40 Mikado locomotives for the Paris, Lyons & Mediterranean Railroad and 16 Santa Fes for the Union Pacific. The American Locomotive Company will furnish the New York, Chicago & St. Louis Railroad with 25 Mikado locomotives and the Birmingham & Southern with 4 Santa Fe locomotives. The Lima Locomotive Corporation is reported to have received an order for 20 switching locomotives for the New York, Chicago & St. Louis. The Russian Government has recently placed orders for 100 decapod locomotives of which the American Locomotive Company will furnish 40, the Baldwin Locomotive Works 40 and the Canadian Locomotive Company 20. The Wabash has revived its inquiry for 25 locomotives. It is estimated that 313 locomotives were ordered in November up to and including Nov. 18, of which 165 were for export.

The Barlow Foundry Company, Newark, N. J., adjudged insolvent last May, is to be sold, by judicial authority, to four holders of preferred stock, who will purchase the plant as a going concern, provisional upon an opportunity being given to holders of common stock to participate in the reorganization. The preferred holders are Joseph M. Perrine, Jamesburg; William Fellowes Morgan, Short Hills; Walter Kidde, Montclair, and Samuel F. Dixon, Newark. The purchasers will pay the receiver, Frederick G. Smith, $9,274, plus the expense of the receivership, and also will assume a mortgage of $36,144.91, a second mortgage of $1,740 and the obligations of the company totaling about $54,190, paying all claims in full. The Barlow Foundry Company is one of the oldest in Newark. It had a capitalization of $150,000 common stock and $60,000 preferred. The majority of the common issue is held by Arthur E. Barlow.

The promoters of the ingot mold plant, which it was recently announced would be built at Dover, Ohio, have effected an organization under the name of the Penn Mold & Mfg. Company, which has been incorporated with a capital stock of $200,000. It is announced that a contract has been closed with the Penn Iron & Coal Company, Dover, for the required supply of metal from its blast furnace for the manufacture of molds.

Brier Hill Buys Western Reserve

At Youngstown, Ohio, last week a deal was concluded by which the Brier Hill Steel Company will take over, about Jan. 1, the Western Reserve Steel Company, Warren, Ohio. The latter is practically a new company, having been established in May, 1914. It has $600,000 capital stock—$250,000 preferred and $350,000 common. Work was begun on its plant in June, 1914, and the first output of sheets was made Jan. 4, 1915. The equipment comprises six pair and sheet furnaces, a 60-in. jobbing mill, eight hot sheet mills, four cold mills, two box annealing furnaces, two pickling machines and two galvanizing pots. The company also owns a metal lath and roofing plant, formerly operated by the Sykes Metal Lath & Roofing Company. The product is flat black and galvanized sheets, metal lath and all forms of roofing, and the annual capacity is 50,000 tons.

With the addition of the Western Reserve plant, the Brier Hill Steel Company will be one of the largest sheet manufacturers in the country, having a total of 20 hot mills. It has steadily expanded since it was organized Feb. 1, 1912. On that date the company acquired the properties of the Brier Hill Iron & Coal Company, operating Grace furnace at Youngstown; Tod blast furnace, operated by the Youngstown Steel Company at Youngstown; the Thomas Steel Company, which had a sheet mill at Niles; the Empire Iron & Steel Company, also with a sheet mill at Niles, and the Gary Iron & Steel Company, which was in the metal lathing and roofing business.

In addition to the above, the Brier Hill Steel Company has built an open-hearth steel plant with 10 90-ton furnaces and two under construction; a 40-in. 2-high reversing blooming mill, capable of taking an ingot 19 x 21 in., weighing 5800 lb., and rolling it into a bloom 7½ in. square in 13 passes; a continuous billet mill of six stands of rolls, 24-in., 2-high, and a tandem merchant mill, 16 stands, 24-in., 2-high. The company is building a Koppers by-product coke plant of 84 ovens to supply its two blast furnaces. It is strong in ore reserves, owning a 75 per cent interest in the Biwabik mine on the Mesaba Range and a half interest in the Pennington mine on the Cuyuna Range. Its coal land holdings include 800 acres of thick vein coal at Brier Hill, Fayette County, Pa.

W. A. Thomas, president Brier Hill Company, in announcing the purchase of the Western Reserve Company, made the following statement: "The plant of the Western Reserve Steel Company is most modern in every respect and exceptionally well equipped for making different sizes and highly finished sheets that are not now made by the Brier Hill Steel Company at its two plants in Niles. These additional facilities are very desirable and will put the Brier company in a position to produce everything in the sheet steel line that the trade requires."

American Tube & Stamping Changes Hands

The American Tube & Stamping Company, Bridgeport, Conn., has been sold to a group of New York capitalists, identified with large steel interests, headed by Guy P. Miller, treasurer Bridgeport Brass Company. Plans are under way for a considerable expansion of the plant and facilities, but no new products will be made. The purchasers will assume charge of the business Dec. 1. The new officers will be chosen the latter part of this month. The company now employs 1500 hands.

A contract for a large extension to its coal-handling plant at Sewalls Point near Norfolk, Va., has been placed by the Virginian Railway Company with the Wellman-Seaver-Morgan Company, Cleveland. The additional equipment will include a car dumper, with a capacity of unloading two cars at once; six transfer cars, of 120 tons capacity each, or larger than ever before built, and an elevator. The fact has developed in connection with the placing of this contract that the Virginian Railway Company plans to place in service 120-ton coal cars. The largest coal cars now in use have a maximum capacity of 100 tons.

PERSONAL

F. C. Yeates, purchasing agent of the Cambria Steel Company, has been appointed in a similar capacity for the Midvale Steel Company, the Worth Brothers Company and the Wilmington Steel Company, vice H. L. Murphey, resigned, the appointment becoming effective Nov. 20.

J. R. Holcomb has been appointed superintendent of the Wilmington Steel Company by President A. C. Dinkey to succeed W. J. Stoop, resigned.

Eli Webb, superintendent of the Pittsburgh Crucible Steel Company, Midland, Pa., has tendered his resignation, effective Dec. 1.

James A. Emery, New York, general counsel of the National Association of Manufacturers, will be the guest of honor at the annual banquet and meeting of the Wisconsin Manufacturers' Association at Milwaukee Dec. 5. Harry W. Bolens, Port Washington, Wis., president of the association, will act as toastmaster.

John G. Lapham has been appointed Eastern representative of the Grand Rapids Foundry Company, Grand Rapids, Wis., and will establish an office in New York immediately. The company specializes in the manufacture of ice-making and refrigerating machinery.

Webster J. Oliver, who for the past four years has been a member of the law firm of Oliver & McNevin, New York, has given up that connection to associate himself with Hogan & Son, steel merchants of New York and Philadelphia. For nearly ten years before taking up the law Mr. Oliver was connected with the Oliver Brothers Purchasing Company, New York and Pittsburgh.

R. E. Woodline of the accounting department of the Bethlehem plant of the Bethlehem Steel Company, has been appointed to succeed E. H. Mengel, who has resigned as cashier of the Steelton plant after twenty-five years' service. Frederick Willy has resigned as forge department foreman at Steelton, effective Dec. 1.

H. S. Kiehl, a director and assistant to B. F. Jones, president Jones & Laughlin Steel Company, Pittsburgh, has resigned after a service of twenty-one years. Mr. Kiehl will spend the winter in the South.

Louis Ruthenburg has been appointed general superintendent of the Dayton Engineering Laboratories Company, Dayton, Ohio, W. P. Anderson having resigned to go in business for himself.

Rodney Derby has joined the staff of the Snead & Co. Iron Works, Jersey City, as foundry manager, H. P. Macdonald now devoting himself to general administrative matters.

John Calder, works manager of the Remington Arms-Union Metallic Cartridge Company, Inc., Bridgeport, Conn., will sail for France on Dec. 2 on a special mission to France.

George D. Babcock, production manager, H. H. Franklin Mfg. Company, Syracuse, N. Y., has been nominated to the vice-presidency of the Taylor Society, which will hold its annual meeting in New York, Dec. 8 and 9, at the Engineering Societies Building.

Ambrose Swasey, president Warner & Swasey Company, Cleveland, and Dr. John A. Brashear, of Pittsburgh, start this week for an extended trip through China.

Tampton Aubuchon, at present manager of the East St. Louis Association of Commerce, has been chosen general manager of the Louisville Industrial Foundation. He will have charge of administration of that organization's million-dollar factory fund, and will report to Louisville late in December.

J. H. D. Eagan has associated himself with F. D. Dimmick, Land Title Building, Philadelphia. Mr. Dimmick has the Eastern agency for the Blackwood Foundry Company, Springfield, Ohio, and makes a specialty of pig iron, coal and coke; small steel castings, brass castings, and all kinds of forgings.

Fall Meeting of New Haven Engineers

The New Haven Section, American Society of Mechanical Engineers, held a meeting at the Sheffield Scientific School, Yale University, Nov. 15. At the afternoon session, held in the Hammond Laboratory, two papers were presented: "Physical Tests of Metals," by Prof. William Kent Shepard, and "Applied Metallography," by Prof. C. H. Mathewson. After a dinner at the Yale Dining Club, an evening session was held in Mason Laboratory. S. J. Berard, instructor in machine design, spoke on "Methods of Duplicating Drawings" and displayed specimens of drawings and reproductions by processes in use over a period of more than 70 years. Frank B. Gilbreth discussed "Recent Developments in Time Study Methods and Devices." The audience was much interested in some of the special cameras which Mr. Gilbreth had with him and in a short talk by John Robertson, Eastman Kodak Company, on the usefulness of small universal focus cameras.

Crucible Steel Company of America's Officers

At the organization meeting of the board of directors of the Crucible Steel Company of America, held Nov. 18, the Executive Committee and officers were elected as follows:

Executive Committee—Herbert DuPuy, chairman; C. C. Ramsey, John A. Sutton, H. S. A. Stewart, H. D. W. English, George W. Crawford and John C. Neff.

Officers—C. C. Ramsey, president; O. H. Wharton, assistant to president; John A. Sutton, first vice-president; J. W. Dougherty, second vice-president; G. W. Sargent, third vice-president; H. A. Brown, fourth vice-president; George A. Turville, treasurer and secretary; A. A. H. Niebaum, assistant treasurer; H. F. Kress, assistant treasurer and assistant secretary; N. W. Nolen, comptroller, and G. A. M. King, auditor.

Cincinnati Business Men's Club

The Business Men's Club, Cincinnati, has elected the following directors: August H. Tuechter, president Cincinnati Bickford Tool Company; Warren E. Kepplinger, president Peters Cartridge Company; Henry G. Frost, attorney, and Harry Meiss, merchant. In his annual address President George McG. Morris stated that plans for the new club house at Eighth and Race Streets have been approved and that it was hoped to have work started at an early date. Addresses were made by Senator Lawrence Y. Sherman of Illinois, and Mayor George Puctha of Cincinnati, who were guests of honor at the banquet.

Pittsburgh Foundrymen's Association

The regular monthly meeting of the Pittsburgh Foundrymen's Association was held in the Fort Pitt Hotel, Pittsburgh, on Monday evening, Nov. 20, preceded by a dinner. H. Cole Estep, associate editor of *The Foundry*, gave an address, illustrated with lantern slides, on "The Solution of Cleaning Room Problems and the Use of Sand Blast in Modern Foundries." This is practically the same address that he gave in September at the convention of the American Foundrymen's Association in Cleveland.

The Northwest Steel Company, Portland, Ore., is preparing a rolling mill, according to J. W. Bowles, president of the company. The proposed enterprise will require an expenditure of $1,000,000 and will provide a plant with a monthly capacity of 15,000 to 20,000 tons of steel plates and other products.

David Milne, 2580 Bowker Avenue, Victoria, British Columbia, proposes to establish a rolling mill in South Vancouver, to cost $150,000. The City Council has granted him certain concessions.

Hickman, Williams & Co., pig iron, coal and coke, have moved their offices from the Pennsylvania Building to suite 901, Morris Building, Philadelphia.

Pittsburgh and Nearby Districts

While the Amalgamated Association scale fixing wages in bar-iron mills that sign that scale does not run over 2c. per lb. for bar iron, puddlers will receive 25c. per ton advance in wages for each advance of 5c. in the bar-iron price. Wages for puddling recently fixed for November and December on a 2c. card gave puddlers $9.55 per ton for boiling, but, should the next settlement be at 2.05c., puddlers will receive $9.80.

The Youngstown Sheet & Tube Company is preparing a plot of ground in East Youngstown, near its mills, to be used for playground purposes.

E. E. Erskine, an attorney of Steubenville, Ohio, states that the project that he and others had under way for the building of a new steel plant at Toronto, Ohio, has been abandoned on account of the result of the Presidential election.

Niles blast furnace of the Carnegie Steel Company, Niles, Ohio, was banked several days last week for lack of coke.

The annual meeting of stockholders of the Standard Underground Cable Company, Pittsburgh, will be held Jan. 23, 1917, at which time it is proposed to ask the stockholders to authorize an increase in the capital of the company, which at present is $3,500,000. The amount of the proposed increase has not as yet been definitely settled by the board of directors.

The Chemical Refractories Company, Youngstown, Ohio, has been organized with a capital of $10,000 to engage in the manufacture of chemicals for industrial purposes.

The Steel City Construction Company, Pittsburgh, capital $5,000, has been incorporated by O. M. Lewellyn, Greensburg, Pa.; A. Waldbauer and I. C. Overdorff, Pittsburgh, for general contracting and building construction.

The Stimson-Kennedy Company, Pittsburgh, capital $20,000, has been incorporated by Robert Stimson, Charles F. Mautz and Henry L. Dietrich, for manufacturing plumbing, drainage, gas lighting and heating supplies.

The Sistersville Boiler Works, Sistersville, W. Va., is in the market for two 10-ton cranes, 50-ft. span, and one 5-ton crane, with 30-ft. span, all hand operated. These are to be installed in a fireproof building, 100 x 110 ft., with lean-to, 30 x 100 ft., to be erected this winter.

The report that the Brier Hill Steel Company, Youngstown, will build additional by-product coke ovens after the 84 ovens now building are completed, is officially denied.

The Marshall Foundry Company, Pittsburgh, has placed an order with the Cleveland Crane & Engineering Company, Wickliffe, Ohio, for two 20-ton cranes to be installed in its plant at Josephine, Pa. The Pittsburgh Crucible Steel Company has placed an order with the same crane company for one 25-ton crane to be installed in its open-hearth steel plant at Midland, Pa.

The Rodney Pierce Optical Company, Pittsburgh, capital $50,000, has been incorporated by Rodney and George R. Pierce, Pittsburgh, and Walter G. King, New York, for manufacturing optical goods, scientific instruments, etc.

The Philadelphia Company, Pittsburgh, and its subsidiaries, the Equitable Gas Company and the Monongahela Natural Gas Company, have notified industrial consumers of natural gas that their contracts will be terminated at midnight, Nov. 30. These companies now quote rates for gas on the basis of 27½c. per 1000 cu. ft. for the first 1,000,000 cu. ft. of consumption per month, ranging down to 17c. per 1000 cu. ft., which is the minimum price for any quantity. It is understood that they desire industrial consumers to equip themselves for using other kinds of fuel so as to conserve the supply of natural gas for domestic consumers who pay much higher rates.

The Westinghouse Electric & Mfg. Company, East Pittsburgh, has extended its bonus system to include salaried and office employees on hourly rates. They will receive a bonus of 8 per cent of their salary each month, providing their total excusable time absent and late during the month does not exceed six hours, incurred on not over three occasions. An additional 4 per cent will be given each month to the employee who has not lost any time through absence or tardiness, thus enabling those affected to obtain an increase in earnings of 12 per cent for a 100 per cent attendance. Several thousand employees of the company in the Pittsburgh district will be benefited.

Carnegie Day will be observed by the trustees and faculty of the Carnegie Institute of Technology, Pittsburgh, on Friday, Nov. 24. An exhibition of student work and of the equipment and buildings will be held from 3 to 5 and from 7.30 to 10.30 p. m. in connection with the observance of the 81st birthday of Andrew Carnegie, the founder of the institution.

Furnace No. 4 of the Shenango Furnace Company, Sharpsville, Pa., which was blown in on Sunday, Nov. 12, was completely relined, bosh and hearth enlarged, and other improvements made, in 24 days, and not six weeks, as stated in THE IRON AGE last week. It was only out from Oct. 19 to Nov. 12. This is certainly a wonderful record for rapid work. It was blown in on basic iron, and is expected to make about 325 tons per day.

The Bessemer Gas Engine Company, Grove City, Pa., has let a contract to the Duquesne Construction Company, Pittsburgh, for an extension, 100 x 200 ft., to its engine assembling and erecting floor, and also for an entirely new machine shop 100 x 200 ft. It has also ordered from the Penn Bridge Company, Beaver Falls, Pa., an addition of 60 x 100 ft. to its present foundry, and will erect an entirely new core-making room, 80 x 120 ft., to be equipped with a 5-ton crane; also a pattern shop and a pattern storage room, each 60 x 120 ft. All the new buildings will be of steel and reinforced concrete, with saw-tooth roofing. The additions will greatly enlarge the capacity of the company in the manufacture of gas and oil engines.

The Hydraulic Press Mfg. Company, Mount Gilead, Ohio, has received an order from the Goodyear Tire & Rubber Company, Akron, Ohio, for 70 hydraulic hot-plate presses, all of one design, and with a pressure capacity of 115 tons each.

The Standard Steel Car Company, Butler, Pa., of which A. N. Fay is purchasing agent, states that the loss occasioned by the recent fire in its power and electrical departments was greatly overstated. The damaged portions of the plant have been repaired, new tools have been bought to replace those crippled by the fire, and the entire plant is now working to normal capacity.

The Pittsburgh Iron & Steel Foundries Company, Midland, Pa., maker of ingot molds, being oversold, has placed an open order with the Edgewater Steel Company, Oakmont, Pa., for 150 tons of steel ingot molds per day.

The Engineering Library in New York

Dr. James Douglas of New York has presented $100,000 to the United Engineering Society, the income to be used for the benefit of the library, which occupies two floors in the Engineering Societies Building in New York. The trustees of the society have perfected plans for the development and the extension of the usefulness of the library and are endeavoring to secure endowments aggregating $1,000,000, the income to be used for the library. The plans of the trustees having been submitted to and examined by Dr. Douglas, he signified his approval by the gift of $100,000. Now that the library of the American Society of Civil Engineers has been united with the libraries of the institutes of Mining, Mechanical and Electrical Engineers the combined library forms, it is stated, the greatest engineering collection in the world.

The Hart-Parr Company, Charles City, Iowa, will build a new steel foundry, to be equipped with two additional 25-ton open-hearth furnaces. The new construction will cost $100,000 and will bring the company's steel capacity up to 200 tons a day.

Judicial Decisions

ABSTRACTED BY A. L. H. STREET

AUTHORITY OF TRAVELING SALESMEN.—Except as the employer of a traveling salesman or sales representative may have expressly or impliedly held him out to customers as being authorized to do so, the salesman has no authority to receive payment of amounts due from customers for goods sold on credit. Customers are not entitled to rely upon the salesman's statements as to the extent of his authority, and they act at their peril in dealing with him without ascertaining the full scope of his authority. The fact that an agent by whom property has been sold on credit is in possession of the statement of account covering such goods gives him no implied power to collect. And when it appears that a salesman has unauthorizedly made a collection and failed to account for it, the loss falls on the customer who made the payment. (Washington Supreme Court, Woodworth vs. School District, 159 Pacific Reporter, 757.)

RIGHTS OF PREFERRED STOCKHOLDERS.—Holders of preferred stock in a New Jersey corporation having delayed three years in objecting to a plan for the reduction of the capital stock of the company by retiring the preferred stock, and the plan having been adopted by more than 90 per cent of the stockholders, and debentures having been issued on the supposition of the validity of the reduction, the right to object was lost. (New Jersey Court of Errors and Appeals, Lazear vs. American Steel Foundries, 98 Atlantic Reporter, 642.)

DUTY TO PROVIDE CARS FOR F. O. B. SHIPMENTS.—In deciding that a contract to sell goods f.o.b. car at point of shipment placed the duty on the seller to furnish the necessary car, in the absence of agreement to the contrary, the New Mexico Supreme Court follows decisions of the highest courts of Alabama, Kansas, Washington and Wisconsin to the same effect. But the court notes that a contrary rule has been declared by the Pennsylvania Supreme Court, and that the Illinois Supreme Court has declared it to be an undecided question in Illinois. (Culp vs. Sandoval, 159 Pacific Reporter, 956.)

EXCLUSIVE SALES AGENCIES AND ANTI-TRUST LAWS.—The Kansas anti-trust law is not violated by an agreement whereby a local dealer is made sole agent for the sale of a manufacturer's machinery in his territory. (Kansas Supreme Court, Zellner Mercantile Company vs. Parlin & Orendorff Plow Company, 159 Pacific Reporter, 391.)

THE INCOME TAX LAW AND EXPORTS.—Corporations engaged in doing an export business are not entitled to a deduction from their income, in computing income taxes, on account of profits accruing from exportation of goods to foreign countries, on the ground that such taxation amounts to a tax upon exports in violation of the federal constitution. "Obviously, general taxation on production may discourage exports, yet that gives no relief as to articles intended for foreign parts. By the same reasoning, profits or income from exports should be taxable, because subsequent to the act of export. Income or profit presupposes a successfully completed transport. It is no part of the act of exportation, though it may be said to be a result thereof. Similarly the fact that taxation of the fruits of exportation may discourage business quite as much as anticipatory taxation on the goods transported is immaterial." (United States District Court, Southern District of New York, Wm. E. Peck & Co. vs. Lowe, 234 Federal Reporter, 125.)

EMPLOYER NOT BOUND TO INSPECT SIMPLE TOOLS.—The obligation of an employer to cause to be made reasonable inspection of machinery and appliances which may injure workmen if in defective condition does not extend to such simple tools as hammers and mauls. (Wisconsin Supreme Court, Kolasinski vs. Chicago, Milwaukee & St. Paul Railway Company, 159 Northwestern Reporter, 563.)

EXAMINATION OF TRADEMARK INFRINGER'S BOOKS.—In determining the amount of damages to be awarded for infringement of a trademark, plaintiff is not entitled to inspect the defendant's books, not in evidence, and in advance of the final hearing, for the purpose of ascertaining therefrom the names and addresses of defendant's customers to whom sales of infringing articles have been made, when such information might be used to the commercial prejudice of the defendant. But this does not mean that production of the books might not be compelled at the trial if necessary to show the damages resulting from the infringement. (United States District Court, Eastern District of Pennsylvania, Cushman & Denison Manufacturing Company vs. L. F. Grammes & Sons, 234 Federal Reporter, 949.)

WAIVER OF RIGHTS UNDER PATENT INFRINGEMENT.—Where an owner of a patent, knowing of its infringement through continued manufacture and sale of a conflicting device, waited several years before suing for an accounting, he lost the right to recover possible profits or damages for that period. (United States District Court, Southern District of New York, Vacuum Cleaner Company vs. Innovation Electric Company, 234 Federal Reporter, 942.)

PRIORITY OF RIGHTS UNDER CONDITIONAL SALE CONTRACTS.—On failure to record a contract for sale of machinery, or other personal property, under which the seller has reserved title until payment of the purchase price, his rights are subordinate to those of any third person who may afterward buy the property or take a mortgage thereon, in good faith and without notice of the seller's attempted reservation of title. But the rights of the seller are paramount to those of one who took a contract from the buyer, before the conditional sale contract was made, under which a lien was given on property to be acquired by the buyer in the future. (United States Circuit Court of Appeals, Eighth Circuit, United States Fidelity & Guaranty Company vs. G. W. Parsons Company, 235 Federal Reporter, 114.)

WARRANTY OF MACHINERY'S CAPACITY NOT WAIVED.—The fact that a buyer of a refrigerating machine gave the seller a written statement that the machine conformed to the specifications under which it had been sold, after it had been installed and operated by the seller's engineer for two days, did not release a warranty, made by the seller as part of the contract of sale, that the machine would have a certain refrigerating capacity. (Michigan Supreme Court, Brown vs. Pendergast, 159 Northwestern Reporter, 541.)

EFFECT OF WARRANTY IN SELLING FURNACE.—A manufacturer having sold a furnace for use in a steam power plant under agreement that the buyer should give it 30 days' trial and that, if the furnace should not prevent emission of smoke to the satisfaction of the city smoke department, the manufacturer would remove it, the burden was on him, in an action to recover the agreed price after the buyer refused to finally accept the equipment, to show that the city smoke department approved it. The duty being on the selling manufacturer to remove the furnace on it failing to meet the conditions of the contract, and the buyer having ordered him to remove it, the buyer's continued use of the furnace pending its removal did not waive the right to reject it, especially since operation of the buyer's plant would otherwise be interfered with. (Iowa Supreme Court, McMillan vs. Jaeger Manufacturing Company, 159 Northwestern Reporter, 208.)

VIOLATION OF PATENT LICENSE AS INFRINGEMENT.—The owner of a patent may sell or authorize others to sell the patented article without limitation as to price, time, or place, or he may limit his licensees as to price, time or locality. Any sale beyond the terms of the license is an infringement. (United States Circuit Court of Appeals, Fourth Circuit, L. E. Waterman Company vs. Kline, 234 Federal Reporter, 891.)

WHEN THERE IS NO PATENTABLE INVENTION.—The dividing of a thing, which in the prior art was whole, into parts, or the making of a part removable, which was previously irremovable, does not constitute patentable invention. (United States District Court, District of New Jersey, Wirtalla vs. Hall, 235 Federal Reporter, 306.)

Iron and Industrial Stocks

NEW YORK, Nov. 22, 1916.

The stock market has been furiously active, with prices of numerous industrial securities advancing to new high records. The advances in some instances have been due to rumors of impending consolidations, while in others they have been simply brought about by reports of large profits and of further bookings of attractive contracts. The usual warnings are being given to speculators by conservative banking interests, but the disposition of the public to purchase stocks is persistent. In striking contrast to the course of other stocks, Driggs-Seabury fell on Friday from 80 to 69, recovering to 80 on Saturday. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week is as follows:

Allis-Chal., com..	31½	- 33½	
Allis-Chal., pref..	89	- 91	
Am. Can, com...	63½	- 67⅜	
Am. Can, pref...	113½	-114½	
Am. Car & Fdy., com.	68¾	- 77¾	
Am. Car & Fdy., pref	117	-117¾	
Am. Loco., com..	92½	- 95⅞	
Am. Loco., pref..	107⅛	-108¾	
Am. Ship. com...	66½	- 70	
Am. Ship pref...	95	- 96	
Am. Steel Fdries.	65½	- 72½	
Bald. Loco., com.	83½	- 89	
Bald. Loco., pref.	107½	-108¾	
Beth. Steel, com.	648	-700	
Beth. Steel, pref.	155	-186	
Cambria Steel...	130	-135	
Carbon Stl., com.	128	-133	
Case (J. I.), pref.	86½	- 89	
Central Fdy., com.	18	- 21	
Central Fdy., pref.	32	- 40½	
Chic. Pneu. Tool.	71	- 73	
Colo. Fuel.....	53⅝	- 61⅞	
Cruc. Steel, com.	87½	- 93⅜	
Cruc. Steel, pref.	120½	-123½	
Deere & Co., pref.	94⅜	- 95	
Driggs-Seabury .	69	- 86	
Gen. Electric....	180	-185¾	
Gt. No. Ore Cert.	42¾	- 47⅝	
Gulf States Steel.	144	-193	
Gulf States Steel, 1st pref.	105	-108½	
Gulf States Steel, 2nd pref.	140	-190	
Int. Harv. of N. J., com.	117	-117¾	
Int. Harv. of N. J., pref		...120	
Int. Harv. Corp., com.	79¼	- 80½	
Int. Harv. Corp., pref		.111¼	
La Belle Iron, com	80½	- 94½	
La Belle Iron, pref.	132½	-133	
Lackaw. Steel ...	96⅝	-107	
Lake Sup. Corp..	25⅛	- 29¾	
Midvale Steel...	68¼	- 74⅝	
Nat. Ed. & Stm., com	33¼	- 36	
Nat. Fn. & Stm., pref.	100	-100½	
N. Y. Air Brake.	170	-186	
Pitts. Steel, pref.	103	-104½	
Pressed Stl., com	78⅛	- 88¼	
Pressed Stl., pref.	105⅝	-108	
Ry. Stl. Spring, com.	53⅞	- 58⅝	
Ry. Stl. Spring, pref.	102	-102¼	
Republic, com. ..	83	- 93	
Republic, pref. ..	115	-117	
Sloss, com.	80½	- 92¼	
Sloss, pref.	101⅞	-103½	
Un. Alloy Steel..	49¼	- 51⅜	
U. S. Pipe, com .	25	- 28⅛	
U. S. Pipe, pref..	65	- 67½	
U. S. Steel, com..	121½	-129	
U. S. Steel, pref..	121	-122⅛	
Va. I., C. & Coke.	58½	- 72¾	
Warwick	93	- 10	
Westing. Elec....	63⅞	- 66⅛	

Dividends

The Republic Iron & Steel Company, regular quarterly, 1¾ per cent on the preferred stock, in addition to 4 per cent in full payment of arrears on that stock, both payable Jan. 1.

The General Electric Company, regular quarterly, 2 per cent. payable Jan. 15.

The Crucible Steel Company of America, regular quarterly, 1¾ per cent on the preferred stock, and an extra of 1¼ per cent on back dividends, payable Dec. 21. This leaves 18½ per cent still due in dividends on the preferred stock.

Fairbanks, Morse & Co., Ltd., regular quarterly, 1½ per cent on the preferred stock, payable Dec. 1.

The Gulf States Steel Company, regular quarterly, 1¾ per cent on the first preferred stock, payable Jan. 1.

The Harbison-Walker Refractories Company, regular quarterly, 1½ per cent on the preferred stock, payable Jan. 20.

The Maxwell Motors Corporation, regular quarterly, 2½ per cent on the common stock, 1¾ per cent on the second preferred and 1¾ per cent on the first preferred, all payable Jan. 2.

The National Lead Company, regular quarterly, 1 per cent on the common stock, payable Dec. 30.

The Pressed Steel Car Company, regular quarterly, 1½ per cent on the common stock, payable Dec. 6, and 1¾ per cent on the preferred stock, payable Nov. 22.

The Columbia Steel & Shafting Company, Pittsburgh, has established a branch sales office at 803 Widener Building, Philadelphia, which is in charge of J. T. Somers, as district manager of sales. Mr. Somers has had charge of sales in the Eastern territory for several years, but has made his headquarters at the general offices of the company at Pittsburgh.

The Midwest Forge & Steel Company, with works at East St. Louis, Ill., and general offices in the Wright Building, St. Louis, announces the purchase of the Heller Forge Works and the Western Forge Company, East St. Louis, which were founded 25 years ago. This company claims to operate the largest steam forge hammers in the Middle West.

Scandinavian and Russian Trade Service

George Schow, conducting a foreign trade service bureau as accredited representative for Europe for American manufacturers, with headquarters at Christiania, Norway, has consolidated his Russian and Scandinavian interests with the Northern Engineering & Trading Company, increasing the capital to 1,500,000 crowns. The headquarters will continue at Christiania. The president of the company will be Halfdan Steen-Hansen and F. Morch-Reiersen, Jr., will be managing director of the Norwegian office. A branch in Petrograd, Russia, will be in charge of Fedor Andrejevitsch Byström, and branches at Moscow and Samara, Russia, will be in charge of Kort Köpke. A branch in Stockholm, Sweden, will be under the charge of Capt. Erik Cronvall. A branch in Copenhagen, Denmark, will be established in the near future. The office in New York City is in charge of Ingvar Tokstad, president of the Normanna Company, Inc., 117 East Eighteenth Street, who is also secretary of the Norwegian-American Chamber of Commerce at New York. Mr. Schow will be the general manager of agencies for all the countries referred to and will spend much of his time traveling and working in connection with the branch offices.

Machinists' Strikes in New York and New Jersey

The strikes for an eight-hour day, involving machinists in 50 metal-working plants in New York City, Jersey City, Newark, Hoboken and Elizabeth, brought at various times in the past year have, with few exceptions, been broken through the efforts of the New York and New Jersey branch of the National Metal Trades Association. At present two important strikes are still on in the New York district. The boilermakers, iron ship builders and helpers of the Morse Dry Dock & Repair Company are demanding the recognition of their union. Of the 500 workmen who have gone out 200 have been replaced. Shipyard work is on an eight-hour basis with three shifts. The Bartlett & Haywood Company, Baltimore, erecting tanks in Brooklyn, is opposing 300 members of the Brotherhood of Boilermakers and Iron Ship Builders on the question of an advance from $4.50 to $5 a day.

Becker Milling Machine Company Sold

The Becker Milling Machine Company, Hyde Park, Mass., has been acquired by the Manufacturers' Company at a price reported to be $2,000,000. Robert E. Herrick succeeds Eugene N. Foss as president. This adds another concern to the "Herrick Group," in which the Reed-Prentice Company and the Wyman-Gordon Company, Worcester, Mass., are included. It is understood that no changes will be made in the operating force.

Record Exports of Locomotives

Exports of steam locomotives from the United States for the period ended Aug. 31, 1916, were 432, or 54 per month, the total value being $6,192,000. The rate in 1915 was 52 per month, with a total of 621. The previous record was in 1913, when 491 were exported. In July and August this year 62 and 69 locomotives were shipped abroad.

In the opening of the wireless telegraph service between the United States and Japan, the American Steel Export Company sent a message to its Tokio agents. Aall & Co. This was the first to follow the official greetings, it is understood, and was itself congratulatory, reading: "Marconi's latest triumph inaugurates new era in interchange of commodities and ideas between our nations instituted by illustrious Perry."

The National Enameling & Stamping Company's new rolling mill at Granite City, Ill., begins operations this week, turning out both light and heavy sheets and bars for outside consumption as well as for company use. For the present the company will absorb about 50 per cent of the output and the remainder has been contracted for by a large equipment company.

Machinery Markets and News of the Works

FEW LARGE ORDERS BOOKED

Italian and Spanish Interests Buying

Harroun Motors Company Placing Orders in Detroit—Russians Figuring on Tools for Agricultural Implement Plant

The general tenor of trade is unchanged, with activity largely confined to booking orders which are small individually, although here and there some reasonably large transactions are noted. In Detroit large orders are being placed by the Harroun Motors Company for its new plant, greatly augmenting the smaller purchasing in that city.

Representatives of the Aksai Machinery Works of Russia, who are planning the purchase of a huge amount of machinery for manufacturing farm implements and machinery, have lately been in Milwaukee investigating the plant equipment question. The deliveries will be contingent on the ending of the war.

Cincinnati reports that Spanish and Italian interests have been extensive buyers recently, one order for shipment to Spain calling for a large number of small lathes. The domestic business is good in that city but no large orders are recorded.

The new demand for small lots is heavy in the aggregate in Cleveland. Lathes and milling and planing machines are especially active. The New York Central Lines are in the market for half a dozen tools.

Buying for shipment to Italy has been fairly active in New York, also, the buyers figuring closely and showing a willingness to wait for deliveries. As a rule deliveries are improving, although on the majority of tools they are still a goodly distance away.

The Pusey & Jones Company, Wilmington, Del., is placing orders for about $75,000 worth of equipment.

The Eastern trade has received the Norfolk & Western list. Several machines have been placed by the Lehigh Valley Railroad.

In the Pacific Northwest the car shortage threatens to paralyze the lumber industry, and this has an adverse effect on all lines in that territory. In San Francisco the demand for new equipment appears to be growing easier.

In Canada attention is being directed to the agricultural implement needs of Russia and Siberia.

New York

NEW YORK, Nov. 22, 1916.

With few exceptions individual sales are not large, but orders for one or more machines are being received steadily, and inquiries are numerous. Some good sales of miscellaneous tools have been made for export to Italy, the buyers figuring closely and in most cases being willing to wait for deliveries on the tools they want.

Deliveries on shaping, grinding, milling, planing and automatic screw machines, radial drills and boring mills are still a few months away with practically all makers, but hand screw machines, lathes and upright drills can be obtained on reasonably prompt delivery. Some large turret lathes require until January, others can be had more promptly. Some makes of boring mills require fully six months for delivery. Upright drills, while easily obtainable, are in excellent demand.

The New York trade is in receipt of the Norfolk & Western list calling for about 35 machines, which was referred to in the Cleveland market last week. The Lehigh Valley Railroad continues to buy.

The export inquiry for 500 turret lathes referred to a week ago is for flat turret machines.

Pusey & Jones, Wilmington, Del., are buying against a list of tools valued at about $75,000.

The F. H. Lovell Company, Arlington, N. J., is buying equipment to be used in filling a United States Government contract.

The Nathan Mfg. Company will use its new plant at Flushing, L. I., for the manufacture of its locomotive specialties, continuing its fuse work at the plant in Manhattan Borough.

The Warner & Swasey Company, Cleveland, Ohio, has had a representative in the East looking for planers, hand millers and engine lathes which can be delivered promptly.

The Steelwhite Company has been incorporated with a capital stock of $200,000 and has purchased a site at Jamestown, N. Y., adjoining the plant of the Interior Metal Mfg. Company, where it plans to erect a factory, 100 x 163 ft., for the manufacture of metal kitchen cabinets, tables and special hospital equipment. It is expected to have the plant in operation early next year. Otho M. Otte, treasurer and general manager of the Interior Metal Mfg. Company, will be at the operating head of the new organization. The company controls a process of welding non-ferrous metals to ferrous metals, which will be utilized in covering steel tops, tables, etc. The plant will be equipped with motor-driven machines throughout, and the work will be done by assembling on traveling benches. Among the Pittsburgh capitalists who have become interested in the company are Julian Burdick, treasurer West Penn Steel Company; James Lippincott, president West Penn Steel Company, and James W. Arrott, Jr., director of the Standard Sanitary Mfg. Company. General sales offices are to be established in Pittsburgh.

The American Car & Foundry Company, 165 Broadway, New York, will spend $150,000 enlarging its plant at Milton, Pa. This is the second increase in capacity to this plant within a year. A car-finishing shop is just being completed. The proposed improvement will be a car building shop, 100 x 400 ft., a foundry, and additions to other main buildings. New machinery will be added, which will practically increase the present output of tank cars and tanks 50 per cent. It is stated that this plant, as it now stands, has by far the largest capacity for work of this kind of any plant in the world.

Recent increases in capital stock have been reported by the Secretary of State, Albany, as follows: The Solar Metal Products Company, 1182 Broadway, New York, $200,000 to $400,000; the Modern Tool & Machine Works, 176 Worth Street, New York, $10,000 to $20,000; the Improved Metal Cap Specialty Company, 337 Sumner Avenue, Brooklyn, N. Y., $15,000 to $75,000; the Frank D. Ward Automatic Machine Corporation, 17 Battery Place, New York, $10,000 to $25,000.

The Doehler Die Casting Company, Court and Ninth streets, Brooklyn, N. Y., has awarded contract to the Turner Construction Company, 11 Broadway, New York, for a seven-story addition to its plant, 50 x 100 ft., to cost about $150,000.

Gould & Eberhardt, Newark, N. J., manufacturers of shapers and other machinery and tools, have awarded a contract for the erection of a new plant on Chancellor Avenue, Irvington, N. J., at a cost of $225,600. Frank H. Smith, Inc., Blanchard Street, Newark, is the contractor.

The Joseph Dixon Crucible Company, 135 West Side Avenue, Jersey City, N. J., will make alterations and extensions in its plant to cost $11,000.

J. J. O'Connor Company, Inc., 1 Exchange Place, Jersey City, N. J., has been incorporated with a capital of $100,000 to manufacture barrels and kindred products. R. F. Norton, A. E. Pettersen and John A. Warnock are the incorporators.

The Motor Steam Generator Company, Atlantic City, N. J., has been incorporated to manufacture devices for internal

combustion engines. Charles W. Evans and Robert J. Eccles are the incorporators.

The Stoneware Electric Stove Company, Dover, N. J., has been incorporated with a capital of $50,000 to manufacture electric stoves and heating devices. Arthur O. Christensen and John L. Sullivan, Dover, and William Taylor, Plainfield, are the incorporators.

The Kent Motors Corporation, 1790 Broadway, New York, has approved plans for its new plant to be erected on Washington Avenue, Belleville, N. J. The plant will specialize in the manufacture of bodies and radiators for touring cars and roadsters, and will have a capacity of about 10,000 cars a year. Employment will be given to about 2000 men. Additional property has been secured for future expansion.

The Nonpareil Auto Car Mfg. Company, Glens Falls, N. Y., has filed articles of incorporation to manufacture motor cars, etc. A. Sansoucy, P. Freund, Troy, N. Y., and N. Favreau, Cohoes, N. Y., are the incorporators. The capital stock is $30,000.

The United Motors Corporation, Detroit, Alexander P. Sloan, president, has acquired the Houk Mfg. Company, Buffalo, maker of wire wheels for automobiles, and additional investments will be expended by the purchasing company at an early date on extensions and equipment at the Houk plant, more than doubling its present capacity. Under the terms of transfer of the Houk Mfg. Company, George W. Houk, the organizer of that company, will be retained as its president and general manager, and will also become a member of the board of directors of the United Motors Corporation.

The Union Tool Company, Rochester, N. Y., is erecting a factory on North Street, 50 x 120 ft.

Arrangements are being made for the rebuilding of the plant of the Phoenix Foundry Company, Voorheesville, N. Y., recently destroyed by fire.

The International Burr Corporation, Watertown, N. Y., has been incorporated with a capital stock of $25,000 to manufacture burrs and paper. F. H. Clark, W. Aiken and A. H. Rector, Watertown, are the incorporators.

Plans have been completed for a two-story factory to be erected at Court and Jay streets, Binghamton, N. Y., by W. E. Ogden & Co., at an estimated cost of $35,000.

The Model Furniture Mfg. Company, Inc., Canisteo, N. Y., has been incorporated with a capital stock of $40,000. A. Mann, Canisteo, and A. M. Rabinovic, 303 West 111th Street, and D. Mann, 509 West 160th Street, New York City, are the incorporators.

The Smith & Sons' Company, manufacturer of hairpins, etc., Lambertville, N. J., has purchased the plant of the Buffalo Veneer Company, Buffalo, N. Y., a three-story stone factory, 80 x 200 ft., at Main Street and the Erie Railroad and will equip it for the manufacture of its products.

The House Wire Wheel Company, D. S. Morgan Building, Buffalo, N. Y., recently incorporated, is making arrangements for the erection of a plant for the manufacture of wire wheels for automobiles, on a site recently acquired.

The Gleason Works, Rochester, N. Y., has let contract to the Ferguson Steel & Iron Company, Buffalo, for construction of a one-story addition to its plant on University Avenue.

The Geneva Cutlery Company, Geneva, N. Y., has let contract for an addition to its plant.

The Buffalo Dry Dock Company will build a two-story reinforced concrete warehouse and shop at its plant on Buffalo River, Ganson Street and the Buffalo Creek Terminal Railroad, Buffalo.

The American Radiator Company will build a further addition to its Pierce Plant at Elmwood Avenue and the New York Central Railroad, Buffalo, to cost about $27,000.

The Nichols & Wright Motor Company, Buffalo, manufacturer of motors and engines for automobiles and motor boats, will build a new factory, of concrete block construction, on Park Ridge Avenue.

The Blaw Steel Construction Company, 165 Broadway, New York, has been awarded the contract to erect a 1½-story brick and steel factory, 50 x 280 ft., at Shooters Island, for the Standard Shipbuilding Company, 44 Whitehall Street, New York.

Frederick W. Korfmann, 409 Ninth Avenue, Long Island City, N. Y., is preparing plans for alterations to the six one-story warehouses and the two brick boiler houses at the foot of Blackwell Street, for the Astoria Veneer Mills & Dock Company, estimated to cost $25,000.

F. J. Ashfield, 350 Fulton Street, Brooklyn, N. Y., has completed plans for the addition to the one-story boiler house, at Driggs Avenue and North Tenth Street, for the Williamsburg Power Company, to cost about $3,000.

New England

[illegible], Mass., Nov. 20, 1916.

Although the embargo on the New Haven Lines has been partially lifted so that less than carload lots originating in New England can be moved, the railroad situation is still serious. On Oct. 23 [illegible] on this system, but on Nov. 9 the [illegible] nearly the total registered during the embargo days of a few months ago.

The New Haven Manufacturing Company, New Haven, Conn., has been incorporated with [illegible] capital paid in. Charles M. Brennan is president; W. F. Brennan, vice-president and [illegible].

The Terry Steam Turbine Company, Hartford, Conn., is having built a [illegible] to be used as a stockroom.

The Acme Wire Company, New Haven, Conn., has increased its capital stock from $500,000 to $1,500,000.

The Schroeder Brothers Mfg. Company, Torrington, Conn., has awarded a contract for [illegible], two stories.

The Knox Motor Company, Springfield, Mass., will begin at once the manufacture of an aeroplane engine invented by Frank H. Trego, its chief engineer. It is reported to be the largest aeroplane engine in the world, weighing fully equipped 1100 lb. and developing over 300 hp. The [illegible] also adaptable for motor boats.

The American Chain Company, Bridgeport, Conn., is erecting an addition, 50 x 75 ft., three stories, to its office building.

The Waterbury Farrel Foundry & Machine Company, Waterbury, Conn., has awarded the contract for the erection of two factory buildings at Bank and Meadow streets: One 40 x 180 ft., two stories; the other, 35 x 150 ft., one story.

The Berbecker & Rowland Mfg. Company, Waterville, Conn., is to build an office building, 40 x 40 ft., three stories.

The Baush Machine Tool Company, Springfield, Mass., has developed a Berthier machine gun in both water-cooled and air-cooled models which will be entered in the competition to be conducted next spring at the Springfield Armory for the final selection of a gun for the United States Army. The original Berthier gun was a Belgian invention and its manufacture had just been begun when the European war broke out. When Liege fell, the four guns which had been made and the plans were removed in safety and the designs were subsquently sold to an American company.

The Scovill Mfg. Company, Waterbury, Conn., has awarded a contract for an addition, 16 x 144 ft., one story, to its factory on Hamilton Avenue.

The New England Westinghouse Company, Springfield, Mass., is building an addition, 29 x 32 ft., four stories, to its plant on Page Boulevard.

The Bela Body Company, Boston, Mass., has been incorporated with capital stock of $800,000. The directors are Lowell Hunt, president; Norman B. French, 128 Fuller Street, Brookline, treasurer, and George C. Shea.

The Baldwin Chain Company, Worcester, Mass., has awarded a contract for an addition, 35 x 52 ft., one story, to be used as an annealing plant.

The United Electric Light & Waterbury Company, Waterbury, Conn., has announced that it is to build at Devon, Conn., a power plant which will generate current for light and power for much of the Naugatuck Valley. It is estimated that the total cost will be over $1,000,000.

The New England Drawn Steel Company, Mansfield, Mass., has been incorporated with capital stock of $210,000. The directors are William B. McSkimmon, president; Clifford L. Lyall, Melrose, treasurer, and H. Griffith.

The Hartford Machine Gun Company, Hartford, Conn., has been incorporated with capital stock of $100,000. The incoporators are E. Henry Hyde, Hartford, and William C. Hungerford, New Britain, and Theodora Ellsworth of Windsor. The real owners as well as the plans of the company have not been divulged.

The Eastern Motors Company, Hartford, Conn., has been organized with capital of $675,000. Willis D. Upson of Waterbury holds 6744 shares of the stock issued.

The Beach Mfg. Company, New Haven, Conn., has been incorporated with capital stock of $500,000. The incorporators are Harry G. Day, Thomas M. Stele and W. J. Beach. The present output of the company, which is now operating in a small way, is mechanical toys, but it is understood that it will later build aeroplanes and will manufacture military and naval equipment and ordnance.

The Ideal Mfg. Company, New Haven, Conn., which was taken over some time ago by the Marlin Arms Corporation, has been purchased from that company by Phineas M. Tal-

cott of Hartford. The Ideal Mfg. Company has taken quarters in the Sheldon Building and will manufacture reloading tools.

The Bridgeport Steel Company, Stratford, Conn., will begin business with capital of $50,000. George Windsor is president and treasurer; W. H. Leonori, vice-president, and B. A. Scrymser, secretary.

The Champion Horse Shoe Company, Providence, R. I., has increased its capital stock from $200,000 to $300,000.

The Locomobile Company, Bridgeport, Conn., is asking bids on a factory, 100 x 160 ft., one story.

Harvey Hubbell, Inc., Bridgeport, Conn., has awarded a contract for an addition, 30 x 90 ft., one story.

The Franklin Machine Company, Providence, R. I., will extend its foundry by additions, 34 x 98 ft. and 56 x 140 ft.

The Greenfield Machine Company, Greenfield, Mass., has awarded a contract for an addition, 50 x 100 ft., one story.

The American Steel & Wire Company, North Works, Worcester, Mass., has awarded a contract for an addition, 50 x 191 ft., one story.

Philadelphia

PHILADELPHIA, PA., Nov. 20, 1916.

The Pennsylvania Equipment Company, Coleman Building, Philadelphia, is in the market for a second-hand 50 ton locomotive crane.

The Cyclone Mfg. Company, Bradford, Pa., formerly manufacturer of stationary and portable vacuum cleaners, has discontinued that line and will hereafter do general light contract work.

The Edward G. Budd Mfg. Company, maker of sheet-steel shapes, etc., Philadelphia, advises that the account given in some quarters that it is erecting a building of six acres for the Budd Wheel Corporation, is entirely erroneous. It is erecting buildings, which when completed will comprise approximately 6 acres of floor space, but this is in the development of its own business, and is not being erected exclusively for the Budd Wheel Corporation, which will occupy only a small part of these buildings. William B. Read is secretary.

The Lozier Brothers Company, Widener Building, Philadelphia, has filed incorporation papers in Delaware with a capital of $10,000,000, to manufacture automobiles. It is announced that a plant will be erected near Philadelphia with an initial cost of about $2,500,000 for the manufacture of automobiles. Harry A. Lozier, former president of the Lozier Motor Car Company and the H. A. Lozier Company, Cleveland, is head of the new company. Engineering offices are being maintained at Cleveland.

The Pennsylvania Flexible Metallic Tubing Company, Philadelphia, will build a one-story tube shop, about 45 x 107 ft., at Seventy-third Street and Elmwood Avenue.

The Philadelphia Screen Mfg. Company, Philadelphia, will build an addition to its machine shop at Fifty-sixth Street and Paschall Avenue.

The Philadelphia Enameling Mfg. Company, Philadelphia, which recently awarded a contract for the erection of a plant on Eighty-second Street, has filed articles of incorporation at Dover, Del., with a capital of $500,000. William E. Groll, L. Groll, East Lansdowne, Pa., and Lewis J. Matthias, Philadelphia, are the incorporators.

John H. Ferguson, Philadelphia, has awarded a contract to H. Reusswick for the erection of a one-story machine shop, 36 x 150 ft., at Broad Street and Hunting Park, at a cost of $10,000.

The L. H. Gilmer Company, Philadelphia, manufacturer of belting, will build a two-story, steel and concrete addition, 50 x 160 ft., on Keystone Street, Tacony.

The Quaker City Drop Forge Company, 229 Market Street, Camden, N. J., has been incorporated with a capital of $150,000 to manufacture drop forgings. Alfred J. Genner, Luther Marsh and William L. Layre, are the incorporators.

Fire Nov. 17, destroyed a part of the plant of the Camden Curtain Rod Company, Broadway and Jackson Street, Camden, N. J., with loss estimated at $18,000. M. O. Phillips is the general manager.

The Crossley Machine Company, State and Monmouth streets, Trenton, N. J., manufacturer of clay and rubber working machinery, has acquired the plant now occupied by the Electric Porcelain & Mfg. Company, Monmouth Street, as an addition to its present factory.

The Electric Porcelain & Mfg. Company, Monmouth Street, Trenton, N. J., manufacturer of electrical porcelain specialties, has acquired the plant formerly occupied by the Climax Pottery Company, New York Avenue and a tract of adjoining property. The company will make immediate alterations in the existing structures and remove its plant to the new site. Plans are now being prepared for an addition, 130 x 150 ft., to cost about $70,000, to be commenced early next year. H. T. Paiste, Philadelphia, is president; H. S. Yearsley is treasurer.

The Lippincott Motor Car Company, Camden, N. J., has [illegible] new garage to be erected by Kennedy & Pidcock, Inc., Trenton, on South Broad Street, Trenton, at a cost of $10,000. The structure will be about 50 x 100 ft., and is to be fully equipped for commercial work.

The Gasco Mfg. Company, Lancaster, Pa., has been organized to establish a plant for the manufacture of specialties for automobiles, including heaters and dashlights. R. W. Shreiver is president.

The Columbia Thermometer Works, Columbia, Pa., has been organized to operate a plant for the manufacture of thermometers. J. E. Blakeman is manager.

Fire, Nov. 14, destroyed the blacksmith shop and boiler plant of the Oil Well Supply Company, Bradford, Pa., with a loss estimated at $50,000.

The McManus Contracting Company, Philadelphia, has been incorporated with a capital of $25,000 by Patricius, Joseph A. and George O. McManus, 3512 Baring Street, and George F. Snyder, 1210 North Eighteenth Street, Philadelphia, to do general construction and contract work.

The Everett Motor Company, Everett, Pa., has been incorporated with a capital stock of $20,000 by James A. Sweet, Saxton, Pa., H. Frank Gump, Jr., J. Grant Hanks, Frank Howard, W. Scott Rinedollar and Lesley Blackburn, Everett, Pa., to repair automobiles, etc.

The Colonial Foundry & Machine Company, York, Pa., [illegible] incorporated with a capital stock of $20,000 by James A. Constantine, Columbia, Pa., J. E. Baker and George R. Shenberger, York, to conduct a general steel, iron and brass foundry and manufacture machinery.

Capitalized at $40,000, the Wilkes-Barre Structural Steel Company, Wilkes-Barre, Pa., has been incorporated by Harry A. Feindt, 34 John Street, Dorranceton, Pa.; James P. Carnody, 53 Vaughn Street, Dorranceton, Pa., and Michael F. McDonald, 6 Brown Street, Hanover, to design, fabricate and erect steel structures.

The Shawinigan Electro-Products Company, U. S. Fidelity & Guaranty Building, Baltimore, plans the addition of another unit to its plant in Highlandtown, Md.

The Pulaski Foundry & Mfg. Corporation, Pulaski, Va., will increase its capital stock from $25,000 to $50,000, and will succeed the Pulaski Foundry & Machine Company. It advises that all additional equipment planned has been purchased. Robert Bunts, Jr., is president.

The Hughes Foulkrod Company, Commonwealth Building, Philadelphia, has been awarded contract for constructing a one-story brick boiler house, 45 x 46 ft., for the Enduro Mfg. Company, Sixty-third and Eastwick streets, Philadelphia, to cost $7,500.

Chicago

CHICAGO, ILL., Nov. 20, 1916.

The Pullman Company, Chicago, concerning whose intent to buy largely of new equipment mention has already been made, has taken out a permit providing for the erection of a machine shop to cost $220,000. It will be of two-story construction, 130 x 240 ft.

The Linde Air Products Company, Forty-second Street Building, New York, is proceeding with the erection of its proposed one-story manufacturing plant at 3633 Wall Street, Chicago.

The Kling Brothers Engineering Works, 1302 Kingsbury Street, Chicago, will build a one-story power house to cost $4,000.

C. Jensen, 644 North Avers Street, Chicago, is building a one-story shop at 3847 West Chicago Avenue at a cost of $5,500. Contracts have been let.

The Universal Portland Cement Company, Chicago, has completed plans providing for the substantial enlargement of its plant at Buffington, Ind.

John Mohr & Sons, boilermakers, Chicago, suffered a loss estimated at $115,000 from fire which practically destroyed its shop on West Illinois Street.

The Central Manufacturing District, Chicago, has prepared plans for the development of a new industrial section, the project calling for the building of a large number of factories, power plants and other facilities.

The Armed Vise Company, Muscatine, Iowa, has been organized by J. M. O'Brien and U. G. Bond, who will build

a factory for the manufacture of acetylene welding and soldering appliances.

The H. L. Collins Company, St. Paul, Minn., will build a one-story brick factory on Myrtle Avenue in that city at a cost of $4,500.

The Wege Concrete Machinery Company, St. Paul, Minn., has been incorporated by A. J. Kroeger, E. F. Wege and C. H. Edwards and will build a plant for the manufacture of machinery to produce concrete products estimated to cost $150,000. It is expected to be ready for occupancy about Jan. 1 next.

The Northern Pacific Railroad has begun work on an addition to its shop at Northtown Junction, Minn., on which about $25,000 will be expended.

D. D. Rullman, 1804 Lathrop Street, St. Joseph, Mo., manufacturer of washing machines, will remove his business to Omaha, Neb., where a factory is about to be erected.

The Albaugh-Dover Company, Chicago, manufacturer of gears, etc., will build a plant at Norfolk, Neb., for the manufacture of farm tractors, for which an investment of $40,000 for buildings and $60,000 for equipment is planned.

The E. H. Sprague Mfg. Company, 606 South Fourteenth Street, Omaha, Neb., has been incorporated to manufacture automobile accessories. It has taken over the plant of the Standard Foundry Company of that city.

The Hutchinson Foundry & Machine Works Company, Hutchinson, Kan., is building an addition to its shop, 30 x 100 ft.

The St. Joseph Structural Steel Company, St. Joseph, Mo., T. W. Dodd, president, is building additions to its plant which will approximately double its capacity.

Detroit

DETROIT, MICH., Nov. 20, 1916.

The activity in the machinery market has been augmented by large orders placed by the Harroun Motors Company for its new plant at Wayne, Mich. Numerous small orders have kept the market very active and jobbers all report a big fall business. The delivery on small machines has bettered considerably, but the higher priced machines, particularly grinding and milling machines, still require from 3 to 6 months for delivery.

The Federal Motor Truck Company, Detroit, is erecting an addition to its factory and installing additional machinery. Another machinery building and assembling plant will be constructed immediately. M. L. Pulcher is general manager.

Work on the construction of a factory for the Universal Valveless Four-Cycle Motor Company, a new industry at Muskegon, Mich., will be started soon. The company is incorporated for $250,000 by Muskegon and Grand Rapids capitalists. I. A. Anderson is the patentee of its product.

The L. M. H. Development Company has been capitalized at $30,000 by Clarence Martin, Jackson, Mich., John Hurlburt, Detroit, and H. M. Leonard, former chief engineer of the Duplex-Power Car Company at Charlotte, Mich., to manufacture a four-wheel-drive tractor. It is the invention of Mr. Leonard, who is now in Charlotte, arranging for the construction of tractors for demonstration purposes.

The Superior Steel Castings Company, Benton Harbor, Mich., whose plant will open Dec. 1, has received orders for castings and gear casing from the United States Government for the construction of torpedo boat destroyers. Orders have been booked for two years ahead, and additional buildings will be erected as the business requires.

It is reported that the Cadillac Machine Company, Cadillac, Mich., is installing new machinery because of its increased business, due to war orders.

The Cadillac Motor Car Company has purchased approximately 50 acres of land on the west side of Scotten Avenue, just off of Michigan Avenue in Detroit, for the erection of a new factory. The land is reported to have cost $750,000 and the new factory building which will be erected will increase the total investment to about $2,000,000 and furnish employment to from 10,000 to 12,000 persons. H. M. Leland is president of the company, which is a subsidiary to the General Motors Company.

The Bay City Foundry & Machine Company, which recently purchased the foundry and machine shops of the M. Garland Company at Bay City, has increased its business to such an extent that an addition is being constructed to its plant.

The Port Huron Construction Company, Port Huron, Mich., has been merged with the Monroe Motor Company of Pontiac, Mich. R. F. Monroe is president of the reorganized company, and Sidney E. Jenks of Port Huron has been selected as vice-president. It will continue to operate the Port Huron plant of the Port Huron Construction Company.

A new corporation, to be known as the Allegan Steel Process Company, has been organized at Allegan, Mich., with a $[illegible] capitalization, and has started the erection of a factory building. The business of the company will be the [illegible] and the forging and [illegible] of steel. The principal officers of the company are [illegible] and the new building is expected to be completed Jan. 1.

The Blood Brothers Machinery Company, Allegan, Mich., reports the closing of [illegible] for [illegible] worth of universal joints, to be delivered within the next 6 months. The company will immediately order additional machinery, which will enable it by early spring to double its output.

The Williams aeroplane factory, Fenton, Mich., will shortly install machinery, looking for contracts to supply machines to the United States Government.

Milwaukee

MILWAUKEE, WIS., Nov. 20, 1916.

Officials of the Aksai Machinery Works, a large Russian implement and farm machinery interest, were in Milwaukee last week on a tour of Middle Western machine-tool centers, with a view to placing orders, it was stated, for $4,000,000 worth of equipment. In the party were B. I. Avilov, president of the company; V. I. Forbloom, chief engineer, and B. M. Sverdloff, manager of the commercial department. In a published interview, Mr. Avilov is quoted as saying that the intention is to contract with lathe and milling machine builders for at least 800 tools, for delivery as soon as possible. The tools, however, are intended for commercial operations at the close of the war rather than for immediate use in the production of munitions of war. Shops in this district were found sold up to the last notch for several months ahead, some as far as July 1 and Aug. 1. Any orders to be placed by the Aksai Works will go through the New York offices of the tool builders, consequently no actual transactions are noted here.

Little headway in the direction of catching up on deliveries on domestic business is being made, because of the steady demand. Business continues to be in single tools or small lots, and large-lot buying is almost entirely absent. The condition has prevailed for a number of months and is regarded as satisfactory. The release of unskilled labor from seasonal occupations has worked out slightly to the advantage of the metal-working industry, which wants skilled workmen urgently. The last report of the Wisconsin free employment bureau says the demand for boys of 16 to 18 is greater than the supply. These boys formerly worked on munitions, doing piece work, at which they earned $2 up to $3. This work now is letting up and it is hard last to get them to work for $5 or $10 a week. It is all harder, the report says, to get them to learn a regular trade.

The Western Malleable Company, Beaver Dam, Wis., has resumed partial operations in the South Center Street plant, one of its group of three foundries, two of which have been working at capacity for some time. The shortage of foundry labor, however, has made it possible to man only one furnace in the third works, although orders available greatly exceed the capacity of the group.

The West Milwaukee shops of the Chicago, Milwaukee & St. Paul Railway Company at Milwaukee are building 50 freight cars daily, and on Dec. 15 will start work on an order issued by its Chicago headquarters on Nov. 15 for 1250 ore and coal cars costing approximately $1,750,000. A. E. Manchester is in charge.

The Smith & Reading Furnace Company has been incorporated with a capital stock of $5,000 by Anthony V. Smith, Gustaf A. Reading and Winifred M. Reading.

The Four Wheel Drive Automobile Company, Clintonville, Wis., is erecting a brick warehouse, 40 x 100 ft., for the storage of its rough castings.

The Mitchell Motors Company, Racine, Wis., will build from 1000 to 1500 ft. of loading sidetracks on both the North-Western and Milwaukee railroads, making a total of nearly four miles of sidings at its plant.

The new branch plant of the Joliet Bridge & Iron Company, Joliet, Ill., at DePere, Wis., formerly the Lyons Boiler Works, is already shipping its first product, a large tank for a rubber manufacturer at Akron, Ohio.

W. Heck & Son, Wewuanee, Wis., have opened a general machinery repair shop and garage at Antigo, Wis., and are installing lathes, milling machine, drill press, welding and cutting unit, etc.

The water and light commission, Plymouth, Wis., is taking sealed bids until 8 p. m., Nov. 24, for a single stage short belt drive air compressor, a single stage centrifugal pump of

1050 gal. per min. capacity, a mixed pressure steam turbine of 100 h. hp., condensers, etc. The consulting engineer is the Thomas S. Watson Company, 1412 Majestic Building, Milwaukee. H. A. Luedtke is city clerk.

The Federal Malleable Company, 299 Sixty-fourth Avenue, West Allis, Wis., has increased its capital stock from $250,000 to $300,000 to accommodate its increased business and to cover the extension of facilities made this year. O. L. Hollister is president and C. R. Messinger is secretary.

The Universal Indicator Company, Milwaukee, manufacturing electrical voting and similar indicating devices, has increased its capital stock from $100,000 to $500,000. The company has large contracts for installing voting systems in State legislative bodies and in the capitol of the United States. B. L. Bobroff is vice-president and chief engineer.

The Foster Construction Company, Caswell Block, Milwaukee, has taken the general contract for erecting a group of buildings for the Coats & Tweed Mining Company of Duluth, Minn., at Verona, Mich., including a central heating plant, a machine shop, smithy, power house, etc., at a cost of between $175,000 and $200,000.

The Anger Engineering Company, 301-303 Sixteenth Street, Milwaukee, will close bids Nov. 26 for the erection of its new machine shop and garage, 120 x 130 ft., one story and basement.

The International Steel Products Company, Milwaukee, has been incorporated with a capital stock of $150,000 by Henry W. Gottschalk, E. Krause and G. F. Knoernschild. The promoters are not ready to announce their plans.

The Keller Pneumatic Tool Company, Fond du Lac, Wis., is having plans prepared by the Werner-Bradfield-Mead Company, Grand Rapids, Mich., for its proposed new plant at Muskegon, Mich. It will be 100 x 300 ft., one story and basement, and work will be undertaken next spring.

Cleveland

CLEVELAND, OHIO, NOV. 20, 1916.

New demand for small lots of machine tools is heavy, particularly for lathes, milling and boring machines. The call for lathes is largely for equipment adapted for very exacting work. The demand for boring machines is coming to a considerable extent from the manufacturers at Akron. Considerable business that would be placed were manufacturers able to make reasonable deliveries is being withheld. Cleveland machinery houses are getting a good volume of business from Detroit. The Burroughs Adding Machine Company placed an order with a local machinery house for $50,000 worth of screw machines and the Studebaker Corporation has practically placed an order with the same company for 40 turret lathes. Among purchasers of considerable equipment in the past few days are the Warner & Swasey Company, Cleveland, and the Morgan Engineering Company, Alliance, Ohio. The McMyler-Interstate Company, Bedford, Ohio, is in the market for 8 or 9 machines, including lathes, boring and shaping machines. Inquiry from the railroads has improved. The New York Central Lines are in the market for about a half dozen machines, including car wheel boring machines, axle lathes and wheel presses. An inquiry is pending from the Chicago, Milwaukee & St. Paul Railroad for several wood-working machines.

Plants engaged in building sugar-making machinery are filling orders for 1917 delivery and some orders for equipment for 1918 have been placed recently. The demand for locomotive cranes is very heavy and manufacturers are getting enough domestic business to keep them busy without taking export orders. A local forge shop is booking considerable foreign business, mostly in car forgings. The demand on some foundries for castings has eased up a bit because of the usual between season letup in orders from automobile manufacturers. Early in the year, when foundries were seriously handicapped by the scarcity of unskilled workmen, a great deal of colored labor was brought to northern Ohio foundries from the South. This class of labor as a general thing proved unsatisfactory, and few of these colored men are now to be found in Cleveland foundries.

The Enterprise Tool Company has taken space in a power building on East Seventy-second Street near St. Clair Avenue, Cleveland, and is installing machinery which is expected to be placed in operation about Dec. 1. It will specialize on tool work. F. J. Whitcomb is manager.

The United States Molding Machine Company, Cleveland, has increased its capital stock from $10,000 to $60,000 to provide additional capital for the growth of its business. No plant extensions are contemplated.

The Ferro Machine & Foundry Company, Cleveland, has increased its capital stock from $850,000 to $1,000,000.

The Titanic Mfg. & Machine Company, Cleveland, has been incorporated with a capital stock of $10,000 by Walter J. Schmidt and others to manufacture metal products.

The Standard Oil Company, Cleveland, has applied for a permit to erect a factory building, 80 x 275 ft., at a cost of $175,000.

The National Carbon Company, Cleveland, has acquired 65 acres of land near its plant on Berea Road, on which it plans ultimately to erect additional factory buildings.

The Sandusky Forge Company, Sandusky, Ohio, has been incorporated with a capital stock of $300,000 and will establish a plant in the building formerly occupied by the Peoples Cement Company. It is stated that equipment, including 22 hammers and accessories, was purchased in Indianapolis several months ago and will be moved to Sandusky. The officers are: President, J. Barrows, Jamestown, N. Y.; vice-president, M. C. Crow, president Crow-Elkhart Motor Company, Elkhart, Ind.; secretary and treasurer, W. H. Collier, Painesville, Ohio.

The Ney Mfg. Company, Canton, Ohio, will enlarge its plant by the erection of a three-story brick building, 35 x 85 ft.

The Myers Rubber Company, Cuyahoga Falls, Ohio, will move to Massillon, Ohio, where it has started the erection of a plant, 62 x 120 ft., to manufacture automobile tires and rubber accessories. E. H. Hachtel is president.

It is announced that a new plant will be established in Toledo, Ohio, by the Saxon Mfg. Company, for the manufacture of automobile accessories. Herman Saxon has resigned as vice-president and factory manager of the Electric Auto Lite Company, Toledo, to take charge of the new industry.

The Hibbard-Atwood Company, Toledo, has been incorporated with a capital stock of $20,000 to manufacture refrigerating equipment. Harry W. Hibbard and Charles G. Atwood are prominent in the organization.

Indianapolis

INDIANAPOLIS, IND., NOV. 20, 1916.

The Elkhart Carriage & Motor Car Company, Elkhart, Ind., has increased its capital stock from $100,000 to $300,000.

The H. & M. Auto Parts Company, Cambridge City, Ind., has been incorporated with $10,000 capital stock to manufacture automobile parts. The directors are O. E. and Al[illegible] Hinchcliff and C. J. Marson.

The Washington Plow Company, Washington, Ind., has been incorporated with $20,000 capital stock to manufacture plows and agricultural implements. M. H. Kelly, E. G. Cissel and C. K. Tharp are the directors.

The Terre Haute Handle Company, Terre Haute, Ind., has increased its capital stock from $12,500 to $25,000.

The Shelter Wood Rim Mfg. Company, Portland, Ind., has been incorporated with $35,000 capital stock to manufacture steering wheel rims for automobiles. The directors are Alonzo F. Bowers, Carl M. Bimel and Edward M. Haynes. Plans for a plant are under way.

Cincinnati

CINCINNATI, OHIO, NOV. 20, 1916.

A good sized order for lathes was received from Spain last week, and as they are of the smaller sizes, it is evident that they will not be used in munitions manufacturing. It is stated that both Spain and Italy have been lately buying more machine tools than ever before. Quite a large number of portable electric drilling machines are also being shipped to those countries. The European demand has dropped off, due to the inability to make direct shipments at this time of the year. French buyers of machine tools have lately been in the market but no large orders have been reported. The domestic inquiry is good, but only a scattered lot of orders has been booked. On account of the rapidly advancing prices on pig iron with a consequent increase in the cost of castings, it does not seem at all unlikely that builders of these machines will be compelled to advance prices at an early date.

Wood working machinery is in better demand, and makers of oil mill equipment in this vicinity report a very good outlook for next year. Manufacturers of engineering specialties have been compelled to advance prices all along the line on account of the high cost of raw materials.

The Oesterlein Machine Tool Company, Cincinnati, has temporarily decided not to construct a new plant, as was recently announced. It has leased part of the former Belmar Machine Tool Company's plant in West End and is fitting it up for [illegible] its line of grinding machines. The present Spring Grove Avenue factory will be devoted almost entirely to [illegible] its line.

J. Hammond, Cincinnati, will construct a plant on Spring Grove Avenue in the Camp Washington district, to be fitted

up for general jobbing machine work and for the construction of special machine tools.

The K. D. Lamp Company, Cincinnati, recently organized by H. R. Kerans and others, has leased a five-story factory building at 108-110 West Third Street, that will be fitted up for the manufacture of automobile lamps and other accessories.

Klein & Cohn, Cincinnati, scrap dealers, junkmen, will remove their plant to a site secured in West End, and will install additional yard equipment at the new location.

The Graves & Marshall Company, Dayton, Ohio, loader manufacturer, is fitting up a new plant on East Monument Avenue that will more than double its present capacity.

It is currently reported that the Stevens Mfg. Company, Dayton, Ohio, contemplates making still further additions to its manufacturing facilities. Details as to the extra equipment required are lacking. The company makes a specialty of dies, jigs and machine screw products.

The Kelly-Springfield Road Roller Company, Springfield, Ohio, has been consolidated with the Buffalo Steam Roller Company, Buffalo, N. Y., and the name of the new organization has been changed to the Buffalo-Springfield Road Roller Company. It is rumored that the Springfield plant will be extended.

The Western Construction Company, Columbus, Ohio, has been incorporated with $5,000 capital stock to manufacture road-building machines. R. J. Reynolds is one of the principal incorporators. Nothing has been given out as to the company's machinery requirements.

The Goodyear Metallic Rubber Company is fitting up a branch plant at Columbus, Ohio, that will be used for the manufacture of tennis shoes and other specialties.

London, Ohio, contemplates adding two generating units to its electric lighting plant.

The Dayton Malleable Iron Company, Dayton, Ohio, which recently purchased a foundry at Ironton, Ohio, intends to erect a large addition to the latter plant at an early date.

The Central South

LOUISVILLE, KY., Nov. 20, 1916.

Relief measures have been effective to a marked degree in meeting the car shortage situation, which this part of the country has been laboring under and the iron and machinery trade is noting a better feeling as a consequence. An increased activity is noted in the development of coal lands. Many inquiries relating to water and lighting plant projects are being received. The demand for motors continues brisk.

The Thomson Milling Company, Louisville, Ky., has been incorporated with capital stock of $100,000 by W. A. Thomson, W. A. Thomson, Jr., and Keith L. Bullitt.

The J. L. Strassel Company, Louisville, Ky., has purchased the wood-working plant of the Wolke Furniture Company, Louisville, for $13,000, and proposes to improve and operate it.

The Paducah Ice Company, Paducah, Ky., will liquidate and re-organize, proposing to establish a larger plant and operate on an extended scale.

The Love Foundry & Machine Company, Winchester, Ky., has been incorporated with capital stock of $10,000 by James Love, Winchester; J. C. Hey and L. B. Patterson, Cincinnati, Ohio. Mr. Love will be general manager. The company will make improvements to its plant.

The plant of the General Refractories Company, New York, located at Olive Hill, Ky., which was destroyed by fire with loss of $100,000, will be rebuilt.

Construction of the oil refinery of the Melick Refining Company, near Lexington, Ky., will begin next March, according to announcement by David L. Melick. It is estimated to cost $2,500,000.

Charles G. Frazier, New York City, and others are reported to be negotiating for purchase of shipyards plants on the Ohio River, to include the Howard Shipyards at Jeffersonville, Ind., and the Paducah Marine Ways, at Paducah, Ky. A steel fabricating plant would be established at Paducah, it is stated.

The Washington Plow Company will be incorporated at Washington, Ind., to take over the William H. Clore Mfg. Company's plow factory there, recently purchased for $40,500 by Mrs. Marie H. Kelly. C. K. Tharp, Egbert Gasell and Mrs. Kelly will be the incorporators.

The Paris Lumber Company, Paris, Tenn., was destroyed by fire with a loss of $15,000. C. M. Williams was principal owner.

The Robert R. Nixon Company, Chattanooga, Tenn., is asking for dealers' prices on a second-hand air compressor, capacity 1200 cu. ft., 100 to 125-lb. pressure, power drive

[illegible] connected to [illegible] and 2200 [illegible] direct-[illegible] current motor. Second hand if in good condition preferred.

J. R. Kinder, formerly [illegible] manager of the Leeper Stove Company, Mendota, Ohio, has completed the organization of the Saxton Furnace Company, Lancaster, Ky., which has been incorporated with a capital stock of $250,000 to manufacture [illegible]. Mr. Kinder will be president and general manager.

Birmingham

BIRMINGHAM, ALA., Nov. 20, 1916.

Conversion of steam-driven power plants to electric units continues on a broad scale, resulting in a steady and large demand for electrical apparatus. The Alabama graphite field locates new lands almost every week, and the latest finds [illegible] demand for electrical equipment. Wholesale machinery dealers report trade excellent in all quarters.

The Kirby Lumber Company, Houston, Tex., has purchased 17,000 acres of timber land in Walton and Holmes Counties, Florida, and will manufacture crossties for the New York Central Railroad.

The Atlantic Paper & Pulp Company, Port Wentworth, Ga., has been organized with J. H. Estes of Savannah, president, to manufacture pulp and paper. It has a capital stock of $1,500,000 and proposes to build a plant with a daily capacity of 50 tons.

The Newport Turpentine & Rosin Company, Milwaukee, Wis., has increased its capital stock from $100,000 to $250,000 and will erect at Pensacola, Fla., a plant costing $400,000. C. H. Turner & Co., Pensacola, have been awarded the contract for the buildings.

St. Louis

ST. LOUIS, MO., Nov. 20, 1916.

Buying of machine tools continues very free with the total running well up to recent high levels. A number of large purchasers have been in the market the past week, among them the Fulton Iron Works, which bought considerable equipment, including a large Gray planing machine. The tendency generally is still to negotiate transactions rather than to send out lists for bids and in consequence the real volume of business is rarely fully ascertainable. Dealers are held back now only by delayed delivery. Price and character of equipment are a secondary consideration. No interference in business on new tools by second-hand equipment is noticeable. Collections are very good and both commercial and investment money is readily available.

The Liquid Carbonic Company, St. Louis, Mo., has leased a five-story factory to which it will remove and install additional equipment for the manufacture of carbonic gas, fountain fixtures, carbonizing machinery, etc. A quantity of new machinery will be bought at once.

The Central Iron Company, St. Louis, Mo., has acquired a new site and will equip a shearing plant. Louis Lubins is president.

Harry Newman, Inc., St. Louis, Mo., has been organized with a capital stock of $10,000 by Charles F. Levy, Samuel V. and Harry Newman to manufacture automobile accessories.

The forgings plant recently noted to be erected by the Fulton Iron Works of St. Louis, Mo., will be operated as an independent corporation, in which the Fulton Iron Works will be interested. The total investment will be about $500,000.

The Wagner Electric Mfg. Company, St. Louis, Mo., will erect a building to add to the capacity of its Wellston plant. It will be five stories with 140,000 sq. ft. floor area and will be equipped to manufacture standard electrical products.

The Bean Spray Pump Company, San Jose, Cal., has been authorized to [illegible] of its capital in a plant to be at Lathrop, Cal.

The West Automatic Injector Company, Kansas City, Mo., has been incorporated with a capital stock of $40,000 by Charles E. West, J. H. Arnold and J. H. [illegible] Lecture steam specialties and a full line [illegible]

The Boiler and Machine Shop [illegible] City, Mo., has been incorporated with a capital stock of $50,000 by E. M. Teed, C. E. [illegible] manufacture [illegible]

Slater, Mo., is receiving bids [illegible] for a municipal [illegible] J. A. Stone [illegible]

The Kansas City Light & [illegible] Mo., will build a [illegible] 000. Plans are being [illegible]

The Prairie Light & Development Company, Little Rock, Ark., has been incorporated with a capital stock of $500,000 by S. R. Morgan, Little Rock; J. P. Perkins, St. Louis, and P. O. Lehn, Chicago, and will equip a plant to furnish electric power for nearby gins, mills, etc.

The North American Light & Power Company, 122 South Michigan Avenue, Chicago, will establish an electric light plant and ice making plant at Durant, Okla., the machinery to cost about $18,000. W. A. Boehn is president.

Stroud, Okla., will change its electric light plant from direct to alternating current. It is in the market for one 75-kw. generator and pump of 250 gal. per minute capacity, one Diesel oil engine, etc.

The Missouri, Kansas & Texas Railway will equip at Muskogee, Okla., a 15-stall roundhouse, machine shop, automatic coaling station, etc. The chief engineer at Dallas, Tex., will have charge.

Garages and machine shops will be equipped by Dodd Brothers, at Delaware, Okla., M. Mortenson at Fairfax, Okla., R. J. Hausman at Hennessey, Okla., and by Simmons & Snider at Jenks, Okla.

The Cloco Gasoline Company, Tulsa, Okla., has been incorporated with a capital stock of $100,000 by H. F. Bo[illegible]man, E. R. Perry and H. A. Gibson to equip a refining plant.

The Tulsa Gas-O Refining Company, Tulsa, Okla., has been incorporated with a capital stock of $600,000 by John B. Enfield, Tulsa, W. R. Southworth, Canton, and J. L. Hughes, Enid, Okla., to operate an oil refinery.

Marlow, Okla., E. B. Roper, city clerk, is receiving bids until Dec. 4 on one 250-hp. engine, one 130-kv. 2300-volt 60-cycle three-phase alternating current [illegible], etc.

Okmulgee, Okla., will receive bids for an electrically driven pump of 1100 gal. per minute capacity.

The plant of the Central Cotton Oil Company, Jackson, Miss., which has been burned with a loss of $15,000, will be re-established.

Columbus, Miss., will erect an [illegible] plant to cost $50,000.

H. L. McLean, of the Algiers Railway & Light Company, New Orleans, La., together with other capitalists, has plans for the equipment of a steel car building plant.

The Wray-Dickinson Company, Shreveport, La., G. D. Wray, president, will erect a garage and machine shop to cost $50,000.

Vinton, La., will spend $20,000 on waterworks equipment, including a rotary pump, a crude oil or distillate engine, etc. T. H. Mandel, Lake Charles, La., is the engineer in charge.

San Francisco

SAN FRANCISCO, CAL., Nov. 14, 1916.

The demand for [illegible] is quickening, as orders have been placed covering principal improvements contemplated, and manufacturers are now awaiting deliveries. Capacity operations, however, are fully maintained, and several shipbuilding companies are still enlarging their yards. Power units and miscellaneous manufacturing equipment are in good demand. Agricultural machinery continues very strong, and oil companies are buying freely for well development and refineries. Exports from San Francisco in October were the largest on record, being valued at $13,248,929.

The Union Works has let a contract for the construction of a three-story office building at Twentieth and Illinois streets, to cost $157,500. Its buildings in course of construction at the Alameda shipbuilding plant are about completed.

The Imperial Foundry & Machine Works, Imperial, Cal., capitalized at $25,000, will take over the machine shop of H. J. Eifler, and equip it to be one of the most complete foundry plants south of Los Angeles.

The City Council, Richmond, Cal., has called for bids for machine shop equipment for the fire department.

It is reported that a new company is to start up the Petaluma Foundry, Petaluma, Cal., under lease.

W. R. Grace & Co., San Francisco, have ordered two pairs of 320-hp. Bolinder Diesel engines for ships which will be built shortly at a Pacific port. They placed orders for four similar engines early in the year.

The Imperial Cotton Machinery Company, Los Angeles, Cal., has been incorporated with a capital stock of $20[illegible] by J. P. Nealey, J. E. McDonald, H. Jones and others.

It is announced that the Moreland Motor Truck Company will erect a factory at Los Angeles.

The R. W. Pridham Company, Los Angeles, manufacturer of paper boxes, has secured a new factory site in that city.

The American Beet Sugar Company, Chino, Cal., is making improvements to its machine and blacksmith shops.

The Inlaid Floor Company is preparing to build a factory at Emeryville, Cal.

Texas

AUSTIN, TEX., Nov. 18, 1916.

Satisfactory reports have been received from the machinery and tool trade this week. Unusual activity of manufacturing and industry in general characterizes present business.

The Chicago, Rock Island & Pacific Railroad will build a 10-stall roundhouse at Amarillo.

It is reported that the Houston Lighting & Power Company, Houston, will enlarge and improve its electric light and power plant.

At a recent meeting of the stockholders of the Texas Company at Houston, the capital stock was increased from $44,400,000 to $55,500,000, the proceeds from the sale of this additional stock to be used for enlarging its refining, pipe line and other facilities.

The Magnolia Petroleum Company, with offices at Corsicana, Fort Worth and Beaumont, plans to increase its capital stock from $20,000,000 to $40,000,000, and will enlarge its pipe line, oil-storage and refining operations.

The City Commission, Galveston, will install another unit to the Alata Loma pumping station of the municipal water works.

The Atchison, Topeka & Santa Fé Railroad will build new freight terminals at Fort Worth.

It is authoritatively announced that the United States War Department will expend about $1,600,000 in building and equipping a permanent aviation station at Fort Sam Houston. Major Ber. D. Foulis is in charge.

The Pacific Northwest

SEATTLE, WASH., Nov. 14, 1916.

The car shortage in the Northwest, which is daily becoming more acute, is likely to completely paralyze the lumber industry unless relief is obtained promptly. Due to this shortage, stocks at the mills are accumulating rapidly, a dangerous market condition, were it not for the fact that the unshipped production is well covered by orders, and it is expected that the accumulating stocks will be worked down to normal as car supply improves. A fair volume of orders is reported by tidewater mills, with indications of heavy water shipping the remaining part of the year. Coastwise domestic lumber orders for the past week amounted to 12,810,703 ft. and export orders 7,028,500 ft. The unparalleled activity in shipbuilding in this district appears to be increasing almost daily. Two of the largest of these plants on Puget Sound have recently begun the installation of lighting systems which will enable them to be operated night and day.

Fifty-three wooden vessels designed for the lumber traffic are now in course of construction in Oregon, Washington and British Columbia. In the construction of these vessels approximately 106,000,000 ft. of lumber will be used, and when completed the vessels will have a combined lumber-carrying capacity of 79,500,000 ft.

In addition to these wooden ships now laid down or ordered, there are unconfirmed reports of contracts for 11 more wooden vessels. While the new tonnage is for the most part being built specifically for the lumber trade, comparatively few of the vessels in course of construction are to be operated by mill companies.

Demand for machinery, especially mining equipment and second-hand tools, is brisk. The unusually fine weather has afforded opportunities for outside construction remarkable in this section.

J. S. Emerson, Prince Rupert, B. C., is completing plans for installation of his proposed sawmill in that city. Plant will have capacity of 75,000 ft. daily.

A major interest in the McEachern-Standifer-Clarkson Ship Company of Astoria, Ore., has been purchased by A. O. Anderson & Co., Ltd., of Copenhagen, incorporated in the states of Oregon and New York. Guy M. Standifer and James Clarkson, Astoria, will retire from the company and will devote their interests to the Standifer-Clarkson shipyard on North Portland Harbor. The McEachern yard, situated on Young's Bay, is now building 7 auxiliary schooners of the five-masted type.

The Packard Logging Company, Seattle, which recently received contract for sale of 227,000,000 ft. of fir in the Olympic National Forest, is completing plans to log the tract at a cost of $1[illegible]. The necessary equipment will cost

$40,000, and a railroad will be built into the timber immediately.

It is announced that the International Harvester Company of Chicago, Ill., will establish a branch distributing plant at Billings, Mont.

The Midland Lumber & Investment Company, Tacoma, Wash., has begun work on the rebuilding of its plant recently destroyed by fire. Included in the work will be a boiler house, sawmill and filing room, and several other structures. Plant will cost $75,000.

The Canadian Robert Dollar Company, Vancouver, B. C., has purchased a 10-acre site on the north shore, upon which will be established a sawmill with daily capacity of 175,000 ft., and an 800-ft. dock. The plant, with purchase of site and necessary equipment, will represent a cost of $200,000, and it is expected will be in operation in about four months.

It is stated that the sawmill plant of the American Export Lumber Company at Rainier, Ore., which was destroyed by fire with a loss of $30,000, will be rebuilt.

A substantial interest in the Heath Shipbuilding Company of Portland has been purchased by Capt. Skaugen, a shipowner of Norway, who will also be general manager of the Oregon Navigation Company, a corporation closely allied to the Heath Company. The Oregon Navigation Company will enter actively into the business of building and operating vessels.

It is reported construction work will start immediately on the proposed packing plant to be built at Butte, Mont., by the Hansen Packing Company. It will be of brick and concrete, four stories, 125 x 250 ft., and will cost complete $500,000. W. G. Hansen is general manager.

The Temple Shipbuilding Company, Seattle, Wash., has been incorporated for $100,000 by B. H. Temple, Vancouver, B. C.; W. L. Waters and F. J. Line, Seattle. It plans to establish a shipbuilding yard at Port Blakely, Wash., where wooden auxiliary powered vessels will be built.

The Hart-Wood Lumber Mfg. Company, Hoquiam, Wash., has awarded to the Matthews Shipbuilding Yards contract for a steam schooner to cost $200,000, and have a lumber-carrying capacity of 1,200,000 ft. This is the second steamer to be built for the Hart-Wood Company this year. The vessel will be an oil-burner.

The Monarch Mills Company, Portland, Ore., has been organized with capital of $750,000, by George F. Huesner, Lester W. David, R. J. Hubbard, and others, to take over the Monarch Mills in North Portland, costing more than $1,250,000. The company owns 1,000,000,000 ft. of timber in Linn County, and present plans include the extension of the Oregon Electric Railway from Albany into the tract. It is reported a shipbuilding plant adjoining one of the mills of the company is also proposed.

Canada

TORONTO, Nov. 18, 1916.

C. F. Just, Canadian Trade Commissioner at Petrograd, states that the supply of agricultural machinery and implements in that country has been much commented upon lately, and that the subject has never before received so much attention. With the active co-operation of the Ministry of Agriculture, certain leading Zemstvos or municipalities, supported by a powerful financial institution in Moscow, have formed a central board for the purchase and distribution of agricultural machinery and implements in the districts represented. Mr. Just reports that the total requirements of the territories in question for 1917 are estimated at 96,800 machines, which include 45,000 reapers of foreign manufacture, 26,000 Russian lobogreikas, 15,000 mowers, 9000 horse rakes and 1800 binders. Siberia is also a potential market to be taken into consideration, where the need of agricultural machinery is even greater than in any part of Russia proper.

Boeckh Brothers & Co., 164 Adelaide Street West, Toronto, are in the market for a wood shaping machine.

Work will be commenced at an early date on the erection of a plant at Mimico, Ont., for the Dominion Abrasive Wheel Company, Ltd., to cost $65,000. The Toms Contracting Company, 501 Kent Building, Toronto, is the contractor.

The Packard Electric Company, Mill Street, St. Catharines, Ont., will build a machine shop to cost $3,000.

The American Can Company, Hamilton, Ont., will build an addition to its plant, of brick and steel construction, to cost $25,000.

The Dominion Cutlery Company, Ltd., 591 St. Catharine Street, Montreal, will build a factory.

The Canadian Tractor Company proposes to build a plant at Whitby, Ont., to cost $60,000. Details may be obtained from Guy R. Creelman, Fenton, Mich.

The Perfect Machine Company, Galt, Ont., will erect an addition to its foundry to cost $3,000.

The Guelph Stove Company, Guelph, Ont., will erect a plant including a foundry, to cost $8,000. W. A. Mahoney, St. George Square, is the architect.

The Under Ground Cable Company of Canada, Sherman Street, Hamilton, Ont., will commence work at once on the erection of a mill and power addition to its plant to cost $30,000.

The Town Council, Penticton, B. C., will purchase an engine for its electric plant. B. C. Bracewell is clerk.

The sash and door factory of Adelard Paquette, St. Hughes, Que., was destroyed by fire with a loss of $20,000. It will be rebuilt and machinery for steam power will be purchased.

The Town Council, Ingersoll, Ont., will grant concessions to a company which proposes to establish a plant at a cost of $200,000 for the manufacture of rubber tires, etc. Particulars may be obtained from Mayor Elliott.

The plant of the Lake Megantic Electric Company, Lake Megantic, Que., which has been totally destroyed by fire, will be rebuilt. Steam power equipment will be required.

The Chicoutimi Pulp Company, Chicoutimi, Que., will build an addition to its plant and increase its output from 80,000 to 130,000 tons of pulp per year. J. U. A. Dubuc, manager.

The Colonial Pulp & Paper Mills, Ltd., Quatsino Sound, Ont., will build a sulphite plant to have a daily capacity of 120 tons per day. The first unit will have a daily capacity of 60 tons. The installation will be completed in about a year.

The Canadian Cartridge Company, Hamilton, Ont., will erect an addition to its plant to cost $13,000.

The North Bay Toy Company, North Bay, Ont., is making arrangements for the erection of a factory to cost $15,000.

The harness factory of Adams Brothers, King and Frederick streets, Toronto, was damaged by fire, Nov. 15, with a loss of about $100,000. The erection of a new factory on King Street West, estimated to cost $75,000, has been commenced.

Plans are being prepared for a reinforced concrete machine shop and roundhouse, estimated to cost $150,000, for the Pacific Great Eastern Railway Company at Lillooet, B. C. A. H. Sperry, Vancouver, B. C., is general manager.

The Orangeville Lime & Cement Company has purchased a tract of land at Teeswater, Ont., and will erect a plant to cost $75,000.

The Franklin Company, Winnipeg, proposes to make additions to its plant estimated to cost $1,000,000. H. H. Franklin is president.

The Brompton Pulp & Paper Company, Ltd., Montreal, has been incorporated with a capital stock of $9,000,000 by Errol Languedoc, Ralph E. Allan, Pierre Charbonneau, and others.

The Packard Fuse Company, Ltd., St. Catharines, Ont., has been incorporated with a capital stock of $200,000 by Ralph B. Hamilton, George C. Rough, Samuel R. Cruikshank, and others, to manufacture fuses, projectiles, etc.

McKelvie & Birch, Ltd., Kingston, Ont., has been incorporated with a capital stock of $50,000 by John McKelvie, William H. Warren, Colin A. Macpherson, and others, to manufacture plumbing, heating and electrical goods, etc.

The Dominion Thresher Company, Ltd., New Hamburg, Ont., has been incorporated with a capital stock of $40,000 by William A. Bailey, Isaac W. Kingswood, both of London, Ont.; William R. Miller of Hamilton, and others, to manufacture farm implements, threshing machines, traction engines, etc.

J. Coughlan & Sons, Vancouver, B. C., have received an order for the construction of two steel steamers for Norwegian interests.

The Dodge Mfg. Company, Ltd., Toronto, has been incorporated with a capital stock of $1,500,000 by Charles F. Wheaton, 122 Bedford Road; William G. Thurston, 23 Toronto Street; Francis H. Snyder, and others, to manufacture machinery, implements, etc.

The Dominion Boiler & Foundry, Ltd., Montreal East, has been incorporated with a capital stock of $200,000 by Charles W. Webb, Joseph H. Charbonneau, Victor Pelletier, and others, to manufacture furnaces, radiators, boilers, etc.

The Revolving Wardrobes Company, Ltd., Toronto, has been incorporated with a capital [illegible] by Robert J. W. Baker, John S. Denison, [illegible] A. Richard, and others, to [illegible]

The [illegible] & Supply Co., Ltd., Toronto, has been incorporated with a capital stock of $50,000 by John Dorning, Philip M. [illegible] to manufacture electrical supplies, etc.

The Electrograph Company of Canada, Ltd., Winnipeg, has been incorporated with a capital stock of $100,000 by William B. Houston, Ora M. Baker, Winnipeg; Andrew J. Tallman, Toronto, and others, to manufacture engines, machinery, electric or gas [illegible] etc.

The Hamilton Steel Wheel Company, Ltd., Hamilton, Ont., has been incorporated with a capital stock of $500,000 by John R. Marshall, George A. Young, Amy H. Johnson, and others. It will build a plant at Hamilton, at an early date for the manufacture of wheels, rolling stock, etc.

Barnes & Peckover, steel merchants, Toronto, have secured a site of one and one-half acres in the Toronto harbor industrial district and will erect a plant to cost $[illegible].

Government Purchases

WASHINGTON, D. C., Nov. 20, 1916.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until, date not set, schedule 381, for one 5-hp. induction motor and schedule 383, for one 40-ton platform scale, all for Washington; schedule 381, for one single-stage iron-casing centrifugal pump for Indian Head; schedule 389, for sixteen 4-cycle gasoline engines for Portsmouth; schedule 390, for two grinding machines and one grinding outfit for grinding planer stocks, all for Newport; schedule 391, for one grinder and cutter, one 18-in. x 12-ft. lathe, one 10-in. engine lathe, one 3 x 36-in. turret lathe, one 16-in. engine lathe, one 60-in. boring, drilling and milling machine, two belt-driven single-spindle sensitive drilling machines, two grinding machines, one 10 x 24-in. grinding machine, one heavy milling machine, one universal milling machine and three bench milling machines, all for Washington; one disk grinder and roll sander, for Boston; schedule 395, for miscellaneous plunger pumps for Brooklyn.

Bids were received by the Bureau of Supplies and Accounts, Navy Department, Washington, Nov. 14 for supplies for the navy yards as follows:

Schedule 312, Construction and Repair.

Class 101.—Three pipe-threading machines, Carroll Electric Company, $876, $516 and $920; Jarack Mfg. Company, $1,366.50; Kemp Machinery Company, $1,422; Landis Machine Company, $3,169.57; Manning, Maxwell & Moore, Inc., $1,720; Frank Toomey, $1,628.77.

Schedule 321, Ordnance

Class 121, Washington—One horizontal boring, drilling and milling machine, Lucas Machine Tool Company, $5,812; Niles-Bement-Pond Company, $4,883.

The purchasing officer of the Panama Canal, Washington, will soon call for bids for two centrifugal pumps of 350 gal. per minute capacity each, with accessory equipment.

NEW TRADE PUBLICATIONS

Hydraulic Valves and Fittings.—Watson-Stillman Company, 190 Fulton Street, New York City. Catalog No. 94 superseding No. 78. Size, 6 x 9 in.; pages, 96. Points out advantages of using the company's line of bronze and forged and cast steel valves and fittings for hydraulic work. The catalog is divided into sections dealing with pipes and fittings and safety, check, stop, operating, by-pass and regulating valves. In the different parts a single page is devoted to each particular valve or fitting with an illustration, a brief description and a table of the sizes that can be supplied. Mention is made of a number of special valves and combinations which can be furnished, together with illustrations of valve reseating tools and leather packings. A number of tables of useful information are included.

Water Tube Boilers.—E. Keeler Company, Williamsport, Pa. Catalog. Describes and illustrates a water tube boiler with vertical baffle walls employing either coal or oil as fuel. The details of construction and equipment are gone into at some length, the text being supplemented by a number of engravings of the different parts. Views of installations are included and the advantages of wrought steel construction, dry steam and free circulation are pointed out. Tables giving the results of a number of tests of the boilers are presented. Mention is made of a cross drum [illegible] return tubular type of boiler.

Gas Engines.—Chicago Pneumatic Tool Company, Fisher Building, Chicago, Ill. Bulletin No. 34-X. Describes a line of horizontal two-stroke cycle [illegible] with cross-head. A brief statement of the [illegible] using a gas engine as a source of power is presented, followed by a description of the construction of the engine, the text being supplemented by a number of engravings of the various parts. Illustrations of the complete engine are presented, together with tables of specifications for the different sizes that are built.

Silent Chain.—Link-Belt Company, Thirty-first Street and Stewart Avenue, Chicago, Ill. Bulletin No. [illegible]. Shows installations of the company's silent chain in the plant of the Schoellkopf Aniline & Chemical Works, Inc., Buffalo, N. Y., where 1000 drives are transmitting from ¾ to [illegible] hp. A view showing the leather belt drive formerly employed for operating aniline kettles is presented by way of contrast with the motor and silent chain drive now employed. A brief description of the chain, in which emphasis is laid upon a patented pin-bushed joint, is presented.

Reamers and Boring Tools.—Kelly Reamer Company, Cleveland, Ohio. Catalog G. Relates to a line of reaming and boring tools for steel, bronze, iron or aluminum equipped with adjustable high-speed blades. The various cutters of the turret cylinder, floating and adjustable types are illustrated and briefly described, with tables of the sizes in which they can be supplied. A number of views of the tools in use are included and directions for using and caring for them are presented.

Forging Furnaces.—Tate, Jones & Co., Inc., Pittsburgh, Pa. Circulars Nos. 149-A and 150. Deal with forging furnaces of various sizes. Those in the first circular are designed for heating billets for large hammer and press work and for medium-sized forging work, while those in the other are smaller and are particularly adapted for rapid heating of work to high temperatures for forging machines, drop hammers, forging presses, etc. Views of the various sizes of furnace, which employ oil or gas as fuel, are presented, with lists of the standard sizes that can be furnished. Descriptions of the construction of the furnaces and installation views are included in both circulars.

Grab Bucket Cranes.—Alfred Box & Co., Philadelphia, Pa. Bulletin No. 600. Illustrates a line of cranes operating a standard two-line grab bucket by using only four steel spur gears, two drums, one motor and one standard controller. The special features of the cranes, such as all steel construction, fewer and readily accessible parts, rapid operation and the use of safety hooks in addition to the king bolts, are mentioned. The bulk of the bulletin is, however, made up of [illegible] x 12 in. illustrations of the different styles of cranes with brief descriptions. Dimension diagrams and tables of the buckets employed are presented, and a number of views of installations are included.

Telautograph Systems.—Telautograph Corporation, 111 Broadway, New York City. Folder. Pertains to the use of the Telautograph, as a means for transmitting messages from a central point, such as the superintendent's office, to the various departments of an industrial establishment or between the several departments. Emphasis is laid upon the fact that the messages are received at once in the original handwriting of the sender, thus giving a record that is as true as a carbon copy, in addition to saving time, irrespective of the distance between the two points. A diagram of a typical installation and an engraving of the instrument are included.

Speed-Regulating Rheostats and Panels.—General Electric Company, Schenectady, N. Y. Bulletin No. 48,320. Embodies illustrations and brief descriptions of a line of rheostats and panels designed to control the speed of direct-current series wound motors by armature regulation and shunt or compound wound motors by either armature or field regulation, or a combination of both, with dimension diagrams and tables of the different pieces of apparatus. A discussion of the relative advantages of rheostats and panels is presented, followed by brief descriptions of rheostats for regulating speed by field control combined with armature starting, by armature control only and by combined armature and field control. Mention is also made of the two types of panels supplied.

Pneumatic Tool Lubricators.—Chicago Pneumatic Tool Company, Fisher Building, Chicago, Ill. Bulletin No. 130, third edition. Lists a line of lubricators for pneumatic tools which includes automatic oilers for use in connection wth all classes of pneumatic hammers, rock drills, etc., and a grease machine for supplying grease to the gears of drilling machines through the dead handle opening. The advantages of thorough and systematic lubrication of the tools are briefly [illegible] and booklet is made of a line of greases and [illegible] lubricants for use with the company's [illegible].

Gears.—Wm. Hoyt & Dutton Company, Cleveland, Ohio. [illegible] "Facts About Gears." Illustrates and describes [illegible] type of gears and is intended as a reference [illegible]. Tabulated data on gearing terms, [illegible] specification formulæ for every type of gear [illegible]. Illustrations of the different styles of gears [illegible] with, references to the pages upon which specifications [illegible] will be found. The gears covered include [illegible] and bevel and worm types, racks and pinions, [illegible] and rawhide pinions. A number of tables of useful information, including circular and diametral pitches, decimal [illegible] weights of round bars and circumferences and [illegible] are included. Drawings showing the comparative size of gear teeth are presented.

THE IRON AGE

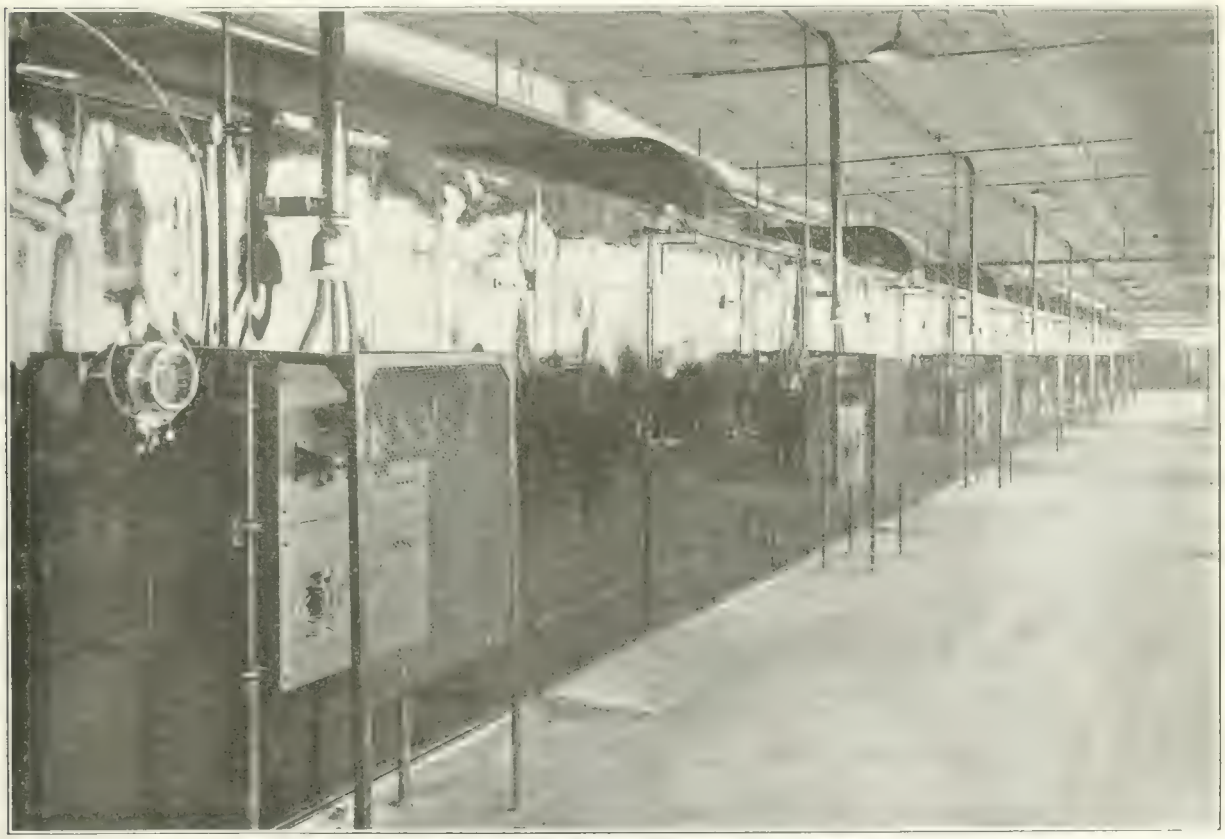
New York, November 30, 1916

ESTABLISHED 1855 VOL. 98: No. 22

Electric Ovens in an Automobile Plant

New Type with Conveyor Equipment at Willys-Overland Plant for Baking Enamels — Some of the Steam-Heated Ovens

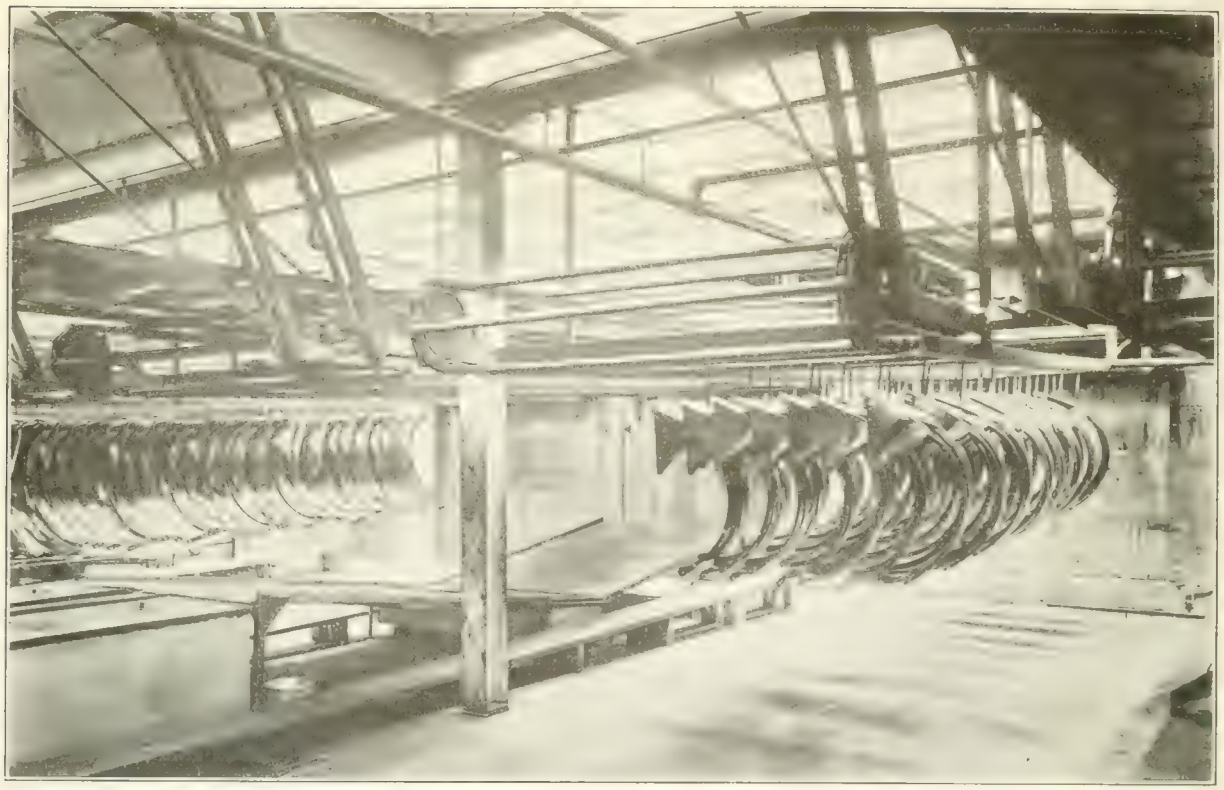
ONE of the recent innovations in the manufacturing methods in the automobile industry is the use of electric ovens for drying or baking enameled parts. Electrically heated ovens in smaller sizes are also now being used in some other manufacturing plants. The first installation of electric ovens for drying enameled automobile parts was made, it is believed, by the Willys-Overland Company, Toledo, Ohio, something over a year ago. This company has recently installed a large number of additional ovens and at present there are fifty-two electric ovens in the Overland plant. These are in various sizes, depending upon the material they are to handle. They take no less than 7000 to 8000 kw. of electric energy.



One of the Batteries of Electric Ovens, These for Baking Car Bodies. Local switchboards and temperature control apparatus are provided as indicated

Among the new oven installations at the Willys-Overland plant is a battery of conveyor ovens of a new type. Continuous open-end steam-heated ovens of the conveyor type and with long heating chambers, in which the frames and chasses are dried during progressive assembling while being carried very slowly on conveyors through the ovens, are now used quite generally in the automobile industry. The conveyor system is now being applied to electric ovens in a somewhat different manner, conveyors being used to take a load of small parts into the oven where they remain stationary until the baking operation is completed, when the conveyor carries them out the opposite side of the oven. This conveyor type of oven is particularly interesting from an economical standpoint in that it is found to effect a great saving in time and labor and to increase greatly the oven capacity.

The Willys-Overland installation of conveyor type of electric ovens includes a battery of ten ovens 21 ft. 6 in. wide, divided in two compartments, 21 ft. 4 in. deep and 8 ft. in height. These are used for fenders, dust-pans, hoods and various other



After the Parts Are Dipped in the Enamel They Are Hung on the Cross Bars of the Conveyor, Ready to be Carried into the Ovens, the Fronts of Which May be Seen in the Background of the Picture

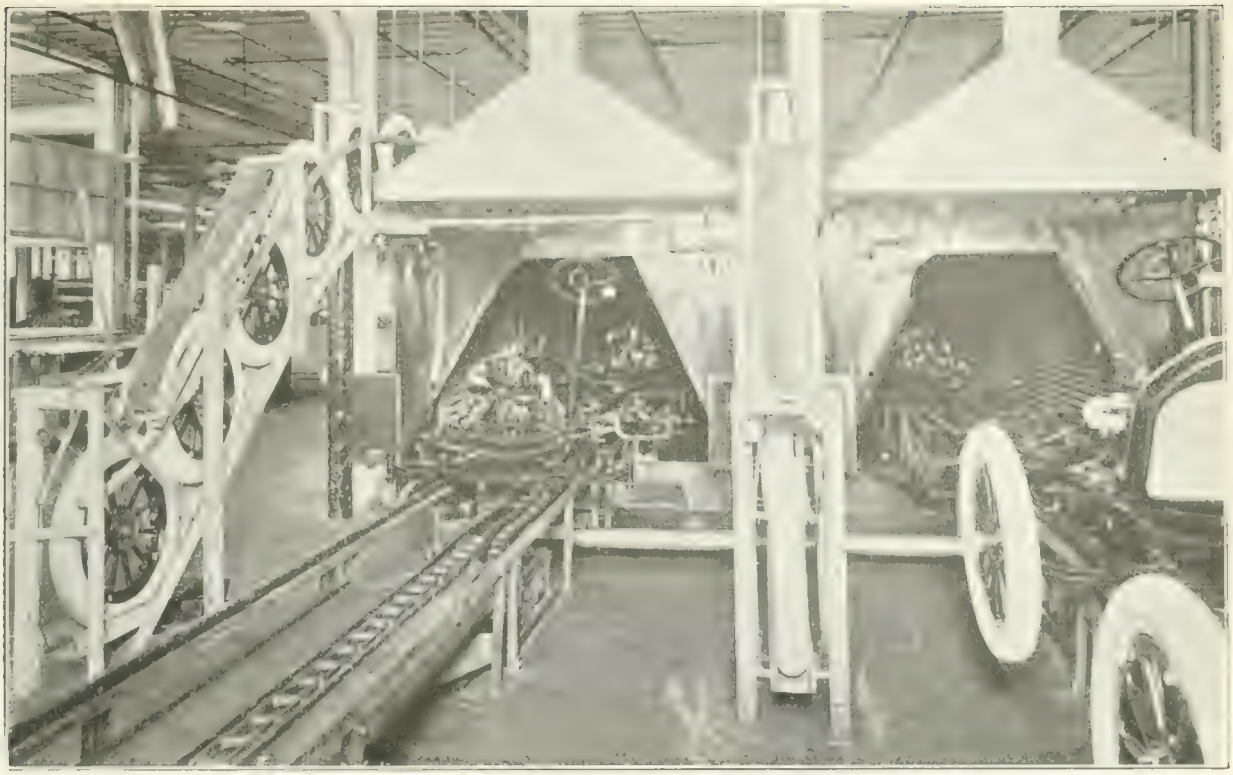
parts and have a capacity for drying the parts of 1000 cars per day. Under the method generally followed, the parts are dipped and then are carried into the oven one by one. That method makes it necessary for the oven to cool off sufficiently for the workmen to go inside with the parts and from 40 to 60 min. is lost in bringing up the heat after the oven is filled, to say nothing of the time required in carrying the individual parts into and out of the oven.

Under the new method with the ovens equipped with mechanical conveyors the parts are dipped in the first coat of enamel at the side of the conveyor and are then hung on the conveyor over drip pans in front of the oven doors. After the conveyor is loaded the oven doors are opened and the conveyor is set in operation and the load is carried into the oven. In this way the maximum capacity of the oven is carried into it at one time and it is necessary to keep the oven doors open only a short time. While one conveyor load is being baked another load is being dipped and placed on a section of the conveyor outside of the oven.

When a load of freshly enameled parts goes into the oven the conveyor carries those parts just baked out the opposite side, and if they require a



The Electric Heating Units Are Distributed Between the Two Compartments of the Body Baking Ovens, for Example, as Here Shown

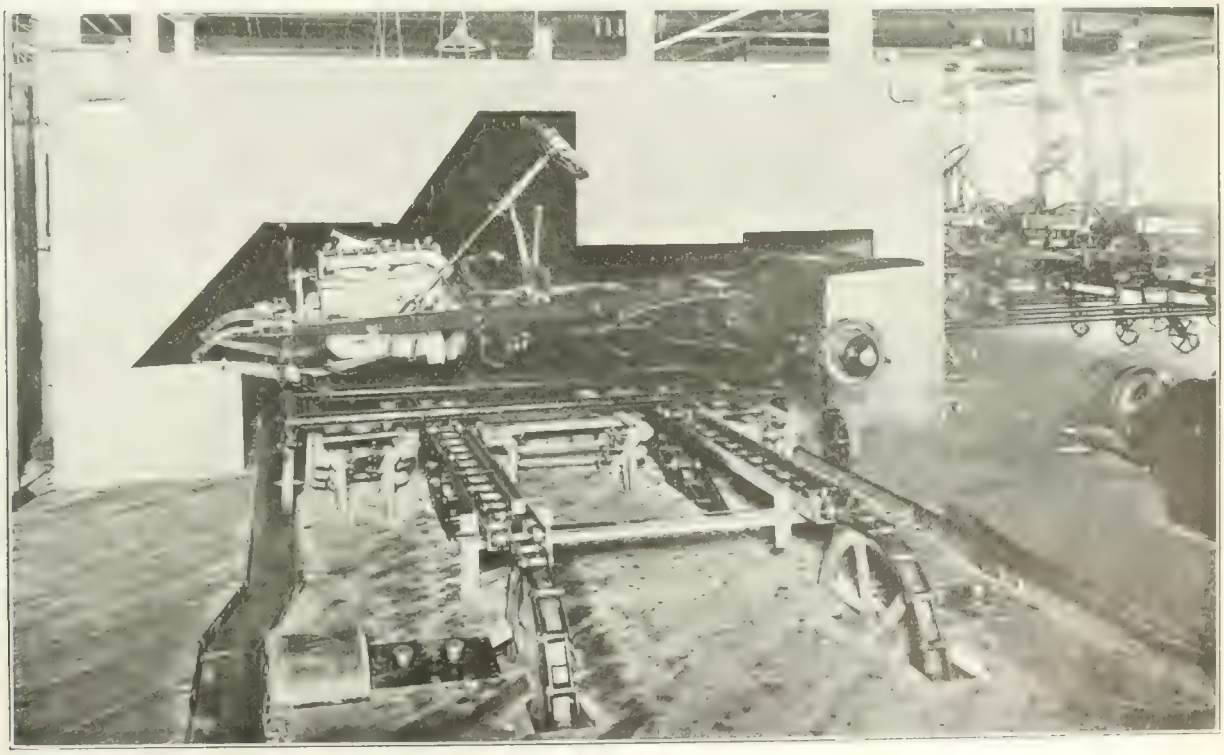


The Classes Are Shown Coming from the Steam Heated Ovens Which Are Also Used in the Plant, Ready for the Application of the Wheels

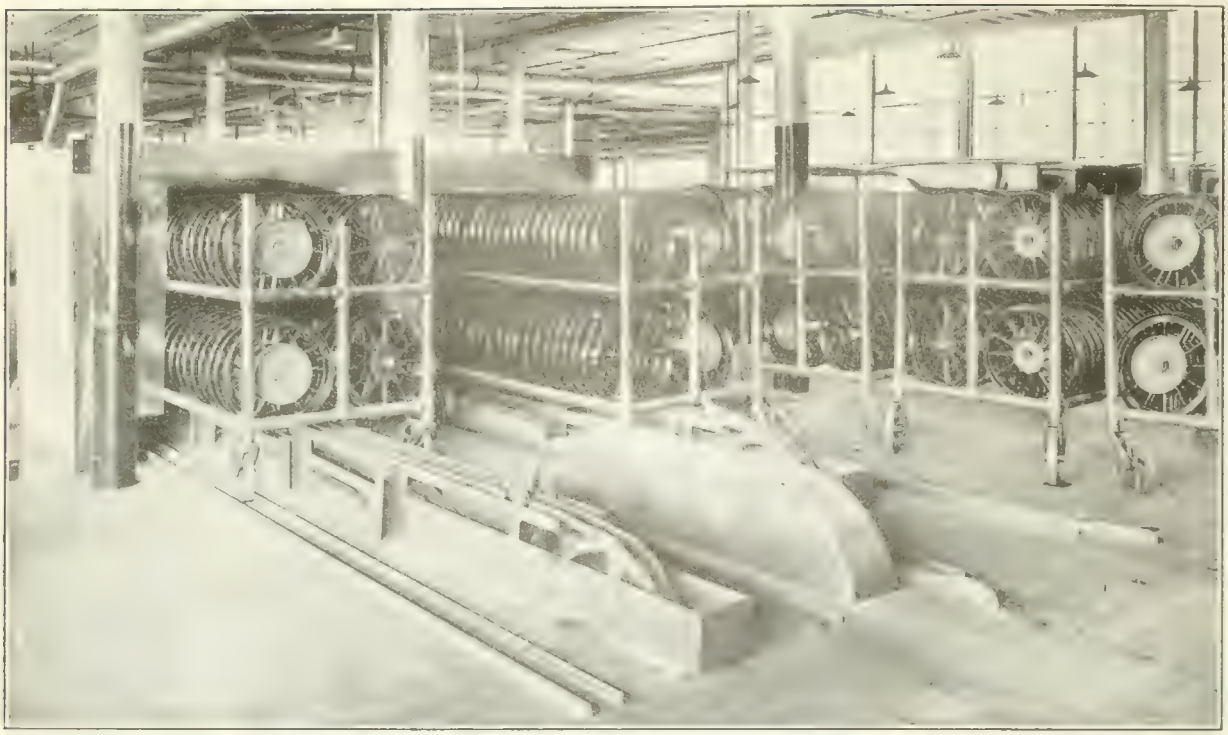
second coat of enamel they are again dipped on that side and come back through the other half of the oven in the opposite direction. It will be seen from this that both the first and finishing coats are dried in the same oven, which, although a departure from the usual practice, is found to work out very satisfactorily.

The conveyor is of the chain type 8 ft. wide and 64 ft. long, each end extending approximately 22 ft. outside the oven and providing outside loading space at each end. The conveyors are driven from one line shaft that extends in front of the ovens, each conveyor being operated independently by means of a clutch. It takes 2½ min. for the conveyor to move approximately 21 ft. to carry a fresh load into the oven and to deliver the baked load, and during that time while the doors are open the oven temperature falls 85 to 100 deg. It requires only about 5 min. to get the temperature back to the average temperature of 350 deg. required for baking. It is said that the ovens have a capacity of about three times that of the ordinary type of ovens without the conveyors.

For drying bodies there are two batteries of ten electric ovens each, one battery for drying the first coat of enamel and the second battery for the fin-



In This Steam Oven, the Chasses Ar[illegible] Carried Sideways [illegible]



Special Racks Are Used for Carrying the Wheels Which Are Drawn Through the Oven by the Chain Conveyor

ishing coat. These ovens are 8 ft. high, 40 ft. deep and 21 ft. 6 in. wide, making the length of each battery 215 ft. For drying the fenders of one model of car, there is a battery of six electric ovens 20 ft. wide and 20 ft. deep. These ovens have a capacity for baking 500 sets of fenders with two coats of enamel in a day. There is another battery of ten electric ovens for fenders and four electric ovens for hoods. Two electric ovens are used for drying the running boards, shields, aprons, under panes, etc.

Two of the illustrations show a battery of chassis drying ovens. These are steam heated ovens about 150 ft. in length. The chasses, after being spray painted, are carried through the oven on a conveyor, taking about 50 min. to pass through. The ovens are kept at a temperature of about 180 deg. The assembled wheels are carried by gravity to the discharge end of the oven to be assembled to the chassis, as shown in one illustration.

While the first cost of the electric ovens is much greater than gas-fired ovens and the cost of operation is higher, it is found at the Overland plant that this increased cost is fully offset by the increased efficiency, quicker handling of material, greater production for the same amount of oven space, improved work and lessening of the fire risk. It is stated that the required temperature is attained much quicker than in gas-fired ovens. With the regular electric ovens without conveyors, the first coat of enamel is baked in 1 hr. 10 min. and the finishing coat in 1 hr. 40 min., a total of 2 hr. 50 min., as compared with 4 hr. 15 min. with gas-fired ovens, which require 1 hr. 45 min. for the first coat and 2 hr. 30 min. for the finishing coat.

In the case of the conveyor type of ovens there is a further saving of time. In these the first coat is baked in 45 min. and the second coat in 1 hr. There are no dust particles and oils in the process of combustion to come in contact with the work while it is being baked. No draft is required, a small flue sufficing to carry all the fumes from the enamel.

The heating units are 14 in. long and 14 in. high and 4 in. in thickness. Each unit is made of eight coils or sections of flat resistance ribbon wound on oblong spools. These units are mounted on iron racks and are placed at each side of the ovens. The wide two-compartment ovens have a row of heating units in the center between the com-



The Conveyor for the Chasses Looking in the Direction of Travel or Toward the Ingoing End of the Steam-Heated Oven

partments. Electricity for heating the ovens is furnished by the Toledo Railways & Light Company, being delivered to the plant in underground cables at 23,000 volts, and the current is 3-phase of 25 cycles. For use in the ovens it is stepped down to 440 volts. The heating units are of 10 kw. capacity.

From 9 to 42 of the units are used to heat one oven, the energy required for each oven ranging from 90 to 420 kw. Each oven is provided with a Taylor Tycos electric contact control instrument by means of which an even temperature is kept within a range of 10 deg. Each oven is provided with a switchboard, this being located in front of the ovens except in the case of the conveyor type, which have switchboards at one end of the battery. A thermometer and time dial are located on the door of each oven. When the oven doors are open the electrical current is automatically cut off.

The ovens were built by the Young Brothers Company, Detroit, and the heating units were furnished by the General Electric Company. The conveyors in the electric and other types of conveyor ovens were designed and furnished by the Link-Belt Company.

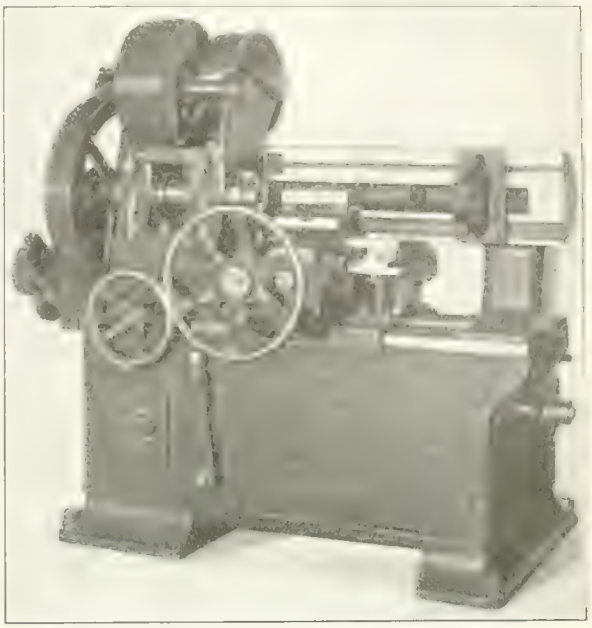
Relieving Machine for Formed Cutters

To provide straight, peripheral, side and end relief for formed cutters having a maximum diameter of 13 in., the Becker Milling Machine Company, Hyde Park, Boston, Mass., has placed a backing-off machine on the market. Cutters having any number of flutes from 3 to 12 inclusive can be relieved, as well as those having even numbers of flutes from 12 to 40 inclusive. In addition it is also possible to hold hobs and worms, the gearing employed for this purpose being readily detachable when not in use.

The machine, which is of rigid construction reinforced by a number of heavy ribs, is of the arm type with special ways. The tailstock, which is maintained in alignment by two T-slots in special ways at the back of the bed, has a maximum adjustment of 24 in. and four clamping bolts are relied upon to lock it in any desired position. The relief, which ranges from 0 to ¼ in., is provided by a single-throw cam at the back of the machine, which is held rigidly in place by the camshaft supports. A tapered gib is provided to take up the wear on the cam rolls and is relied upon to insure a positive throw. When hobs are being given a clearance on the machine, this cam is thrown out in reversing.

The spindle is a piece of crucible steel 3¾ in. in diameter at its largest point. It runs in solid phosphor-bronze bearings having means to compensate for wear and is driven through a spur gear mounted directly upon it. A No. 13 Brown & Sharpe taper hole is provided in the spindle which is bored to accommodate a ¾-in. draw bolt. Clutch drive is relied upon to insure positive rotation of the cutter that is being relieved. The tool holder block is set on a 30-deg. slide plate and is operated by a handwheel at the side of the machine to raise or lower the cutter to the required adjustment. The capacity of the block is for tools from ¼ to 1 in. in thickness, which are fed to the work by a differential handwheel. This arrangement, which makes use of the differential for fine feed and is thrown out to give direct quick adjustment, it is pointed out, furnishes accurate control. A handwheel operating bevel gears on the carriage screw provides a longitudinal adjustment up to 12 in.

In operation the cutter to be formed can be placed in position with relation to the forming tool without loosening bolts or nuts by operating a worm meshing with a wheel on the camshaft. Peripheral and side relief are provided by the same cam and a micrometer attached to the periphery relief slide, it is explained, gives a means for resetting the tool accurately when the work is changed. A separate cam at the end of the bed provides the end relief. The tailstock will accommodate either a collar or a



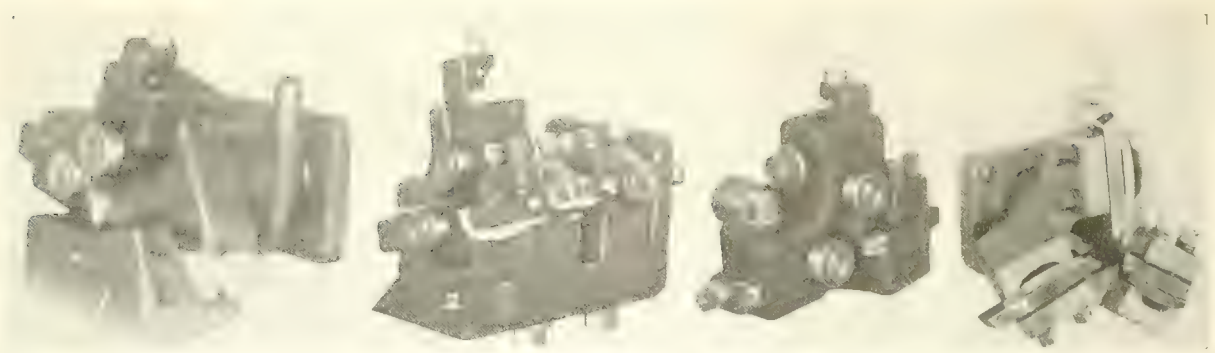
Formed Cutters Up to 13 In. in Diameter and Having from 3 to 40 Flutes Are Given Straight, Peripheral, Side and End Relief by this Backing-Off Machine

center bearing, according to the nature of the work being handled. The former is recommended for heavy cuts on a long arbor to insure rigidity by supporting the arbor near the work, while the other is intended for use where a short arbor is being used on small work.

The machine is arranged for single-pulley drive through a 4-in belt, a set of spur gears providing for three speed changes. If desired, the machine may be motor driven by a 3-hp. adjustable-speed motor having a range of from 500 to 1500 r.p.m. With this arrangement the motor is mounted on a bracket at the back of the machine.

A friendly receivership action has been instituted against the Termaat & Monahan Company, Oshkosh, Wis., gas engines, machine tools and shop specialties, and the Oshkosh Savings & Trust Company has been placed in charge of affairs. The company is filling a large order for the Lodge & Shipley Machine Tool Company, Cincinnati, and the proceedings arise principally to bring this contract to a successful conclusion. Its indebtedness is $132,000, but the assets are conservatively valued at $242,000. It employs 140 machinists and the plant will be continued in operation under the receivership. W. J. Koehn is president.

The Otto Coking Company, Inc., 6 Church Street, New York City, is rapidly completing the shipment of material for the new battery of 50 by-product coke ovens to be erected by the Mitsubishi Goshi Kaisha at Kenjiho, Korea. These ovens will furnish coke for the blast-furnace plant now being erected at that point. The company has also received a contract from the Woodward Iron Company, Woodward, Ala., for the erection of 60 by-product coke ovens. These ovens will have a capacity of 15 net tons of coal and will operate on an 18-hr. coking time. The new battery is scheduled to start operation about July, 1917.



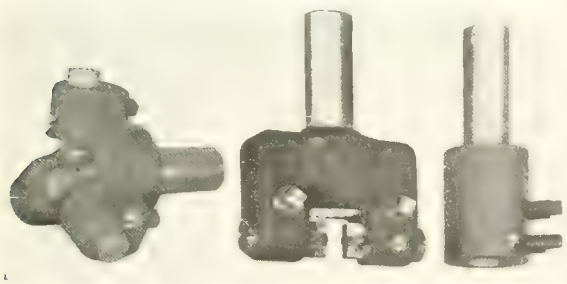
The Single (1) and Multiple Cutter (2) Turning, Pointing (3) and Adjustable Hollow Milling (4) Tools Used for Machining Bar Stock

SCREW MACHINE EQUIPMENT

Tools Developed by the Foster Machine Company for Its No. 5 Machine

BY OSKAR KYLIN

To increase the range of work which can be handled to advantage on its No. 5 screw machine, the Foster Machine Company, Elkhart, Ind., has designed and is now building a complete new line of tools. With these tools almost all kinds of chucking work within the capacity of the machine



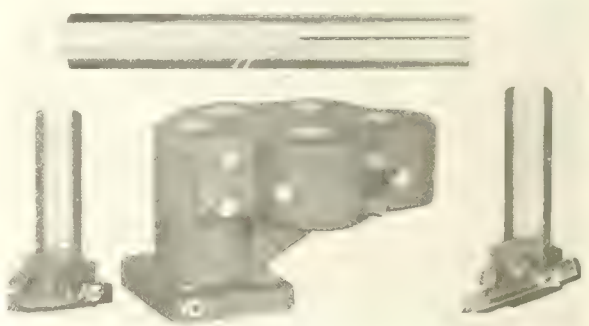
The Center Drilling (5) and Knurling (6) Tools and a Holder (7) Having a Floating Device to Compensate for Errors in Alignment Between the Hole in the Work and the Turret Center

can be handled. The machine is built in two different styles with a back geared cone head and an all-geared head, the latter having been illustrated in THE IRON AGE, Sept. 21, 1916.

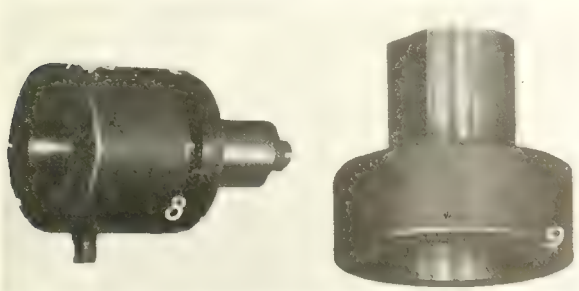
Probably the most important and most widely used of all screw machine tools is the one that is commonly known as the roughing box or single-cutter turning tool (1). The two features of this tool that stand out prominently are its rigidity and convenience of operation. The cutter is held so as to insure the maximum economy of the high-speed steel employed and the two roll jaws are independently adjustable and are secured rigidly to the tool body by a bolt, the body being split for this purpose. The cutter slide is equipped with a release operated by the bent handle in front of the tool to prevent the work from being marred when the tool is being withdrawn. This handle also serves to bind the cutter slide rigidly to the tool body. The slide operating screw is equipped with a graduated dial for convenience in setting. The multiple-cutter tool (2) is also characterized by a high degree of rigidity. In the illustration the tool is shown equipped with two double holders enabling four cuts to be taken at one time and one roller back rest, although three double tool holders for taking six cuts simultaneously and two roller back rests can be employed. With this tool shoulders only ¼ in. apart can be turned.

The pointing tool (3) illustrated is in distinction to the two former tools of the shank type for holding in the turret holes. The roller back rest jaws are independently adjustable and can be interchanged with those of the turning tools. In addition to mounting the pointing tool cutter, this tool is designed to carry a centering drill. A new design of adjustable hollow mill (4) has been brought out. This is intended for use on short work where a large amount of stock has to be removed quickly.

In addition to the bar tools described in the two preceding paragraphs a number of miscellaneous tool holders and adapters have been developed. These include a center drilling (5) and a knurling tool (6) and a floating type of holder (7) having a device by which any error of alignment between the hole in the work and the center of the turret is compensated for, thus preventing the reamer or other tool mounted in the holder from cutting too large.

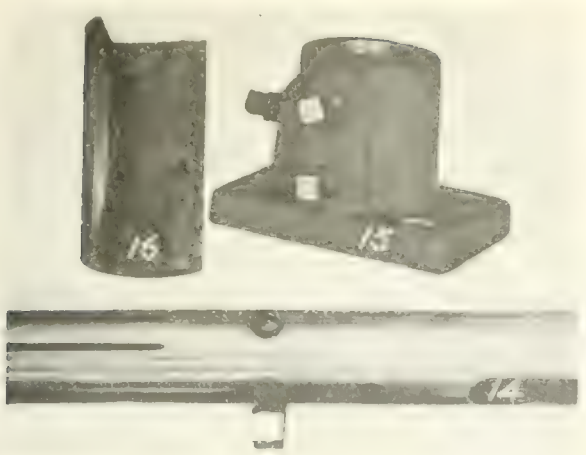


The Multiple Turning Head (10) for General Facing and Turning Work and Two of the Cutter Holders (12 and 13) and the Pilot Bar (11) Used with It



A Spring Die Adapter (8) and the Die Holder (9) It Is Designed to Fit

A spring die adapter (8) has been developed to fit the die holder (9) shown. Drill, tap, die and cutter holders of the standard type have been developed and are designed to fit interchangeably either any of the tool holders or the holes in the turret of the machine. In addition to the regular cut-off slide tool holders, such as are furnished on all standard screw machines, four holders have been developed. The two forming tool holders, one for the front and one for the rear of the machine, are of the dove-tail type and are split to enable the



A Boring Bar, Cut-Off Holder, Tool and Rocker Adapter Also Showing Up Another Combination

forming tool to be clamped to the holder by two screws at the side. Double holders to permit two cuts to be taken, or two shoulders to be necked simultaneously, are made, and are equipped with rocker wedges to adjust the height of the cutter point.

To enable chucking work to be handled, a number of tools have been developed for use with a three-jaw scroll chuck. These include the multiple-turning head (10), which is intended for a general run of turning and facing work and the pilot bar (11) shown, which is carried in the center hole and runs in a bushing held in the spindle and supporting the tool against chatter. The two cutter holders (12 and 13) illustrated were developed primarily for use in the turning head.

For simultaneously boring and turning, a boring bar (14) can be held in the center hole and brought into action at the same time as a cutter holder held in either of the other holes. The holder (15) illustrated is for adapting either of the tool holders or the boring bar to the turret. The rocker adapter (16) shown and the two set screws on the top of the holder enable a forged cutter to be adapted and readily adjusted for diameters.

For recessing and back facing, as well as boring in small quantities, a special tool (17) has been developed. The tool-carrying member swings on a pivot underneath the cutter, the motion being controlled by a handle. The two radial screws provide the required adjustment and also act as stops for gaging the depth of the cut. The slide tool (18) is intended for the same general character of work, but is more rigid and has a greater range. Among the work which it is designed to handle is the back facing of gear hubs and similar operations. The tool (19) is designed for facing work.

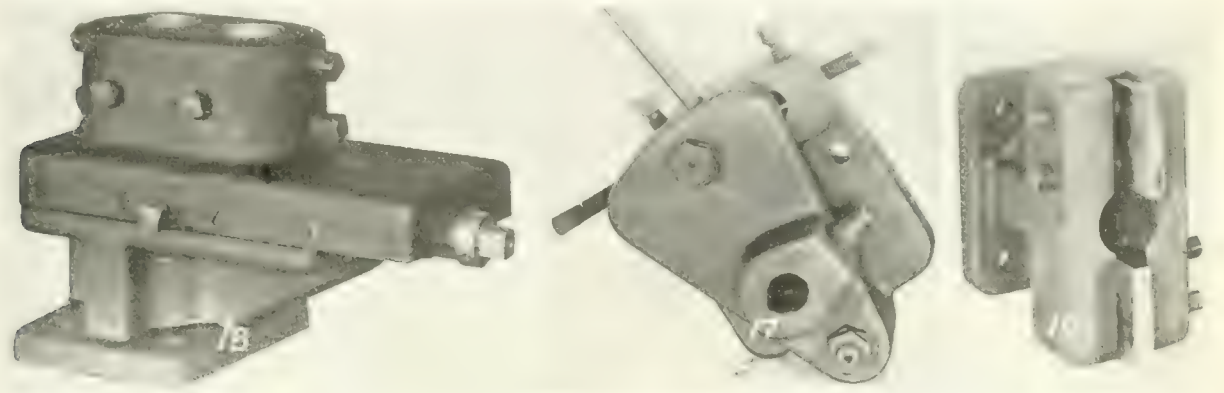
The Future of Zinc

A comprehensive paper on the spelter industry was presented before the British Institute of Metals by Ernest A. Smith at the autumn meeting in London in September. In treating the future of the industry in the United States, Germany, Belgium and other countries, he said in part:

"Before the war spelter reduction plants were in excess of the world's requirements, but the war had a most pronounced effect on the market because the greatest zinc-producing centers outside the United States are within the war zone in Europe. Very great efforts have been made in the United States to take advantage of the war conditions. In 1914 there were 33 zinc-smelting plants in that country, but through enlargements and the erection of new works the total capacity of the American plants will be brought up to about 650,000 tons annually, double the output of 1913, which amounted to 320,000 metric tons, or 32.1 per cent of the world's output.

"As to the spelter industry in Germany and Belgium, both those countries in the past relied largely on foreign ore supplies. Germany, however, has supplies of ore available in Silesia, Hungary, Carinthia and the Tyrol; but even if the mines are worked to their full capacity the supply will doubtless be insufficient to maintain the large output of spelter for which Germany has hitherto been responsible. The future of the Belgian industry is very uncertain, though no doubt the imports of foreign ores into Belgium will be renewed and every effort made to reach the former high production. For some time, however, the total production of Germany and Belgium will probably suffice only for home needs.

"Hitherto Great Britain has had to purchase spelter from other countries, and though there are abundant supplies of zinc ore within the British empire there has been inadequate smelting capacity for its treatment. But now that the Zinc Corporation and the British Broken Hill companies have been released from their contracts wtih the German groups, steps are being taken to erect the necessary smelting plants both in England and in Australia. Attention is also being directed to the possibility of developing the sources of zinc ore in the British Isles, which, with the application of modern methods of dressing, aided by adequate capital, may yet be profitably worked."



Recessing (17), Cut-Off Slide (18) and Boring (19) Tools

World's Output of Graphite

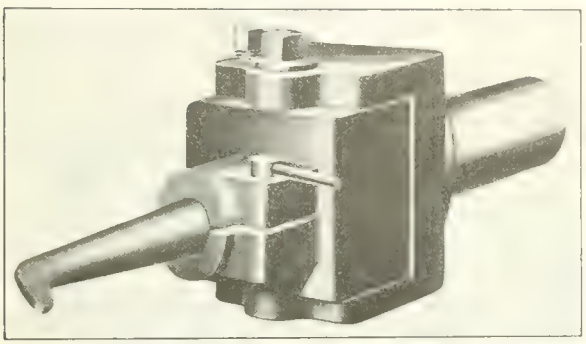
Interest in graphite at present is widespread. According to the Canadian Mining Institute *Bulletin* the two principal forms in which the mineral is found are amorphous and crystalline, the former being very common. The world's production statistics for 1912, the latest available, are as folows:

	Tons
Ceylon	
Canada	
South Africa	
Austria	
Madagascar	
United States	
Mexico	

Forged Cutter Adjustable Boring Tool

An adjustable tool designed for general boring work done with a forged cutter has been placed on the market by the Pierce Machine Tool Company, 617 West Jackson Boulevard, Chicago, Ill. Rigidity and ready adjustment are emphasized, through the location of the cutting point on the correct center line when boring irrespective of any adjustment that may have been made for various sizes. Thus, it is pointed out, the frequent necessity of changing the cutting point to suit the adjustments made is eliminated.

The construction of the tool is apparent from the accompanying illustration. The clamping arrangement is positive and readily adjusted to the desired size. An accurate backing is provided by it for the swivel block, a feature which is relied upon to eliminate all tendency to chatter or vibration. The tool is shipped with the shank set in a central position, and if it is desired to bore holes having a larger diameter than the capacity of 1¼ in. the collar screw is loosened and the set screw, whose point seats on an incline, is adjusted slightly. This forces the adjustable swivel block outward and is relied upon to move the cutting tool to the desired



An Adjustable Boring Tool Employing a Forged Cutter

position. This arrangement and the use of a convenient lever enables the slightest adjustment to be obtained quickly without using wrenches.

As furnished regularly, a shank 1 in. in diameter is provided, together with a forged cutter that is not ground. Any desired shank can be supplied at a slight additional cost.

Electric Arc Furnace for Melting Brass

An electric arc furnace, claimed to be specially suited to melting alloys, such as brass, containing volatile metals such as zinc without excessive loss of the volatile metals has been brought out by Horace W. Gillett and James M. Lohr of Ithaca, N. Y., and U. S. Patent 1,201,224 was granted Oct. 10, 1916. In melting yellow brass in an indirect arc furnace, kept practically motionless, the losses are high. Experiments are cited showing that if there is a sufficiently rapid agitation of the charge the violent shooting out of zinc vapor does not take place. The new furnace comprises a shell with refractory-lined hearth of circular cross section, mechanically revolved on its horizontal axis, with adjustable electrodes, introduced through the ends and revolving with the body of the furnace. An opening into the body of the furnace serves as a charging door and pouring spout and is capable of closing tightly.

The Penn Mold & Mfg. Company, Canal Dover, Ohio, recently organized to build a plant for the manufacture of ingot molds, using hot metal from the Canal Dover blast furnace, has elected the following officers: C. E. Blue, president; H. S. Bradley, vice-president; H. S. Sands, treasurer; W. V. Holt, general manager. Its main office will be located at 47 Eleventh Street, Wheeling, W. Va. The plant will have a capacity of 400 tons a day. The company has placed a contract with the Austin Company, Cleveland, for its building; the Whiting Foundry Equipment Company, Harvey, Ill., for a 102-in. cupola; the Morgan Engineering Company, Alliance, Ohio, for a 25-ton electric crane, and the Case Crane & Engineering Company, Columbus, Ohio, for a 15-ton crane.

Pneumatic Scrap Reclaiming Press

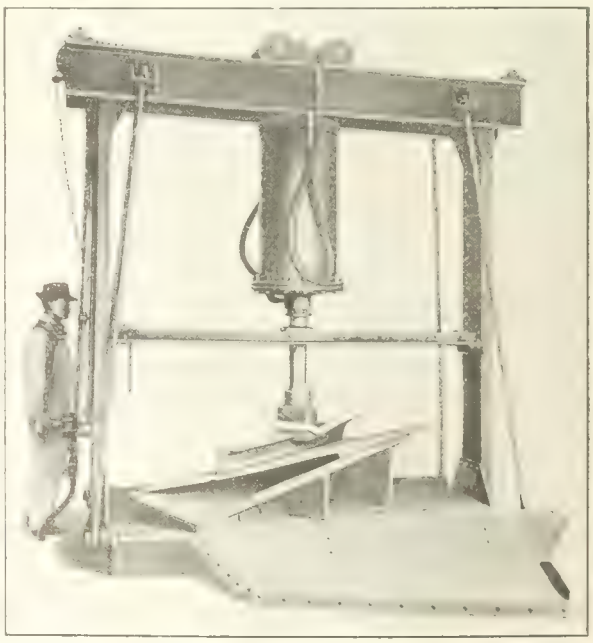
A press for reclaiming scrap material and building and repairing steel cars has been developed by the Southwark Foundry & Machine Company, Philadelphia, Pa. In addition to railroad work it can also be applied to general manufacturing and repair shop work where bent sheets, structural members, etc., have to be straightened or it is desired to form new material to particular shapes. Among the work for which it is particularly adapted are the straightening of bent truck frames, center and side sills, side sheets, channels, angles, truss rods, etc., and for forming new hopper sheets as illustrated, bending guard rails and other work required by the locomotive, car and maintenance of way departments of railroads. In doing the straightening work outlined special dies are provided to hold the material.

The base of the press is a heavy steel casting with a flat surface measuring 5 x 8 ft. and forming the foundation for the structural steel frame. This consists of two uprights supporting a main cross frame, the whole being braced by heavy tierods attached to the four corners of the base platen. The cross frame consists of two channel sections placed back to back with a space between them and serves as a track for the four-wheel carriage from which the pressure cylinder is suspended between the members of the cross frame. The carriage is propelled across the frame by an endless chain traveling over sprockets.

The travel of the ram is controlled by a specially balanced type of four-way valve located in a convenient position for the operator. The guide for the piston rod is held between two angle irons fastened to the vertical columns, which provides a clear space under the die of 36 in. The piston of the pressure cylinder is 20 in. in diameter and has a stroke of 36 in. Leather cup packing, which can be quickly renewed when necessary, is employed to pack the piston. A die, which can be changed in a manner similar to that of a steam hammer, is fitted to the end of the piston rod.

Air is supplied to the cylinder at a pressure of 100 lb. by a 1¼-in. flexible hose connection arranged to give free movement of the cylinder as it travels across the table. The capacity of the press at a 100-lb. air pressure is 15 tons.

Most of the work which the press is designed to handle can be bent or straightened cold, although in some cases it may be found necessary to apply heat. If cracking should occur as a result of cold bending, the cracks can be remedied and defective parts made sound by employing the oxy-acetylene torch or some other welding process.



A Pneumatic Press for Reclaiming Scrap Material and Repairing Steel Cars as Well as for New Work, Such as the Forming of Hopper Sheets for Steel Coal Cars, Which Is Illustrated

HANDLING FORGINGS

The Part Played by Storage Battery Trucks in Two Cleveland Plants

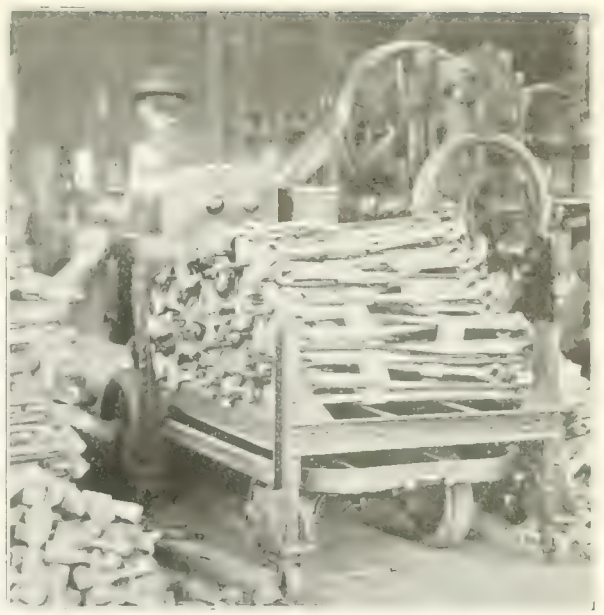
The scarcity and high cost of labor has caused many manufacturers to turn their attention more than ever before to the reduction of manufacturing costs by cutting down the expense of handling material, this being particularly true of old plants not thoroughly modern in respect to their manufacturing and handling facilities. Recently the plant of the Columbian Hardware Company, Cleveland, Ohio, passed into the hands of new owners and one of the first steps taken by the management was to make it more efficient by the rearrangement of machinery and by the installation of improved handling equipment. This company operates a forge shop and makes, among other products, forged steel vises, drop forgings for automobiles, anvils and stamped registers for warm air heating systems. Hand labor for moving material and finished products has been supplanted largely by the use of an electric storage battery truck, which has given very satisfactory results. This is said to be one of the first forge shops to make use of an electric truck.

Raw material is taken on the truck from the stockyard outside of the plant to the shearing machine in the forge shop. When the stock, after successive operations, becomes finished product in the final assembly and finished stockroom the truck is again brought into use for conveying the products to the shipping room. It is also used for carrying the forgings and other products from the shipping room to the shipping platform, running up an incline to reach this platform, which is on the car floor level. Some of the time the truck, with its load, is run directly into the cars. Formerly with hand-propelled trucks it took four men 7½ hr. to load a car. Now it is stated that with the electric truck this work is done by two men in 3 hr.

For convenience in operating the truck, a 4-ft. cement walk has been laid extending from the outside stock storage yard through the forge shop, which has a dirt floor. The illustration shows the truck loaded with vise forgings that are placed on a rack equipped with casters. The rack provided at present is heavier than needed, and because of its weight the men prefer to handle the material by placing it directly on the truck platform. The same truck is also found to be very convenient to use as a tractor in hauling four-wheel wooden box shop trucks around the plant loaded with various materials in process of manufacture. When used as a tractor a chain is slung around as many hand trucks as are to be hauled and the ends are hooked to the tractor.

The electric truck used is of 2 tons capacity and has an elevating platform, making it adaptable for use in hauling loaded racks. It is higher than the standard type to provide greater clearance and easier running over a rough surface. It has 4 x 22-in. driving wheels and 3½ x 15-in. rear wheels with solid rubber tires. The platform is 3 x 5 ft., the wheelbase 53 in., and the turning radius of the outside wheels 7 ft. The height of the platform lowered is 17 in. A truck with a high platform is not considered objectionable for handling forgings, because with a capacity load the material will not reach a height that would add to the manual labor of placing it on the platform. It has three speeds in either direction, its maximum loaded being 5 to 6 miles per hour, and is equipped with Edison batteries of 1040-watt capacity.

Another forge shop that has recently placed an electric truck in use for handling stock, finished automobile and other forgings and for a variety of other similar purposes is that of the Cleveland City Forge & Iron Company, Cleveland. This company uses a 2-ton truck with 3½ x 20-in. wheels on both the front and rear axles. It has a 37 x 75-in. stationary loading platform 24 in. high, the batteries being located under the platform. Both types of trucks were built by the Elwell-Parker Electric Company, Cleveland, Ohio.



A Carload of Forged Vise Parts Is Loaded by Two Men in 3 Hr., Using a Rack Provided with Casters and Taken Away When Filled by a Storage Battery Elevating Shop Truck at a Speed of 5 or 6 Miles as Compared with 7½ Hr. for Four Men Using Hand Trucks

Quick Method of Breaking Steel Bars

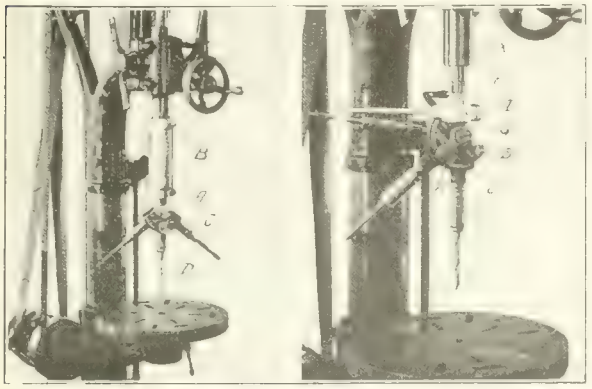
A physico-mechanical process for breaking steel bars of any cross section without waste of metal has been originated by a Frenchman, P. V. L. Bellanger, of Paris, France, and patented in the United States (U. S. 1,201,137—Oct. 10, 1916). At a point in the length of the bar where it is to be broken, the bar is submitted to the very slight and quick action of a blow-pipe, the flame of which may be oxidizing. The action of the flame produces a physico-chemical change modifying the properties, so that the metal becomes brittle at that point in an extremely small zone. The blow-pipe flame should have the shape of a lance head and be applied normal to the length of the bar so that only the point acts on the metal. It is claimed that the molecules of the metal lose their elasticity so that the bar can be broken cleanly without the metal being harmed. The temperature to which the metal is subjected is about 700 deg. C. The bar is placed on two supports and a hard cutter is applied by pressure or blow opposite to the affected portion of the bar, producing a clean break and an absolutely flat section without tearing or wasting the metal.

The St. Louis Safety Council, which has been formed in the St. Louis industrial district, will survey and organize the city and industrial district. Safety round table conferences have been established in five subdistricts in the city and one on the east side of the Mississippi River composed of superintendents and foremen of large industrial plants.

The Magnesite Refractories Company, Portersville, Cal., recently incorporated with a capitalization of $200,000, proposes to build one of the largest magnesite manufacturing plants in the country, reducing crude magnesite for shipment to the East, and manufacturing refractory brick and plastic materials.

Vertical Drilling Turret Attachment

A new style vertical drilling machine turret attachment has been developed by Charles Eisler, 43 Dodd Street, Bloomfield, N. J. In a general way it resembles the lathe turret attachment, which was illustrated in THE IRON AGE, March 16, 1916, and is designed for the manufacture of interchangeable parts in large



The Different Tools Required in the Production of Interchangeable Parts in Large Quantities Are Mounted in Either of These Two Turret Attachments for Vertical Drilling Machines and Brought Into Use as Needed

quantities where a number of different operations have to be performed. The special features of the attachment are that the tools can be readily changed without requiring the operator to leave his working position and when in use the tools are in line with the center of the spindle and consequently receive full pressure, which is relied upon to give better work. The attachment is made in several sizes to handle from two to five tools and in two styles, one with and the other without an automatic stop.

When it is desired to change the tool in use with the plain attachment shown at the left of the accompanying illustration, the knob *A* is pulled out of the hole *B* and the substitution made. The knob is then released and the plunger connected with it enters the corresponding hole and locates the drill in line with the spindle center. The shank *C* of the attachment can be supplied with a taper to fit any standard chuck, or if desired shanks for special chucks can be provided. The stop rod *D* is relied upon to prevent the body of the attachment from rotating. The taper shank *F* drives the turret in the customary way, the body of the attachment pivoting on the pin *G*. When the main spindle of the machine *X* is raised the spindle that is in use *C* stops immediately.

In the attachment provided with the automatic stop, which is shown at the right, when the knob *A* is pulled the drill that is in use *D* stops immediately without raising the spindle of the drilling machine. A sleeve attachment to the spindle *B* is provided for use where the tool is kept at work more or less steadily and can be made for several sizes of drilling machines. This attachment is made for taper-shank drills and it is pointed out that in no case is it necessary to stop the machine when the position of the tool is changed, only 1 sec. being required. A drift hole *C* is shown in one of the shanks.

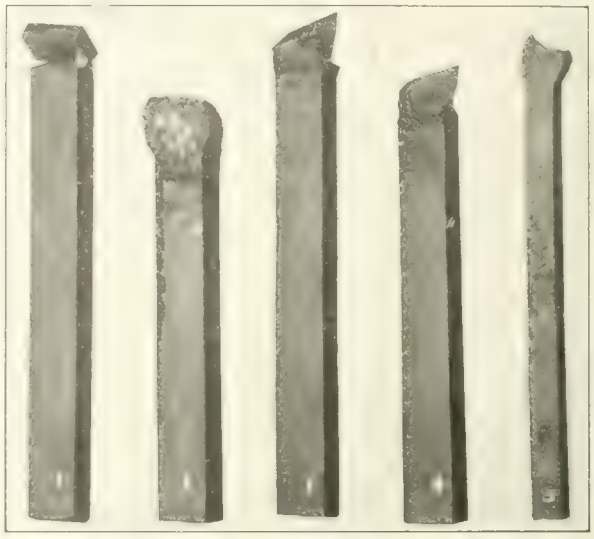
Refractories of Zirconium Oxide

The manufacture of refractory shapes made from zirconium dioxide and thorium dioxide or both is the subject of a German patent (287,554 Nov. 29, 1913), according to *Chemical Abstracts*. The mixture is subjected to high chemical pressure. After relieving the pressure the product is finely ground and stirred up with water or an alkaline solution, after which the liquid mass is poured into the desired forms, dried and burned. The molded article is stated to be readily removable from the form, showing no cracks either on drying or burning. Vessels made of this material are claimed to be tight and sufficiently strong to resist fracture when thrown upon a hard floor.

Cutting Tools Made by Electric Welding

At the present time the Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa., is using a number of welded cutting tools in its planing machines and lathes. They were made by welding high-speed steel tips to shanks of machinery steel by means of the arc welding process. This process has been found cheaper than either oxy-acetylene welding or forging and enables wornout high-speed tools to be cut to tips of the proper size, thus effecting a considerable saving. In the accompanying illustration the successive stages in the production of the tools are presented from left to right.

The high-speed tip is first tacked to the machinery steel shank as shown at *1*. After applying borax as a flux, the welding is begun and when this is completed the tool is laid in mica dust to cool gradually. At this stage of the process the tool has assumed the shape



Successive Stages in the Welding of High-Speed Steel Tips to Machinery Steel Shanks with an Electric Arc Machine from the Preliminary "Tacking" of the Tip to the Shank to a Finished Tool Which Broke Outside of the Weld While Being Subjected to a Hammering Test

illustrated at *2*. The tool is then given an initial grinding as shown at *3*, after which it is tempered and the grinding operation completed. This makes the tool ready for use and one in this condition is illustrated at *4*. The tool at the extreme right marked *5* is one which was hammered to test the strength of the weld, and, as will be noticed, while it broke the fracture was above the weld.

The machinery steel shank used may be of either hot or cold-rolled or carbon steel and of any desired length, while the steel tip should be short. The metal of the shank, which is relied upon to reinforce the tip, is built out and around the latter. In this way, it is explained, a larger radiating surface is provided, as well as a conducting path of greater area back to the butt of the tool, which keeps down the temperature at the cutting end. An ordinary Westinghouse electric arc welding equipment, such as is employed for the welding or repair of castings, is used, a Norway iron electrode 5/32 in. in diameter being utilized. To secure the best results a current of approximately 100 amp. is recommended and a voltage of from 60 to 70 volts. The work, it is stated, should not be hurried, although a good operator should be able to weld from 25 to 30 tools having a cross-section of 1½ sq. in. in a 9½-hr. day.

Helen furnace of the Red River Iron Works, Clarksville, Tenn., was blown in Nov. 3 and will produce ferrosilicon as heretofore. The furnace was blown out Sept. 25 for repairs.

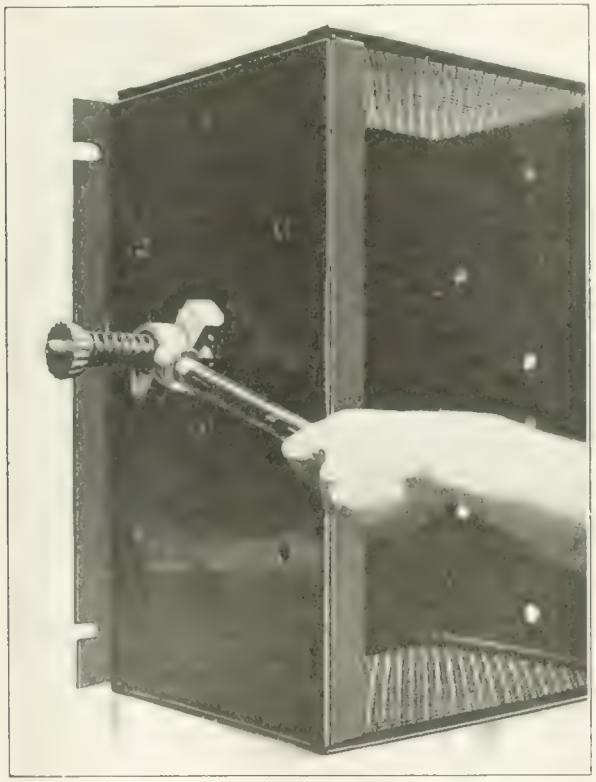
The Lackawanna Steel Company made the first steel in its new No. 23 open-hearth furnace last week. The company recently started its new No. 11 rolling mill.

Handy Cutting Tool for Sheet Metal

To enable additional holes to be made in the metal surrounding an electric light panel box to accommodate pieces of conduit or for similar work in the sides of metal lockers, the Universal Tool & Appliance Company, Stroh Industrial Building, Milwaukee, Wis., is marketing a cutting tool. The device, upon which a patent has been applied for, can be used for cutting all sorts of metal, fiber and slate, and can also be adjusted easily and quickly for various sizes of holes. It possesses the advantage of course that it can be taken to the work rather than having to bring the work to the tool.

When it is desired to use the tool a pilot hole is drilled through the material and the stud of the tool inserted. A flange nut is then secured on the opposite end of the stud and a ratchet wrench applied, as shown, a few operations being all that is required to cut the hole. The knives can be adjusted for cutting several diameters of holes and are held in a swing chuck. The spring shown between the chuck and the sham nut automatically feeds the knives.

In a test recently made of the cutter, the wall of a standard conduit cut-out box, which was approximately 0.1 in. thick, was cut in less than 1 min., 14 revolutions of the knives being required. The tool can also be used



To Cut Holes in Sheet Metal, Fiber or Slate with This Tool a Pilot Hole Is Drilled, the Stud Passed Through and Secured by a Flange Nut on the Opposite Side and a Few Turns Given with a Ratchet Wrench

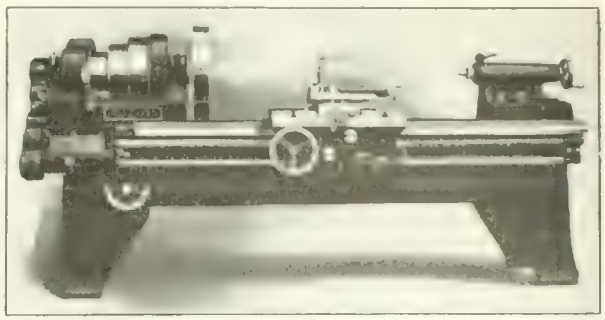
for tanks and similar work where the flange nut cannot be secured to the stud on the inside. The only change necessary in this case is to tap the pilot hole after it has been drilled and screw the stud in.

Patching Concrete Factory Floors

An article entitled "Patching Concrete Factory Floors" was published in THE IRON AGE of Aug. 10. It appears that the use of a mixture of asbestos fiber and rubber gum is not applicable to the repair of deep holes in factory floors or large areas, although such an inference might have been taken from the article. Such patches are quickly made and give excellent results, it is stated, when confined to patches about ⅛ in. thick and where truck loads do not exceed 1½ tons, but when used on deep holes or large areas they will not give the satisfactory service.

A 20-In. Quick Change Geared Lathe

The Walcott Lathe Company, Jackson, Mich., has placed on the market a 20-in. lathe with quick change gear box. Among the features of the lathe are a special arrangement of gear protection, a double-wall type



The Lower Portion of the Gear Guard on This 20-In. Lathe Is Cast Integral with the Headstock and a Special Quick Change Gear Box Provides 32 Thread Changes Controlled by Two Levers

of apron with all steel gears, a wide carriage bridge, an improved form of quick change gear mechanism and large bearing surfaces on the bed.

High-carbon steel finished by grinding is used for the headstock spindle which is mounted in bronze journals having provision for taking up wear. A long pilot for truing up the face plate independently of the thread is provided for the spindle nose. The lower half of the gear guard is cast solid with the headstock and the gear guards proper are bolted in place and cover the gears. The ratios of the back gears are 3.17 to 1 and 10 to 1.

The saddle is of heavy and stiff construction, the carriage bridge being very wide and deep. Further reinforcement for the bridge is provided by having a bearing on the front tailstock way, an arrangement which is relied upon to eliminate all springing under the pressure of the cut. The bearing of the saddle on the V's is 27 in., which, it is explained, tends to increase the wearing quality. The apron is of the double-wall type and the gears are steel drop forgings with wide faces and coarse pitch. The longitudinal and cross feeds are operated by friction and are reversible in the apron. The feed shifter and the lead screw nut are interlocked to prevent the engagement of rod and screw feeds at the same time.

The quick change gear box provides for 32 threads ranging from 2 to 112 per inch including the standard 11½ thread for pipes. Two levers on the front of the machine regulate the changing of the feed and by changing one gear at the end of the lathe it is possible to cut special or very fine or coarse threads. The tumbler gears and cone are used only for thread cutting. This, it is emphasized, simplifies the design of the gear box.

The lathe is regularly furnished with an 8-ft. bed which gives a distance between centers of 54 in. It is belt driven from a double-friction overhead countershaft. The diameter of the largest step of the cone pulley is 12 in. and the width of all the steps is 3 9/16 in.

Protecting Gas Ports of Open-Hearth Furnaces

In order to overcome the rapid deterioration of the gas nozzles of open-hearth furnaces, caused by the action of the intensely hot outflowing gases, rendering the furnace unfit for use until repaired, James W. Barnes, Youngstown, Ohio, has provided a mechanism (U. S. patent 1,186,370) whereby communication between each gas nozzle and its gas chamber is cut off at the outflow end of the furnace so that the hot products of combustion will pass from the furnace solely through the air outlets. An arrangement of ports and valves is also provided by means of which the gas nozzle at the supply end will be placed in communication with its gas chamber simultaneously with the cutting off of communication between the other gas nozzle and its gas chamber.

Book Reviews

Predetermination of True Costs. By Frederic A. Parkhurst. Pages, viii + 96, 6 x 9 in.; illustrations, 30. Published by John Wiley & Sons, Inc., New York. Price, $1.25.

Mr. Parkhurst offers his book as an argument on the possibilities of predetermining true costs and explains in the preface that the contents are conclusions reached after years of actual trial under scientific management. Consequently, at the outset, we must accept this treatise as having proved practicable under his direction. Whether or not a business man would have the courage to study and apply the method to his own plant is another question. Certainly it promises to be too heavy and minute for a small enterprise. The book is not written for the layman; it is detailed but not apparent, the process requiring a clearer routing.

On the other hand, "Predetermination of True Costs" is worked out with great care and offers many valuable suggestions. It points out authoritatively that most systems lack a proper distribution of charges and are insufficiently itemized. Where there is little system, there is much guesswork; and in his attempt to present a method for determining the cost in advance and daily, the author has left no item to speculation.

Having determined the direct and indirect costs of production, together designated "true costs," and having added to them the profit figured on the bases of productive-hour, pound, piece, per cent of cost and mutual satisfaction, we have as the result the "relatively true," or approximate, selling price.

All elements of the operations are known beforehand, standardized and timed so that a man-hour basis may be used even in the foundry. The reader is convinced after reviewing the chapter on the erroneous methods of distributing indirect expense, that the percentage, flat-hour and straight pound rates are inadequate for foundry use and is eager to have the author prove that the differential process rate method, by which the expense of operation is distributed in proportion to the operating cost of equipment—per machine—is practicable. This the author has accomplished in the plant under his own supervision.

In the chapter on mutual satisfaction Mr. Parkhurst discusses the morality of profits and urges that a profit based on costs and not on competition is a legitimate profit and is readily agreed to by the customer. That high salaries and a bonus will improve workmanship and insure a maximum output are the author's conclusions in his study of the good-will of labor.

Complete process forms leading to the final estimate sheet illustrate the edition.

Homans's First Principles of Electricity. By J. E. Homans. Pages, viii + 248, 4¾ x 7½ in.; numerous illustrations. Published by Sully & Kleinteich, 373 Fourth Avenue, New York City. Price $1.

The author starts with the assumption that the reader, even though he may not be familiar with the science of electricity, desires the information that should be found in a book of this nature. An effort has, therefore, been made to cover the principles of the science from the ground up. The book is divided into 24 chapters. Besides basic information the subjects covered include primary and secondary batteries, induction, magnetism, motors and generators of various kinds and magnetic coils and transformers. An appendix contains a number of useful formulas and tables.

Automobile Welding with the Oxy-Acetylene Flame. By M. Keith Dunham. Pages, 167, 4 x 6¼ in.; illustrations, 66. Published by the Norman W. Henley Publishing Company, 132 Nassau Street, New York City. Price, $1.

The book explains the use and care of apparatus in the repairing of automobiles by welding and gives directions for the construction of the necessary shop equipment. The actual welding of all automobile parts of aluminum, cast iron, steel, copper, brass, bronze and malleable iron is treated in a non-technical way and instructions are given on the burning of carbon out of the combustion head. The uses of oxygen and acetylene for lead burning, soldering, case hardening and heating are touched upon, while the final chapter gives instructions on how to figure the cost of making various welds.

The Engineer in War. By P. S. Pond. Pages, xv + 187; 5 x 7½ in.; illustrations, 69. Published by the McGraw-Hill Book Company, New York. Price, $1.50.

This book gives a brief outline of the relation of engineering to the conduct of war and the adaptation of the principles and practices of civil engineering to military requirements. The book is not intended as a text book for civilian engineers who wish to acquaint themselves with military engineering, but is written solely for the purpose of acquainting them with the scope of their duties in the event of war. The 11 chapters cover in a general way the military policy of the United States, the duties of the military engineer and the economies of military engineering, the tools and equipment of military engineering, stream crossings, military roads, military sanitation, field fortification and siege operations, military demolitions, military reconnaissance, sketching and surveying and the mobilization of material resources.

The book is extremely interesting and is a severe indictment of the happy-go-lucky military policy of the United States in that it shows clearly the vast amount of training that civilian engineers would require before they would be of any value to the country from a military standpoint in the event of hostilities.

Hendricks's Commercial Register of the United States. Pages, 1738, 7½ x 10 in. Published by the S. E. Hendricks Company, Inc., 2 West Thirteenth Street, New York City. Price, $10.

The twenty-fifth edition of this book is distinguished by the publication of a list of trade names, brands, etc., apart from the main portion of the register. This list, which covers 202 pages, furnishes a reference for purchasing agents and prospective buyers to any products which have distinctive names. At the same time the trade names which formerly appeared in parentheses after the manufacturer's name under the different classifications are retained.

The main portion of the work is a comprehensive register of producers, manufacturers, dealers and consumers of the products used by the iron and steel, mechanical, hardware, engineering, railroad, architectural, electrical, quarrying, contracting and kindred industries. There are some 45,000 classifications, containing approximately 350,000 names and addresses.

The Cincinnati Milling Machine Company, Cincinnati, Ohio, has issued a 409-page book of standard 6 x 9-in. size, treating of milling machines and the work they do. The book is a compilation of the results of the experimental work that has been carried on by the company in cutter design, cutter and work cooling and other branches of the art and also includes some matter that has not been published in the technical journals. Computations involved in cutting spur, bevel, spiral and worm gears present these subjects in a simple detailed manner and a number of tables and formulas are included. Four chapters are devoted to the construction, use, erection, care and adjustment of the machine, followed by an analysis of the process of milling and data on feeds and speeds, lubrication, design and the sharpening of cutters and the power required to do milling. One chapter relates to milling jigs and fixtures. The cutting of various gears and the calculations involved are covered. The price of the book is put at $1.50.

Plans for the development of a water and industrial terminal at Bayonne, N. J., were filed recently with the Board of Commissioners of that city by the New Jersey State Board of Commerce and Navigation. These plans have resulted from conferences between the Bayonne Chamber of Commerce, the City Commissioners of Bayonne, the State Board of Commerce and Navigation and Irving T. Bush, president of the Bush Terminal Company. Should these plans be put into execution, over $7,000,000 will be expended in this development.

Perpetual Inventory and Appraisal Values

How Values Increased Through Extraneous Conditions Lull Manufacturer Into Wrong Sense of Financial Security — Table of Standard Depreciation Rates

— BY CHARLES PIEZ*

"WHAT is your plant worth? You should know—exactly. You should know for insurance purposes, for financial purposes, for every purpose that has anything to do with the safe conduct of your business. You should know—must know—before you can calculate costs, overhead, profits; before you issue securities, make loans, place insurance. Your annual statement has a hollow foundation if its estimate of your assets as a going concern is based on the accountant's guess—a guess that has no better foundation than an estimate of costs at some past period from which certain arbitrary percentages have been written off each year."

This statement, taken from a publication of one of the appraisal companies, can be accepted as sound, without committing ourselves to the conclusion which the appraisal company is anxious to establish that the real worth of a plant for all purposes can be established only through the work of professional appraisers.

Most plants grow from small beginnings, and during their early life expand as the needs dictate. The organization is necessarily small, because the most rigid kind of economy must be practised, and original costs and the costs of additions are frequently so completely submerged in the total assets that no safe records of these costs can be established. Many plants never outgrow this lump-sum treatment of assets. In these cases depreciation of plant and equipment is either wholly disregarded, or else an arbitrary amount is charged against profits, the amount of depreciation varying inversely as the size of the profit it is desired to show. The annual statements of plants so conducted have indeed a hollow foundation, for not only their assets, but usually their profits are based on the accountants' guesses.

Industries so managed need the assistance of a competent appraisal company to inform them of the value of their assets, as a basis for embarking on a sounder and safer system of accounting methods. Practically all successful industries, after their early years of rule-of-thumb accounting, start with an appraisal, and then so maintain their inventories that additions to the plant are accurately recorded. and depreciation is based on judgment and experience. But even such industries will find it to their advantage to ask the aid of appraisal companies for the purpose of determining authoritative records of the cost of reproducing plant and equipment, so that under-insurance or over-insurance may be avoided, and the basis for the requirements of co-insurance complied with.

Appraisals are also valuable in establishing comparative values of plants that are about to merge, or in serving as a basis of a scheme of financing. But the claims that an appraisal is necessary for figuring overhead costs and the selling price and profit of manufactured articles, is, to say the least, sadly overdrawn.

HOW APPRAISALS ARE OFTEN INFLATED

It has been my experience that in well managed industries appraisal values are usually considerably above sound inventory values established by the management. With the steady advance in prices that has been going on almost continually for the last twenty-five years, it is but reasonable to suppose that replacement values are substantially higher than initial costs, and it is well to establish the amount of such excess if a proper insurance coverage be desired, but such advance is wholly speculative and has absolutely no bearing on the value of the plant from the standpoint of the operating and sales management.

The establishment of true costs is an essential element in the success of the business, and true costs can only be obtained when every item of expense is included. Buildings that were adequate in size and convenience of arrangement when they were first erected gradually out-grow these initial advantages as the business increases, and in spite of substantial increases shown in the appraisal value of the buildings, they have less value for the purposes to which they were put than they had when they were first constructed. They may, in fact, prove so unsuitable to the increasing needs of the business as to justify demolition and reconstruction.

Few owners are astute enough to foresee their needs for ten years to come, and fewer still have the means to build or expand along the lines that will give ample opportunity for future business growth. It is safer by far, therefore, to provide proper sinking funds through an ample rate of depreciation, so that when buildings that have outlived their usefulness require reconstruction, funds have been provided out of profits for rebuilding along more modern lines.

Machine tools have changed very considerably as a result of the development of the Taylor-White and other high speed steels, and companies that followed appraisal methods of depreciation, find themselves with obsolete equipment and no funds to replace it with modern equipment.

Patterns and small tool equipment often have but temporary value and should disappear wholly from the inventory when they have served their purpose, yet these two items are fertile sources for inflation of values through appraisals.

CHARGING DEPRECIATION AGAINST OPERATING EXPENSE

What the management of an industry is chiefly concerned in is to provide a fund through a proper scale of depreciation which will reimburse it for the difference between the cost price of a piece of equipment and the fair cash selling price of that piece of equipment when it is sold, either because it is ready for the scrap heap, or because some newer form or method has made a change desirable. This difference is properly a part of the cost of the product, but becomes so only by charging depreciation against the expenses of operation.

Has any appraisal company ever investigated the subject of depreciation from the operating standpoint and recommended a schedule of depreciation

*President Link-Belt Company, Chicago. The article is a paper to be read before the December meeting of the American Society of Mechanical Engineers.

(*Continued on page* 1266)

ESTABLISHED

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Shortage of Pig Iron

A year ago the attention of our readers was called to the fact that the blast-furnace capacity of the country was not keeping pace with the increase in the capacity of steel works. This assertion was confirmed and emphasized by the summary of new construction printed in THE IRON AGE of January 6, which showed that new open-hearth furnaces then under way represented an annual capacity of 4,265,000 tons of steel ingots, while the new blast furnaces then being built had a capacity of only 1,750,000 tons of pig iron. In THE IRON AGE of January 13 the statement was editorially made that "the balance between pig iron and steel was a delicate one" and that "it now seems by no means improbable that pig iron will undergo an adjustment that will materially lessen the spread between it and unfinished steel."

New open-hearth furnaces steadily came into commission as the year advanced, and the price of steel persistently moved up as the demand was still seen to be in excess of the output, but much to the surprise of blast-furnace owners the supply of pig iron seemed to adjust itself to the increasing requirements of the open-hearth steel makers and the price of basic pig iron showed little variation from month to month. In July announcement was made that the Bethlehem Steel Company's new construction program would involve a total of 12 blast furnaces and that 14 furnaces were to be built by a number of other companies, which with two new furnaces blown in about a month before would eventually give an addition of 4,500,000 tons to our annual blast-furnace capacity. It was pointed out, however, that only a small part of this increase in capacity will be available this year.

These figures are mentioned to indicate that the situation which is now on us was long ago clearly indicated. In the past month or six weeks a scramble for pig iron has taken place. It is true that this was aggravated by the heavy purchases of steel-making pig iron for export, but it appears quite probable that the shortage would have developed even without these export sales, which perhaps simply caused consumers of pig iron to make preparations to cover their requirements for the future. The market report issued by the Matthew Addy Company, Cincinnati, under date of November 25 quite forcibly covers the current situation. It is in part as follows:

> We have had this month the most sensational sudden advances in price that iron has ever known, yet efforts to check the buying of iron seem only to encourage it the more. The most remarkable thing about the present market is the fact that nearly everything that is being sold is for delivery over the last half of next year. Ordinarily pig iron is bought for delivery six to seven months ahead. That is, at the present time iron usually is selling for delivery over the first half of the year. Now, however, tremendous sales are being made for the last six months of 1917. There is a positive shortage of basic and Bessemer steel-making irons. It seems evident that the capacity of the country to make steel has developed more rapidly than the capacity of the country to make iron for the manufacture of steel. And so many furnaces that usually run on foundry iron are being turned over to the making of steel iron that the foundry trade is all upset. This week sales have been on a tremendous scale. Probably November, 1916, will go into history as the largest selling month in the history of the trade. . . . Prices to-day are irregular, depending on the views of the seller. But there are no low prices.

Never before has the country seen such a situation as is here presented. We have had excited times when buyers of iron and steel have taken alarm and have covered their requirements a considerable distance ahead, but never before has a covering movement extended so far into the future. The conditions of the past year or more have been such as to check prophecy, the developments of the trade having completely broken precedents. The conservative naturally shake their heads and counsel caution because the heavy demand for steel products is based on war conditions. But no man can say when the European war will cease. Should it continue for another 12 months the prices now prevailing may seem quite moderate.

Readjustments After the War

The question as to what readjustments in trade will occur after the war has, of course, a very practical bearing for business men, since success consists largely in anticipation. The matter of wages has been brought to the front again by the fact that the iron and steel industry is making another general advance in wages, the Steel Corporation having stated that its advance is to become effective Dec. 15. The iron and steel industry has now made three general wage increases this year. The first, which became effective Feb. 1, was regarded as an ordinary one. The second, effective May 1, was regarded as directly connected with the war, and many

steel manufacturers endeavored to instill the idea that it would automatically come off at the close of the war. In connection with the last advance little reference is made to this idea, it being recognized that the cost of living and various other important factors will enter. In other words, all thought of the war being followed by the *status quo ante* is being abandoned. As the appraisement of things progresses the conception is more along the line of developments at the end of the war being "changes" rather than "readjustments."

So far as wage rates may be dependent upon the cost of living there is ground for expecting reductions. The chief causes in the great advance in the cost of living are the natural advances in commodity prices due to foreign buyers making high bids for our goods, thus establishing high market values and in some instances at least causing more or less of a scarcity, and the advances sellers find they can make with ease, because money is plentiful and the public is not very critical when it is prosperous. There is no indication that the high cost of living is due in any large part to increased cost abroad of the goods we import Every one knows that our imports, reported in dollars of value, are beyond all records, but there is no definite ground for attributing the increase chiefly to higher unit prices. In the case of our exports it is well recognized that values per unit have greatly risen, that our extremely heavy exports are not in the main due to the quantities exported being larger. There is a distinct difference between our import trade and our export trade in this respect. While a complete analysis is quite impossible, some representative imported articles, the quantity of which is given in the import statistics, have been selected at random for the comparison. The representative period before the war, to be compared with the first nine months of this year, is the first nine months of 1913, in which period imports made a new high record. The increase is 39 per cent, from $1,327,385,071 to $1,831,174,668. Representative commodities imported by quantity make the following comparison:

Small decreases—Asphalt, matting, oil cloth.

Large decreases—Cattle, macaroni, carbolic acid, lead, paper stock.

Small increases—Antimony ore, asbestos, rice, bristles, grass seed, raw silk, spirits, lumber.

Large increases—Aluminum, brass scrap, nickel ore, paper, spices, raw wool.

If it were possible to make a complete inventory it would probably be found that the increased unit cost of imports is practically negligible. Nor can it be seen from the data available that we have turned largely to the importation of luxuries. Rather we are importing more raw materials for manufacturing. One important exception is in paper, as we have imported a great deal more paper, but much less of the raw material for making paper.

The end of the war will be likely to occasion, therefore, no great change in our imports, except for the very important possibility of there being large imports of such goods as we can manufacture, but which foreign manufacturers may be willing to sell at much lower prices than our own manufacturers are getting into the habit of charging. Thus there is no reason to expect any material decrease in the total value of our imports, while there may be a tendency for them to increase. To maintain our position it will be necessary for us to have large exports. Of the present export trade little will remain. Much of it is in supplies directly intended for the war, while much lies in the high value placed upon goods exported to neutral countries. If an exact inventory could be made of the quantities of goods exported to neutral countries at present, in the regular course of trade, the total would undoubtedly be pitifully small, compared either with the quantities exported before the war, or the values now assigned to total exports, about half a billion dollars a month.

In American industries the introduction of labor-saving machinery has been continuous. Sometimes the pressure has increased and sometimes it has decreased, but the tendency has always been present. The tendency is great at present, but the expression of it is limited by the difficulty in buying machinery. After the war the limitation will be removed, but the tendency will continue and with most manufacturers the funds will be ready. Under the stress of heavy demand for their products, coupled with scarcity of labor and inefficient performance of the men it is possible to hire, manufacturers in all lines have been making up their minds to push the elimination of hand labor as far as they can year by year. There will be no relaxation of this desire.

The New Ore Prices

Prices of Lake Superior iron ore for 1917 have been established by sales at the highest figures considered in any recent discussion of the matter. The advance of $1.50 a ton over the year's prices is about 50 per cent more than the maximum talked of only two or three months ago. It is only one sign of the times that after sentiment in the ore trade had practically settled upon $1.30 as the extent of the advance, the developments of a single day should have turned the scale in favor of an amount 20 cents higher. The announcement of another general advance of 10 per cent in wages was made by the leading steel companies on Wednesday, Nov. 22, carrying with it a 10 per cent advance in wages of iron miners, and by late afternoon of that day important iron ore interests let it be known that $1.50 rather than $1.30 would represent the step between the furnacemen's iron ore costs of 1916 and 1917.

It need hardly be said that the unparalleled performance of the pig-iron market in the past six weeks could not have been better timed to resolve any doubts the ore producers may have had as to the size of their share in the astounding rush of prosperity in iron and steel. With pig-iron buyers eager to cover for their needs through all of next year at advances amounting to $6 to $8 in a single month, and with vesselmen able to get a 100 per cent advance for 1917 over the 1916 level for ore charters, there was nothing to suggest moderation to the iron ore producer. Accordingly we have in the case of old range Bessemer ore at $5.95 for the base a figure only exceeded by the $6 price of 1887 and 1890, and in old range non-Bessemer at $5.20 an advance of 20 cents over the high level of $5 in 1887, while Mesaba Bessemer at $5.70 is prac-

tically $1 a ton higher than the previous high point of $4.75 for 1907 and 1910, and Mesaba non-Bessemer at $5.05 compares with a previous high of $4 in 1900, 1907 and 1910.

In commenting just twelve months ago on the prices then about to be named for Lake Superior ores for this year, it was said in these columns that "the iron ore producers seem likely to repeat the recent experience of steel makers in having their prices made for them by conditions little within their control." And it was added:

Admittedly there is no parallel for the present situation. Certainly there is a general disposition in the iron trade to believe that considerable advances in pig iron and steel products are yet to be seen, and no indications of an early ending of the war or of the prosperity of iron and steel manufacturers are in sight.

With the remarkable advances pig-iron and steel products, especially the latter, have had in the year since the above was written, the amazing fact is that it may now be taken over word for word as applicable to the situation to-day. The ore men, after deciding late in 1915 on an advance of only 70 cents for this year, though $1 had been proposed in some quarters, are now, with the ending of the war and of war prosperity twelve months nearer, naming prices that seem to suggest compensation for their moderation of a year ago. It certainly cannot be said that they are out of line with present profits on pig iron and steel. What the fact will be 18 or 20 months hence—when $5.95 ore will still be going into the furnaces—as to the relation between ore costs and the pig-iron market, only the war tide of 1917 can determine.

CORRESPONDENCE

Some Causes of Labor Shortage

To the Editor: The editorial on the shortage of labor supply in THE IRON AGE of Oct. 26 stated that "this is not because we are actually short of men . . . but it is because our industrial expansion is proceeding at a greater rate than our human labor supply increases." This is indisputable. At the same time, however, our visible labor supply is not contributing its full quota toward the amelioration of the abnormal conditions which prevail.

There are three types which constitute a drag upon the accomplishment of this industrial expansion. One is composed of those who have been prevailed upon to strike and, irrespective of the merits of the various controversies and the loss of wages to themselves, have caused loss of valuable time to the investor. This time can never be made up and therefore affects adversely the local community and by reason of the multiplicity of these cessations of productivity, the nation at large. Another takes in those who are habitually moving from one job to another; there are also those who cannot stand prosperity and must take a certain number of days off each week. Both these classes cause a loss of time, with the same effect as set forth above. Furthermore, the rover handicaps by failing to attain sufficient skill to maintain an average production when he is working. The third type consists of the goodly number of able-bodied youths who infest the street corners of our cities; and you will find them in the towns and villages also. These are the greatest offenders because they are idle practically from one year's end to another and thus contribute nothing to the welfare of the nation.

All these types have no interest but self and are absolutely blind to the part which it is intended they should play in the development of this nation—in fact, a part which they are obligated to perform, for Capt. John Smith's dictum is just as applicable to-day as when it was uttered. And yet one would expect that very element of selfishness to stimulate the accumulation of all the competence they can in anticipation of the time, which always comes, of stringency if not absolute want.

To the type of workman in industries THE IRON AGE represents this presentation will appear exaggerated, for he is industrious and is possessed of intelligence and foresight. To the man who is confronted with that trying problem of keeping his plant or department up to capacity, however, there is nothing overdrawn in the picture, and it presents at least a partial explanation of our shortage of labor. H. D. MURPHY.

Manufacturers of High Grade Ferrosilicon

The production of 50 per cent ferrosilicon is rapidly being increased in the United States. The Shawinigan Electro Products Company, Baltimore, which has a plant at Highlandtown, Md., completed a second electric furnace last summer which it recently started up and is now adding a third which it will use as a spare. The output of the two now running is from 10,000 to 15,000 tons of 50 per cent alloy per year. The company is booked well into 1917.

Another plant which is operating successfully is that of the Keokuk Electro Products Company, Keokuk, Iowa. There three furnaces are operating and there is good demand for the output. A third plant is that of the Mohawk Development Company at Fort Plain, N. Y., which has one furnace. The country's largest producer, the Electro Metallurgical Company, has an important operation at Niagara Falls, N. Y.

The greatly increased demand for high grade ferrosilicon since the war started has been the cause of this development. Some estimates of the present consumption in the United States go as high as 45,000 tons per year. Considerable is being sold to foreign countries by producers in this country and Canada.

Idle Virginia and Kentucky Furnaces Restarting

Unusual industrial activity is evidenced in eastern Kentucky and southwestern Virginia. Announcement comes from Big Stone Gap, Va., that the Intermont Coal & Iron Corporation, recently reorganized by R. T. Irvine, Dr. J. W. Kelley and others with a capital of $500,000, will have the blast furnace at that point ready for blast by Jan. 1. The plant has been idle since 1907. Additional properties have been purchased, and quite an enlargement is taking place.

At Middlesboro, Ky., the old Watts plant of the Virginia Iron, Coal & Coke Company has been rebuilt and one of the two furnaces was fired several days ago. The other will be running within a short time. A large part of the ore supply comes from northern Georgia, while the coke supply comes from the adjacent coking field of southwestern Virginia. Advices from Max Meadows, Va., are to the effect that the company's plant at that place is to be in operation by Dec. 1. Additional new properties have been obtained in the adjoining county of Buchanan, reached by a branch of the Norfolk & Western.

New Krupp Steel Plant

The Krupp new steel plant at Munich, Germany, is about completed and will start early in 1917, says the London *Ironmonger*. The buildings cover an area of about 70,000 square meters. The plant will not make armor plate or raw materials, but only finished steel, specializing in pressing, turning, shaping, grinding, polishing and mounting.

Silico-manganese, 50 per cent manganese and 30 per cent silicon, is now being made by the Noble Electric Steel Company, Heroult, Cal. It has been producing ferromanganese and pig iron in its electric reduction furnace of the shaft type.

COMING TARIFF REVISION

Is a "Bargaining Tariff" Foreshadowed?—Importance of the Webb Bill

WASHINGTON, D. C., Nov. 28, 1916.—Evidence is rapidly accumulating foreshadowing a more or less comprehensive revision of the Underwood-Simmons tariff act in the new Congress elected on Nov. 7, irrespective of whether Republicans, Democrats or independents are able to organize the new House and to dictate the make-up and policy of the Ways and Means Committee. Should the Republicans control, the revision will be frankly protective, though the increase in rates will be moderate. If the Democrats dominate the situation, it is probable they will devise what would be known as a "bargaining tariff" with maximum and minimum rates. In the event that the independents hold the balance of power and are sufficiently influential to prescribe the character of this legislation, the measure will probably be a compromise in rates between the Republican and Democratic projects, the object of the legislation being to prevent the flooding of domestic markets with low-priced foreign manufactures.

On the face of the returns covering the House of Representatives the Republicans now have a small plurality of three, but six members have been elected who will owe their allegiance to neither of the great parties, calling themselves variously Independents, Progressives, Progressive Protectionists, Prohibitionists, Socialists, etc. Already the leaders of both Republican and Democratic organizations in the House are seeking pledges of co-operation from these members and both sides are claiming sufficient acquisitions to give them control. As the situation is wholly unprecedented in the history of the country, the outcome cannot be foreshadowed, but the close division of the two great parties will undoubtedly make for conservatism and will prevent the forcing through of radical partisan legislative programs.

It has been well understood here for many months that if the new House should be controlled by the Republicans, the Ways and Means Committee early in the new Congress would prepare a tariff bill embodying a moderate upward revision of the rates of the existing law. Two impressive reasons have been brought forward in support of this plan; first, the practical experience during the period from Oct. 3, 1913, until Aug. 4, 1914, immediately following the passage of the Underwood-Simmons act and before the outbreak of the European war; second, the strong probability that the end of the great conflict will be promptly followed by an influx of cheap foreign goods. The experience during the ten months before the war is a matter of record to which the Republican leaders point as indicating what may be expected when the armies of Europe go back to peaceful occupations, with new standards of efficiency before them, with every incentive to indefatigable labor and with a consuming power greatly reduced by their comparative poverty.

THE "BARGAINING TARIFF" PROPOSAL

The Administration, since the recent elections, has been practically committed by the statements of high officials to the early enactment of a so-called "bargaining tariff," the details of which, presumably, are to be worked out by the tariff commission soon to be appointed. In a significant address delivered in the past week before the annual convention of the Nebraska Manufacturers' Association at Omaha, Dr. Edward E. Pratt, chief of the Bureau of Foreign and Domestic Commerce, declared that the adoption of a bargaining tariff must be included in the steps to be taken "to safeguard the future of our foreign trade." He admonished his hearers to "recognize the fact that peace in Europe will bring with it problems almost as great as, if not greater, than the problems that arose at the opening of the European war." "Foreign trade," he said, "often means the difference between prosperity and stagnation; it is a great stabilizer of business conditions, and a firm with a prosperous foreign trade department can depend on foreign orders to keep its wheels going when things are slumping at home." In Dr. Pratt's opinion, a bargaining tariff will enable us to meet the movement now on foot in Europe to centralize economic resources and finances and to put the governments of the belligerent countries behind their respective manufacturers in their effort to recover their lost trade. In this connection Dr. Pratt also emphasizes the importance of the early enactment of the Webb bill permitting American manufacturers to combine for the development of foreign trade.

Statements recently current in the daily press purporting to describe the President's intentions with respect to an extra session of Congress are unreliable. It can be stated on high authority that while the President has no present intention of bringing Congress together soon after the adjournment of the coming session in March, next, his mind is entirely open on the subject and his course will be controlled by developments. It hardly need be said that the ending of the European war would precipitate a situation in the United States that might call for immediate legislation, a fact that gives an added interest to the more or less authoritative statements which are now being put out by prominent public men of both parties.

W. L. C.

Proposed Reorganization of the Iron and Steel Institute

Impressed by the high state of organization of the American scientific and technical institutes and by the economy and convenience resulting from their common home in the Engineering Societies Building in New York, Sir Robert Hadfield made recommendations to the Iron and Steel Institute (London) recently, looking to the reorganization of that society. His suggestions may be classified as follows:

1. Improving the internal work of the institute by sub-committees.

2. Proposals with a view to closer relations with the overseas dominions and India.

3. The establishment of central premises for some or all of the principal technical societies, with their many attendant advantages, including a library service.

With reference to the last suggestion Mr. Hadfield pointed out that the various institutes representing American competitors are now beginning to reap the benefits of their wise policy of having the whole of the work, whether organization, routine, reading of papers, or library research, concentrated in one building, one library and one club. In other words, the United States has one common center for her technical institutes with all its resultant advantages to the metallurgist, mining, mechanical, electrical and civil engineer, including a saving of time, better organization and better work. With a view to increasing national efficiency to cope with after-the-war competition, he was of the opinion that the British should imitate the American example.

RESEARCH COMMITTEES

Dealing with the question of organization, Mr. Hadfield suggested that the Iron and Steel Institute might well consider the system adopted by several of the leading American institutes and to some extent already carried out by several British institutes—the delegation by the council of more work to committees and sub-committees appointed to deal with special subjects. At present the Iron and Steel Institute has only committees dealing with publications and Carnegie scholarships. The council holds about six meetings each year, at which the mass of general business to be dealt with is very considerable, so that sufficient time cannot be given to the many special subjects with which the institute is concerned. He invited consideration of the work of the American Institute of Mining Engineers, where a great deal of work is done by subdivision.

The steps he suggested and which to some extent were later adopted by the Iron and Steel Institute in regard to sub-committees were referred to in THE IRON

AGE of Nov. 2, 1916. Five scientific and technical committees are proposed, as well as a research committee, with about eight members each.

ZIRCONIUM AND INDUSTRIAL RESEARCH

In drawing attention to the organization of work in America, Sir Robert Hadfield laid special emphasis on the advisory committee to the United States Bureau of Standards at Washington and drew a parallel between the National Physical Laboratory and the technical applications of science by the Iron and Steel Institute. The importance of technical committees is shown by the statement that before the war Germany was obtaining over 100 tons a month of zirkite and apparently no one in England knew anything about it or took the trouble to investigate the question. Zirconia ores are now rapidly coming to the front as refractories and if a sub-committee existed it would be the duty of the chairman to report about twice a year to the council on subjects of this nature comprising new developments.

Millions for Navy Yards and Naval Bases

Fleet Bases at New York and San Francisco—Eight Yards to Be Equipped to Build War Vessels

WASHINGTON, D. C., Nov. 28, 1916.—A comprehensive project for the remodeling of all the leading navy yards and the creation of two completely equipped naval bases, involving an expenditure of from $50,000,000 to $100,000,000, has been laid before Congress in formal recommendations submitted to the House Committee on Naval Affairs by Rear Admiral Harris, chief of the Bureau of Yards and Docks. The object of this scheme of reorganization and expansion is two-fold: First, to provide for the equipment of at least eigh navy yards for the building of war vessels, and second to provide a complete innovation in the United States Navy, namely, a well located and fully protected base for naval fleets on both Atlantic and Pacific coasts. Both features of the project are put forward as necessary parts of comprehensive preparedness plans.

Coincidently with the presentation to the House Naval Committee of Admiral Harris's navy yard expansion scheme, the Navy Department announced that after several months' consideration and exhaustive investigation of the resources of all the navy yards it has been decided to expend the $6,000,000 appropriated at the last session of Congress for the enlargement of the navy yards at Portsmouth, N. H., Boston, Philadelphia, Norfolk, Va., Charleston, S. C., and Bremerton, Wash. This amount will be expended in accordance with a program which ultimately will put the Norfolk and Philadelphia yards in shape to construct capital ships, the Boston and Bremerton yards to build cruisers and other vessels up to 12,000 tons, and the Portsmouth and Charleston yards to construct gunboats, destroyers, submarines, high-powered motor boats, etc. When the six yards are fully equipped the Government will have four large establishments capable of building battleships, battle cruisers, etc., inasmuch as New York and Mare Island are now fitted up, though in some respects inadequately, for this class of work. Mare Island especially is not only lacking in important items of equipment, but the docks of that yard possess insufficient depth of water for the proper launching and berthing of battleships.

FLEET BASE IN NEW YORK HARBOR

The details of the department's general plan for developing the manufacturing facilities of the navy yards and especially for the creation of two big naval bases are now being worked out by a special board, the chairman of which is Rear Admiral Helm, who has had wide experience in the management of navy yards. The plan for the New York yard contemplates the separation of the industrial plant for the building of warships from all activities directly connected with the fleet and the transfer of the latter to a fleet base to be established on an island the Navy Department proposes to create below the Statue of Liberty in New York harbor. The new fleet base would be equipped with docking and repair facilities, large storehouses for equipment, commissary supplies, etc., tankage for large quantities of petroleum, which it is estimated the Navy will soon be consuming at the rate of 60,000,000 gal. per annum, coal pockets of large capacity, etc. The concentration of these supplies and facilities at the New York base, it is claimed, will greatly reduce the cost of maintaining the Atlantic fleet. It is not possible to estimate the exact cost of the establishment of the proposed base at New York, but in view of the work that must be done to prepare the site in the harbor it will undoubtedly run into many millions of dollars.

The desirability of creating a fleet base in the vicinity of Mare Island has been emphasized by conditions at that navy yard which have grown steadily worse with the increasing demands made upon it. The new project involves the establishment of a fleet base on San Francisco Bay at an expenditure of approximately $25,000,000, the equipment to duplicate substantially the facilities planned for the New York fleet base. During the consideration of this scheme the department gave some attention to a plan involving the moving of the navy yard to a point on San Francisco Bay where deep water could be secured, but inasmuch as the estimate for this transfer, including the establishment of a fleet base in the same vicinity, was approximately $75,000,000, this idea was abandoned and the department's revised plan involves the retention of the navy yard in its present location and the dredging of a channel to deep water for the accommodation of the largest vessels of the Navy.

The total estimate of the expenditure to be made at the Norfolk yard is $15,000,000, of which more than $4,000,000 has already been appropriated. This yard is designed for the building of battleships and, in connection with it, it is proposed to establish submarine and aviation training schools. The land owned by the Government at Norfolk is insufficient for this purpose and negotiations are now on foot for the purchase of the Jamestown Exposition tract.

ESTIMATES $66,000,000 ABOVE LAST YEAR'S

It is improbable that Congress, at the coming session, will provide the entire amount contemplated by the department's estimates for navy yard expansion. The construction program for the fiscal year ending June 30, 1918, is so large that the estimates now before the House Naval Committee exceed the record-breaking appropriations of the last session by $66,000,000. Much will be accomplished, in the opinion of the department officials, if the comprehensive plans receive Congressional endorsement together with substantial initial appropriations.

Officials of the department declare that the equipment of eight navy yards for construction purposes does not mean that the department proposes to build as many warships as possible, but that the great bulk of the naval construction of the future will be placed with private yards if bidders can be found who will take the work within the statutory cost limits. The fitting up of the Government yards will be to some extent a precautionary measure calculated to enable the Government to execute its building program without regard to the engagements of private shipyards, nearly

all of which promise for several years to come to be so fully occupied with commercial work as to make the taking of Government contracts a matter of patriotism rather than profit. W. L. C.

Germany's Control of the Basic Bessemer Process

An important contribution to the study of the basic Bessemer problem has been made by M. Fernand Engerand, a French economist and publicist, in a book entitled "L'Allemagne et le Fer." In dealing with the industrial as distinct from the sentimental aspect of Alsace-Lorraine, the author emphasizes the fact that the part of Lorraine which Germany annexed in 1871 contains, in the Minette iron ores, the largest deposits in Central Europe, while the valley of the Saar is an important coal field. Nearly all these deposits were French territory in 1814, but at the Vienna Congress of 1815 Prussia acquired the Saar Valley, and after the war of 1870-71 she seized what was then the whole known industrial wealth of Lorraine.

The whole of Germany's industrial imperialism is notoriously built upon the steel industry, the author says, which in turn is dependent on the Minette ore of the Lorraine district. Thus in 1913 Germany raised 28,600,000 tons of iron ore, of which 21,000,000 came from Lorraine. Of the estimated iron-ore resources of Germany representing 2800 million tons, Lorraine alone contains 2100 million tons. What M. Engerand considers a significant admission was made in a manifesto in September, 1915, by some of the German industrial associations in which the sentence occurred: "If the output of the Minette iron ore of Lorraine were to be interrupted, the war would be as good as lost."

The restitution of Lorraine, even with the Saar Valley included, would not be sufficient to break Germany's control of the basic Bessemer steel industry, continues the author, for the question of coal supply has to be considered. Before the war France imported, roughly, 21,000,000 tons out of 62,000,000 tons. The output of the Saar coalfield would make up for that deficiency, but the future needs would leave a new deficiency of about 36,000,000 tons. Under the freight conditions existing before the war probably the whole of this supply would have to be obtained from Westphalia, and the French iron industry would be more or less independent upon the good will of the Germans.

The solution of this metallurgical peace problem suggested is to make the Rhine with the adjoining rivers and canals a free international waterway. Then barges could take coal from Newcastle to Lorraine and return with iron ore for the Northeast coast blast furnaces. The method has already been put to practical demonstration by the Thyssen interests, whose ships carried Westphalian coke to Caen in Normandy before the war and brought back iron ore.

Canadian Industrial Notes

The Lake Superior Steel Corporation, Sault Ste. Marie, Ont., reports for the four months ended Oct. 31 a production of 131,600 tons of ingots and 82,500 tons of finished material. Production has not quite come up to expectations, due to labor difficulties, but conditions are improving. Some delay is being experienced in building two new 75-ton open-hearth furnaces, but, as far as can be seen, they will be completed by the end of the year, and the steel plant should then be able to produce about 45,000 tons of ingots monthly. On account of labor conditions it is doubtful if, beyond a third 75-ton open-hearth furnace, any attempt will be made to embark upon further new construction.

At a meeting held in Hamilton the directors of the Steel Company of Canada authorized additional plant appropriations and considered the question of extensions which will be incumbent upon the company to be undertaken in order to place it in a position to realize the fullest benefit from the expenditures and extensions already made and also having regard to the necessity of putting the operations of the company on the basis of the lowest possible cost of production to meet the competition which is inevitable when readjustment of trade conditions takes place.

The plant of the Pacific Steel Products, Ltd., at Bridgeport, on Lulu Island, B. C., is running steadily, turning out about 10 tons of iron and steel daily. Within 60 days the output is to be increased to about 30 tons. The company is constructing a new open-hearth steel furnace and installing two machines for turning out railroad spikes, bolts and nuts.

H. M. McLeod, general manager of the Canadian Northern Railway, Vancouver, B. C., announces that at Port Mann, B. C., a carbuilding plant will be in operation shortly, with a capacity of five cars per day.

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Bonuses to Workmen in French Shops

The Rowan System in Which the Bonus Is Proportioned to the Time Saved—Results in a Bronze Foundry

In *Revue de Metallurgie*, Paris, is an article by L. Revillon on a system of payment to employees consisting of a wage or salary with bonus. On the resumption of business in France one of the most important problems will be that of labor. In most of the plants that have been destroyed or stripped of material, the most modern labor-saving devices can be installed when they are started again; but at the same time the workmen will have to be trained anew to give them the habit of working and enable them to reach the maximum output with the new machines. To do this something must be done to stimulate their efforts, and it is impossible to make constant increases in salaries without giving some compensation to the manufacturer. It is for this reason that M. Revillon describes a wage and bonus system of American origin, which he used before the war in a particular instance and which he believes will solve the labor question in a great number of cases. His description, practically in full, follows:

It is not necessary to insist on the known disadvantages of payment by the hour. It is unjust because it does not allow at each instant the wage to be proportioned to the service performed by the workman. It is harmful to the workmen for it limits the maximum gain possible to a fixed amount, uniform for the same specialty and necessarily not very high. It is dangerous for the employer because it does not allow him to demand of the workman sufficient work to lower the cost of production to meet competition, or to obtain an output corresponding to a reduced selling price.

CURING THE DEFECTS OF PIECEWORK

Payment by piece work, which at the first glance seems to do away with all inconveniences for the manufacturer, is often looked on unfavorably by the workmen. As carried out in most plants it makes the average workman discontented, for he expects an increased income and does not receive it. Further, it makes the manufacturer dissatisfied, for he sees the wages of the very clever workmen increase out of all proportion without a lowering of the production cost being established. His effort, therefore, is to reduce the piece rate in order to realize his part of the profit. The workman, rather than suffer this constant reduction which he foresees, will limit his output, and very frequently from these opposing interests a conflict is born that is very difficult to adjust. The method of Taylor tries to guard aganst these difficulties by an exact determination of the time necessary to carry out each one of the separate tasks involved in manufacturing a given article. This determination, however, should be made by a clever and impartial man, and be repeated on the least change in the methods of production. It is further only applicable to articles made in large numbers and demands a high professional and moral character on the part of those carrying it out, as well as great willingness on the part of the workmen during the introduction of the system. There are so many diverse conditions that it is difficult to make them harmonize.

In looking for a more rational mode of payment, an effort must be made to find one in which the endeavors of the workman to increase his earnings bring about simultaneously a reduction in the cost of production, in such a way that the two parties have the same interest in looking for methods of increasing the output; that it to say, reducing the time expended on a given piece of work. The method of division, between the manufacturer and the workman, of the profits resulting from increased output should satisfy certain general conditions in order to arrive at the just wage that is being sought. It should allow the receipt by each workman of an amount in proper relation to the intensity of his efforts, the portioning out after a brief interval of the gain merited, and the calculating and controlling of the lowering of cost of production.

THE ROWAN SYSTEM

All these conditions are met satisfactorily by a method based on the bonus system of Rowan. This method was used in France by M. Revillon together with modern methods of cost accounting which give each day the net cost of the raw material in transformation on the one hand and that of the plant operations on the other in such a way that the results could be analyzed. It was found to be remarkably pliable for the most varying work, whether on one or many similar articles; its application did not bring about any difficulty on the part of the workmen in spite of the apparent complexity of the bonus calculations. The results were immediate, and at the end of several years it still gives complete satisfaction without the initial arrangements having to be changed. In certain cases it has given up to 50 per cent increase in production with 15 per cent and more increase in employees' pay. Below are given the principles of this method.

The workman continues to be paid by the hour at a normal rate, because of his trade value, which assures him a minimum day's wage suitable to the starting of a new piece of work, or some stoppage not of his bringing about, such as a failure of machinery or defect of tools, etc. However, the workman who habitually does not exceed this minimum is not a good workman; he is not clever or does not work hard, and there is no reason to try to keep him, because he does not produce profits. In general there is advantage in fixing the minimum sufficiently low so that the workman has no interest in holding it there. The workman is told the maximum time allotted to each of his tasks, whether based on similar work or after time studies, or best of all as shown later, according to an established cost of production or a desired selling price.

THE ADJUSTMENT OF THE BONUS

If the workman brings about a decrease in this maximum time he receives a bonus which is a function of the decrease that he has effected and is defined by the following formula: the relation of the bonus to the wage is equal to that of the time saved to the time given (or the rate of the bonus compared with the wage is equal to the quotient from dividing time gained by the time given). In short, the bonus is equal to economy of time realized. The pieces rejected for bad workmanship are not counted, and the time passed in making them is

added to that spent over the other pieces, and reduces the bonus. An example will illustrate the method: If the workman has a piece of work rated at ten hours and completes it in nine, he has saved one hour; that is a reduction of one-tenth. He will receive for these nine hours outside of his ordinary pay a bonus of one-tenth of this same pay. If he takes only eight hours, he will have during this time his usual wage and a bonus of two-tenths, and so on. In order to obtain the equivalent formula in the case of piece work, where it is desired to have a minimum number of pieces made in a fixed time, the bonus to add to the wage during this time is a fraction of the latter, representing the relation of the number of extra pieces to the total number of pieces made. For instance, if in a day of ten hours a man's task is to make 50 pieces and he produces 65, he will receive in addition to his wage for the ten hours a bonus of 15-65 of the salary.

In order to judge all the value of this method, it is necessary to look into the mathematical laws which indicate the realizable gains and the division of the profits between the two parties. In this way one sees how equitable is this method of division. In the first place, it is thoroughly favorable to the workman even for the smallest increases in output, which are often the hardest to attain. Then it increases the profit of the manufacturer to the extent of the time gained. He sees his profit constantly increasing by all the reduction in production cost, which remains fixed in piece work. There is then no necessity for him to reduce the time given, but on the contrary it is to his interest to make things more easy by constant improvements, for he receives his share of profit from the time gained.

SELLING PRICE AS A BASIS

This method can easily be made a profit sharing plan if some precautions are taken in the determination of the initial time to be given to each piece of work. To determine this time, an experimental method may be used similar to that recommended in the Taylor system, or a more equitable method may be used based on the possible selling prices. In the first case the time strictly necessary for the work under consideration is determined by preliminary experiments, and this is multiplied by a coefficient so that applied effort is demanded of the workman for part only of his time—in general, 8½ hours for a day of 12 hours. If a mistake has been made in the determination of this initial time, then the workman will gain a slightly higher bonus, but this is made up by a lowering of the production cost, depending on the time necessary, and equilibrium is quickly established.

In the other case, on the contrary, no previous experience is necessary in order to give the time necessary for a new piece of work. The time given will be such that it brings about a production cost, including all the general costs, equal to the selling price less the profit that it is desired to realize. In this supposition the profit only results from the gain in time realized by the workmen, and is immediately divided as shown above. It is the real profit sharing plan. Of course, it is proper to take from the selling price all the annexed costs, such as the cost of transportation, commissions, discounts, etc., then the cost of the raw material increased by all the costs of preparation. The remaining cost, which is that of manufacturing, will be divided by the production cost per hour of the workmen, a cost increased by so much per cent for the rejections, in which are included all the general manufacturing costs, such as the salaries of the officials, interest on the capital used and various sinking funds. The time of manufacture thus obtained should be divided between the various stages of manufacture.

If the workman cannot carry out one of the tasks in the maximum time given, he brings about a loss. The attention of the manufacturer should be immediately called to this part of the operation, for the fault may not be due to the workman, and the time given may actually be too little to carry out the work. All the other circumstances being normal, and the other tasks showing profits, it is then an indication of a producing cost too high or a selling cost too low, and the manufacturer must decide if he can increase his selling price, or if he should abandon this particular piece of work which absorbs a part of the profits of the other operations.

In any case the workman will try his best even for such unprofitable operations, for during the time that he gives to them he is getting his ordinary day's pay, while for the work which follows he may get a bonus which increases his earnings.

Evidently the problem is complicated if it deals with a complex article, a machine passing through several departments of a large works, but always a transfer price from one department to another can be reached by determining in each case the initial time as above.

A BRONZE FOUNDRY'S EXPERIENCE

The application of this method was made in a bronze foundry, working chiefly on patterns supplied by the customers, so that the work changed constantly, and the mold often contained a large number of pieces varying greatly in difficulty. The basis of the time given to the workman for each mold was the selling price, depending on the weight. According to the quality of the work demanded the price per kilogram of articles of the same difficulty may vary. To each corresponding selling price per kilogram a certain number of minutes were given the workman. The metal patterns being practically the same weight as the castings to be made, those to be used by the workman were weighed by kinds, according to his capacity and the care of which he was capable, multiplied by the number of minutes, and all the conditions of his work given on a card on which the workman recorded the beginning and the end of each of his tasks. On this, for verification, it was simply seen whether the total corresponded properly to the time passed at the plant.

In another concrete case concerned with the manufacture of articles in large numbers, tables were prepared showing directly the bonus according to the number of articles made. The paper closes by giving the simple mathematical calculations establishing the formulas for this particular case.

G. B. W.

The Union Electric Light & Power Company, St. Louis, for which a 10-story building has just been completed, will devote the entire top floor of the structure to the uses of its employees. A large auditorium will be included, with a stage and scenery as well as equipment for exhibitions, concerts, lectures, etc. A lunch room, library, rest room, demonstration room fitted up for practical use and a gymnasium are other features. The plan was devised by the late president, A. C. Einstein, and the details are being carried out by Secretary Herman Spoehrer.

An Australian plant for making wire cables and metal rope is to be established. An expenditure of about $1,000,000 is estimated as necessary to secure an output of approximately $5,000,000. Employment of 1000 men will be provided and not more than 10 men will be needed from outside the country, it is stated. All the raw material necessary, it is claimed, is obtainable in Australia.

Iron and Steel Markets

RAPID PIG-IRON ADVANCES

Pittsburgh Market Shows Excitement

Pig-Iron and Finished Steel Markets Show Increasing Disregard of Prices

With more excitement in steel making pig iron than has been seen in many years, iron and steel markets have gone on advancing. It was not to be expected that buyers would take less account of the price factor as higher levels were reached, but that is the outstanding feature. Bessemer iron went up $3 and basic iron $4 a ton in the past week as easily as they advanced $1 a ton in recent weeks.

As it appears that the amount of pig iron and of steel Europe needs to get in the United States is increasing over the 1916 rate of purchases here, domestic consumers in every line from iron ore to wire are making assurance of supplies for 1917 the paramount consideration.

Railroad, shipyard and building requirements of steel for next year, it has been more plainly indicated, will be placed without regard to price.

Rail buying for 1918 at $10 a ton above the price at which most of the 1917 deliveries will be made is already active. At Chicago upwards of 200,000 tons was closed including 57,000 tons for the New York Central and 52,000 tons for the Chicago & Northwestern and a subsidiary. With other New York Central purchases its total is between 150,000 and 175,000 tons. The Pennsylvania Railroad is expected to place about 205,000 tons.

Car orders increase in the face of nearly 100 per cent advance in the price of cars. The car builders are making more strenuous efforts with no success to get more steel for the earlier months of next year. This month nearly 25,000 cars have been placed, making a total of about 75,000 since Sept. 1, as against 70,000 for the whole year up to September.

Shipyard inquiry is overwhelming the mills. A domestic shipyard has paid 5c. on a 2500-ton plate order for the last half of next year. Late inquiries include 55,000 tons of plates and 20,000 tons of shapes for ten freight vessels to be built abroad and on which deliveries in the last half of 1917 will be accepted.

Of the 27,000 tons of 6-in. to 8-in. beams wanted for France, 20,000 tons has been taken, the bulk of it at 3.40c. Pittsburgh. Export business in many lines amounting to a large tonnage is being regularly put before steel makers but cannot be entertained. In the 38,000 tons of structural work before the Eastern market a large factor is shipyard extensions.

The week's advances in finished steel products include $3 a ton in wire products, effective Nov. 24, bringing wire nails to $3 and plain wire to $2.95; $2 a ton in rivets and $3 to $6 in sheets.

There is increasing difficulty in getting sheet bars. Sales of 30,000 tons for 1917 have been made to an Eastern company; on one 15,000-ton lot the basis was $56.50 Pittsburgh. At Youngstown a steel company bought 5000 tons of billets at $53, maker's mill. Forging billets have sold up to $80.

At Pittsburgh last week active buying of basic and Bessemer pig iron broke out, 60,000 tons of basic being taken on Wednesday and Thursday at $27 at furnace. Later sales of 34,000 tons were made by one producer at $30 for the second half of next year, and to-day that price is quoted by some furnaces for any delivery. Bessemer iron has sold at $33 and $33.50, and $35 is now asked. For shipment to France and Italy 75,000 to 100,000 tons of basic and Bessemer is before Central Western makers.

Buying of foundry iron at new high prices has been heavy, particularly in the East, and large consumers have been actively in the market. Probably 150,000 tons has been closed at New York in the past ten days. The week's advances have been from $2 to $3 a ton. Lake Superior charcoal iron has gone to $30 at furnace.

Alabama iron is largely taken up for the first half and 250,000 tons is the reported total of Birmingham sales for the second half.

Lake Superior iron ore producers have turned unprecedented reservations of Bessemer and non-Bessemer ores into contracts in the past week on the basis of prices established by sales on Nov. 23. The new prices which represent an advance of $1.50 a ton are $5.95 for old range and $5.70 for Mesaba Bessemer; $5.20 for old range and $5.05 for Mesaba non-Bessemer. The expectation that a $1.30 advance over 1916 prices would prevail was overturned on Nov. 22 by the announcement of 10 per cent wage advances by the leading steel companies, carrying with it an advance in iron mining wages.

Pittsburgh

PITTSBURGH, PA., Nov. 28, 1916.

The iron and steel market is running wild. In the past week prices on Bessemer pig iron have gone up $3 per ton or more. Basic iron has been advanced $4 or more, and there has been about the same rise in foundry, malleable, Bessemer and gray forge. Large quantities of sheet bars for extended delivery have sold as high as $56.50 and high carbon forging billets up to $80, Pittsburgh. Sheets are up anywhere from $3 to $6 per ton. Wire products have advanced $3 and rivets $2. Prompt furnace coke is higher by $1 or more per ton, and nearly all grades of scrap are from $2 to $4 per ton dearer. The high prices now ruling for pig iron and finished steel do not seem to check demand in the least but, on the contrary, it grows stronger. Predictions are freely made of basic iron going to $40 and Bessemer to probably $50. Much higher prices on nearly all kinds of finished steel seem absolutely certain. Any raw or finished material that cannot be sold to domestic consumers can be quickly disposed of for export at higher than domestic prices, and this is helping very much to put the market up. Makers and consumers of steel alike agree that prices long ago reached dangerous levels, but there is no way to stop the advances. Consumers are afraid they will not get material when they need it and insist that the mills put them on their books, the prices to be fixed later. The car supply is still very bad, and this is hurting ship-

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton	Nov. 29, 1916.	Nov. 22, 1916.	Oct. 25, 1916.	Nov. 24, 1915.
No. 2 X, Philadelphia...	**$27.50**	$25.50	$21.00	$17.75
No. 2, Valley furnace...	**30.00**	26.00	21.00	16.00
No. 2 Southern, Cin'ti..	**24.40**	23.90	18.90	16.40
No. 2, Birmingham, Ala.	**21.50**	21.00	16.00	13.50
No. 2, Furnace, Chicago*	**27.00**	27.00	22.00	17.50
Basic, del'd eastern Pa.	**27.00**	26.00	21.00	17.50
Basic, Valley furnace....	**30.00**	25.50	20.00	16.00
Bessemer, Pittsburgh...	**34.45**	30.95	24.00	17.95
Malleable Bess., Ch'go*..	27.00	27.00	21.00	17.50
Gray forge, Pittsburgh..	**29.95**	26.95	20.95	16.45
L. S. charcoal, Chicago	**28.00**	26.75	24.25	17.25

Rails, Billets, etc., Per Gross Ton				
Bess. rails, heavy, at mill	38.00	38.00	33.00	28.00
O.-h. rails, heavy, at mill	40.00	40.00	35.00	30.00
Bess. billets, Pittsburgh.	**55.00**	52.50	50.00	28.00
O.-h. billets, Pittsburgh..	**55.00**	52.50	50.00	29.00
O.-h. sheet bars, P'gh...	**55.00**	52.50	50.00	29.00
Forging billets, base, P'gh	**80.00**	78.00	73.00	50.00
O.-h. billets, Phila. ...	55.00	55.00	50.00	35.00
Wire rods, Pittsburgh...	65.00	65.00	55.00	38.00

Finished Iron and Steel, Per Lb. to Large Buyers	Cents.	Cents.	Cents.	Cents.
Iron bars, Philadelphia..	2.659	2.659	2.659	1.859
Iron bars, Pittsburgh....	2.90	2.90	2.75	1.65
Iron bars, Chicago	2.65	2.65	2.35	1.60
Steel bars, Pittsburgh....	**3.00**	2.90	2.75	1.70
Steel bars, New York....	**3.169**	3.069	2.919	1.869
Tank plates, Pittsburgh.	4.25	4.25	4.00	1.90
Tank plates, New York..	4.419	4.419	4.169	2.169
Beams, etc., Pittsburgh..	3.00	3.00	2.75	1.70
Beams, etc., New York..	3.919	3.019	2.869	1.869
Skelp, grooved steel, P'gh	2.85	2.85	2.50	1.70
Skelp, sheared steel, P'gh	3.00	3.00	2.60	1.80
Steel hoops, Pittsburgh..	3.25	3.25	3.00	1.75

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire, Per Lb. to Large Buyers	Nov. 29, 1916.	Nov. 22, 1916.	Oct. 25, 1916.	Nov. 24, 1915.
	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh	**4.00**	4.00	3.75	2.75
Sheets, galv., No. 28, P'gh	**5.50**	5.50	4.75	4.25
Wire nails, Pittsburgh..	**3.00**	3.00	2.70	1.90
Cut nails, Pittsburgh..	**2.95**	2.95	2.70	1.85
Fence wire, base, P'gh..	**2.95**	2.95	2.70	1.85
Barb wire, galv., P'gh....	**3.85**	3.85	3.60	2.60

Old Material, Per Gross Ton				
Iron rails, Chicago	**$26.00**	$25.00	$22.00	$16.00
Iron rails, Philadelphia..	**24.00**	24.00	20.00	17.50
Carwheels, Chicago	**20.00**	19.00	14.00	14.50
Carwheels, Philadelphia..	**21.50**	19.00	16.00	14.00
Heavy steel scrap, P'gh.	**25.00**	24.00	19.00	17.00
Heavy steel scrap, Phila.	**23.00**	23.00	16.00	14.75
Heavy steel scrap, Chic'go	**23.00**	21.00	17.75	15.00
No. 1 cast, Pittsburgh ..	**19.50**	17.00	16.00	14.00
No. 1 cast, Philadelphia	**20.00**	19.00	16.00	14.50
No. 1 cast, Chicago (net ton)	16.00	16.00	14.00	13.00
No. 1 RR. wrot, Phila...	**25.00**	24.50	22.50	17.00
No. 1 RR. wrot, Chicago (net)	**23.00**	22.00	18.00	14.00

Coke, Connellsville, Per Net Ton at Oven.				
Furnace coke, prompt	**$7.00**	$6.00	$7.00	$2.10
Furnace coke, future....	**4.00**	3.75	3.75	2.35
Foundry coke, prompt	**7.50**	7.00	7.00	2.75
Foundry coke, future	5.00	5.00	4.50	3.00

Metals, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	34.00	34.00	28.50	19.87½
Electrolytic copper, N. Y.	34.00	34.00	28.50	19.87½
Spelter, St. Louis.	**13.00**	12.25	10.00	18.75
Spelter, New York.....	**13.25**	12.50	10.25	19.00
Lead, St. Louis.....	**7.17½**	7.00	6.92½	5.17½
Lead, New York.....	**7.25**	7.15	7.00	5.25
Tin, New York.....	**45.25**	45.12½	41.25	39.25
Antimony (Asiatic), N. Y	**14.50**	14.00	13.00	9.50
Tin plate, 100-lb. box, P'gh.	$6.00	$6.00	$5.75	$3.40

ments to a great extent. Some betterment in the labor supply is looked for as soon as cold weather comes, as many men that now have outside jobs will seek warmer places in which to work.

Pig Iron.—There is a wildly excited pig-iron market, prices on all grades being up $3 to $4 per ton or more, and the end is not yet. At this moment there are active inquiries here for 75,000 to 100,000 tons of Bessemer and basic iron, mostly Bessemer, for shipment to France and Italy, mainly to the latter country. One dealer here a few days ago could have obtained $35 for Bessemer for 10,000 tons for prompt shipment to Italy, but could not find the iron for that delivery. On Wednesday and Thursday of last week there were sales of 60,000 tons or more of basic for delivery in the first half and some at the convenience of the sellers at $27 at Valley furnace, one Ohio interest buying 40,000 tons at that price, part of it from Pittsburgh and part through Cleveland interests. Following these sales came the announcement that the Struthers Furnace Company had sold about 34,000 tons of basic iron for delivery in the second half of next year at $30 net at furnace. It develops that one of two buyers of this iron was an eastern Pennsylvania steel company. There were no strings of any kind attached to these sales, but it was recognized that the price was a little above the market at the time, probably because of the extended delivery. As soon as the facts about these sales became known the whole basic market quickly advanced to $30 at Valley furnace, and it is not believed that any basic iron for any delivery could be bought to-day at less than that price. In fact, some sellers that have basic iron are asking $31 and a few $32 at furnace for it. About the time these sales of basic were made there were sales of Bessemer at $31 and $31.50 at Valley furnace, but, following basic, the Bessemer market quickly went up to $33 and $33.50 in actual sales nearly all sellers now holding for $35 at furnace. A sale of close to 5000 tons of Bessemer for delivery in the first half of next year is reported at $33.50, maker's furnace, and we regard that price as the market at this writing. Sales of foundry and malleable Bessemer iron have been made as high as $30 at furnace, but there is not much doing in gray forge. In the past week probably 20,000 tons of Bessemer was sold at prices ranging from $31 up to $33.50 at furnace, and the minimum asking price is now $35 at furnace, but as yet no sales are reported at that price. We now quote: Standard Bessemer iron, $33.50; basic, $30; malleable Bessemer, $30; No. 2 foundry, $30; gray forge, $29; all at Valley furnace. The freight rate for delivery in the Pittsburgh and Cleveland districts being 95c. per ton.

Ferroalloys.—There is quite a heavy demand for ferromanganese, some for delivery in the first quarter, but mostly for first half, and prices are stronger. English 80 per cent ferromanganese is now firm at $164, seaboard, and 80 per cent domestic is strong at $160 to $162 at furnace, with freight added to point of delivery. We quote 18 to 22 per cent spiegeleisen at $50 to $55, and 25 to 30 per cent at $65 to $75, delivered. We quote 50 per cent ferrosilicon for delivery next year in lots up to 100 tons at $100; 100 tons to 600 tons, $99, and over 600 tons, $98, all per gross ton, f.o.b. Pittsburgh. We quote 9 per cent at $32; 10 per cent, $33; 11 per cent, $34; 12 per cent, $35; 13 per cent, $36.50; 14 per cent, $38.50; 15 per cent, $40.50, and 16 per cent, $43. We quote 7 per cent silvery at $26.50; 8 per cent, $27; 9 per cent, $27.50; 10 per cent, $28; 11 per cent, $29, and 12 per cent, $30. These prices are f.o.b. furnace, Jackson or New Straitsville, Ohio, and Ashland, Ky., all of which have a freight rate of $2 per gross ton to the Pittsburgh district.

Billets and Sheet Bars.—A leading Eastern steel company has been scouring this market lately for a large quantity of sheet bars, estimated at 30,000 to 60,000 tons, and is reported to have closed for about 30,000 tons, of which 15,000 tons was taken by a local mill at the reported price of $56.50, Pittsburgh, and the remainder by a Cleveland interest. It would not be possible to buy any billets or sheet bars from local or Youngstown mills at less than $55. A leading Youngstown steel interest bought last week 5000 tons or more of soft steel billets for which it paid $53, maker's mill, to be used in rolling sheets, the company largely re-

serving its own output of steel billets and ingots of special analysis to fill export orders. We also note sales of 200 to 300 tons of forging billets at $80, delivered Pittsburgh. We now quote base sizes and base carbons of Bessemer and open-hearth billets and sheet bars at $55 to $57.50, maker's mill, Pittsburgh or Youngstown; forging billets, $80 for sizes up to, but not including, 10 x 10 in. and for carbons up to 0.25.

Plates.—Orders for cars continue to be placed with amazing rapidity in view of the high prices charged by the carbuilders and of the fact that deliveries will be quite distant, as the car companies are now filled up for some months ahead. The Great Northern has ordered 100 box cars from the Pressed Steel Car Company, to be built at its Chicago works. The Pressed Steel Car Company has also secured orders for 1250 steel hopper cars from the Union Railroad Company (owned by the Steel Corporation), 500 steel hoppers from the Delaware, Lackawanna & Western, 350 ore cars from the Northern Pacific (to be built in its Chicago works), 1000 steel hoppers from the Wabash-Pittsburgh Terminal, 1000 steel gondolas from the Southern and 1500 steel gondolas from the Burlington (to be built in its Chicago shops). The Nickel Plate, which is in the market for 500 steel hoppers, is also inquiring for 750 composite gondolas. It is said that inquiries are now before the steel carbuilders for 18,000 to 20,000 cars of various types. The situation as regards deliveries of plates is getting tighter. The two leading local mills are practically sold up for all of 1917 and it is predicted that mill prices of plates will go to 5c. within a few months. We quote sheared tank plates ¼ in. and heavier, at 3.50c. at mill, with no promise of delivery; 4c. to 4.50c. for second to third quarters, and 5c. and upward for small lots for fairly prompt shipment, all f.o.b. at mill, Pittsburgh.

Structural Material.—Inquiry is still quite active. The American Bridge Company has taken 2500 tons of plate work for the Southern Railway, 710 tons for extensions to buildings of the Browning Company, Cleveland, and 225 tons for extensions to open-hearth buildings of the American Rolling Mill Company, Middletown, Ohio. The Pittsburgh-Des Moines Steel Company has taken 200 tons for an addition to buildings for D. C. Clark & Co., in this city. We quote beams and channels up to 15-in. at 3c. at mill, with no promise of delivery, and from 3c. to 3.25c. for second and third quarter shipment in 1917; small lots from warehouse stock, 3.50c. to 3.75c., Pittsburgh.

Steel Rails.—No large rail contracts for 1918 delivery have been taken by the local interest. The demand for light rails is active from the coal-mining interests and prices are firm; one or two makers are ask ing higher prices and a general advance is looked for in the near future. We quote 25 to 45 lb. sections at $47; 16 and 20 lb. $48; 12 and 14 lb., $49; and 8 and 10 lb., $50; in carload lots f.o.b. at mill, the usual extras being charged for less than carload lots. We quote standard section rails of Bessemer stock at $38 and of open-hearth $40, per gross ton, Pittsburgh.

Tin Plate.—The situation is steadily getting tighter. While most consumers have covered their needs as far as they could for delivery in the first half of next year, some have not yet bought enough and are in the market for considerable lots. It would be impossible at present to place orders for delivery in the first half with any mill at less than $6.50 per base box, and most makers are quoting higher. There is no doubt that the price of tin plate for delivery in the second half will be $2 and possibly $3 per box higher than prices for first half delivery, which ranged from $5.75 to $6 per base box. Mills report the export demand heavy, and are constantly turning down foreign orders, on which they could probably obtain $7.50 per base box or more. Only three or four makers are in good position to take export orders, namely, those that recently added new mills. Prices on current small orders are strong, primes and wasters from stock being quoted mostly at $7 per base box at mill. We quote bright plate, 14 x 20, at $6 to $6.25 per base box, f.o.b. Pittsburgh, on contract for delivery in the first half of 1917, and small lots of primes and wasters from stock at $6.50 to $7 per base box at mill.

Sheets.—The past week, prices on Bessemer black and galvanized sheets and tin-mill black plate have advanced from $5 to $7 per ton. The absolute minimum of the market on No. 28 Bessemer black sheets is now 4c., this being the nominal price of the American Sheet & Tin Plate Company, which has practically no sheets to sell for the first quarter. Independents that have some sheets to spare for first quarter are quoting 4.25c., and a few as high as 4.50c. at mill. On galvanized sheets, the absolute minimum is 5.50c. on No. 28, this being really a nominal price, most makers quoting from 6.50c. to 7c. at mill. The demand is much beyond the capacity of the mills to supply as promptly as needed. Prices on blue annealed sheets have also advanced, but not to the same extent as on other grades. Still higher prices seem certain. At this writing a fair range of prices in carloads and larger lots are about as follows: Blue annealed sheets, Nos. 3 to 8, 3.75c. to 4c.; box annealed, one pass, Bessemer cold-rolled sheets, No. 28, 4c. to 4.25c.; No. 28 galvanized, 5.50c. to 6c.; No. 28 tin-mill black plate, 4c. to 4.10c., all f.o.b. Pittsburgh.

Shafting.—Most consumers are covered for the first quarter and a few of the largest consumers have been permitted to cover for the first half, owing to the fact that their product is such they must know at least six months in advance what their shafting is going to cost them. Several makers have caught up to some extent on deliveries and are able to ship more promptly than they could have done some time ago. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots and 10 per cent off in less than carload lots for first quarter and first half of 1917, f.o.b. Pittsburgh, freight added to point of delivery.

Railroad Spikes and Track Bolts.—One leading maker of railroad spikes is very indifferent about selling, and is quoting from 2.75c. to 2.90c., depending on the size of the order and the delivery wanted. New demand is more active and it seems certain that prices on spikes will soon be advanced to $2.75 or higher. Railroads are not specifying freely against contracts. The demand for track bolts is quite active, and several makers state that prices will advance in the near future. We quote track bolts with square nuts at 4.50c. to 4.75c. to railroads and 5c. to 5.25c. in small lots to jobbers, base. Track bolts with hexagon nuts take the usual advance of 15c. per 100 lb. Prices on spikes are as follows:

Standard railroad spikes, 4½ x 9/16 in. and larger, $2.65 to $2.75; railroad spikes, ½ to 7/16 in., $2.75 base; railroad spikes, ⅜ in. and 5/16 in., $3.05 base; boat spikes, $2.80 base, all per 100 lb., f.o.b. Pittsburgh.

Wire Products.—Effective Monday, Nov. 27, prices on wire and wire nails were advanced $3 per ton, putting wire nails on a $3 basis. However, even this advanced price is largely nominal, as local makers say they can readily sell wire nails at $3.25 base per keg if they can make the deliveries. Nearly all the large wire and wire-nail interests are sold up so far ahead they have called in most of their men from the road and are now taking only specific orders. Prices now in effect are as follows: Wire nails, $3, base, per keg; galvanized, 1 in. and longer, including large head barbed roofing nails, taking an advance over this price of $2, and shorter than 1 in., $2.50. Bright basic wire is $3.05 per 100 lb.; annealed fence wire, Nos. 6 to 9, $2.95; galvanized wire, $3.65; galvanized barb wire, and fence staples, $3.85; painted barb wire, $3.15; polished fence staples, $3.15; cement-coated nails, $2.90, base, these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to the point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing are 53 per cent off list for carload lots, 52 per cent for 1000-rod lots and 51 per cent for small lots, f.o.b. Pittsburgh.

Wire Rods.—With a famine in the supply, and with an abnormally heavy demand, makers of rods can get practically whatever they ask if they can make the deliveries wanted. A sale of 3000 to 5000 tons of

soft rods for export is reported to have been made by a local mill last week at about $75 a ton at mill. Domestic consumers that are not fully covered for the first quarter and first half are nervous over the situation and several have asked their regular sources of supply to put them on their books for certain quantities, the prices to be fixed later. We quote soft Bessemer, open-hearth and chain rods at $65 to $75 per gross ton, f.o.b. Pittsburgh, but it would probably be difficult to buy any large quantity at less than $70.

Iron and Steel Bars.—The nominal price of the Carnegie Steel Company on steel bars remains at 2.90c. at mill, but with no promise of delivery. Other makers that can ship in the first or second quarter are quoting 3c. to 3.25c., prices depending on the quantities involved and deliveries wanted. Specifications against contracts for steel bars are abnormally heavy. Most of the leading mills are well sold up through the first half, while the Carnegie Company is reported to be largely sold up for all of next year. The demand for reinforcing steel bars is active, with prices higher. The sharp advance in gray forge pig iron is likely to result in higher prices on iron bars. Warehouses are now quoting steel bars and small shapes, including flats, rounds and squares, under 2 in., at 3.65c; 2 in. and over, 4.30c.; H-sections, 3.85c. We quote merchant steel bars at 2.90c. at mill, with no promise as to delivery, and from 3c. to 3.25c. for delivery in the second and third quarters of 1917. We quote refined iron bars at 2.90c. to 3c., and railroad test bars 3c. to 3.10c., f.o.b. Pittsburgh.

Hoops and Bands.—Mills that can promise deliveries on hoops and bands are quoting steel bands from 3c. to 3.25c. and steel hoops, 3.25c. to 3.50c. at mill. Most large consumers are covered through the first quarter and first half at lower prices.

Nuts and Bolts.—Makers state that the recent advance of $5 a ton on nuts and bolts is not only firmly held, but it is likely another raise will be impreative in the near future, because of the advancing prices for steel and the shortage in supply of labor. They are not catching up on deliveries. Discounts are as follows, delivered in lots of 300 lb. or more where the actual freight rate does not exceed 20c. per 100 lb.; terms 30 days net or 1 per cent for cash in 10 days:

Carriage bolts, small, rolled thread, 50 per cent; small, cut thread, 40 and 7½ per cent; large, 35 per cent.

Machine bolts, h. p. nuts, small, rolled thread, 50 and 5 per cent; small, cut thread, 40, 10 and 5 per cent; large, 40 per cent.

Machine bolts, c. p. c. and t. nuts, small, 40 and 5 per cent; large, 30 and 5 per cent. Bolt ends, h. p. nuts, 40 per cent with c. p. nuts, 30 and 5 per cent. Lag screws (cone or gimlet point), 50 per cent.

Nuts, h. p. sq. and hex., blank, $2.60 off list, and tapped, $2.40 off; nuts, c. p. c. and t. sq., blank, $2.20 off, and tapped $2 off; hex., blank, $2.50 off, and tapped, $2.25 off. Semi-finished hex. nuts, 60 per cent. Finished and case-hardened nuts, 60 per cent.

Rivets, 7/16 in. in diameter and smaller, 45 and 10 per cent.

Rivets.—Late last week another advance of $2 a ton was made. Most consumers are covered at lower prices than are now ruling over the first quarter and in some cases through the first half of next year. Makers' prices are now as follows: Buttonhead structural rivets, ½ in. in diameter and larger, $4.25 per 100 lb., base, and conehead boiler rivets, same sizes, $4.35 per 100 lb., base, f.o.b. Pittsburgh. Terms are 30 days net or one-half of 1 per cent for cash in 10 days.

Cold-Rolled Strip Steel.—Contracts for delivery in first quarter only continue to be made at $6.50 to $7 per 100 lb. Makers say they will not sell for delivery beyond the first quarter, owing to the uncertainty of raw material and labor costs. On current orders for fairly prompt shipment makers quote $7 for fair-sized quantities up to $7.50 per 100 lb. for small lots. Terms are 30 days net, less 2 per cent off for cash in 10 days, delivered in quantities of 300 lb. or more when specified for at one time.

Wrought Pipe.—The demand for all kinds of tubular goods, including oil-well supplies, is still abnormally heavy. Mills are sold up on lap-weld pipe for six to eight months, but on butt-weld sizes can make deliveries in 8 to 10 weeks. Some quite large inquiries for line pipe are in the market, but it is not likely that any will be closed, as the mills cannot make the deliveries wanted. Another advance in prices is looked for, possibly by Dec. 1 or shortly after. Discounts on black and galvanized iron and steel pipe are given on another page.

Boiler Tubes.—Local makers of both iron and steel boiler tubes are largely sold up through 1917, and heavy premiums in prices are readily paid on either iron or steel tubes for delivery in three to four months. Prices are likely to be advanced again at an early date. Discounts in effect at this writing are given on another page.

Coke.—Due to shortage of cars and labor there was a heavy decline in the output of coke the past week, with the result that prices on prompt furnace coke advanced upward of $1 a ton. Sales of 60 and 70 carloads of high-grade furnace coke for prompt shipment were made on Monday of this week at $7.50 per net ton at oven. Other grades, not so high in quality, are being offered at $6.75 to $7. As yet, nothing is doing in contracting for furnace coke for first half delivery. Most producers are disposed to hold for not less than $4 per net ton at oven and a few for $4.50. Some furnacemen that have not covered their coke needs for first half say they will buy from month to month and take chances. On Monday of this week most of the producers had only 60 per cent or less of the cars needed, although Monday is regarded as the best day in the week for getting a full supply. We quote best grades of blast-furnace coke for spot shipment at $7 to $7.50 per net ton at oven, and on contracts $4. The best grades of 72-hr. foundry coke for spot shipment are held at $7.50 to $8, and on contract for first half all the way from $5 to $6. The Connellsville *Courier* gives the output of coke in the upper and lower Connellsville regions for the week ended Nov. 18 as $398,299 net tons, a decrease over the previous week of 23,214 tons.

Old Material.—Sensational advances in prices were made on nearly all grades of scrap the past week. Selected heavy steel for open-hearth purposes advanced from $3 to $4 per ton on heavy purchases by the Cambria Steel Company, while other grades advanced $1 to $3 or more. The heaviest advance of all was in low phosphorus melting stock, which went up $5 to $6. Dealers claim that scrap is now only coming into its own and that higher prices are certain. Basic pig iron has sold as high as $28 at furnace for first quarter and first half delivery, and it has always been figured that heavy steel scrap is intrinsically worth as much as basic iron. The amount of heavy steel scrap bought by the Cambria Company is given as 25,000 tons, and it is said that for much of this $25, delivered at Johnstown, Pa., was paid. A local consumer that has not figured in the market as a buyer for some time is said to be offering $25 for upward of 10,000 tons of heavy steel scrap, but has not been able to obtain it. It is difficult to quote the market, as prices are advancing rapidly. At this writing, prices named by dealers for delivery in Pittsburgh and consuming points that take Pittsburgh freight rates, per gross ton, are about as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	$25.00 to $26.00
No. 1 foundry cast	19.50 to 20.00
Rerolling, rails, Newark and Cambridge, Ohio; Cumberland, Md., and Franklin, Pa.	28.00 to 30.00
Hydraulic compressed sheet scrap	18.50 to 19.00
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	15.00 to 15.50
Bundled sheet stamping scrap	14.50 to 15.00
No. 1 railroad malleable stock	22.00 to 23.00
Railroad grade bars	13.50
Low phosphorus melting stock	31.00
Iron car axles	45.00
Steel car axles	42.00
Locomotive axles, steel	40.00
No. 1 busheling scrap	20.00
Machine-shop turnings	11.50
Old carwheels	22.00
Cast-iron borings	12.00
*Sheet bar crop ends	24.00 to 25.00
No. 1 railroad wrought scrap	23.00
Heavy steel axle turnings	14.00 to 15.00
Heavy breakable cast scrap	18.00 to 19.00

*Shipping point.

Chicago

CHICAGO, ILL., Nov. 26, 1916.

The record of the market is largely one of advances in prices following each other in rapid succession. In the last week higher prices were put into effect on several grades of pig iron, structural steel, plates, bars, sheets, wire products and cast-iron pipe, while the prices of scrap have moved upward almost with every transaction. Store prices also advanced, galvanized sheets moving up $20 per net ton. The number of mills that have any product to sell grows smaller with each week, while inquiry received by local producers comes increasingly from distant and unnatural sources. The business of the week in rolled steel products was tremendously heavy, consisting largely of rails for 1918 delivery, plates and shapes for the carbuilders, and bars to the amount of about 50,000 tons for the general manufacturing and implement trades. Rail sales entered on the books or closed last week approximated 250,000 tons, among which the larger purchases were those of the New York Central and the Chicago & Northwestern. The Pennsylvania Lines are inquiring for 205,000 tons. In the pig-iron market, activity was largely associated with standard Bessemer, charcoal and Southern irons. To represent the scrap market during the interval of a week by any one list of prices is impossible. Each sale appears to be followed by a further advance.

Pig Iron.—Buyers generally are on the anxious seat, wrestling with the problem of last half iron. There appears to be no unanimity of opinion, and the fear of pig-iron shortage and the apprehension of a break in prices seem equally at work to divide those who have bought from those who have not. Most of the selling for the last half has been done by the Southern furnaces, the Northern producers quoting for that delivery only where competition is sought by the buyer. For that delivery the Southern situation presents a wide range of prices. Sales of No. 1 and No. 2 Southern foundry on the basis of $21.50, Birmingham, for No. 2 are noted, while as high as $25 is asked by other interests. Sales have also been made on the basis of $22, Birmingham. Buyers are giving considerable attention to the question of deliveries and are favoring those brands promising the greater assurance of delivery on schedule. The selling of high phosphorus Northern iron at equivalent to $26.75, Chicago, may be attributed in part to the above fact. Charcoal iron was sold last week on the basis of $26.25 at furnace for No. 2, but the more common quotation is a minimum of $27 at furnace. Sales of standard Bessemer at Chicago were made on the basis of $30 to $32 in the valley. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of $1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic irons, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton.

Lake Superior charcoal, Nos. 2 to 5	$28.00 to $29.00
Lake Superior charcoal, No. 1	28.50 to 29.50
Lake Superior charcoal, No. 6 and Scotch	29.00 to 30.00
Northern coke foundry, No. 1	27.50
Northern coke foundry, No. 2	27.00
Northern coke foundry, No. 3	26.50
Northern high phosphorus foundry	25.00 to 25.50
Southern coke No. 1 f'dry and 1 soft	26.00 to 26.50
Southern coke No. 2 f'dry and 2 soft	25.50 to 26.00
Malleable Bessemer	27.00
Basic	27.00
Low phosphorus	40.00
Silvery, 8 per cent	35.50 to 36.00
Bessemer ferrosilicon, 10 per cent	40.50 to 42.50

Rails and Track Supplies.—Total purchases of 1918 rails by Western railroads now approximate 500,000 tons, including 50,000 tons placed by the Missouri Pacific with the Pueblo mill, delivery of which will begin in 1917 and extend into 1918. The buying of rails for 1918 delivery continued last week, and as a result total sales amounted to about 300,000 tons in the past fortnight. Among the large purchases of the week were those of the New York Central and the Chicago & Northwestern. The Pennsylvania Lines have put out their inquiry for a total of 205,000 tons. The railroads are also buying largely of track fastenings, the Rock Island alone taking 16,000 tons of tie-plates. The price of spikes presents one of the conspicuous anomalies of the situation, being practically the same as the price of the bars from which they are made. Quotations are as follows: Standard railroad spikes, 2.75c. to 2.90c., base; track bolts with square nuts, 4c. to 4.50c., base, all in carloads, Chicago; tie-plates, $52 to $54, f.o.b. mill, net ton; standard section Bessemer rails, Chicago, $38, base; open hearth, $40; light rails, 25 to 45 lb., $44; 16 to 20 lb., $45; 12 lb., $46; 8 lb., $47; angle bars, 2.25c.

Structural Material.—Carbuilders again bought very heavily of steel, but new car sales in the week included no transactions of large importance. Contracts for the fabricating of steel for building purposes were more numerous and called for an aggregate of 8000 tons. The largest order was for 3500 tons of bridge steel for the Chicago & Northwestern Railway, to be supplied by the American Bridge Company, which will also furnish 750 tons of bridge steel for the Gary, Ind., Land Company and 750 tons for a cold storage warehouse at St. Louis. The Baker Iron Works will fabricate 1000 tons for a Los Angeles building and the Hansell-Elcock Company 300 tons for a seminary at Chicago. Western mills last week announced a further advance of $2 per ton in the price of structural steel, bringing the Chicago price to a parity with the Pittsburgh quotation, and we quote for Chicago delivery of structural steel from mill 3.189c.

The price of structural steel from store has been advanced $7 per ton and we quote for Chicago delivery 3.70c.

Plates.—A very limited tonnage of plates is to be had in this market at any price, even those mills which have been catering to prompt shipment business being in most instances practically out of the market. A further advance of $3 per ton in the price of plates for contracts has been announced, and we quote for Chicago delivery of plates from mill, at its convenience, 3.689c.; for prompt shipment, 4.189c.; in widths up to 72 in. and for wide plates, 4.939c. to 5c.

In keeping with an advance of $7 per ton announced last week, we quote for Chicago delivery of plates from jobbers' stocks 4.35c.

Sheets.—With inquiry from individual consumers running as large in some instances as 1100 tons, most of the producers have little to offer other than constantly advancing quotations intended to discourage the placing of orders. Higher prices are again announced for all grades of steel and we have revised our prices accordingly. We quote, for Chicago delivery, No. 10 blue annealed, 3.689c.; Nos. 3 to 8, 3.839c.; box annealed, No. 16 and lighter, 4.189c. to 4.289c.; No. 28 galvanized, 5.689c. to 6c. These quotations are minimum prices for contracts. Early shipment quotations are $5 to $10 per ton higher.

[illegible] the prices of sheets from store have been announced and we quote for Chicago delivery out of stock, regardless of quantity, as follows: No. 10 blue annealed, 4c.; No. 28 black, 4.60c.; No. 28 galvanized, 6.50c.

Bars.—Without any traceable reason, purchases of steel bars last week were large, and sales totalling 50,000 tons are reported. Another advance of $2 per ton has been made. Inquiry for bar iron continues heavy, but local mills are not encouraging the placing of orders. The makers of rail carbon steel have advanced their prices to the basis of 2.75c. at the mill and have become very conservative in their selling policy because of the scarcity of rerolling rails, one mill having been shut down for two weeks for lack of this raw material. We quote mill shipment, Chicago, as follows: Bar iron, 2.65c. to 2.75c.; soft steel bars, 3.089c.; hard steel bars, 2.75c.; shafting, in carloads, 20 per cent off; less than carloads, 15 per cent off.

Jobbers have advanced their prices for bars $5 per ton and we now quote store prices for Chicago delivery as follows: Soft steel bars, 3.60c; bar iron, 3.60c; reinforcing bars, 3.60c, base, with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting net list.

Rivets and Bolts.—With new contracts generally taken care of for the last half, and specifications very generally scheduled over some time in the future, a comparative lull is apparent since the announcement of the higher discounts on bolts and nuts. We quote

as follows: Carriage bolts up to ⅝ x 6 in., rolled thread, 50; cut thread, 40-7½; larger sizes, 35; machine bolts up to ⅝ x 4 in., rolled thread, with hot pressed square nuts, 50-5; cut thread, 40-10-5; large size, 40; gimlet-point coach screws, 50; hot pressed nuts, square, $2.60 off per 100 lb.; hexagon, $2.60 off. Structural rivets, ¾ to 1¼ in., 4.15c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

Store prices are as follows: Structural rivets, 4.50c; boiler rivets, 4.60c; machine bolts up to ⅝ x 4 in., 50; larger sizes, 10 off; carriage bolts up to ⅝ x 6 in., 40-20; larger sizes, 35-5; hot pressed nuts, square, $3 and hexagon, $3 off per 100 lb; lag screws, 50.

Cast-iron Pipe.—Another advance of $2 per ton has been announced in the price of cast pipe. For 1250 tons of pipe to be bought at St. Paul the leading interest is the low bidder. We quote as follows, per net ton, Chicago: Water pipe, 4-in., $42.50; 6-in. and larger, $39.50, with $1 extra for class A water pipe and gas pipe.

Wire Products.—Prices for wire products have been again advanced $3 per ton and still the mills are receiving more orders than they can accept. We quote as follows per 100 lb.: Plain wire, Nos. 6 to 9, base, $3.239; wire nails, $3.189; painted barb wire, $3.339; galvanized barbed wire, $4.039; polished staples, $3.339; galvanized staples, $4.039; all Chicago.

Old Material.—Prices of scrap are advancing almost without pause. Scarcely any two transactions for the same classes of material are at the same price. Following each transaction, a further advance is asked by the dealers, and since the large purchases of heavy melting and shoveling steel last week on the basis of $23 for the former and $21 for the latter, prices are already quoted at an advance of $1 per ton. Buying by consumers is general and persistent, and dealers acting for them are bidding against each other in the market for the limited supply of scrap available. In some lines, particularly rerolling rails, the scarcity is especially pronounced. An indication of this condition is had in the fact that the only railroad offering of importance is that of 2000 tons from the Burlington. Inquiry for various classes of scrap is coming into the market from many consumers in other districts, the inquiry for carwheels from Pittsburgh and from St. Louis being noted in particular. The disproportion between the amount of scrap apparently available for purchase in the market and heavy consumption grows more pronounced each week, and the upward tendency of prices has no promise in sight of being checked. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	$26.00 to $27.00
Relaying rails	27.00 to 28.00
Old carwheels	20.00 to 21.00
Old steel rails, rerolling	26.50 to 27.50
Old steel rails, less than 3 ft.	24.00 to 25.00
Heavy melting steel scrap	23.00 to 24.00
Frogs, switches and guards, cut apart	23.50 to 24.00
Shoveling steel	21.00 to 21.50
Steel axle turnings	17.00 to 17.50

Per Net Ton

Iron angles and splice bars	$27.00 to $27.50
Iron car axles	27.50 to 28.00
Steel angle bars	20.50 to 21.00
Steel car axles	33.00 to 34.00
Steel rails, rerolling	37.50 to 38.00
No. 1 railroad wrought	23.00 to 24.00
No. 2 railroad wrought	22.00 to 23.00
Cut forge	22.00 to 23.00
Pipes and flues	16.00 to 16.50
No. 1 busheling	19.00 to 19.50
No. 2 busheling	13.25 to 13.75
Steel knuckles and couplers	23.50 to 24.50
Steel springs	23.50 to 24.50
No. 1 boilers, cut to sheets and rings	13.50 to 14.00
Boiler punchings	19.50 to 20.00
Locomotive tires, smooth	25.00 to 26.00
Machine-shop turnings	8.50 to 9.00
Cast borings	7.75 to 8.25
No. 1 cast scrap	16.00 to 16.50
Stove plate and light cast scrap	12.75 to 13.25
Grate bars	13.00 to 13.50
Brake shoes	13.00 to 13.50
Railroad malleable	17.00 to 17.50
Agricultural malleable	15.00 to 15.50

Philadelphia

PHILADELPHIA, PA., Nov. 28, 1916.

The pig-iron market has continued to advance, and precise price levels of the various grades are difficult to determine. While sales have been made at the top quotations, it is doubtful if there is any broad buying at these figures. But the market is unquestionably strong, and if the export demand continues to develop it is not improbable that the predicted $35 level for No. 2 X foundry may be reached. Low phosphorus has touched $50, delivered, and basic has been sold at $30, furnace. Virginia No. 2 X has sold at $29, furnace. A plate maker has advanced his quotation on tank plates to 5c., Pittsburgh, base, or 5.159c., Philadelphia, and has booked large orders at that price. Other makers, nevertheless, continue to ask 4c. and upward, Pittsburgh. Structural material is more active, and one mill has advanced its quotation one-quarter cent to 3.25c. Sheets are higher at 4c., Pittsburgh, for No. 10 blue annealed. The railroads continue to show interest in 1918 rails, the Canadian Pacific trying to secure reservation of space for 50,000 tons. The spot coke market is a little easier. The old material market is excited and prices are advancing by leaps and bounds.

Pig-Iron.—So rapid have been the advances in all grades of pig iron, with the prices paid depending largely on the state of mind of buyers and sellers, that it is difficult to correctly gage the market. Quotations which are good to-day may be worthless to-morrow. There appears to be no consensus of opinion in the matter of prices, consequently their spread is greater than usual. On one thing all agree, and that is the strength of the market and the probability that prices will continue to advance. The situation is attributable to the export demand, which gives promise of even greater expansion in view of the fact that most of the European countries are short of iron. A big export buyer has asked one iron interest to submit a memorandum of all the iron of any delivery he can sell for export. In the face of the existing situation many producers are not anxious to sell, because they are well sold ahead, are holding for higher prices, or both. Predictions are that the price will go to $35 for No. 2 X. Eastern Pennsylvania No. 2 X is quoted at this writing at $28, furnace, or about $28.75, delivered. Virginia iron, for last half delivery, has been sold at $28 and $29, furnace, the iron, however, being special in character. A comparatively small lot of eastern Pennsylvania basic for first half delivery has been taken at $29, delivered. For carwheel iron, $29, furnace, has been paid. A sale is reported of 1500 tons of charcoal iron on the basis of $30, Buffalo. Southern iron shows considerable irregularity, some furnaces quoting $21.50, Birmingham, while a sale of a small lot of No. 3 is said to have been made at $22.75, first half delivery. Standard low phosphorus is quoted at $49 to $50, with the makers having but little left to offer. One interest entered 5000 tons at prices ranging from $47 to $50, delivered. The Lenoir Car Works has an inquiry out for 2400 tons, made up of four grades. The entire market is in an unsettled condition that cannot last indefinitely, but the question is how and when it will begin to resume a more natural course. Quotations for standard brands delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa. No. 2 X foundry	$27.50 to $28.50
Eastern Pa. No. 2 plain	27.00 to 28.00
Virginia No. 2 X foundry	28.00 to 29.00
Virginia No. 2 plain	27.75 to 28.75
Gray forge	26.00 to 27.00
Basic	27.00 to 29.00
Standard low phosphorus	49.00 to 50.00

Iron Ore.—In the week ended Nov. 25 importations from Sweden consisted of 9497 tons. None came from other countries.

Ferroalloys.—The West is reported to be very active, but the situation here is but little changed. For foreign 80 per cent ferromanganese, the quotation is $164, seaboard, and for prompt domestic $165, delivered. On first half domestic probably $160 could be done. The quotations for imported material have unquestion-

ably been kept down by the large production in this country. Ferrosilicon, 50 per cent, is held at $100, Pittsburgh, for carloads, and $99 for 100-ton lots. The quotation for 11 per cent ferrosilicon is around $39.44, delivered.

Plates.—The range of quotations for tank plates is from 4.159c. to 5.159c., Philadelphia. The situation is peculiar in that business is being placed from the bottom to the top of the range, and those commanding the higher price are picking orders that are desirable. On 2000 tons of sheared plates on which September delivery was promised, 5.159c., Philadelphia, was agreed upon. Sales are being made for export to Japan and other countries, one lot of 5000 tons being taken for Japanese delivery. A Norwegian, who is canvassing the trade for boiler and hull plates, states that his people got German plates until September last, when they ceased to receive shipments. Ship plates are quoted at 5c. to 6c., Pittsburgh, with some of the mills not offering. One mill quotes a minimum of 4.659c., Philadelphia, and another 4.159c. on ordinary steel. The mill quoting the maximum will not extend or enlarge contracts already in operation. In the week it has entered orders for 10,000 tons of universal plates, and these it now holds at 4.159c., Philadelphia, an advance of one-quarter cent. The fabricators of structural shapes are seeking plates more actively and a Pacific coast shipyard wants material for three steamships.

Bars.—The market is active with steel-bar quotations ranging from 3.059c. to 3.159c., Philadelphia. The Pennsylvania Railroad is inquiring for 2000 tons of steel bars. Iron bars are still 2.659c., Philadelphia, officially, but business has been done at 2.759c. and 2.859c., Philadelphia.

Structural Material.—A fresh impetus has been given to shapes, and the pressure on one Eastern mill has caused it to advance its quotation to 3.25c., mill, or Pittsburgh, depending on whether shipments are made east or west. The demand for export and from shipyards continues to lead. It is noted that the heavy demand for ship shapes is causing an extra burden to be thrown on those mills which do not make them inasmuch as the makers of ship shapes have more of the latter than they can care for. Ship shapes are quoted at 3.659c., Philadelphia. Worth Brothers, formerly plate makers of Coatesville, Pa., prior to selling out to the Midvale Steel & Ordnance Company, who have formulated plans for a new mill at Claymont on the Delaware River, are asking for bids on the steel work required by four open-hearth furnaces. It is estimated that the project will require about 5000 tons. The Pennsylvania Railroad is inquiring for 1000 tons.

Billets.—On distant deliveries the quotation for open-hearth rerolling billets is $55, and for forging steel, $75.

Sheets.—The makers are not sold so far ahead as they are in most other products, this being their policy. The demand is good and prices have been advanced to 4.159c., Philadelphia, for No. 10 blue annealed.

Rails.—It was erroneously stated last week that $50 had been paid for a small lot of steel rails. Such a sale was agreed upon, but later canceled. For 500 tons of standard rails, first half delivery, shipment in that period to be at the convenience of the mill, $45 has been paid. One mill quotes $50 from stock, and $55 for less than carloads, these rails not being of the first quality. Several of the railroads continue to seek the reservation of mill capacity in 1918, one such inquiry involving 50,000 tons, coming from the Canadian Pacific Railroad.

Coke.—The spot foundry situation appears a little easier, although $9 to $9.50 per net ton at oven is quoted. Contract foundry is nominal at from $6 to $6.50. Prompt furnace is about $7.50 per net ton at oven, and $4 has been offered, without result, for contract. Freight rates from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.95, and Mountain, $1.65.

Old Material.—The market has been excited, and prices have been correspondingly uncertain. A good business has been done for delivery both in and out of this territory. Coatesville is not under embargo. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$23.00 to $24.00
Old steel rails, rerolling	26.00 to 28.00
Low phos. heavy melting steel scrap	30.00 to 33.00
Old steel axles (for export)	45.00
Old iron axles (for export)	45.00
Old iron rails	24.00 to 25.00
Old carwheels	21.50 to 22.50
No. 1 railroad wrought	25.00 to 26.00
Wrought-iron pipe	18.00 to 19.00
No. 1 forge fire	15.50 to 16.50
Bundled sheets	15.50 to 16.50
No. 2 busheling	12.00 to 13.00
Machine-shop turnings	12.00 to 12.50
Cast borings	12.50 to 13.00
No. 1 cast	20.00 to 21.00
Grate bars, railroad	15.00 to 15.50
Stove plate	16.50 to 17.50
Railroad malleable	16.50 to 17.50

Cleveland

CLEVELAND, OHIO, Nov. 28, 1916.

Iron Ore.—Lake Superior ore prices for 1917 were established at an advance of $1.50 per ton over this year's prices by a sale made by W. P. Snyder & Co., Pittsburgh, of 185,000 tons of Mesaba non-Bessemer made late in the afternoon of Nov. 22. Following the establishment of the ore-carrying rates at an advance of 50c. per ton, or double the net contract rate for 1916, some of the ore firms favored $1.30 advance and others held for the higher price. For the past few years the price finally established has been, in several instances, somewhat lower than the price favored by some of the sellers, but this year the maximum price considered was adopted. Although 1916 prices ranged from 70c. to 75c. above those of the previous year, with increased mining costs, including an advance in wages, mining companies shared very little the current year in the general prosperity of the blast furnaces and steel plants. A further increase in mining costs due to higher wages, advance in the cost of coal and supplies and higher royalties on a sliding scale contract will absorb considerable of the addition to the price of ore so that it is estimated that the net increase to the mining companies, after also deducting the 50c. increase in carrying charges, will be only about 60c. to 70c. per ton. Reservations have been made for a very heavy tonnage of ore in the past few weeks, taking the bulk of the available supply, so that there will not be a heavy buying movement when the market becomes active. Reservations are now being written into contracts, and a few sales have been made since the establishment of prices to consumers who had not previously made reservation. As most of the steel companies have reserved ore for their requirements, additional buying will come mainly from the small merchant furnaces. The Eastern steel companies have made large reservations of 1917 ore and shipments to the East next year are expected to be as heavy as in 1916. In addition to the fact that there were large stock piles at the opening of this season of navigation, which helped in making the record-breaking season's movement, but which were all cleaned up this fall, consideration in estimating the 1917 movement will have to be taken of the fact that in many of the open-pit properties in the Mesaba range the ore of good grade was well cleaned out during the rush of the present season, and the output of these mines is likely to be curtailed next year. Owing to the delays caused by the cold weather and frozen ore the November movement, it is estimated, will amount to only about 4,000,000 tons. As a result of the delay, some of the shippers are behind on their schedules and will keep their boats in operation about two weeks in December if weather conditions permit. We quote 1917 prices as follows, delivered lower Lake ports: Old range Bessemer, $5.95; Mesaba Bessemer, $5.70; old range non-Bessemer, $5.20; Mesaba non-Bessemer, $5.05.

Pig Iron.—With $3 a ton added to the cost by the advance in ore prices, and other blast-furnace costs going upward, pig-iron prices continue to rise. Cleveland quotations on foundry and malleable iron have been advanced $2 to $3 per ton, now ranging from $30 to $31 on basic iron and $29 to $30 on foundry and malleable grades. Bessemer iron is quoted at $33 to

$35 by Valley furnaces. A Cleveland interest last week sold 34,000 tons of basic iron for shipment from its Valley furnace at $30. A considerable tonnage of Southern iron has been sold in the past few days at $22, Birmingham, for last half, which is claimed to be the minimum price. For early delivery $23 and higher is being quoted. First quarter Southern iron is scarce. Furnaces are being asked for prices on Northern and Southern foundry grades for first half of 1918, but refuse to quote. Some Virginia iron is coming into this territory, being available for prompt shipment, and is quoted at $23.75 to $25 at furnace for prompt and $25.75 for the last half. Ohio silvery iron has advanced sharply and is in good demand for last half. We note the sale of 500 tons of 8 per cent silvery at $34 and on an inquiry for 1000 tons for last half from a Cleveland foundry a quotation of $38 was made yesterday. A sale of standard low phosphorus is reported at $49. We quote, delivered Cleveland, as follows:

Bessemer	$33.95
Basic	30.30
Northern No. 2 foundry	$29.30 to 30.30
Southern No. 2 foundry	26.00 to 27.00
Gray forge	27.45
Jackson County silvery 8 per cent silicon	36.62 to 39.62
Standard low phos., Valley furnace	45.00 to 49.00

Coke.—There is some demand for foundry coke for prompt shipment, which is quoted at $9 to $9.25 per net ton at oven for standard Connellsville brands. Some Virginia coke has been sold at $7 for the first half. Connellsville foundry coke is quoted at $6.50 for that delivery.

Finished Iron and Steel.—New demand continues active, particularly for plates from the tank shops, which are getting a heavy volume of business. There is a tendency toward higher prices for early shipment, and mills that have been able to make rather good deliveries are getting further behind. One Cleveland mill has advanced its price on light plates to 4.50c., Pittsburgh. The range in plate prices is from 4c. to 4.50c. One Eastern mill has advanced its price on structural material to 3.25c., Pittsburgh. In structural lines the McClintic-Marshall Company has taken 2000 tons for a new plant for the National-Acme Mfg. Company, Cleveland. Fabricators are inquiring for second quarter contracts and some are buying steel out of stock for work under contract. Because of advancing prices of scrap, iron bars have been advanced to 3c. and hard steel bars to 2.90c., at mill. The sheet situation is growing worse. Many mills are refusing to quote and the production is reduced considerably by the scarcity of sheet bars. We quote sheets at 4c. to 4.50c., Ohio mill, for No. 28 black; 3.75c. for No. 10 blue annealed, and 5.50c. to 6.50c. for No. 28 galvanized. Cleveland warehouse prices have been advanced $5 per ton on iron and steel bars, plates and structural material. Prices are now as follows: Steel bars, under 2 in., 3.75c.; squares and rounds, 2 in. and over, 4.25c.; structural material, 3.85c.; plates, 4.35c.; iron bars, 3.70c., and hoops, 4.50c. Stock prices on blue annealed sheets have been advanced $7 per ton, to 4.25c.

Bolts, Nuts and Rivets.—The demand for bolts and nuts continues active and prices are firm at the new quotations. The demand for rivets continues fairly heavy. We quote rivets at 4.25c., Pittsburgh, for structural, and 4.35c. for boiler. Bolt and nut discounts are as follows:

Common carriage bolts, ⅜ x 6 in., smaller or shorter, rolled thread, 50; cut thread, 40 and 7½; larger or longer, 35. Machine bolts with h.p. nuts, ⅜ x 4, smaller or shorter, rolled thread, 50 and 5; cut thread, 40, 10 and 5; larger or longer, 40. Lag bolts, gimlet or cone point, 50. Square and hexagon h.p. nuts, blank, $2.60 off the list; tapped, $2.40 off. C.p.c. and t. hexagon nuts, all sizes, blank, $2.50 off; tapped, $2.25 off. Cold pressed semi-finished hexagon nuts, 60 off.

Old Material.—The local market is quite active and sharp advances have been made on some grades. Several lots of heavy melting steel, aggregating 15,000 tons or more, were purchased by Cleveland mills late in the week at $23 and higher. Later the market eased off a little and sales were made at $22. However, dealers today are asking $23.50 for No. 1 heavy melting steel scrap. Carwheels quoted a week ago around $17 have sold as high as $24 for prompt shipment. Steel axle turnings have sold at $16.50. Railroad malleable scrap is very scarce, owing to the fact that little is being placed on the market by railroads and has advanced about $2 per ton. Railroad wrought is about $3 per ton higher. Borings and turnings have advanced about $2. A local mill has purchased 1000 tons of No. 1 busheling at $17, but for early delivery, and for future shipment dealers have advanced prices. Some of the present market quotations are represented by a wide spread and dealers are holding some grades for considerably higher prices than the usual quotations. The local activity in heavy steel scrap put Cleveland prices as high if not higher than Valley quotations, although heavy steel scrap in Cleveland is usually from $1 to $2 per ton lower than Valley prices. The heavy movement of scrap is being interrupted by railroad congestion. The Pennsylvania Railroad is refusing to accept scrap shipments for Youngstown and the congestion is also interfering with shipments to Canton and Sharon. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton

Steel rails	$20.75 to $21.00
Steel rails, rerolling	24.00 to 24.50
Steel rails under 3 ft	26.00 to 27.00
Iron rails	27.00 to 27.50
Steel car axles	42.00 to 43.00
Heavy melting steel	22.50 to 23.50
Carwheels	23.00 to 24.00
Relaying rails 50 lb. and over	28.00
Agricultural malleable	16.50 to 17.00
Railroad malleable	22.00 to 22.50
Steel axle turnings	16.50 to 17.00
Light bundled sheet scrap	13.75 to 14.25

Per Net Ton

Iron car axles	$38.00 to $40.00
Cast borings	10.25 to 10.50
Iron and steel turnings and drillings	10.25 to 10.50
No. 1 busheling	18.00 to 18.50
No. 1 railroad wrought	24.00 to 25.00
No. 1 cast	18.00 to 18.50
Railroad grate bars	14.00 to 14.50
Stove plate	14.00 to 14.50

Cincinnati

CINCINNATI, OHIO, Nov. 26, 1916.

Coke.—Spot prices in all districts vary so much that no exact quotations can be made. It is simply a question of being able to make prompt shipment of coke urgently needed and the seller fixes his own price. There is not much new business and practically no contracts are being made. Some Connellsville furnace coke is reported sold as high as $8 per net ton at oven, but operators would probably take on future business at $4 to $5, and would doubtless accept foundry coke contracts for last half at 50c. to $1 a ton higher. The same conditions exist in the Wise County and Pocahontas fields. The car shortage is still a factor that is having considerable effect on the spot market.

Pig Iron.—The tonnage booked last week was much smaller than the previous week's record, although it was far ahead of the average. Rapidly advancing prices on the part of producers, both South and North, have induced some melters who have not bought very far ahead to seek cover, and this has caused the marking up of prompt and first half quotations above those for the last half of next year. A little Southern No. 2 foundry iron can be bought at $21.50 for this year's delivery, but for the first half of next year $22, Birmingham basis, is considered minimum. As far as last half of 1917 is concerned, $21, Birmingham, can be done, but the range in quotations is fully $4 a ton. Indiana melters bought several lots of Southern iron for shipment in the last half of next year, the largest sale reported being 700 tons. Quite a number of medium-sized sales were made to central Ohio consumers. The tonnage of Southern iron that will be shipped to northern Ohio melters in the last half of 1917 will surpass any previous record. Northern foundry iron has been slow, as Hanging Rock producers are unable to take on any business for shipment before July 1, and the available foundry, malleable and basic in that district for last half delivery is rapidly being disposed of. A large producer in that district advanced last half quotations this week to a basis of $28, Ironton, but desirable busines can be taken on now at $1 less. In central Ohio two lots of Northern malleable, 500 and 1000 tons respectively, were sold for last half movement. Reports that further large sales of basic

were made last week appear to be without foundation. The inquiry is comparatively light, the largest being from the Southern Railway for 2500 tons of foundry iron to be delivered in the first quarter at Lenoir, Tenn. A local consumer wants 500 tons of Southern foundry iron for first half shipment. The Ohio silvery irons are still advancing, and are quoted to-day all the way from $32 to $34 at furnace, based on an 8 per cent analysis. Foundry iron contractors are urging forward shipments, and as a consequence yard stocks are increasing. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	$24.90 to $28.40
Southern coke, No. 2 f'dry and 2 soft	24.40 to 27.90
Southern coke, No. 3 foundry	23.90 to 27.40
Southern coke, No. 1 foundry	[illegible]
Southern gray forge	22.90 to 26.40
Ohio silvery, 8 per cent silicon	33.26 to 35.26
Southern Ohio coke, No. 1	28.76 to 29.76
Southern Ohio coke, No. 2	28.26 to 29.26
Southern Ohio coke, No. 3	27.76 to 28.76
Southern Ohio malleable Bessemer	28.26 to 29.26
Basic Northern	28.26 to 29.26
Lake Superior charcoal	26.20 to 27.20
Standard Southern carwheel	26.90 to 27.40

Finished Material.—Local warehouse prices have been advanced all along the line and business is very brisk. Most of the orders taken last week were at the old quotations, but the figures given below are firmly adhered to now. In spite of the high price of building material, there is an excellent demand from different sources. It is reported that mill shipments have been more satisfactory of late, yet there is considerable delay on quite a number of orders that were placed several months ago. We quote from jobbers' stocks as follows: Structural material, 3.80c. base; plates, 4.35c.; No. 10 blue annealed sheets, 4.15c. to 4.25c.; bars and small shapes, 3.50c.; rounds and squares, 2 in. and over, $4.25c.; flat bars, 1 in. and over, 4.25c.; cold-rolled shafting, 10 per cent plus list; wire nails, $3.40 per keg base; barb wire, $4.40 per 100 lb. The nearby mills are quoting to-day No. 28 galvanized sheets at 6.25c., Cincinnati or Newport, Ky., and No. 28 black sheets at 4.40c. to 4.50c.

Old Material.—Advance on almost all grades of scrap are now a daily occurrence. Old iron rails, rerolling rails and heavy relaying steel rails are all up $2 a ton. Cast scrap is also up on an average of $1, and even borings and steel turnings that have been a drug on the market for some time have been advanced 50c. The following are dealers' prices, f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton

Bundled sheet scrap	$13.75 to $14.25
Old iron rails	24.00 to 24.50
Relaying rails, 50 lb. and up	28.00 to 28.50
Rerolling steel rails	23.00 to 23.50
Heavy melting steel scrap	20.00 to 20.50
Steel rails for melting	20.00 to 20.50

Per Net Ton

No. 1 railroad wrought	$20.25 to $20.75
Cast borings	6.50 to 7.00
Steel turnings	6.50 to 7.00
Railroad cast	16.00 to 16.50
No. 1 machinery cast	17.75 to 18.25
Burnt scrap	10.00 to 10.50
Iron axles	32.75 to 33.25
Locomotive tires (smooth inside)	26.00 to 26.50
Pipes and flues	13.50 to 14.00
Malleable cast	14.50 to 15.00
Railroad tank and sheet	11.50 to 12.00

Buffalo

BUFFALO, N. Y., Nov. 28, 1916.

Pig Iron.—Sales are unabated, transactions of the past week aggregating 25,000 tons, all grades, largely for last half delivery. A large consumer has taken a considerable quantity of iron for shipment to its English branch, being forced to cover its needs in this country. Domestic inquiry at the same time is increasing in pressure for all grades of iron. The minimum on all grades for prompt shipment has reached $30, except on very low silicons. This price is being held for any available delivery over next year by all but one interest, the latter quoting $28 to $30 on last half. Steel-making irons are being quoted well beyond $30 and up to $36. Pig iron produced outside of this district is being offered at $26 to $28, delivered at Buffalo district points. Grade differentials have wiped out to such an extent that the customary schedule for the time being is eliminated and a general range of $28 to $30 at furnace for deliveries including all quarters of next year takes its place.

Finished Iron and Steel.—Pressure for deliveries is increasingly strong. Prices have been advanced again both on mill and warehouse deliveries. The scarcity of tin plate is causing users to pick up stock wasters at a minimum of $7 per base box. Wire products are up $3 per ton. The Canadian demand for wire rods remains unsupplied and users there may be forced to shut down for lack of material. Inquiry reaches here through Canada for 16,000 tons of shipbuilding material for Norway. A large tonnage of 5½-in. billets has been sold from this market for Italy, with further large inquiries for billets for Italy and France. The McClintic-Marshall Company has taken a contract for 400 tons of steel for a plant addition of the Atlas Crucible Steel Company, Dunkirk.

Old Material.—The market is strong and very active. Prices are advancing daily. Heavy melting steel is extremely scarce. A distinct shortage is in sight, also marked scarcity in other grades of scrap. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	$21.50 to $22.00
Low phosphorus billet and bloom ends	27.50 to 28.00
No. 1 railroad wrought	26.50 to 27.00
No. 1 railroad and machinery cast	19.50 to 20.00
Steel axles	35.00
Iron axles	35.00
Car wheels	19.50 to 20.00
Railroad malleable	19.00 to 19.50
Machine shop turnings	10.50 to 11.00
Heavy axle turnings	15.50 to 16.00
Clean cast borings	10.50 to 11.00
Iron rails	22.00 to 22.50
Locomotive grate bars	15.50 to 16.00
Stove plate (gross ton)	14.75 to 15.00
Wrought pipe	16.00 to 16.50
No. 1 busheling scrap	18.50 to 19.00
No. 2 busheling scrap	14.00 to 14.50
Bundled sheet scrap	14.50 to 15.00

Birmingham

BIRMINGHAM, ALA., Nov. 27, 1916.

Pig Iron.—The week witnessed only one change in the market, that being an advance on Nov. 22 for last half delivery from $20 to $21. The large interests assert that $21 is the minimum for last half 1917 delivery and that $23 is about the best that can be done for spot or first half. One maker, absolutely out of the market since Nov. 8, was still declining to quote. The other makers are nearer the same price basis than since the rise began. As a rule, they have adopted the policy of offering a certain amount of iron at the market price, and when that amount is sold they wait the next rise before re-entry. In this manner regular customers are taken care of and afforded opportunity to purchase before the next rise. The status of the makers is illustrated by that of a leading concern, which has only 10 per cent of its probable make left for first half delivery. All are running from the spot market rather than seeking it. Sales into the second half, made at from $19 to $21, probably aggregate 250,000 to 350,000 tons, of which 20,000 tons of basic went to an Eastern buyer at $20 for last half 1917 delivery. No more basic is to be had except for the last half. Some spot iron, especially when sold through brokers, goes as high as $24 and $25, but the furnace interests have not participated in such prices. The judgment of makers is that the market is going higher, but they are not forcing it. Sloss-Sheffield, Republic, Tennessee and Woodward companies have all raised wages of employees from 10 to 15 per cent in mining departments. So many of the negroes who left for the North in the early autumn are returning in the face of winter that a feared labor shortage does not now exist. Decrease in stocks is reported by almost all makers. Warrant iron stocks are so low, probably only 50,000 tons, as to be a negligible quantity. We quote, per gross ton, f.o.b. Birmingham district furnaces, for first and last half and spot, respectively, as follows:

No. 1 [illegible] soft	$21.50 to $23.50
No. 2 foundry and soft	21.00 to 23.00
No. 1 [illegible]	20.50 to 22.50
No. [illegible]	20.25 to 22.25
[illegible]	20.00 to 22.00
[illegible]	21.00 to 23.00
Charcoal	25.00 to 26.00

Cast-Iron Pipe.—Reluctantly the cast-iron pipe makers have marked prices up again, this time to a level which it is apprehended will serve to stop a lot of business. Municipal bonds voted for certain improvements will not cover specifications at present prices. In some instances makers report that wooden pipe is being substituted for cast iron. However, sufficient orders came in prior to the last rise to prevent curtailment of plant operation. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., $37; 6-in. and upward, $34, with $1 added for gas pipe and 16-ft. lengths. These quotations are uniform.

Coal and Coke.—Delivery is the only question in the coal market. All sorts of prices are obtained, but the larger dealers, with long-standing customers, are content with $3 for run of mine. Stoppages of operations at steam plants are frequent and in at least one Southern city the street car line was put out of business. The car situation is better, but the demand is larger. Monterey, Mex., wants 12,000 tons of coke. Birmingham district makers are quoting around $5 per net ton at oven for standard beehive coke for 1917 delivery and the price is no check to the booking of business to capacity. Higher prices are imminent. Furnace coke brings from $3.50 to $4.

Old Material.—The scrap market is erratic, but the movement is mostly upward. There is no regularity in prices, as much as $2 and $3 difference between sales of the same material occurring, according to the ability to move the scrap and the disposition of the buyer. Steel axles, if available in quantities, would bring $35. Mills are kept on the anxious seat. The car shortage also affects prices. We quote, per gross ton, f.o.b. dealers' yards in Birmingham, as follows:

Old steel axles	[illegible]
Old steel rails	16.50 to 17.00
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

New York

NEW YORK, Nov. 29, 1916.

Pig Iron.—Buying in the Metropolitan district in the past week has been heavy and some important interests have participated in it. It is probable that including iron bought in New York by large companies having plants in different parts of the country, the total put under contract in the past two weeks has been upward of about 150,000 tons. Buying is less now than it was a week ago and high prices have made some buyers hesitate, while the contrary has been the effect with others. There are some indications of anxiety by consumers who have as yet few or no orders for castings for the second half. One railroad equipment interest placed about 8000 tons for New York State and Western plants. In New Jersey one buyer has taken up 1500 tons of charcoal iron and is now figuring on 2500 tons of coke iron. Another New Jersey buyer has closed for 4000 to 6000 tons for the first half of next year. In New England the buying last week was quite considerable, a large interest taking 25,000 tons or more of malleable pig iron. The International Steam Pump Company's wants for second half, probably 20,000 tons, have been satisfied, the business being distributed among a number of furnaces, including the eastern Pennsylvania district. One furnace in that district has put its price at $28.50 for No. 2 X foundry. Buffalo furnaces are selling at a range of $28 to $30 for No. 2 X for the last half. Canada has been a good buyer of Buffalo iron of late. One Buffalo stack has been banked for lack of coke. The two Niagara furnaces in that district are not expected to get in for some months, possibly one in the late spring of 1917 and the other later. The eastern Pennsylvania furnaces are now quoting No. 2 X at $27.50 to $28.50 at furnace. The leading Virginia producer is out of the market, being well sold up for next year. Virginia iron is quoted at $26 at furnace for No. 2 X, which would make the delivered price in New England $29.25 or quite a little under Buffalo iron. Firms buying iron for export are inquiring for both foundry and Bessemer [illegible]. There is some inquiry for Southern warrants both from foundries and speculators. The range is now from $20 to $23, Birmingham. Labor demands at blast furnaces, iron mines and coal mines are continuous. West Virginia coke shipments have been affected by strikes in the mines there, particularly in the Broad Top region. We quote at tidewater for early delivery: No. 1 foundry, $29.50 to $30; No. 2 X, $29 to $29.50; No. 2 plain, $28.50 to $29; Southern iron at tidewater, $28.50 to $29 for No. 1 and $28 to $28.50 for No. 2 foundry and No. 2 soft.

Ferroalloys.—Sales of at least 9000 tons of ferromanganese, mostly domestic, have been closed, bringing the total for the past fortnight to about 14,000 tons. The delivery stipulated in most cases is the first half of 1917, though some sales are for the last half. The consideration was from $160 to $165, delivered, though it is reported some sales have been made at $155. The British alloy is still held at $164, seaboard, with no indication of a reduction to meet the competition of the domestic product. Inquiries are more active, mostly for forward delivery, though one for 200 tons for December-January delivery is noted. Arrivals are in the usual proportions and domestic production in October was over 21,000 tons. An inquiry for 1000 tons of spiegeleisen has appeared. The quotation is $50 to $55, furnace, on the 20 per cent grade, but it is understood not much is available. Ferrosilicon, 50 per cent, is selling at $99 to $100, delivered, with the demand brisk, especially from foreign consumers to whom considerable has been sold.

Structural Material—The large things in the way of new business embrace 10,000 tons for the Newport News shipyard, 5000 tons for the New York Shipbuilding Company, 6000 for the Philadelphia Navy Yard, 5000 for the new Worth Brothers' plant on the Delaware River, 2300 tons for the Poughkeepsie railroad bridge, and all of 6000 tons for the Lehigh Valley, not to mention another offering from the Pennsylvania for two bridges taking 900 tons. The general building situation is also holding its own with a Schwartz loft, West Twenty-second Street, New York, 900 tons; an office building on Thirty-second Street, 1500 tons, and an office building in Baltimore taking 250 tons. Railroad purchases include 3500 tons for the Chicago & Northwestern, 475 for the Wabash and 300 tons, besides two turntables, for the Great Northern, all placed with the American Bridge Company, and 200 tons for the Grand Trunk, awarded to the Lackawanna Bridge Company, and 150 tons for pier 39, North River, for the Jersey Central, to Milliken Brothers, Inc. The general building contracts closed include 1000 tons for some office buildings in Philadelphia placed with the American Bridge Company; 1200 tons for the Rodin Studio, placed with the Hinkle Iron Company; 500 tons for the Mosby department store, Richmond, Va., awarded to the Richmond Structural Steel Company; 1000 tons for the General Electric Lamp Works, Providence, to the Providence Steel & Iron Works; 450 tons for the Engineering Societies' Building addition, to the American Bridge Company, which also took 200 tons for Phelps, Dodge & Co. and 1250 tons which has been bought by the Mead-Morrison Company. It appears that all of the 27,000 tons of 6, 7 and 8-in. beams for France have not been placed, but that perhaps as much as 7000 tons is still pending. Warehouse prices have pretty generally been advanced $5 per ton and we now quote from warehouse at 3.[illegible], New York. We quote mill shipments of plain material at 3.019c. to 3.169c., New York.

Steel Plates.—Universal plates are still obtainable in three to five weeks and at 3.75c., Pittsburgh; several thousand tons of tank plates have been sold for even better delivery at 4c., but a large tonnage of ship plates to a domestic builder for delivery in the last half took no less than 5c. per lb., and a lot of as much as 100 tons of marine boiler steel has been sold at 10.40c., Pittsburgh base. There is apparently no abatement in

foreign inquiry. One of the latest involves 55,000 tons of plates and 20,000 tons of shapes for ten cargo vessels to be built abroad and a late Italian inquiry covers 6000 tons of plates and 2000 tons of shapes. A $5 advance has been made in warehouse prices. We quote universal plates and sheared plates up to 84-in., in a few weeks, at 3.919c. to 4.169c., New York, but Lloyd specification plates at 4.419c. to 5.669c. for what is available in the first half of 1917 and of plates for indefinite deliveries at 3.669c., New York. Out of store we now quote 4.75c., New York.

Bars.—Definite information is obtained of the placing of 550,000 tons of shell steel for the last half at close to 4.25c. It is probable that about 500,000 tons in addition have been put under order. The recent large-lot buying of bar iron has shown to what extent bar iron is being substituted for steel bars with its spread of $8 to $10 per ton compared with steel, and the prices are firm with some talk that an early advance, perhaps of $3 per ton, may be expected. We quote mill shipments of steel bars at 3.069c. to 3.169c., New York, the lower price for indefinite delivery and the higher price for small quantities available in 60 to 90 days and usually of discard shell steel. We quote mill shipments of bar iron at 2.669c., New York. Warehouse prices have been advanced $5 per ton for steel bars, making the base price for steel bars 3.75c., New York, and $2 per ton in the case of iron bars, which are now 3.50c., New York.

Cast-Iron Pipe.—The city of Buffalo will open bids on Friday, Dec. 1, on 2000 tons of 3 to 6-in. pipe for delivery through 1917. Private buying is in excess of the normal volume for the season. Good orders are being entered for spring delivery. An advance of $2 per ton is announced for Friday, Dec. 1. This will make the price of carload lots of 6-in., class B and heavier, $39.50 per net ton, tidewater, as they are now quoted at $37.50. Class A and gas pipe take an extra of $1 per ton.

Old Material.—The market is excited. Heavy buying is reported of practically every commodity. Consumers in eastern Pennsylvania are now scrutinizing material less severely, so that few rejections are being made, and consequently the price of steel scrap for eastern Pennsylvania shipment is more closely approximating that of railroad steel scrap or its equivalent. Italy is inquiring for steel scrap, but cost of delivery is prohibitive to dealers who do not control ocean freight room. Brokers quote buying prices about as follows to local dealers and producers, per gross ton, New York:

Heavy melting steel scrap (for eastern Pennsylvania shipment)	$19.50 to $20.00
Old steel rails (short lengths) or equivalent	21.00 to 21.50
Relaying rails	31.50 to 32.00
Rerolling rails	24.50 to 25.00
Iron and steel car axles (for export)	42.00 to 45.00
No. 1 railroad wrought	22.50 to 23.00
Wrought-iron track scrap	20.00 to 20.50
No. 1 yard wrought, long	19.50 to 20.00
Light iron (nominal)	6.00 to 6.50
Cast borings (clean)	10.00 to 10.50
Machine shop turnings	9.00 to 9.50
Mixed borings and turnings	9.00 to 9.50
Wrought pipe (not galvanized or enameled)	16.00 to 16.50

Cast scrap has not advanced as much as pig iron. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

No. 1 cast (machinery)	$21.00 to $21.50
No. 2 cast (heavy)	19.50 to 20.00
Stove plate	15.50 to 16.00
Locomotive grate bars	15.50 to 16.00
Old carwheels	21.50 to 22.00
Malleable cast (railroad)	17.50 to 18.00

The Wisconsin legislative program of organized labor contemplates changes in the workmen's compensation act to increase the maximum indemnity from $3,000 to $4,000, and the minimum from $1,500 to $2,000. Old age pensions, compulsory health insurance, prohibition of night work by females and physical examinations of workers by physicians employed by the State Board of Health are other propositions to be introduced in the 1917 Legislature, which convenes in January.

British Steel Market

Pig-Iron Licenses Freer—High Grade Ferrosilicon Advanced

LONDON, ENGLAND, Nov. 29, 1916.—(*By cable*)

The pig-iron market is strong and the demand for Cleveland iron is heavy. Licenses for hematite iron are being issued more freely. Ferrosilicon, 50 per cent, is quoted at £30. Tin plate pooling arrangements are stimulating both demand and output, but deficient allotments are 42 per cent of normal capacity. Semi-finished steel is firm but quiet. Ferromanganese for second quarter delivery is quoted at £34. We quote as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 33s.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £19 5s. against £20 a week ago

Steel ship plates, Scotch, delivered local yards, £13 17s. 6d.

Steel rails, export, f.o.b. works, £10 17s. 6d.

Hematite pig iron, f.o.b. Tees, 142s. 6d., compared with about 140s. a week ago

Sheet bars (Welsh) delivered at works in Swansea Valley, £15 5s. nominal.

Steel bars, export f.o.b. Clyde, £18.

Ferromanganese, £34, second quarter 1917.

Ferrosilicon, 50 per cent, c.i.f., £30 against £27 last week.

St. Louis

ST. LOUIS, MO., Nov. 27, 1916.

Pig Iron.—Heavy buying of basic, for St. Louis district delivery, is reported, totaling about 75,000 tons, about two-thirds Southern and the remainder Northern. In foundry iron the transactions were both numerous and large, ranging from 2500 tons downward. A considerable tonnage of spot iron was disposed of, melters having found their needs greater than they anticipated when they placed their contracts for this period of the year.

Old Material.—The scrap market continues on its speculative career, the buying being largely by dealers who are short or who are stocking up against expected buying. The mills are buying only as their imperative needs demand, but for whatever they buy they pay the price without demur. Quite a number of dealers have been caught short. A considerable quantity of material, also, is being shipped East. Carwheels are especially strong. No lists appeared during the week. The situation is one which makes a review of the market difficult, for conditions change almost from hour to hour. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton	
Old iron rails	$25.00 to $25.50
Old steel rails, rerolling	25.50 to 26.00
Old steel rails, less than 3 ft.	25.50 to 26.00
Relaying rails, standard section, subject to inspection	28.00 to 30.00
Old carwheels	18.50 to 19.00
No. 1 railroad heavy melting steel scrap	22.00 to 22.50
Heavy shoveling steel	19.50 to 20.00
Ordinary shoveling steel	17.00 to 17.50
Frogs, switches and guards cut apart	22.00 to 22.50
Bundled sheet scrap	12.00 to 12.50
Per Net Ton	
Iron angle bars	$23.00 to $23.50
Steel angle bars	21.50 to 22.00
Iron car axles	34.50 to 35.00
Steel car axles	35.50 to 36.00
Wrought arch bars and transoms	26.50 to 27.00
No. 1 railroad wrought	22.50 to 23.00
No. 2 railroad wrought	21.75 to 22.25
Railroad springs	22.50 to 23.00
Steel couplers and knuckles	24.00 to 25.00
Locomotive tires, 42 in. and over, smooth inside	27.50 to 28.00
No. 1 dealers' forge	19.50 to 20.00
Cast-iron borings	10.00 to 10.50
No. 1 machinery cast	18.50 to 19.00
No. 1 boilers, cut to sheets and rings	15.00 to 15.50
No. 1 railroad cast scrap	15.50 to 16.00
Stove plate and light cast scrap	11.00 to 11.50
Railroad malleable	15.50 to 16.00
Agricultural malleable	13.50 to 14.00
Pipes and flues	16.00 to 16.50
Heavy railroad sheet and tank scrap	15.50 to 16.00
Railroad steel bars	12.50 to 13.00
Machine shop turnings	10.50 to 11.00
Heavy machine shop turnings	12.50 to 13.00

Coke.—Spot sales were made at almost any figure representatives cared to ask. Connellsville 72-hr. coke

was quoted as high as $11.50 for immediate delivery. On by-product coke no quotations could be obtained, the local producer being out of the market and nearby producers being entirely sold up.

Finished Iron and Steel.—No contracts are being made, buyers keeping out of the market because of their knowledge of the situation as to deliveries. Movement out of warehouse continues heavy at advanced prices. We quote for stock from warehouse as follows: Soft steel bars, 3.65c.; iron bars, 3.55c. to 3.60c.; structural material, 3.75c.; tank plates, 4.40c.; No. 10 blue annealed sheets, 4.05c.; No. 28 black sheets, 4.75c.; No. 28 galvanized sheets, 6.60c.

Automatic Steel Hardening and Tempering

An automatic steel hardening and tempering apparatus has been patented (U. S. 1,183,809—May 16, 1916) by Franklin D. Frisbee and Malcolm H. Baker of Boston. It involves the use of several electromagnets. A number of the thin, flat articles to be treated are arranged in a row in a receptacle, at one end of which is an electro-magnet, operating intermittently through a commutator. The magnet when energized draws one of the articles to a slot in the bottom of the receptacle, through which it drops when the current in the magnet is shut off by the commutator. The piece then falls between two heating heads faced with platinum and also constituting electromagnets controlled by the commutator. When the piece is between the heads, the heads close and compress it; at the same time heat is supplied to the heads by gas burners. After being heated a sufficient length of time, the commutator releases the piece and it drops between two other water-cooled heads, faced with silver and operated in the same way; these cool the piece. It is then dropped to a tempering head or into a tempering bath, which completes the treatment. The operation is automatic and the timing is arranged by adjusting the commutator.

Ferromanganese Imports in October

Ferromanganese imports into the United States in October were 7914 gross tons, against 9237 tons in September and 8515 tons in August. The October receipts bring the monthly average to 6289 tons for the first nine months of this year. The imports in 1915 were only 4600 tons per month. Of the October imports 2641 tons came through Philadelphia, 2657 tons through Baltimore, 1113 tons through New Orleans, 880 tons through Newport News and 623 through New York. The entire receipts were from Great Britain except 203 tons from India through New York.

An Exhaustive Study of Zinc

Recognizing that there is an insufficient knowledge of the properties of zinc, the U. S. Bureau of Standards has undertaken an investigation which it proposes to have carried out with thoroughness. Specimens have been prepared for tests of the metal in tension, torsion, transverse, cold bend, compression, shearing and hardness. Considerable progress has also been made in the investigation of testing methods for galvanized materials, which has been carried out in co-operation with the American Society for Testing Materials, several manufacturers furnishing the samples.

Locomotive Orders

Orders for locomotives in the past week were 54. The Wabash Railroad has ordered 25 Santa Fé locomotives and the Florida East Coast has ordered 10 Pacifics and two six-wheel locomotives from the American Locomotive Company. The Baldwin Locomotive Works will furnish the River Terminal railway with six small locomotives besides numerous individual orders to other customers. It is estimated that, up to and including Nov. 25, 353 locomotives were ordered of which 221 were for export.

The Pittsburgh Instrument & Machine Company, manufacturer of testing instruments, has removed from 236 Third Avenue to 101 Water Street, Pittsburgh.

Iron and Industrial Stocks

NEW YORK, Nov. 29, 1916.

Since last week's report the course of the stock market has been decidedly erratic, sharp advances alternating with equally sharp declines. Adverse influences have been the fear of international complications, indications of less ease in money available for loans and intimations that peace negotiations might begin at almost any time. The underlying strength of the speculative situation is shown by the almost immediate upward movement as soon as a rumor became stale. Steel common struck a new high point at 129¾ on Monday of this week, while Republic common on the same day touched 92⅛. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com.	37	38
Am. Chal. pref.	80¼	81
Am. Cotton Oil, com.	61½	62
Am. Can, pref..	113	114
Am. Car & Fdy. com.	113	114
Am. Car & Fdy., pref.	116¼	117¾
Am. Loco. com.	88¾	89¼
Am. Loco., pref.	108	108½
Am. Rad. com.		42
Am. Ship. com.	65	- 66
Am. Ship. pref.		96
Am. Steel Foundries	84¾	85
Bald. Loco., com.	84¼	85
Bald. Loco., pref.	107	108¾
Beth. Steel, com.	650	- 660
Beth. Steel pref.	155	159
Can. Car & Fdy. com.	40	44
Can. Car & Fdy. pref.	80	83
Carbon Stl., com.	132	133
Case (J. I.) pref.	87¾	- 89
Central Fdry., com.	19	- 22
Central Fdry. pref.	37	- 41
Chic. Pneu. Tool	72	- 73½
Colo. Fuel	64¼	- 66½
Cruc. Steel, com.	83¾	- 85¾
Cruc. Steel, pref.	122½	-123
Deere & Co., pref.	96	96½
Driggs-Seabury	74	- 78½
Gen. Electric	179	-182
Gt. No. Ore Cert.	44¼	- 46¾
Gulf States Steel	150	-181
Gulf States Steel 1st pref.	108	-115
Gulf States Steel 2nd pref.	140	180
Hyd. Walk Refrac., com.		.125
Int. Harv. of N. J. com.	118	125
Int. Harv. Corp. com.	80	- 87½
Int. Harv. Corp. pref.		112
La Belle Iron, com.	88¼	94
Lack. Steel	100¼	-106
Lake Sup. Corp.	21½	- 22½
Maxwell Steel	68¾	- 72¾
Nat. En. & Stm., com.	32½	- 35
Nat. En. & Stm., pref.		96½
N. Y. Air Brake	17	18¾
Nova Scotia Stl.	142	151½
Pitts. Steel, pref.	100¼	102½
Pressed Stl., com.	81½	86¾
Pressed Stl., pref.		107½
Ry. Steel Spring, com.	60¾	- 61¾
Ry. Steel Spring, pref.	102	-103¼
Republic, com.	86	- 92⅛
Republic, pref.	115	-116
Sloss, com.	83	- 90¼
Un. Alloy Steel	51	- 55
U. S. Pipe, com.	25	- 26½
U. S. Pipe, pref.	65	- 66½
U. S. Steel, com.	124½	-129¾
U. S. Steel, pref.	121¾	-122
Va. I., C. & Coke	62	- 69¼
Warwick		98¾
Westing. Elec.	62½	- 64⅞

Dividends

The Lackawanna Steel Company, extra 3 per cent payable Dec. 30.

The New York Air Brake Company, regular 2½ per cent quarterly dividend for next five quarters, payable in instalments and an extra dividend of 12½ per cent, payable in five quarterly instalments along with regular dividend.

The Steel Company of Canada, 4 per cent on the common stock, payable Jan. 1.

The Railway Steel Spring Company, quarterly, 1¼ per cent on common stock, payable Dec. 30; also regular quarterly dividend of 1¾ per cent on preferred stock, payable Dec. 20.

Suit Against American Steel & Wire Withdrawn

The American Steel Company, Park Building, Pittsburgh, which some time ago brought suit against the American Steel & Wire Company, in an attempt to recover damages of $750,000 under the Sherman anti-trust act, on account of the defendant company's alleged monopoly in the manufacture and sale of coated wire nails, has filed a discontinuance in the Federal district court in Boston. The reason for the withdrawal of the suit was not made public.

No. 1 blast furnace of the Worth Brothers Company, Coatesville, Pa., was blown out Nov. 25 on account of the shortage of coke. Shipments delayed by the shortage of cars had resulted in the usual reserve of coke being used up. The furnace had been in operation for 17 months and will now undergo extensive repairs. It is expected to be ready to blow in about April 1.

German submarines are stated to have sunk lately three Norwegian ships carrying Narvik iron ore, which is classed as C ore and is not specified on the German contraband lists. It is high in phosphorus and Germany formerly permitted similar ore from Sydvarangar for England to pass freely.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c. Denver, pipe, 76.1c., minimum carload, 46,000 lb.; structural steel and steel bars, 83.6c.; minimum carload, 36,000 lb. Pacific coast (by rail only), pipe, 65c.; structural steel and steel bars, 75c., minimum carload, 50,000 lb.; structural steel and steel bars, 80c., minimum carload, 40,000 lb. No freight rates are being published via the Panama Canal, as the boats are being used in transatlantic trade.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 3c. to 3.25c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in. on one or both legs	.10
Angles, 3 in. on one or both legs less than ¼ in. thick as per steel bar card, Sept. 1, 1916	.70
Tees, structural sizes (except elevator, handrail, car truck and concentric rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1916	.20 to .50
Deck beams and bulb angles	.70
Handrail tees	.75
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Plates.—Tank plates, ¼ in. thick, 6 in. up to 100 in. wide, 3.50c. to 5c., base, net cash, 30 days, or ½ of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras

	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers)	.10
Boiler and flange steel plates	.15
"A. B. M. A." and ordinary firebox steel plates	.20
Still bottom steel	.30
Locomotive firebox steel	.50

Marine steel, special extras and prices on application.

Gage Extras

Rectangular, ¼ in. thick, over 6 in. wide to 100 in. wide	Base
Lighter than ¼ in., to 3/16 in., up to 72 in. wide	.10
*Lighter than ¼ in., including 3/16 in., over 72 in. to 84	.20
*Lighter than ¼ in., including 3/16 in., over 84 in. to 96	.30
*Lighter than ¼ in., including 3/16 in., over 96 in. to 100	.40
*Lighter than ¼ in., including 3/16 in., over 100 in. to 102	.45
Lighter than 3/16 in., including No. 8, up to 72 in. wide	.15
*Lighter than 3/16 in., including No. 8, over 72 in. to 84	.25
*Lighter than 3/16 in., including No. 8, over 84 in. to 96	.35
Lighter than No. 8, including No. 10, up to 60 in. wide	.25
Lighter than No. 8, including No. 10, over 60 in. to 64	.35
Up to 72 in. and not less than 10.2 lb. per sq. ft. will be considered ¼ in.	
Over 72 in. must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.	
Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.	
Over 72 in., ordered weight 3/16 in., take No. 8 price	
Over 72 in., ordered weight No. 8, take No. 10 price	

Width Extras

Over 100 in. to 110 in. inclusive	.05
Over 110 in. to 115 in. inclusive	.10
Over 115 in. to 120 in. inclusive	.15
Over 120 in. to 125 in. inclusive	.20
Over 125 in. to 130 in. inclusive	.25
Over 130 in.	1.00

Length Extras

Universal plates 80 ft. long up to 90 ft. long	.05
Universal plates 90 ft. long up to 100 ft. long	.10
Universal plates 100 ft. long up to 110 ft. long	.20

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over.	
Lengths under 3 ft. to 2 ft. inclusive	.25
Lengths under 2 ft. to 1 ft. inclusive	.50
Lengths under 1 ft.	1.55
Circles 3 ft. in diameter to 100 in.	.30
Circles over 100 to 110 in. (width extra)	.05
Circles over 110 to 115 in. (width extra)	.40
Circles over 115 to 120 in. (width extra)	.45
Circles over 120 to 125 in. (width extra)	.55
Circles over 125 to 130 in. (width extra)	.80
Circles over 130 in. (width extra)	1.05
Circles under 3 ft., to 2 ft., inclusive	.55
Circles under 2 ft., to 1 ft., inclusive	.80
Circles under 1 ft.	1.85
Half circles take circle extras.	
Sketches not over four straight cuts, inc. straight taper	.10
Sketches having more than four straight cuts	.20
Plates sheared to a radius take complete circle extras.	

*Including extra for width.

Wire Rods.—Including chain rods, $65 to $70.

Wire Products.—Prices to jobbers effective Nov. 27: Fence wire Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, $2.95; galvanized, $3.65. Galvanized barb wire and staples, $3.85; painted, $3.15. Wire nails, $3. Galvanized nails, 1 in. and longer, $2 advance over base price; shorter than 1 in., $2.50 advance over base price. Cement coated nails, $2.90. Woven wire fencing, 53 per cent off list for carloads, 52 off for 1000-rod lots, 51 off for less than 1000-rod lots.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from Nov. 15, 1916, all full weight:

Butt Weld

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
⅛ and ¼	61	34½	⅛ and ¼	50	23
⅜ and ½	65	40½	⅜	51	24
⅝ and ¾	68	44½	½	55	37
			⅝ to 1½	58	42

Lap Weld

2	61	48½	1¼	44	29
2½ to 6	64	51½	1½	50	36
7 to 8	61	47½	2	51	37
9 and 10	57½	..	2½ to 4	53	40
11 and 12	49	..	4½ to 6	53	40
			7 to 12	52	39

Reamed and Drifted

1 to 3, butt	66	52½	¾ to 1½, butt	53	36
2, lap	63	49½	1¼, lap	39	23
2½ to 6, lap	62	49½	1½, lap	45	30
			2, lap	46	31
			2½ to 4, lap	49	34

Line Weld, extra strong, plain ends

⅛, ¼ and ⅜	57	39	⅛, ¼ and ⅜	50	33
½	62	49½	½	55	42
¾ to 1¼	66	53½	¾ to 1½	59	44
2 to 3	67	54½			

Lap Weld, extra strong, plain ends

2	56	47½	1¼	46	31
2½ to 4	62	50½	1½	51	37
4½ to 6	61	49½	2	53	40
7 to 8	57	43½	2½ to 4	55	43
9 to 12	52	38½	4½ to 6	54	42
			7 to 8	48	36
			9 to 12	43	31

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts on less than carloads, freight to be added, effective from Nov. 1, 1916, except 3 to 4½ in. steel from Nov. 20, are as follows:

Lap-Welded Steel		*Standard Charcoal Iron*	
1½ in.	31	1½ in.	23
1¾ and 2 in.	43	1¾ and 2 in.	35
2¼ in.	40	2¼ in.	32
2½ and 2¾ in.	46	2½ and 2¾ in.	38
3 and 3¼ in.	46	3 and 3¼ in.	43
3½ to 4½ in.	46	3½ to 4½ in.	44
5 and 6 in.	45	5 and 6 in.	37
7 to 13 in.	42	7 to 13 in.	34

Locomotive and steamship special charcoal grades bring higher prices.

1¾ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Sheets.—Makers' prices for mill shipments on sheets of U. S. standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Box Annealed Sheets — Cents per lb.

No. 8 to 10	3.75 to 4.00
No. 11 to 12	3.40 to 3.65
No. 13 and 14	3.50 to 3.75
Nos. 15 and 16	3.55 to 3.80

Box Annealed Sheets, Cold Rolled

Nos. 17 to 21	3.80 to 4.05
No. 22	3.85 to 4.10
No. 23 and 24	3.90 to 4.15
No. 27	3.95 to 4.20
No. 28	4.00 to 4.25
No. 29	4.05 to 4.30
No. 30	4.15 to 4.40

Galvanized Sheets of Black Sheet Gage

No. 8 to 11	4.50 to 5.00
No. 12 to 14	4.60 to 5.10
Nos. 15 and 16	4.75 to 5.25
No. 21	4.90 to 5.40
No. 22 and 24	5.05 to 5.55
No. 26	5.20 to 5.70
No. 27	5.25 to 5.75
No. 28	5.50 to 6.00
No. 29	5.65 to 6.15
No. 30	5.80 to 6.30

Tin Mill Black Plate

Nos. 15 and 16	3.80 to 3.90
No. 21	3.85 to 3.95
Nos. 22 to 24	3.90 to 4.00
No. 27	3.95 to 4.05
No. 28	4.00 to 4.10
No. 29	4.05 to 4.15
No. 30	4.05 to 4.15
Nos. 30½ and 31	4.10 to 4.20

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin,	Lead		Spelter	
Nov.	Lake	Electrolytic	New York	New York	St. Louis	New York	St. Louis
22	34.00	34.00	45.62½	7.25	7.12½	12.75	12.62½
23	34.00	34.00	45.00	7.25	7.12½	12.87½	12.62½
24	34.00	34.00	45.37½	7.25	7.12½	13.00	12.75
25	34.00	34.00		7.25	7.12½	13.00	12.75
27	34.00	34.00	45.25	7.25	7.12½	12.87½	12.87½
28	34.00	34.00	45.25	7.25	7.12½	13.25	13.00

NEW YORK, Nov. 29, 1916.

Copper is quieter but prices remain firm. Tin has been dull but the price is a shade higher. Lead has been active and more business is looked for; jobbers have been making the price for prompt and nearby, the leading interest not selling except for January. Spelter has been fairly active and, though somewhat easier yesterday, is higher. Antimony is dull but firm.

New York

Copper.—The volume of business has tapered off considerably, but prices remain strong at the top levels. Nearby metal is more scarce than ever, and this has been an influence in lessening the amount of trading. On one or two days domestic inquiry was widespread, but it cannot be learned that any large business resulted. It is generally regarded as natural that the market should be quieter after the rush to cover for all positions which had existed for weeks, and some members of the trade believe that those consumers who held off buying for the second quarter may derive an advantage from having done so. It is understood that the producers will protect regular customers at 33c. for the first quarter. Prompt December and January is held at 34c. For the second quarter 32c. might be done, although 33c. is asked by some interests for that position. The third quarter is quoted from 31c. to 31.75c. The spread is due to the fact that not a little late buying has been done quietly. Italian buyers were in the market in the past week and are understood to have closed for a tonnage which ordinarily would be considered large. The quotations for Lake are at par with those for electrolytic, with very little Lake available this side of May. In recent days a more conservative tendency has developed with regard to prices, and there is less talk of the market going higher. The dangers of a collapse are more frequently referred to, it being pointed ont that resales are not a remote possibility, also that the railroad freight situation may play a part as it did last winter. Electrolytic was quoted at £169 at London yesterday, or £6 higher than a week ago. The exports of the month are relatively light, amounting up to and including yesterday to 19,622 tons.

Tin.—Throughout the week the market has been dull. Of course there has been some business, especially in futures. On May 27, for instance, 25 tons of May shipment from the East was taken at 43.12½c. The tin-plate mills are buying their tin much as the brass mills do their copper and spelter, particularly where exports are concerned. They buy to cover a specific contract. The arrivals this month total 2230 tons and afloat there is 3392 tons. Spot Straits was quoted at New York yesterday at 45.25c.

Spelter.—Reports vary as to the amount of business done, but altogether the week was a good one. In the past two days second-hands have shown a disposition to realize profits, and sell under the quotations of the producers. The latter yesterday were asking 13.25c., St. Louis, for prompt; 13.12½c. for December, 12.87½c. to 13c. for first quarter, and 12c. to 12.25c. for second quarter, all St. Louis. On the other hand, other sellers quoted 13c., St. Louis, for prompt; 12.75c. for first quarter, and 12c. for second quarter. The New York quotation for prompt yesterday was generally about 13.25c. The producers are not so willing to sell far futures as they were a few days ago. The London spot market was quoted yesterday at £59, against £56 10s. a week previous. The exports of the month are very large, amounting, up to and including yesterday, to 13,334 tons.

Lead.—The situation in lead has been more interesting than in any other metal. The leading producer has not advanced its official quotations of 7c., New York, and 6.92½c., St. Louis, but at the same time it has been taking orders for January delivery at 7.15c., New York. At its official quotations it is not selling. There is a good demand, as yet unsatisfied, but a scarcity of lead restricts sales. Independent producers are well filled with orders. Those sales which have been made were at 7.25c. to 7.30c., New York, and 7.17½c. and upward, St. Louis. At the end of last week prompt lead was practically unobtainable. The London market for spot is unchanged at £30 10s. The exports of the month, including yesterday, total 1363 tons.

Antimony.—This metal is dull but firm at 14.50c., duty paid, for Asiatic grades. For antimony in bond 13.50c. is asked.

Aluminum.—Quotations for No. 1 virgin aluminum, 98 to 99 per cent. pure, are a little easier, at 63c. to 65c.

Old Metals.—The market is still strong and advancing. Stocks of old metal are low. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible	30.50 to 33.00
Copper, heavy and wire	28.50 to 31.50
Copper, light and bottoms	25.00 to 26.50
Brass, heavy	18.00 to 19.00
Brass, light	14.50 to 15.50
Heavy machine composition	24.00 to 26.00
No. 1 yellow rod brass turnings	17.50 to 18.50
No. 1 red brass or composition turnings	19.00 to 22.00
Lead, heavy	6.625
Lead, tea	6.125
Zinc	9.00 to 10.00

Chicago

Nov. 27.—The fever of speculative buying sustains prices of copper despite the warning of producers that no shortage of the metal is at all probable. Spelter and lead prices are higher, the demand for the former being noticeably active. The lead market was comparatively quiet at the end of the week. We quote: Casting copper, 32.25c. to 32.50c.; Lake copper, 33.75c. to 34c.; tin, carloads, 45.50c., and small lots, 47.50c.; lead, 7.15c.; spelter, 12.75c.; sheet zinc, 20c.; Cookson's antimony, 50c.; other grades, 17c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 27.50c.; copper bottoms, 24c.; copper clips, 26.50c.; red brass, 23.50c.; yellow brass, 18c.; lead pipe, 6c.; zinc, 9c.; pewter, No. 1, 26c.; tinfoil, 35c.; block tin pipe, 39c.

St. Louis

Nov. 27—Non-ferrous metals have moved steadily upward, with the close to-day on lead, carload lots, 7.25c; spelter, carload lots, 12.50c to 13c. For less than carload lots the quotations are: Lead, 7.50c; spelter, 14c; Lake copper, 36c; electrolytic copper, 35.50c; antimony, Asiatic, 16.50c. In the Joplin district zinc blende took a fresh spurt upward and the range was $90 to $105, with the average for the week $95 per ton. Calamine ran from $50 to $60, with the week's average $53. Lead ore was higher, touching $90, with the average $87. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 8c to 8½c; heavy yellow brass, 11½c; heavy red brass and light copper, 15½c to 16c; heavy copper and copper wire, 18½c to 19c; pewter, 25c; tinfoil, 32c; zinc, 6c; lead, 5c; tea lead, 3½c.

The Pennsylvania Railroad is about to build a siding of some two miles to connect its main line with the steel plants of the Lukens Iron & Steel Company and the Worth Brothers Company at Coatesville, Pa. All freight consigned to either of these companies over the Pennsylvania Railroad now has to be transferred to the Philadelphia & Reading and delivered over the sidings of the latter company. The Philadelphia & Reading often cannot handle it, and the Pennsylvania has been compelled to place an embargo on freight to Coatesville. The building of the new siding will eliminate such troubles.

PERSONAL

James T. McCleary, secretary American Iron and Steel Institute, is to address a safety mass meeting to be held at Cooper Union, New York, on Friday evening, Dec. 1, under the joint auspices of the New York Local Council of the National Safety Council and the Peoples Institute.

Justice Grugan has resigned as manager of the Northern Ore Company's zinc operations at Edwards, St. Lawrence County, N. Y.

John I. Reid has resigned as works manager of the Thurlow plant of the American Steel Foundries, Chester, Pa., and has been made one of the sales agents of the New York office of the company at 30 Church Street.

G. Komorowski, metallurgical engineer, representing the Girod electric furnace, recently arrived in New York from France. His headquarters are with C. W. Leavitt & Co., 30 Church Street, American agents for this furnace.

Henry D. Hibbard, consulting engineer, Plainfield, N. J., returned Nov. 22 from Norway and Sweden, after a two months' stay on professional business.

A. B. Davenport, who for some time has been filling the position of acting manager of the Driggs-Seabury Ordnance Company, Sharon, Pa., has been appointed manager, succeeding H. M. Hawkesworth, who resigned some time ago. Prior to going to Sharon, Mr. Davenport was general superintendent of William Wharton, Jr. & Co., Inc., Philadelphia.

J. F. Snarenberger, manager of the Louisville branch of the Fairbanks-Morse Company, and W. R. R. LaVielle, president W. H. Neill Company, Louisville, were the speakers at the last meeting of the Louisville Rotary Club, given over to consideration of mill supplies. A large and complete display of the items in the line was provided.

John H. Lloyd, Lebanon, Pa., will on Dec. 4 become superintendent of the Rivetless Chain & Engineering Company's plant at Avon, Pa. For the last three years he has been in charge of the turnbuckle drop-forging department of the American Iron & Steel Mfg. Company.

Gen. Otto H. Falk, president of the Allis-Chalmers Mfg. Company, Milwaukee, has been appointed chairman of the Milwaukee Abraham Lincoln Memorial Committee, which is to devise ways and means of establishing a fitting memorial for the martyred president in Milwaukee. It is planned to raise $50,000 for a monument.

Harry Scullin, president Scullin Steel Company, St. Louis, last week underwent a serious surgical operation at St. Luke's Hospital in that city. He is reported to be slowly improving.

John R. Briggs, Pottstown, Pa., has acquired the iron and steel business of Henry Potts & Co., Real Estate Trust Building, Philadelphia.

Harry Scrivens, formerly Southern representative of the Philadelphia Belting Company, Philadelphia, has been appointed sales manager.

G. C. Emmons, formerly connected with the sales department in the Pittsburgh office of the Chicago Pneumatic Tool Company, has been placed in charge of the efficiency department of the Republic Iron & Steel Company, Youngstown, Ohio, controlling the generation of heat and power for all the Republic plants in that district.

E. E. Russell has been appointed general purchasing agent of the J. I. Case Threshing Machine Company, Racine, Wis., to take effect Jan. 1. He has been with the company since 1889 and for the past 12 years has been in charge of foreign sales. Mr. Russell has served in a number of different positions in the sales and cost departments and was instrumental in opening up a number of foreign branches which led to his appointment as manager of foreign sales.

Walter F. Henly has been appointed New York representative of the Leland-Gifford Company, Worcester, Mass., which has opened a direct sales office for the New York territory in the Singer Building, 149 Broadway, New York. It already has direct sales offices in several other cities. The company manufactures high speed ball bearing sensitive drill presses, also a heavy duty sensitive drill press.

Arthur V. Farr, who for the last three years has been advertising manager of the S K F Ball Bearing Company, Hartford, Conn., has accepted the position of sales manager of the Hess Steel Corporation, Baltimore, Md.

W. J. Golden has been appointed general manager of sales for the Ferguson Steel & Iron Company, Buffalo. For the past four years he has been manager of the jobbing department of the Lackawanna Bridge Company, and prior to that was in the employment of the Railway Steel Spring Company for seven years, in the capacity of manager of its Philadelphia plant, and for some time was purchasing agent at the general offices in New York City.

Frederick R. Pettit, general purchasing agent of the J. I. Case Threshing Machine Company, Racine, Wis., has tendered his resignation, effective Jan. 1 to become vice-president of the J. I. Case Plow Works, also of Racine.

The Packard Motor Car Company, Detroit, Mich., announces several changes in its adminstrative and selling organization. H. H. Hills, sales manager, is made assistant general manager. C. R. Norton, manager of the truck sales department, is promoted to general sales manager. G. R. Bury, manager of carriage sales, is raised to assistant general sales manager. All have been with the Packard Company from seven to nine years.

Arthur E. Corbin, for the last six years assistant sales manager of the Packard Motor Car Company, has resigned, having acquired an interest in the Pluym-Ochs Company of Petrograd and New York, the largest Russian importer of American automobiles and accessories. He will leave in a few weeks for his permanent post in Petrograd. His company has American offices at 120 Broadway, New York City, and handles several well-known makes of cars and also the Curtiss aeroplanes.

The thirtieth annual meeting of the National Association of Brass Manufacturers will be held at the Hotel Astor, New York, on Wednesday and Thursday, Dec. 13 and 14. The unusual trade conditions now existing tend to make this meeting one of the most interesting and important in the history of the organization. All brass manufacturers, whether members or not, are cordially invited to attend and confer with their fellow manufacturers as to the wise course to pursue in view of the erratic course of the metal market. On the evening of the second day's session there will be a banquet and dinner, and the following have been appointed a committee to make the necessary arrangements: A. S. Hills, chairman, Haydenville, Mass.; C. C. Hale, New Haven, Conn.; C. H. Downs, Springfield, Mass. Further information as to details can be had by addressing William M. Webster, commissioner, 1818 City Hall Square Building, Chicago.

The S K F Ball Bearing Company, Hartford, Conn., has been awarded the contract for the self-aligning ball bearing hangers and pillow blocks to be used in the plant of the Courtenay Mfg. Company, Newry, S. C. The contract includes bearings for shafts ranging from 1 11/16 to 6 in. in diameter. A number of the bearings are of sizes not being made as yet at the Hartford factory and are being imported from the parent factory at Gothenburg, Sweden. The weight of the equipment specified ranges all the way from 15 lb. for the smallest hanger to 650 lb. for the largest pillow block.

Railroad Car Buying

Since Sept. 1 close to 70,000 cars have been bought and there are inquiries in the market for fully 11,000, not including more than 4000 for France and the large order expected from Russia. Last week 7500 cars were bought. Among the late awards made to the American Car & Foundry Company are 1000 stock cars for the M. K. & T., 500 box cars for the Lackawanna, 1000 box cars for the Erie, 500 ballast cars for the Denver & Rio Grande and 150 ore cars for the Bethlehem Steel Company. The Pressed Steel Car Company figures in the recent business with 1000 cars for the Wabash-Pittsburgh Terminal, 1000 box cars for the Grand Trunk, 1250 cars for the Union road of the Steel Corporation, 198 cars for Carnegie Steel Company, 300 hopper cars for the Milwaukee Coal & Gas Company, 500 hopper cars for the Lackawanna and 500 automobile cars and 150 center constructions for the Great Northern. The Haskell & Barker Car Company also looms large in recent business with 2000 box cars for the Burlington, 500 refrigerator and 500 automobile cars for the Great Northern, 1000 for the Erie and 1000 for the Illinois Central. The Ralston Car Company is to build 1250 cars for the Steel Corporation's Union road, the Standard Steel Car Company, 2000 hopper cars for the New York Central and 100 stock cars for the Atlantic Coast Line. The leading passenger car purchases include 50 for the Norfolk & Western, placed with the Harlin & Hollingsworth Company, and 25 for the Western Maryland, reported placed with the Pullman Company.

Fresh car inquiries not already noted in these columns include 1000 box cars, 200 flat cars and 300 gondolas for the Minneapolis & St. Louis; 200 caboose cars for the Pennsylvania Lines West; 2000 gondolas and 1000 box cars for the Norfolk & Western; 1300 box cars for the Denver & Rio Grande, at least so reported; 500 hoppers, as well as 750 gondolas for the Nickel Plate; 50 gondolas for the Virginian; 77 hopper cars for the Chesapeake & Ohio, and 500 to 1000 box cars and 50 to 100 tank cars, it is reported, for the St. Louis, Brownsville & Mexico.

Large Railroad Equipment Orders

Orders for cars and locomotives in the first three weeks of November have been larger than for any similar period and exceed those for any month in the last three years. The *Railway Age Gazette* says that the railroad equipment manufacturers have booked 34,908 freight cars, conservatively put at $1,500 each or $52,362,000; 256 domestic locomotives averaging about $30,000 each, or $7,680,000; 633 foreign locomotives worth conservatively $8,640,000 and 416 passenger cars at $17,000 each, or $7,027,000—a total of $75,754,000.

The second best month in three years was October, 1915, when orders were placed for 28,449 cars of which 8500 were for export. The best previous month in 1916 was October, when domestic orders were 21,034, or more than those for October, 1915. Domestic orders this year now (Nov. 25) total 123,386 cars, compared with 84,298 up to the same time last year.

Domestic orders for locomotives in three weeks of November were 256, with foreign orders for no less than 633—a total of 889. For the year thus far domestic orders have been 2386 as compared with 1023 at the same time last year or with a total of 1612 ordered in all of 1915. Foreign locomotives ordered thus far in 1916 are 1838. The locomotive builders and railroad shops of this country and Canada have ordered 4224 locomotives this year. In the first three weeks in November 416 passenger cars were ordered.

Ferrotungsten and Vanadium Exports

Ferrotungsten and tungsten metal exports for September was 40,333 lb. against 47,966 lb. in August. The total for the nine months to Oct. 1, 1916, was 96,706 lb., valued at $323,043.

Ferrovanadium exports in September were 32,289 lb. against 39,130 lb. in August. To Oct. 1, 1916, they were 1,175,729 lb. as compared with 648,863 lb. and 602,850 lb. to Oct. 1, 1915, and 1914 respectively.

OBITUARY

LIEUT. WILLIAM H. JAQUES, who recently took up his residence in High Barnet, a suburb of London, England, was killed by a railroad train Nov. 23. It is believed that he stepped from the car on the wrong side of the track and was struck by another train. He was born in Philadelphia, Dec. 24, 1848, and was graduated from the Naval Academy at Annapolis in 1867. He became lieutenant four years later, but resigned in 1887 to establish the heavy ordnance department at the works of the Bethlehem Steel Company and became its chief ordnance engineer. He served on the Coast and Geodetic Survey, was secretary of the Gun Foundry Board and of the United States Senate Committee on Ordnance and Warships, was on the jury of awards at several expositions as an expert on war materials and transportation and wrote authoritative books on torpedoes, armor and heavy artillery. Fluid compression and hydraulic forging were two of the mechanical processes he brought from Europe to the United States in his endeavor to make this Government the best equipped in the world. The scientific associations of many nations elected him to membership. He organized and for a time commanded the New Jersey Naval Reserve. At the time of his death he was president of the Holland Submarine Company.

WALTER P. NOTCUTT, for many years the representative of well-known American manufacturers in London for British and overseas trade, died Oct. 24. Among the companies represented were the Peck, Stow & Wilcox Company, Simonds Mfg. Company, Eagle Lock Company, Richmond Cedar Works, Cary Mfg. Company, Sawyer Tool Company and Smooth-On Mfg. Company and at one time the J. A. Fay & Egan Company. Mr. Notcutt also operated the Patent Tool & File Company, located near London, which manufactured special types of files for working metals. Earlier in life he spent several years in this country, having an orange grove in Southern California. The London business will be continued at 8 Whitehall Street.

HENRY POTTS, head of the firm of Henry Potts & Co., iron and steel merchants, Real Estate Trust Building, Philadelphia, died at his home in Pottstown, Pa., Nov. 3. He had been connected with the iron and steel business for many years, and through his firm had built up an extensive clientage. His activities extended into other channels of useful work, and he had an enviable reputation for probity and philanthropy. The business will be continued under the old name and will be conducted by John R. Briggs, who has for some time managed the affairs of the firm.

FRANKLIN MOREY, formerly a mining engineer and large manufacturer of mining machinery, also known as the first man to exhibit an arc light in New York City, died in St. Louis, Nov. 22, aged 85 years, at the home of his son-in-law, Clarence H. Howard, president Commonwealth Steel Company. One son, F. L., is secretary and another son, Arthur T., is general manager of the Commonwealth Company.

WILLIAM C. BRADLEY, for twenty-two years connected with the Duff Patents Company, Pittsburgh, builder of the Duff gas producers, and for some years secretary and treasurer of the company, died in Mercy Hospital, Pittsburgh, Nov. 16, aged 48 years. He leaves one son and two daughters.

WILLIAM W. HOPKINS, inventor of the Moon-Hopkins billing machine and director of the company, died in St. Louis last week. He was also an inventor of adding machines and a combination typewriter and adding machine.

WILLIAM F. MULHALL, secretary Medart Patent Pulley Company, died Nov. 21, at his home in St. Louis of heart disease, aged 50 years. He leaves his widow.

FRANCIS X. HOOPER, mechanical engineer, at one time engaged in the machinery business, died at his home in Glenarm, Md., Nov. 22, aged 63 years.

Judicial Decisions

ABSTRACTED BY A. L. H. STREET

WARRANTY OF MACHINERY.—Where it is agreed under a contract for the sale of machinery that the buyer shall be entitled to try it out before being obligated, to determine whether it conforms to the representations made by the seller, the buyer must manifest his dissatisfaction, if any, within a reasonable time, in the absence of any agreement giving him a longer trial period. And, if the contract expressly provides that, in case of dissatisfaction, the buyer shall give certain notice to the seller concerning the breach of warranty, the buyer will not be entitled to rely on a breach of warranty without first giving the specified notice, unless he can show that the seller has waived such notice. The capacity and power of an engine may be proved by an expert witness shown to possess sufficient knowledge and experience to be able to give a reliable opinion on the subject. (Texas Court of Civil Appeals, Street vs. J. I. Case Threshing Machine Company, 188 Southwestern Reporter, 725.)

MAKING MACHINERY SATISFACTORY.—A sale of machinery on condition that it will be made to work "satisfactorily" for the buyer does not entitle him to capriciously reject delivery and installation on the ground of dissatisfaction; such a contract merely binds the seller to make such installation as would satisfy a reasonable person under the circumstances. Hence, where the buyer of elevators for a building expressed dissatisfaction merely as to the controllers, but removed the elevators and installed others made by another manufacturer, he remained liable for the cost of the originally installed elevators, less the cost of substituting controllers of the kind he insisted on. (California District Court of Appeal, Bryan Elevator Company vs. Law, 160 Pacific Reporter, 170.)

LIABILITY FOR STORAGE CHARGES — UNCLAIMED FREIGHT.—The consignee of a shipment of iron beams, although not liable for demurrage charges on refusing to receive it immediately upon its arrival, is liable for reasonable storage charges incurred by the carrying railroad company pending proper disposal of the shipment, as well as for accrued transportation charges. In the absence of Federal regulation on the subject, a State law relating to the disposition of unclaimed non-perishable freight applies to interstate as well as intrastate shipments. (North Carolina Supreme Court, Norfolk & Southern Railroad Company vs. New Bern Iron Works & Supply Company, 90 Southeastern Reporter, 149.)

FREIGHT CLASSIFICATION AS DISCRIMINATION.—A carrier cannot be allowed to put junk in a car and some machinery and call it all junk; if so, the shipper who could get his machinery shipped at junk rates could always undersell one who had to pay the established rate on machinery. If shipper and carrier are allowed by agreement to vary classifications and call a commodity what it is not, the door is thrown wide open to all sorts of discriminations which are prohibited by the statutes. (South Carolina Supreme Court, Byrd vs. Atlantic Coast Line Railroad Company, 90 Southeastern Reporter, 181.)

EFFECT OF WAR ON BUSINESS CONTRACTS.—The breaking out of the European war rendered absolutely void all pre-existing and unperformed contracts between British business concerns and citizens of an enemy country; the agreements not being merely suspended until termination of the war. (United States District Court, Western District of Washington, Lindenberger Cold Storage & Canning Company vs. J. Lindenberger, 235 Federal Reporter, 542.) In this case the court cites an English decision in which it was held that the war absolutely abrogated a pre-existing contract under which a German firm had contracted to take for a term of years an English company's entire output of zinc concentrates.

CONCLUSIVENESS OF WRITTEN CONTRACTS.—Where a retail dealer ordered machines from a manufacturer under a written contract which stated that no understanding should be regarded as part of the agreement unless incorporated in writing, the dealer could not afterward set up a claim against the manufacturer on account of asserted verbal representations made by the manufacturer's representative that the manufacturer had the names of prospective customers in the locality and would assist the dealer in making sales, etc. "Assuming the agent made the representations pleaded and that they were the cause moving the defendant to sign the contract, when he did so with the clause in the contract above set forth staring him in the face, he must abide thereby." (Oklahoma Supreme Court, White Sewing Machine Company vs. McCarty Furniture Company, 160 Pacific Reporter, 495.)

SAFETY OF FOUNDRY PRACTICE.—A manufacturer is liable for injury to an employee in a foundry, caused by the falling of a heavy roller which had been stood on end on a sand floor and was jarred over by the vibrations of machinery operated in the plant, if the circumstances were such that the fall of the roller might reasonably have been foreseen. A verdict for $17,500 in favor of the injured man must, however, be reduced to $15,000 as awarding excessive damages, although he was permanently incapacitated for foundry work and so crippled that he must always use crutches; it appearing that he had previously earned 30 cents an hour. (Wisconsin Supreme Court, Adams vs. Bucyrus Company, 159 Northwestern Reporter, 722.)

UNFAIR COMPETITION IN MANUFACTURE.—A manufacturer, who places on the market machinery parts intended to replace broken or worn-out ones, specially adapted to use on machines marketed by another manufacturer who also sells such parts, is legally bound to so mark them that the public will not be deceived into believing that they were made by the manufacturer of the machine. A simulation of marks under such circumstances as to produce confusion in the public mind will be enjoined. The manufacturer of particular goods is entitled to the reputation they have acquired, and the public is entitled to the means of distinguishing them between those and other goods and to the protection against unfair dealing, whether there be a technical trademark or not. The essence of the wrong consists in the sale of the goods of one manufacturer as those of another. (United States Circuit Court of Appeals, Eighth Circuit, Moline Plow Company vs. Omaha Iron Store Company, 235 Federal Reporter, 519.)

LIABILITY CONCERNING DEFECTIVE ARTICLES.—There is a line of court decisions to the effect that a manufacturer of a thing which is apt to imperil users if negligently constructed is liable for injury resulting from defective construction, although there may have been no contractual relations with the injured person. But, in the recent case of Byers vs. Flushovalve Company, 160 New York Supplement, 1050, the New York Supreme Court refused to apply the rule to an injury resulting from the breaking of the handle of a flushing valve in a toilet. The court said: "The article in question should be held as a matter of law not to be a thing of danger within the principle stated. The difference is manifest, without any attempt at argument, between poisons and defectively made scaffolds and elevators and steam boilers and automobiles, on one hand, and such harmless things as valve handles on the other hand. It cannot be said that a valve handle is any more 'reasonably certain to place life and limb in peril when negligently made' than a broom or a shovel or any one of a thousand ordinary implements. Of course, any of those things, if negligently made, may under exceptional conditions place life or limb in peril, but that is not the test. The result must be reasonably certain, not merely possible."

A new type of public garage construction in steel frame and galvanized sheet siding has been developed by the Eslein Sheet Metal Works, 1001 Thirtieth Street, Milwaukee, as shown in a building erected for Fay L. Cusick, West Allis, Wis. The new garage is 30x120 ft. and required 15½ tons of sheet metal. Skylights and plate glass front have a total area of 675 sq. ft. The interior walls are covered with asbestos, topped with beaver-board, and the floor is of cement. Heating is by a hot air furnace. Complete repair shop equipment is provided.

The Effect of Arsenic on Brass

The question of the extent to which arsenic is detrimental to brass was taken up by C. H. Mathewson and E. M. Thalheimer in a paper before the autumn meeting of the British Institute of Metals in London in September. The authors gave the results of experiments on the annealing of three arsenical brasses containing 62.5 per cent of copper, low and high in arsenic (0.024 per cent, and 0.120 per cent, respectively), and 61 per cent of copper high in arsenic (0.139 per cent).

In the mechanical tests made after annealing and quenching at various temperatures between 450 and 750 deg. C. the arsenical brass was found superior throughout in elongation and strength. Thus, when quenched at 550 deg. C the arsenical brass gave a tensile strength of 49,400 lb. per square inch, with an elongation of 77.5 per cent in 2 in., while the corresponding figures for the other alloy were 48,300 lb. per square inch, and 74.25 per cent respectively. On the other hand, the contraction of area of the arsenical brass, after annealing at a high temperature followed by quenching, was a little the lower of the two; and in all cases the arsenical brass was the better under conditions of less sudden cooling. The alloy with the smaller percentage of copper was less sensitive than the higher alloy to variations in the rate of cooling.

The authors consider that, given proper annealing, arsenical brass is stronger and more ductile than that from electrolytic copper, and that it will stand severe hot and cold working. For brass containing 60 per cent of copper and intended for cold working they recommend that annealing at temperatures above a moderate red heat should be followed by cooling at the rate of about 20 deg. C. per minute, down to a temperature approximating 450 deg. C. Still slower cooling (50 deg. C. per minute) is advised when the proportion of copper is higher, quenching in running water being permissible when the temperature has fallen to about 550 deg. C.; but if the cooling is effected more quickly than the first-named rate it should proceed until 450 deg. C., or an even lower temperature, is attained. The results of the tests are set out in a number of tables and curves.

THE DISCUSSION

In discussing the paper Dr. Hudson rather doubted that the results would establish complete confidence in arsenical brass, for, though it was shown to give material with good tensile properties, other tests, such as the drop test, were required. The banded structure was not infrequent in copper-zinc alloys and probably depended on the size of section rolled. The prevention of zinc diffusion by the arsenic was an effect which seemed to be produced by impurities generally, nickel having a similar effect in copper-zinc-nickel alloys.

Mr. Murray regretted that the authors had not used standard alloys free from arsenic. Manufacturers at present are compelled to use brass of doubtful origin, frequently containing arsenic from mixed grades of scrap copper. He himself had found that sheets with 0.03 per cent arsenic gave better tensile results in practice than pure metal; but the results of an increase in arsenic content, due to scrap returns, had taught him to have nothing to do with arsenic. As a rapid method of detecting the presence of arsenic in brass he had found the Muntzmetal fracture test very satisfactory, cold-worked specimens in particular exhibiting a characteristic yellow fracture all over.

Professor Turner emphasized the desirability of employing shock or alternating tests and wished that that authors had tried a wider range of specimens, with an arsenic content from zero upward.

Dr. W. Rosenhain pointed out an analogy between the effects of arsenic in brass and those of phosphorus on the diffusion or solution of carbon in steel, and also drew attention to the fact that when lead and arsenic were present together they gave results differing from those produced by either singly. He thought the authors' temperature determinations were not accurate and that they had built too largely on insufficient foundations. Professor Huntington said that work on the lines adopted by the authors was very badly needed and that very numerous experiments ought to be carried out with material containing small quantities of impurities.

Aluminum Smelting Operations Near Baltimore

The Aluminum Ore Company, a subsidiary of the Aluminum Company of America, Pittsburgh, has bought a tract of 200 acres or more at Sollers Point, near Sparrows Point, Md., on which it proposes to build a plant for refining bauxite, from which aluminum is extracted. The company has maintained at East St. Louis, Ill., for some years a similar plant, obtaining the bauxite from Arkansas, Georgia and Alabama. The capacity of the new plant at Sollers Point will be much smaller than that of the plant at East St. Louis, but it will be enlarged when the demands of the company make this imperative. The new plant will be built by the engineering organization of the Aluminum Company of America, which is fully equipped to do the work. C. B. Fox, general superintendent of the East St. Louis plant, will be in regular consultation with the company's engineers in Pittsburgh during the progress of the construction work. The Sollers Point plant is expected to cost somewhat in excess of $1,000,000 and to be in operation early in 1918. The Aluminum Company of America is the largest manufacturer of pure aluminum in the world, its principal plants being located at Merryville, Tenn.; Baden, N. C.; New Kensington, Pa.; East St. Louis, Ill.; Niagara Falls and Messina, N. Y., and at Shawinigan Falls, Quebec. The last named plant is operated by the Northern Aluminum Company of Canada, an identified interest of the Aluminum Company of America. The company has several smaller plants at other locations.

New Electric Process for Brass and Copper Alloys

G. H. Clamer, of the Ajax Metal Company, Philadelphia, has patented a process (U. S. 1,198,618—Sept. 19, 1916) for making brass and copper alloys. Melted copper of the correct "pitch" is drawn off into an electric furnace. Zinc and other alloying metals are then added. Economy is claimed for this procedure because large quantities of copper are melted and brought to the proper "pitch" before entering the electric furnace; because alloying is done therein, and because the casting is accomplished at the proper temperature. The ease of regulation of the atmosphere to neutral or reducing and the simplicity with which the temperature can be controlled are claimed as important factors. Little or no zinc is reported as lost by volatilization. Large slabs may be cast, which is pointed to as a saving.

Government Tests of Steel Ingots and Rails

Progress is announced by the U. S. Bureau of Standards in the preparation of the text for the joint research with the Pennsylvania Railroad on steel ingots and their characteristics, as shown in the quality of rails made from several types and methods of manufacture. It is also stated that an investigation on rails has progressed to such a point that the reports on the Great Northern and Pennsylvania Railroad rails which have failed by transverse fissure will be finished shortly, when the chemical work is done. The completion of these reports will make possible the redesigning of the alternating stress machine for rail investigation to be pushed to completion.

Heavy Production of Benzol and Toluol

The present output of benzol and toluol in the United States is conservatively estimated at 3,500,000 gal. per month or 42,000,000 gal. per year. Of this total 3,000,000 gal. each month is benzol. When the new by-product ovens still under construction are completed the yearly output will easily exceed 50,000,000 gal. per year. Before the war this output was inconsequential in comparison.

The Matthews Iron & Mining company, Rome, Ga., has been incorporated with a capital stock of $300,000, has taken over the Silver Run furnace at Rome, and will repair and operate it. H. S. Matthews, J. W. Porter and others, Birmingham, Ala., are the incorporators.

NAVY HIT BY HIGH COSTS

Extent of the Year's Advances in Torpedoes, Shells and Metals—Expensive Labor

WASHINGTON, D. C., Nov. 28, 1916.—Some interesting disclosures concerning the increased cost of raw materials purchased by the Government during the past year and the relative cost of certain forms of war material, including torpedoes and shells, when made by the Government or purchased from private manufacturers, have been made during the past week by high naval officials in statements before the House Committee on Naval Affairs now engaged in the preparation of the annual naval appropriation bill. Some light has also been shed upon the cost of production in Government establishments as affected by the laws limiting the hours of labor, granting annual leave, etc.

METAL AND CONSTRUCTION COSTS UP

The Bureau of Steam Engineering has been hard hit by the increase in the cost of metal products of all kinds, according to Rear Admiral Griffin, chief of that bureau. Boiler plates, which the Government formerly bought for 8c. per pound, are now hard to procure at 12.4c.; copper, which the Government bought at 14c. before the war is now costing 33½c. when purchased under competitive conditions. The recently enacted law granting to all workmen in the navy yards fifteen days leave of absence annually with pay has added approximately $300,000 a year to the expenditures of the Bureau of Steam Engineering, this item amounting to upward of 5 per cent of the total payroll. Wages have also increased in all the trades employed by the bureau.

Admiral Harris, chief of the Bureau of Yards and Docks, gave some impressive testimony. The fact that the Government was in the market for an unusually large amount of material at a time when the demand for similar articles for export was unprecedented, had operated, he said, to force prices still higher and to render the big construction program additionally costly. Declaring that $3,000,000 needed for shore station maintenance would buy no more at present market prices than was purchased last year for $1,800,000, Admiral Harris explained that under the department's contracts the price of structural steel had risen from $55 to $102, with all other iron and steel products in about the same proportion. Finished equipment of all kinds, he said, had risen even more rapidly than raw material, and in this connection he cited the lowest bids the bureau has been able recently to secure on locomotive cranes at $24,000 each for machines which a year ago could be purchased for $10,000.

Rear Admiral Strauss, chief of the Bureau of Ordnance, told the committee that there had been very great advances in the cost of projectiles and other ordnance material since the last naval appropriation bill was passed; hence much more liberal estimates were submitted for the bill now being framed. Fourteen-inch shells for the big navy rifles cost 20 per cent more than last year, and until quite recently other ammunition showed proportionate increases in price. At the present time, however, the cost of small caliber shells is declining, owing, he believed, to the decreasing demand from European countries, which are now manufacturing for themselves a constantly increasing percentage of their requirements.

HIGH GOVERNMENT COSTS FOR TORPEDOES

Admiral Strauss was examined at some length as to the success of the naval gun factory in manufacturing torpedoes and stated that the first deliveries cost the Government considerably more than the price quoted by private manufacturers. This difference, he said, was due largely to the fact that operations were not yet in full swing and he predicted that the factory in the near future would get its costs down below the commercial rate. Current deliveries now cost the Government from $600 to $1,700 per torpedo more than the contract price, the exact difference depending upon the method of calculation employed. In this connection Admiral Strauss said that at the Newport station where the majority of the Navy's torpedoes are produced the cost of production was from $1,000 to $2,100 below the best price now obtainable from private manufacturers. The relatively high cost of torpedoes purchased by contract at this time, it was understood, was due to the European demand.

Several of the officials who appeared before the committee emphasized the difficulty experienced by the Government not only in obtaining material within the estimates fixed in the last naval appropriation act but within the time limits regarded by the department as reasonable. In the construction program, especially, it was stated the department had been obliged to extend delivery limits from 15 to 25 per cent in order to secure bids. Representative Butler of Pennsylvania, a member of the committee, demanded to know whether this difficulty could not be fully remedied by the adoption of a policy under which the Government would build all its own warships in the navy yards. The officials declined to indorse this proposition, however, stating frankly that the increased delivery periods were due to the difficulty of securing raw materials promptly and to the great scarcity of skilled labor of all kinds. Private concerns, it was stated, were actively competing with the Government for skilled operatives, especially in the machinery and shipwright trades, and it would be very difficult to secure adequate working forces for the construction of the entire building program in the navy yards. W. L. C.

New Connecticut Shipbuilding Plant

The United States Steamship Company, 50 Broad Street, New York, has bought 30 acres having 2200 ft. frontage on the east bank of the Thames River near New London, Conn., as a site for a shipyard, where it will build oceangoing steel freight ships for its own use. At the start 10 ships of 6000 or 8000 tons each are planned.

The company already owns a plant at Noank, Conn., which it bought from Robert Palmer & Sons last May, and which employs 500 men. Six oceangoing freight steamships are being constructed there now. When these are completed the Noank plant will be devoted exclusively to the construction of ships for river and lake transportation, while the new plant will specialize on the building of deep sea vessels.

The United States Steamship Company was formed last December by the combination of established companies and capitalized at $25,000,000. Charles W. Morse is president.

United States Gun and Shell Bids and Awards

Contracts for furnishing 50 sets of 4-in. gun forgings, bids for which were opened Nov. 15, have been awarded as follows: The Crucible Steel Company, Pittsburgh, 10 sets; the Erie Forge Company, Erie, 20 sets; the Bethlehem Steel Company, South Bethlehem, 20 sets.

The commanding officer, Frankford Arsenal, Philadelphia, will receive proposals until Dec. 4, under proposal 236 for furnishing 13,986 4.7-in. finished, machined common steel shells.

Proposals for furnishing 57 3-in. guns and 100 3-in. mounts will be received at the Bureau of Ordnance, Navy Department, until noon Dec. 20.

The new 204-in. mill of the Lukens Iron & Steel Company, Coatesville, Pa., which when completed will be capable of rolling plates up to 192 in. wide, is expected to be ready for operation early in the new year. It is believed that this mill will be the largest of its kind in the world. The company is also building eight new open-hearth furnaces and making extensive additions to its yards, including the building of a new siding from the Philadelphia & Reading Railway. It will probably be a year before all the extensions and additions to the works are complete.

It is stated that the majority report of the commission on the Australian iron and steel industry recommends a substantial duty and the prohibition of exports of iron ore. The minority report urges the payment of a bounty.

Pittsburgh and Nearby Districts

The Brier Hill Steel Company, Youngstown, Ohio, will probably begin work shortly on the erection of an office building near its open-hearth steel plant in that city. Two other very large mill office buildings are nearly completed in the Youngstown district, one by the Carnegie Steel Company at its Ohio works, and the other by the Youngstown Sheet & Tube Company at its East Youngstown works.

The new blast furnace of the United Steel Company at Canton, Ohio, was blown in last week. It will have a daily output of 450 to 500 tons. By-product coke and benzol plants are being built, which will be completed in a short time. The new blast furnace will supply hot metal to the nearby open-hearth steel works of the United Alloys Steel Corporation.

The Purchasing Agents' Association of Pittsburgh held its annual meeting in that city last week. Robert McMillan, Pittsburgh Steel Company, was elected president; G. D. Leopold, Edgewater Steel Company, and H. G. Burns, West Penn Traction Company, vice-presidents; H. E. Harmon, Pittsburgh-Des Moines Company, secretary, and E. H. Ridgway, Colonial Steel Company, treasurer. The following directors were elected: Franklin P. Booth, city of Pittsburgh; W. P. Greer, Wheeling Corrugating Company; E. L. McGrew, Standard Underground Cable Company; C. T. Stewart, Harbison-Walker Refractories Company; J. E. Stauffer, A. M. Byers Company; R. F. Blair, Pittsburgh Gage & Supply Company; C. W. Lepper, Pittsburgh Railways Company; E. M. Scott, James H. Matthews Company; J. H. Robison, United States Bureau of Mines, and D. E. Ferguson, H. K. Porter Company.

At the Ohio works of the Carnegie Steel Company, Youngstown, one of the three new open-hearth furnaces, No. 13, has been completed and put in operation and No. 14 will be started this week. No. 15 furnace will not be ready for some time.

Pittsburgh capitalists are interested in the Pull-More Truck Company which will build a plant at New Castle, Pa. The company has placed a contract for the erection of the first unit, 100x500 ft. Among the owners of the new company are Col. H. P. Bope, vice-president Carnegie Steel Company; B. G. Follansbee, president Follansbee Bros. Company; D. M. Clemson, a director of the Carnegie Steel Company; J. W. Kinnear, a director of the Firth-Sterling Steel Company; E. M. S. Young, formerly vice-president Standard Gage Steel Company, Beaver Falls, Pa., but who resigned several months ago, and George Greer, chairman LaBelle Iron Works, Steubenville, Ohio. The Pull-More truck is a tractor-trailer. E. M. S. Young is president of the new company.

The Braddock Machine & Mfg. Company, Braddock, Pa., has been incorporated as the Braddock Mfg. Company, with a capital of $300,000 by William E. Troutman, Robert W. Tener and James L. Adams. Mr. Tener was formerly assistant treasurer of the United Engineering & Foundry Company and Mr. Troutman was general manager of that company's steel foundry department at Vandergrift, Pa. At present the Braddock Company has one 20-ton open-hearth furnace, but it is building a second furnace of the same size and will have it completed about Jan. 1, when the total output will be about 100 tons of special analysis ingots per day. Later on the company will engage in the manufacture of steel castings, with a capacity of 150 tons per day or more. The McClintic-Marshall Company is erecting an addition to the open-hearth building, which will take about 125 tons of steel.

The Driggs-Seabury Ordnance Company, Sharon, Pa., has purchased a site near its plant to be used as a proving ground, for testing new guns. Heretofore the company has sent its guns to the proving grounds of the Bethlehem Steel Company.

J. Rogers Flannery, American Vanadium Company; Col. H. P. Bope, Carnegie Steel Company; F. F. Nicola and W. S. Linderman have been appointed members of the Pittsburgh local executive committee to have charge of arrangements for the annual convention of the National Foreign Trade Council, to be held in Pittsburgh Jan. 25, 26 and 27, 1917.

The Girard Iron Company, Pittsburgh, which operates at Girard, Ohio, the largest iron puddling plant in the country, containing 88 single puddling furnaces, states that it will pay the Amalgamated Association rate for puddling for November and December, which is $9.55 per gross ton of 2240 lb., and will also give its finishers an average increase of 2½ per cent for the same period.

The Burdett Oxygen Company, with executive offices at 1401-5 Jackson Boulevard, Chicago, will complete the erection of its Pittsburgh plant, at Fortieth Street and Allegheny Valley Railroad, on Dec. 1, and will then be in a position to furnish oxygen to users in that territory. It is the eleventh plant erected by the Burdett Company in various industrial centers.

The Sistersville Boiler Works, Sistersville, W. Va., manufacturer of tanks and portable boilers, which is building a new plant with double its former capacity, has contracted for all of its equipment except a flange punch of 1-in. capacity, either new or second-hand.

Stassano Electric Furnace in Italy

The Stassano electric steel furnace is still giving in Italy excellent results in the hands of capable technical men, according to Professor Miolate, quoted in the London *Iron and Coal Trades Review*. Several are now under construction, some of which are to be substituted for other types. At Dalmine the Italian Mannesmann Tube Company has two Heroult furnaces; at Lovere (Bergamo) a Kjellin-Rodenhauser induction furnace was installed, but not having given satisfaction it has been replaced by a Stassano. The Ansaldo Company is installing a Stassano furnace; it already operates a Girod. A completely enclosed Stassano furnace is claimed to be especially suitable for making special steels, for which there is a strong demand in Italy now.

Claire Furnace Sold

The Claire Furnace Company has practically closed negotiations for the sale of its blast furnace at Sharpsville, Pa., to E. W. Mudge & Co., Frick Building, Pittsburgh, large dealers in iron ore, coal, pig iron and coke. The furnace is 75 x 16 ft., equipped with four hot blast stoves and turns out about 300 tons of pig iron per day. It is expected that the buyers will take possession of the furnace Jan. 1, and will operate it on Bessemer iron. The price paid has not been made public, but was considerably in excess of $450,000, which was the amount mentioned in Sharpsville papers. L. C. Hanna is president of the Claire Furnace Company; L. C. Hanna, Jr., vice-president, and H. M. Hanna, Jr., secretary.

New English Electric Steel Furnace

The Greaves-Etchells electric steel furnace is the name of a new type designed by two Sheffield engineers to meet the special requirements of the Sheffield steel industry, according to the London *Iron & Coal Trades Review*. Its construction has now been taken over by the Furnace Construction Company of Sheffield and a dozen such furnaces are being erected or have been contracted for and more are being negotiated for. The new furnace uses a 3-phase current but only two top electrodes.

Three of the 24 hot tin mills in the new plant of the American Sheet & Tin Plate Company at Gary, Ind., are now in operation and a fourth mill will likely be started this week. All these mills are what are known as double mills, and the 24 mills are expected to turn out about the same quantity of plate as is ordinarily rolled on 30 mills of the single type.

The Gulf States Steel Company, Birmingham, Ala., has leased Eagle furnace at Attalla, Ala., and will start it up in the spring of 1917 on basic iron, after relining. Heretofore the furnace has been operated on charcoal iron for carwheel manufacture and has produced at the rate of 18,000 tons a year.

LABOR NOTES

Numerous Employers Advance Wages and Shorten Hours

The machinists' strike in the Youngstown, Ohio, district, which has been in effect since May 1, was declared off by the strikers last week. Among the more important demands they made were an 8-hr. day; a minimum rate of 50c per hour; overtime not to be compulsory, but to be paid for at the rate of time and half-time, while for Sundays and holidays double time was to be paid. They also demanded the closed shop and other restrictions that the machine-shop operators regarded as absolutely unreasonable. Shortly after the strike started, the employers began to secure men from the outside, and were successful in doing this, the shops having been in practically full operation for some months. At the time the strike started, machinists in the district were working 54 hr. per week at an average rate of about 46c per hour, and they returned to work on Monday at this rate and also under exactly the same conditions as were in force before the strike started. However, effective on Tuesday Nov. 28, the machine shop operators in the district voluntarily gave their machinists a substantial increase in the wage rate, putting it on about the same basis as prevails in other districts. The operators will not object to hiring a machinist who belongs to a union, but no labor unions will be recognized and all shops are open.

The general advance of 10 per cent in wages announced by the United States Steel Corporation last week, to be effective on or about Dec. 15, has been followed by a similar advance by nearly all the prominent steel companies. In the Youngstown district the Republic Iron & Steel Company, Brier Hill Steel Company and Youngstown Sheet & Tube Company have notified their employees of a similar advance. The La-Belle Iron Works, Steubenville, Ohio, has taken the same action. This advance puts common labor at $2.75 per day of 10 hr., the general rate now in force being $2.50 per day. Common labor has been advanced since Jan. 1, this year, from about 19½c per hour, the general rate, to 27½c per hour.

In Alabama the Sloss-Sheffield Steel & Iron Company, Republic Iron & Steel Company, Tennessee Coal, Iron & Railroad Company and Woodward Iron Company have all raised the wages of their employees from 10 to 15 per cent in their mining departments.

Effective this week, a 10 per cent increase in the wages of all employees of the Standard Chain Company, Carlisle, Pa., is announced. In some of the departments the new order will be considered effective as of Oct. 1.

The Carpenter Steel Company, Reading, Pa., has announced a 10 per cent wage increase to all of its employees, designating this as an "emergency wage, owing to abnormal price conditions now prevailing everywhere, which increase materially the cost of living." The increase will go into effect Dec. 1.

The employees of the Eastern Steel Company, Pottsville, Pa., will receive a 10 per cent increase in wages, beginning Dec. 1.

The employees of the boiler shops at the John Wood Mfg. Company's plant in Conshohocken, Pa., will go on an 8-hr. shift, it has been decided by the company, in a short time. Heretofore the men have been working 12 hr. a day.

The Metal Trades Association in Portland, Ore., and vicinity, controlling practically all of the machine shops, foundries, pattern shops and boiler and plate shops, has decided to operate its plants on the 8-hr. day basis, beginning Dec. 1.

Newark, N. J., members of the National Founders' Association have raised the wages of their skilled mechanics from $3.75 to $4. The iron molders' union had demanded an increase to $4.25 per day. No change was made in helpers' wages.

The W. O. Hickok Mfg. Company, manufacturer of ruling machines, Harrisburg, Pa., has opened a branch of the Pennsylvania State College extension course in mechanical engineering at its plant for the benefit of its machinists and apprentices.

Pressed Hot Non-Ferrous Metal a Substitute for Castings

In a paper dealing with the problems of the brass foundry, presented at the annual meeting of the American Institute of Metals, E. A. Barnes, Fort Wayne Electric Company, Fort Wayne, Ind., stated that the problem of producing brass and aluminum parts which shall be more homogeneous, tough and perfect than can be produced by ordinary casting methods had led to the development of a pressed metal process which briefly is as follows:

A blank of copper or aluminum containing the volume of metal requisite for the finished part is heated to a fairly high temperature. This hot blank is then forced into a steel mold of the exact dimensions and design of the desired metal part, by means of hydraulic presses, giving pressures of 500 to 2000 lb. per sq. in. These pressures raise the temperature of the metal in the blank and cause it to flow into every part of the mold.

The author stated that the following results were obtained by this process: The most intricate shape can be formed, even newspaper type reproducing perfectly. The parts are formed so exactly to size and are so smooth that practically no machining is required, but where machining is necessary the metal cuts more easily than cast metal. The pressed metal parts are free from gas holes and sand, and because of this can be used for such purposes as gas nozzles, etc. Pressed metal parts are stronger than cast parts of the same metal. Pressed metal brass parts are as strong as bronze or English gun metal and can often be substituted for these.

German Foundries in 1915

The report for 1915 of the Association of German Iron Foundries, presented at a general meeting recently, says that in that year the manufacture of cast-iron shells gradually diminished in proportion to the increased use of shells made of cast or pressed steel. Owing to the shortage of labor the foundries have been obliged to employ women, foreigners and prisoners. Special praise is bestowed upon the women. Both in output and skill the results were quite unexpected. Men maimed in the war have also been employed in several foundries.

The association's scientific investigations comprised a wide field, the experiments with incased iron castings, according to Emperger's process, being especially mentioned.

The secretary in his report, dealing with the central European question and the threatened commercial war after peace is restored, expressed the opinion that a central European commercial union with preferential tariffs would be against the commercial interests of Germany and her allies and fraught with many dangers. The desired end could be better attained by suitable commercial treaties and proper arrangements as to inter-communication and money transactions.

The Machine-Tool Industry of Japan

The war has stimulated the machine-tool industry in Japan. As an example, large works containing roughly 1000 engine lathes, 300 capstan lathes and 150 drilling machines were recently completed within three months after the first orders were given out, over 90 per cent of the machines being made in Japan. Jigs and fixtures are not used to any great extent and as most of the works will accept any order that comes to them within their capacity there is little opportunity for specialization. In an article in the *Monthly Re-* (British) it is pointed out that only within the last ten years or so has Japan taken up the manufacture of machine tools seriously. Little progress was made until about four years ago, when the government decided that it was time to encourage domestic manufacture so as to check the flow of specie abroad and make Japan's markets less dependent on foreign supplies.

Machinery Markets and News of the Works

RAILROADS MORE ACTIVE

Pacific Coast Shipyards Notable Buyers

Higher Costs Preclude Reduction of Machine-Tool Prices and May Cause Advances—Needs Should Be Anticipated

As noted in the New York market various of the railroads are showing more interest in machine tools, at least four of the lines being in the market to some degree. For some time they have been active in the matter of rolling stock, bridges and track materials, and it is but natural that they should also consider equipment for their shops.

The shipbuilders have been active buyers, also, some large orders having been placed in the East by the Pacific coast interests. The New York market shows a gain in activity when all types of machines are considered.

From Cincinnati comes the suggestion that there can be no reduction of machine-tool prices so long as the cost of materials continues at its present high and advancing level. In this direction the greatly advanced cost of pig iron is having a tangible effect and will have more when existing contracts for castings expire. The domestic inquiry in Cincinnati has improved considerably, but actual orders are somewhat slow in closing. Spanish and Italian inquiries are before the trade.

In Cleveland the inquiry for stamping equipment is particularly good, otherwise a quieter trend is noticed. Long deliveries tend to make some purchasers slow in closing, although this effect is not felt in some other parts of the country. In New York, for instance, orders are being placed in a lively way despite the long deliveries.

Business is excellent in Detroit, and is expected to increase when the automobile makers begin to buy more actively to prepare their plants for the rush of spring business. It is urged that prospective buyers should anticipate their wants as much as possible and thereby get needed tools at work as soon as can be done.

In Milwaukee orders are being booked in such steady volume that all available capacity will soon be engaged to the end of 1917. Buyers in that city are more concerned with the question of when deliveries can be made than with the prices they are asked to pay.

New York

NEW YORK, Nov. 29, 1916.

The market is more active, with practically all types of tools in demand. Long deliveries have not deterred purchasers from placing some attractive orders, and it is pleasing to note that they are willing to wait rather than take tools which would suffer from too hurried building. Good buyers, for instance, are willing to wait for castings to become properly seasoned. Most of the buying continues of a miscellaneous character and comes from many directions.

The railroads are showing more life with regard to machine tools. The Norfolk & Western has not begun to purchase yet, but the Lehigh Valley continues to place orders. The Balti-

A large amount of business has been placed by the shipyard. The [illegible] Jones Company, Wilmington, Del., is close to $100,000. Representative [illegible] Shipbuilding & Dry Dock Company, Seattle, Wash., [illegible] heavily for shipyard equipment. The company was recently incorporated with a capital stock of $800,000. It has contracts for three steamships.

The Fabrica Italiana Automobil Torino, Poughkeepsie, N. Y. [illegible] two flat top turret lathes and is in the market for other equipment.

The Hanoff Machine Company, 135 West Street, New York, which builds a high-duty manufacturing lathe, has [illegible] tools to [illegible]

The Jersey Forging Works, Jersey Avenue and Sixteenth Street, Jersey City, N. J., incorporated recently with a capital stock of $[illegible], has [illegible] which it has established one [illegible] hammer and expects to add other new hammers soon. It is equipped to produce crankshafts, gear blanks, columns and heavy and light forged work, general blacksmith work, tie rods, eye bolts and special bolt work. The incorporators are Charles A. Kruse of Chicago; Benjamin Farrier and Charles E. Hendrickson, of Jersey City. Mr. Kruse has been identified with the forging industry for many years. Charles A. Kruse is president.

The new corporate style, the Interstate Machine Products Company, has been adopted by the former Interstate Machine Company, Rochester, N. Y.

The Samuel L. Moore & Sons Corporation, Elizabethport, N. J., is having bids taken through its architects, Ring, Cleaves, Graham Company, 280 North Broad Street, Elizabeth, N. J., for a one-story foundry addition, 40 x 200 ft., to cost about $20,000.

The Norma Company of America, manufacturer of ball and roller bearings, precision testing instruments, etc., 1790 Broadway, New York, has increased its capital stock from $100,000 to $500,000, preliminary to the expansion of its business. W. M. Nones is president.

The Buffalo Foundry & Machine Company, maker of steam hammers, Buffalo, N. Y., expects to build a three-story pattern addition, 52 x 140 ft., of brick and concrete, which will double its present pattern storage space. The company broke ground Nov. 23 for a new laboratory building, 75 x 90 ft., of brick and concrete, to contain its chemical and physical laboratories, used in connection with the foundry, also its laboratory and testing plant used in connection with its vacuum drying business.

The Davis-Bournonville Company, manufacturer of oxy-acetylene and oxy-hydrogen welding and cutting apparatus, Jersey City, N. J., has authorized an increase in its capital stock from $170,000 to $370,000. Only a portion of the stock is to be issued at the present time. The company has very materially increased its output in the past two years and has only recently completed an additional factory building with approximately 35,000 sq. ft. of floor space. It is now still further increasing its manufacturing facilities with two additional stories on the new building with the expectation of occupying the added stories soon after Jan. 1.

The corporate name of the Houk Mfg. Company, manufacturer of wire wheels, Buffalo, N. Y., recently acquired by the United Motors Corporation of Detroit, will be changed to the Houk Wire Wheel Company, which will be capitalized at about $4,000,000. Approximately $1,000,000 will be spent for increasing the company's buildings and equipment. Plans in progress call for two factory buildings, 60 x 300 and 50 x 150 ft., to be added to its plant at Elmwood Avenue and the New York Central Railroad.

Plans for the new factory of the Harrison Mfg. Company, Lockport, manufacturer of motor trucks and parts, will be 163 x 396 ft., two stories, estimated to cost $250,000.

The Crown Metal Construction Company, Jamestown, N. Y. [illegible] plant.

The Diehl Mfg. Company, Elizabeth, N. J., manufacturer of [illegible]

Avenue factory, recently sold to Woodward & Co., will be occupied by the Thurlow Steel Works.

The Hagerstrom & Chapman Company, Newark, N. J., manufacturing jeweler, will build a new two-story brick factory at 9 Orchard Street, to cost about $10,000.

Maher & Flockhart, 60 Polk Street, Newark, N. J., makers of special castings, will make alterations and improvements in their foundry, to cost about $3,000.

The Brunswick Motor Car Company, Newark, N. J., has acquired property at Avenue B and Miller Street, and will establish a plant for the manufacture of automobiles. Russel Smith is president and Alden V. Meeks, New York City, is treasurer.

The Standard Oil Company has awarded a contract for the erection of a two-story and basement service plant and garage, 72 x 91 ft., at 94 Ogden Street, Newark, N. J., to cost $60,000. The H. D. Best Company, 52 Vanderbilt Avenue, New York, is the contractor.

William A. McManus and Frederick A. Hagner, Newark, N. J., have incorporated in Delaware the General Safety Signal Company, with capital stock of $500,000, to manufacture safety signal devices for street cars and automobiles. Charles F. Burroughs, East Orange, N. J., is also active in the company.

The Simplex Instrument Company, Newark, N. J., has been incorporated with a capital stock of $125,000 to manufacture hydrometers, thermometers, battery meters, etc. Frederick Beck and R. G. Higgins, Newark, and Edward W. McDonough, Orange, N. J., are the incorporators.

The Columbus Crystal Company, Newark, N. J., will build a one-story addition, 50 x 184 ft., on Avenue R, near the Central Railroad of New Jersey, to cost $10,000.

The Balbach Smelting & Refining Company, Newark, N. J., will build a one-story addition to its plant, about 40 x 100 ft., at Stockton and Delancy streets.

The Best Hold Fastener Company, Newark, N. J., has been incorporated with a capital of $100,000 to manufacture fastening machines. W. S. Bechtold, Herman F. Behrendt, G. H. Schumacker and Frederick Wilke, all of Newark, are the incorporators.

The Fieldler Corporation, Newark, N. J., has filed plans for a garage to be erected at 524 Broad Street at a cost of $25,000.

Michael J. Kearny, Hoboken, N. J., will build a one-story copper works building at 1102 Clinton Street, at a cost of about $12,000.

The Elevator Supplies Company, 1503 Willow Avenue, Hoboken, N. J., has been incorporated with a capital of $2,000,000 to manufacture elevator supplies and specialties. Edward A. Markley, 144 Erie Street, Jersey City, Ralph E. Cooper, 239 Parker Street, Newark, and John H. Young, 318 Forrest Street, Jersey City, are the incorporators.

The Durstan Gear Company, Maltbie Street, Syracuse, N. Y., has let contract for the erection of a one-story factory, 50 x 108 ft.

The Bennett Corporation, Sietz Building, Syracuse, N. Y., will build a cement plant, comprising three buildings, at Phelps, N. Y., estimated to cost $1,250,000. Plans are in preparation. J. W. Bennett is president.

The Taylor Instrument Company, 95 Ames Street, Rochester, has let contract for erection of an addition to its laboratory, 30 x 120 ft.

The D. & W. Machine Company, Mount Vernon, N. Y., has been incorporated to manufacture machinery, tools, hardware, etc. H. N. Kelly, R. G. Chase and A. L. King, 431 Homestead Avenue, are the incorporators.

The H. W. Johns-Manville Company, Madison Avenue and Forty-first Street, New York, will build a six-story factory addition, 100 x 200 ft., at New Rochelle, N. Y., for the Jones Speedometer Company, lessee, 32 Thirty-third Street, Brooklyn, N. Y.

The American Radiator Company, Buffalo, has let contract for erection of a one-story addition, 80 x 100 ft., to the malleable iron foundry at its plant at Elmwood Avenue and the New York Central Railroad.

Hart & Crouse, Utica, N. Y., are preparing plans for a core shop, 100 x 150 ft., which they will erect at once.

The Elmira Foundry Company, Elmira, N. Y., has been incorporated with a capital stock of $95,000 and will establish a foundry and machine shop. H. C. Mandeville, A. P. Morrow and F. Levalley, 216 West Ray Street, are the incorporators.

The Batavia Specialty Company, Batavia, N. Y., manufacturer of tin boxes, is erecting an addition to its new plant on Harvester Street.

The Delano Self Starter Company, Plandome, N. Y., has been incorporated with a capitalization of $250,000 to manufacture accessories for motor vehicles. E. Buchignani, W. Webster and C. Adams are the incorporators.

The Buffalo Sled Company, North Tonawanda, N. Y., J. J. Snyder, president, has had plans completed for a factory and warehouse to cost approximately $150,000, to be added to its plant at Schenck Street and the Erie Railroad.

Plans have been completed for a factory to be erected on a plot of 130 x 200 ft. at Ingraham Street and Garden Avenue, Brooklyn, for the Greenpoint Metal Covered Door Company. Shampan & Shampan, 772 Broadway, Brooklyn, are the architects.

Henry Burkhardt, 246 St. Nicholas Avenue, Brooklyn, N. Y., is taking bids for a one-story brick ice manufacturing plant, 26 x 125 ft., to be erected at Proctor Street and Edsall Avenue, from plans by Albert F. Thielman, 45 East Forty-second Street, New York, at an estimated cost of $30,000.

The Rand Company, North Tonawanda, N. Y., manufacturer of bank and office equipment, is having revised plans drawn for factory addition, 67 x 102 ft., three stories and basement.

Philadelphia

PHILADELPHIA, PA., Nov. 27, 1916.

A marked relief in the shortage of freight cars, according to officials of the Pennsylvania and the Philadelphia & Reading railroads, has been effected in the last fortnight by business firms and individuals in Philadelphia co-operating with the carriers by prompt unloading. The chief causes for car shortages affecting the railroads terminating here are due primarily to the large amount of equipment tied up at the Great Lake ports, where the coal movement is always extremely heavy just before the lakes are closed to traffic. The heavy amount of ore awaiting haulage to the steel-making centers is likewise carrying cars in this direction. Combined with congestion at tidewater these factors were responsible for the car shortage reaching an acute stage. In comparison with a period of more than a year of freight moving eastward almost wholly, local carriers are experiencing a strong improvement in westward-bound freight.

The S. A. Ashman & Son Company, machinist and manufacturer of forgings, 2300 East Tioga Street, Philadelphia, will make very extensive improvements to its plant. It will erect a new building to contain machinery for extending its forging business in certain lines and will also install a new power plant. In connection with this it will enlarge its capacity for the manufacture of rings and the forging and handling of special tool steel and alloy steel. William W. Sketchley is secretary and treasurer.

The Crescent Ice & Coal Company, Philadelphia, has awarded a contract for the erection of a one-story ice plant, 56 x 225 ft., at Twenty-fifth and Tasker streets, to cost $20,000.

The Victor Motors Company, Philadelphia, recently incorporated with a capital of $2,000,000, has acquired the former plant of the Wharton Switch Works, Jenkintown, Pa., comprising eight buildings and about 25 acres of land, for its initial automobile manufacturing plant. The former plans of the company to build a plant at Grubbs Landing, near Claymont, Del., it is stated, have been abandoned.

The Royal Pioneer Box Company, Philadelphia, has awarded a contract for the erection of a new factory at 934 North Third Street, at a cost of $10,000. The James Levin Company, 1530 South Sixth Street, is the contractor.

The Packard Motor Car Company, Philadelphia, has awarded a contract to Cramp & Co. for the erection of an eight-story steel and concrete service plant, 70 x 185 ft., at Broad and Wood streets.

The Glenwood Avenue Garage, Trenton, N. J., will build a two-story addition, 60 x 110 ft., at Glenwood Avenue and Chambers Street, to cost about $12,000. The capacity of the repair plant will be increased by the installation of new equipment; a gasoline engine for light and power service will also be installed. E. C. Bowers is the proprietor.

C. V. Hill & Son, Trenton, N. J., manufacturers of refrigerators, will build a one-story brick addition to their plant at Chelton Avenue, to cost about $4,000.

The Modern Aeros Corporation, Ltd., Broad Street Bank Building, Trenton, N. J., has been incorporated with a capital of $100,000 to manufacture motors and engines of compressed air and gas types. Joseph Pedery, Lazar Lukacs and Armand W. Allyn are the incorporators.

The Sun Shipbuilding Company, Chester, Pa., has awarded a contract for the erection of five new one and two-story, reinforced-concrete additions to its plant to Barclay White & Co., Philadelphia, at a cost of $120,000.

The Philadelphia & Reading Railroad, Philadelphia, will

build an addition to its locomotive shop and foundry at Reading, Pa. Samuel T. Wagner is the architect.

The Bradley Pulverizer Company, Allentown, Pa., has acquired a section of the former property of the Allentown Foundry Company, 300 x 500 ft., as a site for an additional plant for the manufacture of pulverizing and grinding machinery.

The plant of the Duplex Metallic Company, Conshohocken, Pa., it is reported, is ready for operation, and it is expected that it will be started in a few days.

A contract for the erection of an addition, 20 x 105 ft., to the Columbus Chain Company's plant, Lebanon, Pa., has been awarded. It will be used for the installation of three new furnaces for the manufacture of big link chain.

The Office Appliance Company, Williamsport, has been chartered with a capital of $5,000 by Thomas G. Ward and Henry W. Pyles, Williamsport, and George M. Wilson, Montoursville, to manufacture metal office appliances.

Notice of authority to increase its capital stock from $10,000 to $500,000 has been filed by the Progressive Wire Goods Company, 528 Commerce Street, Philadelphia.

The plant of the Beach Mfg. Company, Montrose, Pa., manufacturers of sawmill and woodworking machinery, was destroyed by fire last week. The company took steps to replace their building and equipment before the ruins were cold. Despite the shortage of spot machine tools they managed to locate a number which were shipped to them immediately.

Notice of authority to increase its indebtedness by $42,000 has been filed by the American Metal Works, Armat and Heiskel streets, Philadelphia.

Pittsburgh

PITTSBURGH, PA., Nov. 27, 1916.

Manufacturers and dealers in this district continue to report a heavy demand for machine tools of all kinds, and state they are able to make better deliveries than were possible three or four months ago. Some of the larger machine-tool builders in New England have caught up to some extent on orders and are able to ship out more promptly. High prices continue to rule, but no marked advances in prices on machine tools have been made for some time. The Carnegie Steel Company, Pittsburgh, sent out recently a list of machine tools for delivery at Clairton, Pa., where it is building a very large number of by-product coke ovens and in connection with which large machine shops will be built. The list, on which no purchases are said to have been made as yet, includes the following tools, all motor-driven, Westinghouse or General Electric types preferred:

One 16-in. x 4-ft. geared head engine lathe, with quick change gears, complete.

One 20-in. x 10-ft. geared head engine lathe, with taper attachment.

One 42-in. x 24-ft. geared head engine lathe, with quick change gear and taper attachment.

Three 24-in. crank shaping machines, complete, with extension base.

Two 3-ft. radial drilling machines.

One 6-ft. radial drilling machine, with tapping attachment.

One 5-ft. boring mill.

One No. 4 universal milling machine.

One 4-ft. x 14-ft. planing machine, open side type, two heads on cross rail and one on side, complete.

Two 20-in. radial drilling machines.

One 3-in. bolt cutter.

One No. 4 Keyseating machine.

One emery grinding machine, with two 18-in. x 3-in. wheels, complete, with guards, speed control and starter.

One emery grinding machine, with two 12-in. x 2-in. wheels, complete, with guards, speed control and starter.

One hack saw, capacity up to 6-in. square.

One No. 3 pipe cutting and threading machine, one No. 6 pipe cutting and threading machine, one No. 8 pipe cutting and threading machine, all three complete with pumps, dies, cutting-off tools, length gages, etc.

One 60-in. gear cutting machine.

The Carnegie Steel Company is also in the market for a 6 x 6-in. angle shear, and a 6 x 1½-in. bar shear, this equipment presumably being for delivery in McDonald, Ohio, where its new bar and angle mills are being built.

New England

BOSTON, MASS., Nov. 27, 1916.

The Chase Metal Works, Waterbury, Conn., is to build at once a factory, 100 x 400 ft., two stories. It will also build an addition to an existing building, 61 x 202 ft., one story.

The Mansfield Foundry Company, Mansfield, Mass., which recently acquired the Rider Foundry property, has started an addition to the latter plant, 60 x 100 ft.

The East Deering Foundry Company, East Deering, Me., a new corporation, has plans for a foundry, 40 x 100 ft.

The M-B Tool Company, Providence, R. I., has been incorporated with capital stock of $50,000 by Louis B. Massicotte, Robert D. Banigan and John J. Banigan.

The E. W. Carpenter Mfg. Company, Bridgeport, Conn., has been incorporated with capital stock of $50,000 by Jonathan Grout, Philo C. Calhoun and J. Walter Scheffer, to manufacture tools.

The Stamford Rolling Mills Company, Stamford, Conn., is building an addition, 37 x 321 ft., and a new casting shop, 62 x 128 ft., at its Fairfield Avenue plant.

The Terry Steam Turbine Company, Hartford, Conn., is making an addition to its stock room, 20 x 125 ft.

The General Mfg. Company, Waterbury, Conn., has awarded the contract for its new plant, 40 x 98 ft., four stories, and a wing, 25 x 60 ft., one story.

The Deane Steam Pump Company, Holyoke, Mass., is reported to be having plans prepared for extensive additions to its plant.

The Granite State Tap & Die Company, Boston, Mass., has been incorporated with capital stock of $200,000. The directors are Walter T. Harrison, president; Charles F. Remington, Charlestown, N. H., treasurer, and L. M. Dunn.

The Quick Lock Demountable Rim Company, Boston, Mass., has been incorporated with capital stock of $50,000. James Norrie is president and Charles F. Crowell, 22 Ames Building, Boston, treasurer.

Baltimore

BALTIMORE, MD., Nov. 27, 1916.

Announcement has been made that the Mutual Chemical Company of America, 1348 Block Street, Baltimore, has purchased over 11 acres at St. Helena, Md., and will construct a by-product plant. The property has 510 ft. of waterfront.

The Continental Can Company, 1002 Keyser Building, Baltimore, has awarded a contract for the construction of a three-story factory, 100 x 300 ft., at Highlandtown, Md., to cost between $80,000 and $100,000.

The Maryland Brass & Metal Works, Guilford Avenue and Federal Street, Baltimore, will build an addition, 19 x 60 ft.

The American Ice Company, 309 Calvert Building, Baltimore, will construct a one-story addition, 27 x 130 ft., to its plant at Montford Avenue and Chase Street.

A plant to cost over $400,000 will be built at Norfolk, Va., by the Virginia Navigation Coal Company.

The Abingdon Utilities Company, Abingdon, Va., has been incorporated with $100,000 capital stock ard plans are being prepared to build an electric plant.

The Black & Decker Mfg. Company, manufaccurer of machinery, 105 to 115 South Calvert Street, Baltimore, has purchased a 10-acre tract at Towson, Md. Duncan Black, president, states that no plans have been made as yet. The company employs about 125 men.

Deibert Brothers, Elkton, Md., are said to be planning the establishment of a plant at Havre de Grace, Md., to build barges. Contracts for two barges are understood to be in hand.

The Baltimore Enamel & Novelty Company, Woodall Street, Baltimore, has asked bids on a one-story factory, 250 x 580 ft., to be built at Westport, Md.

Harry G. Skinner, 1414 Continental Building, Baltimore, formerly associated with the Skinner Drydocks Com[illegible] understood to hold an option on 29 acres on the Elizabeth River at Berkley, Va., for a company which will be capitalized at $2,000,000 to build and repair ships. Ample room is available for two floating drydocks, repair shops, etc.

The Berrethal Machine Company, Moore Street, Suffolk, Va., has awarded contract to Wills & Co. for the construction of a one-story foundry, 62 x 72 ft. J. E. Benthal is the proprietor.

Chicago

CHICAGO, ILL., Nov. 27, 1916.

D. J. Hauptman, 139 North Clark Street, Chicago, will erect a one-story foundry at 1738 North Kolmar Avenue, to cost $15,000.

William H. Barry, 1910 Lakewood Avenue, Chicago, has let contract for a one-story factory building, 161 x 246 ft., to be erected at 5027 South Wabash Avenue at a cost of $35,000. E. J. Ohrenstein & Hield, 105 South Dearborn Street, are the architects.

Robert Glendinning, president, Patent Vulcanite Roofing Company, 2256 West Forty-ninth Street, Chicago, will erect a three-story factory, 30 x 100 ft., at West Forty-eighth Street and Campbell Avenue, to cost $15,000. Arthur Foster, 230 South La Salle Street, is the architect.

S. N. Crowen, 30 North La Salle Street, Chicago, is the architect for a one-story manufacturing building, 99 x 125 ft., to be erected at 309-19 St. John Court, for J. J. Harrington, 38 South Dearborn Street.

H. C. Evans & Co., 75 West Van Buren Street, Chicago, will build a two-story toy factory, 75 x 125 ft., at 1724-28 West Adams Street, which will cost $40,000.

The Clemetson Company, 2607 Flournoy Street, Chicago, will erect a factory at West Division Street and Homan Avenue, consisting of a main building, three stories, 75 x 276 ft, a kiln, 30 x 35 ft., and a power house, 40 x 65 ft., etc., of reinforced concrete. Webster Tomlinson, 64 East Van Buren Street, is the architect.

The Chicago Engineering & Machine Works, Chicago, has increased its capital from $2,500 to $25,000.

The Mackemer Motor Car Company is planning to erect a garage, 48 x 185 ft., on property recently purchased at Canton, Ill. The building will be of brick and concrete and will have full modern equipment.

The Hutchinson Foundry & Machinery Company, Hutchinson, Kan., has plans for a new foundry, 100 x 300 ft.

The Southern Iowa Machinery Company, Centerville, Iowa, has acquired the Goss foundry and machine shop, which will be enlarged and new equipment installed.

The Seaton Foundry Company, Atchison, Kan., will erect a one-story foundry, 100 x 275 ft.

The Jackson Compressor Company, Denver, Col., has started work on a machinery manufacturing plant at Alameda Avenue and Cherokee Street to cost $200,000.

The Crown Tire & Rubber Company, Omaha, Neb., is about to start the building of the first unit of a tire and rubber plant, for which 5 acres has been purchased in a manufacturing suburb of Omaha. The factory will have a full line of rubber machinery, and the product will be manufactured from the crude materials. The company will be in the market for machinery to produce about 300 tires and 250 tubes daily. It is planned to have the building up and machinery installed about Aug. 1 next. An output of [illegible] tires a day, both cord and fabric types, will be undertaken in a temporary location which has been sceured nearby. H. A. Reichenbach is president.

The Hart-Parr Company, Charles City, Iowa, has started the erection of a steel foundry to cost about $100,000 equipped.

Milwaukee

MILWAUKEE, WIS., Nov. 27, 1916.

Business is being booked by machine-tool builders in such steady volume that all available capacity will probably be filled from now until the end of 1917. From the demands upon the general metal-working industry, manufacturers of machinery and equipment are finding no relief from the pressure upon their facilities. Lines of production that have been comparatively dormant for several years have been reviving, because of the broader demand. High prices do not appear to have any considerable effect. It seems to be a question merely of when deliveries can be had, rather than what the price will be. An instance of delivery conditions is reported by a large milling machine interest which received a telegraphic order the past week from California for three standard tools. The company accepted the order for April 15 or May 1 delivery.

Important changes in the organization of the Giddings & Lewis Mfg. Company, Fond du Lac, Wis., manufacturer of machine tools and sawmill machinery, have just been made public. The controlling interest has passed from C. E. Cleveland, president, and Henry Rueping, secretary and treasurer, to the Fred Rueping Estate, which has appointed as general manager M. M. Cory, Chicago, until now associated with the Concrete Steel Company. Work is under way on a new pattern shop, 30 x 60 ft., and an administration building, 40 x 50 ft., two stories and basement. The space thus released will be used for shop purposes. Later a shop addition will be erected. The company has been working 23 hr. a day for several months and employs 346 machinists. Large orders for multiple spindle lathes are being filled, and enough business is available to keep the works operating to capacity until well into 1917, were no new orders booked. The company originally was organized as Giddings, DeGroat & Lewis. In 1887 Mr. Cleveland purchased an interest. It was incorporated under its present name in 1900, with $200,000 capital. George Giddings sold his interest in 1904. Mr. Cleveland became president and Mr. Rueping secretary and treasurer. Both now retire from active business.

Wausau, Wis., will soon be in the market for a centrifugal pumping unit to cost between $1,250 and $1,500.

The Marathon Electric Company, Wausau, Wis., is building an addition to its factory, 40 x 50 ft., and will install some new equipment, which will double the capacity.

A. L. Allen, Brodhead, Wis., has purchased the Broderick machine shop and will remodel part of it into a garage, devoting the remainder to shop purposes.

The John Obenberger Forge Company, Milwaukee, has increased its capital stock from $125,000 to $160,000. It now has its new plant in West Allis in operation and is making deliveries of drop forgings. The additional stock issue is made to accommodate its increased activities.

The Northwestern Motor Company, Eau Claire, Wis., Kim Rosholt, president and chief engineer, maker of gasoline-propelled railroad cars, has contracted with the Northwestern Steel & Iron Company, Eau Claire, for the manufacture of its entire line of products, including four new types, namely, light speed car for inspectors; a standard section and track maintenance car; a special chair car for officials, and a 15-passenger coach. The Eau Claire Mfg. Company has taken sub-contracts for part of the work and has started production on 250 cars. The Northwestern Motor Company has marketed about 6000 cars since it started four years ago.

Soderstrom & Anderson, Ogema, Wis., machinists and blacksmiths, are building a new shop, 40 x 60 ft., to be ready Feb. 1.

The Kempsmith Mfg. Company, Milwaukee, maker of milling machines, reports that it is steadily booking small orders from all over the country and that present orders will keep the plant fully occupied throughout 1917. During the week the company received a telegraphic order from California for three standard tools for rush shipment; but because of the sold-up condition of the shop, will not be able to make delivery before April or May.

Logemann Brothers, 3130 Burleigh Street, Milwaukee, manufacturers of baling presses, etc., will break ground Dec. 1 for another addition to its shops, 50 x 75 ft.

The Gillette Safety Tire Company, Eau Claire, Wis., which is about to commence operations in its new factory, is increasing its capital stock to $1,000,000, Eastern capital having taken an interest. It is planned to erect a new unit this winter, duplicating the present plant, to handle export orders for commercial rubber goods. R. B. Gillette is general manager.

The Wisconsin Aluminum Foundry Company, Sixteenth and Franklin streets, Manitowoc, Wis., has established a welding shop, and will do a commercial business in cutting and welding metals.

Articles of incorporation have been filed in behalf of the LaPoint Foundry Company, Milwaukee, capitalized at $5,000 by Robert and Catherine LaPoint and Frank B. Burke. It will operate the plant of the Standard Machinery Company, Schleisingerville, Wis., recently purchased by Robert LaPoint. The company manufactures gasoline engines and farm machinery and operates a gray-iron and brass foundry.

The Chippewa Foundry & Machine Company, Chippewa Falls, Wis., finished construction work on its new main shop, Nov. 25, and is installing machinery and other equipment. The shop will have a capacity of 40 small pumps and 2 to 4 large pumps daily.

The Ladewig & Stock Company, Waukesha, Wis., manufacturer of brewers' and bottlers' machinery, is reported negotiating for a factory site at Madison and Anne streets, for its proposed new plant.

The Badger Malleable & Mfg. Company, South Milwaukee, Wis., has amended its articles to provide for an increase in the capital stock from $100,000 to $200,000.

The Turbine Sewer Machine Renovating Company, Eleventh and Wells streets, Milwaukee, has changed its corporate style to the Turbine Sewer Machine Company.

The Phoenix Chair Company, Sheboygan, Wis., is contemplating some changes in its power plant, which include the installation of a 200-hp. simple Corliss engine, 120-lb. [illegible] It is also considering

the installation of a 500-kva., 2-pole, 60-cycle, three-phase generator, direct connected to a Corliss engine.

The Diamond Match Company has plans for the enlargement of its plant at Oshkosh, Wis.

The Winther Motor Truck Company is being formed at Kenosha, Wis., and will be incorporated with a capital of $300,000. The company is being promoted by Martin B. Winther, formerly connected with the Thomas B. Jeffery Company and later associated with the Nash Motors Company.

Cleveland

CLEVELAND, OHIO, Nov. 27, 1916.

Inquiry is good, particularly from machine-tool builders and makers of metal stampings, many of whom contemplate the installation of additional equipment next year and desire information as to deliveries and cost of machinery in order that the boards of directors may make the necessary appropriations in case it is decided to go ahead with proposed extensions. With delayed deliveries, some buyers are hesitating about closing at present prices for extended future delivery, thinking lower prices are possible by the time the machines are wanted. Dealers report a more quiet market the past week in the volume of definite inquiries. Considerable extension work continues to come out, involving additional machinery requirements. The demand for boring machines is active. One manufacturer who had several boring mills in various sizes for delivery the first half of next year had these taken up quickly this past week by Akron tire manufacturers.

The Bettcher Mfg. Company, Cleveland, maker of washers, automobile and other metal stampings, will enlarge its plant by the erection of an addition, 50 x 170 ft. All but a small section of this will be two stories. The additional space is needed to relieve the congested condition of the machine shops and provide increased capacity. New presses and other equipment will be installed, orders for which have about all been placed.

The Lamson-Session Company, Cleveland, manufacturer of bolts and nuts, will enlarge its plant by the erection of a three-story addition, 50 x 80 ft., to its bolt and nut works and a steel storage building, 40 x 200 ft. Some new crane and other equipment will be required, orders for which have been placed. The company has increased its capital stock from $300,000 to $1,000,000 to take care of extensions in its plant and business.

The Cleveland National Machine Company, Cleveland, recently incorporated, has purchased the plant of the National Adding Machine Company, 1384 West Seventieth Street, and will engage in a jobbing business in tools, dies and special machinery. Later arrangements will probably be made to manufacture a line of products. The officers are H. D. Marble, president; Harry Newell, vice-president; George D. Harres, secretary, and C. B. Green, treasurer and manager.

The K. D. Carburetor Company, Cleveland, manufacturer of carburetors, will erect a new three-story concrete factory, 100 x 250 ft., at East Thirty-second Street and St. Clair Avenue.

The McLaren Iron Works, Cleveland, will erect a one-story brick and steel structure, 62 x 120 ft., at 1725 Urbana Road.

The Ellwell-Parker Electric Company, Cleveland, maker of storage battery industrial trucks and tractors, will enlarge its plant by the erection of a four-story building, 60 x 120 ft. This will be a duplicate of an extension built some time ago. A third unit of the same size is contemplated early next year.

The Cleveland Twist Drill Company, Cleveland, will enlarge its plant by adding a story, 40 x 150 ft., to one of its four-story buildings.

The Goedecke Specialty Company, Cleveland, is the name of a new firm that will establish a plant at Fifty-first Street and Superior Avenue, to manufacture metal specialties.

The American Auto Trimming Company, Cleveland, has leased quarters in a factory building of the Properties Company on East Seventy-second Street, Cleveland, in which it will establish a plant.

The H. J. Walker Company, Cleveland, which is engaged in machine work for the Chandler Motor Car Company, has under way a plant extension and contemplates the erection next spring of a four-story addition, about 125 x 300 ft.

The Lowe Mfg. Company, Cleveland, will shortly place contracts for a factory addition, 30 x 70 ft.

The Farad Electric Company, Cleveland, has been incorporated with a capital stock of $500,000 to manufacture electric devices. J. L. Huston and others are promoting it.

The Locks Mercury & Mfg. Company, Cleveland, has been incorporated with a capital stock of $15,000 by A. A. Lodge and others.

The Youmans Machine Company, Cleveland, has been incorporated with a capital stock of $20,000 by G. A. Welch, J. C. Barley, G. B. Schaal and others.

It is announced that the Toledo Railways & Light Company, Toledo, which is controlled by the Doherty interests, plans to erect a new power plant at about 120,000 kw. capacity. It is expected that definite plans will be decided upon shortly.

The Knight Tire & Rubber Company, Canton, Ohio, has been purchased by the Fabricated Products, which is capitalized for $20,000,000. N. W. McLeod, St. Louis, Mo., is president. It is stated that an addition to the plant will be built.

The Norwalk Drilling Tool Company, Norwalk, Ohio, will enlarge its plant by the erection of an extension, 48 x 60 ft. Some new equipment, including an 8000-lb. hammer and a 200-hp. boiler will be installed.

Robert Kirk, Findlay, Ohio, has purchased a building which he will equip for assembling light motor trucks and touring cars.

The Mansfield Lock Washer Company, Mansfield, Ohio, a new company, plans to erect a plant, 50 x 150 ft., to manufacture lock washers used largely by the automobile trade.

The Hester Tire & Rubber Company, Cleveland, has entered into a contract with the Commercial Club of Delphos, Ohio, to establish a plant in that city to manufacture automobile tires and other rubber products. The erection of a two-story factory building, 50 x 150 ft., is contemplated.

Catalogs Wanted

The Stambaugh-Thompson Company, Youngstown, Ohio, jobber of hardware, etc., will be pleased to receive catalogs and other information concerning equipment used by road and building contractors.

Indianapolis

INDIANAPOLIS, IND., Nov. 27, 1916.

The plant of the Dockwiler & Kingsbury Fertilizer Company, Indianapolis, was destroyed by fire Nov. 23 with a loss of about $35,000.

The Engle-Phillips Company, Indianapolis, has been incorporated with $10,000 capital stock to manufacture grippers. The directors are Samuel B. Phillips, Albert M. Engle and C. I. Phillips.

The Hassler Motor Company, Indianapolis, has been incorporated with $200,000 capital stock to manufacture automobiles, motor trucks, etc. Robert H. Hassler, Edward D. Fouts and David G. Ong are the directors.

The Irvine-Fessler Motor Corporation, Indianapolis, has been incorporated with $25,000 capital stock to manufacture automobiles. The directors are Dennis J. Bush, Robert V. Fessler and John Irvine.

The South Bend Current Control Company, South Bend, Ind., has been incorporated with $15,000 capital stock to manufacture electrical appliances. Dana E. Westcott, Charles H. Zwergel and Harvey Koontz are the directors.

The Standard Wheel Company, Terre Haute, will build a plant for the manufacture of malleable steel castings, mainly hubs for automobile wheels.

The Elkhart Stamping & Tool Company, Elkhart, Ind., has been incorporated with $25,000 capital stock to manufacture tools. The directors are Alexander H. Hyndman, Oliver A. and Bert D. Gause.

The Gary Motor Truck Company, Gary, Ind., has increased its capital stock from $25,000 to $50,000.

The Frankfort Motor Car Company, Frankfort, Ind., has been incorporated with $250,000 capital stock to manufacture automobiles and accessories. The directors are George L. Thompson, Frank E. Coulter and Robert E. Stevenson.

The National Spring Company, Newcastle, Ind., has increased its capital stock from $25,000 to $50,000.

The Columbus Art Metal Company, Columbus, Ind., has been incorporated with $100,000 capital stock to manufacture metal furniture, office and hospital supplies, etc. The directors are W. H. Alford, J. T. A. McClurg and M. J. Schultes, Indianapolis, and Herman L. Rost, Joseph V. Hilger and H. Karl Volland, Columbus.

The American Appliance Company, Indianapolis, has been incorporated with $[illegible] capital stock to manufacture electrical appliances. The directors are Arthur Taylor, R. T. McFall and H. D. Haring.

The Farmers Utility Company, Evansville, Ind., has been incorporated with $50,000 capital stock to manufacture machinery. The directors are Harvey C. Weber, William J. Schuler and Hayward Flickner.

The plant of the Whiteley Malleable Castings Company, Muncie, Ind., was destroyed by fire Nov. 20 with a loss of $150,000. It was one of the largest of its kind in the Middle West, employing about 800 men.

The Page & Jones Chemical Company, Hammond, Ind., has let contract for a one-story addition, 60 x 250 ft., to be used as a warehouse and machine shop.

The W. D. Patton Gas Company has broken ground for a factory at West Hammond, Ind., to cost $25,000. Of the investment about $15,000 will be expended for equipment.

The Clo-Mix Company, Elkhart, Ind., has been incorporated with a capital of $25,000, to manufacture warm air registers. The incorporators are Andrew H. Beardsley, Chester A. Mixer and Harry E. Clove.

The Metal Auto Parts Company, Connersville, Ind., has increased its capital stock from $50,000 to $150,000.

Swayne-Robinson & Co., Richmond, Ind., have announced plans for the construction of another foundry, which will be practically a duplicate of the one built last spring and will cost approximately $4,000.

The plant of the Jackson Shovel & Tool Company, Montpelier, Ind., was sold to Capt. Henry Channon of Chicago for $23,000.

Don H. Harris, 3230 Webster Street, Fort Wayne, Ind., will build a garage, 44 x 150 ft., and will purchase some light machine-shop equipment.

Fire completely destroyed the main building of the Auburn Foundry Company, Auburn, Ind., causing damage estimated at about $3,000.

About $400,000 is to be spent for the enlargement of the shops and yards of the Pennsylvania railroad at Logansport, Ind.

Cincinnati

CINCINNATI, OHIO, NOV. 27, 1916.

The cost of building a machine tool of any kind is stated by local manufacturers to be higher than at any time in the past. Recent sharp advances in pig iron have run up the cost of castings, while semi-finished parts, such as gear blanks, etc., are quoted at a high-water mark. It is needless to call attention to the price of high-speed steel and to the advanced cost of labor. Leading machine-tool makers believe that, with these conditions, there can be no chance for an early reduction in the prices of machine tools, although the foreign demand is not nearly so brisk as it was the latter part of last year. On the other hand, if any readjustments are made they will tend toward a higher level.

The domestic inquiry has improved considerably in the past few days, but actual orders are slow in closing. With the exception of some recent business booked for shipment to France, nothing of note has transpired, although both Spain and Italy are good customers and have some unclosed inquiries out. A few lathes were recently sold for shipment to Russia via the Pacific Ocean route.

The domestic and foreign call for portable electric drilling machines is said to be holding up remarkably well. Small electric motors are also in good demand.

The Sayres & Scoville Company, Cincinnati, carriage builder, has increased its capital stock from $150,000 to $650,000, and is having plans prepared for a large factory to be erected at Winton Place to be devoted to the manufacture of automobiles and special auto-trucks. Complete building plans are not yet available. The company's former plant on Colerain Avenue was recently destroyed by fire.

The Cincinnati Sheet Metal & Roofing Company, Cincinnati has acquired an additional site adjoining its plant, on which will be erected a three-story storage building.

The Cincinnati Milling Machine Company, Oakley, Cincinnati, has had plans prepared for a three-story reinforced concrete addition to its plant, 20 x 75 ft., for storage purposes.

The Western Water Motor Company has removed its plant from Oxford, Ohio, to a manufacturing building at 2105 Central Avenue, Cincinnati. The company makes washing machines and has sufficient equipment for its present needs.

On Nov. 22 fire almost completely destroyed two large manufacturing buildings, part of the plant of the Manufacturers' Production Company, Dayton, Ohio, entailing an estimated loss of $150,000. The company is engaged in the manufacture of war munitions. Rebuilding plans have not yet been announced.

It is currently reported, but not officially confirmed, that the Big Four Railroad Company will enlarge its repair shops at Columbus, Ohio, and also construct a new roundhouse at that point.

The Mansfield Lock Washer Company, Mansfield, Ohio, has been incorporated with $50,000 capital stock to manufacture lock washers, by A. E. Witter and others.

It is rumored that the Dayton Malleable Iron Company, Ironton, Ohio, is having plans prepared for a large addition to its foundry.

The Municipal Machine Mfg. Company, Piqua, Ohio, has been incorporated with $25,000 capital stock to manufacture street sweepers. J. A. Schroeder is one of the principal incorporators. Nothing is known as to equipment needs.

The Harbison-Walker Refractories Company has tentative plans under way for increasing the capacity of its plant at Portsmouth, Ohio.

The daily press reports that the Ladel Mfg. Company, New Philadelphia, Ohio, has been incorporated with $50,000 capital stock, to operate a gray-iron foundry. U. B. Miller is one of the incorporators.

The Pioneer Window Glass Company, Marietta, Ohio, has been incorporated with $80,000 capital stock by B. F. Strecker and others, for the purpose of establishing a glass factory.

A deal has been closed merging the Love Foundry Company of Winchester, Ky., and the Cincinnati Machine Tool Company.

Detroit

DETROIT, MICH., NOV. 27, 1916.

The machinery and supply business continues to be excellent and dealers anticipate no let up. Deliveries are still far off, and it is wise for customers to anticipate their requirements as much as possible in order to secure their needs on time. Automobile factories in Detroit are expecting to enlarge and renovate their plants before the rush of spring business. The car congestion in this district is holding up deliveries and also cutting down orders by seriously delaying building operations.

It is reported that the Michigan Central Railroad is about to take bids on car shops at Detroit and Jackson, Mich.

The General Motors Company, through W. C. Durant, president, has begun the construction of a building on Holbrook Avenue and the Grand Trunk Railroad to be used for the manufacture of motors for its allied companies. The building will be 200 x 734 ft., one story. The contract has been let to the W. E. Wood Construction Company and is to be finished in 60 days.

The Paige-Detroit Motor Car Company has voted to increase its capital stock from $2,000,000 to $3,500,000 to provide larger working capital and to enable the company to carry larger stocks of material.

The Ball & Ball Carbureter Company, Detroit, has been incorporated with $20,000 capital stock by Frank H. Frederick O. and Kate D. Ball.

The Western Tool Works, Holland, Mich., has let contract for an addition to its factory.

The Grand Trunk Railway has undertaken the construction at Port Huron, Mich., of a plant for the repair of freight and passenger cars.

The Unaversol Superheater Company, Detroit, has been incorporated by Charles R. Talbor, W. F. Flieder and B. A. Geoghan.

The Michigan Quartz Silica Company, Ishpeming, Mich., is constructing a silica mill to take the place of the one destroyed by fire about the first of the year. With its new equipment, the mill will have a capacity of about 40 tons in 10 hr.

The Standard Machinery Company, Owosso, Mich., has increased its capital stock from $20,000 to $32,000.

The new Cadillac Motor Company factory at Clark and Michigan avenues, Detroit, will be erected next year at a cost of $1,250,000, according to an announcement made last week at the annual meeting of the General Motors Company, of which the Cadillac Motor Company is a subsidiary. The Cadillac Company is at present starting work on yet another seven-story building, at Woodward and Burroughs avenues, to be used as a sales and service department. It is expected that the building will be ready for occupancy by July 1. Considerable machinery and tools will be needed for the repair and overhaul work which will be done on the top five floors.

The Duplex Truck Company has been organized at Lansing, Mich., with a capital stock of $1,000,000 to take over the business of the Duplex Power Car Company of Charlotte, Mich. The plant of the old company will be moved from Charlotte to Lansing, where a factory large enough to greatly increase the output will be built. H. M. Lee, now assistant sales manager of the Reo Motor Car Company, Lansing, has been elected president and general manager of the new company, H. E. Bradner, vice-president,

and George W. Hewitt, now credit manager of the Reo Company, secretary and treasurer.

The Auto Specialties Mfg. Company, with a plant at St Joseph, Mich., has closed a contract with the Overland Automobile Company to equip all its machines with the Bair auto top holder, the chief product of the company. The order involves the manufacture of 300,000 sets each year. A total of 3,000,000 holders will probably be manufactured at the new St. Joseph plant in 1917.

The Durand Hoop Company, Durand, Mich., is installing modern machinery to take care of the increased demand in its plant.

The output of the Pontiac Chassis Company, Pontiac, Mich., which has been taken over by the new Olympian Motors Company, will double and then triple its output within a short time. R. A. Palmer is president and general manager of the Olympian Motors Company.

The recent announcement that the International Metal Stamping Company, 332 Artillery Avenue, Detroit, Mich., will build a new factory is incorrect. It has purchased the plant of the Diamond Mfg. Company instead.

Announcement has been made that the Michigan Malleable Foundry Company has been absorbed by the Auto Specialties Company of Joliet, Ill. The foundry company now has two buildings under construction at St. Joseph, Mich., and two more will be added, giving the united plants 75,000 feet of floor space.

Catalogs Wanted

The Monta Mower Company, Traverse City, Mich., desires to receive catalogs on the following apparatus: Power presses, 16 and 18-in. lathes, 20-in. power feed drill presses, bench drills, electric welders, grinding machines, bending machines, woodworking machinery, small power screw drivers, heat-treating furnaces for steel, electric and crucible steel, small tapping machines and machine paint. G. T. Montague should be addressed.

The Central South

LOUISVILLE, KY., Nov. 27, 1916.

No important changes in the trade situation have developed the past week. The volume of business continues satisfactory and inquiries in most lines are holding up. Waterworks, lighting plants and coal development projects are most numerous, although many inquiries are appearing for supplies and equipment for oil well operations. Manufacturers of metal products are contemplating further advances on their products.

The Standard Oil Company of Kentucky, Louisville, Ky., has acquired additional ground adjoining its plant and is reported to be planning a refinery to cost $1,000,000. C. T. Collings is president.

The Central Motor Car Company, Louisville, Ky., has been incorporated with $15,000 of capital stock, by Allen H. Douglas, Robert Thomas and Horace C. Dunavent.

The Quaker City Oil & Gas Company, Winchester, Ky., has been incorporated with capital stock of $25,000 by F. C. Wilson, N. C. Day and J. L. Oldham.

The Kentucky Utilities Company, Lexington and Louisville, Ky., has purchased the Glasgow Electric Light & Ice Company, Glasgow, Ky., at a reported price of $100,000 and will establish a central station there, to supply surrounding communities.

The Sanitary Fountain & Cooler Company Owensboro, Ky., has been incorporated with capital stock of $50,000, by C. T. and J. H. Daniel, D. M. Griffith and Charles Bauman. It will manufacture a patented water cooler and fountain.

The Murphy Chair Company, Detroit, Mich., has purchased the old plant of the Stenotype Company, Owensboro, Ky., at a reported price of $50,000, and proposes to remodel and extend it for occupation.

The tipple, engine room and boiler house of the Advance Coal Company, Hillside, Ky., were destroyed by fire with a loss of $30,000. W. S. Thomson, Madisonville, Ky., is superintendent.

Fire destroyed the plant of the Whitley Malleable Iron & Casting Works, Muncie, Ind., with a loss estimated at $250,000.

The Dixie Motor Sales Company, Memphis, Tenn., has been incorporated with capital stock of $25,000 by Julian L. Brode, F. W. Brode, Max Patteson, R. B. Hebdon and C. N. Bender to manufacture and sell automobiles.

H. J. Moore, Sweetwater, Tenn., is in the market for an oil engine of 75 to 100 hp. and a gasoline engine of the same capacity.

The Jonesboro Supply House, Jonesboro, Tenn., is in the market for a 35-hp. boiler for heating and a 10-hp. alternating current, three-phase motor.

The John G. [illegible] Company, Kenosha, Tenn., is asking for [illegible] prices for material for delivery on a 500 to [illegible] water-tube boiler Stirling pattern.

St. Louis

ST. LOUIS, MO., Nov. 27, 1916.

The machine-tool market continues at a very good level, with no interference by second-hand equipment. The aggregate of transactions is at present only limited by deliveries which are now for the most part twelve months away. Negotiations are constantly pending, but now that actions put under way, but no disposition is forced to put it out, because the prevailing conditions do not permit such competition. Extensions of plant, as well as the establishment of new enterprises assure a very satisfactory business for some time to come. Bank reports show greater ease of investment and loan funds than ever before, while collections are far above normal in all lines.

The Saunders Motor Power Company, Public Library Building, East St. Louis, Ill., is preparing to equip a plant for the manufacture of a rotary motor operated with steam, gas or gasoline. Joseph H. Keys is president. Roy Saunders, Robert Logan and Henry Bode are active in the enterprise.

The Wagner Electric Mfg. Company, now building a plant addition, has plans in reserve for still further construction, which will practically double its present capacity.

The Measuregraph Company, St. Louis, Mo., has leased a new factory at 1819 Olive Street, St. Louis, and will install machinery increasing its output of measuring machines by six times its present amount.

The Thatcher-Kerwin Glass Company, St. Louis, Mo., has leased new quarters and will install equipment for the manufacture of plate glass, etc.

The Kansas City Lock Company, Kansas City, Mo., has been incorporated with a capital stock of $50,000 by Frank Dougherty, John Haward and David F. Hornbuckle.

The Kansas City Light & Power Company, Kansas City, Mo., John H. Lucas, president, will expend from $3,000,000 to $5,000,000 on its proposed plant and equipment. Preliminary work is now being done.

The Brokers' Office & Warehouse Company, Kansas City, Mo., will install about $75,000 of cold storage equipment.

The Bayer Steam Soot Blower Company, St. Louis, Mo., has increased its capital stock by $10,000 for the purpose of increasing its output.

The Lincoln Steel & Forge Company, St. Louis, Mo., has increased its capital by $25,000 for the purpose of adding to its equipment, etc.

The Dumore Heating & Ventilating Company, St. Louis, Mo., has been incorporated with a capital stock of $15,000 by John W. Marx, George A. and Henry V. Deemar to manufacture heating and ventilating apparatus.

The Collapsible Joist Form Company, Kansas City, Mo., has been incorporated with a capital stock of $16,000 by E. C. Marqua, Hans Van Enwarth and J. R. Byrd to manufacture patented forms for concrete work.

The St. Joseph Structural Steel Company, St. Joseph, Mo., is preparing to double its equipment and capacity.

F. E. Scott, Kansas City, Mo., will equip a garage and machine shop to cost $19,000.

The St. Louis, Iron Mountain & Southern Railway Company, E. A. Hadley, St. Louis, chief engineer, will equip a roundhouse and machine shop at Gurdon, Ark.

The St. Francis River Gin Company, Parkin, Ark., has been incorporated with a capital stock of $10,000 by I. R. Dye, W. L. Banks and R. W. Minnie, and will purchase cotton compress and gin equipment.

The Bain Mfg. Company, Pine Bluff, Ark., has been incorporated with a capital stock of $30,000 by D. B. Niven, A. J. Robinson, J. C. Bain, and others, to equip a cottonseed oil mill.

Lindsay, Okla., will purchase an engine and other equipment, to cost about $6,000, for its waterworks and electric light plant.

Tulsa, Okla., will equip a low service pumping unit at the city waterworks pumping station. Strecker & Sloan, Kansas City, Mo., are the engineers.

The Cloco Gasoline Company, 407 Unity Building, Tulsa, Okla., will install compressing plant machinery with a capacity of 1,000,000 cu. ft. of gas daily.

M. Mortenson, Fairfax, Okla., will equip a garage and machine shop, 75 x 140 ft., and is in the market for machinery.

The Churchill Milton Lumber Company, Greenwood,

Miss., John Churchill, Louisville, Ky., president, will equip a hardwood lumber mill of 100,000 ft. per day capacity, to cost about $35,000.

The Stern Foundry & Machinery Company, New Orleans, La., will build additions to its plant, including a foundry and machine shop, which will cost approximately $100,000.

Birmingham

BIRMINGHAM, ALA., Nov. 27, 1916.

Machinery dealers are unable to supply the demand for machine tools. Second-hand dealers have scoured the territory and report everything taken. The coal shortage has stimulated the demand for electrical apparatus. Gasoline engines cannot be supplied fast enough. The trade reports good conditions all round.

The Norway Graphite Mining Company, Birmingham, has been incorporated with a capital stock of $100,000 by R. H. Cobb, Roy M. Sterne, E. L. Muchmore, and others, and will operate a mill in the Ashland district.

George W. Parks, Stuart, Fla., and others, are considering the building of a hydroelectric plant.

The J. H. Hodges Lumber Company, Apalachicola, Fla., will establish a hardwood mill with a capacity of 20,000 ft. per day.

The Vida Lumber Company, Clanton, Ala., will build a narrow-gage railroad, establish a sawmill and develop a turpentine industry on 15,000 acres nearby.

Texas

AUSTIN, TEX., Nov. 25, 1916.

The Post City Brick & Tile Company will build a plant at Post City for manufacturing brick and tile, to cost about $10,000.

An issue of $100,000 bonds is now available for enlarging the municipal waterworks plant at Austin. Another bond issue of $230,000 is to be used for the construction of municipal docks and terminals, and the installation of electric loading and unloading devices upon the deep-water front.

Wilbur Bush & Son, Poteau, Okla., will build an ice and cold storage plant at El Paso, to cost about $60,000.

H. P. Miller, Fort Worth, plans to build a plant at Dallas for manufacturing an automobile appliance.

The Pacific Northwest

SEATTLE, WASH., Nov. 21, 1916.

That December is expected to be a big month in Puget Sound shipping circles is indicated by the fact that Frank Waterhouse & Co., Inc., will handle 45,000 tons of cargo in transpacific trade in that period. October showed the third greatest monthly record in the history of Seattle, with shipments of $38,347,629, making the total for the first 10 months of 1916 $340,560,926, as compared with $257,792,393 for the entire year of 1915.

West coast lumber mills have orders totaling 359,139,860 ft., delivery of which is causing grave concern. Of this amount approximately 10,428 carloads are for transcontinental haul, which the increasing car shortage threatens to seriously interfere with. Mills have partially adjusted themselves to scarcity in ocean tonnage, which has been somewhat relieved in the past two months by curtailing production. The Southern Pacific Company reports cars are now on the way to Oregon to relieve the great shortage there.

The Peninsula Shipbuilding Company, St. Johns, Ore., plans to build two more sets of ways, making four in all. The two five-masted auxiliary schooners now under construction will be followed by three others of the same type.

The J. F. Duthie Shipbuilding Company, Seattle, recently signed a contract with Norwegian interests for another 8800-ton steel steamship, making the seventh vessel now under contract.

The New-York-Montana Testing & Engineering Company, Helena, Mont., plans the installation of a testing plant. It was recently incorporated with a capital stock of $100,000, with Charles E. Fryberger, president, and Hugh Smith, vice president. The initial plant will cost $35,000 and will have a capacity of about 50 tons daily.

The Washington Iron Works, Seattle, plans to immediately erect a foundry addition to its factory, 48 x 72 ft., one-story.

The Seattle Paint Company, Seattle, will shortly receive bids for its proposed two-story factory, 50 x 100 ft., to be built at its plant at a cost of about $20,000. It will be equipped with new machinery.

The Columbia Engineering Works, Linnton, Ore., reports that it has sufficient business now booked to insure continuous operation for two years. It is stated the plant will be enlarged.

The sawmill of the Hillgard Lumber Company, Whitney, Ore., was completely destroyed by fire recently, with a loss of $25,000. It is understood the plant will be rebuilt at once.

William Bryand, Florence, Ore., is at the head of a project to erect a shipbuilding plant in Florence, to cost $100,000.

It is announced that the Norwegian-American Line, a new transpacific shipping company, recently organized, will establish headquarters in Seattle. It purchased one freight vessel, and four others are now under construction in Japanese yards, at a cost of $4,000,000. The company will operate between the Pacific coast and Oriental points. This makes the sixth transpacific line operating out of Seattle, with a total monthly commerce to and from the Far East of $18,000,000.

Plans for the proposed shipbuilding plant to be erected in Portland for the Columbia Shipbuilding Company have been completed. The main building will be 65 x 600 ft., costing $16,000. Three shipways are to be built, each 510 ft. long, and costing $22,000. The company was recently organized by members of the Northwest Steel Company and the Smith & Watson Iron Works. R. F. Arndt, of the Northwest Steel Company, Portland, has charge of construction.

The I. L. Hirsch Radiator Works, Tacoma, Wash., plans the construction of a three-story building, 80 x 100 ft., to cost $25,000.

The new power plant of the Hawley Pulp & Paper Company's plant in Oregon City, Ore., was recently damaged by fire with a loss of $6,000. Principal loss was to the generating machinery. The power plant is part of the new $1,000,000 addition under way.

The Olympia Shingle Company, Olympia, Wash., recently organized to take over the holdings of the defunct Democratic Emergency Shingle Company, Olympia, is completing plans to install new equipment in the plant. It will have an output of 250,000 shingles daily.

It is stated that the plant of the Yellowstone Packing Company, Billings, Mont., now under construction, will be ready for operation about Jan. 15. It will represent an expenditure of $150,000.

Plans for the proposed shipbuilding plant of the Ames Shipbuilding & Dry Dock Company, to be erected in Seattle, are nearing completion in the offices of Lee & Brinton, naval architects, Seattle. The plant will cost $80,000, and will include a plate shed 160 x 440 ft., machine shop 95 x 240 ft., wood-working shop, furnace, blacksmith shop, an office buildings, power plant and three shipways. The company has secured contracts and completed plans for three steel vessels, costing $2,500,000.

It is announced that the Gorham Engineer Works, on the tidal canal, Oakland, Cal., has been taken over by the Skandia-Pacific Oil Engine Company, for a consideration said to be $100,000. It is stated the plant will be enlarged to double its present capacity.

Improvements by the Southern Pacific Railway Company at Eugene, Ore., have been approved, and construction will start in the near future. The plans include a roundhouse, pump house with machine shops, etc., at a total cost of about $150,000.

The Chase Patented Beds Company, Seattle, will erect a two-story factory, 105 x 120 ft., to cost about $45,000. Work will begin about Dec. 15.

The Western Gear Works, Seattle, plans the construction of a two-story plant on Ninth and King streets, which will cost about $10,000.

The Snow Mfg. Company, 945 North Main Street, Los Angeles, Cal., manufacturer of irrigation appliances, tools for making concrete pipe, etc., has purchased a site, 145 x 240 ft., and has started the construction of a foundry and manufacturing plant to be completed in 60 days. Frank P. Snow and Frank S. Livingstone are the proprietors.

Canada

TORONTO, Nov. 27, 1916.

The Dodge Metal Hose Company of Canada, Ltd., is arranging for the erection of a plant at Galt, Ont., to cost $50,000. Machinery to cost $22,000 will be installed. The company will manufacture malleable iron hose, to replace rubber hose used to couple the air line between railway cars. It has also Canadian patents for the manufacture of five other articles, to be turned out in the plant, which is to be erected at Galt. J. R. Cameron, 381 Lansdowne Avenue, Toronto, is active in the company.

The Dominion Creosoting Company, Ltd., South Vancouver, B. C., is erecting a large addition for the manu-

facture of knockdown granaries, for which a large demand exists in the Canadian West.

The Consolidated Mining & Smelting Company, Trail, B. C., is erecting an addition to its electrolytic zinc plant, 165 x 200 ft.

The Port Hope Sanitary Mfg. Company will establish a factory at Port Hope, Ont. Fred Armstrong, Toronto, is general manager.

The Canadian Buffalo Forge Company, Kitchener, Ont., has started work on an addition, 100 x 150 ft., that will double the capacity of its plant. The new addition will cost $100,000.

Construction work has been started on a galvanizing plant for the McClary Mfg. Company at London, Ont., to cost $30,000.

Work has been started on the erection of a factory building at New Toronto, Ont., for the Dupont Fabrikoid Company, Dufferin Street, Toronto, manufacturer of leather goods. The building will cost $75,000 and machinery to cost $175,000 will be installed.

The Public School Board, Edmonton, Alberta, will increase the capacity of the school machine shop. F. Brody is secretary.

Tenders will shortly be called for the erection of the first unit of the grain elevator to be built on the river front at Fort William, Ont., for Sellars Brothers' Elevators, Ltd., Grain Exchange, Fort William, to cost $75,000. Harry Sellars, care the Canadian Northern Elevator Company, Port Arthur, is engineer.

The Tallman Brass Company, Hamilton, Ont., has had plans prepared for the erection of an addition to its plant to cost $4,000. It also proposes to build a brick addition to cost $50,000. Stewart & Whitton, 7 Hughson Street South, Hamilton, are the architects.

Flavelles, Ltd., Lindsay, Ont., proposes to rebuild their cold storage plant which was recently destroyed by fire. The plant will be of brick construction and will cost $75,000. H. S. Johnson is secretary.

The Canadian Robert Dollar Company proposes to build a sawmill and docks at North Vancouver, B. C., at an approximate cost of $200,000. The sawmill will be operated by electricity and about 800 ft. of dock will be constructed.

J. S. Emerson, 744 Hastings Street West, Vancouver, B. C., proposes to build a sawmill, dry kilns, shingle and planing mills at Prince Rupert, B. C.

The Dominion Machinery Company, 110 Church Street, Toronto, has had plans prepared and will erect a brick factory at 14 Darling Avenue, Toronto, to cost $5,500.

The International Machineries, Ltd., Montreal, has awarded the contract to Anglins, Ltd., 65 Victoria Street, for the erection of a plant on Notre Dame Street.

The Canadian Cooperage Company's plant on Union Street, Smith's Falls, Ont., was destroyed by fire with a loss of $10,000. The company proposes to rebuild and will require new machinery.

The Day & Woolworth Handle Company, Louisville, Ky., will erect a plant at Hamilton, Ont. It has secured property opposite the Canada Steel Goods Company and will commence the erection of its plant soon.

The Trudeau Carriage, Ltd., Montreal, has been incorporated with a capital stock of $49,000 by Theophile Trudeau, Maximilien Renaud, Jean L. Poirier, and others.

The Musical Instruments, Ltd., Toronto, has been incorporated with a capital stock of $40,000 by Ambrose T. Pike, 682 Bathurst Street; Jacob A. Moore, B. S. Stright, and others.

The Beaver Board Timber Company, Ltd., Toronto, has been incorporated with a capital stock of $50,000 by James W. Bicknell, John B. O'Brien, John S. Duggan, 25 Harbord Street, and others, to manufacture pulp.

The Reid Products Company, Ltd., Toronto, has been incorporated with a capital stock of $40,000 by Lerritt A. Reeves, 203 Mail Building, Albert C. F. West, and others, to manufacture incinerators, metallic specialties, etc.

The Borbridge Saddlery Company's factory at Winnipeg, Man., was totally destroyed by fire with a loss of $100,000. S. B. Borbridge is manager.

The Beacon Match Company proposes to erect a plant at Bracebridge, Ont., to cost $45,000, to have a capacity of 100 cases of matches per day.

It is reported that John Coughlan & Sons, steel manufacturers, Beatty Street, Vancouver, B. C., propose to establish a shipbuilding yard on False Creek. Plans have been drawn and it is expected that construction work will be commenced as soon as sufficient labor can be secured.

Government Purchases

WASHINGTON, D. C., Nov. 27, 1916.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until date not set, schedule 398, for two muffle type electric furnaces for Newport; schedule 404, for 8 motor-driven main air pumps for condensers, and schedule 405, for 4 main feed water heaters, all for Brooklyn; and Mare Island; schedule 407, for 2 generating sets for Philadelphia; schedule 408, for 8 water tube marine boilers for Brooklyn; schedule 409, for miscellaneous fire and bilge pumps for Boston; schedule 413, for two 24-in. x 10-ft. geared lathes, three 14-in. x 6-ft. geared head lathes and one power gap shears, all for Washington; schedule 414, two 12-in. x 8-ft. geared head lathes, one 14-in. x 12-ft. head lathe, two 14-in. x 9-ft. geared head lathe and two milling machines, all for Washington; schedule 426, for two hand screw machines; schedule 427, for one pneumatic riveting machine for Philadelphia; schedule 428, for 38 trolley hoists; schedule 430, for 35 testing generators; and schedule 439, for 24 portable electric drills, all for Brooklyn; schedule 452, for nine 6-in. handy billy pumps for Mare Island.

Proposals will be received by the Bureau of Yards and Docks, Navy Department, Washington, until 11 a. m., Dec. 4, for furnishing two fitting-out cranes for Mare Island.

The general purchasing officer of the Panama Canal, Washington, will receive sealed proposals until 10.30 a. m., Dec. 15, for furnishing centrifugal pumps and equipment.

Bids were received by the Bureau of Supplies and Accounts, Navy Department, Washington, for supplies for the naval service as follows:

Schedule 294, Steam Engineering

Class 31, Puget Sound—Six alternating current motors—Bid 21, $1,849.39; 50, $1,917.

Schedule 288, Ordnance

Class 71, Keyport, Wash.—One universal cutter and tool grinding machine—Bid 56, $625.

Class 72, Keyport—One bench-type precision lathe—Bid 18, $1,532.25; 56, $1,582.

Class 73, Keyport—One engine lathe—Bid 56, $1,880; 61, $1,120; 73, $2,231; 81, $1,878.

Class 74, Keyport—One screw machine. Bid 56, $1,350.

Class 75, Keyport—One upright drilling machine—Bid 56, $508; 81, $562.

Class 76, Keyport—One universal milling machine—Bid 10, $3,557 and $3,453; 56, $3,625; 63, informal.

Class 77, Keyport—One engine lathe—Bid 56, $3,545; 74, $4039; 81, $3,842.

Schedule 325, Steam Engineering

Class 121, Brooklyn—Eight turning gear motors, with spare parts—Bid 27, $4,048.84; 50, $4,428.80; 91, $3,489.80.

The names of the bidders and the numbers under which they are designated in the above list are as follows:

Bid 10, Brown & Sharpe Mfg. Company; 18, J. Bleser Mfg. Company; 21, Carroll Electric Company; 27, Cutler-Hammer Mfg. Company; 50, General Electric Company; 56, Hallidie Machinery Company; 61, Kemp Machinery Company; 63, Kempsmith Mfg. Company; 73, Manning, Maxwell & Moore, Inc.; 74, Miller Brothers Automobile & Supply House; 81, Niles-Bement-Pond Company; 91, Reliance Electric & Engineering Company.

Brinell Tests and the Law of Similitude

In discussing a paper on the principles of similitude, presented at the recent meeting of the British Association, Prof. C. H. Bulleid gave an instance of the value of one law of comparison in making hardness tests by the Brinell method. The standard size of ball for this test was 10 mm. in diameter. Balls of this size not being available, ⅜-in. balls were used instead and the results reduced to the 10-mm. size. According to the law in question, when the two balls were driven down to corresponding depths, the load necessary would be proportional to the square of the diameter of the balls, and the diameter of the depressions would be proportionate to the ball diameters. It was stated that the law had been tested on a series of balls from ¼ to 3 in. in diameter, and the results were plotted on the co-ordinates of load ÷ the square of the diameter and diameter of impression ÷ diameter of ball. The results were quite consistent so long as the plate used was thick enough to prevent the depression coming through on the opposite side.

Perpetual Inventory and Appraisal Values

(*Continued from page* 1227)

for adoption? Has any appraisal company ever advocated that depreciation be distributed as an operating expense against the product? Can any appraisal company claim with any justice that it can determine proper rates of depreciation without close contact with and full knowledge of the operating conditions and operating needs of an industry? Certainly without such contact and without such knowledge, the claim that successive appraisals are essential factors in the determination of costs, prices and profits, is, to say the least, pure buncombe. The primary business of an appraisal company is to determine an authoritative replacement value, and its entire organization is trained for this purpose. But when the appraisers enter the field of depreciation, operating values, and costs, they are playing wholly out of their class and ought to admit it. They are doing their clients positive harm and are leading them straight to the shoals of financial disaster; for appraisals as previously explained have a distinct upward tendency, and the increases in value which they show as the result of wholly extraneous conditions have the effect of lulling the manufacturer into a wrong sense of financial security.

Standard Depreciation Rates for Factory Buildings and Equipment

Adopted by Manufacturers of Conveyors and Elevators, Chicago, Feb. 25, 1916

A MEETING of manufacturers of conveyors and elevators, called to draw up an agreement on some standardized form of accounting procedure, disclosed that, out of nine manufacturers, two disregarded the question of depreciation, five charged off depreciation to profit and loss and two charged depreciation against operating expenses. The rates of depreciation varied widely and the first step, as told by Mr. Piez in the accompanying paper, was the establishing of the following depreciation standards:

	Per Cent on Cost	Per Cent on Reducing Balance
Buildings and Accessories		
Reinforced concrete or steel and tile	2	3
Brick and steel with non-combustible roof and concrete floors	2.5	4
Brick, steel and wood	3	5
Brick and wood	3	5
Steel frame, wooden roof and corrugated iron walls	3.5	7
Steel frame, non-combustible roof and corrugated iron walls	3	6
Concrete block, with wooden roofs and floors	3.5	8
All wood structures, well built (20 yr.)	5	10
All wood structures, cheap (20 yr.)		12
Sprinkler system (20 yr.)	4	
Heating and ventilating system (20 yr.)	4	
Water and sewer piping and sanitary fixtures (where separate)	4	7.5
Tanks and reservoirs, steel	4.5	10
Tanks and reservoirs, wood (10 yr.)		20
Note: All Repairs and Maintenance to be charged to Account 8059.		
Machinery and Large Equipment		
Boilers, pumps, feedwater heaters and air compressors	6	15
Power piping	6	15
Switchboards, main wiring and conduit	6	
Engines and dynamos		
Machinery, motors, machine tools, traveling cranes, etc.	4.5	
Punch presses, bending rolls, power shears and drop hammers		10
Shafting, pulleys, hangers and belting		
Machine tool accessories—Boring bars, drivers, key seating broaches, etc. (All renewals to repairs)		
Cupolas, converters, melting furnaces and accessories		10
Annealing and heating furnaces, ovens, forges, etc.	5	10
Motor trucks	20	60
Storage battery locomotives (battery renewals to repairs)	10	30
Horses and Wagons	12	35
Small Tools		
For machines, net additions	50	..
Hand tools, net additions	50	..
Punches and dies (Standard) net additions	50	..
Chills, iron and steel flasks and accessories, net additions	50	..
Fixtures, Furniture and Miscellaneous Equipment		
Steel shelving, lockers, etc.	5	12
Mechanical appliances, net additions	60	..
Departmental wiring and electric fixtures, net additions	60	..
Miscellaneous items (wood), net additions	70	..
Patterns (Standard)		
Metal, net additions	75	..
Wood, net additions	100	..
* All patterns required for a particular order or contract to be charged to the job.		
Drawings		
All new standard drawings to be charged to expense.		
All drawings required for a particular order or contract to be charged to the job.		
Miscellaneous Real Estate Improvements		
Pavements, sidewalks, fences, retaining walls, roadways, tracks, yard drainage, general conduits, tunnels, vaults, etc.	4.5	10

MOST INDUSTRIES CHARGE OFF TOO LITTLE

All of those with whom I have been associated in business for the last quarter of a century have been radicals in their methods of depreciation, but with all of this strong leaning toward what might be considered an excessive write-off, we frequently find when we are ready to discard a tool, or reconstruct a building, that a substantial additional amount must be charged off to profit and loss.

The great majority of industries charge off too little rather than too much, and the appraisal companies are, if anything, assisting—unconsciously of course—in increasing this unprofitable and oft-times disastrous habit.

I had occasion recently to go over the financial statements of a manufacturing plant which had delegated the important function of depreciation to an appraisal company. The amount charged off annually was less than one-half of the proper amount, this being due, the owner said, to the constant and considerable advance in the replacement value of the property. Here was a typical case of reducing the operating burden of a plant by crediting it with a wholly speculative, and unrealizable increase in property value. In this case the appraisal company specified the amount to be depreciated each year and the appraisal company was therefore responsible for this wholly unsound and unscientific procedure. The owner is about to build a new plant, and I take no chances in prophesying that he has some bitter disappointments awaiting him in unforeseen shrinkages of assets when he abandons the old plant.

The problem of determining an adequate scale of

depreciation is by no means a simple one, and it goes hand in hand with the problem of distributing depreciation against the cost of the product. It is astonishing to find how widely the practice among different manufacturers in the same line varies.

As a result, largely of the recommendations made by the Federal Trade Commission that the cost accounting systems of various lines of industry be standardized, the manufacturers of conveyors and elevators have made a determined effort to agree on some standardized form of accounting procedure. The preliminary meeting of the manufacturers and their accountants disclosed the fact that out of nine manufacturers two disregarded the question of depreciation entirely, five charged off depreciation to profit and loss, and only two charged depreciation against operating expenses, making it thereby a component part of the cost. The rates of depreciation varied widely, and the first steps taken by the conference consisted in determining a standard schedule of rates of depreciation. As an item of interest in connection with the subject of this paper, and as an incentive for other lines of industry to determine and agree upon similar standards, I am appending the schedule herewith. The rates are but compromises growing out of the judgment and experience of the individual members of the Conveyor Manufacturers' Conference, but their correctness can be verified by matching the perpetual inventory values which these rates will establish against the actual experience of loss in cash value when equipment or buildings are discarded.

They establish, therefore, a broad basis upon which fair operating values and the shrinkage in these values, due to wear and tear and change in style, can be computed, and serve as the preliminary steps to the equitable distribution of these shrinkages, or depreciation in value over the cost of the product.

I recognize the value of the work done by the appraisal companies in establishing authoritative replacement values for purposes of insurance, for the purpose of comparing the physical values of various plants about to be purchased or merged, or as the foundation upon which a perpetual inventory kept by the industry itself can be based; but I am convinced that only a perpetual inventory providing for a sound schedule of depreciation, and intelligently handled by the management of the industry, is of value in determining the true cost of the product.

Cuban Manganese Ore Deposits

Three groups of manganese ore deposits are recognized in the Santiago district of Cuba, according to U. S. Consul P. M. Griffith, of Santiago. They are the Cristo, Cauto and Ponupo mines, the last, which is the largest, being now a producer of about 3000 tons per month of ore running 43 per cent in manganese. The Cristo mines are turning out a small amount of ore having about 46 per cent manganese, while the Cauto group is producing about 2000 tons per month. The Ponupo and Cristo groups are operated by Aguilera & Co. and the Cauto group by the Cauto Mining Company. The report states that lack of labor has held in check development in this industry and that large undeveloped and undenounced deposits of manganese still exist in the province.

The Compressed Gas Manufacturers' Association will hold its fourth annual meeting at its offices, 120 Broadway, New York City, Jan. 15, 1917, at 2 p. m. As usual the meeting will be followed by the association's annual dinner at the Manhattan Club. Otto S. King, 218 East Forty-second Street, New York City, is secretary and treasurer of the association.

Austrian Manganese Ores and Germany's Supplies

In a paper read at the autumn meeting of the Iron and Steel Institute in London, Sept. 22, 1916, Herbert K. Scott discussed the "Manganese Ores of the Bukowina." These deposits are in the Drona Vatra district of Austria, and while not normally important, they are of considerable value to Austrian steel works when the fortunes of war enables Austria to control that territory. Reference is made to the fact that Germany has a number of manganiferous iron ore deposits, the mineral from which is largely used for the manufacture of spiegeleisen. In 1911 the total production from these deposits amounted to over 3,000,000 tons, containing up to 30 per cent of manganese, but only 300,000 tons had contents of 20 per cent and over, while the greater part gave only 2 to 12 per cent of manganese.

In Austria-Hungary the production of manganese ore never has been on a large scale, and the average output for 1909-1913 was 33,662 tons from Austria, Bosnia and Herzegovina, and Hungary. It was stated by the assistant secretary of the German Iron and Steel Institute in March last that the necessary supply of manganiferous ore for the production of ferromanganese and spiegeleisen during the war had been assured, and that a suitable substitute for manganese had been found for the deoxidation of the steel bath. Since the blockade of the Central powers and the cutting of railroad communication between Russia and Austria prevent the importation of manganese ore suitable for ferromanganese production, it is obvious that the output of manganese ore in Germany and Austria must have increased appreciably.

The author, who visited the Drona Vatra district in 1913, describes the geology and occurrence of the manganese deposits and the methods of working adopted. He said that calculations showed that over 150,000 tons of mineral could be mined from the lenses above No. 1 level, a quantity which would guarantee an annual output of 50,000 tons for three years, while further quantities of both oxide and carbonate ore would doubtless be proved at lower levels.

Cleanliness as a Safety Measure

In a paper on the prevention of infection in connection with safety work, presented at the fifth annual safety congress, Detroit, Oct. 17, Dr. Carlos C. Booth called attention to the fact that gloves worn by workers in steel mills may often be the source of infection in the event of accident. A laundered cloth glove, neatly mended, is much safer than a new glove from the store if an accident occurs to the hand or finger. A case was cited in which a hand was crushed while wearing a glove. The glove was not torn or broken but tetanus set in, resulting in the death of the man. The germ was undoubtedly inside the glove at the time of the accident and it was thought probable that if the glove had been recently boiled, the man would have escaped infection.

The author recommended that in those concerns that could not afford to have a resident physician permanently employed at the plant, all wounds be douched at once with a 3.5 per cent iodine solution and then bound up with a simple dressing, prior to sending the man to the office of a physician. This treatment has reduced the percentage of infection in accidents to an extremely low figure.

In concluding, Dr. Booth gave the following advice: "Teach your men to keep as clean as possible under the circumstances, especially their hands and feet, and to report at once to the emergency hospital without touching the wound and without allowing anyone else to do so or to pour water on it. Allow no one to attend the wound but the attendant at the emergency room or the surgeon, if he happens to be there."

The Bonnot Company, Canton, Ohio, has contracted to furnish one of its latest Holbeck improved powdered coal systems to supply powdered coal to 24 sheet and pair furnaces of the Standard Tin Plate Company, Canonsburg, Pa.

NEW TRADE PUBLICATIONS

Vacuum Drying Apparatus.—Buffalo Foundry & Machine Company, Buffalo, N. Y. Folder representing a bond, calls attention to the advantages secured by the use of the company's vacuum drying apparatus, such as complete control of the process, reduced cost; savings in floor space, steam and fuel; elimination of waste and improved quality of output. The coupons of the bond are given over to engravings of the various pieces of apparatus that can be supplied.

Pneumatic Dust Collecting and Conveying Systems.—B. F. Sturtevant Company, Hyde Park, Boston, Mass. Catalog No. 235. Gives general description and specifications for the company's fan systems for collecting dust and conveying materials. The advantages of pneumatic systems of this nature for use in woodworking plants; in connection with grinding, buffing and polishing wheels, tumbling barrels and sand blast machines and in cement plants, coal breakers and shoe factories are briefly pointed out and a number of views of installations are included. Systems for conveying fibrous material, pulverized coal, chips, cork scrap, ashes, etc., are also illustrated. The various fans used are shown and a number of tables of useful information are included.

Steel Stamps.—Weber-Erickson-Bunting Company, Pittsburgh, Pa. Circular. Refers to the use of steel stamps for identifying the workman responsible for any particular piece of work in a shop. Reproductions of the various stamps that can be supplied are presented, together with the identification number and a price list of the different sizes furnished.

Alloy Steels.—Vanadium-Alloys Steel Company, First Avenue and Ross Street, Pittsburgh, Pa. Folder. Devoted to the Vasco-Vanadium line of steels for tools and other work. The various grades are described and considerable information is given on the subjcet of alloy steels in general and their uses. A complete list of carbon steel extras is included.

Tools and Hardware Specialties.—Smith & Hemenway Company, Inc., 99 Chambers Street, New York City. Seventh edition of the "Green Book." Size, 4 x 7 in.; pages, 256. Contains illustrations and brief descriptions of a complete line of tools and hardware specialties, including pliers, tool belts and kits, safety straps, hack saw frames and blades, screw drivers, bits, mitre boxes, nippers, etc. In a number of cases tables of the various sizes of tools that can be supplied are given. An alphabetical list of the lines covered and a numerical one of the list numbers enable any article to be found easily.

Iron and Steel.—Scully Steel & Iron Company, Ashland Avenue and Twenty-fourth Street, Chicago, Ill. November and December stock list and reference book. This publication, which will be issued regularly every two months in the future instead of only a stock list every month, contains in addition to the stock on hand considerable valuable information to the trade. Numerous pages of tables, short cuts, safe loads, etc., taken from the company's Blue Book have been inserted. The book is of pocket size, 4½ x 7 in., and has a thumb index to facilitate finding the various articles carried in stock. In the new book only the sizes carried are listed and no mention is made of quantities.

Engine Lathe.—Climax Machine Company, Lancaster, Pa. Circular. Concerned with a 10-in. engine lathe for light work in machine shops and manufacturing establishments. A brief description is presented and is supplemented by an engraving of the machine and a condensed table of specifications.

Pole Jacks.—Templeton, Kenly & Co., Ltd., 1020 South Central Avenue, Chicago, Ill. Pamphlet. Presents a number of illustrations of a jack in use for pulling and straightening poles, attention being particularly directed to the pulling of a 40-ft. pole imbedded in over 7 ft. of clay in 8 min. A number of testimonial letters and a condensed table of specifications of the jack are included.

Air Compressors and Riveting Hammers.—Ingersoll-Rand Company, 11 Broadway, New York City. Two bulletins. The first, No. 3130, points out the advantages of using a line of power-driven, single-stage straight line air compressors which are built with piston displacement capacities ranging from 52 to 955 cu. ft. per min. A general description of the construction is presented, followed by details of the various parts, the text matter being supplemented by numerous engravings. Dimension tables and diagrams of the compressors, which are equipped with the Ingersoll-Rogler disk type air valve, are included, together with a condensed table of specifications. In the other bulletin, No. 8311, which supersedes No. 8211, illustrations and descriptive matter explain the operation of an inside trigger type of pneumatic riveting hammer. Dimensions and specifications of the [illegible] hammer that can be supplied are presented. Emphasis is laid on the rivet set retainer furnished, which is designed to meet the regulations and requirements of the safety appliance laws enacted in the various states. A number of views of the hammer in use are included.

Gray-Iron Castings.—Houston Car Wheel & Machine Company, Houston, Tex. Catalog. Presents illustrations and brief descriptions of the facilities possessed by the company for turning out gray-iron castings, chilled cast-iron carwheels and doing general machine shop repair work. In the catalog the engravings are presented on one page with the descriptive matter on the facing one.

Tool Holders.—Gisholt Machine Company, Madison, Wis. Circular. Gives some of the reasons for using tool holders in turret and engine lathes to utilize pieces of high-speed steel. Views of the different tool holders are presented, together with a table of dimensions of the five sizes that can be supplied.

Motor Trucks.—White Company, Cleveland, Ohio. Pamphlet. Size, 9 x 12 in.; pages, 56. Deals with the use of motor trucks for hauling, dumping, spreading and rolling road material; pulling road machinery, road maintenance and flushing and sprinkling streets. After a brief description of the trucks and their advantages for this work, the records that have been made in constructing and maintaining various forms of road are brought out in extracts from testimonial letters. The pamphlet is profusely illustrated with views of the trucks in use and the work that has been done by them.

Engine Lathes.—J. A. Fay & Egan Company, Cincinnati, Ohio. Bulletins Nos. 200 and 201. Give illustrations and brief descriptions of a 16 and 18 in. standard engine lathe lathe equipped with double sliding back gears. The two bulletins are identical in make-up, an engraving of the machine being given at the top with the description underneath. Each portion of the lathe is given a separate paragraph in the description and the first word in every case relates to the part of the tool covered by that particular paragraph. To attract attention, this is printed in heavy type. A condensed table of specifications follows the description in each case.

Oxy-Acetylene Welding and Cutting.—General Welding & Equipment Company, 107 Massachusetts Avenue, Boston, Mass. Two pamphlets. The first mentions the equipment furnished by the company in its standard welding and cutting outfits. In addition to illustrations of the apparatus views of the torches employed are presented wth the various parts marked. A partial list of users is included. The other pamphlet describes the precautions to be observed in welding and cutting, giving complete instructions on the welding of various metals and the cutting of iron and steel. After a brief description of the way in which the oxygen and acetylene are generated and used, instructions on the care of the apparatus and the welding of various metals and a number of views of the apparatus in use are presented. The same arrangement is followed in the section dealing with the cutting of iron and steel.

High Phosphorus Slags for Fertilizer

A method of producing steel and high phosphorus slag is covered by a patent (U. S. 1,193,496—Aug. 8, 1916) granted to Anson W. Allen and Eugene G. Lilly of Birmingham, Ala. Instead of pouring off the high phosphorus slag from the steel made from the high phosphorus ores of the United States by the open-hearth or duplex process or the electric furnace and replacing this slag by a refinishing slag in the same furnace, as patented by William R. Walker, of the United States Steel Corporation, the patentees pour the metal and the high phosphorus slag out of the furnace into a ladle, from which the slag is poured off cleanly and completely. The slag is available then for fertilizing purposes. The metal thus "roughed down" is transferred to a refining furnace for ultimate refining or it is cast into ingots directly. The scheme provides for several roughing-down furnaces with a capacity in excess of that of the finishing furnaces, the excess capacity being used for the manufacture of high phosphorus steel. The process is described as really a triplex process consisting of first the converters, the roughing down open-hearth and then the refining, whether open-hearth or electric.

Hugh Obar of Washington and Charles M. Matthias of Frederick, Md., have been appointed receivers for the Morris Iron & Steel Company, Frederick, Md., on a petition filed by the president, John Mitchell, Jr. The plant will be continued in operation.

THE IRON AGE

New York, December 7, 1916

ESTABLISHED 1855 VOL. 98: No. 23

Youngstown's New Coke Oven Plant

Coal Unloading Scheme and New Type of Oven Door Extractor Among Features of Youngstown Sheet & Tube Installation

ON Aug. 19 the first coke was pushed from the Youngstown Sheet & Tube Company's new coke plant at Youngstown, Ohio. The plant consists of four batteries of H. Koppers Company's ovens. Each battery is made up of fifty-one 12¼-ton ovens, and is intended to supply the coke required for the operation of one blast furnace. The surplus gas from these batteries is piped to the company's adjoining steel plant, and used as fuel in the heating furnaces, soaking pits, etc. In connection with the coke plant, there is installed a Semet-Solvay benzol plant, which recovers benzol, toluol and solvent naphtha from the gas after it leaves the H. Koppers' direct process tar and ammonia recovery apparatus.

COAL HANDLING

The coal is delivered to the plant car storage tracks by rail. On these tracks is room for the number of carloads of coal required for a 24-hr. run. The cars are moved on the storage tracks to a high-lift car dumper by means of an electric locomotive running on a narrow gage track, located between two standard gage tracks. A special type of electric locomotive which has a movable arm on both sides was designed by the Westinghouse-Baldwin Mfg. Company for this service.

Upon reaching the car dumper, which was furnished by the Wellman-Seaver-Morgan Company, the cars are lifted to either of two dumping positions. The lower position is for dumping coal to an electric side dump transfer car of 110 tons capacity, which will dump it opposite a storage pile within reach of a proposed bridge grab bucket which will store and reclaim the coal as required. The coal coming from storage will be loaded by the bridge into railroad cars which are taken to the car dumper and dumped at high positions into a receiving hopper at the top of the coal breaker building, and delivered by means of a flight feeder with a capacity of 500 tons per hour to the breakers. Beams are provided in the receiving hopper with 18 in. clear space between them to prevent large lumps or frozen chunks of coal from getting to the



Beyond the Ovens in This View of the Pusher Side May Be Seen the Larger Part of the Coal Bunker, Into Which Cars of Coal Are Lifted and Dumped Preparatory to Its Being Delivered to the Coal Breaker



The High Lift Car Dumper

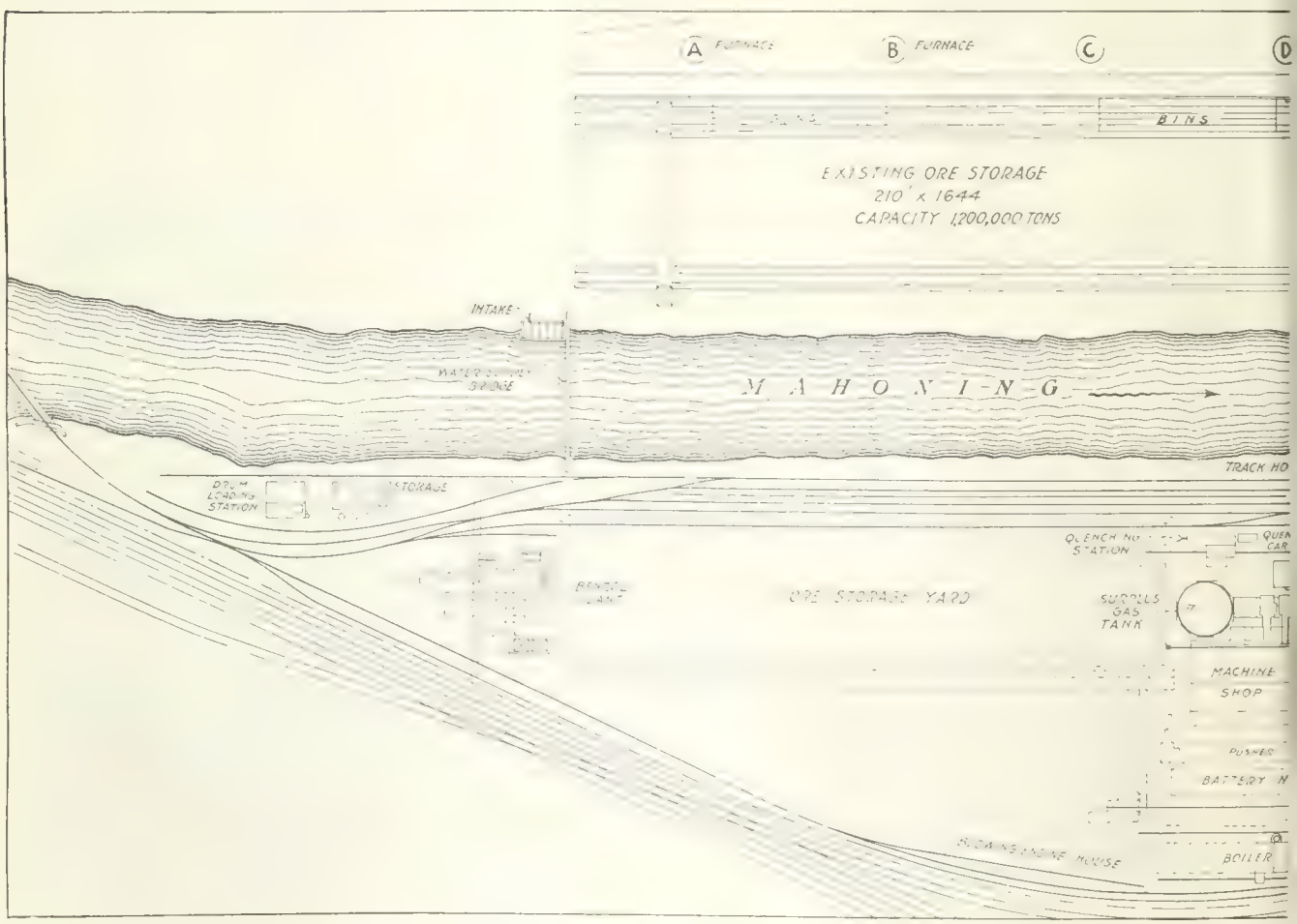
bottom of hopper and stopping the passage of coal.

The arrangement by which coal is dumped from high positions on the car dumper directly into hoppers at the top of the breaker building is unique, and one of the most interesting features of the installation. By this method, a large amount of elevating and conveying machinery is eliminated since the coal is raised by the dumper high enough to permit it to move by gravity through the breaker and hammer mills, making unnecessary belts and other equipment generally used to convey coal to these points.

After leaving the flight feeder under the receiving hopper, the coal passes over a screen which allows the fine coal to go directly to hammer mills, and the coarse to either or both of two breakers, each 12 ft. diameter by 17 ft. long, and each having a capacity of 250 tons per hour. The breakers discharge refuse, such as pieces of iron, slate, etc., and pieces of coal not broken up sufficiently, upon a belt known as a refuse belt. The belt travels at a speed of 60 ft. per minute between platforms, where men remove the refuse, and the over-size coal is automatically returned to the breakers by means of an auxiliary coal handling system.

Under each breaker are located two hammer mills, each having a capacity of the breaker, so that there are two hammer mills to be used as spare units. Over the hammer mill is a retarding feeder, in the chute between the breakers and hammer mills; this is belt driven directly from the hammer mill shaft. The breaker and hammer mills are the Pennsylvania Crusher Company's design, driven respectively, by 50-hp. and 400-hp. alternating-current motors. The hammer mill motors and electric equipment are separated from the hammer mills with a dust-tight plaster partition.

Each hammer mill weighs 38,000 lb. and is rigidly anchored to a concrete foundation, the top of which is 10 ft. 9 in. above yard level, permitting the belt conveyor under the hammer mills to be above yard level. This conveyor is 42 in. wide and runs through a specially designed dust shield which completely encloses the conveyor, and keeps fine coal from scattering all over the place. The next con-



The General Plan of the By-Product Coke Oven Plant of the Youngstown Sheet & Tube Company, Including the

veyor is a 36-in. wide belt conveyor, which when running at a speed of 500 ft. per minute, will deliver 500 tons of coal per hour to the top of a four-compartment coal mixing bin, each compartment having a capacity of 550 net tons of coal. At the top of this bin is a pivoted belt conveyor. This conveyor, together with its driving machinery and motor, is mounted on a steel frame pivoted at the inner end, with the outer end supported on a tee rail track, so that it can be swung around by the hand, thus enabling the operator to discharge the different coals in any compartment desired. The bottom of each compartment is glass lined, and provided with hand operated rack and pinion gate, also a pivoted graduated gate, with screw adjustment, where the flow of each kind of coal to the mixing belts can be regulated.

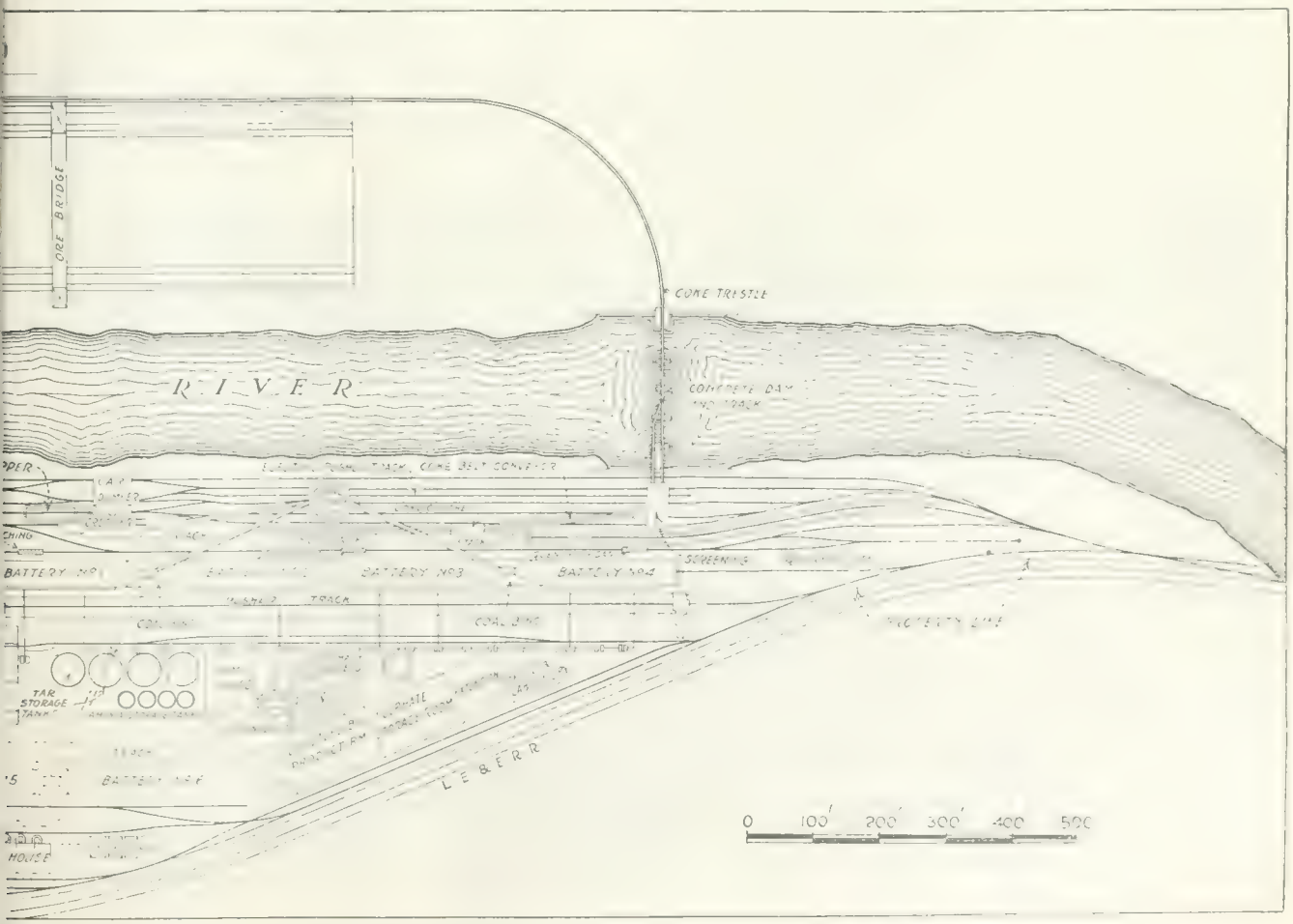
The mixing 48-in. belts lie flat and run from the bottom of the mixer bins to two coal mixers which deliver the coal to a reversing 42-in. belt conveyor, taking it to either one of two 36-in. belts, running to the top of two larry bins. Each larry bin is located between two batteries of ovens, and has a capacity of 1800 tons, one being arranged with a 500-ton compartment for use in experimental work. Under the larry bins are provided platform scales which enable the larry operator to fill his larry with the exact amount of coal to charge an oven.

For an auxiliary coal handling system, to be used in case the high lift car dumper is out of commission, there is provided a concrete track hopper 78 ft. long into which run-of-mine coal may be dropped from hopper cars. There are hand operated gates provided for this hopper and arranged to operate independently, so that coal may be discharged through any one of them to a flight apron feeder 36 in. wide, which takes the coal from the track hopper to a bucket elevator. The bucket elevator is made up of 30 x 36 in. steel buckets, and when running at a speed of 110 ft. per minute will deliver 250 tons of run-of-mine coal per hour to the receiving hopper at the top of the coal breaker building.



A Trestle Extends from the Screening Station to the Blast Furnaces on the Opposite Side of the River and an Electric Transfer Car Carries the Coke

The breaker building, coal receiving hopper and



By-Product Recovery Installation, and the Benzol Plant, All Across the River from the Blast Furnaces



The General Proportions of the By-Product Plant Are Indicated in This View with the Oven Plant Beyond

all conveyor galleries and conveyors were furnished and installed by Fairbanks, Morse & Co., Chicago.

THE OVENS

The four batteries of ovens are built on a straight line and cover a space 40 ft. wide by 1070 ft. long, between pusher machine tracks on one side and quenching car tracks on the other. The oven chambers taper from 17 in. wide at the pusher end to 19½ in. wide at the coke end, and are 9 ft. 10⅝ in. high by 39 ft. 6 in. long. The type of oven is known as the Koppers horizontal cross regenerative by-product oven, detailed descriptions of which have appeared from time to time in these columns.

The new type of door extractor for removing doors on the coke side was designed by H. Koppers for this plant and built by the Wellman-Seaver-Morgan Company. The door lifting levers are operated by hand. The carriage for pulling the door clear of buckstays is mounted on a truck, together with a 6½-hp. motor and travels the full length of the four batteries, propelled by a 10-hp. motor. Three of these machines are provided, one to be held in reserve as a spare machine. The door extractors for the pusher side of batteries are a part of the pusher machine. An electric signal system has been installed so that when the door machine operator on the coke-side of the batteries sees that the coke guide is in position and the quenching car is ready to receive the coke, he signals the man in the pusher machine cab to push.

Under each coal storage bin there is installed a self-discharge 6 ft. wet grinding pan and mixing pan furnished by Thomas Carlin's Sons Company for grinding the luting clay for sealing the oven doors. The necessary clay storage bins are located at the yard level, and a Link-Belt Company bucket elevator, driven by a 3½-hp. a.c., with a D. O. James reduction gearing is installed to elevate the clay to the wet pan at bench level. The gas and air reversing machinery, a standard equipment adopted by the Koppers Company, is also located under the storage bins at bench level.

The waste heat flue of each battery is connected to a separate stack 8 ft. in diameter inside of brick lining, and 200 ft. high. The fuel gas main running along both sides of the battery is 20 in. in diameter, large enough to give uniform pressure of gas at every gun brick. The gas from the coal leaves the pusher end of the ovens through cast iron ascension pipes which are connected to a collecting main with butterfly valves. Two collecting mains are provided for each battery with one suction main from each.



There Are Three Rows of Apparatus in the By-Product Building, the Center One of Which Will Take Care of the Gas from Two Batteries of Ovens

BY-PRODUCTS

Suction mains take the gas from the collecting mains to primary coolers. At the primary coolers are located positive steam-driven Connellsville blowers, which pump the gas through the tar extractors, reheaters, saturators, final coolers, benzol scrubbers and to the fuel gas holder.

There are three rows of apparatus in the by-product building, any one of which will take care of the gas from two batteries, leaving one complete row of apparatus as a spare unit. In front of each draining table there are provided three steam-driven centrifugal dryers which drop the salt after it is dried through the floor into sulphate buggies. The buggies are used to convey the salt to the sulphate storage room where the salt is handled with an electric crane and grab bucket.

The water required for the coke plant is pumped from the Mahoning River, the temperature of which gets as high as 130 deg. Fahr. in summer months. To cool this water economically to a temperature of 80 to 85 deg. Fahr., a suitable temperature for cooling the gas in the primary and final coolers, constituted one of the problems encountered by the Youngstown Sheet & Tube Company's engineers. After careful investigation, it was decided to erect a water cooling tower. A Wheeler-Condenser & Engineering Company's combination natural and forced draft tower was provided and is proving satisfactory.

An up-to-date boiler house containing four 768-hp. units of Babcock & Wilcox boilers supply steam for the coke plant. Fuel fine coke, known as breeze, is hauled from the coke screening station and dropped into a steel plate track hopper. Undercut gates are provided in connection with track hopper to deliver the breeze to a 120 cu. ft. skip bucket hoist and they are operated automatically by the hoist. This skip hoist, driven by a 25-hp. electric motor, deposits the breeze into a storage bin above the boilers so that the breeze may be fed by gravity to Cox stokers at the boilers. A 50-cu. ft. skip bucket, operated by a 7½-hp. electric motor, is provided for delivering the ashes from under the boilers to a railroad car on the track outside of the boiler house. Coke oven gas is also connected to gas burners at each boiler and can be used whenever desired.

In connection with the by-product plant, there is installed on the second floor of the pump house an experimental station for the purpose of testing the coking quality of different kinds of coal under actual operating conditions. Three ovens directly north of the pump house are connected by a 10-in. suction main leading from the ovens to the experimental station. The experimental ovens have gas off-take arranged so that the gas can be either taken through the suction main to the experimental station or the battery collecting main at will.

COKE HANDLING

The coke is pushed from the ovens by means of a coke pusher furnished by the Wellman-Seaver-Morgan Company. There are three quenching cars, one to be held in reserve. The quenching cars were furnished by the Atlas Car & Mfg. Company. They are lined with cast-iron plates and have doors operated by means of air cylinders controlled from the cabs of the 20-ton General Electric locomotives, which are used to take the quenching cars to the coke quenching station.

There are two quenching stations, one being at the east end of the quenching car track and the other at the west end. Each station consists of a ¼-in. steel plate hood or stack 49 ft. high above the quenching car track. The stack is rectangular in shape, 16 ft. wide, 48 ft. long, large enough to completely cover the quenching car. Hot water flows by gravity from the primary gas coolers to a sump on the side of this tower and is pumped by a motor driven centrifugal pump to a 20,000-gal. tank at the top of the quenching hood. A 12-in. pipe connects the tank to two spray pipes 40 ft. long located in the center of the hood just over the quenching car. The flow of water is controlled by a Dravo-Doyle electric solenoid operated valve which is located in the pump house in an accessible position. The water leaving the quenching car flows to the sump under the baffle plates which serve to collect the coke which is washed into the sump. The coke collected in the sump is removed with a locomotive crane and grab bucket. The surplus water flows back to the river.

The quenched coke is discharged from the cars to an inclined wharf 169 ft. 10 in. long and 19 ft. wide, measured on a slope of 26 deg. with the horizontal. The wharf is located in the center of the plant between the two quenching stations and is covered with cast-iron plates laid like roofing shingles. The motion of the coke on the wharf is controlled by twenty-eight finger gates, each about 6 ft. wide. These gates have extension levers so that they may be raised and lowered by the operator from the platform running the full length of the wharf. At the



The Electric Locomotive Running on a Narrow Gage Track Between Rails of a Standard Gage Track is Used for Shifting Cars Lengthwise to the High Lift Car Dumper. In the background may be seen the blast furnaces and ore storage [illegible] the river

bottom of the wharf, there are twenty-eight rotary feeders mounted on two shafts, each shaft carrying fourteen feeders driven by a 5-hp. motor. The operator starts the feeder and raises one gate, then when all the coke that will flow under this gate is handled, the second gate is raised and so on until the entire charge has been fed to No. 1 conveyor. In this way, the operator clears the wharf and closes the gates for the next charge. He can also quench with a small hose any hot spots without over quenching the rest of the charge.

Conveyor No. 1, a belt conveyor 42 in. wide and 303 ft. long, takes the coke from the wharf and discharges it to a revolving grizzly screen in the coke crusher house. The revolving grizzly removes over size pieces and feeds them to an adjustable crusher. The crushed coke, together with the pieces passing through the rotary grizzly, are fed to conveyor No. 2, which elevates them to the top of the screening station. The coke from conveyor No. 2 is discharged to an adjustable bar grizzly, at the end of the conveyor, being pivoted to discharge coke to the grizzly with a minimum of fall. The bar grizzly is in duplicate; the frames are pivoted at the lower end, the upper end being suspended by adjustable bolts



A Part of the Laboratory of the By-Product Coke Ovens

which enable the angle of the frame to be altered at will from 16 deg. to 30 deg. The two frames are carried by a structure mounted on wheels so that either of the bar grizzlies may be under the conveyor as desired.

The blast-furnace coke from the end of the bar grizzly is received by one of double curved chutes mounted on a truck so that the coke can be delivered to the right or left with a minimum of breakage. These movable curved chutes discharge the coke to fixed chutes which carry it to three inclined bins from which it is loaded by means of an electrically operated under-cut gates into the transfer car.

The small coke passing through the bar grizzly is received by a hopper beneath and carried by a chute to either one of two revolving screens 5 ft. diameter by 12 ft. long, which separates the breeze and domestic coke, feeding the two products into their respective bins, so that they may be drawn by gravity into cars.

At the head of conveyor No. 1, in the crusher house, is conveyor No. 3, which receives coke from conveyor No. 1 through a by-pass chute and carries it to open top cars on the track alongside of the crusher house. The end of this conveyor is hinged so that it may be swung up out of the way when not in use.

A trestle extending from the screening station to the blast furnaces on the opposite side of the river is provided for the electric transfer car to carry screened coke directly from the screening station to blast furnace bins.

To insure continuous operation of the coke plant in case the wharf or screening station is out of commission, a depressed track allows for discharging coke directly from the quenching cars to railroad cars for delivery to the blast furnace bins unscreened.

ELECTRIC POWER

Electric current for the coke plant is generated in the blast-furnace power house and transmitted at 6600 volts to a substation located at the coke plant, in which are motor-generator sets and transformers for converting the 6600-volt current to 240-volt d.c. and a.c. current. The distribution of this current around the plant is entirely by means of overhead cables. In the same building with the substation and served by the same 10-ton electric overhead traveling crane is a machine shop, boiler shop and pipe shop, each separated by substantial brick partitions. Adjoining this building will be provided a liberal size store house of fireproof construction. The sanitary equipment for the whole plant has been carefully planned and large, clean and comfortable wash and locker rooms have been provided.

The Oxidation of Nickel-Steel

A note contributed by Dr. J. E. Stead at the recent meeting of the British Association discussed the peculiar properties of the scale which forms on nickel-steel. According to Dr. Stead, the scale is completely removed from ordinary iron or steel when it is rolled after heating. With nickel-steel, however, the scale remains hard on the surface, particularly if the metal has been heated for a long time, in which case the scale is very thick. With a short period of heating the scale is less adherent.

In searching for an explanation of these phenomena, Dr. Stead found, on making a section through the metal, that the scale and steel were locked together, points of the steel penetrating into the scale. An examination of a 25 per cent nickel-steel ignition tube of a gas engine disclosed the metal on the outside to be completely oxidized, while an intermediate portion between the oxidized metal and the metal proper consisted of scale and unoxidized metal suspended through the scale. The unoxidized portions were wedge-shaped. The metallic part completely separated from the scale consisted of an alloy containing 75 per cent nickel instead of 25 per cent, the original composition of the metal.

Virginia Iron, Coal & Coke Earnings

The Virginia Iron, Coal & Coke Company has issued its report for the year ended June 30, 1916. The income account compares as follows:

	1916	1915	1914
Gross earnings	$4,308,598	$2,844,165	$4,262,508
Expenses	3,871,582	2,437,591	3,774,097
Net	437,016	406,574	488,410
Other income	53,964	27,442	23,700
Total income	490,980	434,016	512,110
Charges, etc.	739,074	678,738	629,716
Deficit	$248,094	$244,722	$117,606

Announcement of a new steamship line to run from Baltimore to South American ports was made Dec. 2 at Baltimore by Arthur W. Thompson, vice-president of the Baltimore & Ohio Railroad, at a luncheon to business men. He said the new line proposed to expend $15,000,000 for steamers.

The sales office of the Boss Nut Company, manufacturer of lock nuts, is now located at room 237, Railway Exchange Building, Chicago.

A New Iron and Steel Roll Foundry

The Recent Addition to the Plant of the Birdsboro Steel Foundry & Machine Company—Large Iron and Steel Alloy Rolls—Improvements to Other Units

TO provide for an expansion in its iron and steel roll operations the Birdsboro Steel Foundry & Machine Company, Birdsboro, Pa., recently completed a new foundry containing some interesting features. The company operates a large iron foundry where miscellaneous castings of all sizes and types are produced for the jobbing trade and for its own use as parts of large machinery which it builds. Connected with this unit is an extensive machine shop to which an addition has recently been made. About 14 years ago the company started up a new open-hearth steel casting plant of large capacity which has been running continuously.

Previous to the construction of the new roll foundry, chilled iron rolls were produced in the general iron foundry and steel rolls in the steel foundry. With the growth of the business and in consideration of the fact that the metallurgical and foundry problems involve different practice, especially in iron rolls, the new unit became a necessity.

The new foundry building is 60 ft. by 240 ft. and is located just east of the steel foundry, as shown in the accompanying general plan. The type of construction adopted by the company will be the standard for future improvements and alterations. The walls are of brick running up 15 ft., the remainder being expanded metal on steel framework with a 2½-in. cement wall on the expanded metal. The recent addition to the machine shop and a new erecting shop are of this construction. The lighting of the new foundry is amply provided for as is indicated in one of the illustrations. The floor is commanded by cranes, one of 25 tons and one of 10 tons capacity.

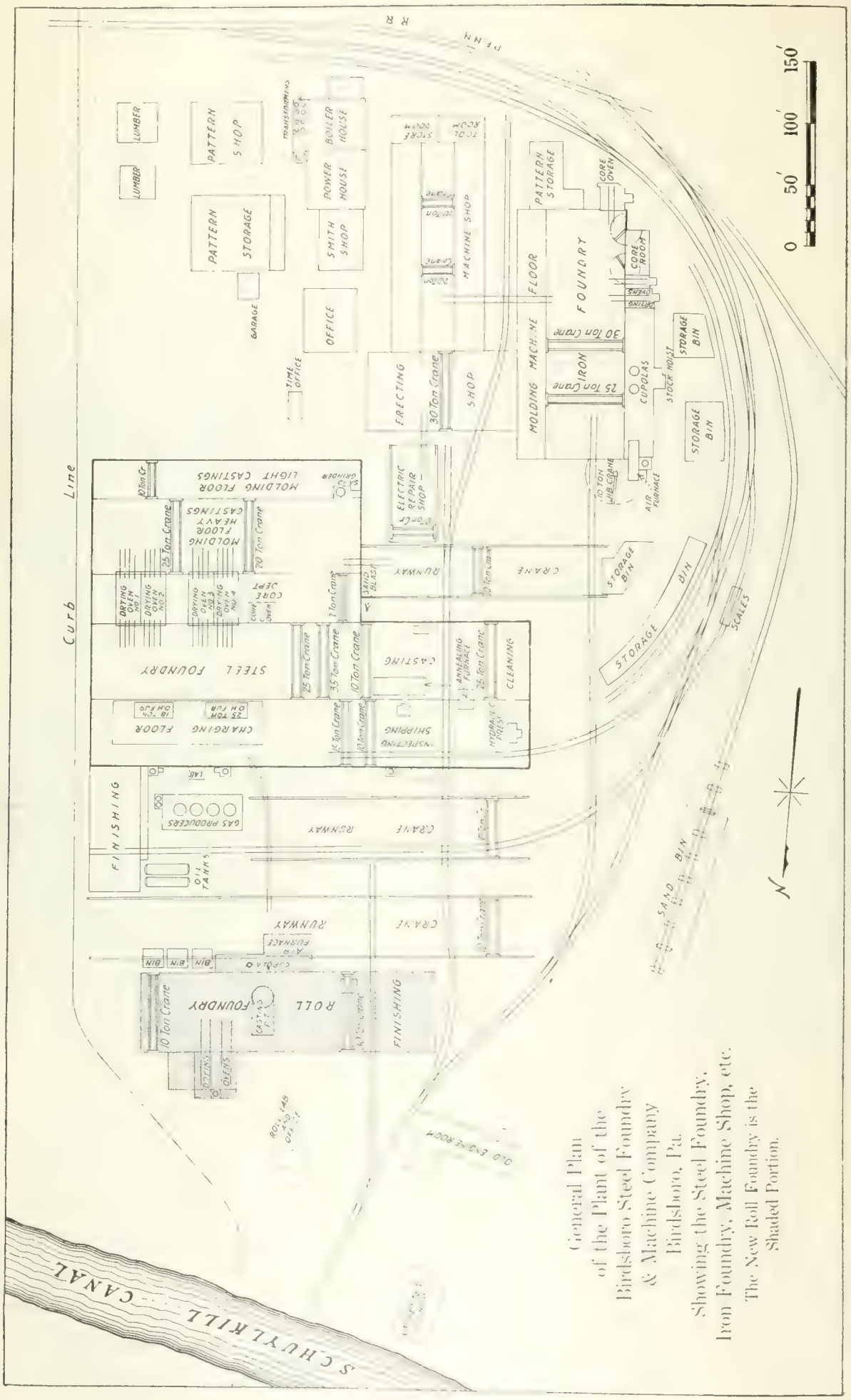
THE MELTING EQUIPMENT

The melting equipment for making chilled iron rolls consists of one 7-ton per hour cupola of standard design, equipped with the Stoughton oil-burning process. Besides this there is a 20-ton air furnace possessing some striking features. This is used for the pouring of the large iron rolls, its melting capacity running to 25 tons. An unusual feature of the air furnace is the removable portion of the roof. As shown in the illustration, a crane from one of the new stock yard runways lifts the roof to one side, and then a complete charge can be put in the furnace in 20 minutes. The removable portion is a single steel casting. This is considered a decided advantage over the older method of charging through a small door at the end of the furnace.

The melting bath of the air furnace is 16 ft.



The Air Furnace Showing the Removable Portion of the Roof and the Method of Charging, Using the Crane on the Runway Outside the Building. The Furnace Is Tapped at the Middle of the Bath and the Metal Is Received in the Ladle in the Small Pit



General Plan
of the Plant of the
Birdsboro Steel Foundry
& Machine Company
Birdsboro, Pa.
Showing the Steel Foundry,
Iron Foundry, Machine Shop, etc.
The New Roll Foundry is the
Shaded Portion.

long and 6 ft. wide. The company states that a 17-ton heat can be made in 7 to 8 hr. To insure quick production and the necessary hot metal, oil fuel is used to finish the heat, the burner being like those employed in open-hearth practice. The temperature obtainable, it is stated, is sufficient to make steel. The tapping hole is located at the center of one side of the bath, rather than at the end near the bridge wall. The air furnace stack is 100 ft. high.

THE LARGE CASTING PIT

Another feature is the large casting pit. It is located crosswise of the foundry instead of lengthwise as is often the case. The advantage claimed is the ability of the crane runner to watch more easily the ladle, as well as the molds and the pouring. The annexed drawing of the roll foundry shows the location of this pit with reference to both the cupola and air furnace. The pit, which is 15 x 40 ft., is of concrete throughout and water tight. The main portion is 12 ft. deep. At one end is a circular hole with a depth of 22 ft. This is for casting very large rolls, either of iron or steel, for it is planned to arrange to bring hot steel in ladles from the steel foundry nearby for pouring large steel rolls immediately in the main roll foundry. The more shallow portion of the pit will accommodate two rows of molds for iron rolls. One of the illustrations shows the two portions of the pit.

The roll turning equipment includes four lathes of the heavy duty type. There are also three Landis grinders, the largest of which is 24 x 120 in. for finishing chilled rolls.



The Special Concrete Casting Pit for Rolls. The 22-ft. Deep Portion Is in the Foreground. The Various Types of Chill Molds and Other Equipment Are Shown

The molding of both the iron and steel rolls is done in the new foundry, but at present the steel molds are transferred to the steel foundry for pouring. The foundry practice is not essentially different from the standard. Jar rammers prepare the copes and drags of the chill iron molds and silica sand tempered with gravel is used.

The drying ovens, located on one side of the foundry, are end-fired and have proved unusually efficient. A 3-ft. x 70-ft. stack creates such an excellent draft that the first moisture is quickly driven out.

The capacity of the new foundry is 500 to 600 tons per month of chilled iron rolls and 500 tons per month of steel rolls. Iron rolls up to 35 tons each and steel rolls up to 30 tons each are capable of being turned out. At present steel and alloy rolls up to 12 to 15 tons are being produced and iron rolls of all sizes and types.

SPECIAL ALLOY ROLLS

The roll foundry is in charge of F. D. Taggart, formerly superintendent of the roll foundry of the Illinois Steel Company, Joliet, Ill., and for many years connected with the United Engineering & Foundry Company as metallurgist in charge of its roll foundries. The operation of a roll foundry, in which steel, iron, chilled iron and alloy rolls in both iron and steel are made, presents some interesting metallurgical problems. A mechanical and physical laboratory is maintained in conjunction with the foundries and particular attention is paid to investigations with the scleroscope. Carbon steel and alloy steel rolls are made and a new annealing furnace has been installed for annealing steel rolls.

A special alloy iron roll has been developed to which the name Durite has been given. These rolls when heat treated have been put in mills in place of chilled iron rolls and have been giving gratifying results. The alloy has been protected by patents and some interesting achievements are forecasted.

THE STEEL FOUNDRY

The output of the steel foundry is about 1000 tons of finished castings per month. A new oil annealer for small castings has just been started, furnished by the Metals Production Equipment Company of Springfield, Mass. It is of the continuous type, 8 ft. by 12 ft. inside, and uses a car as the bottom. A new feature is burning the oil with two burners on each side in a chamber at the top of the annealer, from which the heat is radiated through checkers down into and on the castings. The oil is atomized with 2-lb. pressure. Even and well-regulated temperatures are secured. This annealer will also be used for heat-treating steel rolls.

An addition of 60 ft. was recently made to the steel foundry to house the new annealing furnace and a new hydraulic straightening press. The foundry contains two acid open-hearth furnaces, both using oil for fuel. Four Herrick gas producers are part of the original equipment. Recently also a new sand grinder has been put in which does the work of two of an older type. The new one was built by the company. It is the same as that described in THE IRON AGE, April 6, 1916, designed and patented by Walter H. Bickley, vice-president Penn Seaboard Steel Corporation of Philadelphia. The locations of the annealer, sand grinder, etc., are shown on the plan. An oxy-acetylene plant for cutting off heads is also a recent improvement.

ELECTRIC POWER FOR STEAM

A new electric power house was completed about 18 months ago. High tension current of 13,200 voltage is obtained from the Metropolitan Electric Company of Reading, Pa., nine miles away. This is transformed to 2300 volts for the use of the two electric welders and a large motor-driven direct-connected air compressor and to 230 volts for use in lighting and for motors. The entire plant is motor-driven throughout by independent motors except some of the small tools which are belt driven from motor-driven line shafts.

The company has lately built six large storage bins for molding sand. They are of steel and concrete with a shed roof. The sand falls by gravity from the cars into the bins.

In the stock yard between the steel and roll foundries two crane runways, 50 ft. x 228 ft. and 50 ft. x 360 ft., have been installed. Both carry 15-ton cranes, each equipped with magnets for handling raw material.

The railroad connections are with the Pennsylvania and the Reading. The entire track system has been rearranged and heavier tracks have been put down.

In the machine shop where large machinery of all kinds is under construction, an order for 80 large ingot cars 20 ft. long and weighing 32,000 lb. each all of steel, has about been completed for the Bethlehem Steel Company. There is an electric repair shop, centrally located. About 1000 men are now steadily employed in the entire plant.



The Roll Foundry as It Appears on the Inside, Showing Also a Series of Chilled Iron Roll Molds Ready To Be Poured

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The Berger Mfg. Company, Canton, Ohio, has called a meeting of its stockholders for Dec. 23 to consider a proposed increase in its capital stock from $5,000,000 to $10,000,000, announcing that the extensive additions in the course of erection and the growing business make this necessary. The proceeds will be used for further enlargement of the business and possibly in the development of new lines of products of a nature similar to those which the company is now making.

The Terry Steam Turbine Company, Hartford, Conn., has appointed Stephenson & Nichols, Monadnock Building, San Francisco, as its representatives in northern and central California and the northern part of Nevada.

Weathering of Coal

The weathering of coal has been investigated by Dr. J. B. Porter, McGill University, and the results are published in supplementary report No. 83 to "An Investigation of the Coals of Canada," issued by the Department of Mines of Canada, Ottawa. The conclusions reached by Dr. Porter as to the effect of weathering on coal are seven in number: 1.—The presence in coal of complex and unstable carbonaceous compounds such as resins, humus, etc., promote oxidation. 2.—Pyrite and marcosite in coal are effective both as disintegrating agents and as sources of heat. 3.—The presence of moisture hastens the decomposition of pyrite. 4.—Fine coal or coal dust presents an immense surface to the air in comparison with lumps. 5.—An excess of air, while facilitating oxidation, also carries off the heat generated. When a limited supply of air reaches the coal the destructive action is rapid. 6.—A low pile insures less pressure. 7.—The individuality of coal is a prime factor.

Dr. Porter emphasizes that dry coal is so poor a conductor that the surface may show no indication of a hot spot until, after a rain, the water which has soaked in works its way back to the surface as steam and reveals the fire within.

A really important feature is the initial temperature of the coal at the time of storage. Coal should be handled during the coolest part of the day. Even in the temperate zone the heat of the summer day makes it dangerous for coal to be stored while the sun is bright. This factor influences the storing of coal during the summer for winter use. After the storage is once effected it is not so necessary that the sun's rays be deflected since the heat absorbed during the day will be liberated at night. The loss of coal from fire in the second year of storage is approximately only one-half that of the first year because of the old surface protection.

Properties and Defects of Steel Ingots

Large Savings in Cropping in Recent British Practice — Stearine Cast Ingots and the Value of Models—Advantages of the Tun-Dish

TWO important papers on the production of sound steel ingots were features of the autumn meeting of the British Iron and Steel Institute in London, Sept. 22, 1916. They were "Some Properties of Ingots" by A. W. and H. Brearley, Sheffield, and "Steel Ingot Defects: Principles Affecting Acid and Basic Open-Hearth and Bessemer Steel," by J. N. Kilby, also of Sheffield. An abstract of the former paper was printed in THE IRON AGE Oct. 26 and Nov. 2, 1916, and the latter was dealt with in the issue of Oct. 12, 1916. Both papers attracted considerable interest and discussion. Important points in the discussions were as follows:

Properties of Ingots

Dr. W. H. Hatfield, in opening the discussion of the paper by the Messrs. Brearley, welcomed the contribution as the result not merely of a few months' investigation, but as the outcome of the experience of many years. There were one or two points, however, on which he said he was unable to agree with the authors. One was their belief that it was possible to have an equalization of temperature throughout a large ingot mass. His own view was that there was a steady falling curve of temperature from the interior to the outside of the ingot, and this fact would seem to preclude the possibility of simultaneous freezing of the steel over large areas.

He felt that there were apparent discrepancies in the facts recorded which made it difficult to accept the author's theory as to the formation of ghosts without certain reservations. The authors' theories however he regarded as the most rational he had seen. The illustration showing the effect of a sloped opening in a runner brick in a bottom-cast ingot was most interesting. It indicated how the metal washed the side of the ingot mold and how it formed a stream which upset the regular formation of crystals. He thought the trouble resulting therefrom might be of a more serious nature than the paper emphasized.

STEARINE CAST INGOTS

Dr. J. O. Arnold looked with disfavor on the method adopted by the authors of using a compound of stearic acid and glycerine with which to teach students the freezing phenomena of steel. The question of ghosts was a little obscure, but it was necessary to accept facts and it had been demonstrated that ghosts were segregations high in carbon, sulphur, phosphorus and nickel, if present. Dr. Arnold stated that he himself had brought some remarkable facts in this connection to the attention of the Institute of Mechanical Engineers. They had to do with a 60-ton ingot on the face of which the ghosts, though higher in carbon, sulphur and phosphorus, had frozen first, whereas according to the old theories they should be the last portion to remain liquid. It was necessary to find an explanation of these facts; he had explained them in this way but possibly they could be explained in another.

Dr. Arnold also thought the authors had not given sufficient credit to the pyrometer. He had found remarkable agreement in all pyrometrical readings and could give the strongest testimony as to their value. He also asked, in justice to steelmakers, that slag inclusions should be separated from sulphide of manganese occlusions.

Dr. W. Rosenhain did not fully believe that the authors had sufficiently taken into account the effect of the heat liberated by the freezing of the molten material. The consequence was that the mass of liquid inside was contained in a shell of constant temperature and whatever might be happening outside could not affect the rate of loss of heat from the core. To explain his point he drew an ingot on a blackboard. He pointed out how the heat evolved by freezing was met with a loss of heat on the outside and showed the effect upon the ingot.

THE VALUE OF MODELS

Dr. Rosenhain regarded the paper as interesting in that it afforded another example of the value of models. These had already proved their usefulness in naval construction and in various branches of engineering and were now to show the behavior of steel ingots. One point, however, should be duly remembered, he contended, that model experiments were liable to be mistaken if there were no law of proportionality observed—in the present instance, the ratio of the ingot to the model. It was further necessary that all the physical factors be duly proportioned and he feared it would not be possible to obtain that.

Steel Ingot Defects

In opening the discussion on Mr. Kilby's paper on "Steel Ingot Defects" and referring to the advantage of casting with the wide end up Sir Robert Hadfield stated that all methods of producing sound steel had two ends in view: First, to make steel of better quality and second to save raw material. The latter at the present time is of vital importance to the nation, he said, for it was well known that the steel manufacturing capacity of Great Britain is not large enough for present requirements. He stated that the country had made the great mistake for years of allowing the importation of German bounty-fed steel, but he hoped they had seen the last of that. "I am a free trader," he said, "but free trader or not, I hope we are going to put an end to that kind of thing. Any method of making sound steel and of saving wastage would tend in that direction."

LARGE SAVINGS IN INGOT CASTING

Mr. Hadfield stated that he had been experimenting at his own works where they were making billets and blanks for high explosive shells and were saving equivalent to the output of a 30-ton furnace each week. They were also freely placing at the disposal of other steelmakers for the benefit of the country the process they employed, but he wished that any one desiring to use their process would communicate with him or his firm. Their desire was to help such persons in every way. He testified that they had found that the method was of considerable assistance in producing shell blanks. Many works cast blanks singly, but that made the proportion of waste heavy. The best method of producing ingots for this work in his opinion was to have a parallel ingot of the double type and to get two blanks. It was not a simple matter to make a parallel ingot without wasting a large percentage of material. By the new method employed it was possible to get from 100 lb. of fluid steel 80 lb. of useful material ready to go into the press. That loss included all the wastage in manufacture from first to last.

Another important point which Mr. Hadfield cited was that the billets did not require rolling or forging. The total waste on blanks produced in this manner was not more than 1.5 per cent and the saving effected was considerable.

THE WIDE TOP INGOT AND THE TUN-DISH

F. W. Harbord believed that it had been clearly demonstrated that the wide top ingot which was first introduced by Mr. Saniter had come to stay. It gave a much better result and on shell steel this practice had greatly increased the tonnage.

Referring to the use of the tun-dish E. H. Saniter

said that one of the advantages in teeming with these was partly to cool the steel and partly to reduce the speed of teeming. He had thought if the operation were correctly proportioned teeming could be effected without cracks in the ingots and that it was possible to cast ingots 18 x 19 in. or 16 in. square without cracks in them and to roll them without cracks developing. He pointed out that the illustrations in the paper of the tun-dishes (THE IRON AGE, Oct. 12, 1916, page 825) were representative of the practice in the works of Steel, Peech & Tozer and that they had been sent freely over the country to firms undertaking the manufacture of shell steel.

Greville Jones referred to the practice at the Clarence works and said that when billets, teemed as described, were examined the difference in comparison with the ordinary process was extraordinary. On the subject of the wide top ingot he would only say that they had used that method for many years at the Clarence works and that there was no doubt that it was a proper method of casting.

Dr. Hatfield said that one effect of the tun-dish which had not been mentioned was that it helped to keep dirt out of the steel that is being trapped owing to its low specific gravity.

Giving his experience as a cast-iron manufacturer H. B. Toy said that he found that when casting heavy rolls it was not necessary to provide for an enormous sink head to feed the rolls with very hot metal. They were not cast from the top, but from the bottom at an angle with a spiral movement. It was absolutely necessary to have a proper thickness of chill.

In response to a question of Sir Robert Hadfield as to whether the French Government permitted the use of tun-dishes, Mr. Saniter and Mr. Jones both said that that government insisted upon their use.

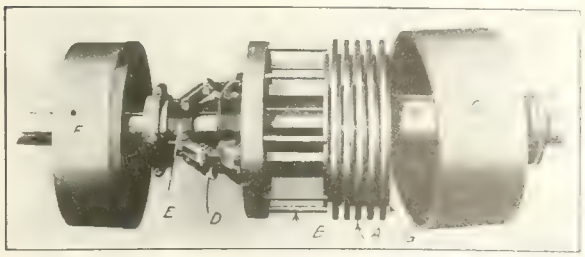
High-Speed Type of Friction Clutch

A friction clutch of the metal-to-metal type has been placed on the market by the Moore & White Company, Philadelphia, Pa. It is made in a number of sizes from 5 to 25 in. in diameter for speeds from 3000 to 750 r.p.m., and is designed for use with alternating-current motors that are required to start under load, as well as for group drives to high-speed machinery and individual drives to woodworking and other heavy machines operating at high speeds. The maximum horsepower intended to be transmitted by the clutch is 630.

In the clutch bronze and copper disks alternate, and, while they are lubricated, they do not run in an oil bath. The disks are fully inclosed, and it is emphasized that all the important parts are machined all over to provide balance. Accurate adjustment is claimed for the clutch and the engaging mechanism is said to eliminate any tendency to grab or drag when the clutch is released. Both loose pulley and cut-off coupling types are built. In the former type the hub is keyed to the shaft and is driven by or drives the [illegible] through a series of pins *B* which connect the hub and the follower *C*. The last member is bored to pass over lugs cast on the pulley sleeve and a threaded adjusting ring is located between the hub and the follower. The operating levers *D* are attached to the hub and act against the adjusting ring when the spool *E* is moved. The adjusting ring *F* is thus forced to the left and carries the follower with it, while the hub is forced in the opposite direction and is relied upon to engage the disks. The bronze disks *G* are slotted and slide on the lugs of the sleeve *H* and are relied upon to communicate power to the latter.

When the clutch is released, the disks are freed by the action of springs. The sleeve *H*, which carries the loose pulley, runs on a divided bronze bushing keyed to the shaft and grooved to distribute oil. This lubricant is placed in the central space, the action of gravity being relied upon to feed it to the running surfaces as long as any remains. The oil-retaining collar is attached to the sleeve and not to the shaft, thus, it is pointed out, making it independent of centrifugal force. This arrangement, too, retains the oil where it belongs and protects the running surfaces and surrounding objects from flying lubricant.

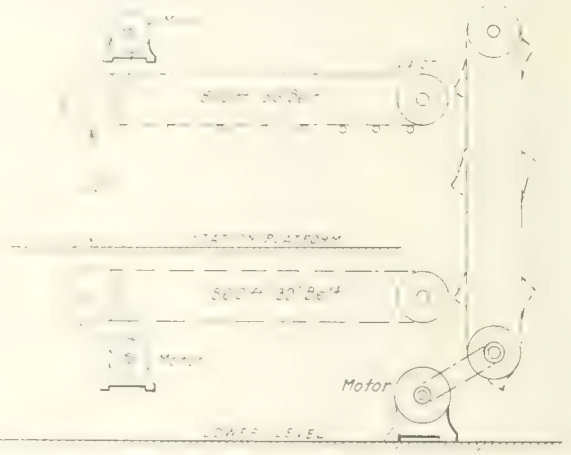
In the cut-off type of coupling, the extended sleeve is omitted and a small bushing is employed to hold the two shaft ends in alignment. In the smaller sizes, from 5 to 13 in. in diameter, the clutches can be fitted directly on an extended hub of the pulley, gear or other member.



The Friction Disks and the Center Plates Have Been Slipped Off the Splines of the Sleeve of This High-Speed Friction Clutch and Show the Driving Lugs

Conveyor System with Magnetic Control

A motor-driven conveyor system equipped with magnetic lock-out switch speed setting controllers made by the Cutler-Hammer Mfg. Company, Milwaukee, Wis., has been installed in the mail building adjoining a large railroad terminal. A feature of the installation is the use of push-button stations placed at various points along the platform so that the driving motors can be started and stopped from any one of these remote locations.



Push Button Stations and Magnetic Lock-Out Switch Speed Setting Controllers Mounted at Convenient Intervals Are Employed to Stop and Start the Driving Motors of This Conveyor System

The installation, which is said to be particularly flexible and efficient, consists of two 800-ft. conveyor belts and a vertical conveyor or bucket lift having a capacity of 200 tons per hour. The arrangement of the conveyors is brought out in the accompanying diagram. Two motors supply the power for the system, one of 15-hp. capacity being used with the 30-in. conveyor, while a 35-hp. motor drives the bucket lift and the 36-in. horizontal conveyor.

The Youmans Machine Company, Cleveland, recently incorporated with a capital stock of $50,000, has taken over the machine shop of the F. A. Maxwell Company, 1011 Power Avenue, and will manufacture automobile parts, tools, jigs and fixtures. W. H. Staring, secretary and general manager of the Peerless Motor Car Company, is president. C. H. Youmans has resigned as assistant superintendent of the Peerless plant to become general manager of the new company.

The Ohio Iron & Metal Company, First National Bank Building, Chicago, dealer in iron and steel scrap, has opened a branch office in suite 505, Transportation Building, Montreal, Canada. John M. Zehner, formerly with the Canadian Fairbanks-Morse Company, Ltd., is in charge of the office.

TO STABILIZE EMPLOYMENT

Employer and Employee Participate in Insurance with Death, Old Age and Other Benefits

To insure to the employer a stable working force and to secure the employee against unemployment, sickness, injury, old age and death, Herbert N. Fell, Fell & Co., Ltd., New York, has devised a pension plan. While the merit of a dividend system for employees, in an endeavor to improve relations between employer and workman, is recognized, it is held that good feeling dependent upon uncertain profits of the future is precarious. According to available statistics, he emphasizes, every new workman costs the employer $45 during the period of his training. In addition almost every business has to hire the equivalent of its entire working force annually. In a concern employing 3000 people the yearly loss for training would be, according to this estimate, $135,000, or for one of, say, 300 employees, no less than $13,500.

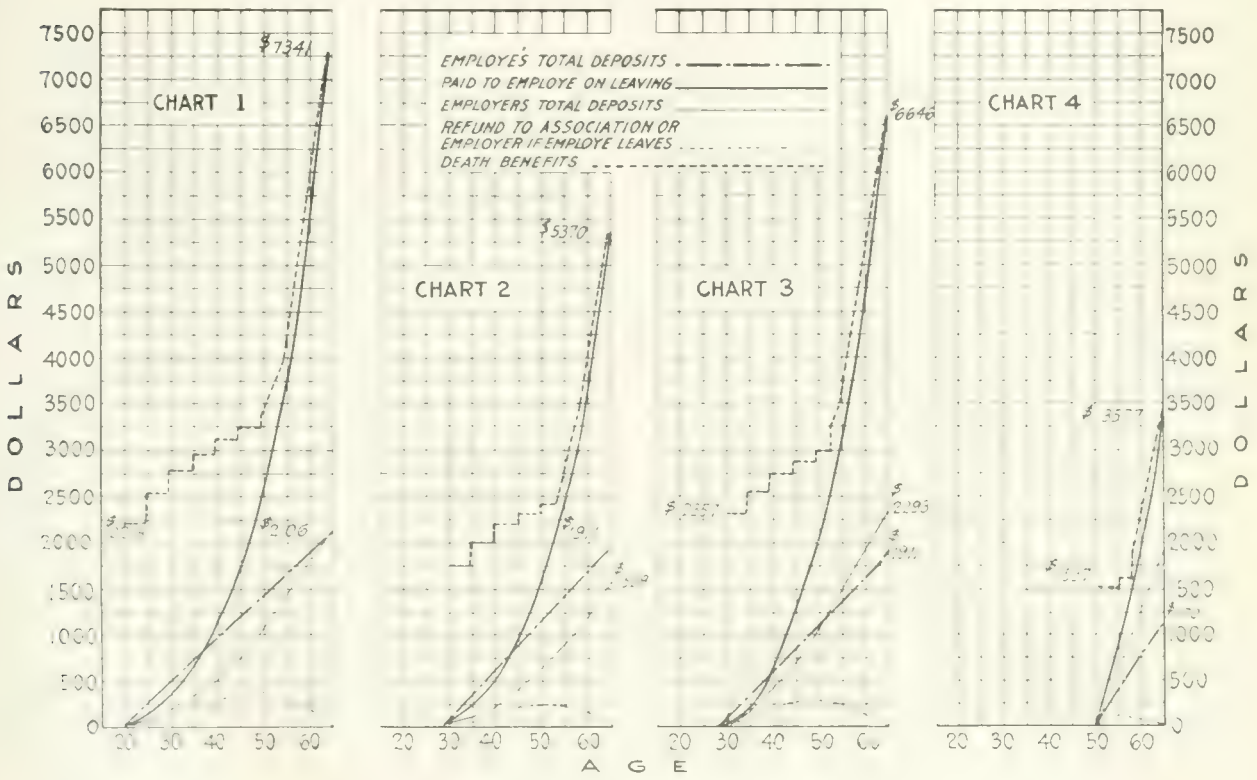
The average workman changes his employment three times a year, according to Mr. Fell, and loses a week's time with each change. At a wage of $15 a week, his losses are $45, an equivalent of his employer's. The opportunity to retain a permanent job, doubtless with an increasing wage, and at the same time to have on small payments an insurance policy may be made to appeal to all workmen—at least this is the Fell contention.

Under the plan devised each employee contributes 5 per cent of his wage and the employer pays on a scale rising from 1 to 9 per cent of the wage, depending on the length of service of the employee, as follows:

Year's service	1 to 5				
Percentage	1				

Thus in the first year the employer pays one-fifth as much as the employee but in the twentieth year exactly the same amount.

The pension plan as applied is briefly as follows: An association of employees is organized. It directs the premium payment on a special policy written by some selected insurance company. This association consists of a board of directors selected by representatives from the various departments of the factory, one representative being elected, say, by each department and serving as the local chairman. Standing committees are appointed by the board of directors. Each employee pays an annual premium of 5 per cent of his wages for the year, as stated, and the company pays something for each employee, according to the foregoing table. So long as the employee remains with the firm he is provided with a savings scheme, because he has a loan privilege, a benefit fund, and an old age pension, as well as a life insurance.



PENSION VALUES AND PREMIUMS

To observe a specific case: an $18 per week employee beginning at the age of 20 years will have paid into the fund $234 in five years; he has had a life policy worth $2,218 in the event of death at any time in that period; he may borrow at that time $168, or if he leaves the business and wants to cash in he will receive $126. If he remains in the firm until 65 years of age he has a life insurance policy for $7,341, which he may withdraw in a lump sum or in amounts of $677 annually for his life time, the remainder accruing to his heirs. In case of total permanent disability the contract immediately becomes fully paid up and values increase in the same ratio as though the premiums had been paid. A sum borrowed in case of illness may be repaid on the workman's terms, the association refunding half of the debt from accumulated interest guaranteed by the contract.

Chart 1 illustrates this specific case. It shows at any five-year period how much the employee and employer have paid in and the final total of both; the actual insurance value to the employee at any time; the pension value and the refunds to the employee and employer or association in case the

workman leaves. For example, after twenty years' service the employee has paid in $936, is carrying life insurance valued at $2,977, can make a loan of $1,268 or draw out $1,008 in cash. Thus he can draw more cash than he has actually paid and may borrow in case of sickness $332 more than he has put into the association.

In chart 2 the employee enters the business and association at the age of 30 and at the weekly wage of $21. Likewise paying 5 per cent of his wages annually, his death benefit at 65 is $5,370.

In chart 3 a man of 30 joins the association with 10 years' service in the plant. This service raises his values, the death benefit being $6,646, because the employer's contribution in this case amounts to 60 per cent of the employee's contribution, instead of 20 per cent for the first year and one-fifth more than the employee pays on the last premium.

Chart 4 plots the case of an employee 50 years of age and with a salary of $30 weekly who has been in the employ of the plant for 30 years. Although he entered the business at 20, the same age as the employee of chart 1, the association was not established until his fiftieth year, an age which is more of a risk in all insurance calculations. His death benefit is $3,577 at 65 and his total deposits $1,170. The possibility of his changing employment between the ages of 50 and 65 is so slight that the curve showing the amount remitted on leaving is straighter than in the other three charts.

ACCIDENTS IN INDUSTRY

Penalizing Carelessness—Handicapping the Deformed—Cure in Good Citizenship Education

The need of penalizing carelessness, of providing conditions as regards compensation laws which will give the deformed a fair chance to secure employment, and the need of developing a bureau of advice on safety measures which would have official governmental sanction, were emphasized in a paper by C. B. Auel, director of standards, processes and materials, Westinghouse Electric & Mfg. Company, read before the safety first conference at Harrisburg, Pa., Nov. 22, held under the auspices of the Pennsylvania Department of Labor and Industry. His paper, in part, was as follows:

The Westinghouse Electric & Mfg. Company is one of the great number of industrial concerns that is giving serious study to the accident problem in works. Not having any standard to be guided by in the beginning, it was necessary for us arbitrarily to group our accidents into certain classifications, and these have been adhered to for the past several years, with the following results:

Causes of Accidents, Expressed in Per Cent of Total

	1913	1914	1915	1916 (9 mos.)
Carelessness of injured	21.4	23.5	32.3	22.9
Carelessness of fellow workmen	6.4	4.8	3.3	1.6
Flying objects	14.8	14.1	18.6	20.7
Handling sheet material	3.8	5.4	1.2	1.5
Slipping and falling	3.8	5.3	5.0	4.4
Ordinary working conditions	15.1	19.2	14.8	11.4
Hand tools used by injured	9.4	6.8	7.8	5.7
Lifting work in or out of machines	3.6	2.4	3.4	4.9
Electric shock and flash	2.6	1.9	1.7	1.0
Burns not electrical	2.3	.8	2.3	1.9
Handling miscellaneous material	8.9	12.1	14.2	14.3
Defective material	2.4	1.2	.9	.9
Miscellaneous	4.5	3.5	3.9	5.8
Want of safeguards	.3	.1	.4	.03

Two features are especially notable. Year after year, accidents due to carelessness of the injured stand at the head of the list, and accidents due to the want of safeguards stand at the foot. If the classifications had been made in any but the most conservative way, the percentage due to carelessness would undoubtedly have been very materially increased, because accidents under the other classifications were so placed without any attempt to ascertain if some of them were not really due to carelessness in the first place.

Some of the accidents classed as due to carelessness could really be classed as the result of employees misrepresenting their experience on being hired, and therefore being given work for which they are hardly qualified. This sort of thing of "putting one over on the boss" and "getting away with it" is actually looked upon by those who do so as a real mark of ability, an actual asset of which they boast later to their fellows.

Our own experience along these lines is, we believe, conservatively in accord with the experience of most other concerns. The New York Edison Company in a recent publication stated that 82 per cent of its accidents were due to the carelessness of the injured, 4 per cent to the carelessness of the fellow workmen, 5 per cent to outside agencies, and 9 per cent to the company.

NO LAWS TO PENALIZE CARELESSNESS

Admitting that our figures represent average conditions, are we to assume the small percentage of accidents due to the want of safeguards has resulted from the present safety laws? Such cannot possibly be, at least in Pennsylvania, for there has been no appreciable change since the laws went into effect, as a glance at the statistics will show. And what, may be asked, have the laws in this or any other State done, either to reduce or to penalize carelessness on the part of the injured, the greatest cause of accidents? As yet, nothing; in fact, as far as the laws are concerned, they do not admit that such a cause of accidents exists.

In the matter of accident compensation, 33 States have already adopted the principle, and there are, accordingly, 33 sets of laws (not to speak of the amendments) the output of at least 33 sets of lawyers and 33 or more legislatures; and all industries doing an interstate business are now trying to keep up with them. We find the law-observing citizens of one State are actually violators of the laws in other States. We find further the cost of the same accident varies with the place of its happening, so that every one should carefully consult all of the laws on the allied subjects of safety and accident compensation before deciding on the best place for an accident to occur to himself.

WESTINGHOUSE RELIEF AND PENSION PLANS

Data apart from the operation of the compensation law have been compiled, this in connection with a relief department established by our company in 1907 for the payment of benefits to employees who are members, in the event of their meeting with disability due to sickness or to accident while off duty.

Membership is confined to employees under 50 years of age, and involves the payment of certain comparatively small dues as well as the passing of a physical examination. If having a defect, an employee is still allowed to join providing he signs a release relieving the relief department of obligation to him in case of disability due directly to his defect.

About two years ago the company introduced a service pension plan to which all employees are eligible upon reaching the age of 70 years and after 20 years of service, providing they are members of the relief department. In order not to debar any one at the time of its inauguration from qualifying, all restrictions were temporarily set aside, and employees were permitted to join the relief department regardless either of their age or their physical condition. Furthermore, the twenty-year feature of the pension plan was reduced to ten years for the benefit of those employees already old in the service. (In passing, it may be mentioned that the employees who have been in the company's service over 20 years now number between 500 and 600, and there are at work to-day several over 70 years of age, all of whom would resent any suggestion having in view their retirement on pension owing to their age.)

It is almost needless to say that a very large majority of the employees have joined the relief department, being perhaps a better recommendation than if

every single one had, as it is quite evident in consequence that there is no compulsion about joining.

Upon a certain date, of which due notice was given, the restrictions—which, as stated, had been temporarily set aside—were again put in force, namely: that employees, to qualify for membership in the relief department, must thereafter be under 50 years of age and must pass a physical examination. As in the original regulations, a defect does not necessarily debar an employee from membership providing he will sign a release, as stated.

Such defects as have been encountered during the past year or two have been classified, with respect to males, as follows:

Defects Among Male Employees

Classifications	Per Cent
Hernia	44.5
Teeth	3
Varicose veins	3.3
Eyes	36.3
Defective generally	1.6
Refusal to be examined	.5
Hearing	.5
Amputation (legs, fingers)	4.1
Nerves	.3
Venereal	4.1
Hydrocele	1.8

It will be noted that there are no instances of weak heart or lungs; this is not necessarily because there are none among those examined, but because our facilities are, as yet, such as to prevent suitable investigation being made for these defects.

Among the females, the defects classify as follows:

Defects Among Female Employees

Classifications	Per Cent
Eyes	31.7
Malnutrition	2.8
Vermin	5.8
Heart	5.8
Lungs	5.8
Goitre	2.9
Suspected pregnancy	2.9
Nose and throat	14.4
Hernia	1.9

Since the inception of our relief department there has been observed an increasing tendency on the part of employees to consult the medical staff for advice, and, while no provision was made for this feature in the original plans, it seems to have so much merit as a preventive measure—not from accident, perhaps, but as an aid to keeping the employee on the job—that it is hoped we may be able, in due course, to extend the privilege of free medical examination and consultation from time to time to all employees who may desire it.

COMPENSATION LAWS AND THE DEFORMED INDIVIDUAL

Reverting again to the present State compensation laws, it is, of course, a mighty fine thing for an employee to be able to appear before a referee and cite his troubles without cost to himself, but it does seem as though some penalty should be inflicted when endeavor is made in this way to obtain compensation for fancied injuries, such, for example, as running sores resulting from slight bruises of varicose veins, and which in a healthy individual would never occur.

But while the compensation laws are so solicitous in these features why do they not take cognizance, at least, of the much more unfortunate individual who has lost an arm, an eye, a leg, or has some deformity, and afford an employer an opportunity to provide work for such instead of threatening to inflict double penalties in the event of employment and a further accident? For example, when an applicant for a position presents himself having but one eye, an employer, although never having seen the man before, and perhaps being desirous of lending a helping hand, has confronting him the law, which says: Beware! If you employ this man, and he is so unfortunate as to lose his other eye while in your employ, you are responsible to the same extent as though you had caused the loss of both of his eyes. And it matters not that the applicant himself is willing to have the employer released—not from all liability for compensation in the event of a further similar accident, but simply from the double feature—the law again steps in and says no such release will be valid. Why should the law handicap an individual already handicapped? And what does the law propose to do for such unfortunates?

NEED OF OFFICIAL BUREAU ON SAFETY DEVICES

There is a tremendous duplication of work being done the country over by employers in designing safety devices independently of one another, and for the same tools, much of which could be avoided by the establishment of an exchange bureau. Two efforts in this direction are now being made by the National Safety Council and the American Museum of Safety respectively, but they are lacking in official recognition by the States, and their work is thus not so effective as it might otherwise be.

Investigations show that the average disabling accident in our works results in a loss of 9 days to the injured, and that those occurring to employees who have been less than one year in the service are 39 per cent more severe in this respect than are accidents occurring to employees older in point of service. It will thus be seen how important a factor labor turnover is, not only in its relation to accident prevention, but in its effect upon output as well.

If education is the best specific, who shall apply it, what shall it include, and where is it to begin? With the labor turnover approximating 100 per cent, the average employer who undertakes educational work is up against a stiff proposition, and his efforts would seem to be largely for the benefit of his neighbors, at least until such time as he can induce his employees to stay with him.

SAFETY FIRST LINKED TO GOOD CITIZENSHIP

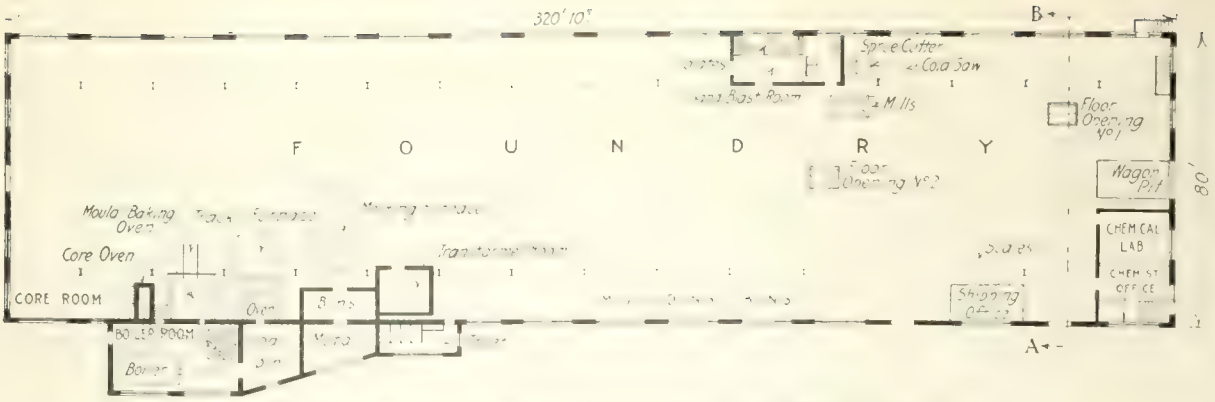
In any event, education requires time, while accidents do not, as they have been shown to occur largely among new employees, so that it is evident educational work, if it is to assist in reducing accidents, should be undertaken before employment, and this assumption puts the burden right up to the village, the city and the State where, in the speaker's opinion, it properly belongs, aided of course, by every individual and every concern to the limit of their capacity.

Such educational work should not be along narrow lines, but should, in fact, embrace everything pertaining to good citizenship, including right living and right thinking, of which safety first with respect to accidents would be a mere incident of the larger problem; and any measures less than the broad ones indicated will fall short of accomplishing its purpose.

An important phase of this work would include better educational facilities for our foreign-born population. We have no business longer to invite or permit unlimited immigration, if for no other reason—although there are other reasons—than that we are not at present equipped to make good citizens of them. In this State, for example, there are 1,500,000 foreign-born whites over ten years of age, of whom a third of a million cannot read or write any language, while a half million cannot speak, read or write our own language. But, what is more appalling, the number who cannot speak, read or write our language jumped in only ten years from a quarter to a half million; that is, increased by 100 per cent. If this proportion holds in other States, is it to be wondered at that in the disorders occurring throughout this country during the past two years foreigners took such a leading part?

It may seem to some like a far cry from safety first to good citizenship, but the complete solution of the one is intimately linked with the solution of the other, and if ever there was a single cause to which all in these troublous times could wholeheartedly contribute in some degree, and without difference of opinion, it is this one of good citizenship, education, community betterment, safety first, conservation of our resources, call it what you will.

The new addition to the plant of W. H. Nicholson & Co., Wilkes-Barre, Pa., makers of expanding mandrels, compression shaft couplings, Wyoming steam specialties and gage, jig and fixture work, has been completed and will give 100 per cent additional floor space.



Plan of the Foundry Showing the Arrangement of the Different Departments

Racine Electric Steel Foundry Completed

Belle City Malleable Iron Company Adds an Electric Steel Castings Plant to Its Facilities — Heroult Furnace Installed

THE Racine Steel Castings Company completed its foundry and took the first heat from its 3-ton Heroult electric furnace, May 18, last. The company has a close affiliation with the Belle City Malleable Iron Company, whose plant at Racine, Wis., it adjoins. The output of both the malleable and steel foundries is marketed through the one sales organization and the steel castings made are of standard analysis for general purpose and automobile use. A very substantial fireproof building has been erected, 80 x 320 ft., the steel framework being spaced for a 50-ft. center bay, spanned by a 7½-ton Pawling & Harnischfeger crane. The height of 27 ft. under the roof trusses indicates the excellent ventilating characteristics of the building. The roof is a double monitor, the upper one providing only ventilating panels, the openings being protected by pivoted steel plate shutters. In the lower monitor are continuous sash of the Fenestra pattern, the same company's sash being used in the sidewall lighting. The accompanying floor plan and cross-sectional elevation indicate clearly the type of construction used.

The melting unit is a standard 3-ton Heroult furnace lined with a basic bottom. It is being worked to melt only three heats in a day turn, at present, but is expected to be on a four-heat schedule regularly or 8 heats per 24 hr. The metal from the furnace is handled for pouring in a 1½-ton lip-pour ladle, which is filled three times from each



Some of the Foundry's Products Are Shown [illegible] Trapdoors through Which Sand Is Hoisted from the Basement May Be Noted [illegible] from the Cleaning Room End



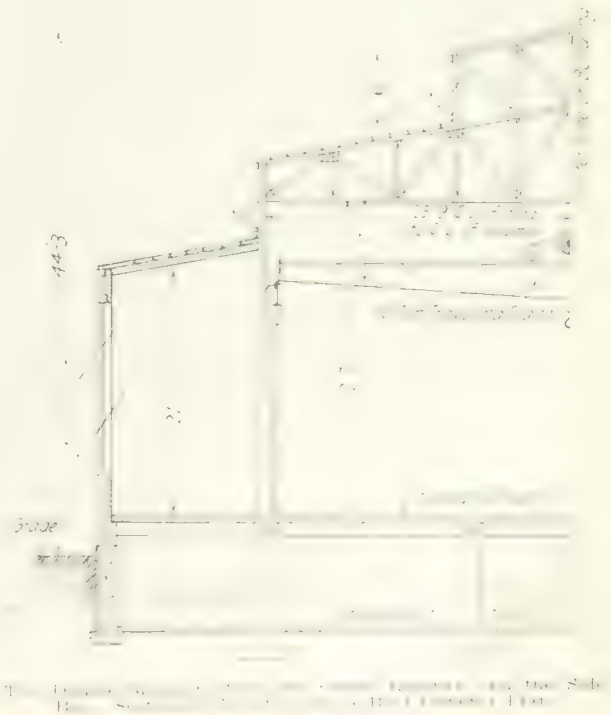
The 3-Ton Heroult Electric Furnace at the Left and the Brick Scrap Storage Bins at the Right

heat. Current is kept on the furnace between the intervals of pouring to hold the temperature of the steel, but the consumption, considering the small number of heats and the small size of the ladle in which the metal is poured, has been very satisfactory. Electrode consumption has also been moderate considering the high price, 6c. per lb., now in effect, and has approximated $1.50 per ton of steel.

Except for some special analysis work done in the early summer, no "specification" castings have been made, the standard practice being directed toward the making of steel analyzing carbon 0.20, manganese 0.60 to 0.70, silicon 0.25 to 0.30 and sulphur and phosphorus around 0.03 to 0.04 per cent. The furnace charge consists of 1500 lb. of boiler punchings, 3000 lb. of low-phosphorus open-hearth plate scrap cut to small pieces, and 1500 lb. of foundry scrap, sprues and risers. It is apparent that with scrap of this quality the furnace at present is melting without the necessity of refining, a situation made logical because of an easy market for the scrap used. The practice thus far has been to work the metal in the bath down below the carbon requirement, take a bath test for the determination of the carbon, the dephosphorizing slag being run off meanwhile, and then recarburize with pig iron.

As yet no mechanical molding is being done, but the installation of machines merely waits on the work demanding them. The work of the foundry, of which several castings shown in the left foreground of the general view of the foundry are illustrative, runs from very light motorcycle parts poured in snap flask molds put up on benches, to heavy pieces for machine frames or motor truck gears weighing up to the capacity of the ladle. One of the interesting castings is a differential gear housing, which is poured without a riser despite the 5/16-in. metal section. The shrinkage is taken up in the soft green sand center core which is made on a form. The work is done on both a piece and hourly rate basis, the former being used wherever the quantity makes it feasible.

The main floor of the foundry is at an elevation of 42 in. above the ground level. This serves a double purpose in permitting a depressed wagon entrance into the shipping floor from the street so that loading can be done at floor level, and more important, in providing for a 9-ft. basement running 100 ft. back from the front of the building which was obtained with a comparatively small amount of excavating and at small cost, as the cut was used to fill in the foundry floor. Into this basement all of the refractories and the foundry sands are delivered by gravity from cars outside the building. A Simpson intensive mixer will be located centrally in the basement and the prepared sand is lifted by the crane in large boxes through a trap-door in the floor above, for delivery wherever re-



quired. This basement also provides a convenient location for the blower for the sand blast equipment and also for the dust collector for the grinding machines, the dust pipes being brought down through the floor from each machine. The basement also serves for general storage purposes.

The foundry is provided with an oil burner drying system for the ladles, adequate coreroom and core oven facilities for both green and dry sand cores and fireproof pattern storage. The cleaning room is supplied with a Bush sprue cutter, Pangborn sand blast room equipment, a battery of tumbling mills and grinding machines and a Davis-Bournonville torch with which to cut off risers or weld such castings as require it. Pneumatic ramming and chipping tools are used throughout. A well equipped laboratory makes for a certain check on all steel that is made.

Effect of Sulphur and Phosphorus on Steel

High Percentages Not Wholly a Detriment —Unfair Specifications and the War Output—Relation of Sulphur and Manganese

AN important paper by Dr. J. E. Stead on the "Influence of Some Elements on the Mechanical Properties of Steel" was presented at the autumn meeting of the Iron and Steel Institute in London, Sept. 22, 1916. It consists of 91 pages and covers a wide field in steel metallurgy, being probably one of the most extensive papers ever presented to a technical society. It was fully discussed by prominent metallurgists.

The important subject of the influence of sulphur and phosphorus on steel was given a prominent place in both the paper and the discussion. An abstract of what Dr. Stead has written on this subject, as well as of the discussion, is given in the following:

INFLUENCE OF PHOSPHORUS

It would appear from the work of Stead and d'Amico that the effect of 0.1 per cent phosphorus within certain limits is comparable with that of carbon. For comparison, the effects of each are placed side by side in the following table. Carbon has a greater influence than phosphorus in reducing the ductility.

Table of the Comparative Effect of Carbon and Phosphorus on Steel Tests

	The Effect of 0.1 Per Cent Carbon	The Effect of 0.1 Per Cent Phosphorus	
		Stead	d'Amico
Yield point raised, tons.....	1.78	2.5	2.3
Maximum stress raised, tons..	4.18	2.4	4.1
Elongation reduced, per cent..	4.35	0.7	1.36
Reduction reduced, per cent...	7.40	1.5	3.8

Webster concluded that as the carbon rises the effect on the tenacity per unit of phosphorus also increases from about 4 tons per square inch when 0.09 per cent carbon is present, to nearly 7 tons per square inch when the carbon reaches 0.17 per cent—a result different from those given above, for there is apparently less effect on the steels tested by Stead, which had 0.3 per cent carbon, than on those tested by d'Amico, which contained less than half that amount.

The value of 0.5 per cent phosphorus steels in resisting continued rotary stresses, as compared with that of the same steel containing little phosphorus, points to the value given to the steel by raising the yield point from 20 to 32 tons per square inch. The steels tested by Stead were in the forged condition and the structure was very fine.

A certain amount of carbon—about 0.25 to 0.35 per cent—when present in steel containing 0.2 to 0.5 per cent phosphorous, causes the steel in setting to be much more finely crystalline than when phosphorus is quite absent, but the reverse is the case when little or no carbon is present. In the forged steels the crystalline structure is usually the finer in the phosphoric steel. This is not generally known, but can be proved by fracturing any segregated steel bar, when the structure of the phosphorus-rich segregate will always be found to be finer than the surrounding steel.

STEEL RAILS AND PHOSPHORUS

There is no reliable record showing that sound steel rails containing from 0.07 per cent to 0.09 per cent phosphorus break up on the track more frequently than those containing less phosphorus. Phosphoretic rails undoubtedly resist wear better than the same rails with less of the element present. Sir Lowthian Bell's results confirm that conclusion in iron rails. In days gone by, when iron rails were in use, it was the practice to have iron very rich in phosphorus in the heads of the rails, for it was recognized that the phosphoretic iron wore better than the purer material. When steel was introduced, carbon replaced phosphorus.

Phosphoretic steel is still largely used and is most useful in small amount in tin-plate bars, as it prevents the sheets sticking together during rolling, and it is used in larger quantity in low-carbon steel for bicycle parts. It confers the important property on steel of giving clean and bright surfaces when turned in the lathe, and moreover increases the elastic limit and tenacity. The quantity required to give good machining property is usually from 0.13 to 0.20 per cent. Phosphorous alloyed with iron makes the metal less liable to corrode and in that respect is useful.

When judging the properties of steel note should be made of the fact that in many cases when carbon is rather low phosphorus may be an advantage, for it has similar influence to carbon, which it replaces. Phosphorus has a bad name, like many other elements, but far from always being an enemy is often a friend.

It must not be assumed that the use of high-phosphorus steels in general is advocated. All that can be said is that in judging the quality of steel it should not be assumed that phosphorus is as bad as it is painted.

PHOSPHORUS IN WROUGHT IRON

Although wrought iron containing phosphorus from 0.4 to 0.5 per cent is liable to develop dangerous crystallization if highly heated and in the neighborhood of welds, iron containing a smaller proportion between 0.10 per cent and 0.15 per cent does not lead to that result. The best Yorkshire and Staffordshire irons contain phosphorus between these lower limits, and for structural purposes are superior to the best Swedish wright irons, as the phosphorous in the former raises the elastic limit and makes the iron easier to weld, and gives a higher yield point and tenacity.

Carbon, being always low, the phosphorus takes its place in conferring on the iron these useful properties. When the phosphorus reaches 0.4 to 0.5 per cent the iron becomes brittle, and it is impossible to refine the coarse crystalline structure by heat treatment. Refining of the iron can only be effected by forging.

INFLUENCE OF SULPHUR AND MANGANESE

Professor Arnold was the first to explain how it is that sulphur *per se* in steel without manganese produced redshortness, and there can be no doubt that the bad character of sulphur was earned in the early days of steel-making owing to the difficulty of getting a sufficient quantity of manganese into the steel without unduly raising the carbon, for at that time only German spiegeleisen, containing about 4.5 per cent carbon and 7 to 9 per cent manganese, was available.

When the Ebbw Vale Steel Company in Wales produced spiegeleisen containing 20 per cent manganese for use in steelmaking, little or no redshortness appeared, and when the manganese was still further increased, sulphur ceased to be the bugbear it had previously been. It was proved long ago that manganese counteracts the effect of that element, but books have been written in which sulphur was condemned, and engineers and their experts read those books and copied them, so that even to this day steel rails, etc., of exceptional quality are rejected because the sulphur exceeds arbitrary limits, even when all mechanical tests have proved that the material is perfect.

The work of Brinell has shown that steel with 0.15 per cent sulphur gives better impact tests than any other steel used in a most exhaustive series of tests, better far than similar steel containing only 0.015 per cent sulphur. In one example a steel was alloyed with 0.5 per cent sulphur and 1 per cent manganese, and this as well as the other rolled and worked perfectly. Brinell, however, said that sulphurous steel was weaker when tested transversely, and this undoubtedly is the case. It is well known that ship and boiler plates high in sulphur are weaker transversely than in the direction in which they are most extended by rolling.

Cross sections cut from the heads of rails 2 in. x ¼ in. x ¼ in., containing variable amounts of sulphur, bend to a continually diminishing degree as the sulphur is increased. When the material in use has to be stressed transversely to the rolling direction the sulphur should be low, but when stressed in line with the rolling direction, as in rails and axles, and in material that has to be submitted to sudden shock, sulphur is not a disadvantage. Steel high in sulphur resembles wrought iron and is more or less fibrous. It is a fact that steel called free-cutting fibrous steel is being imported and used in England to-day, and the peculiar properties referred to are due to the deliberate introduction of sulphur into the steel. Such material contains about 0.15 per cent sulphur. Sulphur then may be regarded as a friend when it is used intelligently, and not invariably as the enemy it is represented to be.

SULPHUR AND THE SOLUBILITY OF STEEL

The more sulphurous a steel, other conditions being constant, the more rapidly is it attacked by acid solvents. This is due to the great solubility of the sulphide of manganese. If cross sections of rolled bars are immersed in dilute sulphuric or hydrochloric acids, the ends of the elongated cigar-shaped sulphide of manganese thread inclusions are at once dissolved away and the acid then attacks the walls of the holes so produced. As the amount of steel dissolved away is proportional to the surface exposed, and as the surfaces of the cavities at first occupied by the manganese become larger and larger, the steel dissolves in an increasing degree on continued attack. As the number of holes produced by the acid is proportional to the number of separate sulphide inclusions and to the sulphur, it is obvious that the higher the sulphur the greater will be the ultimate attack.

Some engineers and inspectors immerse cross sections of steel in acid for a given time, and on finding that vertical holes are produced they assume that the steel is porous. The test is called the porosity test. It does not detect porosity but produces holes in places initially occupied by the sulphide of manganese. It is customary to assume that if the point of a needle can be inserted into these holes to a depth of about 2 millimeters and the hole is fifty one-hundredths of a millimeter in diameter, the steel is very porous—an entirely unwarranted assumption. The original diameter of the sulphide inclusions is rarely more than one one-hundredth of a millimeter. It is the acid which attacks the walls of the hole at first occupied by the thread of manganese sulphide that is responsible for the greatly increased diameter, and the hole is no indication of porosity in the steel.

The test is a suitable one for roughly detecting sulphur, but not porosity. It has been alleged that high sulphur is conducive to increased corrosion, and there is some chemical reason for this, inasmuch as the sulphides readily oxidize into oxides of manganese and sulphuric acid, and the acid produced then attacks the iron. It is not certain whether comparative "field tests" have been made to determine whether this is so or not. Probably some members of the Institute will be able to present definite information on this question.

The Discussion

In discussing the paper Sir Robert A. Hadfield said that he was sorry he could not agree with the author's remarks. He admitted that with mild steels it was possible to have a much higher phosphorus, which was most excellently demonstrated by research work many years ago. As Dr. Stead had pointed out, at the time ferromanganese first came into general use at a reasonable price there was no doubt that this meant that a lower carbon and a higher phosphorus steel could be made, but he would not like it to go forth from the Institute that it was safe to use high sulphur and phosphorus. He thought the author should qualify his statement by stating that a lower carbon should be used under such circumstances. In all the steel, however, made at the present time, a lower carbon could not be used, and unfortunately with high phosphorus, anything over 0.08 to 0.09 per cent, the material was much more liable to be burned during heat treatment. In other words, Mr. Hadfield claimed that it was possible to take the same steel with lower phosphorus and heat it to a higher temperature without risk of its being burned; that is, creating too large a crystallization, as compared with a similar steel in regard to carbon and manganese and with a lower sulphur and phosphorus, or at least a lower phosphorus.

Mr. Hadfield cited the fact that several years ago he had obtained some excellent results from a small specimen of steel containing 0.14 per cent phosphorus. By heat treatment he obtained some very good mechanical and shock tests. The carbon was 0.2 and the steel was heat treated—that is, it was not tested as forged.

HIGH SULPHUR AND PHOSPHORUS

C. H. Ridsdale, in continuing the discussion, said that it had long been the custom to regard 0.06 per cent of sulphur or phosphorus as the limit for most commercial steels up to 0.5 per cent carbon, and although the late British standard specifications for rails allow up to 0.07 per cent and for some sections 0.08 per cent, yet one often meets with exaggerated ideas to the effect that 0.08 to 0.10 per cent of phosphorus would fully account for extreme brittleness, or, in the case of sulphur, for redshortness or mysterious fractures resulting from segregated sulphides.

A great number of cases had come under his notice of material that was chemically perfect, but had received faulty treatment and also a few cases in which the steel at fault was high in these constituents but had also been badly heat treated. Mr. Ridsdale, however, could not recall a single instance in which steel had received reasonable treatment where, for the particular purpose for which it was wanted, the presence of sulphur or phosphorus up to say 0.10 per cent could be definitely shown to be the cause of the trouble.

UNFAIR SPECIFICATIONS AND WAR STEEL

Dr. J. O. Arnold thought that valuable contributions had been made to the main thought of the paper dealing with sulphur and phosphorus but that it was necessary to keep a balance in reference to this matter at the present time. He said many armament manufacturers were simply writhing under the unreasonable specifications for sulphur and phosphorous. There was one specification of 0.04 per cent phosphorous. Taking it as an example, if to the best of the chemist's ability the phosphorous turned out to be 0.042 per cent it was rejected.

In Dr. Arnold's opinion this was not only unfair but such ridiculous specifications were restricting the output of the country at present. Dr. Stead had made at Middlesbrough a set of steels ranging in phosphorous from 0.04 to 0.5 per cent, and proved that under the Wohler test 0.5 per cent of phosphorous resisted alternation up to ten times the extent of the 0.04 per cent steel.

E. H. Saniter stated that the steel manufacturers in Sheffield did not believe much in sulphur and phosphorus and that sulphur was not an unmitigated benefit in steel rails. It might increase the shock resisting properties in one direction, but he thought an excess of sulphur was very liable to originate cracks, causing split heads, which were perhaps not so dangerous, but at any rate were dangerous.

F. W. Harbord expressed his entire agreement with Dr. Arnold that an intelligent interpretation of specifications was required and that steel should not be rejected on what was simply a personal error. Such procedure was ridiculous. In his opinion a really intelligent interpretation would be that, with a lower carbon, a higher phosphorous steel should be taken, but he feared that that would put the steel manufacturer in a worse position than he was at present because there were so many variables. To reject steel which had 0.8 per cent of phosphorous when it had a slightly higher carbon and to pass it with a slightly lower carbon was, he feared, a position which would be far more unsatisfactory than the present state of affairs.

He was very glad to hear Dr. Stead emphasize the point that the less the sulphur and phosphorous were the better. He believed it was necessary to face the fact that if 0.1 per cent phosphorous existed in one part of an ingot there was a great risk of a very much higher quantity being present in another part, and the same remark applied to sulphur. He agreed that sulphur did not affect the mechanical strength of the steel, but the incipient cracks to which Mr. Saniter had referred were liable to be produced.

Dr. Stead, in replying to the foregoing discussion, stated that he had never advocated high sulphur or phosphorous, but pointed out that he had urged on every occasion that every means be employed to reduce these elements to the lowest limits. He insisted that what he did say and what no one had controverted was that, for certain purposes, phosphorous and sulphur might be useful and that steels were actually sold in England having certain properties only conferred on them by the presence of sulphur or phosphorous. He stated that if the sulphur were raised unduly outside sulphur lines and ghost lines would be produced, and when these were present it was impossible to tell whether they were only superficial or whether they extended to a great depth. For this reason an undue proportion of sulphur must be condemned.

STEEL RAILS MADE IN INDIA

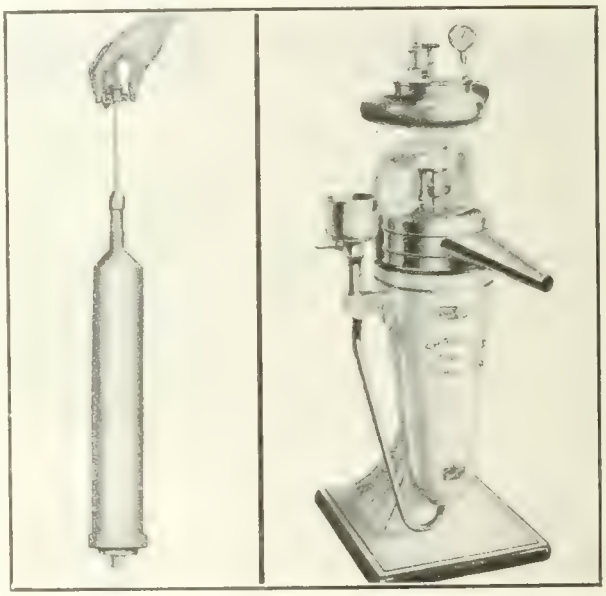
Many years ago, continued Dr. Stead, when discussing the question of sulphur and phosphorous in specifications he had said that if he had brought home from India and thoroughly examined the steels that had performed the best service he would find that they were not made according to specification. The steel rails for India were so made because steel makers could never comply with the specifications, and it was not possible to make the steel on a sufficiently large scale. Because of the severe specifications the Engineering Standards Committee had met and fully studied the question, and as a result had raised the sulphur and phosphorous limit to 0.07 and 0.08 per cent, and he did not think the increase from 0.06 per cent had led to the fracture of any more rails on the railroads than had occurred previously. He contended that the steel makers of England and America were beginning to discover that the reason why rails broke depended more upon their solidity and soundness.

Dr. Stead believed that the amount of sulphur present was a measure of the amount of manganese sulphide. He challenged steel makers and others to bring forward any evidence to prove that 0.07 or 0.08 per cent or even 0.09 per cent phosphorous was harmful in a steel that had not been heated and hardened. It was for the steel makers to prove that he was wrong. The basic steel makers of Middlesbrough, he was proud to say, could make purer and he claimed better steel than the average steel produced in Sheffield. The Middlesbrough makers were proud of their ability to make steel with 0.03 per cent sulphur and phosphorous, and they claimed that that steel would take a very important place in the future.

Electric Steel and the Severe Strains of Rapid Revolution

A steel bowl running at a speed of 16,000 r.p.m. is the main feature of an interesting centrifugal separator construction. The centrifugal force generated by the high speed of this bowl is very great. The liquid in the bowl is subjected to a force 40,000 times greater than its own weight. The strain on the steel is of course very severe.

The machine is composed of an iron frame supporting the revolving steel bowl, which is about 4 in. in diameter and 24 in. long. The steel of the bowl must have a very high elastic limit and electric steel satisfies this requirement. If by any chance the bowl should far exceed its normal speed, the stress on the metal would pass the elastic limit and permanently distort the bowl, throwing it out of true and out of balance. The bowl must be in perfect balance to run at a speed of 16,000 r.p.m. and the moment it is thrown out of balance by distortion it runs rough and slows down. This seemingly minor feature is such an effective and



This Is the Steel Bowl, Which, Hanging from a Ball Bearing by a Flexible Spindle, Spins at About 16,000 r.p.m., Depending to Do Its Work. To Be Done. The Other Is the Complete Machine

positive safeguard that in its 39 years' experience and with many hundreds of thousands of separators in daily operation, the manufacturers have never had a serious accident caused by the use of one of these machines. They are employed generally for the separation of cream from milk or the removal of sediment from benzine, oils, chemicals, etc. A high enough speed is scarcely ever reached to overstrain the metal. Should such a condition obtain, the stretching without breaking feature of the bowl steel puts on the brakes automatically.

The steel bowl shells themselves are made from steel produced in an electric furnace. After conversion into billets it is cold drawn into seamless steel tubes 4 in. in diameter and 12 ft. long—an indication of the excellent quality of the steel. It is still further worked by forging one end down to a bottle neck. Its composition is not revealed but it is not an alloy steel. The illustration shows a complete machine as well as one of the steel bowls which hangs from a ball bearing by a flexible spindle.

The Pennsylvania State Department has approved the merger of the Rockhill Coal & Iron Company, and the Broad Top Improvement Company, under the corporate name of the former. The headquarters will be in Philadelphia and the new merger will be capitalized at $1,600,000. G. Theodore Roberts, New York, is president, and S. J. Livingston, Philadelphia, is secretary-treasurer.

Customs Decision

IMPORTS DUTIABLE PRECISELY AS RECEIVED

A decision made the past week by the Board of General Appraisers has the effect of discouraging the practice sometimes resorted to by importers, of entering foreign-built machinery, machine tools and other metals in separate [illegible] parts, thereby a lower rate of duty. In the case just decided, standing in the name of Albert T. Otto & Sons, there was nothing in the official record to warrant the inference that the shipment of parts of the machine tools in question was arranged [illegible] At the same time, the principle enunciated in the board's decision was sufficient [illegible] cases where parts of the same kinds of merchandise arrive on different steamers. The specific question before the board was whether parts of a complete machine tool could be imported in two distinct shipments and still be considered for tariff purposes as constituting a "machine tool" within the meaning of paragraph 165.

Stated briefly, the protests of the importing firm had reference to two distinct importations of machine-tool parts, separately entered and on different dates. The collector at New York classified both shipments at 20 per cent under that part of paragraph 167 reading, "manufactures of metal not specially provided for," whereas, the importers claimed that the metal parts, although imported in different shipments and separately entered, should nevertheless have been classified by the collector as constituting an entirety, and duty taken at 15 per cent under paragraph 165, as "machine tools," since it was duly admitted by the Government that if the parts had been shipped as a single importation they would have been properly classifiable as a machine tool within the Congressional definition of that term as set forth in paragraph 165.

In other words, it was alleged by the protestants that the customs officials erred in treating the shipment as comprising separate dutiable entities by classifying the parts enumerated on each invoice as incomplete machines, and consequently covered by the general provision for manufactures of metal not specially provided for, rather than as representing collectively a single machine tool as comprehended by paragraph 165.

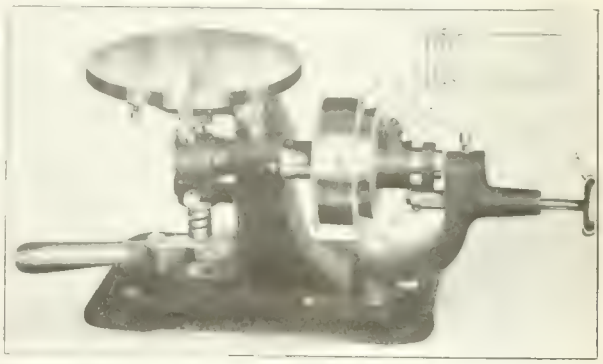
At the trial, counsel for the importers made six points in favor of the contention of his clients, among them that when assembled the parts made a complete machine; that the tools were ordered, made, purchased and as far as practicable were intended to be shipped as an entirety, but that being large and cumbersome the parts had to be packed in separate cases for convenience of transportation. It was further set forth that, on account of their size, the cases containing the parts could not all be placed on one of the small Swiss railroad freight cars. Another plea was that the second shipment from the Swiss factory was held up by the French authorities at the port of exportation in France while an investigation was made to determine whether or not the goods were of enemy origin.

Judge Fischer, in his decision, concurred in by the other members of the customs tribunal, said in part:

> If there is one principle of law which is so fundamental, established and well settled as to customs administration that it may truly be said to be axiomatic, it is that imported merchandise must be considered for tariff purposes precisely as it was received by the collector at the port from which it is imported. Whatever legitimate advantages importers may properly be entitled to derive therefrom, in order to insure the payment of the lowest possible rate of duty on their goods, the rule that the condition of the importation must inevitably determine its tariff status is so well established that it is not to be compromised or deviated from. Indeed, it is difficult to overestimate the prime importance of a strict application of that test, for upon the soundness and integrity of the principle involved may be said to rest the stability of the entire tariff structure. Inasmuch, therefore, as there exists no special provision for parts of machine tools, and as the goods in question, [illegible] composed wholly of metal, it follows as matter of law that they are properly relegated for tariff classification to the general provision in paragraph 167 for manufactures of metal not specially provided for and we so hold. The protests are therefore severally and in all respects overruled and the decision of the collector in each instance is affirmed.

Die Forming Machine with Belt Drive

In addition to the motor-driven die forming machine which was illustrated in THE IRON AGE, Oct. 5, 1916, the Anderson Die Machine Company, Bridgeport, Conn., has placed one on the market having a special form of belt drive. The interesting feature about the new machine is the employment of a steel ball to control the



A Special Arrangement of a Ball and Set of Grooves Shown [illegible] Belt-

engagement of the friction member of the drive with the pulley over which the belt runs. The ball arrangement is offered with a view to eliminating as far as possible the troubles incident to loose pulleys and machinery which is kept running continually, whether in use or not.

[illegible] is controlled by the operating knob *A*, which is fastened to one end of a rod having a forked member *B* at the opposite end. This forked member engages a friction member *C*, which has a cone *D* fitting into the pulley *E*. A hub *F* is located in the friction member and has a hole *G* containing a spring and a screw for varying its tension. A steel ball, 5/16 in. in diameter, operating against the radial grooves in the hardened sleeve **H** as indicated in the insert sketch, is located in front of the spring.

Pressure applied to the knob *A* forces the friction member *C* into the pulley *E*, the steel ball assuming the position indicated by *I*, where it is relied upon to hold the friction member in engagement with the pulley. When the friction member is withdrawn, as in the position shown in the photograph, the ball takes the position indicated in the sketch by *J*, and holds the friction member out of engagement.

Furnace Linings of Bauxite Brick

Bauxite brick for furnace linings is discussed by W. C. Phalen in a U. S. Geological report on "Bauxite and Aluminum in 1915." The purer the material used the more refractory the brick. The addition of bauxite to refractory clays not only increases their alumina content but also their refractoriness. The two kind of brick in common use, made by hydrous oxide of aluminum, contain 56 and 77 per cent of alumina respectively. The lower percentage brick are used as fire clay brick but will withstand higher heat. Those containing the higher percentage have been used as a substitute for magnesite brick for open-hearth and other furnaces. Mr. Phalen cites an instance where bauxite brick were used in the port and of a furnace forming a bulkhead for that particular furnace for 365 heats after which a new roof was put on. The opposite port of magnesite brick is reported to have been in a worse condition.

Iron, steel and their products will be handled by the John Illingworth Steel Company, which has been chartered with a capital of $10,000, with Philadelphia as its headquarters. The incorporators are John Illingworth, Newark, N. J.; Charles P. Soden, New York; Clarence Illingworth, Philadelphia, and William H. Illingworth, Newark, N. J.

The Erosion and Hardening of Large Guns*

Phenomena and Causes of the Cracks and Hardness on the Inside—Effect of Temperature, Mechanical Deformation and Cold Work

BY HENRY FAY

THE erosions of guns is a complex problem which can be solved only by a detailed study of all the factors involved. In the present paper it is proposed to submit the results of observations and experiments which have extended over several years. Certain facts have been established and preliminary reports have been published (Tests of Metals, Watertown Arsenal, 1913 and 1914). Conclusions have been reached since then, but the particular phase of the problem which will be presented here is the hardening of the inner surface of the gun tube.

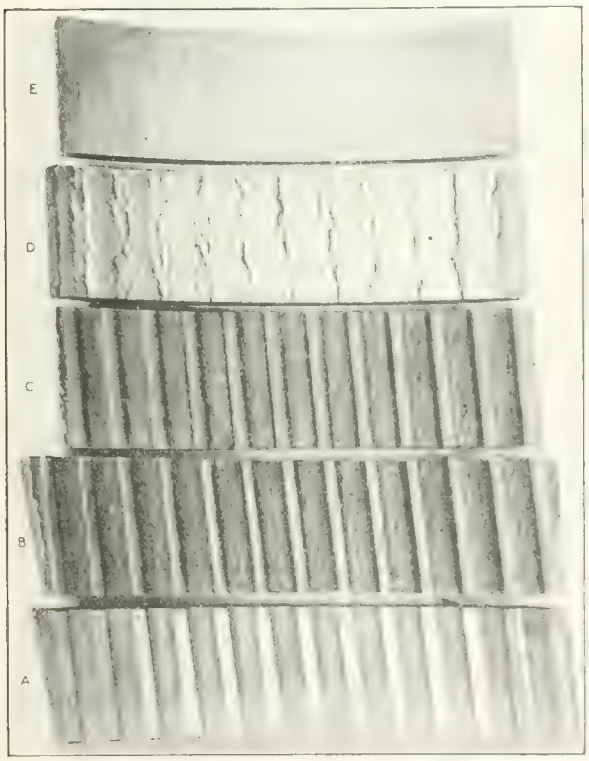


Fig. 1—Appearance of the Surface of the Steel in Different Sections of the Inside of a 12-In. Gun

It has been known for a long time that after firing a large-caliber gun for some time, the surface of the metal becomes hard and brittle, cracks, and wears away. This action is not confined to large-caliber guns exclusively but will occur also in smaller guns, although, as will be shown, the action is much accelerated with the increase in the weight of the projectile. The character of this phenomenon may be learned by an examination of some results which are typical, obtained from a detailed study of a 12-in. gun. The gun was trepanned and rings representing various sections of the gun were cut out for examination. The first ring represented the metal at the muzzle end, and the other rings were removed at approximately 120, 240, 325 and 337 in., respectively, toward the breech end.

The appearance of the surface of the metal in the different sections is shown in Fig. 1. The greatest amount of wear and maximum amount of hard surface layer was found in section marked E, which is nearest the powder chamber and at the beginning of the rifling; the maximum amount of cracking in D; the maximum amount of copper deposition in C. Section B showed heat cracks on both land and grooves, and section A showed heat cracks on the driving edge of the lands only. There was much flow of metal in both sections E and D, and there was progressively less effect noticeable toward the muzzle end. The extent of the erosion is greatest nearest the powder chamber, and diminishes toward the muzzle end.

The depth of heat crack varies irregularly in each section, and somewhat regularly in sections proceeding from A to E, increasing in depth toward the powder chamber. The number of cracks does not, however, vary in the same way. In section E, where the greatest erosion has taken place, the smallest number of cracks appear.

The greatest depth of crack is found in Section D, with an average depth of 0.038 in. The width of crack in this section varies between 0.001 and 0.015 in. In section E the depth varies between 0.024 and 0.039 in. In section C the average depth of crack is only a trifle less than in D, but the width is not nearly so great. The cracks diminish progressively in depth and width in sections B and A, the latter section showing practically no cracks on the face normal to the axis of the gun. On a face parallel to the axis of the gun and cut along the driving edge, section A shows some clean, sharp cracks about 0.01 in depth.

Sections B, C, D and E show a hard layer of metal on the face cut normal to the axis. All five sections show the hard layer on the face cut parallel to and along the driving edge. The depth of this layer on the face normal to the axis varies as follows: A, 0.0000 in.; B, 0.0004 in.; C, 0.0008 in.; D, 0.0013 in.; E, 0.0015 in.

The cracks are undoubtedly due to the unequal expansion and contraction between the hard and soft layers. When subjected to strain the hard, brittle surface develops cracks, and the cracks penetrate into the soft metal. The section showing the greatest thickness of hard layer ought to show the greatest depth of crack, but other influences counteract this effect.

The microscopic appearance of a surface showing cracks is shown in Fig. 2, and in Fig. 3, the latter a characteristic structure always found at the junction of a land and groove. The interpretation of these photographs will be considered in detail after discussing the cause of the formation of the hard layer. In addition to the hardening which takes place in the gun tube proper, hardening and cracking of the surface takes place on the pressure plugs which are inserted in guns for the purpose of measuring maximum powder pressures. The pressure plug shows hardness around the edge of the central hole, around the edge of the plug itself, and shows the effect of hardening in the form of cracks all over the surface, but particularly in the vicinity of letters which have been stamped on the surface. Any theory which may be offered to explain the hardening of the gun tube proper must also explain the hardening and cracking of the pressure plug.

While these results are in general typical of what takes place, there are variations in individual cases. For instance, the metal on the driving edge may not have been affected as it was in the 12-in. gun referred to, but it is merely a matter of time until the conditions as described are obtained. The action is a progressive one and is dependent upon the number of times the gun is fired.

Hardening may be produced by three well-defined methods: cementation; heat treatment; mechanical deformation or cold work.

Cementation.—The principal products of combustion of the powder are carbon dioxide, carbon monoxide,

*From a paper to be presented at the New York meeting of the American Institute of Mining Engineers in February, 1917. The author is professor of analytical chemistry, Massachusetts Institute of Technology, Boston, Mass





Figs. 2 and 3—The Microscopic Appearance of a Surface of the Inside of a 12-In. Steel Gun Showing Cracks. The photomicrograph at the right is the characteristic structure always found at junction of a land and a groove. The magnification in both cases is 49 diameters

water, and nitrogen. The equilibrium phenomena are very complex and will vary with the composition of the powder, the temperature and pressure. It is conceivable, however, that large amounts of carbon monoxide may be formed, and under the conditions of high temperature and pressure cementation could take place. This would produce a hard, brittle layer on the surface richer in carbon than the original metal.

Heat Treatment.—When a piece of steel is heated above its critical temperature, Ac_1, and then suddenly quenched, it is hardened, the depth of hardening being dependent upon the temperature of heating and the rate of cooling. The temperature of combustion of the powder is sufficiently high to heat a skin of the metal above the Ac_1 point, and hardness would result if the surface were cooled with sufficient rapidity. The relatively low temperature of the large mass of steel would produce a rapid loss of heat.

Mechanical Deformation or Cold Work.—When any ductile metal is subjected to mechanical deformation it becomes hard and brittle, and if the work is carried too far, cracking will result. Even the most ductile metals, such as gold and platinum, lose their plasticity and become hard and brittle when subjected to drawing, hammering, etc. In wire drawing it becomes necessary to anneal the metal frequently in order to restore plasticity and prevent it from cracking. This phenomenon is common to both ductile and brittle metals.

According to Beilby*, a surface skin may be built up by mechanical movement which gives unmistakable evidence that the surface must have passed through a state in which it possessed the perfect mobility of a liquid. This surface possesses distinctive properties which differentiate it from the surface beneath it. These layers retain their mobility for a brief period only, and then solidify in a vitreous amorphous state cementing together all of the surfaces of slip or shear throughout the mass.

Such a surface produced by polishing, burnishing, drawing, hammering, or cold work of any kind, possesses the property of hardness and brittleness. Metal in this condition may be restored to its natural crystalline, ductile state by annealing.

It would seem at first to be rather difficult to prove whether or not cementation had taken place, as the maximum thickness of layer which had been hardened amounted to only 0.0015 in. It was obviously impossible to cut off this layer for analysis, not only on account of the thinness, but also on account of the hardness.

Microscopically the appearance of this surface suggested cementite, as it remained bright after etching, as shown in Figs. 2 and 3, and, furthermore, in no case was there any evidence, even under high power, of martensite, which would also remain brighter than the original structure. Etching with boiling sodium picrate, which darkens cementite, gave negative results. The hardness of the layer and its appearance would indicate free cementite, but this test would, therefore, appear to be conclusive that the surface cannot contain any free or excess cementite. The test was carried out always within a control piece which contained about 1.25 per cent of carbon, and therefore known to contain free cementite. Under all conditions the control gave positive results. There is some doubt as to whether or not a small amount of cementation takes place, and experiments are in progress which, it is hoped, will prove this point definitely.

While it seems fairly clear that the hard surface layer is not free cementite, judging from the sodium picrate test, it would have been difficult on this basis to explain the fact that the hard layer occurs only on the driving edges in the muzzle end of the gun. Selective formation would not seem probable.



Fig. 4—Photomicrograph, 71 Diameters, Showing the Effect of Cold Work on Steel When Stamped with the Letter A

*Journal of the Institute of Metals, vol. 6, p. 5 (No. 2 1911).



Fig. 5—Photomicrograph [illegible] Showing the Effect of Cold Work on Steel When Stamped with [illegible]

That hardness might be produced by raising the temperature above Ac_1 and suddenly cooling seems entirely possible, and most of the facts can be explained on this basis. The temperature within the gun at the time of the explosion is far above Ac_1, in fact may be above the melting point of the metal. A thin skin of metal is heated for a brief period during the explosion, and before the heat can penetrate any distance, it is cooled by the mass of metal back of this layer. Such a hardening ought to produce the microscopic constituent martensite, but this structure in its characteristic needle-like form is never found, although troostite is frequently found. Rosenhain and Belaiew have reported martensite in the hardened surface of the rifling of a gun, but so far in the examination of many gun fragments, and in trepanned guns, the characteristic martensitic structure has been missing. In some experimental steels which had been subjected to erosion tests by allowing the gas of an ignited charge of powder to escape through a tube of the metal, there was found not only well-characterized martensite but also troostite adjacent to it. The essential difference in this case is that there was no projectile to produce mechanical deformation on the surface.

That the hard surface is actually composed of martensitic material is proved by the fact that on tempering it passes over to characteristic troostite. Samples were cut out of the ring from section E. and heated for 15 min. to 300, 400, 500, 600 and 700 deg. The specimen heated to 300 deg. showed troostite development most markedly and unmistakably. The 400 and 500 deg. samples also showed troostite, but less well defined, the transformation having progressed further, and there was almost complete reversion in the specimens heated to 600 and 700 deg. This experiment seemed to prove conclusively that the hard surface was martensite, but threw no light upon the fact that in the muzzle end of the gun the surface was hardened on the driving edge only.

It was thought for a time that mechanical deformation or cold work produced by the rotating projectile would account for all of the phenomena, but this idea was negative by (1) the martensite-troostite conversion; (2) by the fact that the powder chamber itself, untouched by the rotating projectile, showed hardness; (3) and by the fact that the pressure plug showed hardness.

That mechanical deformation has much to do with the production of hardness is shown by the selective harden-



[illegible] of the Effect of [illegible] After [illegible]



Fig. 6—Photomicrograph, 50 Diameters, Showing [illegible] of Cold Work on Steel When Stamped [illegible]

ing on the driving edge of the land on the muzzle section, and by some experiments which were conducted on pressure plugs.

Knowing that pressure plugs harden in the same way as the surface of the gun tube itself, it was decided to experiment with pressure plugs, and to follow the development of the hard surface layer in its various phases. For this purpose, a plug having approximately the same composition as gun steel was prepared for service. The metal was carefully analyzed, it was heat treated, and photographs were made of the fine sorbitic structure. The surface as a whole was uniform. The prescribed lettering was stamped on the surface. It was then placed in service, and, after having been fired until it showed signs of heat cracking, was returned for microscopical examination. The face was polished and etched, and the structure seemed to be normal, but it was seen on detailed examination that the hard surface had begun to appear on the edge of the center hole and on some of the letters. Examination showed that this development had taken place at those points where the *maximum amount of cold work had been applied in stamping the letters.*

This is shown in Figs. 4, 5 and 6, representing the letters A, O, and a period respectively. In the letter A and in the period the die was apparently not held in a truly vertical position and one side of the letter was cold-worked more than the other. Selective con-

version of soft to hard metal has taken place at these points. This is shown in the lighter area of Fig. 4, and also of Figs. 5 and 6, the light area in each case being the hard area. Observations of a similar character were made on almost every letter on the face of the pressure plug, each showing partial conversion from soft to hard structure at the point of maximum cold work.

This evidence seemed to favor the view that cold work was an important factor in the martensitization of the metal. In order to test this view systematically, a second pressure plug was prepared and the letters V and O were stamped on the face of the plug at varying pressures. This was done by holding the stamping die in one jaw of a tensile testing machine and the plug in the other jaw. The machine was now put into compression and the letters stamped at varying pressures, from 500 to 2000 lb. By mistake, one of the letters V was stamped at 5000 lb. instead of 2000 as originally intended.

The pressure plug was then put in service and the gun was fired 100 rounds, when the plug was returned for examination. The original sorbitic condition of the metal was found to have changed to the troostitic condition at those points of maximum cold work and to have remained practically unchanged at other points. Thus the first step in the change sorbite → trootsite → martensite has been accomplished. The letter impressed at 2000 lb. also shows the change, but not advanced so far as in the letter of greater pressure. At 1500 lb. the change has begun but the advance has not been far, and at 1000 lb. pressure the change is not noticeable.

The plug was again placed in service for 100 rounds and then returned for examination. The result is shown in Fig. 7, which is the letter V impressed at 5000 lb. It will be noticed that the transformation has proceeded to its final stage, viz., the light etching structure which had previously been shown to be martensite.

These experiments seem to prove that the hardness of the surface of a gun tube as well as the pressure plug is due to a combination of mechanical deformation and a process of martensitization. This process requires time, and the development takes place in stages. Even in the early stages there was evidence of heat cracking before the change of structure had taken place. When the structure begins to change it first shows as troostite, and then develops into martensite, but the latter is amorphous in form. Temperature and work are also important factors. The transformation takes place with the greatest rapidity where the work has been most severe.

These factors counterbalance each other in the gun to a certain extent. In the powder chamber there is the maximum temperature, but the minimum amount of work. The only work which has been done upon the metal here is the original machining of the gun. In section E where the rifling begins, the maximum amount of cold work is done. The rotating band is undeformed and the whole surface bears on the rifling. This is also true of section D, but in each section toward the muzzle there is a decreasing amount of work due to the grooving of the rotating band until at the muzzle end the driving edge alone receives work.

In a gun the original metal is sorbitic and the iron carbide is therefore mostly in the free form, only a minimum amount being held in solid solution. When subjected to the pressure of cold work, or the pressure of the explosion at a high temperature, solution may take place, each round of firing adding to the amount which goes into solution. This would lead naturally to the formation, first of troostite, and when the solution is complete, or martensite. These steps are actually observed.

Either hypothesis—solution in amorphous metal, or solution by pressure—may explain the phenomena observed, but the latter seems the more likely. This would more adequately explain the fact that in erosion tests of steels of various composition, those steels high in nickel or manganese show the greatest amount of martensite formation. In these steels the Ar_1 point is lowered slightly, thus increasing the tendency for the carbide carbon to be held in solid solution form. Thus, in one case, a 3.50 per cent nickel steel showed a martensite surface 0.05 in. in depth, while under exactly similar conditions a plain carbon steel showed only 0.001 in.

Experiments are now in progress with alloy-steel pressure plugs to see whether or not the hard surface develops more rapidly with them than with plain carbon steels. It is highly probable that those steels having the highest Ac_1 point will show hardening the least rapidly.

Suggestions on Engineering Education

In his address opening the annual meeting of the American Society of Mechanical Engineers in New York, on Tuesday evening, Dec. 5, Dr. D. S. Jacobus, president of the society and advisory engineer of the Babcock & Wilcox Company, argued for a lowering rather than a raising of technical college entrance requirements. He devoted himself to "Education in Engineering," and in the light of years of experience as a professor in Stevens Institute of Technology, what he had to say was accepted as worthy of serious consideration. Some of his suggestions were as follows:

Preparatory schools should be encouraged to give more attention to teaching good English and to giving a broad, general education, and applicants should be also judged as to their initiative and general make-up in deciding whether they should be admitted.

Professors in practical engineering subjects should have practical experience so that they can speak with authority. Professors in charge of practical engineering departments should be encouraged to undertake practical engineering work, and their work arranged so that they can be relieved from meeting classes when the engineering work makes this necessary.

Special attention should be given to teaching the fundamentals of engineering science, even though this may result in the elimination of certain specialized branches.

Greater practice should be given in the writing of concise and logical reports in good English, and in speaking on one's feet. The student should be encouraged to confer with the professors, and regular hours should be provided for this purpose, all to the end that the teachers may extend a helping hand where needed and that there be a mutual understanding and trust.

Meeting on Scientific Management

Scientific management and progress is to be discussed at the annual meeting of the Taylor Society to be held in the Engineering Societies' Building, New York City. This topic is that assigned to the session on Saturday afternoon, Dec. 9, based on a paper by Dr. Horace B. Drury, instructor of economics and sociology, Ohio State University, Columbus. The discussion is to be opened by Naval Constructor Frederick G. Coburn, U. S. N., and of Harvard Graduate School of Business Administration, Cambridge; by Robert M. Haig, Columbia University School of Business, and by Henry L. Gantt, consulting management engineer, New York City.

The meeting will open on Friday evening with a paper on scientific management in hospitals, and there will be a session on Saturday morning on "Planning of Power Plant Work." The last session of the meeting will occur on Saturday evening with the following addresses: "Discipline on the Border," by Paul B. Valle, Acme Wire Company, New Haven, Conn.; "Who is Boss in Your Shop?" by Morris L. Cooke, Philadelphia, and by George D. Babcock, production manager, H. H. Franklin Mfg. Company, Syracuse, N. Y.

Sulphuric acid exports for the nine months to Oct. 1, 1916, were 53,919,218 lb. or 5,991,024 lb. per month compared with 7,050,175 lb. per month to Oct. 1, 1915. In 1915 the exports were 77,812,029 lb. or 6,484,335 lb. per month. In 1913 the monthly exports averaged only 807,417 lb.

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THE IRON AGE

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Europe's Need of War Steel

A prominent member of the British Ministry of Munitions recently made this statement:

Our extensions of steel works, at a probable saving of something like six millions [sterling] a year, will make us, if our program is satisfactorily developed, entirely independent of foreign steel supplies by March next. . . . Industry is going to be equipped in this country better than ever it has been equipped before. Manufacturers will be more inclined than ever to adopt scientific and up-to-date methods, and it will be made a *sine qua non* in all extensions contemplated that plants be up-to-date.

It is not necessary to take too literally the prophecies that the Allies will soon be independent of American steel works. Similar statements were made on their behalf six months and even a year ago, yet their buying in this country did not diminish. That Great Britain will be "entirely independent of foreign steel supplies by March next" is inconsistent with the recent placing of orders for munitions steel in this country by the agents of the Entente Powers to an amount estimated above 1,000,000 tons. Signs are not wanting, moreover, that the later stages of the war will be marked by a more lavish expenditure of resources, both in men and in war materials. In that view of the situation, the domestic consumer finds little warrant for the expectation that the European pressure upon this market will soon be relaxed. It is not enough that British and French steel outputs should increase; the plans of the leaders of their armies are evidently on a scale with which neither their raw materials nor their iron and steel-making capacity can cope, saying nothing of the limitation of the supply of skilled workmen.

In its bearing on the period following the war, as we have pointed out heretofore, Europe's new steel capacity has quite a different significance. The British official quoted points to the better equipment and better methods that will mark future steel-making there. Another year will see still further additions both to American and British works, as well as to those of Germany and France. Millions of tons of war consumption will be cut off when the war ends, whether one year or three years hence; but the world's capacity for producing steel will be far in excess of any previous demands of peace times. To-day the condition is one of buyers competing for the product of the works; inevitably, later will come the other and more familiar competition of well-equipped works able to make much more than the market can take.

The Industrial Physician

The increasing interest in compulsory health insurance, which is under consideration by the Legislatures of a number of States, and the consequent growing knowledge of what the system would mean to manufacturing industry, are resulting in closer attention to those conditions which the system is intended to improve, including the general health of shop employees. Health insurance is not held in high esteem by employers, because they feel it would impose upon them a new and unjust burden, in that they would be held responsible financially for sickness and injury incurred outside of the employment. On the other hand, a good many employers accept the moral responsibility for conditions within the employment, including those affecting health, and experience has shown them that there is nothing to be compared with the services of the industrial physician in reducing the hazard, whether of accident or of sickness.

It has even been urged that the employment of a physician by every industrial establishment be made compulsory. This would seem a radical measure, but plant owners who have had experience assert that such a law would create no hardship, and that apart from the satisfaction of knowing that their employees are laboring under healthful conditions, the results would show the investment to be a profitable one. The expense is reduced where a group of small plants employ the same physician.

Not a few firms have records to demonstrate how the plan works out, both in the welfare of employees and in dollars and cents. Some of the financial benefits are direct. It is known that the percentage of idle hours due to sickness and accident, including "playing sick," shows a material decrease. Also, premiums for workmen's compensation insurance decrease as the hazard becomes less. Among advantages not so definitely measurable there is a sure gain with a rise in the average physical condition of employees, because their production per dollar of wages becomes greater. Experience has proved, too, that where working

conditions are healthful and stimulating, as through an abundance of light and fresh air and with cleanliness, it is easier to get the more desirable class of labor—a factor of no small importance in labor costs.

The industrial physician not only treats all cases of accident or sickness, but strives always for prevention. Usually the scope of the work increases as owners see results. When the doctor has become thoroughly established he has an emergency hospital, in which he treats every injury, no matter how slight, immediately following the accident, and he continues the treatment until recovery is made, either at the shop hospital or the home, or the hospital to which the patient has been sent. All cases of sickness are similarly looked after, even to the slight cold or headache. The employee who fails to report for work is followed up, and, if he is found to be ill, is cared for. This work is therefore done thoroughly and systematically.

The doctor realizes the need of educating employees in connection with his work. He directs the work of the district nurse, whose duties carry her to the homes of employees. Here she takes care not only of the workman, but of members of his household who require her attention, and incidentally promulgates ideas as to sanitary conditions and the choice and preparation of food. The doctor also studies the works, with a view to suggesting changes in the interest of health, and he co-operates in the matter of safety devices. He gives particular attention to the prevention of diseases peculiar to the employment. If there is compulsory physical examination of workmen, he conducts the department, aiming to segregate the unfit and give them labor better suited to their capabilities, or to reject the incompetents among those who apply for work.

A good deal depends upon the personality of the doctor and his tact in handling people. He must be a good surgeon and all-round physician, up to the standard of the general practitioner, and must have an understanding of hygiene as applied to manufacturing plants. The profession is coming to recognize the work as one worthy of special study. Already some medical students are selecting their courses with a view to the industrial field, and the medical schools are co-operating actively.

Coal, Oil and Gas

All who are interested in the great fuels of the United States—coal, petroleum and natural gas—are more or less familiar with the production statistics, but because the statistics are necessarily returned in different units there is no ready means of gaging even approximately the proportion of our power contributed by each. In great detail the Geological Survey reports the country's coal production in tons of 2000 lb., its petroleum production in barrels of 42 gal., and its natural-gas production in thousands of cubic feet.

How are these fuels to be compared? There is only one common basis, and that is the theoretical capacity to produce heat. If such a comparison has never been made it is well to make it now. Certainly the following statistics of production in 1915 are not suggestive of the relative importance of the minerals:

Coal, net tons	531,619,487
Petroleum, barrels	281,104,104
Natural gas, 1000 cu. ft.	628,578,842

The thermal values of the coals of the United States do not vary greatly. Any coal above 15,000 B.t.u. per pound is very high, and any below 12,000 is very poor. A weighted average, paying attention to the tonnage importance of coal in different districts, indicates that a fair measure for the whole country, as coal is actually produced, is about 14,250 B.t.u. per pound; *i.e.* a pound of coal, if burned without loss, should raise 14,250 lb. of water from 32 deg. to 33 deg. F.

In the case of petroleum there are wider variations, as commercial limitations do not step in. Any oil that can be produced at a reasonable cost is worth producing. The variations in commercial value are not so much on account of the varying heat units as on account of the varying quantities of the commercial products, gasoline, lubricants, etc., derived from them. A fair average, drawn from a great many analyses of oil from the various fields, indicates that about 19,000 B.t.u. per pound is a fair factor to apply to the country's production as a whole.

Natural gas shows considerable variation in heat units as it escapes from the ground, and the variations are often accentuated by loss of suspended gasoline during transmission. Recently the important industry of producing "casing head gasoline" from natural gas has arisen, by which the gas is somewhat impoverished. A fair average for natural gas at the point of consumption is 1025 B.t.u. per cubic foot.

The computations run into such large figures that it is necessary to omit twelve ciphers, the table below being in units of B.t.u. x 10^{12}:

Theoretical Heat Value of 1915 *Production*	
Coal	15,116
Petroleum	1,602
Natural gas	644

Thus, theoretically, the oil production of the country has a trifle more than one-tenth the heat-producing value of the coal, while natural gas has two-fifths that of petroleum.

These fuels are more or less in competition with each other, but transportation is a large factor in determining the choice of fuel, while the efficiency of the various means for gaining and using the heat from the different fuels varies still more. As the Geological Survey reports the total value of the fuels, it is of interest to compare the market's appraisal of fuel values in terms of their theoretical heat-producing capabilities. The statistics are of coal value at the pit mouth and of oil at the well, while the natural-gas value is at the point of consumption. It is unfortunate that the gas value is not given also at the point of production, so that a comparison could be made with uniform conditions; and such statistics would be interesting also as affording a means of gaging how much the cost of transportation and distribution enters into the value of gas as delivered to

the consumer. The reported values of the production in 1915 are as follows:

	Total Value	Per Unit
Coal	$686,691,186	$1.29 per ton
Petroleum	179,462,890	63.8c. per barrel
Natural gas	101,312,381	16.12c. per 1000 cu. ft.

For the quantity of each fuel that theoretically would produce 100,000,000 B.t.u., the cost from the above values figures out as follows:

Coal	$1.54
Petroleum	11.20
Natural gas	15.70

Considering the various factors that must enter into the commercial competition between the different fuels, the value of the gas appears low, for it includes cost of transportation, an item not included in the case of petroleum. On the other hand, natural gas cannot be transported as well as petroleum, and that works against it, while petroleum has, on an average, a value decidedly greater than indicated by its mere heat-producing value, because it can produce lubricants, etc., and the gasoline derived is not to be valued directly by its heat-producing value. There is no convenient means, for instance, for operating automobiles with either coal or natural gas.

The amount of power actually produced in the United States by means of heat has been roughly estimated at 30,000,000 or 40,000,000 horse power, but of course this is not produced continuously. If all the coal produced were used for power purposes, with an efficiency of one pound of coal burned per horse power per hour, a considerably higher efficiency than is obtained in average practice, it would be possible to produce 129,000,000 horse power for 24 hours each day throughout the year. If the petroleum and natural gas were employed at the rate of efficiency in proportion to theoretical heat-producing capacity, the total would be 150,000,000 horse power.

From the comparisons that have been made it is evident that so far as the production of heat is concerned, convenience being disregarded, the country could dispense with its natural gas entirely without having occasion to increase the coal production by an amount equal to the fluctuations that occur from year to year. Convenience, however, is an elastic term. When the present naval program is completed a supply of more than 20,000,000 barrels of fuel oil a year will be absolutely indispensable for the use of the navy.

How long fuel will constitute the chief means of power production is a favorite matter of speculation in some quarters. It may be noted that at the conference on conservation in 1908 it was cited that there was at least 30,000,000 horse power in waterfalls in the United States. While this is probably less than the rated power of engines in service, the one works continuously and the other does not, so that possibly the waterfalls would deliver more power than the engines do. Apart from this power it is estimated that the utilization of stream flow would produce several times as much power as the falls.

All these items as to power pale into insignificance when the power of the sun is considered. While the "solar constant" as a theoretical factor is determined very accurately, the average amount of energy that actually penetrates to the earth's surface in different regions can only be roughly approximated. It may be of interest to note, however, that making allowance for differences in latitude, cloudiness, etc., it has been estimated by some authorities that the energy is equal to 7500 horse power per acre.

Computing direct from the solar constant, with allowances, it would appear that the number of thermal units reaching the average square mile of surface of the United States in a year is in the neighborhood of 33×10^{12}. Comparing this with the heat units theoretically obtainable from the country's annual production of coal, oil and gas, it would appear that an area of 519 square miles receives as much solar energy as the total theoretical value of all the fuels produced in the country. The total area of the United States thus actually receives from the sun an amount of energy 6000 times as much as its fuels would produce if burned without any waste, and it is quite natural, therefore, for inventors to consider that here lies a good field for their efforts.

New Demurrage Rates a Compromise

WASHINGTON, D. C., Dec. 5, 1916.—With a view to relieving the freight car shortage the Interstate Commerce Commission has adopted an emergency measure under which the railroads are authorized to establish and maintain until May 1 next, a new progressive demurrage scale in the nature of a compromise between the proposed graduated schedule in the railroad tariffs recently suspended and the rates suggested by various shippers' organizations. The new arrangement will go into force automatically as to each railroad three days after such carrier files its formal schedule with the commission. The new scale provides two free days with subsequent charges of $1 for the third day, $2 for the fourth day, $3 for the fifth day and $5 for the sixth and each succeeding day. The commission orders the retention of the rule that charges shall be suspended on days when the weather prevents unloading and the so-called "average agreement" by which credit is allowed shippers who unload in less than the two free days.

It is the expectation of the commission that by May 1 the situation with respect to available cars will have improved to such an extent that the emergency scale may be abrogated and the standard rules again placed in force. Special emphasis is placed upon the statement that the commission has no intention of retaining the demurrage penalties in force indefinitely.

W. L. C.

Legislation is advocated by a committee of the Chamber of Commerce of the United States to make it possible for the Federal Trade Commission to formulate constructive plans under which industries concerned with primary natural resources may co-operate. The question is now being voted upon by the different commercial bodies of the country. The underlying thing is that agreements could be made which would tend to conserve the resources, to lessen accidents and to promote the public interest. The acting chairman of the committee is W. L. Saunders, chairman Ingersoll-Rand Company, New York.

A firm for which an installation for the manufacture of Marquardt porcelain tubes was designed and supervised by the U. S. Bureau of Standards is now marketing these products, which are said to be at least equal in quality to the refractory porcelain formerly obtained from the Royal Porcelain Manufactory at Berlin, Germany. The composition and process were worked out by the Bureau.

Iron and Steel Exports Less in October

Values Fall Off 10 Per Cent and Tonnage Items 5 Per Cent—Continued Decline in Machine Tools

WASHINGTON, D. C., Dec. 5, 1916.—Official statistics of the exports of manufactures of iron and steel in October, which have just been compiled, might give some color to reports now current of a lessening demand on the part of the belligerent countries of Europe for American war material. As compared with the phenomenal record of September, October shows a decline of nearly 10 per cent in value, but the experience of the past year has amply demonstrated that the course of the export movement for a single month is not a reliable criterion of the general tendency. A very interesting peculiarity of the export movement, first noticed nearly five months ago, is marked in the October record, namely, a substantial shrinkage in the exports of machine tools and certain other classes of machinery accompanied by an increase in the shipments of those tonnage commodities largely used in the production of shells, shrapnel and other forms of ammunition. As suggested in this correspondence in connection with the September foreign trade statistics, it would appear that the warring countries of Europe have nearly completed the equipment of their own munition factories and are now buying chiefly raw materials. This tendency doubtless accounts for the fact that while the exports of machine tools during October showed a loss of 46 per cent as compared with the high record made last May, the decline in the shipments of tonnage iron and steel was but 5.2 per cent from the high water mark reached in September of this year.

MACHINE-TOOL DECLINE STEADY

The total shipments of iron and steel products in October on a basis of values gained 89 per cent upon the same month of 1915, but declined 9.7 per cent from the record total of September of this year. Tonnage commodities gained 74 per cent over October, 1915, but lost 5.2 per cent as compared with the high figures of September. Shipments of machinery in October gained 21.6 per cent over the same month of 1915 but lost 25 per cent as compared with the record of August of this year. The recent shrinkage in machinery exports has been a notable feature of this movement, and it will be observed that October's total has been exceeded in every previous month since last April. Shipments of machine tools, while gaining 64 per cent over October, 1915, declined 46 per cent, as compared with the high level of last May.

For the 10 months ended October the total exports of iron and steel surpassed the high record of 1915 by 131 per cent. Tonnage commodities gained 77 per cent over 1915 and exports of machinery rose 74 per cent over the 1915 total, which was within a fraction of 1 per cent of the high mark reached for the 10 months of 1913.

The value of all shipments of iron and steel products in October, 1916, was $82,010,972 as compared with $43,602,741 for the same month of 1915 and $16,455,832 for October, 1914. The exports of September of this year, when all records were broken, aggregated $90,895,592. For the 10 months of 1916 the total was $701,052,410, as compared with $294,822,223 for the same period of 1915 and $169,232,670 in 1914.

EXPORTS OF MACHINERY

Exports of machinery in 1916 were valued at $18,479,007, as compared with $15,239,415 for the same month of 1915. August, 1916, still leads in exports of machinery, with a total of $24,657,597. Shipments of metal-working machinery aggregated $5,892,802 in October compared with $3,236,079 for the same month of 1915, and $7,901,328 to September this year. Maximum exports of metal-working machinery were recorded in May with an aggregate of $9,935,806. Exports of machinery of all kinds for the 10 months ended October, 1916, were valued at $186,234,917, as compared with $107,420,692 in 1915 and $108,585,468 in 1913 which was the record total for the 10-months period. Details of the exports of machinery for October 1915 and 1916, and for the two 10-months periods are given in an accompanying table.

DECLINE OF 5 PER CENT IN TONNAGE EXPORTS

The exports of iron and steel for which quantities are given aggregated 610,096 gross tons in October, 1916, as compared with 351,128 tons in the same month of 1915. The record for these exports was made in September of this year, when the total was 643,763 tons. For the 10 months of 1916 the shipments aggre-

Exports of Machinery

	1915	1916	1915	1916
	October		Ten Months	
Adding machines	$42,901	$129,896	$463,659	$1,170,382
Air-compressing machinery	56,070	74,050	407,14[illegible]	706,[illegible]
Brewers' machinery	132	1,138	55,540	12,867
Cash registers	133,802	169,082	1,110,665	1,377,140
Parts of cash registers	8,498	12,946	84,141	121,832
Cotton gins	1,400	8,842	49,926	82,546
Cream separators	34,011	12,243	253,301	382,692
Elevators and elevator machinery	113,128	108,256	751,478	1,482,675
Electric locomotives		129,788	109,270	517,858
Gas engines, stationary	62,927	48,747	42[illegible]	319,041
Gasoline engines	984,729	670,935	5,090,973	12,029,208
Steam engines	3,478,224	764,002	7,[illegible]	[illegible]
All other engines	105,404	412,659	87[illegible]	4,338,943
Parts of engines	510,403	1,794,[illegible]	3,744,[illegible]	9,65[illegible]
Laundry machinery, power	9,787	12,[illegible]	2[illegible]	254,[illegible]
All other laundry machinery	28,592	29,314	21[illegible]	227,773
Lawn mowers	3,769	13,740	2[illegible]	1[illegible]
Metal-working machinery (including metal-working tools)	3,236,079	5,892,802	11,187,[illegible]	6[illegible] 11,004
Meters, gas and water	25,[illegible]	16,415	21[illegible]	96,254
Milling machinery (flour and grist)	117,[illegible]	96,[illegible]	1,943,713	1,[illegible]
Mining machinery (oil well)	112,977	113,519	1,117,241	1,[illegible]
All other mining machinery	[illegible]	892,048	4,330,705	[illegible]
Paper-mill machinery	71,224	[illegible]	747,691	893,171
Printing presses	111,[illegible]	[illegible]	1,[illegible]	1,619,443
Pumps and pumping machinery	362,430	484,135	[illegible]	1,[illegible] 6,914
Refrigerating machinery (including ice-making machinery)	67,943	37,896	[illegible]	[illegible]
Sewing machines	[illegible]	[illegible]	[illegible]	[illegible]
Shoe machinery	91,036	[illegible]	[illegible]	[illegible]
Sugar-mill machinery	998,432	[illegible]	[illegible]	[illegible]
Textile machinery	[illegible]	245,496	[illegible]	[illegible]
Typesetting machines	52,899	[illegible]	[illegible]	[illegible]
Typewriting machines	[illegible]	[illegible]	[illegible]	[illegible]
Windmills	[illegible]	47,264	734,[illegible]	[illegible],841
Wood-working machinery, saw-mill	[illegible]	31,676	[illegible]	[illegible]
All other wood-working machinery	213,251	67,459	904,[illegible]	744,642
All other machinery and parts of	2,538,870	[illegible]	[illegible]	32,363,280
Total	$15,239,[illegible]	$18,[illegible]	$107,420,692	$186,234,917

gated 4,968,285 gross tons, as compared with 2,818,999 tons for the same period of 1915. The accompanying table shows the exports of tonnage iron and steel for October and for the 10 months ended October, 1916, as compared with 1915.

Exports of Iron and Steel

	October		Ten Months	
	1915 Gross Tons	1916 Gross Tons	1915 Gross Tons	1916 Gross Tons
Pig iron	21,212	101,750	178,141	[illegible]
Scrap	17,115	19,904	85,098	[illegible]
Bar iron	3,592	4,142	29,984	[illegible]
Wire rods	13,640	14,427	127,[illegible]	[illegible]
Steel bars	41,455	64,[illegible]	367,611	[illegible]
Billets, ingots and blooms, n.e.s.	43,405	162,679	451,306	1,220,788
Bolts and nuts	2,747	2,[illegible]	18,[illegible]	[illegible]
Hoops and bands	3,219	3,[illegible]	[illegible]	[illegible]
Horseshoes	797	[illegible]	14,[illegible]	[illegible]
Cut nails	374	41	3,[illegible]	[illegible]
Railroad spikes	2,378	1,032	7,230	21,172
Wire nails	8,156	13,202	74,[illegible]	[illegible]
All other nails, including tacks	1,041	1,558	7,[illegible]	[illegible]
Cast-iron pipes and fittings	2,382	9,061	37,[illegible]	[illegible]
Wrought pipes and fittings	8,474	15,617	100,[illegible]	1,4[illegible]
Radiators and cast-iron house heating boilers	197	247	1,84[illegible]	[illegible]
Steel rails	67,783	52,[illegible]	292,[illegible]	441,[illegible]
Galvanized iron sheets and plates	3,833	7,892	67,871	[illegible]
All other iron sheets and plates	3,241	4,[illegible]	19,[illegible]	[illegible]
Steel plates	29,297	26,[illegible]	187,[illegible]	[illegible]
Steel sheets	8,150	10,[illegible]	81,[illegible]	[illegible]
Structural iron and steel	23,338	27,342	189,[illegible]	[illegible]
Tin and terne plates	16,922	14,177	122,031	193,[illegible]
Barb wire	19,[illegible]	37,61[illegible]	19[illegible]	[illegible]
All other wire	16,873	18,[illegible]	184,[illegible]	[illegible]
Total	351,128	610,[illegible]	2,818,999	[illegible]

IMPORTS OF IRON AND STEEL

Imports of tonnage iron and steel in October, 1916, aggregated 30,169 gross tons, as compared with 34,317 tons for the same month of 1915. The imports for the 10 months of 1916 were 233,191 gross tons as against 209,855 tons in 1915. The following table shows the imports of tonnage commodities for October, 1916, and for the 10 months ended October as compared with 1915.

Imports of Iron and Steel

	October		Ten Months	
	1915 Gross Tons	1916 Gross Tons	1915 Gross Tons	1916 Gross Tons
Ferromanganese	...	8,114	...	65,588
Ferrosilicon	370	61	4,134	[illegible]
All other pig iron	7,[illegible]	6,1[illegible]	[illegible]	[illegible]
Scrap	10,[illegible]17	11,[illegible]48	49,[illegible]	[illegible]
Bar iron	640	[illegible]	[illegible]	[illegible]
Structural iron and steel	40	32	1,242	1,113
Steel billets without alloys	54	472	1,256	8,771
All other steel billets	[illegible]	[illegible]	[illegible]	[illegible]
Steel rails	13,[illegible]4	[illegible]	7,[illegible]	[illegible]
Sheets and plates	116	[illegible]	[illegible]	[illegible]
Tin and terne plates	[illegible]	[illegible]	[illegible]	[illegible]
Wire rods	[illegible]	[illegible]	[illegible]	[illegible]
Total	34,317	30,[illegible]	[illegible]	[illegible]

Preliminary reports from the leading custom houses on the Atlantic coast indicate that the export movement in November has been obstructed to a material extent by railroad embargoes and by difficulty in obtaining cargo space. The returns thus far received furnish no basis for an estimate of November's shipments as compared with those of October. W. L. C.

Record Exports of Semi-Finished Steel

Exports of billets, blooms and slabs in September exceeded those in any month since the war started. They were 163,104 gross tons, the previous record having been 160,921 tons in August. The total for the nine months to Oct. 1, 1916, was 1,058,109 tons as compared with 407,813 tons and 33,262 tons for the same nine months in 1915 and 1914 respectively. Of the shipments this year to Oct. 1, 1916, France has taken 719,246 tons and Great Britain 164,243 tons, though some of the latter may have simply gone via British ports, as Great Britain reports total imports of billets, blooms and slabs for the first 10 months of this year of only 130,207 tons. Last year in the same period France took none at all while Great Britain received 310,236 tons or twice as much as this year.

Atlas Crucible Steel Company to Make Electric Steel

The Atlas Crucible Steel Company, manufacturer of high grade tool steels, Dunkirk, N. Y., has contracted for the installation of one 3-ton Heroult electric furnace for the manufacture of its product. A new building for the electric steel department, 69 x 100 ft., will be erected on the opposite side of Howard Avenue, where the company owns a piece of land 400 x 1000 ft. Contracts have been let for the erection of this building as well as for a rolling-mill building, 69 x 414 ft.; a new steel boiler house and a 14-in. rolling mill, together with traveling cranes, shears, lathes and other necessary equipment. During the past year the capacity of the plant has been doubled and all of this equipment is now in operation, but it is still insufficient to meet the demand. The Dunkirk City Council granted a petition of the company permitting it to carry Howard Avenue around the outside of the plant so as to use the present street, thus avoiding the necessity of crossing the street with two or three railroad switches.

Koppers Coke Ovens Built in Record Time

In connection with the recent starting of the new blast furnace of the United Furnace Company, Canton, Ohio, it develops that at the time the order for the furnace was placed a contract was also given to the H. Koppers Company, First National Bank Building, Pittsburgh, for the erection of 47 by-product coke ovens and a benzol plant. There was some doubt on the part of the furnacemen as to whether the coke ovens and benzol plant could be completed before the blast furnace was started, but the Koppers Company made special efforts, sparing no expense, with the result that the coke oven plant was in operation seven weeks before the furnace was blown in, while the benzol plant was started five weeks before the furnace. When the extremely unfavorable conditions in the labor market are considered and the great difficulty in obtaining materials is taken into account, the fact that the H. Koppers Company was able to complete the ovens and benzol plant so long ahead of the blast furnace is certainly worthy of record. The achievement demonstrates the resources of the company when put to test.

The Texas Steel Company

L. P. Featherstone, Beaumont, Tex., in announcing the incorporation of the Texas Steel Company, with capital stock of $2,500,000, states that 200 acres fronting on the Neches River has been secured for plant site and a railroad costing approximately $1,000,000 has been constructed to the iron ore fields of Cass County. Plans for the initial construction include a 300-ton blast furnace and a foundry for the manufacture of cast-iron water pipe. It is estimated that the ore properties owned by the company in Cass and adjoining counties are sufficient to supply the plant to full capacity for 40 years. Details preparatory to beginning construction of the plant are being worked out. Associated with Mr. Featherstone on the board of directors are W. C. Ratcliffe, S. G. Burnett, T. S. Reed, C. T. Heisig, M. Guiterman, John L. Keith, L. L. Featherstone and others. The design and construction are under the supervision of Walter Rachals & Co., engineers, Youngstown, Ohio.

Exports of Pig Iron from India

Pig-iron exports from India for the fiscal year ended March 31, 1915, were 52,055 tons against 82,592 tons and 92,614 tons for the same periods in 1914 and 1913. Imports of pig iron were 5457 tons for the same fiscal year 1915, as compared with 12,254 tons and 11,545 in the corresponding periods of 1914 and 1913.

The National Tube Company's series of motion picture films, illustrating the manufacture of National pipe, from ore to finished product, will be shown before the National Association of Stationary Engineers, at Coplay, Pa., Tuesday evening, Dec. 12.

LAKE ORE RATE CASE

Details of Ore-Carrying Charges Filed by Middle Western Roads

WASHINGTON, D. C., Dec. 5, 1916.—The railroads which are respondents in the iron-ore rate case have filed an elaborate series of proposed tariffs in compliance, they assert, with the desire expressed by the Interstate Commerce Commission in its report on this long-standing controversy. The chief feature of the order of the commission, distinguishing it from all others ever issued by that body, was the requirement that carriers should state separately the charge made for each factor in the whole service of bringing ore from the docks to the furnaces instead of expressing the charge in a lump sum.

Examination of the tariffs indicates, however, that the carriers have complied with the order of the commission, which becomes operative April 1, only as to rates specificallly covered in the commission's ruling. While they have stated separately the components as to ore to be moved over their own docks, they have named lump sum rates only as to ore passing over docks owned by others. Baltimore & Ohio tariffs, which may be regarded as typical, present in parallel columns the separately stated items going to make up the full charge as if the shipper or receiver of ore had an option whether he would take all or only a part of the service. From Lorain, Ohio, to Allegheny (North Pittsburgh), the charge on "direct" ore for the line-haul is 76c. and for the handling of the ore from the rail of the vessel to the railroad car 6c., or a total of 82c., the figure set by the commission as the maximum charge for taking the ore from the rail of the vessel to an indefinite point in Allegheny. The line-haul charge on dock or "indirect" ore is set forth at 76c.; the charge for handling the ore from the ship to the dock is 16c., and for taking the ore from the dock to the car 10c., or a total of $1.02. For service over the National Dock, owned by the National Tube Company, the tariff fixes a charge on "direct" ore of 82c. and on dock or "indirect" tonnage $1.02 per gross ton. The order does not require a separate statement of components in the aggregate charge on ore moving over a private dock; hence the railroad company publishes a blanket rate only on such traffic.

The new rates contain a note respecting the rates on ore moving over private docks that has attracted special attention at the offices of the commission and that will probably be very carefully investigated. This note stipulates that an allowance of 2c. per ton will be made to the National dock, a rate which the experts of the commission assume represents the railroad's idea of the value of the right to send ore over the Tube Company's dock. Inasmuch as the Baltimore & Ohio charges 6c. per ton for handling ore over its own docks the commission is interested to ascertain why the services over the railroad docks are worth so much more than a similar service over the National dock.

An interesting change growing out of the order of the commission is the inclusion in the tariffs of a minimum weight which hereafter is to be the marked capacity of the car in which the ore is loaded. Under the practice followed heretofore, when the cargo of a particular ship runs a little more than an even number of carloads the remainder is shipped as a "follow" load without regard to weight. Hereafter these tailings, if only a few tons, must pay the full minimum rate of the car in which they are transported because no less-than-carload rates have been provided.

The tariffs also provide a storage charge of 1c. per ton per month computed on a daily average of tons of ore stored on the docks by the shippers who for any reason are unable to take the ore at their furnaces. Trestle delivery charges included in the tariffs are separately stated. Typical charges are as follows: Carnegie Furnace at Bellaire, 3c. per ton; Penn Iron & Steel at Canal Dover and A. M. Byers Company at Girard, 2c.; Brier Hill at Girard, 4c.; Republic and Youngstown Sheet & Tube at Haselton, 4c.; Atlantic and Carnegie Nos. 1, [illegible] at New Castle, 2c.; Carnegie No. 2 at New Castle, 3c.; Carnegie at Niles, 4c.; Carnegie at Youngstown, 2c.; Republic's Valley, 4c., and Republic's Hannah, 3c. Attorneys for the iron and steel companies anticipate that their clients will make vigorous objection to the charges for "spotting" cars at the docks; No other industry in the country pays such a tribute and the point is made that the commission and the United States Supreme Court in the Los Angeles switching case disapproved switching charges when added to line-haul rates. W. L. C.

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FEWER FURNACES ACTIVE

November Pig Iron, 3,311,811 Tons

Marked Increase in Output of Ferromanganese and Spiegeleisen

Pig-iron production in November, apart from charcoal iron, was 3,311,811 gross tons, or 110,394 tons a day, against 3,508,849 tons in October, or 113,189 tons a day. In view of the special effort for a large output in October, the falling off of 2800 tons a day is not surprising. It still leaves November the second month of the year in rate of output. Current production is remarkable, considering car shortages and coke delivery troubles. Some furnaces are going out for relining after long campaigns under strain for high outputs. The capacity of the 322 furnaces in blast Dec. 1 is estimated at 108,127 tons a day, against 109,022 tons a day for the 325 furnaces reported active on Nov. 1. The November output of ferromanganese and spiegeleisen is well beyond the highest in the country's history at 44,975 tons, against 38,597 tons in June, the previous high month. A new furnace has been added to the list —that of the United Furnace Company, Canton, Ohio.

DAILY RATE OF PRODUCTION

The daily rate of production of coke and anthracite pig iron by months, from November, 1915, is as follows:

Daily Rate of Pig-Iron Production by Months—Gross Tons

	Steel Works	Merchant	Total
November, 1915	73,282	27,962	101,244
December	73,647	29,686	103,333
January, 1916	72,614	30,132	102,746
February	75,305	31,151	106,456
March	76,274	31,393	107,667
April	77,226	30,366	107,592
May	77,706	30,716	108,422
June	76,526	30,527	107,053
July	74,397	29,620	104,017
August	74,617	28,729	103,346
September	76,990	29,755	106,745
October	81,639	31,550	113,189
November	80,141	30,253	110,394

CAPACITY IN BLAST DECEMBER 1 AND NOVEMBER 1

The following table shows the daily capacity in gross tons of furnaces in blast Dec. 1 and Nov. 1 by districts:

Coke and Anthracite Furnaces in Blast

Location of furnaces	Total number of stacks	Dec. 1 Number in blast	Dec. 1 Capacity per day	Nov. 1 Number in blast	Nov. 1 Capacity per day
New York:					
Buffalo	19	15	4,734	17	[illegible]
Other New York	5	3	566	3	562
New Jersey	6	1	212	1	240
Pennsylvania:					
Lehigh Valley	20	13	3,889	13	[illegible]
Spiegel	2	2	200	2	194
Schuylkill Valley	12	9	2,356	11	[illegible]
Lower Susquehanna	6	5	1,149	5	1,127
Lebanon Valley	8	7	1,021	6	[illegible]
Ferro and Spiegel	2	2	148	2	141
Pittsburgh Dist	53	49	22,810	51	[illegible]
Ferro	3	3	705	3	124
Shenango Val.	19	19	6,280	18	[illegible]
Western Pa.	24	19	5,980	19	[illegible]
Ferro and Spiegel	3	2	124	2	137
Maryland	3	3	1,201	4	[illegible]
Ferro	1	1	84	0	0
Wheeling District	14	14	4,675	14	4,491
Ohio:					
Mahoning Val.	25	23	10,132	24	[illegible]
Central and Northern	25	23	9,020	22	[illegible]
Hock. Val. and Hang'g Rock	15	10	1,476	9	[illegible]
Illinois and Ind.	35	33	16,106	32	[illegible]
Ferro	2	1	149	0	0
Michigan, Wis. & Minn.	12	11	3,129	10	[illegible]
Colo. and Mo.	6	3	900	4	[illegible]
Ferro	1	1	99	1	[illegible]
The South:					
Virginia	18	8	969	8	[illegible]
Kentucky	5	4	666	4	[illegible]
Alabama	37	28	7,742	28	[illegible]
Ferro	1	1	60	1	[illegible]
Tennessee	15	9	1,113	9	[illegible]
Total	394	322	108,127	[illegible]	[illegible]

Among the furnaces blown in between Nov. 1 and Dec. 1 were North Cornwall in the Lebanon Valley, one Shenango in the Shenango Valley, the new stack of the United Furnace Company in Ohio, Lawrence in the Hanging Rock district, Miami in the Chicago district, one Bay View in Wisconsin, one Pueblo in Colorado and Helen in Tennessee.

The furnaces blown out last month include one Buffalo Union and one Susquehanna in the Buffalo district, one Warwick and one Worth in the Schuylkill Valley, one Clairton and one Duquesne in the Pittsburgh district, Niles and Mary in Ohio, Marting in the Hanging Rock district, two Pueblo in Colorado and Cumberland in Tennessee.

OUTPUT BY DISTRICTS

The accompanying table gives the production of all coke and anthracite furnaces in November and the three months preceding:

Monthly Pig-Iron Production—Gross Tons

	Aug. (31 days)	Sept. (30 days)	Oct. (31 days)	Nov. (30 days)
New York	182,812	185,483	194,657	183,906
New Jersey	7,020	6,907	7,431	6,384
Lehigh Valley	99,650	104,989	122,025	121,948
Schuylkill Valley	88,373	91,483	99,587	90,119
Lower Susquehanna and Lebanon Valley	69,558	64,514	72,574	78,079
Pittsburgh district	721,917	724,183	812,572	723,997
Shenango Valley	179,970	185,276	194,534	183,273
Western Pennsylvania	172,970	183,647	187,764	181,409
Maryland, Virginia and Kentucky	92,540	94,382	97,612	89,100
Wheeling district	123,426	124,034	139,225	140,245
Mahoning Valley	326,413	316,907	339,592	318,181
Central and Northern Ohio	263,187	248,434	273,485	258,609
Hocking Valley and Hanging Rock	50,168	43,948	50,797	50,966
Chicago district	480,836	457,637	504,368	489,158
Mich., Minn., Mo., Wis. and Col.	115,341	121,877	131,389	127,873
Alabama	219,076	219,508	248,863	234,095
Tennessee	30,056	29,157	32,374	34,469
Total	3,203,713	3,202,366	3,508,849	3,311,811

PRODUCTION OF STEEL COMPANIES

Returns from all furnaces of the United States Steel Corporation and the various independent steel companies show the following totals of steel-making iron month by month, together with ferromanganese and spiegeleisen. These last, while stated separately, are also included in the columns of "total production."

Production of Steel Companies—Gross Tons

	Pig, total production 1914	1915	1916	Spiegeleisen and ferromanganese 1914	1915	1916
Jan.	1,261,430	1,115,944	2,251,035	17,325	18,041	24,866
Feb.	1,329,414	1,237,380	2,183,845	10,524	13,319	23,877
Mar.	1,704,688	1,751,082	2,366,116	20,133	12,274	29,388
Apr.	1,635,226	1,584,111	2,316,768	18,676	12,337	31,862
May	1,457,847	1,694,290	2,408,890	21,504	13,440	35,844
June	1,329,623	1,770,657	2,295,784	16,254	19,200	38,597
July	1,396,851	1,949,750	2,306,303	16,524	17,854	31,353
Aug.	1,455,054	2,101,818	2,313,122	11,577	27,463	33,338
Sept.	1,390,322	2,129,322	2,309,710	13,786	23,159	29,451
Oct.	1,251,820	2,251,146	2,350,808	17,435	23,992	34,566
Nov.	1,070,179	2,148,459	2,404,210	21,977	28,741	44,975
Dec.	1,034,802	2,283,047	[illegible]	20,733	25,004	[illegible]

THE RECORD OF PRODUCTION

Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1912—Gross Tons

	1912	1913	1914	1915	1916
Jan.	2,057,911	2,797,331	1,885,054	1,601,421	3,185,121
Feb.	2,100,815	2,586,287	1,888,670	1,674,771	3,087,212
Mar.	2,402,218	2,763,563	2,347,867	2,063,834	3,337,691
Apr.	2,375,436	2,752,761	2,269,655	2,116,494	3,227,768
May	2,432,582	2,822,217	2,092,886	2,563,470	3,361,073
June	2,419,745	2,628,565	1,917,783	2,380,827	3,211,588
July	2,416,859	2,766,246	1,957,645	2,563,420	3,224,513
Aug.	2,441,421	2,545,763	1,995,261	2,779,647	3,203,713
Sept.	2,405,839	2,505,927	1,882,577	2,852,561	3,202,366
Oct.	2,559,073	2,246,261	1,778,186	3,125,491	3,508,849
Nov.	2,458,547	2,233,123	1,543,316	3,037,308	3,311,811
11 mos.	26,870,427	28,746,444	21,433,700	26,459,241	35,861,705
Dec.	2,458,767	1,983,607	1,515,752	3,203,322	[illegible]
Total	[illegible]	30,724,101	23,049,752	29,662,566	[illegible]

The fluctuations in pig-iron production from January, 1908, to the present time are shown in the accompanying chart. The figures represented by the heavy lines are those of daily average production, by months, of coke and anthracite iron. The two other curves on the chart represent monthly average prices of Southern No. 2 foundry pig iron at Cincinnati and of local No. 2 foundry iron at furnace at Chicago. They are based on the weekly market quotations of THE IRON AGE.



Diagram of Daily Average Production by Months of Coke and Anthracite Pig Iron in the United States from Jan. 1, 1908, to Dec. 1, 1916; Also of Monthly Average Prices of Southern No. 2 Foundry Iron at Cincinnati and Local No. 2 Foundry Iron at Chicago District Furnace

DIAGRAM OF PIG-IRON PRODUCTION AND PRICES

The figures for daily average production, beginning January, 1909, are as follows:

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1909.
Gross Tons.

	1909	1910	1911	1912	1913	1914	1915	1916
Jan.	57,975	84,148	56,752	66,384	90,472	60,808	51,659	102,746
Feb.	60,456	87,616	64,090	72,442	92,269	67,453	59,813	106,456
Mar.	79,233	84,459	70,026	77,591	89,147	73,738	66,575	107,667
Apr.	81,063	82,792	68,836	79,181	91,759	75,665	70,550	107,592
May	80,754	77,102	61,079	81,051	91,029	67,506	73,915	108,422
June	64,656	75,516	59,585	81,358	87,619	63,916	79,361	107,053
July	67,703	69,305	57,841	77,738	82,601	63,150	82,691	104,017
Aug.	72,146	67,903	62,150	81,046	82,057	64,363	89,666	103,346
Sept.	79,107	68,476	65,903	82,128	83,531	62,753	95,085	106,745
Oct.	83,856	67,320	67,811	86,722	82,133	57,361	100,822	113,189
Nov.	84,917	67,809	66,648	87,697	74,453	50,611	101,244	110,394
Dec.	85,022	77,249	67,912	89,766	63,987	48,896	103,233	. . . .

British Imports of Manganese Ore

British imports of manganese ore in October were 38,360 gross tons against 42,389 tons in September and 60,931 tons in October, 1915. The total for the 10 months to Nov. 1, 1916, was 386,754 tons against 270,745 tons to Nov. 1, 1915. The receipts for the 10 months this year are at the rate of 42,973 tons per month against 30,083 tons per month for the same period in 1915. Imports of manganese ore into the United States to Oct. 1, 1916, were 469,222 tons—exceeding the British receipts.

Chairman E. H. Gary of the United States Steel Corporation stated in the past week that there was no basis for reports that the Steel Corporation is planning to take over the Great Northern iron-ore properties.

Blast Furnace Notes

Mary furnace, of the Ohio Iron & Steel Company, at Lowellville, Ohio, was blown out Dec. 1 for relining. It is to be ready for operation about Jan. 1, the repair gangs having orders to work day and night.

The No. 4 furnace of the Rogers-Brown Iron Company, Buffalo, was blown out Nov. 27 for relining.

A new stove was recently built for furnace A of the Northwestern Iron Company, Mayville, Wis.

Due to a shortage of coke, and also because they are isolated stacks, the Carnegie Steel Company blew out last week Steubenville furnace at Steubenville, Ohio, and Niles furnace at Niles, Ohio. Clairton No. 3, at Clairton, Pa., and Duquesne No. 6, at Duquesne, Pa., have also been blown out for relining and repairs. In addition to the above, one Isabella and one Edgar Thomson are out for repairs. The furnace at Zanesville, Ohio, a small one, has been out for some years. At present, the Carnegie Company has 52 blast furnaces operating and seven idle.

The large No. 2 Warwick stack of the Eastern Steel Company at Pottstown, Pa., has been blown out and will be entirely rebuilt on new lines. It will probably be ready to go in again in April.

The blast furnaces of the Bethlehem Steel Company at South Bethlehem, Pa., made a new 24-hr. record on Nov. 25 with a total of 3287 tons for six furnaces.

No. 1 stack of the Wellston Iron Furnace Company, Jackson, Ohio, will be blown in Dec. 15 on Bessemer pig iron, having been entirely rebuilt. This will give the company a daily tonnage of 250 tons of Bessemer iron.

Iron and Steel Markets

PIG IRON LESS EXCITED

Northern Furnaces Make New Advances

Large Rail Orders for 1918—Ferromanganese Production at High Point

The November rush of pig-iron buying and the excitement attending it have given way to a quieter market. There have been good sales in December, but the rise of Northern iron to $30 at Eastern and Central Western furnaces has had a sobering effect on many buyers. Even in the face of predictions of higher pig iron, some foundry buyers wait to know what the demand for castings will be on the new level of cost.

November pig-iron production, as was expected, did not measure up to the remarkable rate of October. The total was 3,311,811 tons, or 110,394 tons a day, against 3,508,849 tons in the 31 days of October, or 113,189 tons a day. However, no other month of the year equaled the November rate, in spite of coke and car troubles.

It is evident that no early relief of the pig-iron stringency is to come from increased output. Several furnaces have blown out after long and hard campaigns and others will follow. On Dec. 1, 322 furnaces were in blast, with capacity of 108,127 tons a day, against 325 furnaces Nov. 1, producing at the rate of 109,022 tons a day.

Another 30,000-ton sale of Bessemer iron for export and inquiry for 30,000 tons more from the same source indicate a large European demand still unsatisfied. At Buffalo upwards of 20,000 tons of basic was sold to Canada at $30 at furnace and Eastern sales of over 20,000 tons were made at $30. In the Central West 6000 tons of basic for the first half of 1917 sold at the same figure. At Pittsburgh basic and Bessemer irons have been less active.

The Southern pig-iron situation is mixed, with an increasing disinclination to sell. Little iron can be had for the first half, and while some producers are holding aloof sales of No. 2 foundry have been made at from $22 to $25, Birmingham, for various deliveries in 1917. In northern Ohio Southern iron has been offered at $2 to $5 under the new $30 to $31 basis established by local furnaces.

By far the larger part of current business in foundry iron is for the second half of next year. Buyers of castings, who ordinarily place contracts in December for six months or a year, are concerned over the pig-iron level and see a falling demand for their own products at corresponding prices. In steel such fears have not been realized.

Rail buying for 1918 is becoming general. Sales in the Chicago district have taken up most of the local rail mill capacity for the first half of that year. The St. Paul, the Illinois Central and the Santa Fe have closed in the past week for about 150,000 tons, of which 18,000 tons will be rolled at Ensley and 30,000 tons at Pueblo. The St. Louis Southwestern has bought 13,000 tons and the D. L. & W. 10,000 tons. Both the Erie and the New Haven have made some reservations for 1918. Probably 1,200,000 tons in all has been placed for that delivery.

American plate mills are looked to to take the brunt of the world's shipyard work. A Scandinavian inquiry is for a total of 72,000 tons on a 5-year sliding scale contract. An order just booked is for 12,000 tons for Norwegian vessels building at Vancouver. Foreign business is constantly offered for delivery next year and mills are asking 5c. and 6c. A new Tacoma shipyard is in the market.

New advances in finished products come with each week. Iron bars are up $5 a ton and some Central Western mills are withdrawing from the market in view of the high price of scrap. Another advance of $4 has been made in black and galvanized steel and iron pipe and spikes are 25c. a keg higher. The leading tin plate producer has fixed its price for 1917 delivery before July 1 at $6.50, which is 50c. above the original contract basis, but independent makers have gone to $7.

It has been estimated that four steel companies having contracts from the Allies will enter the new year with about 3,000,000 tons of munition steel on their books. Nearly two-thirds of this is for delivery in the first six months.

The production of ferromanganese and spiegeleisen in November was by far the highest on record at 44,975 tons. The increasing competition in the domestic market is also indicated by a late sale of ferromanganese at $155, delivered in Ohio.

The Lake Superior iron ore market has shown no scramble of furnaces to cover at the $1.50 advance, though it is understood that Bessemer ores are well sold up. The cry of ore shortage through the past season has resulted in shipments ample for all needs. To Dec. 1 the movement was 63,648.298 tons, and December Lake shipments, together with all-rail ore, will bring the season's total well above 65,000,000 tons. Some furnaces are not covering for all their ore requirements at the new high figures.

Pittsburgh

PITTSBURGH, PA., Dec. 5, 1916.

Advances in prices in the past week have not been so numerous or so great as in the preceding week, but the general tendency is still upward. Pig iron and semi-finished steel continue to be quoted at the figures of last week, but some grades of ferroalloys are up $5 to $6 per ton. Tin plates on current orders for shipment in the first half of next year are up about 50c. per box; railroad spikes, 25c. per keg; iron bars, about $5 per ton; black and galvanized steel and iron pipe, also oil country goods and line pipe, about $4 per ton. Some grades of scrap are up from $1 to $3 per ton. There is a distinct scarcity of pig iron and of semi-finished and finished steel, the demand being larger than the furnaces and mills can supply; hence, the natural course for prices to take is upward. The car situation in this district is deplorable, and even the most favorable weather possible of the past month or more has not bettered it. Last week the Pittsburgh, Fort Wayne & Chicago Railway declared an embargo on all shipments west of Pittsburgh, except on live stock and perishable goods, and this is still in force. The general wage advance of 10 per cent, effective Dec. 15, is also influential in putting up prices. Some of the larger steel companies are not quoting on any of their products, except on specified orders, in spite of importuning from

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

	Dec. 6, 1916.	Nov. 29, 1916.	Nov. 8, 1916.	Dec. 8, 1915.
Pig Iron, Per Gross Ton:				
No. 2 X, Philadelphia	**$28.50**	[illegible]	$24.00	$15.00
No. 2 Valley furnace	[illegible]	30.00	24.00	17.00
No. 2 Southern, Cin'ti	**25.90**	25.40	23.00	16.90
No. 2 Birmingham, Ala.	**27.00**	27.00	18.00	14.00
No. 2, f.o.b. furnace, Chicago*	**28.00**	28.00	24.00	18.00
Bess. gold, eastern Pa.	**30.00**	30.00	30.00	18.00
Bess. Valley furnace	[illegible]	[illegible]	[illegible]	18.00
Bessemer, Pittsburgh	34.45	[illegible]	[illegible]	19.45
Malleable Bess., Chicago*	**28.00**	28.00	25.00	18.00
Gray forge, Pittsburgh	[illegible]	[illegible]	[illegible]	17.95
L. S. charcoal, Chicago	**31.75**	31.75	[illegible]	14.75
Rails, Billets, etc., Per Gross Ton:				
Bess. rails, heavy, at mill	[illegible]	[illegible]	[illegible]	28.00
O.-h. rails, heavy, at mill	[illegible]	[illegible]	[illegible]	28.00
Bess. billets, Pittsburgh	[illegible]	[illegible]	[illegible]	[illegible]
O.-h. billets, Pittsburgh	[illegible]	[illegible]	[illegible]	[illegible]
O.-h. sheet bars, Pgh.	[illegible]	[illegible]	[illegible]	[illegible]
Forging billets, Pgh.	[illegible]	[illegible]	[illegible]	[illegible]
O.-h. billets, Phila.	**60.00**	[illegible]	[illegible]	36.00
Wire rods, Pittsburgh	[illegible]	[illegible]	60.00	40.00
Finished Iron and Steel, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Iron bars, Philadelphia	**2.909**	[illegible]	[illegible]	1.909
Iron bars, Pittsburgh	**3.25**	[illegible]	[illegible]	1.80
Iron bars, Chicago	**2.75**	2.65	[illegible]	1.60
Steel bars, Pittsburgh	[illegible]	[illegible]	[illegible]	1.70
Steel bars, New York	[illegible]	3.169	2.919	1.859
Tank plates, Pittsburgh	4.25	4.25	[illegible]	1.90
Tank plates, New York	4.119	4.119	4.169	2.169
Beams, etc., Pittsburgh	**3.25**	[illegible]	2.75	1.70
Beams, etc., New York	**3.419**	[illegible]	[illegible]	1.869
Shafting, grooved steel, Pgh.	[illegible]	[illegible]	[illegible]	1.70
Steel, turned steel, Pgh.	[illegible]	[illegible]	[illegible]	1.80
Steel hoops, Pittsburgh	[illegible]	[illegible]	[illegible]	1.90

*The Chicago switching charge for delivery to foundries in the Chicago district is 50c. per ton.

	Dec. 6, 1916.	Nov. 29, 1916.	Nov. 8, 1916.	Dec. 8, 1915.
Sheets, Nails and Wire, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh	[illegible]	[illegible]	[illegible]	2.50
Sheets, galv., No. 28, P'gh	[illegible]	[illegible]	[illegible]	[illegible]
Wire nails, Pittsburgh	[illegible]	[illegible]	[illegible]	[illegible]
Cut nails, Pittsburgh	[illegible]	[illegible]	[illegible]	[illegible]
Fence wire, base, Pgh.	[illegible]	[illegible]	[illegible]	[illegible]
Barb wire, galv., P'gh	[illegible]	[illegible]	[illegible]	[illegible]
Old Material,				
Iron rails, Philadelphia	**$29.00**	[illegible]	[illegible]	[illegible]
Iron rails, Philadelphia	**25.00**	[illegible]	[illegible]	[illegible]
Car wheels, Chicago	**21.50**	[illegible]	16.00	14.50
Car axles, Philadelphia	**22.50**	[illegible]	[illegible]	[illegible]
Heavy steel, Pittsburgh	**26.00**	[illegible]	[illegible]	[illegible]
Heavy steel, Chicago	**24.00**	23.00	[illegible]	[illegible]
Heavy steel, Philadelphia	**23.50**	[illegible]	19.00	[illegible]
No. 1 cast, Pittsburgh	**22.50**	[illegible]	[illegible]	[illegible]
No. 1 cast, Philadelphia	[illegible]	[illegible]	[illegible]	[illegible]
No. 1 cast, Chicago (new)	**16.50**	16.00	[illegible]	[illegible]
No. 1 RR. wrot, Phila.	**26.00**	[illegible]	[illegible]	[illegible]
No. 1 RR. wrot, Chicago (net)	**26.00**	[illegible]	[illegible]	[illegible]
Coke, Connellsville, Per Net Ton at Ovens:				
Furnace coke, prompt	**$7.50**	[illegible]	[illegible]	[illegible]
Furnace coke, future	[illegible]	4.00	[illegible]	[illegible]
Foundry coke, prompt	[illegible]	[illegible]	[illegible]	[illegible]
Foundry coke, future	[illegible]	[illegible]	[illegible]	[illegible]
Metals, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	**31.50**	[illegible]	[illegible]	[illegible]
Electrolytic copper, N. Y.	**31.50**	[illegible]	[illegible]	[illegible]
Spelter, St. Louis	[illegible]	[illegible]	[illegible]	[illegible]
Spelter, New York	[illegible]	[illegible]	[illegible]	[illegible]
Lead, St. Louis	**7.40**	[illegible]	[illegible]	[illegible]
Lead, New York	**7.50**	[illegible]	7.00	[illegible]
Tin, New York	[illegible]	[illegible]	[illegible]	[illegible]
Antimony (Asiatic), N. Y.	[illegible]	[illegible]	[illegible]	[illegible]
Tinplate, 100-lb. box, Pgh.	$6.00	$6.00	[illegible]	[illegible]

customers to be placed on the books. Very little finished material of any kind can be bought for delivery in the first half of 1917, and this applies to some extent on pig iron. Still higher prices on nearly everything in iron and steel are likely before the first of the new year.

Pig Iron.—The violent advances in Bessemer and basic pig iron are set forth in the average prices on those two grades of iron for November. W. P. Snyder & Co. report the average price of Bessemer iron in November to have been $29.122, Valley furnace, an advance over October of $5.4644. The average price of basic pig iron in November was $27.229 at Valley furnace, an advance of $6.9204 compared with October. The average prices on both Bessemer and basic for December will also show a heavy increase over November. Following the great activity in sales of Bessemer and basic iron and sensational advances in prices of a week ago, the market has quieted down to some extent, but prices are firm, and likely to be higher. Bessemer has sold in the past week in fairly large quantities at all the way from $32 to $35 at Valley furnace, the larger sales having been made at the lower price. We note two sales of 5000 tons each of Bessemer, one for delivery in first half and the other for delivery over all of next year, at $32. We also note several sales of small lots of Bessemer, ranging from 300 to 1000 tons, at $35. There have also been several sales of fairly large lots of basic iron at $30, Valley furnace, and the market is strongly maintained at that price. There have been sales of No. 2 foundry and malleable Bessemer iron at $30, Valley furnace. We quote: Standard Bessemer iron, $33.50; basic, $30; malleable Bessemer, $30; gray forge, $29; and No. 2 foundry, $30, all at Valley furnace, carrying a freight rate for delivery in the Pittsburgh or Cleveland district of 95c. per ton.

Ferroalloys.—Nearly all consumers of low-grade ferrosilicon have covered for the first half at prices ranging from $3 to $5 per ton lower than are now being quoted. Several furnaces making ferrosilicon report they are sold up for the first half and are refusing to quote. The new demand for ferromanganese is fairly active, English 80 per cent being firm at $164, seaboard, while 80 per cent domestic is held at $160 to $162 at furnace, freight added to point of delivery. We quote 18 to 22 per cent spiegeleisen at $50 to $55, and 25 to 30 per cent at $65 to $75, delivered. We quote 50 per cent ferrosilicon for delivery next year, in lots up to 100 tons, at $100; 100 tons to 600 tons, $99; and over 600 tons, $98, all per gross ton f.o.b. Pittsburgh. We now quote 9 per cent ferrosilicon at $39 to $41; 10 per cent, $40 to $42; 11 per cent, $41 to $43; 12 per cent, $42 to $44; 13 per cent, $43.50 to $45.50; 14 per cent, $45.50 to $47.50; 15 per cent, $47.50 to $49.50; and 16 per cent, $50 to $52. We quote 7 per cent silvery at $29.50 to $30; 8 per cent, $30 to $31; 9 per cent, $30.50; 10 per cent, $31; 11 per cent, $32; and 12 per cent, $33. These prices are f.o.b. at furnace, Jackson or New Straitsville, Ohio, and Ashland, Ky., all of which have a freight rate of $2 per gross ton to the Pittsburgh district.

Billets and Sheet Bars.—The situation as regards the supply of semi-finished steel is steadily getting tighter, and prices on billets and sheet bars for fairly prompt shipment seem to be on the way to $60 at maker's mill. While it is possible some steel might be picked up at $55 for fairly prompt shipment, higher than this price has been paid for large lots of both billets and sheet bars for delivery over the first half. Two leading open-hearth steel mills are buying small ingots from steel-casting plants and rerolling them, paying as high as $55 at mill. Forging billets are scarce. We quote base sizes and base carbons of Bessemer and open-hearth billets and sheet bars at $55 to $57.50, maker's mill, Pittsburgh or Youngstown; forging billets, $80 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25.

Plates. Orders for steel [illegible] week were not so numerous as in the preceding week, but some fair-sized contracts were [illegible] and the inquiry is active. The Pressed Steel Car Company has taken 100 additional steel hoppers for the Milwaukee Coal & Coke Company, and the Standard Steel Car Company has taken 100 stock cars for the Atlantic Coast Line and 2000 steel hoppers for the Pittsburgh

& Lake Erie. The Union Pacific has again come in for 2500 refrigerator cars with Bettendorf steel underframes and also for 100 ore cars. The demand for plates from the shipbuilding interests and the steel carbuilders is still enormously heavy, contracts from the former for large quantities having been placed for delivery in the first half. Active inquiries now in the market total about 20,000 cars of various types, and the leading builders are booked full for the first half. Small lots of sheared plates for delivery in the first quarter have sold at 5c. at mill. We quote sheared tank plates ¼ in. and heavier at 3.50c. at mill, with no promise of delivery; 4c. to 4.50c. for second to third quarters, and 5c. and upward for small lots for fairly prompt shipment, all f.o.b. at mill, Pittsburgh.

Structural Material.—New inquiry is still active, but several local fabricators say they are not bidding on much new work, being filled up for the greater part of next year. W. N. Kratzer & Co. have taken about 300 tons for an addition to the plant of the American Steel Foundries at Franklin, Pa., and the Fort Pitt Bridge Works, about 500 tons for an addition to the plant of the Petroleum Iron Works Company, Sharon, Pa. We quote beams and channels up to 15 in. at 3c. at mill, with no promise of delivery, and from 3c. to 3.25c. for second and third quarter shipment in 1917; small lots from warehouse stock, 3.50c. to 3.75c., Pittsburgh.

Steel Rails.—The reported inquiry of the Pennsylvania Railroad for 205,000 tons of standard sections has not yet reached here. It is expected that one-third or more of this order, when placed, will come to the local maker. The demand for light rails is active and prices are firm, with prospects of an advance in the near future. We quote 25 to 45 lb. sections at $47; 16 and 20 lb., $48; 12 and 14 lb., $49, and 8 and 10 lb., $50, in carload lots, f.o.b. at mill, the usual extras being charged for less than carload lots. We quote standard section rails of Bessemer stock at $38 and of open-hearth $40, per gross ton, Pittsburgh.

Tin Plate.—The American Sheet & Tin Plate Company has fixed its price on tin plate for delivery up to July 1, and for such quantities as it may be able to spare, at $6.50, base. This is virtually a nominal price, as this maker has little to sell for the first half. Other makers are quoting as high as $7, and one leading mill asks $7.25 for wasters and $7.50 for primes, for small lots to be shipped in the first half. There is some talk that tin plate for delivery in the second half may be as high as $9. We quote bright plate, 14 x 20, at $6 to $6.25 per base box, f.o.b. Pittsburgh, on contracts for delivery in the first half, and small lots from stock at $6.50 to $7, base box at mill.

Sheets.—The nominal price of the American Sheet & Tin Plate Company on No. 28 Bessemer black sheets for the first quarter remains at 4c. at mill, but nearly all the independent makers are quoting 4.25c. and some as high as 4.50c. On No. 28 galvanized prices range from 5.50c., the nominal price of the leading interest, up to 6c. and 6.50c., quoted by some of the independent mills. The demand for all grades of sheets is so heavy that still higher prices are practically certain. We quote: Blue annealed sheets, Nos. 3 to 8, 3.75c. to 4c.; box annealed, one pass, Bessemer cold-rolled sheets, No. 28, 4c. to 4.25c.; No. 28 galvanized, 5.50c. to 6c.; No. 28 tin-mill black plate, 4c. to 4.10c., all f.o.b. mill, Pittsburgh.

Shafting.—Several local makers have lately increased their capacity for making shafting to a considerable extent, and are now in position to make deliveries more promptly than for some time. One or two can ship fairly large lots in six weeks to two months from date of order. Most consumers are covered for the first quarter and some for first half. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots and 10 per cent off in less than carload lots for first quarter and first half of 1917, f.o.b. Pittsburgh, freight added to point of delivery.

Railroad Spikes and Track Bolts.—Prices on railroad spikes are up 25c. per keg, or to the basis of $2.90, and some makers are not anxious to sell even at this price, preferring to put the steel into other products in which there is more profit. The Chicago, Burlington & Quincy is reported in the market for 20,000 to 25,000 kegs for delivery in the second half, but makers are not willing to sell for delivery so far ahead. Nearly all the railroads are covered on their needs of spikes for the first half. We quote track bolts with square nuts at 4.50c. to 4.75c. to railroads and 5c. to 5.25c. in small lots to jobbers, base. Track bolts with hexagon nuts take the usual advance of 15c. per 100 lb. Prices on spikes are as follows:

Standard railroad spikes, 4½ x 9/16 in. and larger, $2.90; railroad spikes, ½ to 7/16 in., $3.00 base; railroad spikes, [illegible] boat spikes, $3.00 base, all per [illegible] Pittsburgh.

Wire Products.—Notice is expected any day of another advance of at least $3 per ton on all kinds of wire and wire nails, while some in the trade believe the advance will be $5 because of the extraordinary demand and also the higher cost of steel and labor. Two of the leading makers have not been accepting contracts for some time, selling only against specified orders and requiring that branch sales managers submit all inquiries to the home office before accepting any new business. The output of wire and wire nails is under contract for the next three or four months and mills are back in shipments to a considerable extent. Prices in effect at this writing, or dating from Nov. 27, are as follows: Wire nails, $3, base, per keg; galvanized, 1 in. and longer, including large head barbed roofing nails, taking an advance over this price of $2, and shorter than 1 in., $2.50. Bright basic wire is $3.05 per 100 lb.; annealed fence wire, Nos. 6 to 9, $2.95; galvanized wire, $3.65; galvanized barb wire and fence staples, $3.85; painted barb wire, $3.15; polished fence staples, $3.15; cement-coated nails, $2.90, base, these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to the point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing are 53 per cent off list for carload lots, 52 per cent for 1000-rod lots and 51 per cent for small lots, f.o.b. Pittsburgh.

Wire Rods.—The new demand for wire rods is still beyond the capacity of the mills to supply and some consumers are having great trouble in getting rods on which to operate their finishing mills. The demand from Canada is heavy, and large quantities of rods are going from this district into that country. We quote soft Bessemer, open-hearth and chain rods at $65 to $75 per gross ton, f.o.b. Pittsburgh, but it would probably be difficult to buy any large quantity at less than $70.

Iron and Steel Bars.—Effective from Tuesday, Dec. 5, the Lockhart Iron & Steel Company of this city advanced its prices on refined iron bars to 3.25c. at mill in carload lots and 3.50c. in less than carloads. Practically the entire output of steel bars of the leading makers is under contract for the first half, and one leading maker reports its output sold for all of next year. We quote merchant steel bars at 2.90c. at mill, with no promise as to delivery, and from 3c. to 3.25c. for delivery in second and third quarters. We quote refined iron bars at 3.25c., and railroad test bars at 3.40c. in carload lots, f.o.b. Pittsburgh.

Hoops and Bands.—The nominal price of the Carnegie Steel Company on steel bands remains at 2.90c., with extras as per the steel-bar card, and steel hoops 3.25c., but with no promise of delivery. Other makers that can promise shipments in three to four months from date of order are quoting steel bands at 3.25c. and steel hoops at 3.50c. at mill. Most consumers are covered for the first quarter and some over the first half. Specifications against contracts are active.

Nuts and Bolts.—Due to the steady advance in price of steel bars and poor delivery by the bar mills, the nut and bolt factories are not able to make full output, and are much behind in deliveries. Local makers are not paying much attention to the heavy foreign demand as they are not able to meet the domestic demand. Another advance in prices at an early date

is likely. Discounts are as follows, delivered in lots of 300 lb. or more where the actual freight rate does not exceed 20c. per 100 lb., with terms 30 days net or 1 per cent for cash in 10 days:

Carriage bolts, small rolled thread, [illegible] per cent small, cut thread, [illegible] per cent large, [illegible] per cent.

Machine bolts, h. p. sq., [illegible] rolled thread, 50 and 5 per cent [illegible], cut thread, 40 [illegible] per cent large, 10 per cent.

Machine bolts, c. p. sq. and hex. nuts, small, 40 and 5 per cent large, 40 and 5 per cent. Hot pressed h. p. nuts, 40 per cent with c. p. nuts, 50 and 5 per cent. Lag screws, coach or gimlet points, 70 per cent.

Nuts, h. p. sq. and hex., blank, $2.60 off list, and tapped, $2.40 off. Nuts, c. p. sq. and hex., blank, $2.50 off, and tapped, $2 off. Hex. blank, $2.50 off, and tapped, $2.25 off. Semi-finished hex. nuts, 60 per cent. Finished and case-hardened nuts, 60 per cent.

Rivets, 7/16 in. in diameter and smaller, 15 and 10 per cent.

Rivets.—The recent advance is firmly held, and makers report the domestic demand heavy and specifications active. Difficulty in getting deliveries of steel bars from the mills is holding down the output of rivets to some extent. The export demand is also active, and considerable shipments are being made to foreign countries. Makers' prices are firm as follows: Buttonhead structural rivets, ½ in. in diameter and larger, $4.25 per 100 lb., base, and conehead boiler rivets, same sizes, $4.35 per 100 lb., base, f.o.b. Pittsburgh. Terms are 30 days net or one-half of 1 per cent for cash in 10 days.

Cold-rolled Strip Steel.—Most of the consuming trade is covered over the first quarter, but so far the makers are refusing to sell for delivery beyond that period. Nearly all contracts were taken on the basis of $6.50 base per 100 lb., and a few at slightly higher prices. On current orders for fairly prompt shipment, makers quote $7 for fair-sized quantities up to $7.50 per 100 lb. for small lots. Terms are 30 days net, less 2 per cent off for cash in 10 days, delivered in quantities of 300 lb. or more when specified for at one time.

Wrought Pipe.—Effective Friday, Dec. 1, several independent pipe mills lowered discounts on black and galvanized steel pipe and line pipe two points, equal to an advance of $4 per ton, and practically the same advance was made on oil-country goods. On Monday the National Tube Company and the makers of iron pipe made similar advances. The abnormal demand for tubular goods of all kinds, and the increasing cost of making pipe, due to high charges for labor and steel, are given as the main reasons for this latest advance. No large inquiries are in the market for line pipe, and on this product mills are sold up for three months or longer, and on lap-weld sizes of iron and steel pipe from six to eight months. On butt-weld sizes of iron and steel pipe up to 3-in., mills can ship in two to three months from date of order. This year will be a record in the pipe trade, both in orders booked by the mills and in high prices ruling. The new discounts on black and galvanized iron and steel pipe are given on another page.

Boiler Tubes.—Because of the advance of $4 per ton on other tubular goods, a similar advance is looked for in iron and steel boiler tubes possibly before this week is out. For months the demand for tubes has been extraordinarily heavy, and makers are sold up practically a year ahead. Premiums over regular prices are readily paid to any mills that can make fairly prompt shipments of tubes. Discounts in effect at this writing are given on another page.

Coke.—No marked changes in general conditions occurred in the coke trade the past week. The demand for spot furnace coke, while not heavy, is large enough to take all that is being offered on the basis of $7 to $7.50 per net ton at oven. Some grades of furnace coke running high in sulphur can be bought as low as $6.50. Nothing is doing in contract furnace coke, as the furnacemen who have not covered for the first half are not willing to pay the high prices asked—$4 or more per net ton at oven—while producers believe they may get a higher price later on. The supply of cars in the coke regions last week was a little better than the previous week, but is still far from being satisfactory. We quote best grades of blast-furnace coke for prompt shipment at $7 to $7.50 per net ton at oven, and on contracts about $4. Best grades of 72-hr. foundry coke for spot shipment are held at $7.50 to $8, and on contracts producers quote from $5 up to $6. The Connellsville *Courier* gives the output of coke in the upper and lower Connellsville regions for the week ended Nov. 25 as 408,159 net tons, an increase over the previous week of 9870 tons.

Old Material.—Again prices on nearly all grades of steel-making scrap have advanced $1 to $3 per ton, or more. This is in spite of the fact that sales to consumers have been comparatively light. The local scrap market is about as excited as the pig-iron market, consumers trying to buy and dealers inclined to hold their scrap for higher prices. It is predicted that by Jan. 1 prices on selected heavy steel scrap will be $30 per ton, or higher. The Baltimore & Ohio list was closed last week at the highest prices obtained for some years. The lists of the Pennsylvania Lines East and West closed Dec. 5, and while the prices paid have not been given out, dealers are said to have bid unusually high. We note a sale of 1500 tons of heavy steel scrap at $26.50; another of 3000 tons at $27; 800 tons of burnings at $13; about 4000 tons of borings at $14 to $14.50; 2000 tons of low phosphorus melting stock at $31, and 1500 tons at $32, all delivered to consumers' mills. Prices are likely to be higher on some commodities before this report reaches our readers. Prices now named by dealers for delivery in Pittsburgh and other consuming points that take Pittsburgh freight rates, per gross ton, are as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	$26.00 to $27.00
No. 1 foundry cast	20.50 to 21.00
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	29.00 to 30.00
Hydraulic compressed sheet scrap	20.00 to 21.00
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	17.00 to 17.50
Bundled sheet stamping scrap	16.50 to 17.00
No. 1 railroad malleable stock	22.00 to 23.00
Railroad grate bars	14.50 to 15.00
Low phosphorus melting stock	31.00 to 32.00
Iron car axles	48.00 to 50.00
Steel car axles	48.00 to 50.00
Locomotive axles, steel	50.00 to 51.00
No. 1 busheling scrap	19.00 to 20.00
Machine-shop turnings	13.00 to 13.50
Old carwheels	23.00 to 24.00
Cast-iron borings	14.50 to 15.00
*Sheet bar crop ends	27.00 to 28.00
No. 1 railroad wrought scrap	23.00 to 24.00
Heavy steel axle turnings	16.00 to 17.00
Heavy breakable cast scrap	19.00 to 20.00

*Shipping point.

Chicago

CHICAGO, ILL., Dec. 5, 1916.

The hampering effects of car shortage enter more largely into the increase of congestion with each succeeding week. One of the largest steel companies has adopted the policy of rolling no steel for which it has not cars available for making shipment. To lay down material on the yard to await cars, under the existing conditions, would result in it being left there indefinitely. This policy has already cut down shipments in a degree. The order departments of most of the large producers are laboring with an almost overwhelming confusion of shipping obligations. One mill has found it necessary temporarily to suspend all first-half specifications pending the completion of this year's shipments. For at least one large interest at Chicago, the month of November was the biggest in its history by a considerable margin, with new sales more than double shipments. The placing of rails and car steel were largely responsible for this showing. Bookings of rails for 1918 are already sufficient to absorb nearly the full mill capacity for the first half of that year. The placing of orders and contracts for rolled steel in various forms is increasingly a matter of the purchaser finding a source of supply where special pleas of necessity can win consideration. Car buying last week was unimportant, and the Rock Island has withdrawn its inquiry

for 2000 cars. Pig iron users desirous of securing iron, both for prompt shipment and last half delivery, are numerous and the quantities desired in many instances of considerable size. The increased demand for spot iron is especially noticeable. Prices of scrap are soaring and consumers are not hesitating over differences of 50c. to $1 per ton in prices.

Pig Iron.—Consumers are displaying interest, particularly in carload lots for immediate delivery, in the anticipation of shipments scheduled for the first half, and in the placing of contracts for the last half of the year. The growth of demand for spot iron appears to be attributable to the needs of the smaller foundries which are now closing contracts for castings and, not having ventured to risk premature purchases at high prices, are covering for work recently taken. Many larger interests are asking for shipment of first-half iron in December, both because their needs are running ahead of expectations and because they desire the security of having the iron on their own yards before shipping congestion grows worse. Inquiry for the last half includes both Northern and Southern iron in quantities up to 5000 tons, and sales are noted of 4000 tons of Southern iron, 1000 tons of standard Bessemer, 5000 tons of malleable Bessemer and other lots of similar size. Of standard Northern irons, recent sales have been on the basis of $28, at Chicago furnace, while Southern foundry iron has sold at from $22, Birmingham, for spot delivery, to $25 for last half. At the beginning of the current week the minimum quotation is probably $23. A minimum of $30 at the furnace is now asked for charcoal iron, while a sale of 200 tons of low phosphorus iron is reported at approximately $52, delivered to an Indiana melter. This latter price compares, however, with an approximate delivered price for Canadian low phosphorus iron, at Chicago, of $36. Recent quotations on standard Bessemer at Chicago are on a basis equivalent to $35 at the Valley. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of $1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic irons, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton.

Lake Superior charcoal, Nos. [illegible]	[illegible]
Lake Superior charcoal, No. 1	[illegible]
Lake Superior charcoal, No. 6 and Scotch	[illegible]
Northern coke foundry, No. 1	[illegible]
Northern coke foundry, No. 2	28.00 to [illegible]
Northern coke forge, No. [illegible]	[illegible]
Northern high phosphorus [illegible]	[illegible]
Southern coke No. 1 fdry and 1 soft	[illegible]
Southern coke No. 2 fdry and 2 soft	[illegible]
Malleable Bessemer	28.00 to [illegible]
Basic	[illegible]
Low phosphorus	[illegible]
Silvery, 8 per cent	[illegible]
Bessemer ferrosilicon, 10 per cent	[illegible]

Rails and Track Supplies.—Rail purchases for 1918 delivery have now been made in quantity sufficient to engage local mill capacity for nearly the entire first half of that year. Included among the railroads that have closed for their requirements in the last week are the Chicago, Milwaukee & St. Paul, the Illinois Central and the Santa Fé. In addition to rails, heavy tonnages of tie-plates, track bolts and spikes were also placed under contract. Although still disproportionately very low, the minimum price of spikes has been advanced to 3c. Quotations are as follows: Standard railroad spikes, 3c., base; track bolts with square nuts, 4c. to 4.50c., base, all in carloads, Chicago; tie-plates, $52 to $54, f.o.b. mill, net ton; standard section Bessemer rails, Chicago, $38, base; open hearth, $40; light rails, 25 to 45 lb., $44; 16 to 20 lb., $45; 12 lb., $46; 8 lb., $47; angle bars, 2.25c.

Structural Material.—The withdrawal by the Rock Island of its inquiry for 2000 cars was an interesting feature of the week's car business. No purchases of size are reported, although there remains in the market inquiry for a total of 7000 to 8000 cars. Western railroads have been buying locomotives quite freely. The principal contract taken by fabricators last week was that covering 1600 tons for an Illinois Central Railroad bridge at Chicago, to be furnished by the American Bridge Company. The Kansas City Structural Steel Company will supply 275 tons to the Utah Copper Company and the Hansell-Elcock Company 240 tons for a factory building at Chicago. The Milwaukee Western Fuel Company has taken figures on 400 tons for an ore bridge. The available supply of plain material for delivery in the first half is steadily dwindling. A large independent mill, which has been selling for three to four months' delivery, is now out of the market for the first half, following large export sales. We quote for Chicago delivery of structural steel from mill 3.189c. to 3.439c.

We [illegible] for Chicago delivery of structural steel out of [illegible] 3.70c.

Plates.—Tank plates may be had in limited quantities for prompt delivery at prices ranging from 4.50c. to 5c., Pittsburgh, while universal mill plates, though available only for more remote delivery, are being quoted at 3.50c. to 4c. The entire volume of business is not large. We quote for Chicago delivery of plates from mill, at its convenience, 3.689c.; for prompt shipment, 4.189c. to widths up to 72 in., and for wide plates, 4.939c. to 5c.

We quote at Chicago delivery of plates from jobbers' [illegible] cent.

Sheets.—A sale of 600 tons of galvanized sheets of various gages is noted at a price equivalent to 6c., Pittsburgh. Transactions of this size are unusual and the number of mills that can be found to quote on any inquiry for galvanized may almost be counted on the fingers of one hand. The situation is but little easier for black or blue annealed sheets, and for special finishes and electric sheets consumers are with greatest difficulty finding mills to take their orders. We quote, for Chicago delivery, No. 10 blue annealed, 3.689c.; Nos. 3 to 8, 3.839c.; box annealed, No. 16 and lighter, 4.189c. to 4.289c.; No. 28 galvanized, 5.689c. to 6c. These quotations are minimum prices for contracts. Early shipment quotations are $5 to $10 per ton higher.

Sobstantial [illegible] in the prices of sheets from store [illegible] and we quote for Chicago delivery out of [illegible] regardless of quantity, as follows: No. 10 blue [illegible] No. 28 black, 4.60c.; No. 28 galvanized, 6.50c.

Bars.—With the bar-iron mills already sold up much farther into the future than is their practice, offerings from consumers continue to press for consideration. The price of 2.75c., at which the larger part of recent sales were made, is now a firmly established level, and some of the mills are looking ahead to further advances. There is less activity in rail-carbon steel, and for mild steel bars there is no special demand. Some tentative inquiry from implement interests for last half is noted. We quote mill shipment, Chicago, as follows: Bar iron, 2.75c.; soft steel bars, 3.089c. to 3.189c.; hard steel bars, 2.75c.; shafting, in carloads, 20 per cent off; less than carloads, 15 per cent off.

We [illegible] store prices for Chicago delivery as follows: Soft steel bars, 3.60c.; bar iron, 3.60c.; reinforcing [illegible] base, will be extra for twisting in sizes 1½ in. [illegible] extras for smaller sizes; shafting [illegible] per cent.

Rivets and Bolts.—A quiet situation prevails following recent heavy specifying and prices are correspondingly less disturbed. We quote as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 50; cut thread, 40-7½; larger sizes, 35; machine bolts up to ⅜ x 4 in., rolled thread, with hot pressed square nuts, 50-5; cut thread, 40-10-5; large size, 40; gimlet-point coach screws, 50; hot pressed nuts, square, $2.60 off per 100 lb.; hexagon, $2.60 off. Structural rivets, ¾ to 1¼ in., 4.15c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

[illegible] screws. Structural rivets 4.50c.; machine bolts up to ⅜ x 4 in., 40-10-5; [illegible] bolts up to ⅜ x 6 in., [illegible]; [illegible] pressed nuts, square, $2.60 off; hexagon, [illegible] screws, 50.

Cast-Iron Pipe.—An awakening of interest on the part of many municipal buyers is found in numerous inquiries which include 1250 tons for Eveleth, Minn., 1150 tons for Ann Arbor, Mich., 600 tons for Erie, Pa., and 1500 tons for Toledo, Ohio. At St. Paul the expected award of 1250 tons was cut to 450 tons and at

Bay City, Mich., the Glamorgan Pipe & Foundry Company was the successful bidder for 500 tons. We quote as follows, per net ton, Chicago: Water pipe, 4-in., $42.50; 6-in. and larger, $39.50, with $1 extra for class A water pipe and gas pipe.

Wire Products.—With the possible exception of woven fence, the makers of wire products are discouraging further purchases. There is some decrease noticeable in the movement of wire nails, due to the normal seasonal falling off in trade. We quote as follows per 100 lb.: Plain wire, Nos. 6 to 9, base, $3.239; wire nails, $3.189; painted barb wire, $3.339; galvanized barbed wire, $4.039; polished staples, $3.339; galvanized staples, $4.039; all Chicago.

Old Material.—The advance in prices of scrap was, if anything, accelerated in the last week. Consumers appear to be buying freely at such prices as are asked and usually find their purchase a good one in the light of quotations immediately following the transaction. Prices paid by consumers are frequently higher than the quotations to which general currency is given, an unusual condition which may have to do with the efforts of the dealers to cover their sales. As high as $25 per ton has been asked for shoveling steel and sales of No. 1 wrought at $26.50 are noted. The disproportionately low price of carwheels has disappeared with the rapid advance in the past 10 days, and the sale of a round tonnage at $21.50 is reported. A like adjustment of the prices of foundry grades of scrap in keeping not only with other old materials but also with the price of pig iron is generally anticipated. Demand for cast scrap at St. Louis and Ohio River points, usually sources of material for delivery in this market, is noted. The shortage of labor, which is limiting the fabrication of country mixed iron, is showing itself in the comparatively low prices for that class of scrap. Railroad offerings of old material continue below normal, the current lists including 2300 tons from the Wabash, a moderately large list from the Pennsylvania Lines, 500 tons from the Pere Marquette and 4000 tons from the Chicago & Northwestern, in which is included 1000 tons of rerolling rails. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	$22.00 to $30.00
Relaying rails	29.00 to 30.00
Old carwheels	21.50 to 22.00
Old steel rails, rerolling	28.00 to 29.00
Old steel rails, less than 3 ft.	25.50 to 26.00
Heavy melting steel scrap	23.50 to 24.50
Frogs, switches and guards cut apart	24.00 to 25.00
Shoveling steel	23.00 to 24.00
Steel axle turnings	13.50 to 14.00

Per Net Ton

Iron axles and splice bars	$29.50 to $30.00
Iron rails, long and transoms	30.00 to 30.50
Steel rails, long	21.50 to 22.00
Iron car axles	38.00 to 39.00
Steel car axles	39.00 to 40.00
No. 1 railroad wrought	26.00 to 26.50
No. 2 railroad wrought	25.00 to 25.50
Car springs	25.00 to 25.50
Pipes and flues	16.00 to 16.50
No. 1 busheling	19.00 to 20.00
No. 2 busheling	13.50 to 14.00
Steel knuckles and couplers	23.50 to 24.50
Steel springs	24.50 to 25.00
No. 1 boilers, cut to sheets and rings	15.50 to 16.00
Boiler punchings	20.50 to 21.00
Locomotive tires, smooth	25.00 to 26.00
Machine-shop turnings	10.00 to 10.50
Cast borings	8.75 to 9.25
No. 1 cast scrap	16.50 to 17.00
Stove plate and light cast scrap	12.75 to 13.25
Grate bars	13.00 to 14.00
Brake shoes	13.00 to 14.00
Railroad malleable	18.00 to 19.00
Agricultural malleable	16.00 to 16.50

The Slatington Iron & Steel Company, Slatington, Pa., has been incorporated with a capital stock of $10,000. It has taken over the plant of the Iron Products Company at Slatington, and will continue the manufacture of that company's brands of bar iron. Robert J. Scott is president; Richard G. Park, vice-president; B. Frank Conner, general manager. They are directors, together with W. Logan MacCoy and William Heebner. W. T. Handwerk is secretary and treasurer.

The Austrian Steel Trust, which would have expired at the end of 1917, has been dissolved. It embraced all products from pig iron to finished steel.

Philadelphia

PHILADELPHIA, PA., Dec. 5, 1916.

The entire market shows greater strength. The high quotations and sold-up condition of the producers, as well as the heavy commitments of consumers, naturally combine to make the pig-iron market less active, but nevertheless there is a good bit doing, and prices are stronger. The producers are asking $29 to $30, furnace, for eastern Pennsylvania No. 2 X. Eastern Pennsylvania basic has sold at $30, furnace, one purchaser taking 15,000 tons at that figure. Virginia No. 2 X is offered at $26.50, furnace, or $29.25, Philadelphia, several makers staying out of the market. Standard low phosphorus has sold at $50, delivered. The export demand continues as heavy as ever, with the call spread over a greater variety of grades. Plates are higher with some makers, the minimum quoted on tank steel being 4.409c., Philadelphia. Next to plates, structural shapes are the strongest in the finished-steel market; eastern Pennsylvania makers quote 3.409c., Philadelphia. Steel bars are at the same level. The makers of iron bars have at last advanced their quotation, now asking 2.909c., Philadelphia, for carloads. Open-hearth rerolling billets are up to $60. No. 10 blue annealed sheets are stronger at 4.409c., Philadelphia. The old material market shows a steadily advancing tendency, with more or less irregularity in quotations. It is influenced by the strength at Pittsburgh, and the fact that scrap is being shipped to the West from Eastern points. The coke market appears a trifle easier, although spot furnace has sold at $7.75 per net ton at oven. To insure receiving coal and coke it has under contract the Alan Wood Iron & Steel Company, Conshohocken, Pa., has placed an order with the American Car & Foundry Company for 100 50-ton cars of the so-called battleship type, for which it will supply the plates.

Pig Iron.—Basic reached $30 per ton last week when a contract naming that price at furnace was closed for 15,000 tons, last half delivery, to a domestic buyer. There have been further inquiries for basic, none of which resulted in sales so far as can be learned, but it is safe to assert that less than $30, furnace, could not be done to-day. Standard low phosphorus is firm at $50, delivered, a price at which business has been done. Activity in this grade is tapering off, but only for the reason that the makers have not much to sell. It is doubtful if a lot of 5000 tons could be rounded up, and producers are urging caution on the part of consumers. The latter, in the majority of cases, are buying only to cover contracts actually in hand. Eastern Pennsylvania No. 2 X is held at $29, furnace, or $29.79, delivered, by one producer who is practically out of the market for the first half. Another brand of Pennsylvania iron, coming from the central western part of the State, is quoted at $29, also, but the freight in this instance brings the delivered price to $30.90. Still another brand is held at $30, furnace. Buffalo iron is firmly held at $30, furnace. Most of the Virginia producers are out of the market, but one interest quotes $26.50, furnace, equivalent to $29.25, Philadelphia, first half delivery. Other Virginia iron has sold up to $29, furnace, but special analysis or circumstances prevailed. Domestic consumers have been fairly active in the past week, but not as much so as in the earlier stages of the present movement. Few or no lots larger than 1000 tons have been taken. A shortage of iron in the first half of next year is predicted, despite the fact that high prices usually bring out unsuspected stocks. An influence to be considered now is the probability of a serious curtailment of production. No. 2 Warwick furnace, the capacity of which is about 500 tons per day, has been shut down for relining. Fortunately the materials needed for relining and other repairs are on the ground. The export demand continues to grow. Not only are foreign consumers eager to get all the Bessemer that can be shipped, but they are anxious also for foundry grades. Holland, Sweden and Norway in particular are taking foundry iron. A moderate-sized lot of Virginia foundry was taken for export at a [illegible] New

York, the asking price for export being $27, furnace. Quotations for standard brands delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa. No. 2 X foundry	$ [illegible] to $ 29.50
Eastern Pa. No. 2 plain	[illegible] to 29.00
Virginia No. 2 X foundry	29.75
Virginia No. 2 plain	29.00
Gray forge	26.00 to 27.00
Basic	30.00
Standard low phosphorus	50.00

Iron Ore.—Arrivals of foreign ore at this port in the week ended Dec. 2 were as follows: From Spain, 11,757 tons; Sweden, 5690 tons, and Chile, 6800 tons.

Plates.—A mill whose minimum for tank steel a week ago was 4.159c., Philadelphia, now quotes 4.409c., and continues its policy of not wanting to sell too far ahead. It is conservative in booking orders for ship plates, despite the heavy demand from both domestic and foreign shipbuilders. Another mill which is practically filled for the first half quotes 4.659c., Philadelphia, on such business as it can take. Still another, which is almost out of the market for the first three quarters of 1917, quotes 5.159c., Philadelphia, minimum, on tank steel, and 6.159c., Pittsburgh, on ship plates. It has turned down many orders, including one of 2000 tons of ship material offered at 5.659c., Philadelphia. Carbuilders are specifying heavily against contracts they have with the company last referred to.

Ferroalloys.—Representatives of the English producers continue to quote $164, seaboard, for any delivery of 80 per cent ferromanganese, and what variances in prices exist pertain to domestic material. It is reported that a Portsmouth, Ohio, steel company last week purchased 2400 tons, delivery at the rate of 200 tons per month, from a domestic maker at $155, delivered, but most of the American product is held at $165, delivered, and it is believed that the shading of this price has about ceased. The Algoma Steel Corporation, Ltd., Sault Ste. Marie, Canada, has been inquiring for 1000 to 1500 tons, delivery at the rate of 100 tons a month. Several of the domestic makers are inquiring for manganese ore. With the exception of a few part cargoes, all of the high-grade ore is coming from Brazil. The quotation for 50 per cent ferrosilicon is unchanged at $100, Pittsburgh, for carloads, and $99 for 100-ton lots. Blast-furnace ferrosilicon, 11 per cent, has been advanced by some makers to $45, furnace, or $48.44, Philadelphia.

Bars.—Most of the large consumers of steel bars covered their requirements around 2.50c., Pittsburgh. Smaller consumers who are not in such a fortunate position will have to pay 3.25c., Pittsburgh, or 3.409c., Philadelphia, to one large producer, for their first quarter needs. With favored customers, 3.159c., Philadelphia, probably could be done in other directions. Iron bars have been advanced one-quarter cent per lb., the new quotation being 2.75c., Pittsburgh, or 2.909c., Philadelphia, for carload lots.

Structural Material.—Mills in this territory are sold up through the first quarter and well into the second, farther than which they do not care to go. They quote 3.409c., Philadelphia. The demand continues heavy, ranking next to that for plates, and considerable business is being refused. The John A. Roebling's Sons Company, Trenton, N. J., will require 2000 to 3000 tons for new plant construction.

Billets.—The demand is steady, and open-hearth rerolling billets have been advanced to $60 per ton; forging steel being unchanged at $75 to $80. Producers have but little steel to offer for the first half, and the business of one important maker has been almost confined to enlarging existing contracts.

Sheets.—No. 10 blue-annealed sheets are held higher at 4.409c., Philadelphia.

Coke.—Prompt furnace coke appears to be a little stronger, $7.75 at oven having been paid for 20 cars. Other interests put the market at $7.50 per net ton at oven. Contract furnace is nominally unchanged at about $4 at oven. The spot foundry situation continues to show an easier trend at $9 to $9.25 at oven. Contract foundry is unchanged at $6 to $6.50. Freight rates from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain $1.65.

Old Material.—The market is active, with all grades in demand. Strength is imparted to the local situation by the strong Western market. Meanwhile both speculators and shorts are active. Scrap has been purchased in the East for shipment to Youngstown and other Western points. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$24.00 to $25.00
Old steel rails, rerolling	27.00 to 28.00
Low phos. heavy melting steel scrap	33.00 to 35.00
Old steel axles (for export)	45.00
Old iron axles (for export)	45.00
Old iron rails	25.00 to 26.00
Old carwheels	22.50 to 23.50
No. 1 railroad wrought	26.00 to 27.00
Wrought-iron pipe	19.00 to 20.00
No. 1 forge fire	16.50 to 17.50
Bundled sheets	16.50 to 17.50
No. 1 machinery	13.00 to 14.00
Machine-shop turnings	13.50 to 14.00
Cast borings	14.50 to 15.00
No. 1 cast	20.00 to 21.00
Grate bars, railroad	15.50 to 16.00
Stove plate	17.00 to 17.50
Railroad malleable	17.50 to 18.50

Cincinnati

CINCINNATI, OHIO, Dec. 6, 1916.—(*By Wire.*)

Pig Iron.—Prices have been advanced at such a rapid rate that it is difficult for either seller or buyer to keep in touch with the market. Southern No. 2 foundry for prompt or first half shipment is quoted all the way from $23 to $25, Birmingham basis. Only a small quantity of iron can be purchased for December shipment. The Southern furnaces have practically sold their entire output until July 1, with the exception of some off iron that will come on the market later. The southern Ohio producers have had such a large call for basic that they are unwilling to take on any further business for nearby delivery, and are reluctant to book orders for the last half of next year. Northern iron is to-day quoted flat at $30, Ironton, for shipment through 1917, although a few foundry contracts were made last week around $28 to $29 at furnace. The Ohio silvery irons continue to advance, and 8 per cent silicon iron is now quoted at $35 at furnace, one producer holding out for $1 more. Virginia foundry iron has again been evident in this market and several contracts were made in both Indiana and southern Ohio, mostly for last half shipment. The largest sale reported is in Indiana, covering about 5000 tons of mixed Southern, Northern and Virginia foundry iron for last half. A number of smaller contracts for Southern iron were closed by northern Ohio melters for the same delivery. Business in this immediate vicinity has been slow and the only general inquiry out is one from a local company for 2500 tons of foundry iron for first half. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	$26.40 to $28.40
Southern coke, No. 2 f'dry and 2 soft	25.90 to 27.90
Southern coke, No. 3 foundry	25.40 to 27.40
Southern coke, No. 4 foundry	24.90 to 25.40
Southern, gray forge	24.40 to 26.40
Ohio silvery, 8 per cent silicon	35.26 to 36.25
Southern Ohio coke, No. 1	31.76
Southern Ohio coke, No. 2	31.26
Southern Ohio coke, No. 3	30.76
Southern Ohio malleable Bessemer	31.26
Basic Northern	31.26
Lake Superior charcoal	26.70 to 27.70
Standard Southern carwheel	26.90 to 27.40

(*By Mail*)

Finished Material.—Further advances have been made by nearby mills on both black and galvanized sheets. Changes have been made so rapidly that it is difficult to state what the correct quotations should be, but from 4.65c. to 4.75c., Cincinnati or Newport, Ky., is quoted on No. 28 black sheets and from 6.65c. to 6.90c. on No. 28 galvanized. Some business has been done at the higher figures. Warehouse stocks of galvanized sheets do not cut much figure, as they are mostly in the hands of roofing manufacturers who need them for their own contracts. The jobbers' price of steel bars and small structural shapes has been advanced to 3.70c., and other store prices are as follows:

Structural material, 3.80c., base; plates, 4.35c.; No. 10 blue annealed sheets, 4.15c. to 4.25c.; rounds and squares, 2 in. and over, 4.25c.; flat bars, 1 in. and over, 4.25c.; cold-rolled shafting, 10 per cent plus list; wire nails, $3.40 per keg, base; barb wire, $4.40 per 100 lb.

Coke.—Prompt shipment prices on both furnace and foundry coke have not receded. On the other hand, some coke ready for shipment has been sold at higher levels. This situation has not affected contract business and 48-hr. coke can be obtained in the Connellsville district for future shipment at $4 to $5.50 per net ton at oven. A small quantity of prompt furnace coke was sold last week as high as $8. First half Connellsville foundry ranges from $4.50 to $6 at oven, but few contracts for either furnace or foundry are being made. Foundry coke buyers are generally well protected to July 1, and it is reasoned that the car shortage proposition will probably not be so acute several months hence as it is at present. Wise County and Pocahontas furnace and foundry grades are quoted on the same level with Connellsville. No definite figures are obtainable on New River coke.

Old Material.—The rolling mills and foundries that have contracts are calling for shipments on them, and as a consequence a large amount of scrap is moving forward to consumers from yard stocks. The rapid advances that have been made in the past four weeks appear to have been checked to some extent and prices this week are about on the same level as last week's quotations. However, some dealers are asking more, especially on scrap that can be used by the rolling mills. Relaying steel rails that will pass inspection are now practically above the price of new heavy rails four months ago. The following are dealers' prices, f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton

Bundled sheet scrap	$13 75 to $14 25
Old iron rails	24 00 to 24 50
Relaying rails, 50 lb. and up	28 00 to 28 50
Rerolling steel rails	23 00 to 23 50
Heavy melting steel scrap	20 00 to 20 50
Steel rails for melting	20.00 to 20.50

Per Net Ton

No. 1 railroad wrought	$20 25 to $20 75
Cast borings	6 50 to 7 00
Steel turnings	6 50 to 7.00
Railroad cast	16 00 to 16 50
No. 1 machinery cast	17 75 to 18 25
Burnt scrap	10 00 to 10 50
Iron axles	32 75 to 33 25
Locomotive tires (smooth inside)	26.00 to 26.50
Pipes and flues	13 50 to 14 00
Malleable cast	14 50 to 15.00
Railroad tank and sheet	11.50 to 12.00

St. Louis

ST. LOUIS, MO., Dec. 4, 1916.

Pig Iron.—Transactions are being, for the most part, privately conducted. In consequence, while the business was of considerable volume, it is not easy to arrive at statistical facts. The best estimates are that the sales for the week aggregated 10,000 tons of all grades. The last sale reported of No. 2 Southern for last half delivery was at $22, Birmingham, while present widespread figures range, according to furnace, from $23 to $25.50 per ton, Birmingham. Spot sales were made as high as $24. Sales are reported as high as $23.50 for delivery throughout 1917, and at $22.50 for the second half. Inquiries for deliveries in the third quarter have been, for the most part, turned down.

Coke.—The excited condition continued, and sales of spot coke were made as high as $10.50 per net ton at ovens, one transaction being for 300 tons at this price. Future prices are being made for Virginia foundry coke at $7 per net ton at ovens for first half, and $6 for last half. By-product sources of supply are so completely sold up that they are not in the market at all. Furnace coke is also quoted high, and special sales have been made as high as $10 for spot delivery.

Finished Iron and Steel.—Prices quoted are only nominal, and no business develops from them. In rails, the Cotton Belt closed for 13,000 tons for 1918 delivery. Another inquiry pending is for 6000 tons for a Southwestern road. The Texas, Oklahoma & North Eastern has closed for about seven miles of 75-lb. rails, with fastenings. Light rails are in much the same position as standard sections. Lumber and coal interests cannot get early deliveries, and are unwilling to contract ahead. Their specifications on contracts already made, however, are quite heavy. Light spikes are four months behind orders, and demand very sharp. Movement out of warehouse is active, with no hesitation on account of the prices quoted, which are, for immediate delivery, as follows: Soft-steel bars, 3.65c.; iron bars, 3.60c. to 3.65c.; structural materials, 3.75c.; tank plate, 4.40c.; No. 10 blue annealed sheets, 4.05c.; No. 28 black sheets, cold-rolled, one pass, 4.65c.; No. 28 galvanized sheets, black sheet gage, 6.60c.

Old Materials.—There are evidences that for the present, at least, the price limit has been reached. Mills are taking more freely material bought on contract, and will buy below the present quotations. The prices in the East have brought about sales by dealers and others for shipment into that territory. Dealers are confident that still higher prices are to come. The especially strong points were heavy melting steel, carwheels, busheling and railroad wrought iron. Lists out in the week include 700 tons from the Mobile & Ohio, 1500 tons from the Wabash, and 300 tons from the Vandalia. These lists, in view of the favorable weather for picking up scrap along the lines, are particularly light, and indicate how closely the supply has been bought up. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton

Old iron rails	$24 00 to $25 50
Old steel rails, rerolling	26.00 to 26 50
Old steel rails, less than 3 ft.	26.00 to 26 50
Relaying rails, standard section, subject to inspection	28 00 to 30 00
Old carwheels	19.00 to 19.50
No. 1 railroad heavy melting steel scrap	22 50 to 23 00
Heavy shoveling steel	19.50 to 20.00
Ordinary shoveling steel	17.00 to 17.50
Frogs, switches and guards cut apart	22.50 to 23 00
Bundled sheet scrap	12.00 to 12.50

Per Net Ton

Iron angle bars	$23 00 to $23 50
Steel angle bars	22.00 to 22.50
Iron car axles	34 50 to 35.00
Steel car axles	35.50 to 36.00
Wrought arch bars and transoms	26.50 to 27.00
No. 1 railroad wrought	23 50 to 23 50
No. 2 railroad wrought	22 00 to 22 50
Railroad springs	22.50 to 23.00
Steel couplers and knuckles	24.00 to 25.00
Locomotive tires, 42 in. and over smooth inside	27.50 to 28.00
No. 1 dealers' forge	19 50 to 20 00
Cast iron borings	10 00 to 10 50
No. 1 busheling	19.00 to 19.50
No. 1 boilers, cut to sheets and rings	15.00 to 15.50
No. 1 railroad cast scrap	15 50 to 16 00
Stove plate and light cast scrap	11.00 to 11.50
Railroad malleable	15.50 to 16.00
Agricultural malleable	13.50 to 14.00
Pipes and flues	16 00 to 16 50
Heavy railroad sheet and tank scrap	15.50 to 16 00
Railroad grate bars	12.50 to 13.00
Machine shop turnings	10 50 to 11 00
Heavy machine shop turnings	12.50 to 13.00

Birmingham

BIRMINGHAM, ALA., Dec. 4, 1916.

Pig Iron.—Southern pig iron is becoming scarce, with some producers completely out of the market. The Alabama Company is one of these. It re-entered the last ten days of November at $21 and $24 for regular foundry and high silicon iron respectively, sold 8000 to 10,000 tons of each at these figures with some of the tonnage going at $1 advance, and retired again about Dec. 1. When it retired its quotations were $22 for foundry and $25 for high silicon, with no specification as to delivery period. It may re-enter with a limited tonnage and repeat the performance. Republic has not been heard of as making a sale since Nov. 9 or 10. The leading interest announces that it has no basic and is well sold on foundry for the remainder of 1917. Sloss-Sheffield, at the close of the week ended Dec. 2, was on a basis of $24 for spot and $22 for second half. Woodward is reported as taking care of customers at prevailing market prices. The price of spot iron is from $23 to $25, with many small lots going at $24. The market for the second half may be stated as $21, because, although some makers name that figure,

the leading producer had not gone above that with the close of the week. Furnace operators are endeavoring not to anticipate their entire capacity in order that they may take advantage of further rises, but they find it difficult to do so. One interest is reserving the capacity of one furnace until it sounds the market a little more. Wage advances are adding to the cost of manufacture. Thus far there has been no real labor trouble, two threatened small strikes having been averted amicably. Stocks are believed to have been considerably reduced. There is the usual clamor for delivery, and in this respect pig iron fares better than coal. We quote, per gross ton, f.o.b. Birmingham district furnaces, for spot or early shipment, as follows:

No. 1 foundry and soft	[illegible]
No. 2 foundry and soft	[illegible]
No. 3 foundry	[illegible]
No. 4 foundry	[illegible]
Gray forge	[illegible]
Basic	[illegible]
Charcoal	25.00 to 26.00

Cast-Iron Pipe.—The makers have received some orders on specifications submitted some time ago, but new business shows a disposition to halt. The pipe market is really in an unsettled condition owing to price advances. Another week or so will show whether operations are to be curtailed or not. The United States Cast Iron Pipe & Foundry Company has started work at Bessemer, Ala., on 35,000 tons of the 65,000-ton Argentine order. Employees were given a 5 per cent wage advance. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., $37; 6-in. and upward, $34, with $1 added for gas pipe and 16-ft. lengths.

Coal and Coke.—Spot steam coal is selling at $3 and $4 per ton, f.o.b. mine, and domestic is retailing in Birmingham at $6. The car shortage keeps down the output to 60 per cent of what it might be and railroads are running short of coal and may confiscate. Standard beehive coke has sold as high as $8 per net ton at oven for spot delivery. It is difficult to secure any contract coke under $5 per ton. Furnace coke, of which there is none not already engaged, would bring as high as $4 per ton if available.

Old Material.—The scrap market is irregular, with consumers and dealers equally busy obtaining supplies. Steel plants are melting their own scrap. Wrought is extremely scarce. Railroad yards and mines are being raked and scraped for scrap of all kinds. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old steel axles	$26.00 to $32.00
Old steel rails	[illegible]
No. 1 wrought	[illegible]
Heavy melting steel	16.00 to 16.50
No. 1 machinery cast	[illegible]
Carwheels	[illegible]
Tram carwheels	[illegible]
Stove plate and light	11.50 to 12.00

Cleveland

CLEVELAND, OHIO, Dec. 5, 1916.

Iron Ore.—Shipments of Lake Superior ore this season by water will be close to 65,000,000 gross tons, providing weather conditions continue favorable a week longer. The movement up to Dec. 1 was 63,648,298 tons, being 17,386,730 tons in excess of that for the same period of 1915. Shipments in November were 5,715,452 tons, exceeding expectations, as ore traffic was almost at a standstill for over a week in that month on account of the cold weather. The ore market is not very active. Some sales are being made, however, and a number of inquiries are pending. Practically all Bessemer ore has been disposed of. Following the announcement by the Steel Corporation of a 10 per cent advance in wages, some of the independent mining companies made a similar advance effective Dec. 15 and others are expected to follow suit shortly. This is the third 10 per cent increase in miners' wages during the year. We quote prices as follows, delivered lower Lake ports: Old range Bessemer, $5.95; Mesaba Bessemer, $5.70; old range non-Bessemer, $5.20; Mesaba non-Bessemer, $5.05.

Pig Iron.—Buying of foundry iron has been fairly heavy during the past week but mostly in Southern grades. In steel-making iron a Canton consumer has taken about 6000 tons of basic for first half at $30. Prices on Northern foundry grades have advanced much more rapidly than on Southern, so that the latter can be had at a delivered price in the Cleveland territory from $2 to $5 a ton lower than Northern iron. With order books only partly filled for the last half, some sellers of Northern iron do not relish business going to Southern furnaces that they could place on their own books at about $26 at furnace. The demand is largely for the last half but quite a few small consumers have not yet covered for their first half requirements. Cleveland prices have again been marked up from $1 to $2 a ton on Northern foundry grades, local quotations ranging from $30 to $31 for No. 2. The Valley price is $30. As high as $31 has been paid for a 2500-ton lot for shipment from Cleveland to a point outside of this territory. There is a wide spread in Southern iron prices, represented by $22 to $25, Birmingham, for No. 2 for delivery in both first and last half. Considerable Southern iron was sold last week at $22 and some sales are reported at $24. Very little first half Southern iron is available and the same is true of Ohio silvery iron. Virginia iron is quoted here at $27 for the last half. The present high prices of pig iron are beginning to reach manufacturers operating foundries and the buyers of castings who place contracts this month for their first half or full year requirements and the situation is causing no little concern. Some of these contend that the demand for their products will be curtailed materially when the addition in selling prices is made that is necessitated by the present cost of pig iron. We quote, delivered Cleveland, as follows:

Bessemer	$33.95 to $35.95
[illegible]	30.30 to 30.95
Northern No. 2 foundry	30.30 to 31.30
Southern No. 2 foundry	26.00 to 29.00
Gray forge	29.00
Ohio silvery, 8 per cent silicon	36.62 to 39.62
Standard low phos., Valley furnace	48.00 to 49.00

Coke.—There is some demand for foundry coke, which is quoted at $9.25 to $9.75 per net ton, at oven, for standard Connellsville makes, for prompt shipment, and $6.50 for first half.

Finished Iron and Steel.—The demand for steel for early delivery, or at the convenience of the mills, continues heavy. Deliveries on structural material are getting further behind. One mill that has been able to make early shipments is now sold up until the third quarter. Some railroad and traction lines are inquiring for rails for 1918. The Baltimore plant of the Bethlehem Steel Company has purchased from a Cleveland mill 40,000 tons of open-hearth sheet bars for delivery during ten months of 1917, starting with March, at a reported price of $55, Cleveland. We also note the sale by the same interest of 500 tons of open-hearth forging billets at $75, Cleveland. Plates are quoted at 4c. to 4.50c. Pittsburgh, by Cleveland mills, and can be had from a Pittsburgh district mill for early delivery in the lighter gages at 3.75c. Leading independent mills have advanced black and galvanized butt and lap-welded pipe two points, or $4 a ton, and oil-country goods approximately $4 a ton. Bar iron is quoted at 3c. Pittsburgh, but local mills are practically out of the market, declaring they will shut down when present orders are filled, rather than pay the prevailing prices for scrap. Hard-steel bars are quoted at 2.90c. at mill. Inquiry for sheets is very heavy, and only two or three Ohio mills have any to offer for first quarter. Small sales of black sheets have been made as high as 5c. We quote sheets at 4.25c. to 5c., Ohio mill, for No. 28 black; 3.75c. to 4.25c. for No. 10 blue annealed, and 6c. to 7c. for No. 28 galvanized, the most general quotation on the latter being [illegible]. Warehouse prices are as follows: Steel bars, under 2 in., 3.75c.; squares and rounds, 2 in. and over, 4.25c.; structural material, 3.85c.; plates, 4.35c.; iron [illegible] 3.70c.; hoops, 4.50c.

Bolts, Nuts and Rivets.—Bolt and nut specifications are very heavy. Some consumers are unable to get deliveries as promptly as desired, and are endeavoring to place orders with other makers than their regular [illegible]rce of supply. Cleveland manufacturers have ad-

vanced railroad-track bolts from 4.50 to 5c. We quote rivets at 4.25c. Pittsburgh for structural and 4.35c. for boiler rivets. Bolt and nut discounts are as follows:

Common carriage bolts ⅝ x 6 in., smaller or shorter rolled thread, 60 cut thread, 10 and ⅞ larger or longer 30. Machine bolts with hpt. nuts, ⅝ x 4 smaller or shorter, rolled thread 40 and 5 cut thread 10 10 and 5 larger or longer, 10. Lag bolts gimlet or cone point 50. Square and hexagon hpt. nuts, blank, $2.60 off the list, tapped $2.40 off. C'pcs. and t. hexagon nuts, all sizes blank, $2.40 off, tapped $2.25 off. Cold pressed semi-finished hexagon nuts 60 off.

Old Material.—The rapid advance in prices has brought out considerable scrap held by producers and in dealers' yards. Prices have further advanced on several grades, but in most cases the advances have not been over 50c. a ton, and no further advance has been made in heavy melting steel scrap. The market is fairly active, but transactions are largely between dealers. Mills are well supplied for extended future requirements, and the present high prices have tended to check buying by the consumers. Some dealers look for a lull in the demand until January, and believe that the top-notch in prices has been reached. Consequently they have been selling quite freely during the past few days. We quote f.o.b. Cleveland as follows:

Per Gross Ton

Steel rails	$21.00 to $21.50
Steel rails, re-rolling	24.50 to 25.00
Steel rails under 3 ft.	26.50 to 27.00
Iron rails	27.00 to 28.00
Steel car axles	40.00 to 46.00
Heavy melting steel	26.00 to 27.00
Car wheels	23.00 to 24.00
Relaying rails 50 lb. and over	28.00
Agricultural malleable	16.50 to 17.00
Railroad malleable	22.00 to 22.50
Steel axle turnings	16.50 to 17.00
Light bundled sheet scrap	13.75 to 14.25

Per Net Ton

Iron car axles	$42.00 to $43.00
Cast borings	16.50 to 19.75
Iron and steel turnings and drillings	10.50 to 10.75
No. 1 busheling	18.50 to 19.00
No. 1 railroad wrought	24.00 to 25.00
No. 1 cast	18.50 to 19.00
Railroad grate bars	14.00 to 14.50
Stove plate	14.00 to 14.50

San Francisco

SAN FRANCISCO, CAL., Nov. 28, 1916.

More interest has developed among buyers in practically all lines, and quite a general desire is shown to place orders or contracts for extended delivery. In most departments the mill agents are more reluctant than ever to accept new business, and many concerns are accepting practically nothing in this territory. Foreign inquiries are numerous, and in certain lines some large orders have been accepted. The announcement of an advance in west-bound freight rates the first of the year, amounting to $2 per ton on pig iron and 10c. per 100 lb. on steel products, is a disturbing factor. Jobbing business shows a marked revival, and has been exceptionally active for the last fortnight.

Bars.—Local mills have until recently booked a large volume of Oriental business, taking some attractive orders at rather easy prices, but they now appear less anxious for such business, much of which is still going to mills in other parts of the country. Demand for reinforcing bars has kept up remarkably well for this time of year, and manufacturers' requirements are fully as large as they have been, with a disposition among large consumers to cover as far ahead as possible. Local mills are selling on contracts at about 3.25c. for round lots, but deliveries are slow, and the jobbing price on small lots is 4.25c.

Structural Material.—While a number of large buildings are being planned, little of real importance has lately appeared. Small work, however, is sufficiently plentiful to keep all the local shops well occupied, some being busy on old contracts. The labor situation in the fabricating and erecting line still gives some trouble. With plain shapes costing about 4c. landed here direct from mills, and structural plates at 5.25c., many builders are holding off, though fabricators and other large consumers are endeavoring to build up fair stocks before the end of the year. Plans are under way for a 12-story building for the Matson Navigation Company, to be built next summer, and plans will soon be out for a 6-story apartment house at Eddy and Hyde streets. Plans are being drawn for a 6-story class A loft building for Ninth Street and Broadway, Los Angeles, and plans have been started for a $500,000 library for Stanford University. Competitive plans have been submitted for the State building in San Francisco. Two large drawbridges across the Oakland estuary have been condemned, and must be replaced within two years by lift or bascule bridges with 200-ft. span in the clear. A steel drawbridge is to be built by the Northwestern Pacific Railroad near Eureka, Cal. The town of Baker, Ore., is having plans drawn for a steel bridge over Powder River. The George A. Lowe Company, Ogden, Utah, has taken the steel contract for two sugar mills in Idaho.

Rails.—A very fair tonnage of light rails has recently been booked for Oriental shipment, and a large business in industrial track has been done in the Hawaiian Islands. There is also considerable activity in mine rails.

Plates.—Shipbuilders are still actively in the market, and are absorbing about all that can be had of wide and heavy plates. Quite a large tonnage will be accounted for by the naval vessels for which contracts have been placed with the Union Iron Works, Mare Island Navy Yard, etc. The Union Iron Works has taken a contract for two more tank vessels, succeeding two just launched. Tank inquiries, though not extraordinary, are of some importance. The Java-Pacific Line plans to build a 2000-ton tank for cocoanut oil in this city. The jobbing price on tank plates is 5.10c.

Sheets.—Galvanized sheets are becoming scarce, and manufacturers find difficulty in meeting actual needs. Jobbers have set a price on No. 28 of 7.35c. The demand under such conditions is rather limited. Blue-annealed sheets continue in demand, and a few good-sized pipe orders have recently been placed, including 1200 tons of Nos. 10 to 16 for Terra Bella, Cal., and 40,000 ft. of 6-in. No. 14 riveted pipe for Los Angeles. The local resale price on blue-annealed sheets has been marked up to 5.25c.

Wrought Pipe.—The demand for merchant sizes continues to drag. A few waterworks orders have appeared recently, but the tonnage was not important. Oil-field business is fair, but on a smaller scale than a month or two ago.

Cast-Iron Pipe.—The freight rate advance Jan. 1 will be $2 per ton. There is no very large corporation buying at present, as most early requirements have been covered. The city of Los Angeles recently placed an order for 1714 tons, and small orders have been placed by Porterville, Cal., and Douglas, Ariz. Whittier, Cal., is in the market for 260 tons, taking bids Dec. 4, and Calexico will take bids on a small lot Dec. 5. Prices are now quoted here at $45 per net ton for 6-in. and over, $48 for 4-in., $1 extra for class A or gas pipe.

Pig Iron.—It is hard for the local trade to keep abreast of the advances at the furnace. The present local quotation on No. 1 Southern foundry iron is $33 to $34 per gross ton. With the freight advance announced for Jan. 1, local melters in many cases are ordering sufficient iron to carry them through the first quarter, though the movement is less general than last summer.

Coke.—Prices are going to levels never before heard of, and the local trade, though not pleased with the advance, has no choice in the matter. While there is still a good stock on hand from earlier purchases, a number of new orders are coming out.

Ferroalloys.—Ferrosilicon is slightly firmer, but sufficient supplies are coming in to meet current needs. Ferromanganese is now being secured largely from domestic sources, partly from this State.

Scrap.—Cast-iron scrap is in quite strong demand at the foundries, though there has been no shortage of supplies. Prices continue around $16 per net ton. Steel melting scrap continues firm, and is rather closely held at the more accessible points. The local price continues around $11 to $14 per gross ton.

New York

NEW YORK, Dec. 6, 1916.

Iron Ore.—The announcement of Lake Superior iron-ore prices has brought out more definite information as to the basis on which Eastern ores will be sold for 1917 delivery. The new prices named at Cleveland would mean a delivered price of Lake ores in the Lehigh Valley of about 12.9c. a unit for old range non-Bessemer and 12.6c. per unit for Mesaba non-Bessemer. This year sales of Eastern ores were made at 8¼c. to 9c. a unit in eastern Pennsylvania and the prices of such ores for 1917 will range from 10½c. to 11¾c. per unit. Port Henry ores, for which there have been very considerable reservations in recent weeks against the 1917 production, which is expected to be about 1,250,000 tons, are selling at $1.50 to $1.70 advance over this year's basis.

Pig Iron.—With prices around the $30 mark at Eastern furnaces and with most buyers covered for the first half of 1917 and many of them through the third quarter or farther, the past week has brought some slowing down from the November buying pace. The present level is one at which producers would have said two months ago they would sell all that the market would take, and yet there are those who are holding back iron on the chances of getting more money. The fact that a good many buyers have gone into the market to safeguard against possible scarcity and higher prices is causing conservative furnace companies to take unusual care about contracts. Sales of basic iron have been a feature of the week. One of over 20,000 tons for shipment to Canada was made at Buffalo, and in eastern Pennsylvania a 15,000-ton transaction is reported, both on the basis of $30 at furnace, while several thousand tons is involved in another eastern Pennsylvania sale. New York export sales include one of 30,000 tons of Bessemer iron, which was followed by an inquiry from the same quarter for a like additional amount which the seller could not entertain. In low-phosphorus iron a 1000-ton sale was made at $48 at furnace. Not all foundry iron buyers have been willing to close at present prices, even though conceding that the market may go higher. They are counting on the low priced iron they bought earlier in the year to average up and are interested in finding out what advances can be had in castings. Southern warrants are quieter. A small amount can be had at $22.50 and more are available at $23. Probably half the warrant iron in Birmingham yards is now in the hands of the ultimate consumer. Current transactions are more between consumers and dealers than with outside speculators. Most New England foundries are carrying good stocks of iron and are not troubled by the embargo which has now been on for nearly two weeks. The embargo on coke has been lifted. Some tentative inquiries for foundry coke contracts beginning July 1 have come out but sellers are not willing to quote. We quote at tidewater for early delivery: No. 1 foundry, $29.50 to $30.50; No. 2 X, $29 to $30; No. 2 plain, $28.50 to $29; Southern iron at tidewater, $28.50 to $29 for No. 1 and $28 to $28.50 for No. 2 foundry and No. 2 soft.

Ferroalloys.—An interesting sale of domestic ferromanganese made about two weeks ago has just been reported—about 2500 tons for delivery at about 200 tons per month during 1917 sold to a southern Ohio steelmaker by a Western producer at $155, delivered. This is the lowest price recorded in some time. Besides the sales of about 14,000 tons in the fortnight previous to last week, about 1000 tons is reported sold in the last few days at $165, delivered, for domestic and $164, seaboard, for British alloy. Inquiry at present is not large and attempts to depress the price of the British product have met with little success. Receipts from abroad during November are reported at the rate of recent months, but it is predicted that arrivals during December and January will be quite a little less. Sales of 1000 tons of 20 per cent spiegeleisen are reported for the past week and there are before the market domestic inquiries for 5000 tons and foreign inquiries for 3000 tons. The range is $50 to $55, furnace. Ferrosilicon, 50 per cent, is in strong demand; for forward delivery, quoted at $99 to $100, New York. Considerably more is asked for early delivery and there are suggestions of possible scarcity next year. Ferrotungsten is quoted at $2.60 per pound of contained tungsten, New York, with the ore concentrates selling at about $17 per unit. Ferrovanadium is quoted at $2.75 to $3, Pittsburgh, per pound of contained vanadium. Ferrocarbontitanium is selling at 8c. per pound, in carload lots, 10c. per pound in ton lots and 12½c. per pound in lots less than a ton. Ferrochrome, 60 to 70 per cent, is unchanged at 16c. to 20c., New York, per pound of contained chromium.

Structural Material.—A sudden stiffening by all mills, so that shapes are now in step with other forms of finished steel, is the feature of the week. It is doubtful if 3.25c., Pittsburgh, can be bettered for any quantity except for indefinite delivery. Movement of structural shapes continues very largely for factory additions, with the mill and price situation such that Eastern mills provide the material for Middle West plant construction. The individually large contracts are for railroad bridges, while the early future gives promise of a considerable amount of piershed work for seacoast cities. Any increased amount of general building work not now visible would therefore, it is believed, aggravate the problem of deliveries, while for the moment fabricators are well engaged probably with an average of three months' bookings. Besides the railroad work already mentioned in this column, mention may be made of 750 tons for the Baltimore & Ohio and also 3000 tons for piersheds at Baltimore for this road and 2200 tons for the Maine Central. Early decision is expected on 1100 tons for five bridges for the Pennsylvania, and bids are being taken admitting more extended delivery on 1800 tons for the New York Central at the Grand Central terminal area. The 6500 tons for the Lehigh Valley has been awarded to the Bethlehem Steel Bridge Corporation and the American Bridge Company has closed for about 2000 tons additional, making 4500 tons in all, for the Southern. The American Bridge Company is to supply 2500 tons for the Crucible Steel Company of America at Harrison, N. J., and the Hedden Iron Construction Company, 1600 tons for the Providence Telephone Company. An addition to the Hotel Woodward, Broadway and Fifty-fourth Street, with three floors to accommodate the Ford Motor Company, will involve 1800 tons. We quote mill shipments in 2 to 5 mo. at 3.419c., New York, and warehouse shipments at a minimum of 3.75c., New York.

Steel Plates.—Mills seem more definitely desirous than ever of not taking on further orders. Such inquiries as are temporarily entertained are submitted to headquarters, partly to pick out the most desirable and expedient from the mill standpoint and partly because of the uncertainty of delivery. The feeling is that with the large amount of business constantly offered from foreign sources, the mills can augment their bookings any time they please. Universal plates are higher and it is doubtful if better than 4c., Pittsburgh, can be done for any delivery. With two mills 4.50c. appears minimum for ordinary tank plates subject to nothing beyond mere mill inspection and following last week's statement of 2500 tons of specification plates sold to a domestic shipyard at 5c. for the third quarter of 1917 is the record of a sale of 2000 tons for the same delivery at 5½c. Ordinarily 6c. is the best price for ship plates for earlier delivery, if it can be obtained. One interesting inquiry from Scandinavia is for 72,000 tons of ship plates over five years on a sliding scale based on quotations of some other commodity. A Canadian inquiry for 10,000 tons of skelp is noted. We quote universal and ordinary tank quality plates at 4.169c. to 4.669c., New York, but Lloyd specification plates at 5.169c. to 6.169c., with little available before the third quarter of 1917 and for plates in the fourth quarter of 1917 and the first quarter of 1918 at 3.669c., New York. Out of store we quote 4.75c., New York.

Bars.—Steel bar mills are generally out of the market and the quotation of 3c., Pittsburgh, is nominal. Reservations have undoubtedly been made for manufacturing consumers for the last half of 1917, but mill

books have not been opened for this purpose nor have domestic users been asking for this future protection. It is estimated that the mills will enter 1917 with as much as 3,000,000 tons of shell steel under order, with almost as much for the second as for the first half delivery. The result is that more domestic rails are not wanted, nor is it at all certain that the 118,000 tons of the late British inquiry, acceptable through 1917, can be taken with the $15 to $20 per ton obtainable above the $40 domestic rail price. Some of the last-half shell steel sold for 4½c. per pound. A good market is obtained for the relatively high carbon shell-discard steel, but this goes mainly as 8 x 8-in., 6 x 6-in. and similar size billets at about $36 per ton. Renewed activity is noted in bar iron and leading mills have put up the price to 2.75c., Pittsburgh, with best iron in the Pittsburgh market itself $10 per ton higher. We quote mill shipments of steel bars at 3.069c. to 3.169c., New York, the lower price for indefinite delivery and the higher for small quantities in, say, 3 mo. We quote mill shipments of bar iron at 2.919c., New York. Out of warehouse iron bars are 3.50c. and steel bars 3.75c., New York.

Cast Iron Pipe.—Quite a number of small municipalites are purchasing pipe without the formality of public letting. Private gas and water companies are freely buying for spring delivery. The bulk of business thus transacted privately is much greater than usual at this season. It not only consists of many small purchases but a good sprinkling of sizable contracts. The advance of $2 per ton, announced last week, is in effect, and the price of carload lots of 6-in., class B and heavier, is now $39.50 per net ton, tidewater, with class A and gas pipe taking an extra of $1 per ton.

Old Material.—Prices of practically all kinds of old materials are higher. Outside consuming centers are drawing on supplies in this vicinity, while local buying, both for consumers and speculative purposes, is more active than for a long time. Brokers quote buying prices about as follows to local dealers and producers, per gross ton, New York:

Heavy melting steel scrap (for east ern Pennsylvania shipment)	$20.50 to $21.00
Old steel rails (short lengths) or equivalent	22.00 to 22.50
Relaying rails	35.00 to 36.00
Rerolling rails	27.00 to 28.00
Iron and steel car axles (for export)	15.00 to 17.00
No. 1 railroad wrought	20.50 to 21.00
Wrought-iron track scrap	22.00 to 22.50
No. 1 yard wrought long	20.50 to 21.00
Light iron (nominal)	6.00 to 6.50
Cast borings (clean)	11.50 to 12.00
Machine shop turnings	10.50 to 11.00
Mixed borings and turnings	9.00 to 10.00
Wrought pipe (not galvanized or cleaned)	17.00 to 17.50

An inquiry is in the market for 1000 tons of cast scrap for export. Local foundries are not disposed to pay the prices now asked, but consumers of cast scrap in outside localities drawing supplies from this vicinity are paying the equivalent of the prices named below. Some dealers are asking as high as $19.50 on stove plate and grate bars delivered at points in New Jersey. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

No. 1 cast (machinery)	$20.50 to $21.00
No. 2 cast (heavy)	19.00 to 19.50
Stove plate	15.50 to 16.00
Locomotive grate bars	15.50 to 16.00
Old car wheels	21.50 to 22.00
Malleable cast (railroad)	17.50 to 18.00

The setting up of 400 locomotives of American manufacture in the shops of the Chinese Eastern Railway at Harbin, China, for the Russian Government has served as a good advertisement for American machinery, according to U. S. Consul Charles K. Moser of Harbin.

M. Schleif & Co., 111 Broadway, New York, exporters of iron and steel, have removed to 141 Broadway.

British Steel Market

Steel-Bar Deliveries Curtailed Further—Wide Variations in Semi-Finished Steel

(By Cable)

LONDON, ENGLAND, Dec. 6, 1916.

The pig-iron market is firm, but domestic demand for Cleveland is quieter and export business is improving. Tin plates are firm. A further curtailment of steel-bar deliveries to about one-third of normal is expected. Semi-finished steel is strong, but prices asked differ widely. Wire rods are quoted at £22 to £25, c.i.f., with ferromanganese at £35.

Benzol is quoted at 14d., toluol at 2s. 3d., and ammonium sulphate at £18. We quote as follows:

Tin plates [illegible]

Steel black sheets, No. [illegible] export [illegible] Liverpool, £19 [illegible] last £20 a week ago

Hematite pig iron, [illegible] Tees [illegible] compared with about 140s. a week ago

Sheet bars (Welsh) [illegible] at works in Swansea Valley, £15 [illegible] ton bad

Ferromanganese, £37

Ferrosilicon, 50 per cent [illegible] against [illegible] last week

Pig-Iron Situation Less Acute—Pooling the Tin-Plate Output

(By Mail)

LONDON, ENGLAND, Nov. 22, 1916.—The congestion has become intensified in various directions, but the strenuous efforts made to develop the output of pig iron, and that of steel, are a little more successful. At any rate, complaints of steel manufacturers as to deliveries are less frequent. It is worth noting that in spite of her own big requirements, Great Britain has been enabled to maintain her exports of iron and steel on a large scale, the total for the 10 months to Nov. 1, 1916, being 2,919,092 gross tons, which shows an increase of about 279,000 tons against the same period in 1915, but a considerable deficit as compared with 1914.

The situation in pig iron is less acute. The demand for Cleveland foundry grades has developed on a heavy scale. After booking big contracts in recent weeks, makers have become more reticent as to new business, pending further developments in the output. There is but little prospect of maximum prices being increased for some time. The entire output is being rapidly absorbed, and a good deal more could be sold if available. Export sales are restricted and prices rule firm, ranging from 97s. 6d. for France up to about 105s. f.o.b. for neutral countries.

Within the last few weeks hematite consumers have been able to fill their requirements better, makers being more disposed to take orders even for export. A large tonnage has been booked for Italy at 142s. 6d. f.o.b. The output is being slowly increased, but near delivery is difficult. The pressure should be relieved next month, additional furnaces now being put into commission.

The outlook in finished iron and steel favors an advancing market because most makers have more orders on hand than they can handle, while discounts have been withdrawn in many cases. Only orders, to which the "A" certificate applies, or for war work, are now accepted by steel sheet makers, almost similar restrictions being in force in the tin-plate industry, according to new regulations issued last week. Domestic deliveries or for export can only be made against government permits. There is more difficulty about securing export licenses.

More interest is shown in American semi-finished steel with a fair business done in 4-in. billets for January-March delivery up to $68, c.i.f. Liverpool. Sellers now insist on $70, but there is not much material offered, while about £22 is being asked for wire rods with buyers at £20. A lot of material will yet be wanted early next year, but buyers are still reticent.

The general demand for ferromanganese is quiet,

the f.o.b. terms for export for the first half of 1917 being £30 to £35 basis for loose. American inquiries are now rare. There is not much interest in Indian manganese ores, though America is still occasionally placing small orders at about 259d. per unit, c.i.f.

Later.—At another meeting of the Tin-plate Makers' Association, held in South Wales on Nov. 21, the recent proposal to fix a minimum basis price for "A" certificates was entirely withdrawn, due probably to the fact that not a few makers were opposed to such a regulation. On the other hand, it is understood that an arrangement was unanimously arrived at to "pool" the output. On the basis of this arrangement makers will be indemnified at the rate of 1s. per box for shortcomings in output against their fixed allotments, but will have to pay 2s. per box for any excess over the allotments up to 10 per cent and 3s. per box over 10 per cent. This arrangement has not had any effect on the market, while the general demand is undoubtedly still prejudiced by the serious handicap to export business.

Buffalo

BUFFALO, N. Y., Dec. 5, 1916.

Pig Iron.—Sales in this district have been forced to quiet down, owing to the inability of the furnaces to meet the demands of melters. There is a spread of $5 per ton between the prices asked by various makers. One selling interest is quoting $30 to $32 on any grade, and another has fixed the minimum at $35 for any. The third producer is not quoting, having nothing to sell. All furnaces of the district are entirely out of the market on malleable. Where furnaces that were sold up heretofore were able to draw upon certain yard stocks or resale iron that was available to meet the demands of consumers, these reserve tonnages have reached the vanishing point, leaving no outlet for relief in this direction. Selling agencies report that efforts to secure iron from remote producing districts for customers in this territory meet with the response that there is little or no iron available from such sources. We quote as follows, f.o.b. furnace, Buffalo, for any deliveries that are obtainable:

No. 1 foundry	$32.00 to $33.00
No. 2 X foundry	30.00 to 31.00
No. 2 plain	30.00
No. 3 foundry	30.00
Gray forge	30.00
Malleable	31.00
Basic	30.00 to 31.00
Charcoal	31.50 to 33.50

Old Material.—The market continues to show increasing strength. Turnings and borings are particularly strong. Heavy melting steel is scarce. Prices have been marked up on a number of leading commodities and indications point to further advances all along the line. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	$32.00 to $33.00
Low phosphorus billet and bloom ends	35.00 to 36.00
No. 1 railroad wrought	27.00 to 27.50
No. 1 railroad and machinery cast	30.00 to 31.00
Steel axles	40.00
Iron axles	36.00
Carwheels	30.00 to 31.00
Railroad malleable	19.00 to 19.50
Machine shop turnings	16.00 to 17.00
Heavy axle turnings	17.00 to 18.00
Clean cast borings	16.00 to 17.00
Iron rails	32.00 to 33.00
Locomotive grate bars	17.00 to 18.00
Stove plate (gross ton)	15.00 to
Wrought pipe	16.00 to 16.50
No. 1 busheling scrap	18.00 to 19.00
No. 2 busheling scrap	14.00 to 15.00
Bundled sheet scrap	14.00 to 15.00

Finished Iron and Steel.—Several leading producers and sales agencies are apparently out of the market on all products. Most producers are more concerned about working off tonnages for which they are already obligated than in assuming new obligations. While this has been the policy of a number of mills for a considerable time, there are now more who are rigidly enforcing the policy. The Wickwire Steel Company announces that its new billet and wire-rod mills are rapidly nearing completion and it is commencing to take contracts, aggregating a large amount. The current price for rods from this mill is $70 per ton, f.o.b. Buffalo. The Lackawanna Bridge Company has received the general contract for construction of the new plant of the United States Alloys Company, on the Niagara River, near Buffalo, requiring about 200 tons of structural steel.

Iron and Industrial Stocks

NEW YORK, Dec. 6, 1916.

Values of industrial stocks advanced quite steadily for the greater part of the past week. Indications were strong that large interests were favorable to the establishment of considerably higher prices. On Monday of this week, however, enthusiasm was chilled by exorbitant rates of interest asked on call money, and a decline set in which was accelerated by the catching of numerous stop-loss orders. The decline on some stocks was then greater than the total gained for the entire previous week. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com.	32⅞- 36	Harb-Walk. Refrac., com.	125
Allis-Chal., pref.	89¼- 90½	Int. Harv. of N. J., com.	123½-125
Am. Ag. Chem., com.	61½- 64	Int. Harv. Corp., com.	81 - 84⅜
Am. Can, pref.	113 -114½	La Belle Iron, com.	88½- 91
Am. Car & Fdy., com.	72 - 75½	La Belle Iron, pref.	133
Am. Car & Fdy., pref.	118	Lacka. Steel	102⅛-104½
Am. Loco., com.	88¼- 91½	Lake Sup. Corp.	29½- 31½
Am. Loco., pref.	107¾	Midvale Steel	68⅝- 71⅜
Am. Rad., com.	420 -425	Nat. En. & Stm., com.	321½- 335
Am. Sm., com.	65 - 66	Nat. En. & Stm., pref.	100½
Am. Sm., pref.	96 - 96¼	N Y Air Brake	171¼-180
Am. Steel Fdries.	65½- 69	Nova Scotia Stl.	144 -145
Bald. Loco., com.	71¼ - 81⅝	Pitts. Steel, pref.	104
Bald. Loco., pref.	106⅞-108	Pressed Stl., com.	81½- 85
Beth. Steel, com.	160 -170	Pressed Stl., pref.	106¼-107⅜
Beth. Steel, pref.	160	Ry. Steel Spring, com.	58¾- 60½
Cambria Steel	130 -134¾	Republic, com.	85⅛- 90⅞
Cent. Stl., com.	45	Republic, pref.	113⅛-114¼
Cl. Cl. & I. Co., pref.	57½ - 58½	Sloss, com.	82½- 85½
Colo. Fd., com.	18¾ - 20½	Stl. Alloy Steel	52⅝- 55¼
Colo. Fd., pref.	45 - 47	U. S. Pipe, com.	20 - 20⅝
Crucible Steel, com.	73 - 76½	U. S. Pipe, pref.	64 - 65
Cruc. Steel, pref.	92½ - 95	U. S. Steel, com.	124 -128
Cuban Steel	45 - 47	U. S. Steel, pref.	121½-122¼
Cuba Cane Pd.	5¼ - 5⅝	Va. I. C. & Coke	60¾- 64
Cuba Cane Pd., pref.	29 - 30	Westvaco	93¾
Emer. Mfg., com.	42½ - 44	Westing. Elec.	621½- 637⅝
Gen. Elec.	170 -180		
Int. Nickel, com.	43½ - 44⅛		
Int. Nickel, pref.	100 -114		
Lack. Steel	41 - 47		

Dividends

The New Jersey Zinc Company extra, 5 per cent, payable Dec. 11.

The American Locomotive Company, regular quarterly, 1¼ per cent on the common stock, payable Jan. 3, and 1¾ per cent on the preferred stock, payable Jan. 22.

The Gulf States Steel Company, regular quarterly, 1½ per cent on the second preferred stock, payable Feb. 1.

The American Iron & Steel Mfg. Company, regular quarterly, 1¼ per cent on the common and preferred stocks, payable Jan. 1.

The Pressed Steel Car Company, regular semi-annual, 3½ per cent on the preferred stock, payable Jan. 1.

The Bethlehem Steel Company, regular quarterly, 7½ per cent on the second preferred and 1¾ per cent on the preferred stock, payable Jan. 2.

The Crucible Steel Company, 30 per cent on account of accumulations, on the preferred stock, payable Dec. 20.

The Driggs-Seabury Ordnance Company, regular quarterly, 1¾ per cent on the first preferred and 1½ per cent on the second preferred stock, payable Dec. 15.

The Haskell & Barker Car Company, initial, 75c. per share, payable Jan. 2.

The Cleveland Iron Works regular quarterly, 2 per cent, and extra proceeds of sale, 2½ per cent, on the preferred stock, payable Dec. 22, and 1 per cent on the common stock, the first for several years, payable Jan. 31.

The American Car Company, regular quarterly, 1¾ per cent on the preferred stock, payable Dec. 15.

The Midvale Steel Company, regular quarterly, 1¾ per cent on the first preferred and second preferred stocks, payable Jan. 2.

The Colorado Fuel Company extra, 10 per cent, payable Dec. 15. This makes total dividend disbursements this year 99 per cent.

The Pittsburgh Steel Corporation quarterly, $1.75 per share.

The Standard Steel Works Company, regular quarterly, 1¾ per cent.

The Pittsburgh Steel Company, regular quarterly, 1¼ per cent on the preferred stock, and 1¾ per cent on the preferred stock.

The Pressed Steel Car Company, regular quarterly, 1¾ per cent on the preferred stock, and quarterly 1¼ per cent on the common stock, all payable Jan. 1.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c; Cincinnati, 15.8c:; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c. Denver, pipe, 76.1c., minimum carload, 46,000 lb.; structural steel and steel bars, 83.6c.; minimum carload, 36,000 lb. Pacific coast (by rail only), pipe, 65c.; structural steel and steel bars, 75c., minimum carload, 50,000 lb.; structural steel and steel bars, 80c., minimum carload, 40,000 lb. No freight rates are being published via the Panama Canal, as the boats are being used in transatlantic trade.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 3c. to 3.25c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs	.10
Angles, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and coupler bar)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.30 to .80
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Plates.—Tank plates, ¼ in. thick, 6 in. up to 100 in. wide, 3.50c. to 5c., base, net cash, 30 days, or ½ of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras

	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers)	.10
Boiler and flange steel plates	.15
"A. B. M. A." and ordinary firebox steel plates	.20
Still bottom steel	.30
Locomotive firebox steel	.50

Marine steel, special extras and prices on application.

Gage Extras

Rectangular, ¼ in. thick, over 6 in. wide to 100 in. wide	Base
Lighter than ¼ in., to 3/16 in. up to 72 in. wide	.10
*Lighter than ¼ in., including 3/16 in., over 72 in. to 84	.20
*Lighter than ¼ in., including 3/16 in., over 84 in. to 96	.30
*Lighter than ¼ in., including 3/16 in., over 96 in. to 100	.40
*Lighter than ¼ in., including 3/16 in., over 100 in. to 102	.45
Lighter than 3/16 in., including No. 8, up to 72 in. wide	.15
*Lighter than 3/16 in., including No. 8, over 72 in. to 84	.25
*Lighter than 3/16 in., including No. 8, over 84 in. to 96	.35
Lighter than No. 8, including No. 10, up to 60 in. wide	.20
Lighter than No. 8, including No. 10, over 60 in. to 64	.35

Up to 72 in. and not less than 10.2 lb. per sq. ft. will be considered ¼ in.
Over 72 in. must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.
Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.
Over 72 in., ordered weight 3/16 in., take No. 8 price.
Over 72 in., ordered weight No. 8, take No. 10 price.

Width Extras

Over 100 in. to 110 in. inclusive	.05
Over 110 in. to 115 in. inclusive	.10
Over 115 in. to 120 in. inclusive	.15
Over 120 in. to 125 in. inclusive	.25
Over 125 in. to 130 in. inclusive	.50
Over 130 in.	1.00

Length Extras

Universal plates 80 ft. long up to 90 ft. long	.05
Universal plates 90 ft. long up to 100 ft. long	.10
Universal plates 100 ft. long up to 110 ft. long	.20

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over.	
Lengths under 3 ft. to 2 ft. inclusive	.25
Lengths under 2 ft. to 1 ft. inclusive	.50
Lengths under 1 ft.	1.55
Circles 3 ft. in diameter to 100 in.	.30
Circles over 100 to 110 in. (width extra)	.35
Circles over 110 to 115 in. (width extra)	.40
Circles over 115 to 120 in. (width extra)	.45
Circles over 120 to 125 in. (width extra)	.55
Circles over 125 to 130 in. (width extra)	.80
Circles over 130 in. (width extra)	1.30
Circles under 3 ft., to 2 ft., inclusive	.55
Circles under 2 ft., to 1 ft., inclusive	.80
Circles under 1 ft.	1.85
Half circles take circle extras.	
Sketches not over four straight cuts, inc. straight taper	.10
Sketches having more than four straight cuts	.20

Plates sheared to a radius take complete circle extras.

*Including extra for width.

Wire Rods.—Including chain rods, $65 to $70.

Wire Products.—Prices to jobbers effective Nov. 27: Fence wire Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, $2.95; galvanized, $3.65. Galvanized barb wire and staples, $3.85; painted, $3.15. Wire nails, $3. Galvanized nails, 1 in. and longer, $2 advance over base price; shorter than 1 in., $2.50 advance over base price. Cement coated nails, $2.90. Woven wire fencing, 53 per cent off list for carloads, 52 off for 1000-rod lots, 51 off for less than 1000-rod lots.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from Dec. 4, 1916, all full weight:

Butt Weld

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
⅛	53	37			
¼	64	50½			
⅜	67	54½			
½	67	54½	½	44	27
¾ to 3	68	55½	¾ to 2	48	34
			2½ to 3	47	33
			3½ to 4	51	38
7 to 12	66	53½	4½ to 6	51	38
13 and 14	59½	46½	7 to 8	49	36
15	47	34½	9 to 12	46	33

Lap Weld

2	67	54½	2	52	27
2½ to 3	68	55½	2½ to 3	48	34
3½ to 6	68	55½	3½ to 4	47	33
7 to 12	66	53½	4½ to 6	51	38
13 and 14	59½	46½	7 to 8	49	36
15	47	34½	9 to 12	46	33

Extra Strong Plain Ends

1 to 3, butt	64	50½	¾ to 1½, butt	1	34
2, lap	67	54½	2, lap	37	21
2½ to 6, lap	66	53½	2½ to 3, lap	43	28
			3½ to 4, lap	44	29
			4½ to 6, lap	47	32

Extra Strong Screw Ends, with Couplings

⅛, ¼ and ⅜	55	37½	⅛, ¼ and ⅜	48	31
½	60	44½	½	53	40
¾ to 1½	64	50½	¾ to 1½	54	42
2 to 3	65	52½			

Lap Weld, Extra Strong, Plain Ends

2	67	54½	1½	43	29
2½ to 4	66	53½	1½	49	35
4½ to 6	59	47½	2	1	38
7 to 8	50	41½	2½ to 4	3	41
9 to 12	50	36½	4½ to 6	7	46
			7 to 8	16	54
			9 to 12	41	29

To the trade adding trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices on less than carload lots 10 per cent lower basing the next higher price than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts on less than carloads, freight to be added, effective from Nov. 1, 1916, except 3 to 4½ in. steel from Nov. 20, are as follows:

Lap Welded Steel		Standard Charcoal Iron	
1½ in.	31	1½ in.	22
1¾ and 2 in.	43	1¾ and 2 in.	32
2¼ in.	46	2¼ in.	32
2½ and 2¾ in.	46	2½ and 2¾ in.	38
3 and 3½ in.	46	3 and 3½ in.	43
3½ to 4½ in.	46	3½ to 4½ in.	44
5 and 6 in.	45	5 and 6 in.	37
7 to 13 in.	42	7 to 13 in.	34

Locomotive and steamship special charcoal grades bring higher prices.
1¾ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.
2 in. and larger, over 22 ft., 10 per cent net extra.

Sheets.—Makers' prices for mill shipments on sheets of U. S. standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Black Annealed Sheets

	Cents per lb.
Nos. 3 to 8	3.00 to 3.00
Nos. 9 to 12	3.10 to 3.10
Nos. 13 and 14	3.15 to 3.15
Nos. 15 and 16	3.20 to 3.20

Black Annealed Sheets, Cold Rolled

Nos. 17 to 21	3.50 to 3.60
Nos. 22 and 23	3.60 to 3.70
Nos. 24 and 25	3.70 to 3.80
No. 26	3.80 to 3.90
No. 27	3.90 to 4.00
No. 28	4.00 to 4.10
No. 29	4.10 to 4.20
No. 30	4.20 to 4.30

Galvanized Sheets, Box Annealed, Base Gage

Nos. 10 and 11	4.75 to 4.85
Nos. 12 to 14	4.85 to 4.95
Nos. 15 and 16	4.95 to 5.05
Nos. 17 to 21	5.05 to 5.15
Nos. 22 and 23	5.15 to 5.25
Nos. 24 and 25	5.25 to 5.35
No. 26	5.35 to 5.45
No. 27	5.45 to 5.55
No. 28	5.55 to 5.65
No. 29	5.65 to 5.75
No. 30	5.75 to 6.15

Box Annealed

Nos. 10 and 11	4.60 to 4.70
Nos. 12 to 14	4.70 to 4.80
Nos. 15 and 16	4.80 to 4.90
Nos. 17 to 21	4.90 to 5.00
Nos. 22 and 23	5.00 to 5.10
Nos. 24 and 25	5.10 to 5.20
No. 26	5.20 to 5.30
No. 27	5.30 to 5.40
No. 28	5.40 to 4.05
No. 29	4.05 to 4.15
No. 30	4.15 to 4.25

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

Nov	Copper, Lake	Copper, New York Electrolytic	Tin, New York	Lead, New York	Lead, St. Louis	Spelter, New York	Spelter, St. Louis
29	.34.50	34.50	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Dec.							
1	.....34.50	34.50	45.00	7.30	7.25	13.25	13.00
2	34.50	34.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	34.50	34.00	44.75	[illegible]	[illegible]	[illegible]	[illegible]
5	34.50	34.50	44.37½	[illegible]	[illegible]	[illegible]	[illegible]

NEW YORK, Dec. 6, 1916.

Copper is less active but stronger because of its scarcity. Tin is dull and lower. Lead has steadied at higher prices, the leading interest at last advancing to 7.50c., New York. Spelter is lower because of profit taking by second hands. Antimony is quiet and a little lower.

New York

Copper.—The market is considerably quieter but prices are stronger than they were, because of the scarcity of nearby and first quarter metal. The latter position is practically as scarce as spot. Prompt has sold at 35c., and if reports are to be believed, even higher, although these sales undoubtedly involved small lots. There is still unsatisfied demand for the first and second quarters, and no sign of weakness whatever. The trade are quite generally of the opinion that prices have reached the top, and they are well satisfied, inasmuch as they believe that any further advance would be unhealthy. Electrolytic was quoted yesterday at 34.50c., nearby and first quarter, with second quarter around 33.50c. and third quarter at 32.50c. The same quotations apply to Lake. Practically all of the buying for future deliveries is to cover specific contracts. The London quotation for spot electrolytic yesterday was £170, against £169 a week ago. The November exports totaled 21,433 tons. In 11 months of this year the total of exports was 299,659 tons, or 65,741 tons more than in the same period of 1915.

Tin.—Since the last report the market has been continuously dull. On Monday there was fair inquiry, but on that day the monthly statistics appeared and apparently were regarded as unfavorable by consumers, with the result that they did not place orders. The total visible supply Nov. 30 was 21,186 tons, against 17,415 tons Oct. 31, an increase of 3771 tons, a showing which was regarded as an adverse influence. The deliveries into consumption in November were fair, amounting to 3165 tons. The total of deliveries since Jan. 1 is 51,553 tons, against 44,962 tons last year, an increase of 6591 tons. Prices have shown a downward tendency and the quotation yesterday was 44.37½c. The supply of Banca tin is becoming small. It was quoted yesterday at 44c. to 44.25c.

Lead.—Until yesterday the market was extremely difficult to gage because of the fact that the official quotation of the leading producer was from 50 to 75 points under those of independent producers. The American Smelting & Refining Company yesterday, however, announced two advances—from 7c. to 7.25c., New York, and from 7.25c. to 7.50c., New York, which served to steady the market, fixing its range from 7.50c. to 7.62½c., New York. Throughout the week the short supply for December has been a dominant feature. The scarcity has restricted the volume of business despite the fact that there is unsatisfied demand. Although the market has been irregular, its trend has been upward and to-day it is very strong. The London quotation yesterday, as compared with a week ago, was unchanged at £30 10s. The November exports amounted to 1436 tons.

Spelter.—The long rise in prices which existed through November was checked on Monday of this week, when dealers decided it was time for them to take profits. On that day they sold December at 12.75c., St. Louis, and first quarter at 12.50c. Yesterday there were offerings at 12.50c., St. Louis, for December, and correspondingly less for the first quarter. At first the business was entirely in the hands of dealers, but later their prices were met by some of the producers. Representatives of the latter are firmly of the opinion that January will see the St. Louis quotation up to 14c., New York ranging about ¼c. per pound higher, basing their belief on the usual circumstances which develop in cold weather and which always restrict production. It is reported that two of three large turbines used by a hydroelectric company for supplying power for mine operations in the Joplin district have broken down under the strain of overloading, and that repairs cannot be made for two or three weeks. On the other hand, some experts point to the extremely large production and express doubt that the market will go much higher. Their views helped to precipitate the decline of this week. The spot quotation of London yesterday was £58 10s., a decline of 10s. from a week previous. The November exports reached the large total of 16,098 tons.

Antimony.—Dealers report that business is dull, but importers say the demand is fair. Quotations range from 14c. to $14.50c., duty paid, for Asiatic brands.

Aluminum.—The quotation for No. 1 virgin aluminum, 98 to 99 per cent pure, is unchanged at 63c. to 65c.

Old Metals.—The market continues strong. Dealers' selling prices are as follows:

	Cents per lb
Copper, heavy and crucible	31.50 to 33.00
Copper, heavy and wire	30.00 to 31.50
Copper, light and bottoms	27.00 to 28.00
Brass, heavy	17.50 to 19.00
Brass, light	14.50 to 15.50
Heavy machine composition	25.00 to 26.50
No. 1 yellow rod brass turnings	18.50 to 19.50
No. 1 red brass or composition turnings	20.00 to 24.00
Lead, heavy	6.75
Lead, tea	6.25
Zinc	10.00 to 10.75

Chicago

DEC. 4.—With the quantity of Lake copper available very limited, and demand turning strongly to casting copper, the spread between the prices of these grades has been reduced abnormally. Sales of lead are being made very generally at higher than the published prices. The market has passed through a week of marked strength. We quote: Casting copper, 33.75c.; Lake copper, 34c.; tin, carloads, 45c., and small lots, 47c.; lead, 7.35c.; spelter, 12.90c.; sheet zinc, 21c.; Cookson's antimony, 50c.; other grades, 17c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 27.50c.; copper bottoms, 24c.; copper clips, 26.50c.; red brass, 23.50c.; yellow brass, 18c.; lead pipe, 6.25c.; zinc, 9c.; pewter, No. 1, 26c.; tinfoil, 35c.; block tin pipe, 39c.

St. Louis

DEC. 4.—Non-ferrous metals have advanced steadily, with sales very satisfactory. Lead is firm to-day at 7.50c. in carload lots, and spelter at 13c. for prompt shipment in carload lots. In less than carload lots the quotations on non-ferrous metals are: Lead, 7.75c.; spelter, 14c.; tin, 49c.; Lake copper, 36c.; electrolytic copper, 35.50c.; antimony, 17c. In the Joplin district, all ores were strong. On zinc blende, the basis range was $90 to $105 per ton, with the average for the week for the district $99. Calamine ranged from $50 to $62, with the average for the week $54. Lead ore was higher, reaching $91, with the average for the week $89. On miscellaneous scrap metals, we quote dealers' buying prices as follows: Light brass, 10.50c.; heavy yellow brass, 16c.; heavy red brass and light copper, 19c.; heavy copper and copper wire, 22c.; zinc, 7c.; lead, 5.50c.; tea lead, 4c.; pewter, 25c.; tinfoil, 34c.

S. Diescher & Sons, engineers, Farmers Bank Building, Pittsburgh, have taken a contract for the erection of the new plant of the Kelley Springfield Tire Company at Cumberland, Md. The engineers are now working on the plans and specifications. It will be some weeks before construction work starts, but it is hoped to complete the plant in about a year.

WARSHIPS TO COST $65,000,000

The 1917 Program Largely in Hand—Doubts About 1918 Contracts

WASHINGTON, D. C., Dec. 5, 1916.—Contracts for warships involving a total expenditure of more than $65,000,000 were formally awarded during the past week, leaving but seven vessels of the 1917 construction program undisposed of. The awards include two battleships each to the New York Shipbuilding Company and the Newport News Shipbuilding & Dry Dock Company, the formal announcement as to these four vessels being merely a confirmation of the decision reported in THE IRON AGE a fortnight ago; one 850-ton fleet submarine and 18 coast submersibles to the Electric Boat Company of New York; one fleet submarine and six coast submersibles to the Lake Torpedo Company of Bridgeport, Conn., and three coast submersibles to the California Shipbuilding Company of Long Beach, Cal. The four battleships will cost approximately $11,000,000 each, the two fleet submarines approximately $1,190,000 each and the 27 coast submersibles will range in price from $694,000 to $698,000 each.

While the four new battleships will rate as sister ships to the California and Tennessee, now under construction, and will have substantially the same displacement, namely, about 32,500 tons, their batteries will be more formidable than any heretofore provided for ships of this class. Instead of carrying twelve 14-in. rifles as in the California class they will mount eight 16-in. rifles each. The increase in range and in weight of projectile thus obtained is calculated to give these vessels greatly increased effectiveness, judging by the lessons of the naval engagements in the European war

SUBMARINES LIKE U-53

Special interest attaches to the two fleet submarines, which will have a displacement of about 800 tons, for the reason that they are similar in size and general characteristics to the German undersea boat U-53, which, by crossing the Atlantic under its own power and raiding commerce off the New England coast, has demonstrated the efficiency of this type of vessels and their ability to develop a remarkable steaming radius and to keep the sea for extended periods. The Government is now preparing to construct a fleet submarine of similar size and type at the Portsmouth Navy Yard for the purpose of demonstrating the relative efficiency of undersea boats of this size as compared with the 1300-ton Schley, which is now being built for the navy. The 27 coast submarines just awarded will range in displacement from 475 to 550 tons, and, while following a general type, will possess numerous individual characteristics, as indicated in the plans submitted by the successful bidders. The experts do not believe that sufficient experience has been obtained to justify them in adopting iron-clad plans at this time.

Of the 1917 construction program there now remain to be disposed of but four battle cruisers, bids for which will be opened on Dec. 6, and three scout cruisers, proposals for which will be submitted on Jan. 3. The decision of the Secretary of the Navy to ask Congress for an increase in the appropriation for scout cruisers, bids for which were opened last month, on the ground that but one proposal was within the statutory limit of cost and was hedged about with objectionable conditions, has been reconsidered and one of the cruisers has been awarded to the Seattle Construction & Dry Dock Company, Seattle, Wash., after a satisfactory adjustment or the points in question.

NEW NAVY CONTRACTS IN DOUBT

In view of the fact that the Naval appropriation bill carrying the construction for 1918 must become a law on or before March 4, or in less than three months, department officials are considering with no little anxiety the outlook for the placing of the new contracts, especially in view of the innovations now contemplated. The 1918 program is expected to include at least three battleships, one battle cruiser, three scout cruisers, 16 destroyers, four fleet submarines, 14 coast submarines, one submarine tender and one destroyer tender. It is proposed to increase the displacement of the battleships about one-fourth, or to about 40,000 tons to give them twelve instead of eight 16-in. guns and to increase their speed from 21 to 23 or 24 knots. These changes will involve not only power plant problems, but certain gun platform technicalities due to the proposed 50 per cent increase in primary batteries. It would be difficult for a shipping expert to forecast the placing, within the next six months, of merchant vessels equivalent in tonnage to the 1918 construction program, even at the liberal prices which are now freely bid for merchant ships; it is not surprising, therefore, that the naval authorities should regard somewhat dubiously the prospect for the letting of these new contracts within the cost limits that are likely to be insisted upon by Congress. W. L. C.

Lake Superior Ore Shipments to Dec. 1 Were 63,648,298 Tons

Iron-ore shipments down the Lakes from the Lake Superior region to Dec. 1 reached the remarkable total of 63,648,298 tons. In November they were 5,715,452 gross tons, compared with 4,445,129 tons in November, 1915, and 9,116,196 tons in October of this year. The increase in November is 28.57 per cent over the total for November, 1915. The following table gives the November and season shipments by ports and the corresponding figures for 1915 in gross tons:

	November, 1916	November 1915	To Dec. 1, 1916	To Dec. 1 1915
Escanaba	772,447	696,346	7,270,899	5,636,427
Marquette	243,801	263,186	4,820,442	3,999,489
Ashland	66,339	141,020	2,963,187	3,146,772
Superior	1,132,642	958,465	12,626,172	8,307,381
Duluth	1,982,872	1,328,848	21,455,345	15,437,419
Two Harbors	888,381	747,064	10,530,944	8,633,980
Total	5,715,452	4,445,129	63,648,298	46,261,568
1916 increase	1,270,323		17,386,730	

The Duluth percentage to Dec. 1, 1916, was 33.71, against 33.37 per cent last year, while the Great Northern dock at Superior shipped 17.20 per cent of the total this year, against 15.51 per cent to Dec. 1, 1915. The increase to Dec. 1, this year, was 17,386,730 tons, or 37.58 per cent.

Hydraulic Pressed Steel Company in a Merger

Negotiations for the sale of the Hydraulic Pressed Steel Company, Cleveland, to Eastern interests, which have been in progress for several months, have been concluded and a new company with a capital stock of $10,000,000 will be formed to take over the property. The present capital stock is $2,500,000. As a part of the same transaction the Cleveland Welding & Mfg. Company, Cleveland, will be merged with the Hydraulic Company. It is understood that present holders of Hydraulic common stock will retain a large interest in the new company, being offered $108 a share cash and $162 in stock of the new company. The Hydraulic Company makes automobile frames and other sheet metal stampings, metal frames for concrete building work and shell forgings. It has greatly increased its plant capacity in the past two or three years. The Cleveland Welding & Mfg. Company makes automobile rims.

The entire equipment of the Chicago, Anamosa & Northern Railroad was sold at Cedar Rapids, Iowa, by the road's receivers Nov. 28 to Herman Sonken, Kansas City, dealer in scrap. The price was $70,000. The material will be taken up and sold for scrap.

The Marlin Arms Company, New Haven, Conn., is retiring its preferred stock to the amount of $1,166,600. It is reported that the funds necessary have come out of the unusually large profits of the past year.

A new British industry is being established. The British Detinning Company, of Birmingham, has been formed to utilize the supplies of tin scrap and tin shearings that are accumulating very fast.

PERSONAL

Ralph H. Sweetser, Easton, Pa., is now engaged in consulting work in connection with the manufacture of pig iron. For the present, his headquarters are in Easton, but later he will open an office in New York.

Andrew Carnegie has given $1,038,500 to the Carnegie Institute and $956,000 to the Carnegie Institute of Technology, both at Pittsburgh. These gifts make his total benefactions to both institutions $28,000,000.

Hugh H. Davis, president Monongahela Tube Company, Pittsburgh, has been elected a director of the Keystone National Bank of that city, succeeding W. C. Baldwin, deceased.

W. C. Stevens was appointed sales manager of the Cutler-Hammer Mfg. Company, Milwaukee, at the last district managers' meeting held at the head office of the company in Milwaukee. He has been connected with the company about 10 years, the last three years in charge of the New York office. Mr. Stevens graduated from Sibley College, Cornell University, in 1906 and at once took up the shop, testing room and engineering course at the Milwaukee factory. The latter part of 1907 he was sent to the Pittsburgh office, in which field he devoted his time to sales-engineering and installation work. Much of the installation and experimental work connected with controllers for the steel plants and unloading plants was done under his supervision, and many features patented by Mr. Stevens are incorporated in the Cutler-Hammer furnace skip hoist controllers. T. D. Montgomery has been appointed manager of the New York office to succeed Mr. Stevens. He joined the Cutler-Hammer forces when the J. L. Schureman Company, Chicago, with which he was connected, was bought out eight years ago. He has been a member of the New York office sales engineering force for the past four years.

William J. Flynn has been appointed superintendent of rolling mills of the Brier Hill Steel Company, Youngstown, Ohio, succeeding A. G. Hargate, resigned. He was formerly assistant superintendent of the rail mills of the Illinois Steel Company at Gary, Ind., and prior to that was connected with the United States Steel Corporation at various plants for 17 years.

C. H. Booth, chairman of the board of directors of the United Engineering & Foundry Company, Pittsburgh, now makes his headquarters in the offices of the recently acquired William Tod Company at Youngstown, Ohio. He formerly made his headquarters in the offices of the Lloyd-Booth department of his company at Youngstown.

James A. Campbell, president Youngstown Sheet & Tube Company, Youngstown, Ohio, has returned from a vacation spent at Hot Springs, Va.

A. L. Sonnhalter, who for the past year held the position of chief chemist and metallurgist with the Page Woven Wire Fence Company, Monessen, Pa., has resigned to accept a position as assistant superintendent of the open-hearth department of the United Alloy Steel Corporation, Canton, Ohio.

William H. Ham has resigned from French & Hubbard, engineers, Boston, Mass., to become manager of the Bridgeport Housing Company which was incorporated, with capital stock of $1,000,000, some time ago to conduct large housing operations in Bridgeport in the effort to solve the city's great housing problem.

Julius Michelson, heretofore connected with the Harbor Machine Company, has become the proprietor of the Up-To-Date Tool Company, at 60 K Street, South Boston, Mass., and will personally manage the business.

W. H. Alford, Indianapolis, president Spring Steel Fence & Wire Company, Anderson, has been el[illegible] president of the Columbus Art Metal Company, recently organized at Columbus, Ind., with $100,000 capital stock. H. K. Volland, mayor of Columbus, is secretary-treasurer and M. J. Schultes, superintendent J. T. A. McClurg, Indianapolis, one of the directors, is president and general manager of the Indianapolis Corrugating Company.

New directors of the Baldwin Locomotive Works are Guy E. Tripp, chairman of the Westinghouse Electric & Mfg. Company board; Sydney F. Tyler, chairman of Fourth Street National Bank board; William E. Corey, president Midvale Steel & Ordnance Company, and Sydney E. Hutchinson, Hutchinson & Rivinus. They succeed John G. Shedd, E. T. Stotesbury, T. De Witt Cuyler and Otis H. Cutler, who resigned on account of the Clayton act.

W. V. D. Wright, treasurer of the Inter-Ocean Steel Company, Chicago, up to the time of its merger with the Railway Steel Spring Company, and who since that time has been vice-president of the latter, in charge of its sales in the Chicago district, has resigned to become a vice-president of the Edgewater Steel Company, which is now building a plant at Oakmont, near Pittsburgh, for the manufacture of locomotive tires and rolled steel wheels.

The American Iron & Steel Mfg. Company, Lebanon, Pa., has appointed James A. Kinney chief engineer, to succeed C. J. Gadd, resigned.

C. A. Buck, vice-president Bethlehem Steel Company, has been elected president of the Cornwall Ore Banks Company, Miners Village, near Lebanon, Pa., a closely affiliated organization, succeeding Edgar C. Felton, resigned.

Eugene E. Hart, formerly with the Pratt & Whitney Company, has joined the machinery department of the Cleveland Tool & Supply Company, Cleveland.

Benjamin E. Bosler, formerly assistant superintendent of shops of the Cambria Steel Company, Johnstown, Pa., has been appointed superintendent of the mechanical department of the company.

M. R. Jonas has been appointed test engineer of the by-product coke works of the River Furnace Company, Cleveland.

H. O. C. Isenberg, recently of the Ferro Machine & Foundry Company, Cleveland, is now chief engineer of Scripps-Booth Company, Detroit.

Bethlehem May Buy American Iron & Steel Manufacturing Company

The acquisition of the American Iron & Steel Mfg. Company, with works at Lebanon and Reading, Pa., by the Bethlehem Steel Company is under consideration as this issue goes to press but a decision is not expected for a day or two.

The American Iron & Steel Mfg. Company has an annual capacity of about 170,000 tons of bar iron and steel. At the Lebanon works are puddling furnaces, four 50-ton basic open-hearth furnaces and two 20-ton induction electric furnaces. Bolts, nuts, boiler and structural rivets, track spikes, and merchant bar iron and steel and staybolt iron are the principal products. The Reading works is an iron-rolling mill with six heating furnaces. A long time feature of these plants has been the utilization of pulverized coal, this fuel being applied indeed to the open-hearth furnaces which are without regenerators.

New American Tube & Stamping Directors

The personnel of the new board of directors of the American Tube & Stamping Company, Bridgeport, Conn., which was recently sold, as stated in THE IRON AGE, Nov. 23, 1916, is as follows: J. V. W. Reynders, chairman of the board; C. D. S. Miller, president; W. R. Palmer, vice-president; Guy P. Miller, treasurer. The other members of the board are Charles G. Sanford, William L. Abbott, F. Kingsbury Curtis, V. Everitt Macy, F. J. Kingsbury and William R. Webb. The new interests in control of the company are represented among the executive officers and directors and large stock interests remain in Bridgeport. No changes are contemplated in the administrative or working forces or in the general character of the products manufactured, although it is planned to extend the operations of several works of the company.

Canadian Industrial Notes

TORONTO, Dec. 2, 1916.—The most important contract the Canadian Car & Foundry Company, Montreal, has yet arranged in Canada has been completed with the Imperial Munitions Board. This contract is for forgings to be supplied to various munitions plants now manufacturing shells. It is reported that its total value is approximately $14,000,000. This order will be carried out by the Canadian Steel Foundries, a subsidiary of the Canadian Car & Foundry Company, in its forgings department, and will require almost the entire capacity of the present plants for 1917.

The Canadian General Electric Company, Toronto, has notified all employees who were with the company during the reduced-wage period of 1914-15, and are still with it, that a bonus will be paid to them shortly, making up the difference between the regular rate of pay and the reduced rate, which lasted for about 15 or 16 months. The bonus will require about $130,000.

British Columbia munitions plants have just received orders calling for the manufacture of 30,000 18-lb. high-explosive shells per week for the first half of next year. Practically all of the coast machine shops were operating double shift on the same class of shells up to the end of August. In the meantime orders were accepted by some firms for a limited supply of larger shells, necessitating a change of machinery. Although the shops have been at work for some time the shipping stage has not yet been reached. The contracts mentioned will amount to $1,250,000. Vancouver will produce 12,000 shells a month; New Westminster, 10,000, and Victoria, 8000. The Vancouver Engineering Works will secure the bulk of the Vancouver order.

Locomotive Orders

Orders for locomotives in the past week are reported as 117. Of these, the Baldwin Locomotive Works will furnish 30 to the Atchison, Topeka & Santa Fe, 45 to the Southern Railway, and 22 to the Norwegian State Railways. The same company will also furnish the Bethlehem Steel Company with 6 switching locomotives for its Sparrows Point plant, and the French Government with 100 small locomotives. The American Locomotive Company will build 10 Pacific locomotives for the Missouri, Kansas & Texas. Orders for locomotives in November are estimated at 586, of which 343 were for export. This is next to the largest month this year, the best previous record having been in October, when 779 locomotives were ordered, of which 563 were for export. The orders for the first five months of the last half of this year have been 1857, which compares with 2124 for the first half of the year, bringing the total to Dec. 1 this year to 3981, of which 1382 were for export. Total orders in 1915 were only 1972.

Railroad Car Buying

The number of cars before the market is now about 15,000, not including 4000 for France and the long-delayed purchases for Russia. The new business offered covers in part 2500 refrigerator cars for the Union Pacific, 200 hopper cars for the Atlantic Coast Line, 1000 general service cars for the Los Angeles & Salt Lake, 100 gondolas for the Piedmont & Northern, 500 automobile cars for the Illinois Central, 100 hopper cars for the Westmoreland Coal Company, 38 cars for the New Jersey Zinc Company and about 30 cars for the Boston Elevated lines. The Pressed Steel Car Company has been awarded 1000 box cars for the Minneapolis & St. Louis; it is believed the Standard Steel Car Company will provide 100 underframes for the Maine Central and that 50 gondolas have been put under order for the Virginian.

Fifteen acres of ground and an idle blast furnace, the property of the Susquehanna Iron Company at Wrightsville, Pa., have been purchased for $14,000 by Ralph P. Wilton and D. S. Cook, who are associated in the Susquehanna Casting Company.

OBITUARY

WILLIAM W. SCRANTON, at one time a leading manufacturer of Bessemer steel, died at Scranton, Pa., Dec. 3, aged 72 years. He was born in Augusta, Ga., but was taken to Scranton by his parents when he was 3 years old. He was educated at the Phillips Exeter Academy at Andover, Mass., and immediately afterward went into the plant of the Lackawanna Iron & Coal Company at Scranton, largely owned by his family, and learned the business of manufacturing iron and steel. He rose to the position of general manager of the company, which at that time was manufacturing both iron and Bessemer steel rails, having engaged in the steel business in 1875. Mr. Scranton in 1881 organized the Scranton Steel Company, which built a Bessemer plant and began to manufacture steel rails in May, 1883, making a conspicuous success in using Cornwall pig iron in producing steel. The Scranton Steel Company was absorbed by the Lackawanna Iron & Coal Company in 1891 and the name of the latter was changed to Lackawanna Iron & Steel Company. Mr. Scranton then severed his connection with the steel business. At the time of his death he was president of the Scranton Gas & Water Company. Walter Scranton, his brother, also identified with the Scranton Steel Company and the Lackawanna Iron & Steel Company, and subsequently president of the Lackawanna Steel Company, is now living at Vergennes, Vt. W. W. Scranton leaves his widow and one son.

FREDERICK BALDT, SR., long prominent in the steel castings trade, died Dec. 1 at his home in Philadelphia, aged 75 years. He was the founder and former president of the Baldt Steel Company, New Castle, Del., and had been actively associated with numerous other steel plants. He was the inventor of important processes which are now used in the steel foundry industry. He is said to have been the maker of the first 6-in. high-pressure rifled cannon for the Government which passed the required test. In 1864 Mr. Baldt became manager of Reaney & Archibald, Chester, Pa. Later he became connected with the Roach Shipbuilding Company and the Chester Steel Casting Company. In 1875 he organized the Eureka Cast Steel Company and the following year became identified with the management of the Standard Steel Casting Company at Thurlow, Pa. He then retired and took up his residence on an estate in Maryland. In 1892 he returned to the steel industry, becoming associated with the Penn Steel Casting Company, Chester. Thirteen years ago he organized the Baldt Steel Casting Company, which now is a branch of the Penn-Ordnance Company, withdrawing from it a few years ago. He leaves his widow, seven sons and three daughters.

JAMES H. CLEMENS, Pittsburgh, died Dec. 4, aged 80 years. He was associated long ago with Lyon, Shorb & Co., later with Phillips, Nimick & Co., then with the Sligo Iron & Steel Company and afterward with the Oliver Iron & Steel Company. He is credited with having been the inventor of the water-flue puddling furnace in 1871. He leaves his widow and three daughters.

The Ludlum Steel Company, 2 Rector Street, New York, with works at Watervliet, N. Y., announces that its name has been removed from the British blacklist, the English authorities conceding that it was placed there by mistake. British subjects are thereby free to buy the company's high-speed and other alloy steels.

The Gulf States Steel Company, Birmingham, Ala., will supply coke to the Attalla, Ala., furnace which it recently leased, from its by-product ovens now under construction at Alabama City, Ala. These will probably be completed by April 1, 1917. Meanwhile Attalla furnace will be relined and repaired.

Pittsburgh and Nearby Districts

Among recent orders received by the Westinghouse Machine Company, East Pittsburgh, for complete equipments of turbines, gears, and condensing apparatus for ships now in construction are the following: Chester Shipbuilding Company, one 2500-s.h.p. set; Skinner & Eddy Corporation, one 2500-s.h.p. set; Ames Shipbuilding & Dry Dock Company, three 2500-s.h.p. sets, and the Baltimore Dry Docks & Shipbuilding Company, two 1800-s.h.p. sets. An order has also been received from the Moore & Scott Iron Works, San Francisco, for three 2500-s.h.p. sets, including turbines and gears.

The Pannier Bros. Stamp Company, Pittsburgh, is about to occupy its new building, 207-209 Sandusky Street, North Side, which is specially equipped for making its products. It is a four-story steel and concrete structure, 44 x 100 ft. One floor is exclusively devoted to the manufacture of steel stamps and dies. The constantly increasing business of the company made a larger productive capacity imperative. Its products consist of steel stamps and dies, time checks, stencils, rubber stamps, embossing dies and accessories to these lines.

The pulverized coal plant to serve eight 60-ton open-hearth furnaces in the Donora works of the American Steel & Wire Company is being built complete by the Fuller Engineering Company, Allentown, Pa.

The Asbestos Protected Metal Company, Pittsburgh, has filed notice at Harrisburg, Pa., of an increase in its capital stock from $250,000 to $300,000.

The annual banquet of the Engineers Society of Western Pennsylvania will be held in the William Penn Hotel, Pittsburgh, on Monday evening, Dec. 11. Edwin M. Herr, president Westinghouse Electric & Mfg. Company, will be toastmaster. The list of speakers includes Gen. George W. Goethals, builder of the Panama Canal; William L. Saunders, past president of the American Institute of Mining Engineers, and George Ade, the humorist, who is expected to deliver an address on "Technical Education."

This being electrical week throughout the country, the city of Pittsburgh is taking an active part in the celebration. An electrical show of the allied interests of Pittsburgh is being given in the ballroom of the William Penn Hotel. The exhibit includes electrical devices of all kinds, particularly those for household use.

This week American Steel & Wire Company officials are making their annual inspection of the plants in the Pittsburgh district. These include the works at Donora, Farrell and Pittsburgh. The Western plants will be inspected later.

Two of the three new 75-ton open-hearth furnaces which have been under erection for some time at the Farrell, Pa., works of the Carnegie Steel Company are completed and in operation, and the third will shortly be started.

The Fort Pitt Steel Casting Company, McKeesport, Pa., has filed notice at Harrisburg, Pa., of an increase in its indebtedness of $150,000.

The Sharon Clay Products Company, Sharon, Pa., has been awarded a contract for the fire brick for the 10 new hot tin mills to be erected at the Farrell, Pa., works of the American Sheet & Tin Plate Company.

The Brier Hill Steel Company has purchased a tract of 250 acres lying between Niles and Warren, Ohio, which is well adapted for manufacturing purposes. The transaction leads to the belief that large extensions are planned. The erection of several jobbing mills, a pressed-steel department and possibly bar mills is intimated.

The Youngstown Sheet & Tube Company, Youngstown, is entertaining about 30 of its sales managers who are located in various large cities. On Tuesday they were taken through the plants of the company in East Youngstown, and in the evening were entertained with a banquet in the Hotel Ohio. Wednesday was devoted to a business session of company officials and sales managers.

The American Auto Lock Company, Pittsburgh, has been granted a Delaware charter with a capital of $50,000 to manufacture automobile locks and specialties. The incorporators are James W. Alexander, Albert E. Evans and Arvid P. Sunnergren.

The fourteenth annual report of the Harbison-Walker Refractories Company, Pittsburgh, has been issued. The combined profit and loss account for the year ended Sept. 30, 1916, shows earnings of $4,305,450.38 and a net profit of $3,540,604.37. After deductions of $1,836,000 for dividends, the amount carried to surplus is $1,704,604.37, making the total surplus $8,547,257.86. President H. W. Croft in his accompanying remarks says: "While our earnings for the year are gratifying to the officers of the company, they do not fail to take note of the fact that conditions on the whole have been abnormal; so long, however, as such conditions continue our earnings should be equally satisfactory."

One Strike and Many Advances

About 250 union molders employed in five foundries at Racine, Wis., walked out Dec. 1 to enforce a demand for $4 per day of 9 hr. Notice was issued to the employers a week ago by the International Molders' Union that the increased scale would be effective Dec. 1. The foundries which received notice are the Simms, Badger, Racine Brass & Iron, Stannard and Holbrook-Armstrong. The Badger and Holbrook-Armstrong foundries are operating as usual, but others are running short-handed. The demand of the union affects only the day workers. The piece-workers are earning from $6 to $8 per day. The present minimum wage for day workers is $3.25. New men are being hired and all foundries expect to be operating as usual within a few days.

Effective Dec. 1, the Ingersoll-Rand Company has offered 7500 shares of its common stock to the employees at its machine shops at Phillipsburg, N. J., numbering about 3000, at $200 per share, payable in instalments. The offer is the third of its kind which the company has made, and is open to those who did not take advantage of the former opportunities. The stock has recently been quoted as high as $260 per share on the market.

The Broderick & Bascom Rope Company, St. Louis, has increased the pay of its employees 10 per cent, dating from last July and continuing indefinitely. The announcement was made as a Thanksgiving gift. The increase applies to all departments and to the New York and Seattle branch plants.

The E. & G. Brooke Iron Company, Birdsboro, Pa., has given its blast-furnace hands an advance of 25c. per day from Nov. 27. Heretofore advances and reductions were made on a percentage rate.

Among large employers of labor in addition to those mentioned last week, who have followed the example of the United States Steel Corporation in raising employees' wages 10 per cent are the following:

Alan Wood Iron & Steel Company, Conshohocken, Pa.
Fore River Shipbuilding Corporation, Quincy, Mass.
International Harvester Company, Chicago.
Bethlehem Steel Company, South Bethlehem and Steelton, Pa., and Sparrows Point, Md.
Central Iron & Steel Company, Harrisburg, Pa.
Lalance & Grosjean Mfg. Company, Harrisburg, Pa.
Cambria Steel Company, Johnstown, Pa.
Marting Iron & Steel Company, Ironton, Ohio.
Standard Steel Car Company, New Castle, Pa.
Superior Steel Company, Carnegie, Pa.
Eastern Malleable Iron Company, Naugatuck, Conn.
Graton & Knight Mfg. Company, Worcester, Mass.
The Gardner Machine Company, Beloit, Wis.
Nicholson File Company, Port Hope, Ont., Canada.

The Chicago Bridge & Iron Works, all employees at Chicago, Greenville, Pa., and Bridgeport, Ont., as well as the field and erecting forces.

The Marshall Foundry Company, Pittsburgh and Josephine, Pa. This company also allows every man a bonus of 10c. per day if he has been at work every day in a month.

NOVEMBER A BIG MONTH

Deliveries Being Forced Further Ahead

New Designs Probable for United States Shrapnel and High Explosive Shells—Canadians Building Great Munitions Plant

New York dealers and manufacturers' representatives assert that November was the best month of the year in point of volume of business, while Milwaukee reports that the month was better than November, 1915. The demand shows no abatement, and already deliveries on standard tools are beginning to become tighter again. An inquiry in the New York market calls for no less than 700 No. 4 screw machines.

It is interesting to note that the United States Government is likely to profit from the manufacture of foreign shells in this country. A committee of army officers is studying the peculiar merits of various shrapnel and high-explosive shells with a view of embodying their good features in a new design of shell for this Government. The Russian fuse is favored for the reason that it is simpler and easier to make than others.

The crane builders have lately done some attractive business in the East and more is pending.

Cleveland notes a heavy export demand for automatic screw machines; with the general domestic demand tending toward quiet. In Cincinnati the export demand for large lathes is good, the domestic activity is satisfactory, and the trade is feeling better because of a more plentiful supply of skilled labor.

Industrial plants continue to extend their facilities in Detroit, although the automobile builders are slowing down preparatory to taking inventory. Deliveries in Detroit are 3 to 6 months away on standard machines.

Deliveries are being forced further into the future in the St. Louis territory, thereby cutting down sales. In Texas there is a heavy demand for small tools.

Business on the Pacific coast is restricted as it is everywhere else by the scarcity of machines on which prompt delivery can be made. In that territory the shortage of freight cars continues to hamper business of every character.

American firms are constructing at Trenton, Ont., a group of about 60 buildings which are to be used for the manufacture of munitions under the supervision of the Imperial Munitions Board.

New York

NEW YORK, Dec. 6, 1916

Not only has the past week been a good one with the local machinery trade, but with several sellers of machine tools November was the best month of the year, a fact accounted for by the recent improvement in deliveries which enabled the sellers to at least partially satisfy the spirited demand. Many types of standard machines still require several months for delivery, and on all types the good buying of recent weeks has again tightened deliveries. With some of these, prices are still advancing, quotations having been advanced in the week by a maker of milling machines and a builder of boring mills. Planers are in heavy demand, as [illegible] correspondingly far off.

[illegible] and on a 217½-ton, 71-ft. 4-in. span crane, $180,035. On [illegible] additional

[illegible] ft. span (alternate $104,250) and $236,200 for the 71-ft. 4-in.

[illegible] 17 to 19 months.

[illegible] lot. [illegible] Company was low at $117,791 (alternate $112,063). On this crane the Cleveland Crane & Engineering Company quoted $168,275, the Alliance Machine Company, $198,700, and Niles-Bement-Pond Company, $233,130 (alternate $230,030) and the Morgan Engineering Company $280,250.

Makers of turret lathes are fighting on a basis for one lot of no less than 700 No. 4 screw machines (1½-in. spindle capacity) for April delivery. It is understood that the machines are not for munitions work.

It is not thought probable that big buying for the Frankford Arsenal will take place until certain points are settled with regard to the design of high-explosive and shrapnel shells. A committee of army officers is now considering the question with a view of profiting from the experience gained in the past two years in the manufacture of shells for other countries. In some particulars each of the foreign designs have peculiar merits, the Russian fuse, for instance, being favored by some officers because of its simplicity and the comparative ease with which it can be made. The Frankford Arsenal has been buying forgings which were rough finished, but in view of the fact that some of the forging companies have not the facilities for rough finishing, the Government has purchased a few machines for this work.

The Lukens Iron & Steel Company, Coatesville, Pa., has placed an order with the Cleveland Crane & Engineering Company for four cranes to be installed about the first of April.

A recent inquiry for 44 boring mills is still pending.

Fire Nov. 27 destroyed the plant of the Seamless Products Corporation, manufacturer of a patented egg carrier and kindred specialties, North Grove Street, East Orange, N. J., with a loss of about $35,000, of which $20,000 represents the machinery loss; and a portion of the plant of the Lock Joint Pipe Company, adjoining, with a loss of about $10,000.

Harry H. Picking, Charles O. Guver, and Stanley L. Gedney, Jr., East Orange, N. J., have incorporated in Delaware the New York Aero Construction Company with a capital stock of $1,000,000 to manufacture aeroplanes and airships.

The Bogota Folding Paper Box Company, Bogota, N. J., has been incorporated with a capital stock of $[illegible] by H. K. Hess and Michael Densen.

The Eclipse Tanning Company, 126 Sussex Avenue, Newark, N. J., will make extensions in its machine shop to cost about $[illegible].

The J. H. Meyer Tire Duck Company, New York City, has awarded contract for the erection of a three-story plant and boiler house at 708 Frelinghuysen Avenue, Newark, N. J., to the J. W. [illegible] Company, [illegible] Avenue, New York, at a cost of $[illegible].

The [illegible] Tool & Machine Company, Newark, N. J., has been incorporated with a capital of $25,000. Frank Heal, [illegible], and H. [illegible] are the incorporators. Harry Unger, 800 Broad Street, Newark, is the agent.

Max Klein, [illegible] Broadway, New York City, has acquired

property at 28 Kipp Street, Newark, N. J., and will erect a plant for the manufacture of cutlery. The initial operations will give employment to about [illegible]

The Smidth-Lewis Foundry, Inc., Elizabeth, N. J., has been incorporated with a capital of $10,000 to operate a foundry at North Avenue and Meadow Street. Stephen G. Williams, John J. Griffin, and Kenneth McEwen are the incorporators.

The Robert Levy Company, 47 [illegible] Street, Newark, N. J., manufacturer of jewelry and [illegible], has acquired additional property at 117 Sussex Avenue to increase the capacity of its plant.

The National Welding Company, Newark, N. J., will build a one-story welding shop at [illegible] Mott Street, to cost about $2,500.

The Sanitation Corporation, Jersey City, N. J., has acquired property at Twelfth and Monmouth streets to be used for a machine shop.

The Miller Reese Hutchinson Company, Jersey City, N. J., has been incorporated with a capital of $[illegible] to manufacture electric motors and operate a [illegible] factoring business. Alexander F. [illegible], Howard A. Voorhis, and H. T. Letts, all of Jersey City, are the incorporators.

The M. W. Kellogg Company, Jersey City, N. J., manufacturer of riveted piping, will build a new [illegible] welding shop at 117 West Side Avenue to cost $18,800.

The Torsion Balance Company, Jersey City, N. J., manufacturer of scales and balances, will make extensions in its five-story factory at 151 Eighth Street to cost about $10,000.

The Davis-Bournonville Company, Jersey City, N. J., manufacturer of oxy-acetylene welding and cutting equipment, has filed plans for two additional stories on its three-story concrete factory at 140 Cortlandt Avenue, to cost $[illegible].

The Bausch & Lomb Optical Company, Rochester, N. Y., has acquired six acres, but has not decided upon the development of it yet.

The Cohoes Power & Light Corporation, Albany, has been incorporated, with a capital stock of $5,000,000, to produce electricity in Albany and Saratoga counties. The incorporators are L. Grant, 174 Gates Avenue; C. A. Rood, 738 St. Marks Avenue, and J. A. Byrne, 91 St. Nicholas Avenue, Brooklyn, N. Y.

The Pierce-Arrow Motor Company, Elmwood Avenue and New York Central Railroad Belt Line, Buffalo, has let contract for erection of a sand blast and pickling building of steel construction, to be erected at its plant.

New England

BOSTON, MASS., Dec. 4, 1916.

The Lake Torpedo Boat Company, Bridgeport, Conn., has been awarded a contract for the construction of six coast defence submarines at a cost of $694,000 each, and one seagoing submarine to cost $1,195,000. It is probable that this contract, which will total over $5,000,000, will mean greater activity and expansion of the company's plant.

The Norton Company, Worcester, Mass., is to build two additions to the plant of the Norton Grinding Company, its subsidiary, which manufactures grinding machines. The larger of the two additions will be a five-story building, 72 x 200 ft., the smaller addition will be [illegible] x 175 ft., two stories. Both will be manufacturing units and will nearly double the present size of the Norton Grinding Company plant. It is also reported that the Norton Company will build next spring a building to house its testimonial and [illegible] apparatus.

The directors of Landers, Frary & Clark, New Britain, Conn., have voted to recommend to the stockholders at the annual meeting, Dec. 19, that the capital of the company be increased from $4,000,000 to $[illegible].

The Farrel Foundry & Machine Company, Ansonia, Conn., has purchased land on Main [illegible] which it does not intend to use now, but will hold to provide for future plant expansion.

The Hartford Industrial Development Company has been formed to finance the building [illegible] Underwood Computing Machine Company, [illegible] Underwood Typewriter Company. The plant will be [illegible] with one end extending to a width of [illegible] manufacturing operations now carried on at Providence, R. I., and locations in Hartford will be [illegible] which will employ 600 more workmen [illegible].

The Eastern Motors, Inc., which recently, has taken a lease of the [illegible] building owned by the American [illegible] New Britain, Conn.

The Becker Milling Machine Company, [illegible] Massachusetts charter with an authorized capital of $2,250,000.

The Electrical Welder Company, Lynn, Mass., has been incorporated with capital stock of $850,000, by Carl R. Felton, president; Eugene T. Connolly, 84 State Street, Boston, treasurer, and David J. Lyne.

The General Electric Company has announced that it will go ahead with the plans for operating its plant at Great Barrington, Mass., which has been idle for some time. About [illegible] workers will be employed at the start.

The Dowling Iron & Steel Company, Boston, has been incorporated with capital stock of $20,000 by Martin A. Dowling, president; George Blaney, 53 State Street, Boston, treasurer, and William J. E. Sauder.

The Taylor Machinery Company, Boston, Mass., has been incorporated with capital stock of $3,000. The directors are Thomas Irving Taylor, 8 Oliver Street, treasurer; G. E. Emerson and George Taylor.

The Daniel Russell Boiler Works, 83 Boston Street, South Boston, Mass., is having plans drawn for a factory, 70 x 115 ft., [illegible] story.

The Monarch Metal Mfg. Company, 45 Haverhill Street, Boston, Mass., is rebuilding a factory in Cambridge, Mass.

The Worcester Pressed Steel Company, Worcester, Mass., will build a [illegible] 200 x 170 ft., two stories.

The Scovill Mfg. Company, Waterbury, Conn., has awarded a contract for a building, 114 x 116 ft., one story.

The Standard Engineering Works, 190 Exchange Street, Providence, R. I., has awarded a contract for a factory, [illegible] x 7[illegible] ft., two stories, to be built on Rand Street, Central Falls, R. I.

The B. B. Noyes Company, Greenfield, Mass., has been incorporated with a capital stock of $12,000 to do a general foundry and machine-shop business. The directors are M. T. Noyes, president; Winthrop T. Noyes, Greenfield, treasurer, and G. S. Cumming.

The Spring Snap Fastener Company, Lynn, Mass., has been incorporated with capital stock of $25,000 by William H. Terry, president; Frank S. Elliott, treasurer, and E. P. [illegible].

The Leland-Gifford Company, Worcester, Mass., has awarded a contract for a four-story factory building, 104 x 15[illegible] ft.

The General Electric Company has awarded a contract for the erection at Atwells and Harris avenues, Providence, R. I., for its Providence Base Works, of a factory, 228 x 268 ft., with wings 116 x 144 and 33 x 135 ft., two stories. It will also erect a power house, 62 x 75 ft.

The Eastern Machine & Iron Company, Boston, Mass., has been granted a Massachusetts charter with authorized capital of $225,000.

The Universal Winding Company, Cranston, R. I., has awarded a contract for a factory addition to cost $25,000.

The Rhode Island Malleable Iron Works, Warwick, R. I., has awarded a contract for an addition to its factory to cost [illegible].

The Connecticut Marine & Motor Appliance Company, Bridgeport, Conn., has been incorporated with a capital stock of $[illegible],000 by Frederick LePan, Roger O. Foust, both of Milford, and Thurber R. Chatfield, Waterbury.

The E. W. Carpenter Mfg. Company, Bridgeport, Conn., [illegible] has been organized with Edward W. Carpenter, president; R. E. Norton, vice-president, and Grace E. Smith, secretary.

The Bridgeport Safety Emery Wheel Company, Stratford, Conn., has awarded a contract to the Austin Company, [illegible] 60 x 241 ft., on West Broad Street.

Philadelphia

PHILADELPHIA, Dec. 4, 1916.

[illegible] & Machine Company, Troy, Pa., is taking sub-bids for the erection of a one-story foundry 50 x 194 ft. [illegible] Fletcher Thompson, Inc., 206 [illegible] Street, Newark, N. J., is the architect and engineer.

The Martin Carriage Works, York, Pa., manufacturer of [illegible] heating apparatus, has been [illegible] Fred M. Small of York and John J. Watson of New York City. It is their intention to enlarge the plant.

[illegible] Metal Works, Philadelphia, has acquired [illegible] between Rockland and Louden [illegible] Wayne Junction, and proposes to erect a metal- [illegible] [illegible] cost $[illegible].

[illegible] Company, Trenton, N. J., manufacturer [illegible] has awarded contract [illegible] and steel addition to its recently [illegible] on Monmouth Street. Newton A. K. Bugbee, [illegible].

[illegible] Corporation, 517 Federal Street, Camden, [illegible] incorporated with a capital of $50,000 by

Charles M. Pearce, John B. Kates, and also Albert E. Burling.

The Thomas K. Bell Engineering Company, Harrison Building, Philadelphia, recently organized, is reported to have acquired options on the former property of the Longmead Iron Company, Conshohocken, Pa., comprising about 12 acres of land and mill buildings.

The Denver Motors, Inc., Wilkes-Barre, Pa., has leased the property of the former local cutlery works and will establish a plant for the manufacture of a small, moderate-priced automobile.

The Bethlehem Foundry & Machine Company, Bethlehem, Pa., is adding a foundry annex, to its plant, 125 x 140 ft.

The Sonder Mfg. Company, Bridgeton, N. J., has been incorporated with a capital stock of $100,000 to operate a machine shop. Frank P. Wilson, H. and E. Sonder are the incorporators.

Henry Disston & Sons, Inc., Philadelphia, manufacturers of saws and files, has awarded a contract for the erection of a one-story addition, 51 x 84 ft., on State Road.

The Atwater-Kent Mfg. Company, 4937 Stenton Avenue, Philadelphia, manufacturer of electrical specialties, will build a one-story brick addition to its plant, 150 x 250 ft.

Morris, Wheeler & Co., Philadelphia, have awarded a contract for the erection of a one-story addition to their iron and steel plant, about 120 x 316 ft., at Thirtieth and Locust streets. The William Steele & Sons Company, Philadelphia, has the contract.

The David Berg Distilling Company, Philadelphia, will build a one-story machine shop, 50 x 150 ft., on Delaware Avenue.

The Litter Ice Cream Company, Philadelphia, will build a one-story machine shop, about 50 x 75 ft., at 223 Lombard Street.

The Church Lane Garage Company, Philadelphia, has awarded a contract for a one- and two-story commercial garage, 80 x 140 ft., on Main Street, Germantown.

Janney & Burroughs, Inc., Philadelphia, manufacturers of leather, has increased its capital from $10,000 to $1,500,000, to provide for plant and business extensions. The company has filed plans for immediate improvements and extensions in its plant at Third and Wood streets.

Joseph Hyman, Philadelphia, president and organizer of the Enterprise Foundry Company, has acquired the foundry of William M. Myers, South Wilmington, Del., to be operated by the new company. It is proposed to make extensive improvements. An addition will be erected and the capacity increased. William M. Myers has been appointed manager.

The Atlantic Refining Company, Philadelphia, manufacturer of oils, has acquired property at Fortieth and Walnut streets, 81 x 100 ft., for $29,000, and is planning for the erection of a general automobile service station.

C. W. Sexton & Co., Inc., Waynesboro, Pa., has been incorporated with a capital stock of $25,000 to manufacture metal cornices, skylights, and various sheet-metal articles, ranges, plumbing equipment, and metal roofs, by C. W. Sexton, R. M. Feister, R. E. Beam, Waynesboro; B. C. Small, Antrim; William J. Patton, Greencastle; H. C. Adams, Chambersburg, and W. H. Noll, Quincy.

The Wallace Mfg. Company, Philadelphia, has been incorporated with $20,000 capital stock to [illegible] by Albert G. Schuchler, 1238 Hilton Street; Joseph C. Breithaupt, Second and Thompson streets, and John G. Wallace, 3117 North Twenty-fifth Street, Philadelphia.

The Lebanon Gear & Machine Company, Lebanon, has been incorporated with a capital of $25,000 to manufacture iron, steel, and other metals, to do copper smithing, brass working, and general foundry and machine manufacturing. H. T. Gerdes, A. F. Sinclair, and Godfrey Engle, Jr., 50 Church Street, New York; R. E. Fowler, Hanover; R. N. Gerdes, 115 Liberty Street, New York, are the incorporators.

Baltimore

BALTIMORE, Dec. 4, 1916.

The Black & Decker Mfg. Company, 109 South Calvert Street, Baltimore, Md., advises that while it is not yet ready to build upon the tract of land it has purchased on the outskirts of the city, nevertheless increasing business will make it necessary for the company to build a plant there soon to handle it. S. Duncan Black is president.

The proposed addition which will be built by the Baltimore Enamel & Novelty Company, Woodall Street, Baltimore, will cost about $125,000 and is to include enameling furnaces, a power plant and machinery for the manufacture of electric signs.

The Hagerstown & Frederick Railroad Company, Frederick, Md., will install a 5000-kw. generator, condensers, boilers, etc., at its electric power plant at Security, Md.

Robert Krome & Co., 21 Frederick Avenue, Baltimore, [illegible] will build a four-story brick addition [illegible] ft., at a cost of $20,000.

The Minerals Separation North American Company, to engage in [illegible] has been incorporated with a capital stock of $[illegible] by [illegible] Maryland with [illegible] Baltimore; J. [illegible] Hill, Jr., [illegible] Baltimore.

[illegible] has been [illegible] to 16 Beth[illegible] Company, [illegible] [illegible] Lobdell Car Wheel Company, [illegible] Lobdell Car Wheel Company, [illegible] Lobdell Car Wheel Company,

[illegible] for punching and [illegible] machinery with capacity up to 1½ in. thick.

The Automatic Screw Machine Products Company, 416 West Grand Avenue, Chicago, will build a one-story shop.

The Northern Malleable Iron Company, St. Paul, Minn., will not erect a one-story foundry, as stated in THE IRON AGE of Nov. 16. The company advises that the building will be a [illegible] to [illegible]. No action has been taken [illegible] as stated.

The Fountain Faucet Company, Duluth, Minn., will build a two-story factory, 50 x 100 ft., at Grand Avenue and Sixty-first Avenue West [illegible].

Detroit

DETROIT, MICH., Dec. 4, 1916.

In anticipation of a record spring trade, manufacturers in this district are enlarging their plants and installing new machinery. This is particularly true of the automobile and accessory lines, in which future orders call for more than plant capacity in many cases. Automobile concerns [illegible] showing down to investigate [illegible] plans for the construction and installation of new machinery. Many [illegible] inquiries on machines, particularly milling and grinding machines, were received the past week. Delivery is still from 3 to 6 months on standard machines and present delivery is unreliable because of freight congestion hereabouts. Money is free, but a growing conservatism in investment is noticeable.

The Disco Electric Starter Corporation, Detroit, Mich., will lease a new brick factory building, 78 x 185 ft., two stories, providing over 28,000 sq. ft. of floor space, to be erected by the Michigan Wire Cloth Company, owner. The H. A. Jones Construction Company, Detroit, J. Will Wilson, architect, will be the builder. The company is in the market for approximately the following machinery:

Two double-spindle Jones & Lamson 2 x 24-in. screw machines.
One Bryant chucking grinder.
Several Norton or Landis grinders suitable for shaft work.
Several Lo-Swing lathes.
One Whiton centering machine.
One cold saw for cutting shafting.
Several tapping machines similar to the R. & S.
Two air brush outfits for painting.
One or two large baking ovens for baking armatures and field coils.

The Excelsior Wrapper Company, Grand Rapids, Mich., is building an addition, 75 x 150 ft., in which it will install 40 additional knives to increase its capacity 40 per cent.

The Huron Tractor Company, Penobscot Bulding, Detroit, Mich., has been incorporated with a capital stock of $500,000. It has located its plant in Port Huron, Mich. It is manufacturing a motor-driven tractor. The company is in the market at the present time for a planing machine and one large lathe. R. R. Boyer is manager.

The Sterns Tire & Tube Company, Canada, has been formed with an authorized capital of $1,000,000 and will build a factory, 100 x 150 ft., in Windsor, Canada. The officers of the company are N. J. Morrissey, Pickering, Ont., president; Edward Sterns, St. Louis, Mo., director and consulting engineer; E. M. Carruthers, Toronto, secretary and treasurer.

The Universal Motor Company, a new industry that will manufacture a valveless internal combustion motor, has started the construction of a factory at Muskegon, Mich. Charles E. Johnson, president of the Piston Ring Company, Muskegon, is president and general manager.

The Auto Body Company, Lansing, Mich., is completing additions to its plant which will double its capacity and necessitate the employment of several hundred additional workmen.

The Kelly Ice Cream Company, Grand Rapids, has completed plans for doubling its capacity and make it the largest plant of its kind in the State. A 30-ton ice machine will be installed and equipment for handling ice added.

The Imperial Chemical Company, Grand Rapids, has been incorporated and will take over the Udell Chemical Company, whose plant has not been in operation for some time. Walter Ioor is president.

Detroit and three other Michigan cities, Pontiac, Flint and Saginaw, will receive the benefits of $2,055,000 to be spent during 1917 by the General Motors Company for new buildings. The new factory buildings for the Cadillac Motor Company in Detroit will cost $1,250,000. The addition to the Northway Motor Company, Detroit, will cost $250,000. The Buick Motor Company, Flint, will get $250,000 for a new administration building, and the Weston-Mott Wheel Company plant will get $125,000 for factory additions. The Oakland Motor Car Company, Pontiac, will be extended at a cost of $100,000, and the Jackson-Church-Wilcox Company, steering gear manufacturer, Saginaw, will receive $80,000 for an addition.

The Universal Solder Company has been incorporated for [illegible] Detroit, by Fred Sieknager, Fred L. Newberry and H. Lawrence Putman.

The Fisher Starter Company, Detroit, has been incorporated by Frank E. Fisher, William E. Reilly and Ward [illegible].

[illegible] Gas Steel Company has arranged to move from Detroit to Grand Rapids, where it will occupy the National Rusk & Business Company's building. The company manufactures [illegible] and other accessories.

The Grand Trunk Railway has begun the construction of a new plant at Port Huron, Mich., for the repair of freight [illegible] which will cost approximately $700,000.

[illegible], Mich., is considering issuing bonds to the amount of $400,000 for the construction of a new waterworks plant.

The [illegible] Machine Company, Owosso, Mich., has increased its capital from $20,000 to $32,000.

Milwaukee

MILWAUKEE, WIS., Dec. 4, 1916.

Machine-tool production in this district in November reached a volume even larger than that of the same month of 1915. Although the oversold condition of shops appears to make large-lot buyers chary about placing orders, tool requirements for gradual extensions and replacements keep capacity fully occupied. Interests which purchased round lots of considerable dimensions in 1915 have returned with piecemeal orders, due, it is believed, to the fact that tool builders cannot guarantee deliveries until well after July 1. From present indications, December will show a continuance of October and November conditions in demand and production.

The Stegeman Motor Car Company, 606 Linus Street, Milwaukee, manufacturer of motor trucks, broke ground Dec. 1 for a one-story factory addition, 139 x 190 ft., at Woodworth and Linus streets, to relieve the pressure of its machine shop and assembly room. Practically all equipment has been contracted for. Oscar Stegeman is president and chief engineer.

The Milwaukee Concrete Mixer Company, Thirtieth and Wright streets, Milwaukee, has awarded contracts for a shop addition, 75 x 75 ft., one story and basement.

George Rieboldt, Jefferson Avenue and North Seventh Street, Sheboygan, Wis., is having plans prepared by Juul & Sixta, architects, for an addition, 30 x 120 ft., to his garage and machine shop.

The Wisconsin Telephone Company, 185 Fifth Street, Milwaukee, will take bids soon for the erection of a fireproof garage, machine and service shops, and warehouse, 118 x 270 ft., two stories and basement.

The J. B. D. Resilient Wheel Mfg. Company, 671 Smith Street, Milwaukee, has changed its corporate style to the Motor Parts Machine Company to better describe its lines of manufacture. Paul W. Arndt is secretary.

[illegible]ch Brothers, Mukwonago, Wis., intend to rebuild their garage and repairshop, totally destroyed by fire with a loss of $10,000 last week.

The Thomas A. Edison affiliated interests, Orange, N. J., on Jan. 1 will take possession of the Wisconsin Seating Company, New London, Wis., which recently took a five-year contract for Edison phonograph cabinets. The name will be changed to the Wisconsin Cabinet & Panel Company, and the facilities will be extended considerably and probably arranged for complete phonograph production, adding 100 [illegible] to the present payroll of 350. Frank L. Zaug will continue as vice-president and general manager.

J. P. Eastman, Manitowoc, Wis., has withdrawn from the general manufacturing business of Muehlenberg & Eastman and will establish a factory and shop on York Street for the production of patented hose couplings.

[illegible] Process Company, Milwaukee, has been incorporated with a capital stock of $10,000 by A. U. Stettin, L. E. Fichaux and E. W. Passmore to manufacture [illegible] etc.

[illegible] Mfg. Company, Milwaukee, manufacturer of bank, bar and office fixtures and hardwood products, is [illegible] a new manufacturing building to replace [illegible] Avenue and Milwaukee River damaged [illegible],000 by fire Nov. 30. Much of the machinery and equipment [illegible] Louis J. Wollenger is secretary and [illegible].

The Davis Mfg. Company, Milwaukee, manufacturer of

gasoline engines and power units for automobiles, trucks, etc., is reported to be preparing to make large additions to its works at Fifty-seventh Avenue and Mitchell Street, in West Allis, erected less than two years ago. Tentative plans are said to have been completed for a one-story brick and steel shop, 124 x 225 ft., and a new pattern shop, 24 x 90 ft. Frank W. Davis is president and general manager.

The Eau Claire Mfg. Company, Eau Claire, Wis., has purchased some of the unused machinery and equipment of the Laursen Automatic Pump Company, Menomonie, Wis., to increase its production of Kellar gasoline engines. An unusually large number of orders have been booked within the last two or three weeks. Charles Keilar is general manager.

The Duka Brothers Mfg. Company, Boscobel, Wis., foundry and machine shop has perfected a new line of farm equipment, such as feed cookers and water heaters, and will engage in a limited production, making all parts in its own works.

The Mars Mfg. Company, Inc., Merrill, Wis., is preparing to establish a factory to manufacture a special steel and sheet metal cabinet. L. A. Jiranek is vice-president and manager.

The Progressive Metal & Refining Company, Milwaukee, Wis., will build an addition to its plant, 40 x 160 ft., two stories and basement.

Indianapolis

INDIANAPOLIS, IND., Dec. 4, 1916.

The Wright Mfg. Company, East Chicago, Ind., has been incorporated with $60,000 capital stock to manufacture machinery. The directors are Neville T. and Charles Wright and G. W. Fitz.

The Lavelle Foundry Company, Anderson, Ind., has increased its capital stock from $10,000 to $25,000.

The Graham Glass Company, Evansville, Ind., will build an addition that will double the capacity of its plant.

The Auburn Foundry Company, Auburn, Ind., whose plant was recently destroyed by fire, has erected temporary structures and is melting 10 to 12 tons of gray iron per day. Permanent buildings will be erected in 10 days. B. A. Fitz is proprietor.

R. H. Humphrey & Co., New Albany, Ind., have been incorporated with $60,000 capital stock to do a general lumber manufacturing business. The directors are Richard H. Humphrey, M. E. Humphrey, and Wilson E. Cook.

James H. Rusk, Lafayette, Ind., and James H. McGill, Valparaiso, Ind., have bought the Dairy Cream Separator Company of Lebanon, Ind., the capital stock of which is placed at $175,000.

The car repair shop of the Chesapeake & Ohio Railway, Peru, Ind., was destroyed by fire Nov. 27, with an estimated loss of $75,000.

The plant of the American Safe & Lock Company, Anderson, Ind., manufacturer of office safes, has been sold at receiver's sale to Mirom G. Reynolds, Anderson, for $10,000. Mr. Reynolds was vice-president and principal stockholder.

The Washington Plow Company, Washington, Ind., has been incorporated with a capital of $50,000 by Marie H. Kelly, Egbert G. Gesell and Clinton K. Tharp.

Cleveland

CLEVELAND, OHIO, Dec. 4, 1916.

The machine-tool market has quieted down considerably the past few days, due to some extent to the holiday last week. Dealers' sales were limited to scattering orders for one or two machines. The foreign demand for automatic screw machines continues fairly heavy, a Cleveland manufacturer having booked orders for a round lot for England. The call for cranes is less active, although the National Pressed Steel Company, Massillon, Ohio, has just placed orders for a number of cranes, as well as other equipment, for its new plant. Some crane builders are practically out of the market, being sold up so far ahead that they are unable to make desired deliveries.

The Carbo Hydrogen Company, Bayonne, N. J., it is announced, plans to erect a plant in Cleveland, having just acquired a site on Center Street.

A brass manufacturing plant, 120 x 120 ft., will be erected on Hamilton Avenue, Cleveland, by a company in which John Kleinbohl and others are active.

The Lowe Mfg. Company, Cleveland, will enlarge its plant by the erection of an addition 30 x 70 ft.

The Palbro Mfg. Company, Cleveland, has been incorporated with a capital stock of $75,000 by E. P. Strong, George Q. Kelley, F. A. Cook, and others to manufacture metal products.

The National Pressed Steel Company, Massillon, Ohio, [illegible] has purchased [illegible] and equipment, and expects to begin the erection of a plant within the next 30 days. It will consist of two buildings, 75 x 600 ft. and 65 x 540 ft., respectively.

The Zahner Metal Sash & Door Company, Canton, Ohio, will at once rebuild its plant which was recently almost totally destroyed by fire. Some new equipment will be required.

The Gillian Mfg. Company, Canton, has changed its name to the Gillian Company, and will increase its capital stock from $350,000 to $800,000. It has purchased the plant of the John Deerer Mfg. Company and will build a foundry. Huntlie Gordon and Charles M. Converse, formerly president and treasurer, respectively, of the Novelty Iron Company before its removal from Canton about a year ago, are now associated with the Gillian Company.

The plant of the Canton Drop Forging & Mfg. Company, Canton, is being enlarged and four additional hammers will be installed.

Lima, Ohio, will receive bids Dec. 11 for improvements to its waterworks, including a filtration plant, a pumping station, high and low service pumping equipment, and an auxiliary pumping station.

The Ladel Mfg. Company, New Philadelphia, Ohio, recently incorporated with a capital stock of $50,000 by U. D. Miller, Fred F. Hall, F. R. Stroup, and N. W. Judkins, will build a brick-and-steel foundry and machine shop, 150 x 250 ft. A 15-ton traveling crane will be installed.

The Akron Metal Products Company, Akron, Ohio, has been incorporated with a capital stock of $100,000 by Herbert P. Lawrence, M. B. Glore, W. C. Tappenden, and others.

Cincinnati

CINCINNATI, OHIO, Dec. 4, 1916.

Refrigerating equipment is in very good demand, although only a few of the larger ice-making outfits are under consideration just now. Makers of sugar machinery report quite a number of deals pending in Cuba and Puerto Rico, even though this is not the regular contracting season for that class of equipment. The machine-tool inquiry from domestic sources is still very good, but with the exception of some of the Eastern railroads actual business being received is small from that particular branch of the trade. Car manufacturers and auto-truck builders are constantly placing orders for single tools, but are not issuing any large lists. Wood-working machinery is slow.

No foundries in this vicinity have as yet been compelled to curtail operations on account of the shortage of cars for transporting coke and pig iron. Steam power plants have also not been inconvenienced to any extent on account of the coal supply. The supply of skilled labor is on the increase and practically all plants are operating with full forces. Lately there has been a number of inquiries put out by exporters for the larger-sized lathes, some of which are to be shipped to Canada.

The Kelley-Koett Company, Covington, Ky., manufacturer of X-ray apparatus, has had plans prepared for a large addition to its plant at 122 West Fourth Street.

Plans have already been prepared for the reconstruction of two large manufacturing buildings of the Manufacturers' Production Company, Dayton, Ohio, recently destroyed by fire. The company manufactures war munitions and it is understood that a large number of automatic screw machines and other machinery will have to be replaced.

The John C. Turner Novelty Company, Dayton, Ohio, whose plans were recently mentioned, has been incorporated with $55,000 capital stock and will increase the capacity of its plant.

The Dicks-Pemtius Company, Dayton, manufacturer of putty and sealing wax, has had plans prepared for a new factory, 70 x 170 ft., two stories, of reinforced concrete.

The plant of the O. S. Kelly Company, Springfield, Ohio, recently destroyed by fire, will be rebuilt. The company manufactures piano plates and reports that its foundry building was undamaged.

The Springfield Motor Car Company, Springfield, Ohio, will rebuild its garage and machine shop recently badly damaged in a wind storm.

The plant of the Ballman Cabinet Company, Cincinnati, was partially destroyed by fire Dec. 2. The officials announce that rebuilding plans are already under way.

The Foundation Company, New York City, has been awarded contract for the superstructure of the large new [illegible] for the Union Gas & Electric Company, Cincinnati.

The W. A. Kelso Tire & Service Company, Cincinnati, now

at 2137 Reading Road, has secured a site at Reading Road and McMillan Avenue on which will be erected a garage and repair shop.

The Campbell Brothers Auto Concern, 2508 Reading Road, Cincinnati, will erect an addition to its plant, 20 x 200 ft., one story. Little new equipment will be required.

The A. M. Lewin Lumber Company, Cincinnati, is erecting an addition to its plant on Dana Avenue that will nearly double its present capacity. All machines will be motor-driven. Only a part of the required equipment has been purchased.

The new five-story addition to the plant of the Huenefeld Company, Cincinnati, will soon be under cover, and the work of installing the necessary sheet-metal working machinery will begin at an early date.

The Columbus Packing Company, Columbus, Ohio, will move to a recently completed refrigerating plant on South High Street. Practically all refrigerating and other equipment has been purchased.

James Ohlen & Son Saw Mfg. Company, Columbus, Ohio, suffered a small fire loss Nov. 27. No delays in shipments will occur.

The Monitor Motor Car Company, Columbus, Ohio, has been incorporated with $1,000,000 capital stock and will increase its automobile manufacturing plant heretofore operated under the name of the Cummins Monitor Company.

The Hydraulic Press Mfg. Company, Mt. Gilead, Ohio, has had plans prepared for extensive additions to its plant that include a new power plant, machine shop and other improvements.

The Central South

LOUISVILLE, KY., Dec. 4, 1916.

Prices are beginning to get more attention from customers of the Louisville trade than was the case some weeks ago. Inquiries in most lines continue numerous, but it is occasionally admitted that the price quotations given obtain the reply that the proposed improvements can and will wait until lower levels are reached. A large amount of inquiry is for ice-making machinery, while electric motors are in continued brisk demand. Extension of the eastern Kentucky oil field is being felt in the way of a strong demand for special equipment, while coal developments continue to take equipment.

The Ever Ready Auto Service Company, Louisville, Ky., has been incorporated with capital stock of $10,000, by Henry and Julius Strauss and M. and Sam Swilow.

The Nathan Scrap Iron & Metal Company, Louisville, Ky., has been incorporated with capital stock of $10,000 by Henry E. Nathan, Alfred Marcus and others.

The Thomas Garage, Louisville, Ky., has been incorporated with a capital stock of $25,000 by William A. and Vincent Thomas and F. J. Gathof.

The Olympia & Owingsville Railway Company, Owingsville, Ky., has been incorporated with capital stock of $15,000 by James M. Richards, J. L. Vice, John T. Kindbrough, and A. T. Byron. It is proposed to construct a short steam railroad.

The Illinois Central Railroad will erect additional machine shops at Louisville, Ky., estimated to cost $15,000. A. S. Baldwin, Chicago, is chief engineer.

Winchester, Ky., with the proceeds of the sale of $50,000 worth of waterworks bonds, proposes to construct a motor-driven pumping plant on the Kentucky River to supply water to the city. Two heavy-duty pumps of 1,000,000 gal. per day capacity each are proposed, three low-duty pumps, 500-hp boilers, etc. Edgar B. Kay, Winchester, Ky., is the engineer.

W. S. Perry, Jenkins, Ky., is an incorporator of the Huntington Mfg. Company, Huntington, W. Va., with $25,000 to manufacture steel waste boxes, etc.

The Automatic Emergency Brake Company, Bowling Green, Ky., has been incorporated with capital stock of $55,000 by W. H. N. D. and A. M. Reddick.

The Hull Pump & Tank Company, Paducah, Ky., contracted with the Stenotype Company, Indianapolis, Ind., for the manufacture of parts to be used in the pump. The contract to run between $7,000 and $10,000.

The Cincinnati Southern (Cincinnati, New Orleans & Texas Pacific) Railway Company has purchased 50 acres on the outskirts of Danville, Ky., and will establish a round-house, shops, etc., at a cost estimated at $500,000.

The powerhouse and tipple of the Enterprise Coal Company, Woodson, Ky., which were destroyed by fire, loss of $30,000, will be rebuilt.

Fire destroyed the plant of the [illegible] Company, Winchester, Ky., Dec. [illegible]. The incorporation of a company with $[illegible] by L. B. Patterson, J. G. Hes[illegible] W. H. [illegible] and James Love, was recently effected to acquire the property. It was to have been extended and now will be rebuilt.

The Roy Lumber Company, Nicholasville, Ky., has been incorporated with capital stock of $30,000 by James Nocton, L. D. Ward and G. A. Roy.

The Indiana Power & Water Company, which has taken over the lighting plant and the Linn Coal Company, Bicknell, Ind., will improve the Bicknell plant and erect another plant to supply Edwardsport and Lenora, Ind., as well as several coal mines and communities.

A. W. Benham, Henry Benham and Fred Mitchell, of Crothersville, Ind., have incorporated with $10,000 capital stock and purchased the Hyatt Cooperage plant, which they will improve and operate.

Fire destroyed the car-repairing and painting departments of the shops of the Chesapeake & Ohio Railroad at Peru, Ind., with a loss of $75,000.

White & Walker, Memphis, Tenn., will rebuild the cotton gin recently destroyed by fire. They will erect sheet-iron buildings to cost $10,000 and equip at a cost of over $6,000. W. F. White is president.

The Bristol Door & Lumber Company, Bristol, Tenn., will rebuild its plant burned with a loss of $5,000, installing a complete sawmill.

The Drumright Cut Stone Company, Nashville, Tenn., has been incorporated with capital stock of $20,000 by J. H. Drumright, A. C. Tanksley and others.

Birmingham

BIRMINGHAM, ALA., Dec. 4, 1916.

The demand from new and small factories has diminished, due to construction requirements being cut down by the high price of materials. As a rule wholesale machinery is as active as it has been for the past three months, with deliveries the only trouble.

The American Graphite Company, Lineville, Ala., incorporated by S. C. Eddy of Atlanta, L. G. Brantley of Atlanta and others, with a capital stock of $40,000 to establish a graphite plant at Lineville.

The Traynham Lumber Company, Atlanta, Ga., capitalized at $50,000, has been incorporated by W. L. Traynham, Walter Lawrence and others.

The Clay Products & Automobile Company, Belton, S. C., has increased its capital stock from $100,000 to $150,000 and plans the enlargement of its plant.

The Woods Pottery Clay Products Company, B. Mifflin Hook, Atlanta, president, will remodel its plant at Melville, Tenn., for the manufacture of acid-proof stone and vitrified floor tile.

St. Louis

ST. LOUIS, MO., Dec. 4, 1916.

A [illegible] of heavy buying is reported in the machine tool market, but dealers are beginning to complain that deliveries are not as prompt as they have been. Generally speaking, domestic purchasing rather than export buying has brought about this condition. Local sales are increasing. The demand for equipment is very general and mostly for single tools. The disposition to negotiate, rather than to put out lists, is still pronounced.

The Century Electric Company, St. Louis, has contracted for the erection of an additional building at a cost of $[illegible], to be used in part for a warehouse and in part for manufacturing electrical equipment.

The plant of the American Foundry & Mfg. Company, St. Louis, was considerably damaged by fire Nov. 29. President B. H. Sanders announces that the plant will be reconstructed.

The William C. Johnson Sons Machinery Company's building, a four-story structure at 210 Washington Avenue, St. [illegible], was burned Nov. 28, with a loss of about $35,000. The [illegible] stock by the company was damaged [illegible].

The [illegible] Tire & Rubber Corporation has bought the plant at St. Louis of the Union Tire & Rubber Company at Bittner and Kendrick streets and will enlarge it, more than [illegible]. Until this is finished the present plant will operate three shifts daily.

The Indiana Truck Company, Marion, Ind., will erect at [illegible] a garage and machine shop. Charles McCallum, 618 Wall Street, Joplin, is local manager.

The [illegible] Metals Mfg. Company, Kansas City, Mo., will erect an addition to its present plant.

The [illegible] & Cold Storage Company, Hoopeston, [illegible] for rope drive and power equipment [illegible] company.

The Williams Rotary Printing Company, Jonesboro, Ark., has been incorporated, with a capital stock of $100,000 by D. B., M. C. and S. C. Williams and J. E. and J. W. Rhodes, and is in the market for such equipment.

The Tompkins Motor & Sales Company, Ashdown, Ark., will equip a garage with machine tools, etc.

The plant of the Texarkana Ice & Cold Storage Company, Texarkana, Ark., has been bought by the Southern Ice & Utilities Company, C. W. Dawley, president, Dallas, Tex., and will be enlarged. Other plants are to be established by the company.

The Arkansas Mill Supply Company's building at Pine Bluff, Ark., has been burned, with a loss of $15,000. It will be restored and new equipment placed.

The Pioneer Telephone Company, Oklahoma City, Okla., will equip a garage and repair plant for its motor trucks, etc., the machinery to cost about $9,000.

The Forster-Lukins Auto Company, Tulsa, Okla., has been incorporated with a capital stock of $50,000 by E. W. Lukins, J. T. Forster and Charles Lukins to equip a garage and machine shop.

The Inland Refining Company, Tulsa, Okla., has been incorporated with a capital stock of $1,000,000 by H. A. Gibson, R. H. Kirkland and R. A. Sills, to establish a large oil refinery.

Gilbert D. Von Phul, Hibernia Bank Building, New Orleans, La., is in the market for one 16 x 36-in. or 42-in. and one 18 x 36-in. or 42-in. Corliss engines, right hand.

G. G. Bradshaw, Hammond, La., is in the market for boilers, engine, canning machinery, etc., for his plant.

The Richardson Aeroplane Corporation, New Orleans, La., has been incorporated with a capital stock of $500,000. F. T. Richardson is president. It will equip to manufacture aeroplanes on a large scale.

Lafayette, La., will install an oil engine and also generating apparatus in connection with its waterworks and electric light plant.

Henry J. Cox & Co., Alexandria, La., are in the market for hoisting equipment and other machinery.

Texas

AUSTIN, TEX., Dec. 2, 1916.

The closing week of November showed an improvement in the machinery and tool trade. The demand for small tools is unusually large. Plans are on foot for installing a number of manufacturing plants of considerable magnitude.

The Henry A. Huber Sons Company, Philadelphia, is building a plant at Port Arthur for cutting the steel plates of burned oil tanks to small dimensions, so as to permit loading them into box cars or ocean-going vessels.

The Interstate Electric Corporation, 141 Broadway, New York, which recently obtained a franchise for a street railway system at San Angelo, plans to expend about $12,000 in power plant machinery and other improvements.

It is reported that the Atchison, Topeka & Santa Fe Railroad plans to build car repair shops at Lubbock.

Sam Hunter and E. A. Vondeveld are arranging to build a plant at El Paso for the manufacture of a patented gasoline vending machine.

J. P. Hassell, Corsicana, and associates will build a factory at Waco for making patented poultry houses.

The G. V. B. Smith Milling Company, Sherman, plans to build a reinforced concrete flour mill and install machinery at a cost of about $125,000. The building will be of 600-bbl. per day capacity.

The Atchison, Topeka & Santa Fe Railroad will build new freight terminals at Dallas.

The Pacific Coast

PORTLAND, ORE., Nov. 28, 1916.

The car situation is restricting the demand from mill and logging projects, though sales of wood-working machinery are better than to be expected under the circumstances. Machine tools for prompt or early delivery are in quite strong demand, but the absence of offerings holds business back materially. Some of the larger shops are in the market most of the time with single-tool inquiries, and show little hesitation in placing orders for such delivery as they can get. Canning machinery is in strong demand, and many manufacturers find difficulty in filling orders now several months behind. Specifications for many mining projects are appearing. Farm equipment and public service machinery of all kinds are moving exceptionally well in the interior, and a healthy buying movement is now being carried on by manufacturers.

The Tacoma Shipbuilding Company has recently filed articles of incorporation and plans to establish a Tacoma shipbuilding plant. The incorporators are Jesse S. Baker, W. H. Seal, H. A. Rhodes and others. The company plans to construct [illegible] steel vessels, the contracts to be let by the owners of these types. Incorporation papers [illegible] the capitalization of the company.

The Pacific Coast Shipbuilding Company, Tacoma, Wash., shall soon begin [illegible] on its proposed shipbuilding plant, for the building [illegible] cost about $1,000,000.

A factory [illegible] will be established in Portland, Ore., by J. Clark Mo[illegible], Jersey [illegible] of the Never Hone Razor Company, of New York, [illegible] Mo[illegible] and J. R. Dodson of the Portland Knitting Company, which will manufacture razors, [illegible] strops, shaving [illegible] and safety [illegible].

The Allerton Shipbuilding Company, Seattle, Wash., will begin work shortly on the [illegible] shipbuilding plant on Lake Washington, [illegible] Seattle. It will construct a marine railway [illegible] 400 feet [illegible]. The company has contracts for two 8800-ton steel [illegible] for Hartevelt Brothers of Norway.

The Washington Shipbuilding Company has recently been incorporated and will establish a shipbuilding plant in Tacoma, Wash., at a cost of $[illegible]. The company is headed by D. D. Hartman, attorney, Seattle; C. A. McMasters, treasurer of the Alaska Steamship Company, Seattle, with W. C. Hellar and William Jones of Tacoma. It has contracts for eight 8800-ton steel ships. The contract for the steel has been let. A site on the Tacoma tideflat has been selected and construction will start at once.

The Kilbourne & Clark Mfg. Company, Seattle, Wash., has received a contract from Hartevig Brothers of Norway and New York for equipping ten steamships of its fleet with wireless equipment. The contract amounts to $[illegible],000 and provides that all additional ships to be built by the shipping company in the next three years shall be equipped with these wireless systems. The company some time ago increased its capitalization to $100,000, and is preparing to enlarge its factory. F. C. Simpson, manager.

The Northwest Steel Company, Portland, has announced that in addition to the other structures planned it will erect a complete [illegible] building 90 x 100 ft., to cost about $6,000.

The Chevrolet Motor Company, Detroit, plans the construction of an assembling plant in Portland. The site is already selected. The structure will be 100 x 200 ft., and will cost $100,000.

The American Dredge Building & Construction Company, Seattle, has received contracts for construction of three gold-dredging machines, costing about $150,000, to be sent to Alaska early next spring.

The Pressed Steel Car Company, Seattle, has received a contract from the Northern Pacific Railway for 350 all steel ore cars, to cost $1,500 each.

The Washington Oregon Shipbuilding Construction Company, Seattle, Wash., will shortly file articles of incorporation and plans to erect a shipbuilding plant in Aberdeen, Wash. The head offices will be in the Pacific Block, Seattle, and P. J. Donovan, Seattle, will be superintendent in charge of the work. The company has contracts on hand for construction of six [illegible]-powered wooden ships, totaling $1,[illegible],000. When completed the plant will have ways for building 10 ships.

It is announced that plans and specifications are now under preparation in the drafting department of the Pacific Coast Steel Company in San Francisco for the proposed rolling mill plant to be erected in Portland, Ore. William Pigott, Seattle, is president and manager of the company. The initial plant will manufacture reinforcing and merchant bars, [illegible] and will be later enlarged to make open hearth [illegible]. The [illegible] is to cost $250,000.

Barbare Brothers, shipbuilders, Tacoma, recently received contracts for 11 fishing boats to cost $55,000 each.

The Seattle Dock Company, San Francisco, recently incorporated with a capital of $[illegible], has purchased the Hurlbut Boat Building [illegible] on the property [illegible] the Seattle Engineering Company, Fairview avenue, near Pratt street. The new plant [illegible] of boats, engines [illegible] well equipped, having a wood-working shop, metal foundry, [illegible] shop, which has been [illegible] and will be [illegible].

tools added, including [illegible] for [illegible]. The Gorham Engineering Company retains its patents and designs.

F. O. Stallman, formerly vice-president and manager of the Pacific Tool & Supply Company, San Francisco, recently opened an establishment at 129-131 First Street, known as the F. O. Stallman Supply Company, with a line of machine tools and general shop supplies.

The Ames Shipbuilding Company, Seattle, which has been buying its engines and boilers in the East, is preparing to have the power equipment built near San Francisco.

The roundhouse and machine shop of the Nevada Copper Belt Railroad, Mason, Nev., was totally destroyed by fire Nov. 17, all tools being lost.

The Trades Brass & Machine Works, Seattle, has been incorporated with a capital stock of $100,000 by L. E. Smith, P. W. Allen, H. T. Graham, and others.

The Universal Grinding Machinery Company, Reno, Nev., has been incorporated with a capital stock of $1,000,000 by W. M. Gardiner, Leon S. Meyer, and J. N. Norris.

Wright & Smith, Seattle, machine-shop operators, have incorporated with a capital of $25,000.

Construction was commenced about Nov. 15 on the new steel shipbuilding plant of the Albina Engine & Machine works, Portland, which has contracts for several large vessels for Norwegian interests.

It is announced that the Utah Copper Company and the American Smelting & Refining Company will spend about $10,000,000 in the next two years on improvements to their plants near Salt Lake City; also that the Tacoma, Wash., smelter is to be further enlarged to handle the increasing shipments of ore from South America.

H. Hackfeld & Co., agents for the Oahu Sugar Company, Honolulu, have placed a large order with the Honolulu Iron Works for additions to its plant, including a large grinding mill, additional boilers and engines, and electrical equipment.

Libby, McNeill & Libby, Chicago, Ill., are building a plant in connection with their pineapple cannery in the Hawaiian Islands for the handling of pineapple waste. The machinery, including several sets of rollers, engine and crane, will be furnished by the Honolulu Iron Works.

Canada

TORONTO, Dec. 4, 1916.

Representatives of the Imperial Munitions Board, Ottawa, have a staff at Trenton, Ont., overseeing the erection of about 60 buildings on a site of 140 acres on the east side of the Trent River. The Gaylord Engineering & Construction Company, Scranton, Pa., and Binghamton, N. Y., has about 400 men at work erecting 28 buildings, and the Pratt Engineering Company, New York City, is making preparations to erect as many more. The plant will be used to manufacture war munitions for the Imperial Munitions Board.

The Empire Brush Company, 16 Pearl Street, Toronto, is in the market for new machinery estimated to cost $2,500, which includes a clinching and nailing machine. No. 1 Liebig machine, etc.

The Cummer-Dowswell Company, Elgin Street, Hamilton, manufacturer of washing machines, etc., will erect an addition to its plant to cost $16,000.

The Tallman Brass Company, Sanford Avenue, Hamilton, will erect an addition to its plant to cost $4,000.

Construction work will commence on a building for Forgings, Ltd, 502 Lumsden Building, Toronto, to cost $3,000.

Construction work has begun on the erection of a factory for W. H. Banfield & Son, 372 Pape Avenue, Toronto, manufacturers of drop and steam power hammers, forges, etc., to cost $10,000.

Stauntons, Ltd., 944 Yonge Street, Toronto, will build a boiler-room and garage to cost $7,000.

The Toronto Laundry Machine Company, 803 Dundas Street, Toronto, is building an addition to its plant to cost $7,500.

The British Chemical Company has awarded contract to the Gaylord Engineering & Construction Company for the erection of its plant at Trenton, Ont., including about 40 steel and concrete buildings, to cost $500,000.

The British Munitions, Ltd., Montreal, is building an addition to its plant at Verdun, Que.

Halley & Sons, St. Stephen, N. B., have commenced the erection of a lumber plant to cost $30,000 to replace the one destroyed by fire a short time ago. Sawing and planing machines, lathes, etc., will be required.

The Board of Control, Toronto, will receive tenders until [illegible] for the installation of centrifugal sewer pumps at the main sewage pumping station. T. L. Church is chairman of the board, and specifications may be obtained at the City Hall.

The Sault Shipping Company, Ltd., Sault Ste. Marie, Ont., has been incorporated with a capital stock of $300,000 by Alexander T. Taylor, Rex A. Nicholson, 21 Sussex Avenue; Joseph G. Gibson, and others to build and operate steamers, etc.

The D. Burtch Mfg. Company, Ltd., Toronto, has been incorporated with a capital stock of $50,000 by James McMillan, Delbert Burtch, 114 Armstrong Avenue; Rupert K. Grimshaw, and others to manufacture farm and dairy machinery, implements, etc.

The Pairless Horse-Shoe Nail, Ltd., Toronto, has been incorporated with a capital stock of $600,000 by Wilson, Rudd 89 New Oxford Street, London, W. C., England; Edward T. Thomlinson, 24 Holborn London, E. C., and others, all of England.

The Dominion Forge & Stamping Company, Ltd., Walkerville, Ont., will increase its capital stock from $500,000 to $1,000,000.

The Myer's Box Company, Granby, Que., will build an addition to its factory to cost approximately $10,000. A. S. Myer is superintendent.

Thomas Ramsay, 17 Market Street South, Hamilton, is having plans prepared for a garage to cost $15,000.

Richardson & Co., Port Arthur, Ont., propose to let contracts for an elevator to have a capacity of 2,500,000 bu. R. D. Morgan is manager.

Work will be commenced at once on a plant for the Canadian Cooperage Mfg. Company at Smith's Falls, Ont. to cost $20,000. F. F. Kessel, manager, is in the market for machinery, including a 75-hp. engine, motor, etc.

Sheldon's, Ltd., Galt, Ont., manufacturer of blowers, fans, heating and drying apparatus, etc., will build a brick plant to cost $18,000.

The Granby Chair Company, Granby, Que., has awarded the contract for the erection of an addition to its factory to cost $10,000.

The Dalyte Lamp Company, Guelph, Ont., will build an addition to its factory to cost $15,000.

The Nova Scotia Steel & Coal Company has commenced the erection of an addition to its plant at New Glasgow, N. S.

The Hamilton Gear & Machine Company, 15 Van Horne Street, Toronto, is building an addition to cost $7,500.

The Sterns Tire & Tube Company of Canada, Ltd., Windsor, Ont., will commence at once the erection of a plant for the manufacture of an automobile tire.

The Winnipeg Machine Exchange, Sutherland and Gladstone streets, Winnipeg, Man., is in the market for a boring [illegible] with 30 to 42 in. table.

H. M. Ashby, general manager Sherwin-Williams Company of Canada, announces that his company will build a large dye plant at Montreal.

The White Pass & Yukon Line, operating in Alaska, with offices in Vancouver, B. C., plans considerable development work with the construction early next year of two steamers to cost $1 [illegible] each. H. Wheeler is manager.

Government Purchases

WASHINGTON, D. C., Dec. 4, 1916.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, Dec. 19, schedule 470, for one punching machine for Philadelphia.

Bids were received at the Bureau of Supplies and Accounts, Navy Department, Washington, Nov. 28, for supplies for the naval service as follows: Schedule 341, Yards and Docks, Class 51, Norfolk—for two 15-ton 8-wheel locomotive cranes, the Browning Company, $18,565; the Industrial Works, $23,200; Link-Belt Company, $20,347; McMyler Interstate Company, $18,580.

The following bids were received Nov. 11 at the Bureau of Yards and Docks, Navy Department, Washington, for [illegible] locomotive jib crane of 50 gross tons capacity, at Pearl Harbor, Hawaii:

[illegible] specified 2, same, bidder's specification [illegible] steam crane as specified; 4, same, bidder's specification [illegible]

[illegible] Company, New Bedford, Ohio, [illegible]; item 4, $155,552.

[illegible] & Co., Cleveland, Ohio, item 2 [illegible].

THE IRON AGE

New York, December 14, 1916

ESTABLISHED 1855

VOL. 98: No. 24

Bethlehem Ore Dock in New York Harbor

Features of the Hulett and Mead-Morrison Unloaders Provided to Serve the Various Classes of Ocean-Going Vessels

Several unusual features have been provided in the new ore unloading dock of the Bethlehem Steel Company at Constable Hook, Bayonne, N. J., which will be ready for the unloading of ore from boats in the latter part of this month. The unloading plant consists of an electric substation, a machine shop, a Hulett automatic unloader of the stiff-leg type, and a Mead-Morrison unloader having a grab bucket operated by the rope system. Two types of ore unloaders were installed because of the differences in boats that will be unloaded. The Hulett machine is especially adapted for unloading modern ore boats with many large hatches, while the Mead-Morrison unloader can operate advantageously in tramp steamers having restricted openings.



Iron Ore Unloading Dock of the Bethlehem Steel Company at Constable Hook. On the left is a Hulett Stiff-Leg Machine and on the right a Mead-Morrison Grab-Bucket Unloader

The machines operate on 62-ft. 10-in. runways extending the entire length of a pier 1060 ft. long. The pier is provided with four railroad tracks under the unloaders. The slip alongside is dredged to a depth of 35 ft. of water at low tide and is connected with the main ship channel to New York harbor by a channel 35 ft. deep, 250 ft. wide at the bottom and 1400 ft. in length.

THE HULETT MACHINE

The Hulett unloader operates a clam-shell bucket of 17 tons capacity. This is rigidly attached to the lower end of a rotating vertical stiff leg carried by a walking beam mounted on a trolley which traverses a runway on the main frame. The main frame is propelled along the pier to line up with the cargo hatches of a ship being unloaded. The bucket discharges its contents into a 50-ton hopper which is located at the slip end of the main frame. This receiving hopper discharges by motor drive into a 30-ton scale hopper mounted on a larry car, which travels on a runway on the main frame so as to register the scale hopper directly above railroad cars on any of the four tracks beneath the machine. This weighing arrangement insures all cars being loaded to their indicated carrying capacity. The operating range of the machine is such that the bucket can extend 66 ft. from the face of the wharf, 44 ft. above and 10 ft. below the water at low tide. All the operations of lowering and hoisting, opening and closing the bucket, rotating the bucket leg, trolley traversing and moving the machine along the dock are under the control of one operator who is located in the bucket leg just above the bucket. In this location the operator travels with the bucket and is thus enabled to have an unobstructed view of it in all positions.

The weighing of the ore and its discharge into cars are under the control of another operator, located on the traveling larry car. The total weight of the Hulett machine is 850 tons and is carried on 48 wheels. The power equipment is as follows:

[illegible]	[illegible] motor
Trolley traverse	one 100-hp. motor
Bucket operating	one 100-hp. motor
[illegible]	[illegible] motor
[illegible]	[illegible] motor
Larry travel	one 30-hp. motor
Larry hopper	one 30-hp. motor
Propelling gear	one 100-hp. motor

This machine will average one trip per minute, handling 17 tons per trip when working in the

hold of a ship with no obstructions to the free action of the bucket.

The 6000-lb. overbalance of the walking beam is just sufficient to allow the bucket to lower by gravity. This gives a low-power consumption per ton of ore handled, as the walking beam is nearly balanced. The bucket has a long reach for scraping the bottom of a boat in cleaning up, handles large quantities of ore per trip and is very easy of control. This type of unloader is used to a large extent at Great Lakes ports. However, the installation at Constable Hook is the first machine of this type at tidewater. Some modifications were required to adapt this machine to unload ocean-going tramp steamers, as well as modern vessels with open holds, such as are now being built by the Bethlehem Steel Company.

THE MEAD-MORRISON MACHINE

The Mead-Morrison rope system unloader operates a 5-ton rope-suspended clamshell bucket. It employs a hinge type of boom of sufficient length to allow the bucket to reach 60 ft. from the face of the wharf. The overhead clearance is 48 ft. above the water at low tide. The bucket discharges its contents into a 50-ton receiving hopper at the front end of the machine on the main tower. Motor-operated gates on the receiving hopper control the discharge of the ore into a 30-ton scale hopper, mounted on a traveling larry car, which conveys the ore to the railroad cars on any of the four tracks beneath the machine. The operator of the ore bucket is located in a stationary house near the top of the main frame at the wharf side. The rope-system machine weighs about 250 tons and is carried on 40 wheels. The motor equipment is as follows:

Hoisting	300-hp.
Trolley traverse	60-hp.
Propelling gear	60-hp.
Receiving hopper	24-hp.
Larry car travel	12-hp.
Larry hopper	12-hp.

This machine is capable of making two round trips per minute, carrying five tons per trip when the bucket has free access to the cargo. It can use a smaller clam-shell bucket which will reach the cargo in a tramp steamer having stanchions between decks, narrow alleys along shaft tunnels, etc., which would be inaccessible to the Hulett unloader. The clam-shell bucket can be removed and a hook substituted for handling small scoop buckets where it is necessary to shovel the ore by hand.

ELECTRIC SYSTEM AND CONTROL

The electric-control apparatus on the two unloaders was furnished by the Cutler-Hammer Company and the motors by the General Electric Company. The electric power to operate the unloaders is purchased from the Public Service Electric Company of New Jersey, at 2200 volts, 2-phase, 60-cycle, alternating current. The unloaders use direct current at 250 volts, with a complete metallic circuit. A sub-station was installed to transform the alternating current into direct current. All the sub-station apparatus, which was furnished by the General Electric Company, is as follows:

2 rotary converters, each rated at 500 kw., 2 phase, 60-cycle, 600 r.p.m., 250 volts d.c.

4 single-phase transformers (two for each rotary converter), each rated at 270 kva., 2200-180 volts, 60 cycles, oil-insulated, self-cooled.

1 motor generator flywheel balancer of 250 kw. capacity, 250 volts d.c., speed range 550 to [illegible] r.p.m.

The armature shaft of the machine carries a flywheel consisting of a number of steel plate disks riveted together. This wheel weighs 12,500 lb., and when running at full-rated speed has a peripheral speed of 22,000 ft. per minute. The machine absorbs energy from the source of supply when the power requirements of the unloaders are light, and gives out energy to the unloaders at maximum power-demand periods, by virtue of the energy stored in the flywheel. The maximum demand on the generating station supplying the sub-station is reduced so that a lower power rate can be secured, as the electric power is purchased on a maximum demand basis. One rotary converter and the flywheel set are of ample capacity for operating the unloaders.

An underground conduit system of six 750,000 c.m. lead-covered copper cables connects the sub-station with the contact rails that feed the unloaders. This contact rail system consists of two 85-lb. standard railroad steel rails, one above the other and 750,000 c.m. bare copper cables clamped to the rails for continuous bonds. Porcelain insulators with hook bolts through rail supporting brackets clamp the head of the contact rail, and the contact shoes on the unloaders run on the under side on the base of the rails.

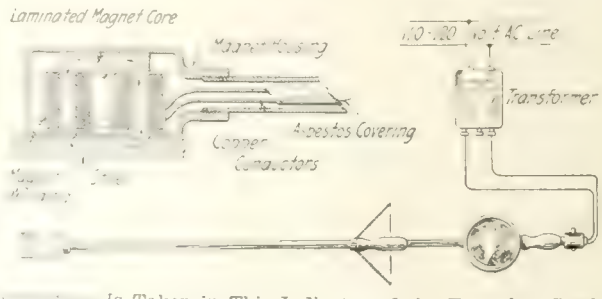
The machine-shop equipment consists of a Putnam 42-in. x 10-ft. engine lathe, a Reed Prentice 16-in. x 4-ft. lathe, a 32-in. shaper, a 5-ft. radial drill, a 31-in. sliding head drill press and a double-ended emery grinder. Each machine tool is equipped with individual motor drive for 2-phase, 250-volt, 60-cycle current, which is supplied by two 15 k.v.a. transformers in the sub-station. The rotary converters will operate only when the unloaders are in operation. The complete lighting is for 250 volts, alternating or direct current. A one-story brick building contains the machine shop, office, storeroom and sub-station.

All the dock equipment is calculated to unload any class of ocean-going vessel with a saving in time and expense. The Lehigh Valley Railroad serves the ore dock and is interested in it.

Indicating Critical Point in Heat Treatment

The Gibb Instrument Company, Inc., Highland Building, Pittsburgh, has put on the market an instrument, known as the Crit-Point, for determining the critical point in the heat treatment of steel. The construction of this new device is clearly shown in the accompanying drawing.

The temperature at which this critical point is reached in each steel is determined in the laboratory by the aid of apparatus, and in practical application the



Is Taken in This Indicator of the Fact that Steel [illegible] Magnetic Properties when Brought to the Critical Point in Heat Treatment

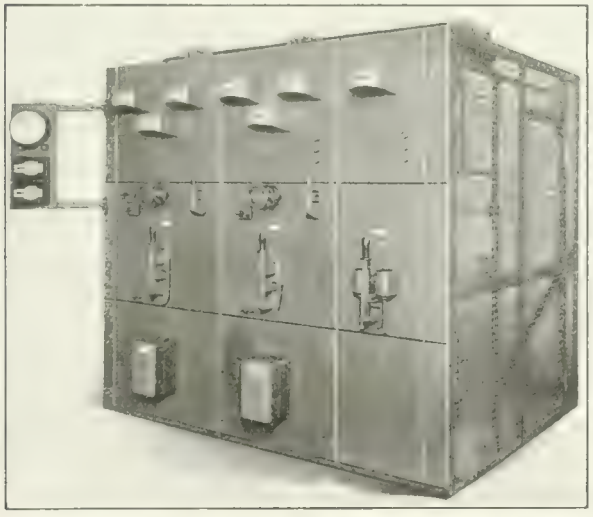
furnace temperature is raised somewhat above this point. The steel is put in and is brought up to what [illegible] supposed to be the temperature of its critical point. It is a well-known fact that steel in the process of heating loses its magnetic properties when it is brought to its critical point and the Crit-Point takes advantage of this infallible phenomenon.

Through the medium of magnetic coils, contact is made with the steel in the furnace. A magnetic indicator is placed in the circuit, which is connected through a small step-down transformer with a source of alternating current and immediately indicates whether or not the steel has reached its critical point The surface of the steel in time becomes non-magnetic, or, in other words, is brought up to the critical point. This is indicated on the meter by an approach of the needle toward the red line indicative of the critical point. As the heat penetrates the steel, and the interior is brought to the critical temperature, the needle on the indicator continues to approach the critical-point mark. The Crit-Point, it is pointed out, does not measure temperature. When the critical point is indicated on the meter, no indication is given of what the temperature might be. The knowledge of this temperature is irrelevant; the steel is at or above the critical point.

A Switchboard of the Dead Front Type

The switchboard department of the General Electric Company, Schenectady, N. Y., has developed a type of switchboard for general power and lighting service up to 3500 volts in which live parts are inaccessible from the front of the board. The live parts of the current and potential receptacles are recessed to make accidental contact with them difficult. Further protection is afforded by grille work screens having hinged doors and spring locks. In this way it is impossible for any one other than an authorized person holding the key to enter the space at the rear of the switchboard.

Disconnecting switches are employed between all oil circuit breakers and busbars and provide for the convenient and rapid isolation of the breakers from the buses for inspection, changing oil or repairs without danger. The board is equipped with calibrating receptacles on the front of the panel instead of the usual calibrating switches at the rear, an arrangement which,



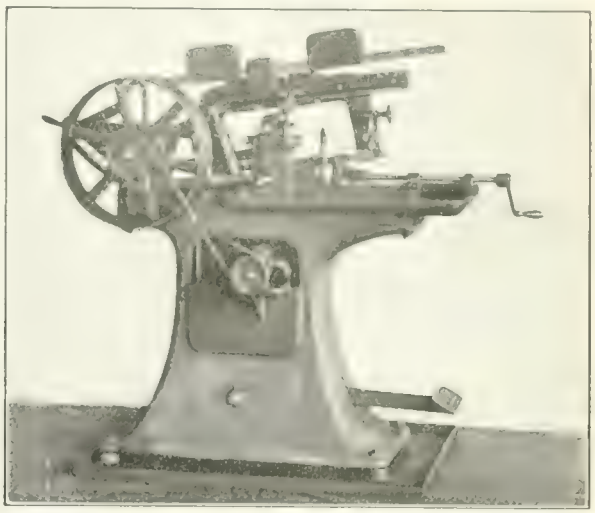
All Live Parts Are Inaccessible from the Front of This Alternating-Current Switchboard Except the Current and Potential Receptacles Which Have Their Live Parts Recessed to Make Accidental Contact Difficult

it is pointed out, permits safe and convenient calibration of instruments and meters from the front, the insertion of plugs in the calibrating receptacles connecting the testing instruments in series with the one undergoing test. Removable fuse receptacles of the screw plug type are provided and enable the secondary potential transformer fuses to be replaced from the front of the switchboard without danger of contact with live parts.

The third annual safety exhibition of the Ohio Industrial Commission will be held at Columbus, Ohio, March 5 to 10. Arrangements for the exhibits will be made at an early date, and Memorial Hall has been selected as headquarters. Manufacturers may obtain further information from J. Y. Bassell, Columbus Chamber of Commerce.

Hack Saw Machine with a Treadle

The L. S. Starrett Company, Athol, Mass., has put a hack-saw machine on the market. Aside from the fact that the machine represents a new line for the company, it is of interest in that it has a treadle for raising the saw frame, an oil dashpot control for



A Treadle Arrangement Is Employed to Raise the Saw Frame in This Hack Saw Machine Instead of Requiring the Operator to Lift It

the descent of the blade, a stroke adjustment and a frame-locking device.

The saw frame is mounted on a rectangular slide with a bearing 11¼ in. long. An adjustment for wear is provided as well as a quick-acting tightening device to hold the blade at right angles with the work being cut. The stroke of the saw is adjustable for stock ranging from 1 to 6 in. in diameter, and it is possible to use practically the entire length of the blade, which, it is emphasized, insures uniform wear and faster cutting.

The descent of the saw to the work when the machine is started is controlled by an oil dashpot. This arrangement, it is explained, makes it possible to start the machine with the frame up and is relied upon to prevent the latter from dropping and breaking the saw. The blade is also gradually lowered to the work with the result, it is pointed out, that the teeth do not bite in rapidly and become stripped or the saw broken. The treadle at the right of the base is employed for raising the saw frame. In this way the weight of the operator brings the saw up instead of requiring an expenditure of his strength in lifting, a feature which tends toward greater speed. The saw is prevented from dragging on the return stroke by an automatic locking device, which also keeps the frame at any height when the machine is stopped for setting the work.

A tank for cutting compound and a pump are located in the interior of the base. If desired, they can be removed readily for cleaning, although it is explained that this is seldom required, since the chips are retained in the pan of the bed and are easily taken away. While the machine is intended to take the builder's standard 14-in. blade, 12 or 13 in. blades can also be used. The over-all height is 48 in. and the distance from the floor to the top of the table is 28 in. The floor space occupied measures 14 x 32 in.

Another Stainless Steel

Harry Brearly, Sheffield, England, has patented in this country (U. S. 1,197,256) a non-tarnishable alloy containing 9 to 16 per cent of chromium and less than 0.70 per cent carbon. A typical composition has 0.30 per cent carbon, 0.30 per cent manganese and 13 per cent chromium. Small amounts up to 1 or 2 per cent of nickel, copper, cobalt, tungsten, molybdenum and vanadium are said to be without effect on the untarnishable properties.

The Power-Forging of Chain Cables*

How the Substitution of Power for Hand Welding Produced Better Chain and Worked an Economic Revolution in the Industry

BY FREDERIC G. COBURN†

There has been developed, during the last two years, at the Boston Navy Yard, a power-forging process for the manufacture of chain cables. Chain cables up to 2¾ in. diameter were manufactured by hand without any serious mechanical difficulties. Three-inch cables, however, presented difficulties due to the size of the metal and the hard labor required of the chain makers' helpers.

The Panama Canal Commission required 3-in. guard chains for the Panama Canal and called for an ultimate breaking stress of 525,000 lb. for stud-link chain and desired the same strength for 3-in. open-link chain. It was found necessary subsequently to reduce the requirement to 500,000 lb. and later to 450,000 lb. Private chain makers were unable to make the chain as good as that manufactured at the navy yard. Illustrations Figs. 1 to 4 show test triplets submitted to the Panama Canal Commission by the private manufacturers. It will be noted that the hand-welded links are irregular in shape or reduced in diameter adjoining the weld, and are obviously inferior to the power-welded links.

The inferiority of hand-made welds is due to the fact that the helpers cannot hit hard enough with their sledges to drive the scarfs together. The welding surfaces are not smooth since they are made by peening, forming pockets which retain slag which is not worked out by the hammering. Fractures in old chains show that not over 10 per cent of the surface was welded. The strength of the chain was due to its form, assisted by the tacking together of the scarfs. In the large chains it is impossible to finish the inside of the link at the welded end, thus leaving a hole and reducing the sectional area. Another serious defect in hand-welded chain is the wasting of material in the fire just back of the weld.

The power-welded process as experimentally developed consists briefly of shearing the bar to length in a power shear; bending up the end in a 6-in. Ajax upsetting machine; forming the scarf under a 2500-lb. steam hammer; bending the link by hand around a mandrel; welding the link under 350-lb. single frame steam forging hammer, finishing the link under dies fitted to 3000-lb. double frame forging

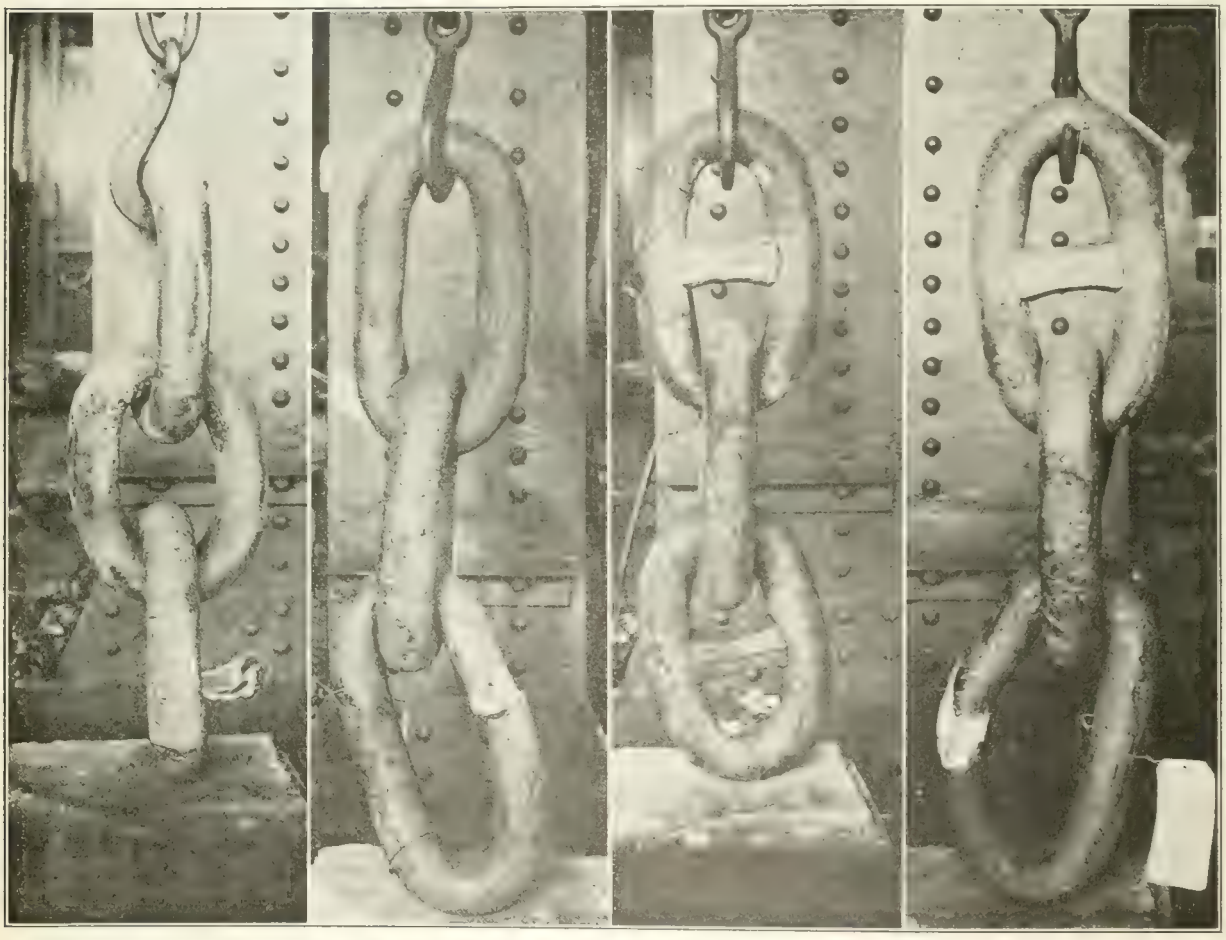


Fig. 1—Hand Welded Triplet No. 2, Open Link Chain. Note irregular shape of middle link. Fig. 2—Hand Welded Triplet No. 2, Open Link Chain, After Test to Destruction. Note lifeless appearance. Broke at 364,000 lb. 525,000 lb. required. Fig. 3—Hand Welded Triplet No. 1, Stud Link Chain. Rough and irregular. Fig. 4—Hand Welded Triplet No. 1, Stud Link Chain. Tested to Destruction. Broke at 390,000 lb. 525,000 lb. required

*Abstract of a paper read at the twenty-fourth g[illegible] meeting of the Society of Naval Architects and Marin[illegible] neers, New York, Nov. 16, 1916.

†Naval constructor, United States Navy.

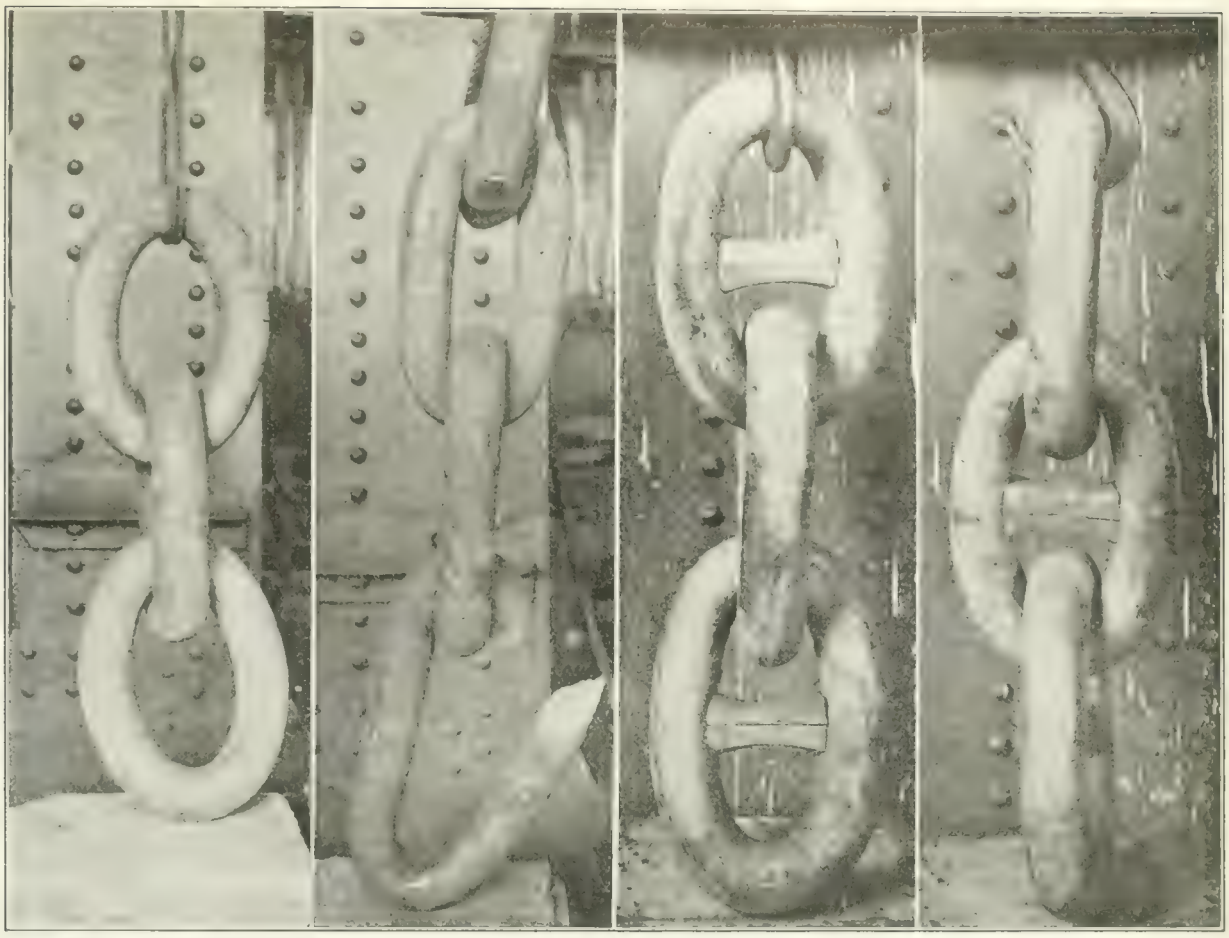


Fig. 5. Power Welded Triplet No. 3, Open Link Chain. Smooth forge, regular in shape. Fig. 6. Power Welded Triplet No. 3, Open Link Chain. Tested to destruction. Looks tough and well put together. Broke at 532,000 lb. 525,000 lb. required. It exceeded the requirement for stud link chain. Figs. 7 and 8—3¼-In. Test Triplets. This chain weighs 595 lb. per fathom, and runs 6 links per fathom. Ultimate strength 612,000 lb. For battleships of the Pennsylvania class

hammer; trimming off the "flash" by hand. The chain made by this process looked well, but would not meet the breaking stress requirements. This fault was remedied by heat treatment.

It had been suggested that the chain be quenched from a temperature above the critical point and vibrated, if possible, with a view to stiffening and strengthening it. The opposite treatment, however, namely, an air quench from a temperature slightly above the upper critical point was found to be the one needed. The reason for this is that that severe hammer blow on the link by the steam hammer stiffens it in the welded quarter and partial annealing is required to soften it enough to make the quarters deform under the shearing stress which obtains there. This permits the total stress to run up until the fracture can be obtained by a combination of shear and tension. The power welding and heat treatment process permitted the manufacture of open-link 3-in. chain which would stand a stress



Fig. 9—Upsetting the Bolt

Fig. 10—Scarfing the Bolt



Fig. 11—Bending the Bolt. Ready to bend



Fig. 12 Bending the Bolt. Prying scarfs apart

as high as 550,000 to 560,000 lb. The work done up to this point was of an experimental nature, and on July 31, 1914, authority was given by the Navy Department to proceed with the chain making on a manufacturing basis by means of the power-forging process.

During the fiscal year ending June 30, 1916,



Fig. 13—Threading the Preheated Link

the Boston Navy Yard manufactured about 9 miles of chain ranging in diameter from 2½ to 3⅜ in. inclusive. The cost of the 3¼-in. chain was practically $6.00 per foot or 6 cents per pound, which cost is still considered high because it will be possible to effect further improvements in the manufacturing process. The relative rate of speed of the hand-welding and power-welding process is as follows: The production of 3¼-in. cables by hand-welding was three links in two days per gang, at which rate a single gang would require seven years to make the cables for a battleship of the Pennsylvania class. The production at the present by means of power welding is at the rate of 20 links per gang per day.

In the manufacturing process, the bar iron, after being sheared into lengths or bolts, is transported in baskets, a ton or more at a time, to the upsetting and scarfing machine. Each scarfing unit consists of a special furnace, an upsetting machine and a drop hammer arranged practically in the arc of a circle. The furnace is charged with from 6 to 12 bolts, depending upon the diameter. Each bolt is heated for a length of about one foot and is then upset in the machine, as shown in Fig. 9. In the same heat the bolt goes directly from the upsetting machine to the 2500-lb. hammer, where it is scarfed, as shown in Fig. 10. The flash from the drop forging is removed and the process is repeated to scarf the opposite end of the bolt.

From the scarfing operation, the bolts go to the link-bending plant, consisting of a hydraulic forging press of capacities of 40, 60 and 100 tons respectively. Ordinarily only the 40-ton cylinder is used and the process of bending the link is illustrated in Figs. 11 and 12. The mechanism for bending the link is mounted on a sole piece bolted to the body of the press. It consists of a stationary mandrel of the size and shape of the inside of the link. The bolt is clamped into the press with one of the scarfed ends fitting snugly one end of the mandrel. When the press comes forward the small wheel, shown in Fig. 12 as touching the link, wipes



Welding Operation on Dolly Dies

the bolt around the mandrel, leaving it in the position shown in the illustration. The small wheel is carried on an arbor attached to a toothed wheel revolving about the geometrical center of the mandrel. The wheel is rotated by a sector which rotates about an arbor fixed to the sole piece of the mechanism. It is pushed and pulled by a link secured to its end and to the head of the press. As soon as the chain link has been wiped around the mandrel, the scarfs are pried apart with a crow bar.

The welding plant consists of two hammers, a 3000-lb. double-frame steam forging hammer, and a 350-lb. single-frame steam forging hammer, both operated by compressed air. The 3000-lb. hammer is fitted with dies, similar to drop-forging dies, in which there is an impression of the shape of the link. This impression is not the final shape of the completed link, but is such that when the link is hammer, it is not in perfect shape. It is, therefore, re-heated and when at welding heat is struck several blows by the dies in the 3000-lb. hammer, thus forming the link perfectly and completing the welding.

The plant illustrated is one in which the process was developed but new plants will consist of one double-frame 1800-lb. steam drop hammer, on either side of which will be installed a 250-lb. single-frame forging hammer, one being left-handed and the other right-handed. This arrangement permits two gangs to work on opposite sides of the large hammer, each having its own crane, fire and small hammer, and dividing the cost of the large hammer between them.

All experimental work was done with cast-iron dies. Early dies were made by "rule-of-thumb" and a process of trial and error, which, however, gradu-



Fig. 15. Second Welding Operation

stretched to proof stress, it will take the shape specified on the standard plan.

Immediately after the link has been completed in the chain, a new link is threaded through it, being brought from a preheating furnace. The chain being made is carried on a low jib crane with a trough running from the end of the jib to a point about 4 ft. from the ground. The new link having been threaded in, the chain is swung over to the large hammer and closed down in the dies. The link is then heated for the first welding heat in an oil forge of the ordinary type, excepting that it has an unusually large area of flame duct and combustion chamber.

The division of labor in welding is: One man to operate the hammers, one to operate the hoist and swing the crane, a mechanic and his helper to grab the link with a special pair of tongs, and a fifth member of the gang, who tends the fire, helps with the chain under the hammer, swings the crane and assists in setting the stud.

The scarf is thoroughly hammered under the 350-lb. hammer, which is fitted with special dies with horns in the form known as "dolly dies," and the slag worked out from between the welding surfaces. This is the most important part of the welding process. While the link is welded in the 350-lb.

ally developed into an engineering problem. Steel dies were next put in service and experiments made with cut and cast-steel dies, in which the latter proved to be superior, being cheaper and lasting fully as well. At the writing of this paper a pair of cast-steel dies have been in service 24 hours per day for almost every working day during a period of eleven months. They are still in good condition.

It is interesting to note the economic significance of this power-forging process of making chain, as it is an excellent illustration of the division of labor which always results in the application of power for operation. Where one gang performed the operations of scarfing, bending, welding, finishing, etc., it was impossible to substitute a machine for the gang. But when the process was divided into its integral parts, then it was found that each little part was a simple one, to be done over and over again, and lending itself to the application of power. It has also this significance—that where the hand-welding process required a high-grade mechanic on each operation, the power process required a high-grade mechanic on only one operation —that of welding. The other operations are so simple that a helper can be used, the helper being carefully taught the particular part of the process that he will have to perform.

Sulphide and Oxide Inclusions in Steel*

A New Metallographic Method for Distinguishing Them—Light Gray Spots Not Always Sulphides – Some Practical Examples

BY GEORGE F. COMSTOCK

IT seems a common opinion among metallographists that all light-gray inclusions seen with the microscope in polished sections of steel are manganese sulphide. Examples of this belief are continually appearing, as for instance in the paper by Dr. Henry Fay on manganese sulphide as a source of danger in steel rails,† and in Lieutenant-Commander Cook's paper on "The Metallography of Steel for U. S. Naval Ordnance."‡

Slate-colored inclusions are considered to be silicates, and dove-gray inclusions, manganese sulphide. To show the danger in the latter unqualified assumption, it should be sufficient to examine the edge of any piece of steel that is covered with a fairly thick scale, and that has been polished in such a way as to prevent the scale from breaking away entirely below the polished surface. This can be done by protecting the scaled edge of the specimen with some soft metal, or fusible metal applied molten, or ordinary red fiber such as electricians use for insulating. An examination of this scale, if the polishing has been done well, and the sample is preferably unetched, will show it to be light gray, and apparently "manganese sulphide." We know, however, that scale is chiefly iron oxide, and contains sulphur only as an impurity. Its similarity in appearance to manganese sulphide is shown in Fig. 1, which is a transverse view of the edge of a small hot-rolled steel rod, magnified 200 diameters. The steel has been etched with picric acid, but the gray scale can be plainly seen at the edge of the metal. The very dark material beyond the scale is the red fiber in which this specimen was clamped to prevent the scale from falling away during polishing.

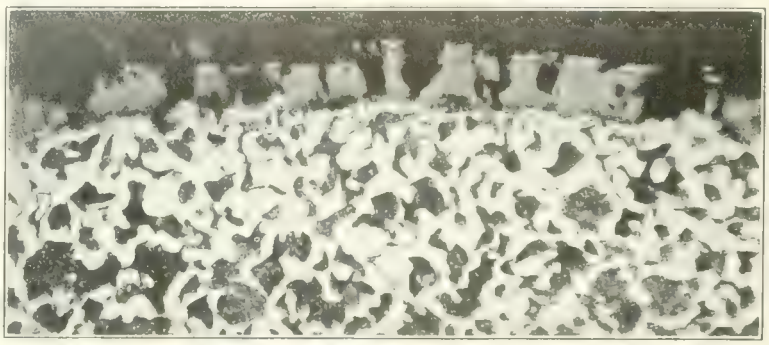


Fig. 1—Transverse View of the Edge of a Small Hot-Rolled Steel Rod. Etched with Picric Acid, Magnified 200 Diameters

In the course of several years' work with the microscope on rail steel and other commercial steels the writer has not infrequently seen light-gray inclusions that, from evidence given by sulphur prints, or for other reasons, did not seem likely to be sulphides, and in some cases these were known without any doubt to be oxides, like the scale above mentioned. Finally, a case of some importance arose, where it was desired to know definitely whether certain light-gray inclusions were sulphides or not, and it was not possible to decide the question from their color alone.

Reference to the standard textbooks on metallography did not help much, for the only real test described for distinguishing oxides from sulphides involved heating the polished sample in a current of carefully purified hydrogen, and this method was considered as too complicated and necessitating too much preparation and practice. Etching with weak organic acids was not found satisfactory, and neither was the method of using a drop of sulphuric acid and watching for bubbles of hydrogen sulphide gas. Tried with known sulphide inclusions, both these methods attacked the steel itself too strongly, or else, if the acids were weakened, had no effect either on steel or sulphides. It was finally decided to get together a few specimens containing sulphides, and others in which oxides were known to be present, and to try various solutions on them until one was found that would attack one type of inclusion and not the other.

This work had not progressed very far when it was remembered that boiling alkaline sodium picrate, which is used to darken cementite, having no effect on ferrite and very little on pearlite, was always found to attack the sulphide inclusions in a sample, leaving black pits instead of the light-gray spots seen before etching. Fig. 2, for instance, shows some sulphide inclusions in a polished section, unetched, cut from a segregated streak in a steel rail, where sulphur prints indicated the presence of high sulphur. This same spot etched with boiling alkaline sodium picrate is shown in Fig. 3, where the sulphides are seen to have been blackened by this reagent. The darkening seems to be due to an actual



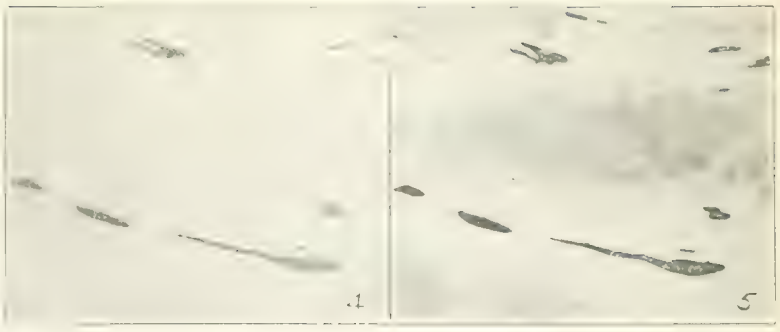
Sulphide Inclusions in Steel Rails [illegible] Streak in a [illegible] Fig. 3 has [illegible]

*From a paper to be presented at the meeting of the American Institute of Mining Engineers in New York in February, 1917. The author is metallographist, physical testing laboratory, Titanium Alloy Mfg. Company, Niagara Falls, N. Y.

†A Microscopic Investigation of Broken Steel Rails: Manganese Sulphide as a Source of Danger. *Proceedings* of the American Society for Testing Materials, Vol. 8, p. 74 (1908).

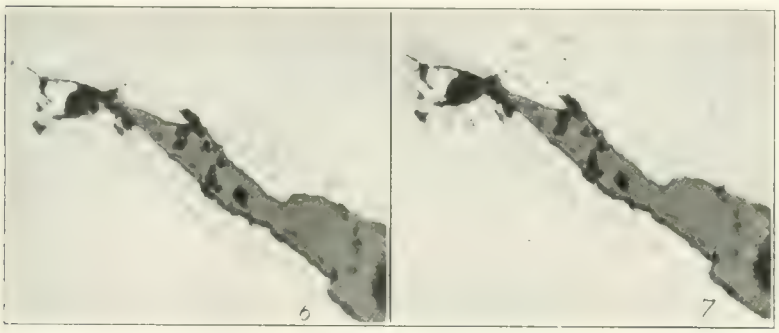
‡*Transactions* American Institute of Mining Engineers, Vol. 53, p. 238 (1915).

solution of the manganese sulphide in the etching liquid, so that instead of a smooth polished surface, we now have a surface full of pits or hollows, where the sulphides were, and as these hollows do not reflect any light back into the microscope with vertical illumination, they appear black in the field of view. Figs. 4 and 5 show some other sulphide inclusions in a shell-steel billet, before and after etching, respectively. In this lower-carbon steel the ferrite-pearlite structure is brought out faintly by the etching, but not enough to interfere with the distinct blackening of the sulphides.



Sulphur Inclusions in a Shell Steel Billet, Magnified 130 Diameters. Fig. 4 is unetched and Fig. 5 has been etched the same as Fig. 3

When this etching with boiling alkaline sodium picrate was tried on steel known to contain oxides, the problem of distinguishing oxides from sulphides was solved at once, for the oxide inclusions were found to be absolutely unattacked. Fig. 6 shows a cross-section, unetched, of a seam in the base of a steel rail. These surface seams are always filled with scale, or oxide, although the light-gray color has sometimes led observers to believe that manganese sulphide was present. The fact that such seams give light streaks instead of black spots on sulphur prints and etched sections, however, shows that oxide and not sulphide is really present in them. This seam, etched with boiling alkaline sodium picrate, is shown in Fig. 7. The oxide is seen to be entirely unattacked.



Cross-section of a Seam in the Base of a Steel Rail, Magnified 130 Diameters. Fig. 6 is unetched, and Fig. 7 has been etched as in the foregoing cases

The application of this solution to etching all grades of steel for distinguishing between oxides and sulphides has not been described before, so far as the writer is aware. In ease of application and certainty of results it is much superior to other methods that have been suggested for this purpose. One advantage is that the solution used is one that every metallographist should have on hand for etching cementite in high-carbon steel.

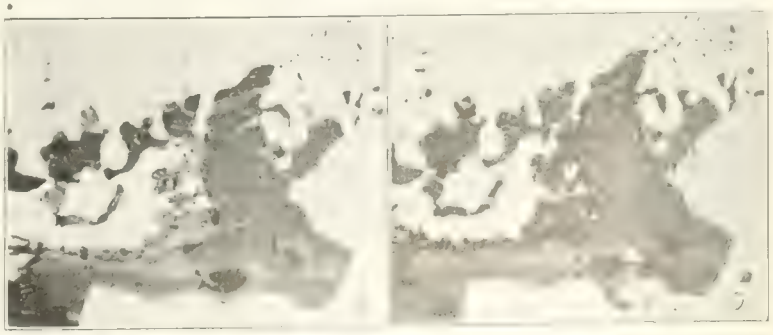
This same solution can be made to serve two purposes. It was first discovered by Kourbatoff, who recommended it for darkening cementite because it does not attack ferrite or pearlite. The writer makes up the solution according to the formula given in Sauveur's *Metallography and Heat Treatment of Iron and Steel*, the procedure being about as follows:

25 gr. NaOH are dissolved in 60 to 70 c.c. of water, 2 gr. picric acid are added, and the solution is heated until the picric acid is dissolved, when the volume is brought up to 100 c.c. by adding more water.

In using this solution to etch polished-steel specimens, it is brought to boiling in a beaker on a hot plate, the specimen is immersed in the solution, and boiling is continued for 10 min. Then the specimen is removed, washed, and dried. The polished and etched surface may be wiped dry with chamois skin without affecting the results. If the specimen contains cracks, this wiping is necessary, and repeated washing and drying may also be necessary, to remove the last traces of the sodium picrate from the surface to be examined. The solution may be used many times, but as the boiling makes it more concentrated water should be added occasionally to keep the volume about 100 c.c.

Some illustrations of the practical use of this method for distinguishing oxides from sulphides follow. A section of a steel casting, which cracked while hot and in which the presence of oxides might therefore be expected, was polished. An experienced eye could perhaps tell which of the inclusions were sulphides and which were oxides, but the distinction at best would not be convincing. After etching by the method described above, however, the difference between the two kinds of inclusions became evident. The arrangement of these sulphides was noteworthy, as a network was strongly suggested. By this method of etching it can easily be shown that the small inclusions often found in a network arrangement in the ferrite of well-deoxidized steel castings are merely finely divided sulphides. An instance of such inclusions was described by Dr. Henry Fay in a paper on "Some Causes of Failures in Metals," *Proceedings* of the American Society for Testing Materials, Vol. 11, p. 439 (1911), and well illustrated by his Figs. 16 and 17 on page 450. These are said to be "slag" by Dr. Fay, but their appearance is exactly similar to numerous occurrences of sulphides which have come to the writer's attention.

A large complex slag inclusion, also in a cracked

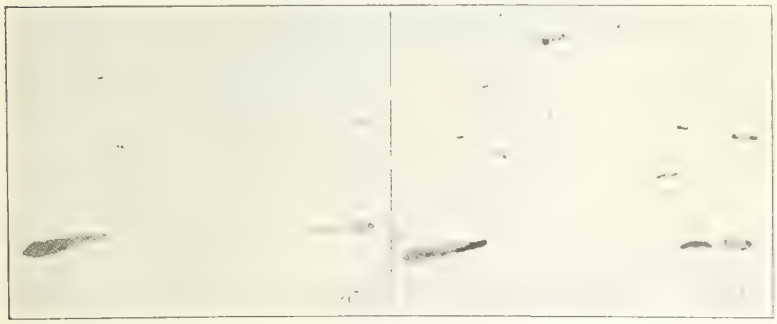


Cracked Steel Casting Showing Large Complex Slag Inclusions, Magnified 130 Diameters. Fig. 8 is unetched and Fig. 9 has been etched as in the preceding

steel casting, is shown unetched in Fig. 8. The light-colored rough-looking part of this inclusion at the center of the field of view was bright yellow, and hence considered to be sulphide of iron. The other light-gray portions, including the spots in the dark-gray part, were supposed at first to be manganese sulphide, and the darker part, manganese silicate. But when etched with boiling alkaline sodium picrate, only the yellow constituent was attacked, showing that it alone was sulphide, and the light-gray constituent was oxide instead of manganese sulphide. The appearance after etching is shown in Fig. 9.

A section cut from a bar of ingot iron that was red-short and cracked in rolling is shown in Fig. 10, taken before etching. Most of the inclusions found here were light gray in color, but many of them had yellow parts attached to them at one or both ends. The yellow substance, which is very rarely seen in steel, was taken to be sulphide of iron, and the gray inclusions were at first supposed to be manganese sulphide. But the manganese content of this ingot iron was found to be very low, and the sulphur also was not high enough to allow the presence of so many sulphides. Consequently, it was doubtful whether these gray inclusions were sulphides or oxides, until the sample was etched with the boiling alkaline sodium picrate solution, when it was apparent at once that they were oxides, and only the yellow substance was sulphide. The inclusions of Fig. 10 are shown after etching in Fig. 11, where the distinction between oxide and sulphide is very plain. One of the largest particles of the yellow constituent was noticed, before etching, to have a spotted appearance, and when examined under high magnification it was seen to be full of very fine gray spots. This is evidently a eutectic of iron oxide and iron sulphide. Under the microscope, the large unspotted dark-gray areas, with the black pits due to fracture in polishing, were oxide, and the spotted area the eutectic. The oxide is darker than the sulphide. After a short etching with boiling alkaline sodium picrate the eutectic, but not the oxide, was attacked, for the former was now darker than the latter, and its structure blurred and indistinct.

These notes are presented in the hope that the simple method here described will appeal to metallographists in general as being worthy of trial in cases where the identity of light-gray inclusions in steel is in question, so that in future sulphides need not be called slag; and the error of calling oxide or scale inclusions manganese sulphide merely because their color is light gray may also be avoided.

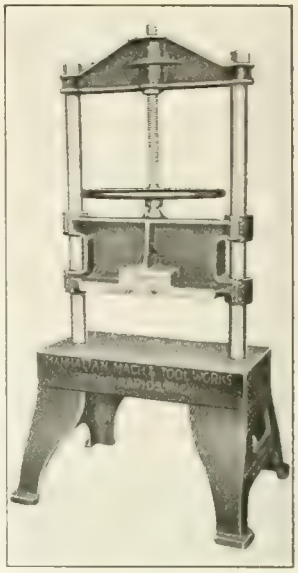


Section Cut from a Bar of Ingot Iron That Was Red-Short and Cracked in Rolling. Magnified 130 Diameters. Fig. 10 is unetched and Fig. 11 etched with a boiling alkaline sodium picrate

The greatest possible economy in the use of high-speed tool steel is recommended by the local munition authorities in Germany by means of the display of an official notice in factories and workshops.

Screw Punch and Die Testing Press

A screw press designed to aid toolmakers in the production of accurately fitting punches and dies has been developed by the Manhattan Machine & Tool Works, Grand Rapids, Mich. An effort has been made to provide sufficient space for mounting the die in any desired position, as well as providing ample room between the bed and the ram. Another point, upon which emphasis is laid, is the convenience of handling, it being a one-man machine, in which the toolmaker does not require any help.



The Die Being Tested Is Clamped on the Bed of the Press and the Punch Is Forced Down by the Hand-wheel

The press consists of a bed measuring 18 x 36 in. and having a clear space of 26 in. between the standards. The top of the bed has 52 holes, ⅝ in. in diameter, tapped in the upper surface to enable the die to be mounted in any desired position. The handwheel for operating the punch shank is 24 in. in diameter and is mounted between the standards.

A maximum clear space of 24 in. is provided between the bed and the ram, thus, it is explained, enabling the die to be blocked up on parallels and providing clearance for springs, cams, etc., as well as permitting the action of the punch in the die, the timing, etc., to be inspected. Another advantage claimed is that the punch can be lined up with the die and then raised high enough to enable the pressure pads, stripper plates, springs, etc., to be mounted without removing the punch from the press.

One Day of Rest in Seven Discussion

Working hours in continuous industries is one of the topics to be discussed at the annual meeting of the American Association for Labor Legislation, and William B. Dickson, second vice-president and treasurer of the Midvale Steel & Ordnance Company, is to lead the discussion on "Practical Aspect of the Weekly Day of Rest and the Eight-Hour Shift in Continuous Industries." This particular session will be held on Friday morning, Dec. 29, at Ohio State University, Columbus, Ohio. Another one of the sub-divisions of the topic announced is: "One Day of Rest in Seven by State and Federal Legislation," discussions to be led by John A. Fitch, editor, industrial department of the *Survey;* and another, "Eight-Hour Shifts by Federal Legislation," led by Prof. John R. Commons, University of Wisconsin.

After-the-European-War problems are to be discussed at the banquet of the association, Friday evening, and at a luncheon meeting, Saturday, Dec. 30, at the Hotel Sinton, Cincinnati, health insurance is to be the topic.

The testing of two series of steel columns of the American Railway Engineering Association and the American Society of Civil Engineers by the United States Bureau of Standards has been temporarily interrupted, with the object of studying the data already obtained and making further supplementary tests on specimens cut from the columns. A paper on the strength of steel columns in tests has been completed and it will be published as a technological paper by the bureau.

Management and Engineering Meetings

Measuring the Manager; Humanizing the Plant; Evaluating the Business; and Studying the Machine Shop Discussed in New York

THE inefficiency of the manager; more about the human factor in industries; the need of a means for collating machine-shop information for the common good, and the undeveloped but necessary place of the mechanical engineer in industrial preparedness were conspicuous topics in the discussions of the meetings held last week in New York of the American Society of Mechanical Engineers and on Saturday of the Taylor Society, the society organized some years ago to promote the science of management, and renamed last year.

As usual, the meetings on mechanical engineering subjects were numerous with simultaneous sessions on different days. The Taylor Society meeting, following the meeting of the mechanical engineers and attended by some members of that organization, found itself like the mechanical engineers, for example, emphasizing a need to open the manager's eyes to his own inefficiency, and also dwelt at length on the human factor. In this respect the management meetings were noteworthy for the relatively small consideration given to the mechanism of management, which has formerly received most of the attention, discussing instead the worker from the standpoint of human relations.

The subjoined account covers these various topics and also some of the information developed on gas-power subjects, and on the heat treatment of chains.

Machine-Shop Practice Data to Be Compiled

At the session of Wednesday afternoon, Dec. 6, of the American Society of Mechanical Engineers, held under the auspices of the sub-committee on machine-shop practice, two papers were presented. The first of these, by Carl G. Barth, consulting engineer, Philadelphia, was on "Standardization of Machine Tools" and contained suggestions regarding standards of speed and feed series and standardized power for machine tools, etc. It dealt with the subject of standardization of the machine equipment of a shop as a whole, standard speed and feed series, the power of machine tools, toolposts for lathes, lathe centers, T-slots and milling and vertical drilling machine sockets.

Universal Speed and Feed Series

The author strongly urges the adoption of a universal speed series by all machine-tool builders for all machines such as lathes, boring mills, milling and vertical drilling machines, etc., with the available speeds in geometric progression. The same procedure is recommended for feeds except for lathes where the feeds for plain turning are obtained as a constant fraction of those employed in screw cutting. The adoption of a standardized amount of power for each size of machine of a certain type is recommended as enabling the greatest advantage to be derived from the adoption of a standard speed series. Both, however, must be adopted if the fullest advantages are to be realized. The form of toolpost recommended for lathes is that which has been in use for some time. The universal adoption of Brown & Sharpe standards for lathe centers and sockets for milling and vertical drilling machines is recommended, as well as the universal abandonment of the tang as a method of driving drills, a key drive being employed. It is planned to review the paper at some length in an early issue.

Codifying Machine-Shop Practice

The other paper, "A Proposed Plan for the Activities of the Machine-Shop Practice Sub-Committee," by H. K. Hathaway, consulting engineer and vice-president Tabor Mfg. Company, Philadelphia, advocated a plan leading to the more rapid and positive development of machine-shop practice as a science and to make available and readily accessible to all engaged in that practice the knowledge now existing in scattered and unrecorded form as well as that which might be added as the science advances. He recommended the grouping and codification of the data in accordance with a logical scheme of classification and indexing which would bring together in the most accessible and usable form everything pertaining to each of the divisions and subdivisions of the science, and the working out of a definite plan of action for procuring from members best qualified papers dealing with each subject covered by the classification, with the result that the papers when properly arranged would constitute a classified reference library. Another and even larger undertaking recommended was the prosecution along predetermined lines of research that would result in definite advancement of the art, such work at present being almost entirely left to the enterprise of individuals or companies, with the result that there is no co-ordination of effort. The first part of the plan in the author's opinion might be undertaken at once and a classification of machine-shop practice arranged to permit of easy expansion and correction was appended to the paper.

HOW PROPOSED WORK SHOULD BE DONE

This paper produced considerable discussion. In a written discussion submitted by Henry Hess, Philadelphia, general supervision by the research committee of the society of the work of the sub-committees engaged in the researches outlined by the paper was suggested, as well as co-operation with other technical societies.

Robert C. H. Heck, professor of mechanical engineering, Rutgers College, New Brunswick, N. J., asked for data on average practice on speeds and feeds in machine shops.

R. J. S. Piggott, power engineer, Remington Arms-Union Metallic Cartridge Company, Bridgeport, Conn., agreed with the author as to the desirability of having data available. He mentioned conditions in a munitions shop where thirty-one cutting compounds formerly used had been reduced to seven. He stated that the work should be done earnestly or not at all, and blamed the attitude of secrecy on the part of manufacturers as being at the bottom of American inefficiency. With reference to the classification system proposed by the author he took exception to the statement that the Dewey decimal system would not serve, and stated that the latter could be expanded as needed.

F. L. Eberhardt, Gould & Eberhardt, Newark, N. J., commended the paper as giving a plan for collecting interesting data, but suggested that a time limit of one year should be fixed in analyzing results given in the trade and technical journals, etc. He thought the sub-committee should co-operate with the research committee of the society and believed that the greatest opportunity of the sub-committee was to bring out at the annual meeting the latest developments in shop practice.

Dr. William Kent said that at the present time the machine-shop branch of mechanical engineering was

the least scientific and that the proposed plan afforded an opportunity for change. He suggested that the committee procure questions from machine-shop men as a basis for research work and endeavor to answer 10 questions and conduct one extended research each year. He was opposed to the Dewey classification system and favored a letter one rather than the mnemonic system proposed.

MEAGER INFORMATION ON MACHINE TOOLS

John J. Ralph said that data did not become obsolete as soon as was thought. He spoke of the lack of information about requirements for machine tools and said that machine shops did not know what tools were on the market. He suggested the compilation of factors about machine tools, such as floor space, depreciation, suitability, etc., with a view to weighing these various elements on a percentage basis if desirable. The method of testing tools for accuracy he said should be standardized and specifications similar to the boiler test rules prepared.

Charles J. Simeon, works manager, Reed-Prentice Company, Worcester, Mass., spoke of the difficulty of solving a problem in shop practice or manufacturing and then finding a solution of practically if not identically the same problem shortly afterward in the technical press. He considered the compilation of a glossary of information highly desirable and suggested the presentation of information in tabloid form.

Harry V. Haight, engineer, Canadian Ingersoll-Rand Company, Sherbrooke, Que., said that information on cutting speeds and feeds was available now as never before from munitions manufacturers, and work along this line should give the information requested by Mr. Heck.

Elmer H. Neff, Brown & Sharpe Mfg. Company, New York City, suggested that one page of the society's *Journal* be used each month to publish questions of interest, and said that it would bring very good results.

Mr. Barth commended the paper as a means of ending numerous experiments which were undertaken and which could be done away with if the plans for making data available were carried out.

There was considerable other commendatory discussion. One speaker said that manufacturers would cooperate with the committee in research work, and stated that colleges should be asked to solve one problem a year and report results. In this way the educational institutions would become interested in the movement and the United States would do what is being done abroad and should be done here in research work. The preparation of standard rules and forms for reporting data from machine shops was suggested as the first thing to be undertaken.

Necessity of Measuring the Efficiency of the Manager

Accomplishment as the sole measure of the right of a plant to exist was the keynote of the industrial valuation session of the American Society of Mechanical Engineers, held Thursday, Dec. 7. To compete with European industries following the war we must, it was emphasized, offer good commodities at low prices. Opinion generally was that this can be accomplished only through complete reorganization of our industrial system. The fault, it was agreed, does not lie with the workmen so much as with the management. "Our greatest incompetents," one impromptu speaker ventured, "are at the head of our plants, and a housecleaning must begin there."

The papers which raised such enthusiastic response were prepared by Walter N. Polakov and H. L. Gantt, both consulting engineers of New York City.

Putting Value to Industrial Methods

Mr. Polakov, who specializes on beneficiating power plants, spoke on "Valuation of Industrial Properties versus Valuation of Industrial Methods." His address in part was as follows:

The loss to the companies from the undervaluation of their property is insignificant in comparison to the actual losses due to the lack of proper operating methods. The subject of correct methods of appraising a property is completely overshadowed by the importance of determining the proper methods of using this property. . . . What is needed most is the correct valuation of operating and managerial methods in vogue, for overestimating the importance of property valuation is like trying to trace old sins instead of preventing the committing of new ones.

It is a fact that the fixed portion of the capital invested in real estate and equipment has materially increased since the tractor replaced the ox plow; modern factory equipment has taken the place of artisans' tools and transportation is done by rail and automobiles instead of horses. The correspondingly increased financial burden has created a new problem: how to absorb the expense of wear and tear, obligations to money lenders, etc., increased by adopting expensive machinery of production as a result of engineering progress.

The solution offered by the financiers and accountants of the old school was to include in the manufacturing costs all the fixed charges of a plant and all the financial obligations of a company, irrespective of whether these investments or expenses contributed anything to the value of the commodity or in any way benefited the production. . . . Apparently the self-evident fact that the equipment not used in production cannot pass any part of its value into the product was usually obscured by a consideration that it loses value during idleness and meanwhile accumulates such charges as rent, interest, insurance, etc. This practice manifestly tends to charge against the cost of a product the cost of overequipment and mismanagement, thus imposing on society the penalty for tolerating these conditions in the industries.

When the cost of production increases after an investment is made it indicates plainly either that it was poor judgment to make the change or that the method of management does not offer the opportunity to secure the advantages inherent in the new improvement.

Nevertheless, the tendency of the average rate of profit to fall is only a manifestation of the development of the productive powers of society. Automatization, growing speed and capacity of machinery cause the same number of laborers in the same time to convert a larger quantity of raw and auxiliary materials into product. In other words, the fall of the rate of profit is not due to an absolute but only a relative increase of the capital invested in means of production over its part invested in labor.

At the outbreak of this war our country was rushing headlong into a period of industrial depression caused by surplus production that could not be consumed in the United States on account of the small purchasing capacity of the people, and could not be exported because poor shop methods prevented us from producing as cheaply as other countries. The undeveloped stage of our credit system contributed a further obstacle to the development of export. There was no incentive for us to plunge into the war, since there were no foreign markets to fight for; neither could anything be gained by a territorial expansion. A crisis seemed imminent, but the loading up of our industries with European orders postponed it.

Similar circumstances in Europe culminated in the present great war when German methods of production took away foreign markets from the countries whose workers could not consume at home all they produced. If it were not for the war between the nations a war within the nations might have been imminent. In the course of this struggle the most amazing reshaping of principles underlying the industrial life is taking place. Various governments have been forced to admit that the industries should serve the country, not the individuals. Handicapped by unscientific, disorganized production of the most necessary commodities, they have come to realize that the right to control and direct pro-

duction involves the responsibility of applying proper methods to secure beneficial results. Furthermore, precedents have been established where those who were not carrying on their business for the common good were denied the privilege of running it at all.

The misuse of or failure to use the expensive machinery of production is not a sufficient reason to either advance prices or to lower wages, as both undermine our future.

The revenue-producing factor in our mode of production is not the investment, but the method of its use. It is the business of financiers to invest money in industries, and they want to know what this investment is and what return they are getting. Ultimately the question they will ask is: What is the value of the methods and what do they do?

The use-value of the plant has nothing to do with its cost-value and is in the highest degree unfit for the purpose, as it varies with personnel, policy and methods.

Unfit methods and incapable leaders are equally harmful to both investors and consumers and their interests unite in demanding that methods of the highest value be developed and put into use.

In closing Mr. Polakov said the new business ideal is to make men dear and products cheap.

Charting the Management

Mr. Gantt, in introducing his paper, remarked that most efficiency has been inefficient. It has been an attempt to speed up workmen and has neglected the manager. The chart system is beginning to measure the efficiency of the man at the top. "The value of a thing," said Mr. Gantt, "should be measured by its ability to contribute to human happiness." The plant and equipment have static value, while the manager and engineer have dynamic value. In the past only the static value has been measured. We are adding something to the books called "Good Will."

THE BRITISH AWAKENING

They have just found it necessary to make a change in England. Lloyd George, more than any other one man, represents the working forces, the great producing force, of the British Empire. It was necessary to sweep away the old order, and put in charge the man who had made good. Now they are saying in England that if Britain is to win the war it must follow the plan Germany has been pursuing. The English had been seeing how much money and not how much ability they could accumulate. That policy is now shown to have been wrong.

Remember, we are in the same class with England. She has learned her lesson at last. I doubt if we have. If we were brought face and face to-day with the same problems that England has, the engineers would have to handle the problem, because the financiers couldn't do it.

The representatives of the forces of production in America to-day are the engineers, and the lesson must be learned that it is upon these producing forces and not upon mere dollars that national ability rests. America must consider first the value to the whole community.

Mr. Gantt's paper was in part, as follows:

If there is any one thing which has been made clear by the war it is that the most important asset which either a man or nation can have is the ABILITY TO DO THINGS. Our industrial and economic developments have in the past been largely based on the theory that the most important quality a man can possess is, his *ability to buy things;* but the war has distinctly shown that this quality is secondary to the *ability to do things.* The recognition of this fact is having a most far-reaching effect, for it makes clear that the real assets of a nation are properly equipped industries and men trained to operate them efficiently. The money which has been spent on an industrial property, whether it has been spent wisely or unwisely, and the amount of money needed to reproduce it are both secondary in importance to the *ability of that plant to accomplish the object for which it was constructed,* and hence cannot be given the first place in determining the value of the property.

To determine the value of an industrial property, we must be able to know with accuracy the cost at which it can produce its product, and the amount it can produce. To compare two factories on this basis, their cost systems must be alike; for, if there is a lack of agreement as to methods of cost accounting, there will necessarily be a lack of agreement as to the estimated value of the properties. There are many methods of cost accounting; but there are only two leading theories as to what cost consists of. They are:

1. That the cost of an article must include all of the expense incurred in producing it, whether such expense actually contributed to the desired end or not.
2. That the cost of an article should include only those expenses actually needed for its production, and any other expenses incurred by the producers for any reason whatever must be charged to some other account.



DR. IRA N. HOLLIS

President of the American Society of Mechanical Engineers. In September, 1874, at the age of 18 years, he entered the U. S. Naval Academy. In 1884 he served with the advisory board that built the four ships of the White Squadron. In 1892 he was ordered to the Bureau of Steam Engineering under George W. Melville, then Engineer-in-Chief. On Oct. 1, 1893, he resigned from the navy to become professor of engineering at Harvard University. In 1913 he resigned to take the position of president of Worcester Polytechnic Institute just before the transfer of Harvard's engineering department to the Massachusetts Institute of Technology.

WHAT KNOWLEDGE OF IDLE MACHINERY DOES

When plants are operated at their full capacity, both theories give the same cost. When, however, they are operated at less than their full capacity, the expense of carrying the idle machinery is, under the first theory, included in the cost of the product, making the cost greater; while under the second theory, this expense of idle machinery is carried in a separate account and deducted from the profits, leaving the cost constant. It is most interesting to note that, *when costs are figured on the second basis, great activity immediately ensues to determine why machinery is idle, and to see what can be done to put it in operation.*

If we buy a machine for $1,000 we lose the interest on that $1,000, say at 5 per cent per year, then we have taxes on that machine at 2 per cent and insurance of 1 per cent. Further, the machine probably depreciates at a rate of 20 per cent per year, and we must pay $50 or more per year for the rent of the space it occupies. All

these expenses, together $330, go on whether we use the machine or not. Thus, the simple fact of our having bought this machine and kept it takes from our available assets approximately one dollar per day.

If now the cause for idleness is ascertained each day we can find the expense of each cause of idleness as shown on the accompanying chart. That part which is due to lack of orders points out that our selling policy is wrong, or that the plant is larger than it should be —in other words, that somebody in building the plant has overestimated the demand. It is clear, however, that no conclusion should be based on the figures for one month, but on the results for a series of months during which the problem has been carefully studied. If a mistake has been made in building too large a plant, an effort should be made to determine the proper disposal, or utilization, of the excess in order that the expense of idleness may be taken care of, even if no profit can be made.

If the expense is due to lack of help, we must investigate the labor policy. Expense due to lack of, or poor, material, is an indication of the efficiency of the purchasing policy and storekeeping system.

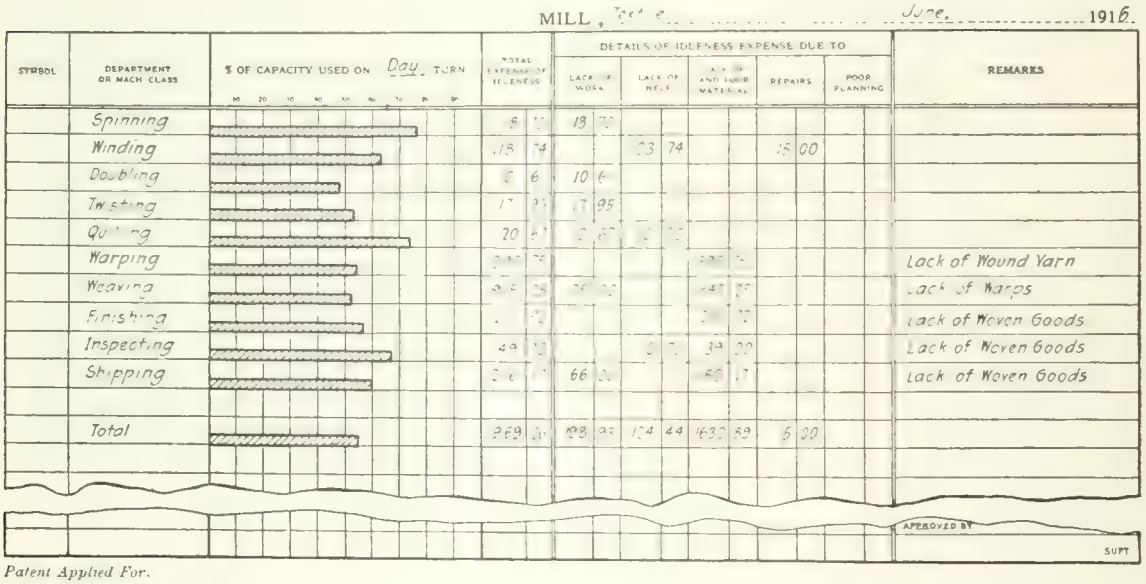
If in any case the expense of idleness is greater than can be attributed to all of these causes together, it must go in the last column as poor planning.

In several cases, such an investigation resulted in the scrapping of machinery which had been idle for years. The space thus saved was used for a purpose for which the superintendent had felt he needed a new building. In another case it resulted in the renting of temporarily idle machinery at a rate which went far toward covering the expense of carrying that machinery.

Still another factor enters into the value of a "going plant." We all have known cases where the same plant operated under one manager was a failure, and under another a very decided success. The value of a going plant, therefore, consists of two elements, namely, the value of the physical real estate and equipment, and the value of the organization operating it. In considering the value of an organization we should realize that it lies not so much in the personality of the managers or leaders (who may die or go elsewhere) as in the permanent results of their *training and methods, which should go on with the business,* and are therefore an asset and not an accident.

If the above premises are correct, the following factors are important elements in determining the value of an industrial property:

The cost of the product
The capacity of the plant
The portion of the plant operated, and
The expense of maintenance of the idle portion.



Patent Applied For.

Charting Idle Time of Machines and Giving Reasons and Costs, All for the Benefit of the Manager

VIEWS ON CHARTING THE MANAGER

W. S. Rogers, president Bantam Anti-Friction Company, Bantam, Conn., enthusiastically endorsed the opinions of the two speakers quoted. He said, "We handle the poor fellow at the machine and try to make him part of it. He is blamed for the mismanagement of the men at the top, whereas most directors are there not for their ability but because they put the most money into the business. Everyone of my men has been supplied with copies and asked to read a story recently published in the Saturday Evening Post and entitled, 'The Man Who Wanted To Be It.'"

Carl G. Barth, Carl G. Barth & Son, Philadelphia, told of an experience in taking charge of a losing proposition and making of it a profitable business. When he called on the president he entered the typical well-equipped room with a long table surrounded by many comfortable chairs. The president thought he was going to buy new machines and establish a scheme for making the workmen turn out more products. "Just then," said Mr. Barth, "I saw the picture on the wall of a former president and under the picture the motto, 'Make Men, not Money,' and I adopted that as my motto and told the president that is what I wanted to do. I wish I could describe the look on the president's face. He understood. We both had the feeling for humanity."

F. G. Coburn, U. S. Navy, referred to Mr. Gantt's chart and asserted that it would show exactly how much to charge the customer and what goal in the manufacturing field the plant should strive toward.

EXPERIENCES WITH CHARTS

H. M. Wilcox, Winchester Repeating Arms Company, uses a chart similar to Mr. Gantt's. It tells them, he said, exactly how much and where the loss is. It has also released energy which was not in evidence before. Men become interested in their work when they learn how to improve their methods and know that a charting will show where the fault lies.

A further improvement on the chart was exhibited by J. E. Melaney. The maximum output decided by test is plotted with dark lines while red lines measure the exact percentage of the maximum actually obtained.

A record department should be established in every business, was the contribution of W. C. Brinton, consulting engineer, New York City, to chart the entire plant. Unless the head of the department reported to the general head, he feared, this unfortunate man would be without friends. Directors of such work should be capable and well paid.

A suggestion which looks far into the future was made by A. C. Jackson, Miller Lock Company, Frank-

ford, Pa. He said, "I hope for the development of the whole industry by a chart in which all industries will be included." He added that it will show what the limitations of an industrial field are and what plants have a right to continue in the field.

SESSION ON CO-OPERATION OF WORKMEN

A separate session on industrial management was also held by the American Society of Mechanical Engineers, Wednesday afternoon, Dec. 6. It had been a late arrangement and one of the smaller rooms of the Engineering Societies' Building was set apart for it, but so great was the interest that the room was crowded and extra chairs had to be brought in. This statement is made to indicate what interest in management problems there was among large numbers of those attending the meeting. Three papers were read, one "Aids to Secure the Co-operation of Workmen," by E. E. Barney, superintendent Remington Typewriter Works, Ilion, N. Y.; another, "Standardization in Industrial Management," by Sanford E. Thompson, consulting engineer, Newton Highlands, Mass., and the third, "Graphical Control on the Exception Principle for Executives," by Frank B. Gilbreth, consulting engineer, Providence, R. I.

The discussion quickly took up the development of the human relation in factories. W. S. Rogers, president Bantam Anti-Friction Company, Bantam, Conn., told in some detail how his plant was started and how those in the higher executive positions form what is known as the senate, and the others the members of the house and how matters are decided by one or the other or by both bodies, even, for example, the engagement of a new salesman, who must be acceptable to the senate. Many of his employees are stockholders in the business.

Arthur J. Baker, Cincinnati Milling Machine Company, Cincinnati, told what has been done at his plant to secure co-operation of the workmen. One of the best moves in this connection was to establish a health service and in this the important point has been the selection of a doctor; it is proved that he must be of the right caliber. In their own case he has inspired confidence in himself and has relations with the men that the officers of the company could not hope to secure. Out of some 1600 employees as many as 250 calls have been made in a day on the doctor and, of course, for things apart from physical ills. His confidential relation led to investigations and improvements in plant conditions and among other things resulted in a co-operative luncheon arrangement operated wholly by the employees, the company merely supplying at the beginning the equipment necessary. The doctor has been able to discuss food values, resulting in educating the workers respecting inexpensive but valuable foods, at least from the energy standpoint.

Out of these relations has grown a mutual aid society and the doctor has a hand in the hiring and firing, and the whole effect is securing an attitude which makes the men a part of the plant. Besides an individual bonus for individual performances, a quarterly bonus is allowed if plant or department output exceeds some stated quantity for the period, and Mr. Baker suggested that the best sign of a satisfactory condition within the plant is that at the time of the recent strikes in Cincinnati, the Cincinnati Milling Machine employees, without suggestion, organized their own anti-strike committee.

As regards the use of graphics for the guidance of executives, offered by Mr. Gilbreth, it is planned to give this paper in a later issue.

Taylor Society Contributions

The Taylor Society, besides considering scientific management applications in hospitals and the planning of power-plant work, the latter based on a paper by Mr. Polakov, had a session on Saturday afternoon, Dec. 9, and on Saturday evening. The afternoon session revolved about the lack of efficiency among executives in industries, and the evening session discussed largely the question of initiative on the part of the worker engaged under scientific management and his spirit of co-operation. Besides engineers and managers, economists and sociologists participated, and also a leader of organized labor. The burden of the discussions was that the worker has abundant opportunity for self-expression under scientific management.

The afternoon discussion was based on a paper by Dr. Horace B. Drury, instructor in economics and sociology, Ohio State University, Columbus, Ohio, on the progress scientific management is making. Lieut. Frederic G. Coburn, U. S. N., opened the discussion and emphasized that too much time was commonly spent talking on the matter of time studies. It was also brought out that if the personal factor is divorced there is an approach to mere welfare work in the plant. It is argued that industry has passed the period when there was an utter disregard for the worker to the present time, when there are coercion measures to minimize the standards of treatment, and that the tendency now is toward a voluntary study to improve conditions without coercion. It was explained, for example, that after the Civil War men worked 12, 14, and 16 hr. a day, sometimes with no attention to working conditions and nothing in the nature of welfare. At the present time we are having considerable legislation to force a minimum standard of good treatment and the transition is now toward the third stage.

H. L. Gantt discussed his chart to measure the management; this reproduced in the foregoing account of the engineers' meeting.

Appraising Industrial Plants

John G. Morse, Factory Mutual Fire Insurance Companies, at the valuation session of the American Society of Mechanical Engineers, spoke on "Accurate Appraisals by Short Methods." A review of this paper may find space elsewhere in this issue. "The Relation Between Perpetual Inventory and Appraisal Value" was the subject of a paper by Charles Piez, president Link Belt Company, Chicago, printed at length in THE IRON AGE of Nov. 30. John H. Gray, professor of economics, University of Minnesota, read a paper on "How Does Industrial Valuation Differ From Public-Utility Valuation?" He said W. J. Bryan inaugurated valuation under court control. The reproduction theory, he said, was an attempt to assure value to watered stock.

Dean M. E. Cooley, University of Michigan, referred to a specific case where, in endeavoring to determine the depreciation, it was calculated that the original plant had cost $180,000, whereas, after 25 years it would cost $360,000 to replace it. The machines were 18 to 25 years old.

L. S. Randolph, Polytechnical Institute, Blacksburg, Va., decried the use of the word "depreciation" and said that he had found "productive life" covered a broader field and was more suitable.

The appraisal commission of Pennsylvania, thought Morris Knowles, University of Pittsburgh, was an organization which would prove of great value in the field of appraisals. A case is always referred to two engineers representing the plant and the other party with the chief engineer of the commission presiding. "When engineers face each other across a table," said Mr. Knowles, "each one can tell if the other knows what he is talking about." In making appraisals, Mr. Knowles urged that where a sinking fund is provided a valuation of 100 per cent should be made; otherwise depreciation should be subtracted.

Dr. William Kent, construction engineer, Montclair, N. J., pointed out that there are two kinds of obsolescence. 1—the depreciation of a machine; 2—getting out of the market of products, leaving machines in good mechanical condition. An inventory, he said, will rise and fall according to the condition of repair. In appraisals the earning power of a plant should always be a prime factor.

"What is the value of the valuation?" L. K. Frank thought was the principal question to be considered. Social control, he argued, is coming, and the engineer should assist, not hinder it.

(*Continued on page* 1350)

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November Steel Orders

In view of market conditions during November the steel trade was prepared to see the Steel Corporation report a very large increase for the month in its unfilled obligations, and such expectations were certainly not disappointed when the report showed unfilled tonnage at the end of November amounting to 11,058,542 tons, representing a gain of 1,043,282 tons.

The November bookings were not made up largely of "open contracts" of the form that prevailed so largely in the last buying movement, that of 1912. There were large tonnages of rails, car material, ship material, and shell steel. The principal contract tonnage was in sheets and tin plates, books having been opened for the first half of 1917 on Oct. 12. These contracts, however, are now regarded as binding, the buyer being expected to take out the entire quantity on time, and at the contract price, irrespective of market conditions. Dividing the total tonnage on books into open contract business and specific job business, the average date of delivery of the latter is farther ahead of the average delivery date of the former than has ever been the case before.

From the long-range view, tonnage has not piled up as rapidly on the Steel Corporation's books as it has in previous market movements. In October, 1912, the increase in unfilled obligations was 1,042,874 tons. In this movement the largest increase for a month, until last month, was the 1,024,037 tons shown for November, 1915, not altogether as large an increase as was shown for October, 1912, and relatively a much smaller one, as the corporation's production is about 25 per cent greater. The corporation's largest order book in the 1912 movement was on Dec. 31 of that year, 7,932,164 tons, practically the entire accumulation having occurred in the nine months preceding. With the smaller capacity of that time, the obligations represented an average operation of 7½ months. With the corporation's capacity of this year, it was not until early last April, when the improvement in the steel industry had been in progress for 15 months, that it reached the point of having tonnage obligations equal to its output for 7½ months. Even after the enormous bookings of last month the obligations were equal to the production of eight months.

The pressure on the part of buyers to get under cover has been vastly greater in this movement than in that of 1912, but there has been the offset that the mills have pursued a much more reserved sales policy. Instead of accepting open contracts freely, they have confined their commitments largely to the sale of specific tonnages for specific use. They have, indeed, reserved tonnages at various times for certain classes of customers, only putting the business on books at the last moment. Thus the mills are assured of full operation for a much longer period ahead than was the case at the close of 1912, although the bare figures, set on paper, show scarcely any difference.

A Remarkable Ore Year

The cry of Lake Superior ore shortage has gone up so often in the season of navigation now closing that it may have helped to secure the abundant supply of iron ore indicated by late figures. All through the year the steel trade has appreciated the possibility of an ore movement inadequate to cope with a 40,000,000-ton output of pig iron. Before navigation opened there were predictions that the machinery of transportation and of ore handling on the Lakes was not equal to getting down 60,000,000 tons of ore in a season. It now seems likely that the total for the year, including all-rail ore, will exceed 66,000,000 tons.

It was conceded at the beginning of the season that every link in the chain that connects iron mines and furnaces would need to hold perfectly throughout the seven and a half months of navigation to meet the needs of the pig-iron producers. It is now seen that the season has been extraordinary in the working together of all the factors in iron mining, Lake transport and unloading at lower Lake docks to secure the most favorable results. There was a strike on the Mesaba range which might have brought serious curtailment of output but did not, and in November there was a scare because of the unseasonable coming on of severe winter in upper Lake districts. But the year's provisions for thawing ore at upper Lake docks were unusual, in view of the necessity of shipping late, and the freeze-up gave way to milder weather so that the closing will be the latest in years. There were no serious storms in the sea-

son, at least none that scattered the fleet for any long time. Added to all else that was favorable, for most of the season there was a foot more of water than the average of 1915 and this added 7 or 8 per cent to vessel loads. The fact is that with all the hue over possible ore shortage, the season ends with more ore on docks and in furnace yards in proportion to the needs of the furnaces at the present rate of operation, than has been the case in years.

It is early to borrow trouble about 1917, but under the law of averages next year might not be expected to have so perfect a concurrence of favorable factors. For one thing, the depth of water in the Lake channels is now less than the average for the past season. The most important consideration has to do with the railroads. A shortage of iron ore carried with it so many serious possibilities, national and international, that in the past season the railroads worked as they have never been known to work to give the fastest dispatch to ore boats at Lake Erie docks. Locomotives and cars have been worn out in this service. There is also the fact that having catered in an unprecedented way to ore shippers the railroads are now recognizing their obligations to traffic in other lines. With plenty of ore down, they are trying to make up for neglects in other directions, and may enter the spring with larger use of their equipment for service from which it cannot readily be taken again to haul ore. It is a question how far cars and locomotives now under contract will make up for equipment worn out in the high pressure ore operations of this year. The vessel situation will be better next year. That is admitted. Careful estimates indicate that new vessels to be completed in the coming winter and those promised for various times in the season of 1917 will add 3,000,000 tons to the movement of this year.

The continuance of a 40,000,000-ton rate of pig-iron production over a year is entirely possible, in spite of the chance of coke and car shortages in the next four months. That would mean a demand for 63,000,000 to 64,000,000 tons of Lake Superior ore a year. With other blast furnaces coming on, though they are not numerous, a rate of 42,000,000 tons of pig iron might be reached after the new season of navigation opens. That, if kept up, would suggest some increase over this year's ore movement, but it should not be overlooked that the season of 1916 has actually furnished a surplus of ore, and therefore that strain for a new record may not be necessary in 1917.

Tightness in Money Reappears

One of the measures for which the present Administration has claimed great credit is the establishment of the Federal Reserve system. In fact, this effort at constructive legislation has been frequently singled out by spokesmen for the Administration as its masterpiece. It has been assumed that through the workings of the Federal Reserve act the country is no longer in danger of panics, as it has been claimed that whenever a financial exigency arose the necessary funds would be automatically available for financial relief. At last we had been given an elastic financial system comparable with those existing in other great countries. Of course, this carried with it the easy confidence that no such thing as a pinch in money rates could again take place in our financial markets, as was formerly the case every autumn and winter, but that reasonable terms for interest were assured.

Within the past few days, however, a demonstration of some weakness in the workings of the Federal Reserve act has taken place. Although for many months a golden stream has been flowing into the United States from foreign countries, a stream of such extraordinary extent that some banking interests have professed to be alarmed because this tremendous addition to our stock of actual money appeared almost to impose inflation, a severe scarcity of money was felt last week in New York and rates on call loans ran up as high as 15 per cent. The situation was then relieved by the fortunate importation of additional gold, but this week again a squeeze of the same kind occurred, showing that the situation had simply been ameliorated and not completely remedied. Thus it appears that the highly praised Federal Reserve system has not completely solved the monetary situation for this country.

The New York *Commercial and Financial Chronicle,* in dwelling upon these developments, states that the tightness of money is caused by the reduction in the money holdings and surplus reserves of New York clearing house banks and trust companies through the Federal Reserve Bank located in New York City. These banks have been losing heavily in money and surplus reserves every week through that channel since the beginning of November, and financial authorities have directed attention to the possibility of some embarrassment on that account. Enormous amounts were thus transferred from New York, the financial center, to other points through the Federal Reserve clearing house system. It is pointed out that the enforcing of a low level of interest rates in other parts of the country has served to remove the restrictions existing in the past upon unsound business developments. At the same time it has created new problems and a perplexing situation for New York banks while removing none of the old ones.

It will of course be claimed that the New York rates of interest are largely local and that they apply mainly to speculation in stocks. While this cannot be completely denied, yet New York has such a commanding influence on the financial situation in this country that high rates of interest in that city have a very great effect on business matters in other sections. If it is found that the Federal Reserve banks are unable to restore an adequate amount of funds to the New York banks to replace to a sufficient extent what has been drawn from them to other parts of the country, interest rates in New York will, as in the past, be raised to a level that will attract money to that city, causing the pinch to be felt elsewhere. This has frequently been experienced in the past, and it was just such a condition that it had been hoped would be remedied by the much praised Federal Reserve act.

The Steel Corporation and Thompson Coal

The sale of Greene County coal acreage just arranged between the Josiah V. Thompson creditors' committee and the H. C. Frick Coke Company of the Steel Corporation only serves to direct attention to the fact that the Thompson coal lands are moving very slowly indeed. The acreage taken by the greatest coke-consuming institution in the world is only about one-fifth of the Thompson holdings in Greene County alone, and represents but a slight addition to the Steel Corporation's coal reserves. The appraisement made some time ago placed the Thompson acreage in Greene County at 58,403, and it appears that 12,000 acres have been sold to the Steel Corporation at about $500 an acre.

The Thompson failure occurred in January, 1915, when it was not entirely clear that business and finance had begun to recover. It has required nearly two years and the establishment of an industrial pace undreamed of, with surplus earnings beyond former possibilities of conception, to make a narrow market for the coal land at a price lower than was paid for some of the later of the Thompson acquisitions. The price to be paid by the Steel Corporation represents approximately its surplus earnings at the current rate for about 15 business days.

It is true that in recent years the steel interests have become less disposed than they were ten years or more ago to carry large reserves of minerals in the ground, but at the present time large surpluses are accumulating, and it is impossible, on account of the state of the labor and machinery markets, to make anything like as large investments as are desired. The restriction as to capital available is entirely removed.

The Steel Corporation's coal holdings, as shown by its last report, comprise, in the North, 66,611 acres of Connellsville coking coal and 64,848 acres of Pocahontas coking coal, with 96,618 acres of steam coal in other districts, and in the South 317,038 acres of coking and steam coal, making a grand total of 545,115 acres. Thus a purchase of 12,000 acres of coking coal represents an increase of 9 per cent in the Steel Corporation's Northern coking-coal acreage and an increase of 2.2 per cent in its total coal acreage.

The failure of Greene County coking-coal acreage to find a ready sale to the ultimate consumer at high prices was due, of course, to the rapidly increasing vogue of the by-product coking process, a development which Mr. Thompson appears to have been too busy to be able to appraise at its true value. By-product coking involves a totally different set of conditions from beehive coking. Of primary importance is the fact that the by-product oven is located at the point of coke consumption, and the coal is brought to it, while the beehive oven is located over the coal. As the by-product coal must be shipped, it is possible to ship it from various points. There is competition between different districts to sell coal to the by-product ovens, while to make feasible the building of a beehive plant one must provide himself with sufficient coal to last a considerable time. The by-product operation is practically assured of being able to buy coal year after year. Freight rates may change, and what is the cheapest coal delivered one year may not be the cheapest another year. Before the by-product process was improved to its present stage those who embraced it recognized the fact that while the capital outlay in ovens was very large, relative to beehive, there was a great offset in that it became unnecessary to make a large outlay in coal land.

Possibly the most important thing that has been learned in recent years with respect to the selection of coal for by-product coking is that there is still a great deal of information to be acquired, as was plainly stated by an official of the H. Koppers Company in a presentation of the whole subject of by-product coking before a section of the Engineers' Society of Western Pennsylvania a fortnight ago. There are coals that were thought, a few years ago, to be very promising for by-product coking, but are not favorites now, while other coals formerly considered impossible have lately been made to produce good results. Some of the divergences are probably due to changes in the oven design and changes in methods of operation. Widely variant results are obtained by changing the proportions of the coal used without changing the coal. So much knowledge seemed possible of acquisition in the future, indeed, that the speaker observed that the time was coming for the formation of a society of by-product coke engineers which should consider in particular the selection and proportioning of coals for coking. In such circumstances it is natural that the builders of by-product ovens should not rush to commit themselves as to the coal to be used over a period of years.

To Promote Efficiency Legislation as Regards Industry

The movement to prevent legislation antagonistic to efficiency in industry, started by the Committee of Ten, so called, out of an informal meeting of well wishers of scientific management held a year ago, is to be carried on in a broad educational way by a committee of the Chamber of Commerce of the United States. The personnel of the committee is as follows: Homer L. Ferguson, president Newport News Shipbuilding & Dry Dock Company; Richard A. Feiss, Joseph & Feiss Company, Cleveland; Charles Piez, president Link-Belt Company; L. S. Gillette, Minneapolis Steel & Machinery Company, Minneapolis; William Butterworth, Deere & Co., Moline, Ill., and W. Herman Greul, Otis Elevator Company, New York.

Steel-Plate Exports Exceed Records

Steel-plate exports are assuming larger proportions with each month, due partly to the foreign demand for ship plates. The exports in September were 24,385 gross tons and in October, 26,399 tons. This brings the total to Nov. 1, 1916, to 222,901 tons, or at the rate of 22,290 tons per month. To Sept. 1, 1916, the monthly rate was 21,514 tons. The previous record was in 1913, when the total was 223,814 tons, or 18,651 tons per month.

Of the 4,759,536 lb. of copper bars shipped in 1915 at the Chilean port of Antofagasta, 3,976,506 lb. came from the new plant of the Chile Exploration Company, an American corporation, the first unit of which was built last year at Chuquicamata, Chile. It was designed to treat 10,000 tons of low-grade copper ore per day. It began operating in May, 1915, but the full output was not reached until the end of the year.

NAVAL VS. MERCHANT VESSELS

Shipyards Cannot Build More of the Former Except at the Expense of the Latter

WASHINGTON, D. C., Dec., 12, 1916.—In recommending a reduction from 62 to 52 in the number of ships included in the building program of the General Board of the Navy to be appropriated for at the present session of Congress, Secretary Daniels, in his annual report, makes the significant statement that existing conditions in the private shipyards of the country, as well as in the Government navy yards, are such as to preclude the placing of contracts during the fiscal year beginning July 1, next, for more than 42 ships, including 3 battleships, 1 battle cruiser, 3 scout cruisers, 15 torpedo boat destroyers, 4 fleet submarines, 14 coast submarines, 1 fleet submarine tender and 1 destroyer tender. Concerning conditions in the navy yards and private shipbuilding plants the Secretary says:

The navy yards are not yet prepared to add materially to the facilities for construction. The private yards have obtained more contracts for merchant ships in the past year than in a long period, and their facilities for building ships for the navy are limited. Moreover, the revival in shipbuilding and the big naval program of the fiscal year 1916 have about taxed their capacity. In addition, the number of skilled men in the shipbuilding industry has not grown with the increased demand, and the demand for materials of all kinds has caused a rise in price and a delay in delivery. It will tax the Government and private yards, even after new facilities are provided, to build the ships recommended for the fiscal year 1918 and complete those heretofore authorized.

The private and public yards cannot, unless they abandon building merchant vessels, build a larger program than I have recommended. The crowded condition of shipyards, the difficulty of securing labor and material, and the reports made to me by the officers of shipbuilding yards all unite in convincing me that the largest program that can be constructed, under present shipbuilding conditions in this country, is that which I have recommended, and which I understand meets the policy which Congress incorporated in the last naval bill, to wit, 156 ships to be commenced in three years.

COMPULSORY PRECEDENCE TO GOVERNMENT WORK

The Secretary foreshadows the possibility of an appeal to Congress to clothe the Navy Department with the power to compel private shipyards to give precedence to Government work to meet a serious emergency. In this connection he says:

The last naval bill does not give to the department any additional or extraordinary powers in connection with placing the contracts for these vessels or in obtaining materials for their construction. It is hoped that the necessity will not arise of having to ask for such powers, as a number of shipbuilders and manufacturers have shown an attitude of willingness to assist the department in meeting the unusual situation created by the desire of the country to commence and to expedite an entirely unprecedented naval program at a time when the industrial resources of the country are already taxed to their utmost capacity in meeting the demands of tremendous trade activity, both domestic and foreign, in every branch of business. It may be necessary, however, for Congress to enact legislation of this character to insure the early completion of the program of construction.

Concerning the building of warships in navy yards the Secretary reviews the work done during the past year in improving the construction facilities at New York, Mare Island, Philadelphia, Boston, Portsmouth, N. H., Norfolk, Va., and Charleston, S. C., as the result of which, he says, war vessels ranging from battleships down to submarines may be built in these yards. Continuing, he says:

In addition to this accomplishment, the recent naval act authorizes the expenditure of $6,000,000 for fitting navy yards for ship construction, and steps are being taken to fit yards for the construction of capital and other ships. It is confidently expected these improvements will be far enough advanced so that some of the ships to be provided for in the naval act of the coming session of the Sixty-fourth Congress can be laid down at these yards.

EARLY START ON ARMOR PLANT

On the subject of the purchase of armor and the construction of a Government armor plate plant, the Secretary describes his negotiations with the armor manufacturers which he says resulted in saving "in less than four years the rather neat sum of over $2,000,000." This saving, he says, was due to the fact that "the Navy Department, making public the lack of competition, refused to pay the higher prices demanded and urged Congress to erect a Government plant." He adds that plans are now being prepared for the building of the armor plant for which Congress appropriated $11,000,000 at the last session and "early in the new year" work will commence on its construction and when completed "not only will the Government be in position to make a portion of its armor at lower prices than it has been paying, but improvements in the manufacture of armor plate by our experts will belong exclusively to our Government, an advantage not to be lightly regarded." W. L. C.

LATER.—Secretary Daniels has advised the House Committee on Naval Affairs now engaged in drafting the annual naval appropriation bill that he will submit an amendment to the bill compelling shipbuilders, steel companies and other manufacturers to give preference to Government orders for military supplies. In his testimony before the committee to-day he said he had reached the conclusion that such an amendment was necessary to hasten warship construction. He asserted that the shipyards were not only filled with merchant work but were unwilling to attempt any form of novel construction. The Secretary made no comment upon the fact that innovations in shipbuilding are as costly as in other lines of manufacture and that the limits of cost fixed by Congress for the battle cruisers and scout ships are believed to be considerably below the actual cost of building them, to say nothing of the fact that all the leading shipyards are now rejecting merchant work tendered at prices guaranteeing handsome profits.

Foreign Trade Convention at Pittsburgh

As chairman of the National Foreign Trade Council, James A. Farrell issued the call this week for the fourth convention under the auspices of the council to be held at Pittsburgh, Jan. 25, 26 and 27. The general topics to be discussed are the following:

1. Conditions in foreign markets after the war, including the European economic alliances, and the measures necessary to safeguard American foreign trade, as well as the foreign trade aspect of the American tariff system.
2. Co-operation in foreign trade: The necessity for the relief of exporters from the restrictions of the anti-trust laws, which now oblige them individually to meet combinations of foreign rivals encouraged by foreign governments to resist American competition, and often to sell to combinations of foreign buyers, equipped to depress the prices of American products.
3. Shipping. The revival of the American merchant marine.
4. Foreign investment of American capital in its relation to oversea commerce.
5. Problems of the smaller manufacturer: How this class of industries, producers and merchants may more effectively enter foreign markets.

The group session plan, which gave such good results at the St. Louis and New Orleans conventions will be followed again, and in these meetings experiences will be interchanged and advice given in an informal way by those who have had most to do with export trade. The subjects of stated papers include "European Reconstruction," by W. W. Nichols of the Allis-Chalmers Company, chairman of the American Industrial Commission to France; "Foreign Trade Aspect of the Tariff," by Willard Straight, vice-president American International Corporation; "Government and Foreign Trade," by Edward N. Hurley, chairman of the Federal Trade Commission; "How Commercial Organizations Can Aid Foreign Trade Development," by F. J. Koster, president of the San Francisco Chamber of Commerce. The National Foreign Trade Council will present to the convention a report on world trade conditions after the European war. Robert H. Patchin, secretary of the council, will speak on the need for enacting the Webb bill, already passed by the House and now before the Senate, permitting American corporations to co-operate in the export trade.

NEW BATTLE CRUISER BIDS

Four Shipyards Offer to Build at Cost Plus 10 to 15 Per Cent Profit

WASHINGTON, D. C., Dec. 12, 1916.—The Navy Department is about to undertake an experiment in the letting of contracts for warships which is a decided innovation. Arrangements will probably be made on the basis of bids opened Dec. 6 for the construction of the four battle cruisers, Nos. 1 to 4, authorized by the last naval appropriation act, the Government agreeing to pay the actual cost of building plus a percentage of profit to be determined by the Secretary of the Navy and the bidders, possibly with the assistance of the Federal Trade Commission. Contracts for the construction of one cruiser each will probably be awarded to the Newport News Shipbuilding & Dry Dock Company, the Union Iron Works, the Fore River Shipbuilding Corporation and the William Cramp & Sons Ship & Engine Building Company.

In recognition of the fact that the battle cruiser is a new type of warship in the United States Navy, having engines six times as powerful as those installed in any other war vessel and with a required speed many knots in excess of the swiftest battleships, Congress, in the last naval appropriation act, authorized the Secretary of the Navy, if he should deem it to the public interest to do so, to contract for the building of these four vessels on a basis of cost plus a reasonable profit. The pressure on the leading shipyards of the country has become greater daily since the naval appropriation act was passed and the department has already been obliged to re-advertise three of the four scout cruisers because of the unwillingness of private shipyards to undertake their construction within the limit of cost fixed by Congress.

BIDS FOR BATTLE CRUISERS

Naval officials, therefore, were not greatly surprised when the bids for the battle cruisers were opened to find that all the bidders declined to fix an upset price, proposing only to build the vessels on a basis of cost plus a profit ranging in the various bids from 10 to 15 per cent. The proposals in detail were as follows:

Class 1.—Department's design

Class 2.—Hull and equipment of department's design machinery of bidder's design.

Newport News Shipbuilding & Dry Dock Company, Newport News, Va.

Class 1:

1 vessel, at Newport News, within 51 months for actual cost plus 10 per cent as profit.

Fore River Shipbuilding Corporation, Quincy, Mass.

Class 1 or class 2; if class 2 machinery of the Curtis turbine geared type; 180,000 shaft hp.:

1 vessel at Quincy, within 48 months, for actual cost plus 15 per cent profit, or such percentage of profit as Federal Trade Commission may determine to be reasonable.

Union Iron Works, San Francisco, Cal.

Class 1 or class 2; if class 2, machinery of the Curtis turbine geared type, 180,000 shaft hp.:

1 vessel at Alameda or San Francisco, within 48 months for actual cost plus 15 per cent profit, or such percentage of profit as Federal Trade Commission may determine to be reasonable. Vessel to be in accordance with plans specifications, modified form of contract etc., submitted by Fore River Shipbuilding Corporation for these vessels.

William Cramp & Sons Ship & Engine Building Company, Philadelphia, Pa.

1 vessel at cost plus 10 per cent commission

Three of the four bidders submitted extended statements of the reasons for their inability to take on the battle cruiser contracts at upset prices.

While the Secretary of the Navy unquestionably has authority to make contracts for the construction of these vessels on a basis of cost plus a reasonable profit, a complication is seen in the fact that in appropriating for these ships Congress fixed a total cost limit of $16,500,000 each. Under another provision of the naval appropriation act the Secretary may pay a bonus not to exceed 20 per cent of the cost of the ships for expedited delivery so that if the periods of construction stated in the proposals are reduced to the satisfaction of the Secretary he will be in position to pay $19,800,000 each for the four cruisers.

Inasmuch, however, as the bidders decline to fix even this sum as an upset price the Navy Department finds itself in a quandary concerning its authority to let the contracts. It is probable, therefore, that Department officials will confer with the leading members of the House and Senate Naval Committees in addition to consulting the law officers of the Department before making any awards. In any event it is understood that if contracts are made on a basis of cost the margin of profit to be allowed by the Government will be the same in case of all contractors. In the opinion of naval experts it will not be practicable for the Department to consider a proposition made by the Fore River Shipbuilding Corporation to employ a sliding scale by which the builder's profit will decline as the cost exceeds an agreed estimate and vice versa. W. L. C.

Steel Corporation's Largest Order Book

Unfilled orders on the books of the U. S. Steel Corporation at the close of business on Nov. 30, 1916, were 11,058,542 tons, the largest total ever recorded. This was an increase of 1,043,282 tons over the orders reported as unfilled on Oct. 31, 1916, a month previous. This is also a record for one month's expansion. A year ago on Nov. 30, 1915, the books showed 7,189,489 tons and on Nov. 30, 1914, only 3,324,592 tons. The orders at present are over three times those at the same time two years ago. The following table gives the unfilled tonnage at the end of each month from January, 1913:

	1916	1915	1914	1913
January	7,922,767	4,248,571	4,613,680	7,827,368
February	8,568,966	4,345,371	5,026,440	7,656,714
March	9,221,001	4,255,749	4,653,825	7,468,956
April	9,829,551	4,162,244	4,277,068	6,978,762
May	9,987,798	4,264,598	3,998,160	6,324,322
June	9,949,458	4,678,196	4,032,857	5,807,317
July	9,593,592	4,928,540	4,158,589	5,390,256
August	9,660,357	4,908,445	4,213,331	5,223,468
September	9,522,784	5,317,618	2,787,667	5,003,785
October	10,015,260	6,165,452	3,461,097	4,513,767
November	11,058,542	7,189,489	3,324,592	4,396,317
December		7,806,220	3,836,643	4,282,108

Past High Prices for Pig Iron

The Matthew Addy Company, Cincinnati, in its market report under date of Dec. 9, gives the following interesting reminiscence of past high prices: "Our memories do not go back to the year 1864, but George H. Hull, who was a member of the old firm of Addy, Hull & Co. (one of the predecessors of this company), calls our attention to the fact that in the boom of that year iron advanced from $16 to $80 a ton. He writes us that consumers at that time came into our old office and deposited their money, saying, 'Give me iron at any price you can get in exchange for this money,' and then an advance of $5 per ton a week was not unusual. So, while this present market is full of sensational features, its sudden advances in price have not been without precedent. Nor have the recent advances been as great as was the case 52 years ago. Then the end of the war boomed the iron trade, while now war itself is doing the trick."

A new plant of all steel construction will be built by the Weimer Chain & Iron Company at Avon, Pa., along lines that were followed in the erection of the Weimer machine shops at Lebanon. The new plant will be 40 x 220 ft. Plans are now being drawn for the improvement. Twelve fires are now running at the company's old plant, two having been lighted this week, and its full capacity of 100 tons is being turned out.

Chester, Pa., made its second contribution to the Norwegian merchant marine when the 400-ft. steel tanker Golaa was launched at the Chester Shipbuilding Company's yard on Saturday, Nov. 25.

TO RECONSTRUCT EUROPE

American Steel Will Be Required for Some Years, According to S. A. Benner

So completely has Europe made war a business that America will be called upon to furnish the steel for Europe's reconstruction and development after the war. This is the opinion of Samuel A. Benner, European representative of the American Steel Export Company in London and Petrograd, who has just returned to this country. He says that England, Russia and France have commandeered all factories for military use and have turned all their energies from constructive work to the manufacture of ammunition.

Mr. Benner believes that for several years after the return of peace the steel capacity of the world will be insufficient to replace worn-out machinery and factories and to take up the building which was stopped by the war. All the steel going to Europe at present, he says, is being used for the manufacture of munitions of war or in extending railroads for military purposes.

The capture of many Russian mines and factories in Poland has caused a shortage of steel in Russia. The output of ingots in Russia is said to be about 50,000 to 60,000 tons a month, which is about one-half of the production before the war. Russia has mobilized 20,000,000 men and has placed her skilled laborers in munitions plants. All of the industries of the country have been mobilized to push the war to a successful conclusion.

France has lost her largest steel-producing plants to Germany, and is dependent upon her steel imports. A complete system of portable railways has been constructed behind the lines.

Steel production in England, which before the war averaged about 8,000,000 tons a year, has risen to 10,000,000 tons, Mr. Benner estimates. The exact figures could not, of course, be obtained owing to military censorship.

Railroad building is being rushed in all countries, Mr. Benner observes. Russia, in particular, has been forced to take great strides to meet the military pressure. The government controls about 80 per cent of the railroad mileage and as private charters expire it takes over other lines. About 4000 miles of double track a year is being built, principally to the new port of Alexandrovsk, which is to surpass Archangel in size. Most of the system to Vladivostok has already been double tracked.

Mr. Benner estimates that the Allies are now producing 1,000,000 tons of shells a month, including the supplies from the United States. This estimate includes Great Britain, Italy, Russia, Canada, France and Japan. He believes that there is no thought of peace in the Allied capitals. Everywhere is the preparation to pursue the war. Lloyd George's cabinet, he thinks, is determined to reverse the misfortunes of the Allies and to push the war until their desires are accomplished.

Two New Cambria Blast Furnaces

At a meeting of the directors of the Midvale Steel & Ordnance Company held last week it was decided to build two additional blast furnaces at the Johnstown, Pa., plant of the Cambria Steel Company. Both will be of large size. Both will be pushed rapidly to completion and one is expected to be ready for blowing in in May, 1917. It is the intention of the company to have one blast furnace available for the production of ferromanganese and other ferroalloys and for special irons.

One of the two blast furnaces of the Central Iron & Steel Company, Harrisburg, Pa., which have been idle since Dec. 31, 1913, will be blown in next April,, and arrangements are now being made for the necessary supplies of fuel from the company's mines in West Virginia and ore from the Mohawk mine on the Mesaba range. The company also plans to place in service another 130-ton open-hearth furnace about June 1, 1917. This will increase the steel output about 30 per cent. Four open-hearth furnaces are now being operated.

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Management and Engineering Meetings

(Continued from page 1343)

Reserve for Mechanical Engineers

A paper which attracted much attention was "An Illustrated Review of the Development of Our Fleet and Naval Stations" by W. L. Cathcart, consulting engineer, Gwynedd Valley, Pa. In this paper the necessity for constructing a large navy, particularly capital ships and destroyers, if this country is to maintain its position among the nations of the world, was clearly brought out, and it followed as a matter of course that the berthing and repair stations must be correspondingly developed.

In the discussion which followed, the idea that the engineer must take a more prominent place in public affairs was emphasized by a number of the speakers. Rear-admiral Edwards urged the development of navy yards and said that a naval base was required on the Gulf of Mexico or at any rate somewhere along the Southern coast, since no drydocks capable of taking our large men-of-war were available there. He recommended the cutting of the naval program, if necessary, to provide the funds for the development of such a base.

Carl G. Barth, consulting engineer, Philadelphia, spoke of the way in which the shops at the navy yards were run, speaking particularly of conditions as they existed in the New York yard some eight years ago, where inefficient operation was caused, for example, by inability to get the proper speed of the shafting.

D. S. Jacobus, advisory engineer, Babcock & Wilcox Company, New York City, said that the engineer would have to take a broader stand in civic and governmental affairs. Heretofore he had stuck close to his profession but now the engineering societies would have to do more in the future, it being up to them to decide whether they should get away from engineering or form a new general society of engineers. The success of the recently conducted industrial census was commented on.

M. E. Cooley, dean of the departments of engineering and architecture, University of Michigan, Ann Arbor, Mich., spoke of the work which the engineering colleges were doing in preparing men for naval service. He had made a thorough investigation of the curricula of the engineering schools and the military and naval academies and found that apart from special military training and discipline, the engineering schools gave from 85 to 90 per cent of the work covered by the Government academies. He was in favor of attendance at military camps or participation in summer cruises to help supply the military training and discipline.

Dr. Ira N. Hollis, president, Worcester Polytechnic Institute, Worcester, Mass., said he approved thoroughly of the participation of the society in public affairs and considered it necessary to the continuance of the American Society of Mechanical Engineers as a useful part of society. Preparedness in his opinion was much more than military drill and meant general service. He suggested the formation of an engineer reserve to enable the society to do its part in time of war by releasing officers from stations on shore for active duty. This he believed would supply a connecting link between civilian and military operations which was very necessary.

HEAT TREATMENT OF LARGE CHAINS

In the paper on "Heat Treatment of Wrought Iron Chain Cable," by Naval Constructor F. G. Coburn, U. S. N., and W. W. Webster and E. L. Patch, assistant naval constructors and students at the Massachusetts Institute of Technology, the manufacture of power welded chain was gone into at some length. This it developed became necessary at the Boston Navy Yard on account of a strike of the hand chain makers in July, 1914. The properties of the iron used were touched upon and considerable information given on the heat treating and testing of the links. The conclusions brought out by the laboratory experiments were as follows:

Annealing in a furnace reduces tensile strength from 49,000 to 47,000, reduces impact resistance from 150 to 90, and increases elongation and reduction of area.

Cooling in air increases tensile strength from 49,000 to 50,500, increases impact resistance from 150 to 240 and reduces elongation and reduction of area.

Quenching in oil increases tensile strength from 49,000 to 57,000, increases impact resistance from 150 to 340 and reduces elongation from 36 to 31 per cent.

Quenching in water increases strength from 49,000 to 67,000, increases impact resistance from 150 to 400 and reduces elongation from 36 to 25 per cent.

Increase of the temperature from which the material was cooled or quenched above 950 deg. C. slightly decreases tensile strength, increases elongation and reduction of area and does not appreciably affect impact resistance. Temperature of 950 deg. C. gives best results. The higher the drawing temperature, the greater the decrease in tensile strength and increase in elongation. Drawing has little effect on impact resistance. Increased time of annealing slightly decreases tensile strength and slightly increases elongation, reduction of area and impact resistance.

GAS PRODUCER FOR BITUMINOUS COAL

The first paper presented at the gas power session, held Thursday afternoon was by O. C. Berry, Purdue University, Lafayette, Ind. It covers investigations made by the author at the University of Wisconsin and afterward at Purdue on a recirculating producer in which the steam supplied for the gasification process is introduced through a steam jet blower and provides the means of circulating the gases. The question of the various forms of blowers suitable for this purpose is gone into at some length with special reference to the use of the least steam to deliver the required amount of gas, the ability of the blower to give continuous performance without clogging up or varying the delivery of the gas, freedom from excess tar precipitation, ease of access for cleaning and freedom from influence in the amount of gas delivered due to changes in the character of the fuel column. The proper temperature for the recirculated gases to precipitate the minimum amount of tar was investigated and between 550 and 900 deg. Fahr. was found to be the preferred range. The recirculating producer designed by the author is described. Among the considerations that the producer was designed to meet are simple construction, ability to stand wear; ease of poking, ready means for cleaning out clinker and ash, air and recirculated gases must enter evenly over the entire area of the bottom of the fuel column, even distribution of the steam through the air for combustion, free air circulation in all parts of the fuel column, delivery of gas from the producer so as to cause an even circulation through the upper part of the fuel column and the delivery of tar-free gas at all times.

Godfrey M. S. Tait, consulting engineer, Washington, D. C., said that the information contained in the paper would be of use to other investigators. He considers the single-zone up-draft producer with tar washing apparatus the best and cited a case where such a producer required only 15 min. per week for cleaning and oiling even though Illinois slack was used as fuel. He believes, however, that the investigation under commercial conditions should be continued.

Edward Rathbun, second vice-president, Rathbun Engineering Company, Toledo, Ohio, discussed the paper from the standpoint of an engine builder. He believed that the paper was an excellent laboratory development and showed a way toward conducting tests, but considered it limited as an aid to commercial operation. He thought that the cleanliness of the gas should have been considered after the producer was developed. He found in his experience that bituminous gas was cleaner than that produced from anthracite coal. The down-draft producer is objectionable, as it gives gases having a low heat value and thus reduces the capacity of the engine

to which it was connected, while a gas having a high heat value increased the flexibility of the engine.

H. F. Smith, secretary and general manager, Smith Gas Power Company, Lexington, Ohio, was impressed with the care with which the problems were worked out, but the process outlined had limits which should be borne in mind. He believed that a gas having a high heat value would be best for commercial work and stated that while brazing was hard with gas having a value of 120 B.t.u., it was easy where the value was 180 B.t.u.

W. B. Chapman, president, Chapman Engineering Company, New York City, considered the work in perfecting the producer creditable, as well as advancing testing. He thought that a producer using soft coal could not be depended upon to give uniform gas. The poking of a deep fire bed was difficult and he stated that the fire arched across in sizes up to 8 ft. in diameter, this fact being depended upon by the builders of mechanical producers to revolve the fire as the walls of the producer revolved. This results in the formation of cavities which if not broken down would result in the delivery of non-uniform gas. The regulation of the amount of air to the amount of gas produced was not easy and recirculation of the gases was apt to cause a drop in capacity.

SAMPLING AND ANALYZING PRODUCER GAS

The next paper, on the "Commercial Sampling and Analysis of Producer Gas," was presented by Philip W. Swain, New Haven, Conn. The paper pointed out that there were a number of ways aside from making a complete gas analysis by which the quality of producer gas could be judged more or less accurately. Low carbon dioxide, as determined by an Orsat or a recording carbon-dioxide machine, meant good gas and efficient producer operation, other indicators of gas quality being the carbon monoxide the appearance of the test flame and the reading of a recording calorimeter. In the future the standard way of determining gas quality would probably be by the use of a recording calorimeter, but at present both this instrument and the recording carbon-dioxide machines are likely to give trouble and get out of order.

A sample of the producer gas to be analyzed should be drawn from a pipe in which there was a continuous flow of fresh gas from the main, care being taken that there was no variation in pressure in the gas entering the sampling bottle. The sample must be drawn from the entire main and represent the average gas over its entire cross-section, and further should be drawn at a rate proportional to the flow of gas in the main. A two-bottle device, which the author designed for gas sampling, is described and illustrated. This permits accurate measurement and the control of the flow of water from the sampling bottle. It has a bubbling pipette for rapid absorption and can determine the carbon-dioxide by absorption or by explosion. Another form of portable instrument, which consists of an ordinary Orsat outfit which has been adapted to the analysis of producer gas, is illustrated. While the apparatus is fairly accurate, it is not as convenient and rapid in operation as one specially designed for the analysis of producer gas.

Harry F. Smith, secretary and general manager, Smith Gas Power Company, Lexington, Ohio, complimented the author on the practical way which the paper was prepared. He believed that a word of caution was necessary against using carbon-dioxide only to give a general idea of the quality of the gas. In support of his contention he cited a number of cases where, with 4 per cent of carbon-dioxide, the heating value ranged from 155 to 205 B.t.u., and with a percentage of 6.4 it ranged from 165 to 189 B.t.u. and also others where gas having a heat value of 205 B.t.u. varied in carbon-dioxide content from 4 to 13 per cent.

Another speaker stated that the subject of sampling and analysis of gas deserved more consideration from owners of producer gas plants than was given it. The personal equation was even more important in producer operation than in the operation of steam plants.

In closing the discussion the author stated that he was well aware that carbon-dioxide could not be relied upon to give a general idea of the quality of the gas. In preparing the paper, he stated, he had sent letters to a number of practical men in the gas producer field asking for their opinion on this subject, and three-quarters of them had replied that it was entirely practical to take carbon-dioxide as an indicator of the quality of the gas.

JOHN E. SWEET MEMORIAL

Memorial addresses in honor of the late Prof. John E. Sweet, founder of the society of Mechanical Engineers, were delivered Wednesday, Dec. 6, at the annual meeting of this society.

Worcester R. Warner, Warner & Swasey Company, Cleveland, gave the principal address. He referred to the letter of invitation written by Professor Sweet to Mr. Warner in 1880 to become a charter member of the society. At that time the mechanical engineer, was an indefinite personage, his profession not being included in the college curricula. Consequently, Professor Sweet had to invade the ranks of the mechanics and foremen for membership to the new society and there he found Mr. Warner.

Capt. Robert W. Hunt, Robert W. Hunt & Co., said, "Professor Sweet's life was as simple as his mechanical ideas."

Prof. Albert W. Smith, now dean of Sibley College, Cornell University, said the two typical qualities of the character of his former teacher were clearness of thought and deep human sympathy. For the would-be inventor he always carried a "needle to prick hot-air balloons," but having bursted these useless ideas he was anxious to offer constructive advice.

John H. Barr was chairman of the exercises.

England's Production of Shell Steel

That England would be entirely independent of foreign steel supplies by March, 1917, was the statement of Dr. Addison, of the British Ministry of Munitions, to a party of journalists which visited the Woolwich arsenal recently. This was made possible, he said, because of the extensions of steel plants effecting a probable saving of about £6,000,000 per year, assuming the carrying out of the present program. During the Somme offensive, he added, the expenditure of ammunition had been about 10 times the weekly rate in January, yet there were more filled shells in France now than at the beginning of the war. He thought that dilution of the working forces could not go beyond a certain point. There is essential work which can only be entrusted to the physically vigorous. The new program, he calculated, is eating up explosives in thousands of tons.

As to male labor, two new factories for explosives must need 21,000 workmen and he predicted that at least 315,000 additional men and 100,000 women workers would be necessary, if the augmented program was carried out. The control of the country's entire stock will be necessary, resulting in a greater interference than ever with private trade. He predicted that industry is going to be equipped better than ever before and that manufacturers would be more inclined than ever to adopt scientific and late methods, and that it would be essential in all extensions contemplated that the plant be up-to-date.

Mechanical Engineers Research Plans

Sub-committees on research have been appointed by the American Society of Mechanical Engineers. One of these is to consider bearing metals. Its chairman is C. H. Bierbaum of the Bierbaum-Dollar Company and vice-president of the Lumen Bearing Company, Buffalo, and the other members of the sub-committee are Prof. H. Diederichs, Sibley College, Cornell University, and John A. Capp, chief of the testing laboratories, General Electric Company, Schenectady. Another of the sub-committees is to study fuel oil, of which Prof. R. Danforth, Case School of Applied Science, Cleveland, is chairman. Sub-committees have also been appointed on flow meters, on the cutting action of machine tools, on lubrication and on worm gearing.

Iron and Steel Markets

EFFECTS OF PEACE NEWS

Price Possibilities in the Steel Market

Heavy Domestic Demand as Seen in Steel Corporation Orders

The one day that has elapsed since the surprising announcement of Germany's peace proposal has shown no traceable effects in the steel market. If actual negotiations for peace should be undertaken in the near future it is conceded that the developments in the steel industry would be highly important; but at present the trade is dominated by the belief that at this stage no basis of agreement can be found on which the war can soon be ended.

All calculations of domestic buyers and sellers of steel have long been based, not on the imminence of peace, but on the indefinite continuance of the war and the present price structure has been built up by the war. The effect on prices of actual negotiations for peace, should they come, is not overlooked in the current discussion, and until there is an actual rejection of the Berlin offer to discuss terms buying for farther future deliveries will naturally be restricted.

For months contracts between American steel manufacturers and the Allies have been drawn so as to guard against an abrupt falling off in the demand for war purposes. A stipulation in some contracts is that if shell steel is not specified the buyer shall take commercial steel in some form, as rails, plates or shapes.

Concerning the Steel Corporation's increase of over 1,000,000 tons in orders in November, it is stated on authority that out of nearly 2,500,000 tons booked in that month less than 10 per cent is to be classed as export war business. As to the proportion of the shipments from mills in recent months that should be credited to war demand estimates differ. In munitions steel and finished shells the country has probably been turning out 4,500,000 to 5,000,000 tons a year.

The German peace proposal came just as greater efforts were being put forth on behalf of Great Britain and France to get American steel. This week one sale of 30,000 tons of 82-mm. rounds is reported for delivery in the first quarter of 1917. The price was about 4½c. One or two steel companies have been negotiating for the sale of round lots of forging steel, and from Canada it is intimated that all the steel that can be furnished from this side will be taken.

That Chicago district mills contributed 500,000 tons or about half of the Steel Corporation's gain in unfilled orders last month indicates the activity of domestic buyers, particularly the railroads. Already fully 450,000 tons of rails have been sold there for delivery in the first half of 1918. An additional 20,000 tons has been taken by the St. Paul road, making its total 60,000 tons. It is expected that the Pennsylvania railroad's orders for 205,000 tons of 100-lb. to 130-lb. rails will soon be placed for 1918.

The Railroad situation in the Valley and Pittsburgh districts has gone from bad to worse. A number of blast furnaces are short of coke, due to recent embargoes, and some are likely to be forced out of blast. Shipments of finished material are also seriously hampered and the closing of some mills may be necessary if product accumulates further.

The week's advances in finished steel products have been chiefly in spikes, which have long been out of line, in tie-plates, sheets, and in iron and rail carbon bars. Some producers have put up spikes $10 a ton; Western producers with more moderation have made a $2 advance. Wire products are expected to go higher, probably $2 or $3 a ton, before Jan. 1.

It is expected that the contract price on sheet bars for the first quarter of 1917 will be fixed at close to $50. For export billets and sheet bars $60 has been paid, and a Central Western sale of ingots for domestic consumption was made at $55.

The pig iron market has lost its feverish activity and in some districts there is a marked falling off in demand. Prices have reached a level that causes buyers to hesitate. Bessemer iron for export has sold at $35, Valley furnace, and on a more limited scale of buying domestic users have paid that price. Foundry iron has advanced $1 in some markets but in other districts is unchanged.

Pittsburgh

PITTSBURGH, PA., Dec. 12, 1916.

Reports of Germany's willingness to enter into peace negotiations reached Pittsburgh at noon to-day and are the subject of much discussion in iron and steel circles. A violent break followed in the local stock market, but the reports had no effect whatever on prices of iron and steel products, which continue as strong as ever. In the past week Bessemer pig iron has advanced squarely to $35 on export and domestic sales. Prices on semi-finished steel are no higher, but very few sales are being made, as the steel cannot be obtained. Domestic ferromanganese is up about $10 per ton, sheets are slightly higher, railroad spikes are up about $10 per ton, prompt coke has sold up to $8 per ton, heavy steel scrap is up $1 to $2 per ton, and low phosphorus melting stock from $4 to $5. Another advance on wire products is expected before Jan. 1, and there may be advances on other kinds of finished material. As the close of the year approaches, the usual slight falling off in specifications on some lines is noted. The car situation is worse, and blast furnaces in the valleys and in the Pittsburgh district are suffering greatly for want of coke. It is not

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton	Dec. 13, 1916.	Dec. 6, 1916	Nov. 15, 1916.	Dec. 14, 1915.
No. 2 X Philadelphia	**$29.50**	$28.50	$25.00	$19.50
No. 2 Valley furnace	**31.00**	30.00	25.00	18.00
No. 2 Southern, Cin'ti	25.90	25.90	22.90	16.90
No. 2, Birmingham, Ala	23.00	23.00	20.00	14.00
No. 2, furnace, Chicago*	**30.00**	28.00	26.00	18.00
Basic, del'd, eastern Pa	30.00	30.00	26.00	18.00
Basic, Valley furnace	30.00	30.00	25.00	17.50
Bessemer, Pittsburgh	**35.95**	34.45	29.95	19.45
Malleable Bess., Ch'go*	**30.00**	28.00	26.00	18.00
Gray forge, Pittsburgh	29.95	29.95	25.95	17.95
L. S. charcoal, Chicago	31.75	31.75	25.75	19.25

Rails, Billets, etc., Per Gross Ton				
Bess. rails, heavy, at mill	38.00	38.00	38.00	28.00
O.-h. rails, heavy, at mill	40.00	40.00	40.00	30.00
Bess. billets, Pittsburgh	55.00	55.00	52.50	30.00
O.-h. billets, Pittsburgh	55.00	55.00	52.50	31.00
O.-h. sheet bars, P'gh	55.00	55.00	52.50	31.00
Forging billets, base, P'gh	80.00	80.00	76.50	52.00
O.-h. billets, Phila.	60.00	60.00	55.00	36.00
Wire rods, Pittsburgh	**70.00**	65.00	65.00	40.00

Finished Iron and Steel, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Iron bars, Philadelphia	**3.159**	2.909	2.659	1.959
Iron bars, Pittsburgh	3.25	3.25	2.85	1.80
Iron bars, Chicago	2.75	2.75	2.65	1.75
Steel bars, Pittsburgh	3.00	3.00	2.75	1.80
Steel bars, New York	3.169	3.169	2.919	1.969
Tank plates, Pittsburgh	4.25	4.25	4.25	1.90
Tank plates, New York	4.419	4.419	4.419	2.169
Beams, etc., Pittsburgh	3.25	3.25	2.80	1.70
Beams, etc., New York	3.419	3.419	2.969	1.869
Skelp, grooved steel, P'gh	2.85	2.85	2.70	1.70
Skelp, sheared steel, P'gh	3.00	3.00	2.80	1.80
Steel hoops, Pittsburgh	3.25	3.25	3.10	1.90

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire, Per Lb. to Large Buyers	Dec. 13, 1916. Cents	Dec. 6, 1916. Cents	Nov. 15, 1916 Cents.	Dec. 15, 1915. Cents.
Sheets, black, No. 28, P'gh	**1.25**	1.00	3.65	2.50
Sheets, galv., No. 28, P'gh	**6.00**	5.00	5.25	4.75
Wire nails, P'gh	3.00	3.00	2.85	2.00
Cut nails, Pittsburgh	3.00	3.00	2.80	1.90
Fence wire, base, P'gh	2.95	2.95	2.80	1.85
Barb wire, galv., P'gh	3.85	3.85	3.70	2.85

Old Material, Per Gross Ton				
Iron rails, Chicago	$29.00	$29.00	$25.00	$16.00
Iron rails, Philadelphia	**27.00**	27.00	23.00	19.00
Carwheels, Chicago	**22.00**	21.00	16.50	14.50
Carwheels, Philadelphia	23.00	22.50	18.00	15.50
Heavy steel scrap, P'gh	**27.00**	26.00	21.00	17.50
Heavy steel scrap, Phila	24.00	24.00	19.50	15.75
Heavy steel scrap, Chgo	23.50	23.00	20.50	15.75
No. 1 cast, Pittsburgh	**23.00**	20.00	17.00	15.25
No. 1 cast, Philadelphia	**21.00**	20.00	18.00	15.75
No. 1 cast, Chgo (net ton)	16.50	16.50	15.50	13.75
No. 1 RR wrot., Phila	**27.00**	26.00	23.50	20.00
No. 1 RR wrot., Chgo (net)	20.00	20.00	21.00	15.25

Coke, Connellsville, Per Net Ton at Oven				
Furnace coke, prompt	$7.50	$7.50	$7.50	$2.75
Furnace coke, future	4.00	4.00	4.75	2.40
Foundry coke, prompt	**8.00**	7.00	7.00	3.75
Foundry coke, future	**6.00**	5.00	5.00	3.00

Metals, Per Lb. to Large Buyers	Cents	Cents	Cents	Cents
Lake copper, New York	**35.50**	34.50	32.50	19.75
Electrolytic copper, N. Y.	**35.50**	34.50	32.50	19.50
Spelter, St. Louis	*11.50*	12.50	11.37	16.50
Spelter, New York	*11.55*	12.75	11.50	16.75
Lead, St. Louis	**7.80**	7.40	6.90	5.25
Lead, New York	**7.90**	7.50	7.00	5.40
Tin, New York	*43.00*	44.37½	44.12½	37.65
Antimony (Asiatic), N. Y.	14.00	14.00	13.00	29.00
Tinplate, 100-lb. box, P'gh	**$6.50**	$6.00	$6.00	$3.50

unlikely some stacks will soon blow out if coke shipments do not improve quickly.

Pig Iron.—Prices on Bessemer iron have advanced to $35, Valley furnace, no sellers quoting less than that price, while some ask $36 to $37. There have been probably half a dozen or more sales of Bessemer in lots ranging from 200 tons to 1000 tons at $35, and we also note a sale of 2500 tons of standard Bessemer for shipment to Italy at the same price. Some sellers are asking $32 for basic iron, but this has not been reached in actual sales. We note one sale of 5000 tons of basic for second quarter delivery at $30, Valley furnace. An open-hearth steel plant in the Wheeling district is understood to have closed late last week for 10,000 to 12,000 tons of basic for delivery in the second half of 1917 at about $30, Valley furnace. It is said part of the iron was secured from other districts. There have been small sales of No. 2 foundry iron at $32 to $33, Valley furnace, but the general market is $31 to $32. We quote standard Bessemer iron, $35; basic, $30 to $31; gray forge, $29; malleable Bessemer, $30, and No. 2 foundry, $31 to $32, all at Valley furnace, the freight rate for delivery in the Pittsburgh or Cleveland district being 95c. per ton.

Ferroalloys.—In the past two or three weeks there have been heavy sales of domestic ferromanganese for delivery in the first half at $160 to $165 at furnace. Several makers, however, have advanced their price on 80 per cent to $175 at furnace. English 80 per cent is held at $160 to $164, seaboard. We quote 18 to 22 per cent spiegeleisen at $50 to $55, and 25 to 30 per cent at $65 to $75, delivered. We quote 50 per cent ferrosilicon for delivery next year, in lots up to 100 tons, at $100; 100 tons to 600 tons, $99; and over 600 tons, $98, all per gross ton f.o.b. Pittsburgh. We now quote 9 per cent ferrosilicon at $39 to $41; 10 per cent, $40 to $42; 11 per cent, $41 to $43; 12 per cent, $42 to $44; 13 per cent, $43.50 to $45.50; 14 per cent, $45.50 to $47.50; 15 per cent, $47.50 to $49.50; and 16 per cent, $50 to $52. We quote 7 per cent silvery at $29.50 to $30; 8 per cent, $30 to $31; 9 per cent, $30.50; 10 per cent, $31; 11 per cent, $32; and 12 per cent, $33. These prices are f.o.b. at furnace, Jackson or New Straitsville, Ohio, and Ashland, Ky., all of which have a freight rate of $2 per gross ton to the Pittsburgh district.

Billets and Sheet Bars.—It is practically impossible to find semi-finished steel for sale at any price. A large Youngstown producer was in this city late last week scouring the local market for ingots, and is said to have picked up several small lots for which above $55 at shipping point was paid. The export demand for billets and sheet bars is still heavy and probably $60 could be obtained on these inquiries for base sizes and carbons, but those having the inquiries say they cannot find the steel. Prices on contracts for billets and sheet bars for first quarter delivery will be fixed about the 20th of this month, and it is said will be close to $50 at mill. We quote base sizes and base carbons of Bessemer and open-hearth billets and sheet bars at $55 to $57.50, maker's mill, Pittsburgh or Youngstown; forging billets, $80 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25.

Plates.—Inquiry for steel cars seems to have quieted down and no important orders were placed the past week. The Phillips Sheet & Tin Plate Company has awarded 25 steel gondolas to the Pressed Steel Car Company. The Pittsburgh & Lake Erie is in the market for 500 steel hoppers, and the H. C. Frick Coke Company for 1500 mine cars. The Carnegie Steel Company will furnish the steel plates and armor plate for two battleships to be built at Newport News, and will divide with the Cambria Steel Company the plates for two ships to be built at Camden, N. J., by the New York Shipbuilding Company. The nominal price of the Carnegie Company on sheared plates remains at 3.50c. at mill, with no promise as to delivery. Several other plate mills that can ship in the second and third quarters are quoting sheared plates at 4c. to 4.50c. at mill. On small lots for fairly prompt shipment, prices range from 4.50c. to 5c. at mill, f.o.b. Pittsburgh.

Structural Material.—Some good sized jobs were placed the past week and inquiry is reported active. The American Bridge Company has taken 1300 tons of bridge work for the Pennsylvania Railroad, 2000 tons for the

Southern and 5000 tons for the Lehigh Valley. The same company took 2500 tons of steel for extensions to the plant of the Crucible Steel Company of America at Harrison, N. J. The McClintic-Marshall Company has taken 2400 tons for new steel buildings for the National-Acme Mfg. Company, Cleveland, Ohio, the Austin Company of that city having the general contract. The same fabricator took 3200 tons for a new plant for the National Malleable Castings Company. We quote beams and channels up to 15 in. at 3c. at mill, with no promise of delivery, and from 3c. to 3.25c. for second and third quarter shipment in 1917; small lots from warehouse stock, 3.50c. to 3.75c., Pittsburgh.

Steel Rails.—It is reported that the order of the Pennsylvania Railroad for 205,000 tons of standard sections is to be placed this week. Makers report the new demand for light rails active, with an advance in prices likely in the near future. We quote 25 to 45 lb. sections at $47; 16 and 20 lb., $48; 12 and 14 lb., $49, and 8 and 10 lb., $50, in carload lots, f.ob.. at mill, the usual extras being charged for less than carload lots. We quote standard section rails of Bessemer stock at $38 and of open-hearth $40, per gross ton, Pittsburgh.

Sheets.—A wide range in prices is being quoted by the different mills on blue annealed, Bessemer black and galvanized sheets. It is said that several sales of carload lots of No. 28 Bessemer black sheets have been made at as high as 5c. per lb. at mill, but this is regarded as above the regular market, the sales evidently being for exceptionally prompt shipment or having some other unusual condition attached to them. The leading interest has not changed its price of 4c. on such sheets, but has practically none to sell for at least first quarter, while outside mills are quoting from 4.25c. to 5c., a fair range of the market being 4.25c. to 4.50c. The same applies to blue annealed and galvanized sheets, as much as $5 per ton difference in prices being quoted by different mills for the same gage. It is reported that galvanized sheets have sold higher than 6c. for prompt shipment. Sheets of all grades are scarce, and most mills are sold up through the first quarter and some partly through the second. We quote blue annealed sheets, Nos. 3 to 8, at 3.75c. to 4c.; box annealed, one-pass, Bessemer, cold-rolled sheets, No. 28, 4.25c. to 4.50c.; No. 28 galvanized, 5.75c. to 6.25c., and No. 28 tin mill black plate, 4.10c. to 4.25c., all f.o.b. mill, Pittsburgh.

Tin Plate.—Practically all that the mills can turn out in the first half of 1917 is under contract at $5.75 and $6 per base box, but on current orders the makers are quoting $6.50 to $7 for primes and practically the same prices for wasters. Several are quoting as high as $7.25 for wasters and $7.50 for primes for shipment from stock. We also note that a very large amount has been sold for delivery in the second half, the price to be fixed later. On terne plate, prices have been advanced by most makers from 25c. to 50c. per base box. We quote bright plate, 14 x 20, at $6 to $6.25 per base box, f.o.b. Pittsburgh, on contracts for delivery in the first half of 1917, and small lots from stock at $6.50 to $7 per base box at mill. We quote I. C. terne plate, 107 lb., at $7.15 to $7.65, and 200 lb. carrying 8-lb. coating, at $11, the usual advances applying for heavier weights and coatings.

Shafting.—Most consumers are covered through the first quarter and some of the larger ones through the first half of next year. Makers report specifications active, with prices firm, but deliveries are being made more promptly by several of the makers. It is said that the 20 per cent discount is allowed only on very attractive orders and that it may disappear entirely before long. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots and 10 per cent off in less than carload lots for first quarter and first half of 1917, f.o.b. Pittsburgh, freight added to point of delivery.

Railroad Spikes and Track Bolts.—There has been a sharp advance in prices on railroad spikes and track bolts. The demand for spikes is reported better while that for track bolts has been heavy for some time. We now quote track bolts with square nuts at 4.85c. to 5c. to railroads, but in Chicago and at other Western points lower prices are being named. We quote track bolts at 5c. to 5.25c. in small lots to jobbers, base. Track bolts with hexagon nuts take the usual advance of 15c. per 100 lb. We quote railroad spikes as follows: 9/16 in. and larger, $3.40, base; 7/16 and ½ in., $3.50, base; 5/16 and ⅜ in., $3.75, base; boat spikes, $3.65, base, all per 100 lb., f.o.b. Pittsburgh.

Wire Products.—Makers, and the trade as well, expect another advance of $3 to $5 per ton on or before Jan. 1. The demand for wire nails and wire is still abnormally heavy, and export inquiry is also active, mostly from Canada. Mills are sold up for two or three months, and it is said wire nails for prompt shipment bring 15 to 25c. per keg advance over regular prices. Owing to the bad car situation all the mills are still much behind in deliveries. Prices in effect at this writing are as follows: Wire nails, $3, base, per keg; galvanized, 1 in. and longer, including large head barbed roofing nails, taking an advance over this price of $2, and shorter than 1 in., $2.50. Bright basic wire is $3.05 per 100 lb.; annealed fence wire, Nos. 6 to 9, $2.95; galvanized wire, $3.65; galvanized barb wire and fence staples, $3.85; painted barb wire, $3.15; polished fence staples, $3.15; cement-coated nails, $2.90, base, these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to the point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing are 53 per cent off list for carload lots, 52 per cent for 1000-rod lots, and 51 per cent for small lots, f.o.b. Pittsburgh.

Wire Rods.—The new demand is still heavy, but some large makers are not selling many rods, needing practically their entire output for their own finishing mills. The demand from Canada has been active for some time, and quite large shipments are being made to that country. On a recent fairly large inquiry a local mill quoted $75 per ton for No. 5 soft rods, but has not yet obtained the order. We quote soft Bessemer, open-hearth and chain rods at $70 to $75 per gross ton, f.o.b. Pittsburgh.

Iron and Steel Bars.—Mills report the demand heavy for both iron and steel bars. The Carnegie Steel Company is understood to be practically sold up for all of 1917 on steel bars, and other large makers are about filled up for the first half. The nominal price of steel bars is 2.90c. at mill, with no promise of delivery, but makers that can ship in the latter part of the first quarter or early in the second quarter are quoting 3c. to 3.10c. at mill. The demand for reinforcing steel bars is heavy and prices are strong. We quote refined iron bars at 3.25c. and railroad test bars at 3.40c. in carload lots, f.o.b. Pittsburgh.

Nuts and Bolts.—Makers refer to the new demand as heavy, both from domestic and export customers, and they are about as far back in shipments as ever. Deliveries of steel bars by the mills are still bad and the shortage in cars is holding up shipments to a considerable extent. Another advance in nuts and bolts on or before Jan. 1 is expected. Discounts are as follows, delivered in lots of 300 lb. or more where the actual freight rate does not exceed 20c. per 100 lb., with terms 30 days net or 1 per cent for cash in 10 days:

[illegible] bolts, small, rolled thread, 50 per cent; small, cut [illegible] per cent large 35 per cent

[illegible] nuts, small rolled thread, 50 and 5 [illegible], 40 10 and 5 per cent, large, 40 [illegible]

[illegible] nuts, small, 40 and 5 per [illegible] per cent. Bolt ends, h. p. nuts 40 per [illegible] per cent. Lag screws (coach or [illegible] per cent.

Nuts, h. p. sq. and hex., blank, $2.60 off list, and tapped, $2.40 off; nuts, c. p. c. and t. sq., blank, $2.20 off, and tapped, [illegible] off, and tapped, $2.25 off. Semi-finished hex. nuts, 60 per cent. Finished and case-hardened [illegible]

[illegible] and smaller, 45 and 10 per [illegible]

Rivets.—The new demand is fairly active, but most large consumers are covered over the first quarter and

some through the first half. Export demand is also heavy. Recent shipments were made to India and Africa. Makers' prices are firm as follows: Buttonhead structural rivets, ½ in. in diameter and larger, $4.25 per 100 lb., base, and conehead boiler rivets, same sizes, $4.35 per 100 lb., base, f.o.b. Pittsburgh. Terms are 30 days net or one-half of 1 per cent for cash in 10 days.

Cold-Rolled Strip Steel.—Nearly all consumers are covered for the first quarter on the basis of $6.50 per 100 lb. at mill, but makers state they have not yet opened their books for sales for delivery in the second half. On current orders for fairly prompt shipment, makers quote $7 for fair-sized quantities up to $7.50 per 100 lb. for small lots. Terms are 30 days net, less 2 per cent off for cash in 10 days, delivered in quantities of 300 lb. or more when specified for at one time.

Hoops and Bands.—The nominal price of steel hoops remains at 3.25c. and steel bands at 2.90c., with no promise of delivery, but mills that can make shipments in the first quarter or early in the second quarter are quoting steel bands as high as 3.25c., with extras as per the steel-bar card, and steel hoops at 3.50c. at mill. Nearly all consumers are covered over the first quarter and some over the first half of next year at lower prices than are noted above.

Wrought Pipe.—The Philadelphia Company of this city has closed for about 12,000 tons of iron pipe and 8000 tons of steel pipe of various sizes, for delivery through 1917. This was divided among local, Youngstown and Wheeling mills. The Pierce-Fordyce Oil Association, operating in Oklahoma and Texas, is in the market for 100 miles of 8-in. line pipe for delivery in Healton, Okla., and Fort Worth, Tex. Most of the larger pipe mills are sold up for the first half on lap-weld sizes of iron and steel pipe, but on butt-weld sizes they can make delivery fairly promptly. Several large makers report that their orders for pipe this year will show an increase of 30 to 40 per cent over last year. Discounts in effect on black and galvanized iron and steel pipe are given on another page.

Boiler Tubes.—The market is very firm and an advance in prices is looked for at any time. Mills making iron and steel tubes are largely sold up for the next six to eight months or longer, and tubes for fairly prompt shipment bring premiums over regular prices. Discounts are given on another page.

Coke.—Only about two weeks remain for blast furnaces that desire to contract for coke for the first half of next year to get under cover, and it is believed that several large contracts now pending will shortly be closed. Some furnacemen that have not covered now seem disposed to pay as high as $4 for high-grade coke for delivery over the first half, but not all producers are willing to sell at that price, believing they will get more. There is a fair demand for prompt coke. The car supply is reported slightly better, but is still far from being satisfactory. We quote best grades of furnace coke for prompt shipment at $7.50 to $8, and on contracts $4 or higher, per net ton at oven. Best grades of 72-hr. foundry coke for spot shipment are held at $8 to $8.50, and on contracts from $5 to $6.50, several makers of foundry coke having a high reputation in the trade asking the higher price. The Connellsville *Courier* gives the output of coke in the upper and lower Connellsville regions for the week ended Dec. 2, as 419,377 net tons, an increase over the previous week of 11,208 tons.

Old Material.—Dealers are predicting a famine in scrap used for steel-making purposes. Early last week sales of high-grade steel melting scrap were made at $25 and $26 per ton, but in the last day or two several large local consumers who have bought 10,000 tons or more have paid as high as $27, while $28 is reported to have been paid for part of it. There is a heavy demand for low phosphorus melting scrap, and it has sold from $35 to $36 per ton, delivered, some sellers now quoting $37. There is a moderate demand for borings and turnings. We note sales of 600 tons of turnings at $13.50 and about 1000 tons of borings at close to $15, delivered. Prices being named by dealers at this writing for delivery in Pittsburgh and other consuming points that take Pittsburgh freight rates, per gross ton, are as follows:

Heavy steel melting scrap, Steubenville, Ind., Youngstown, Sharon, Monessen, Midland and Follansbee	$27.00 to $28.00
No. 1 railroad wrought	23.00 to 24.00
Bundling stock, New York and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	30.00 to 31.00
Heavy axle, compressed sheet scrap	22.00 to 23.00
Bundled sheet scrap, axles and steel rails, Pittsburgh district	17.50 to 18.50
Bundled sheet stamping scrap	16.00 to 16.50
No. 1 railroad cast, Pittsburgh	21.00 to 22.00
Railroad grate bars	13.00 to 14.00
Low phosphorus melting stock	36.00 to 37.00
Iron car axles	48.00 to 50.00
Steel car axles	48.00 to 50.00
Locomotive axles, steel	50.00 to 51.00
No. 1 busheling scrap	19.00 to 20.00
Machine shop turnings	13.00 to 14.00
Cast-iron borings	14.50 to 15.00
*Sheet bar crop ends	29.00 to 30.00
No. 1 railroad wrought scrap	23.00 to 24.00
Heavy steel axle turnings	17.00 to 18.00
Heavy breakable cast scrap	19.00 to 20.00

*Shipping point.

Chicago

CHICAGO, ILL., Dec. 12, 1916.—(*By Wire.*)

Of the increase of 1,000,000 tons in the unfilled tonnage of the Steel Corporation, as just reported, it is estimated the Illinois Steel Company is responsible for one-half. The record-breaking sales of November could hardly be maintained through this month, and daily bookings are a little more than 50 per cent of the November average. Rail sales of 1918 now exceed the expected output for the first six months in this district, based on a gait of 70,000 tons per month, total bookings approximating 450,000 tons. Current inquiry for cars includes about 14,000, while in the past week some 2000 were bought. Among the mill products prices have been advanced $2 for spikes, $5 for tie-plates, $5 to $10 for sheets, while quotations for iron and rail-carbon bars are moving upward toward 3c. at the mill. Out-of-store sheets are now $5 per ton higher. Pig iron at Chicago has advanced to $30 at the furnace and cast-iron pipe is up an additional $2. The freer offerings of dealers' scrap retarded somewhat the upward movement of prices for those grades, but railroad scrap continues to mount, with rerollers selling at $32 and iron axles in excess of $40 per ton.

(*By Mail*)

Pig Iron.—The market presents a varied assortment of inquiry, with resultant sales of a wide range in analysis and price. Buyers are generally covered through the first half, and transactions having to do with deliveries within that period are for filling-in purposes to cover additional business taken, or for the purpose of adjusting mixtures. The amount of iron from either Northern or Southern furnaces available for first-half delivery is now small, and the producers are disposed to distribute the limited quantities they have to sell rather pointedly as favors. There is also some iron to be had for delivery in December, but for this special prices are being asked. The relative scarcity of iron for first half delivery explains the willingness of some of the Southern furnaces in particular to sell in the second half at lower prices. For that delivery recent sales have been made on the basis of $23, Birmingham, with quotations ranging upward to $24. Few of the furnaces, however, are quoting openly, requiring rather that their representatives submit offers. For competitive high-phosphorus Northern iron, prices representing a spread of 50c. to $1 per ton over the Birmingham basis are being secured. Strong Northern foundry iron, malleable Bessemer and basic are held at $30 at furnace, and sales have been made at that price. For Lake Superior charcoal iron, we quote delivery prices at Chicago to include a freight rate of $1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic irons, which

are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton.

Lake Superior charcoal, Nos. 2 to 5	$31.75 to $32.75
Lake Superior charcoal, No. 1	32.25 to 33.25
Lake Superior charcoal, No. 6 and Scotch	32.75 to 33.75
Northern coke foundry, No. 1	30.50
Northern coke foundry, No. 2	30.00
Northern coke foundry, No. 3	29.50
Northern high phosphorus foundry	28.00
Southern coke No. 1 f'dry and 1 soft	27.50 to 28.50
Southern coke No. 2 f'dry and 2 soft	27.00 to 28.00
Malleable Bessemer	31.00
Basic	30.00
Low phosphorus	40.00
Silvery, 8 per cent	35.50 to 36.00
Bessemer ferrosilicon, 10 per cent	40.50 to 42.50

Rails and Track Supplies.—Rail bookings at Chicago for 1918 now total about 450,000 tons, commitments which will fill the mills well into July of that year. A number of the important roads are still unprovided for. Tie-plates have been advanced to a minimum of $55 and sales have been made at that price, including 900 tons to the Pennsylvania Lines. Spike prices also have been adjusted and 3.50c. is now the low quotation. Quotations are as follows: Standard railroad spikes, 3.50c. to 3.60c., base; track bolts with square nuts, 4c. to 4.50c., base, all in carloads, Chicago; tie-plates, $55 to $60, f.o.b. mill, net ton; standard section Bessemer rails, Chicago, $38, base; open hearth, $40; light rails, 25 to 45 lb., $44; 16 to 20 lb., $45; 12 lb., $46; 8 lb., $47; angle bars, 2.25c.

Structural Material.—Outstanding car inquiry includes 1000 box for the Northern Pacific, 2500 refrigerators for the Union Pacific, 2000 gondolas and 1000 box for the Norfolk & Western, 500 coal cars and 750 gondolas for the Nickel Plate, 1000 box and 100 tank cars for the Gulf Coast Line, 1200 hoppers and 400 cabooses for the New York Central Lines, 1500 hoppers for the San Pedro, Los Angeles & Salt Lake City, 500 stock cars for the Great Northern, 500 automobile cars for the Illinois Central, 200 hoppers for the Atlantic Coast Line and a scattering of about 500 other cars in lots of 50 to 100. Orders for cars last week in the West include 1000 box for the Minneapolis & St. Louis, placed with the American Car & Foundry Company, and 500 stock cars for the same road, taken by the Haskell & Barker Car Company. The Northern Pacific placed its order for 500 automobile cars. The Minneapolis & St. Louis cars will require only about 5000 tons of steel, being almost entirely of wood construction. In building lines the week brought out no contracts of importance but inquiry from fabricators for plain material continues in surprising volume in view of the very small quantity of material available for any delivery within six months. There are now no makers of standard shapes quoting for deliveries this side of July. We quote for Chicago delivery of structural steel from mill 3.189c. to 3.439c.

We quote for Chicago delivery of structural steel out of jobbers' stocks 3.70c.

Plates.—Armour & Co., Chicago, have contracted for oil storage tanks in Texas requiring 1150 tons of plates. With practically no supply available, plate mills are daily in receipt of numerous inquiries, many of them for export. Very desirable specifications for tank plates are offered to local mills in lots up to 600 tons at 4.25c. at the mill. We quote for Chicago delivery of plates from mill, at its convenience, 3.689c.; for prompt shipment, 4.189c. to widths up to 72 in., and for wide plates, 4.939c. to 5c.

We quote for Chicago delivery of plates from jobbers' stocks, 4.35c.

Sheets.—A wide variance in the quotations being made by the mills is noted, and while there remain some few producers in a position to accept business, the general attitude indicates a wish to avoid additional obligations. Quotations as high as 4.50c. for blue annealed, 5.50c. for black and 7.50c. for galvanized are being regularly made, but the market is more properly quoted at $10 per ton below these prices. We quote, for Chicago delivery, No. 10 blue annealed, 4c. to 4.50c.; box annealed, No. 16 and lighter, 4.50c. to 5c.; No. 28 galvanized, 6.50c. to 7c. These quotations are minimum prices for contracts. Early shipment quotations are $5 to $10 per ton higher.

Further advances on the prices of sheets from store have been announced and we quote for Chicago delivery out of stock, regardless of quantity, as follows: No. 10 blue annealed 4.50c.; No. 28 black, 4.75c.; No. 28 galvanized, 6.75c.

Bars.—The bar-iron mills are carefully choosing in the matter of accepting additional business and quotations are noted as high as 3c. at the mill, though 2.75c. remains the accepted market. Western makers of rail-carbon steel who are not entirely withdrawn are also asking up to 3c. We quote mill shipment, Chicago, as follows: Bar iron, 2.75c. to 3c.; soft steel bars, 3.089c. to 3.189c.; hard steel bars, 2.75c. to 3c.; shafting, in carloads, 20 per cent off; less than carloads, 15 per cent off.

We now quote store prices for Chicago delivery as follows: Soft steel bars, 3.60c.; bar iron, 3.60c.; reinforcing bars, 3.60c. base, with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting list plus 5 per cent.

Rivets and Bolts.—Existing prices appear to be no bar to new inquiry for bolts and nuts and leading manufacturers report little or no difficulty in the making of contracts on the basis of the recent advance. There also appears to have been no recurrence of the irregularities affecting the prices of rivets. We quote as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 50; cut thread, 40-7½; larger sizes, 35; machine bolts up to ⅜ x 4 in., rolled thread, with hot pressed square nuts, 50-5; cut thread, 40-10-5; large size, 40; gimlet-point coach screws, 50; hot pressed nuts, square, $2.60 off per 100 lb.; hexagon, $2.60 off. Structural rivets, ¾ to 1¼ in., 4.15c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

Store prices are as follows: Structural rivets, 4.50c.; boiler rivets, 4.60c.; machine bolts up to ⅜ x 4 in., 40-10-5; larger sizes 10; carriage bolts up to ⅜ x 6 in., 40-7½; larger sizes, 35; hot pressed nuts, square, $3, and hexagon, $3 off per 100 lb.; lag screws 50.

Cast-Iron Pipe.—New inquiry for pipe for municipal purposes is limited to the proposed purchase of 1500 to 2200 tons at St. Paul. Contracts closed last week included 1250 tons for Eveleth, Minn., awarded to the American Cast Iron Pipe Company; 1150 tons at Ann Arbor, Mich., to the National Cast Iron Pipe Company, and 600 tons at Erie, Pa., to R. D. Wood & Co. A further advance of $2 per ton has been announced in the price of pipe. We quote as follows, per net ton, Chicago: Water pipe, 4-in., $44.50; 6-in. and larger, $41.50, with $1 extra for class A water pipe and gas pipe.

Wire Products.—The trade in wire products is without significant features, the slight falling off in business having its explanation in the normal decline at this time. We quote as follows per 100 lb.: Plain wire, Nos. 6 to 9, base, $3.239; wire nails, $3.189; painted barb wire, $3.339; galvanized barbed wire, $4.039; polished staples, $3.339; galvanized staples, $4.039; all Chicago.

Old Material.—The freer offering of yard scrap by the dealers is being felt in the market, and a comparison of present prices with those of a week ago shows that little advance has been made, in consequence, for these grades. The heavy scrap coming from the railroads has continued to advance. Rerolling rails are now quoted $31 to $32, prices as high as these having been paid by some of the mills, though other more favorably situated users are declining to pay over $28 except as the rails may be especially desirable. The market for heavy melting steel is temporarily quiet for lack of new buying, but prices for shoveling steel are being largely determined by offers from Pittsburgh melters. Demand for axles has reappeared and quotations are in excess of $40. Sales of foundry scrap were heavier last week and large purchases of No. 1 cast are noted. The price of stove plate still commends itself as relatively low compared with pig iron. Railroad lists last week were more in evidence as to number but of not great importance in size. The Soo Line has 1200 tons, the Big Four 3100, the Union Pacific 1200, the Santa Fé 1400, the Monon 800 and the Vandalia Lines about 400. We quote for delivery at

buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

	Per Gross Ton	
Old iron rails	$29.00 to	$30.00
Relaying rails	32.00 to	33.00
Old carwheels	22.00 to	22.50
Old steel rails, rerolling	31.00 to	32.00
Old steel rails, less than 3 ft	26.50 to	27.00
Heavy melting steel scrap	23.50 to	24.50
Frogs, switches and guards, cut apart	24.00 to	25.00
Shoveling steel	23.00 to	23.50
Steel axle turnings	14.50 to	15.00

	Per Net Ton	
Iron angles and splice bars	$29.50 to	$30.00
Iron arch bars and transoms	30.00 to	30.50
Steel angle bars	32.00 to	33.00
Iron car axles	40.00 to	42.00
Steel car axles	42.00 to	43.00
No. 1 railroad wrought	26.00 to	26.50
No. 2 railroad wrought	25.00 to	25.50
Cut forge	25.00 to	25.50
Pipes and flues	16.50 to	17.00
No. 1 busheling	19.00 to	20.00
No. 2 busheling	13.50 to	14.25
Steel knuckles and couplers	23.50 to	24.50
Steel springs	24.50 to	25.00
No. 1 boilers cut to sheets and rings	15.50 to	16.00
Boiler punchings	20.50 to	21.00
Locomotive tires, smooth	25.00 to	26.00
Machine-shop turnings	10.50 to	11.00
Cast borings	9.50 to	10.00
No. 1 cast scrap	16.50 to	17.00
Stove plate and light cast scrap	12.75 to	13.25
Grate bars	13.50 to	14.00
Brake shoes	13.50 to	14.00
Railroad malleable	18.00 to	19.00
Agricultural malleable	16.00 to	16.50

Philadelphia

PHILADELPHIA, PA., Dec. 12, 1916.

Naturally enough, the activity in pig iron is tapering off as prices go higher, but quotations continue on the upward trend. Representative brands of eastern Pennsylvania No. 2 X are held at $30, furnace. The price of basic, at $30, furnace, was confirmed in the past week by the taking of 500 tons at that figure. For a good-sized lot it is believed that over $30 would be asked. Virginia No. 2 X has sold at $30.75, the seller now quoting $31.75, with none available this side of February, but no sales have been made at the higher figure. A Pennsylvania furnace quotes $32.90, but has made no sales at the new price. It is confidently expected, however, that consumers will eventually be glad to pay these prices. Standard low phosphorus is strong at $55. The overwhelming demand for ship plates continues, with one maker quoting 6c., Pittsburgh, as his minimum. Norwegian, Italian and Japanese interests are energetic in their quest for ship steel. Steel bars are strong at unchanged quotations, but iron bars have again been advanced, the makers quoting 3.409c., Philadelphia. A mill rolling structural steel has advanced its minimum to 3.659c., Philadelphia, and is seeking no orders. Billets and sheets show renewed strength. The old material market is irregular, with heavy melting steel especially strong because of the activity and high prices prevailing at Pittsburgh. Railroad offerings last week went at prices which netted the roads more than they had received for scrap in many years.

Pig Iron.—The market is quieter, but prices have continued their progress upward, and less iron is available at any price. It is to be remembered that these are days when quotations change greatly in the course of a few hours. At some of the top prices quoted yesterday business had not been done, but sellers were confident that consumers will meet the levels they name. Competition still plays its part in the market. No large tonnages have been entered in the past week, but the aggregate of small and moderate-sized orders is good. One brand of eastern Pennsylvania No. 2 X, held last week at $29, furnace, has been advanced to $30, furnace, or $30.79, Philadelphia. For gray forge $28.79, Philadelphia, has been paid. Another brand of eastern Pennsylvania No. 2 X is held at $31, furnace, or $32.90, Philadelphia, but no sales have been made at the figure; another brand is quoted at $30, furnace, equal to $30.85, Philadelphia. A Virginia iron that was sold freely at $26.50, furnace, a week ago ($29.25, Philadelphia) brought $28, furnace, or $30.75, Philadelphia, on Saturday, and yesterday was marked up by one seller to $29, furnace, or $31.75, delivered, with none available this side of February. Still another brand of Virginia was quoted yesterday at $27.25 to $28, furnace, or $30 to $30.75, delivered. A consumer paid $30, furnace, for 500 tons of basic. The steel works and pipe shops, which are the largest purchasers in this territory, have covered their future requirements, and only appear in the market for occasional prompt lots, but it is believed that considerable first-half iron is yet to be purchased by other consumers who have not been aroused to the seriousness of the situation. One of these has inquired somewhat anxiously as to the effect of furnaces going out of blast. Standard low phosphorus is held at $55, and no signs of a halt in its upward trend are observed; indeed, the scarcity indicates higher prices. Southern No. 2 X is quoted at $25, furnace, or $30.25, Philadelphia. Export inquiries for all grades continue to come out. Quotations for standard brands delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa. No. 2 X foundry	$29.50 to $30.50
Eastern Pa. No. 2 plain	29.00 to 30.00
Virginia No. 2 X foundry	29.00 to 30.00
Virginia No. 2 plain	28.75 to 29.75
Gray forge	28.25 to 28.75
Basic	30.00
Standard low phosphorus	50.00

Iron Ore.—In the week ended Dec. 9 arrivals of foreign ore at this port were as follows: From Sweden, 13,021 tons; from Cuba, 12,700 tons, and from Spain, 6,195 tons.

Ferroalloys.—Prompt domestic 80 per cent ferromanganese appears to be stronger at $165, delivered. If this price were shaded at all it would be for future delivery. No prompt foreign is available and it is firmly held at $164, seaboard. Shipments from abroad are not so freely made as they were earlier in the year, and one English maker is out of the market for the first quarter. Arrivals here from England last week totaled 869 tons. The demand for miscellaneous carloads for prompt shipment is good. Spiegeleisen is held at $50 to $55, furnace. Small lots of prompt 50 per cent ferrosilicon are quoted up to $115, Pittsburgh, with carloads at $100, and 100-ton lots at $99. For blast-furnace ferrosilicon some makers ask $47, furnace, or $48.44, Philadelphia.

Plates.—The strong position of the market is indicated by the fact that in the past few days one mill received export inquiries for 54,000 to 55,000 tons of ship plates wanted by Norwegian, Italian and Japanese interests. It figured on but 10,000 tons, quoting 6c., Pittsburgh. A Norwegian buyer, in addition to the above, desired to contract for 10,000 tons a year over a period of five years, but his proposition was not considered. The mill which received these inquiries quotes ordinary tank steel at 5.159c., and ship material at 6.159c., Philadelphia. The question of another maker is 4.409, Philadelphia, on tank plates. A mill which quotes 4.659c., Philadelphia, as its minimum, took an order for 1000 tons at 4.909c., Philadelphia, delivery at its convenience. The railroads are rushing to buy.

Bars.—Steel bars range from 3.159c. to 3.409c., Philadelphia. Iron bars have again been advanced, the new quotation being 3.159c., Philadelphia, for carload lots. The demand is good and for light sizes full extras are demanded. The export demand continues.

Structural Material.—Eastern Pennsylvania makers have advanced their quotation to 3.50c., Pittsburgh, or 3.659c., Philadelphia, and with the price goes the statement that they are not looking for business, but 3.409c., Philadelphia, can still be done. The new building for the John A. Roebling's Sons Company, Trenton, N. J., which requires 2000 to 2500 tons, has been placed with the McClintic-Marshall Company. A municipal pier at the foot of Cherry Street, Philadelphia, is pending, and will require a round tonnage.

Billets.—The market is stronger than ever, with steel still scarcer for delivery in the next few months. The nominal prices are $60 for open-hearth rerolling billets and $75 to $80 for forging steel. Steel round discards are being offered at about $40 at mill.

Coke.—The situation is but little changed, with prices stiff and a source of worriment to consumers. Prompt furnace is quoted at $7.50 to $7.75 per net

ton at oven. Prompt foundry is quoted at $9 to $10. Contract furnace is nominal at $4 to $4.50 per net ton at oven. Cases have come to light where much higher prices have been asked, but consumers have not considered them. Contract foundry is nominal at $6 to $6.50 at oven. Freight rates from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Sheets.—No 10 blue annealed sheets are strong at 4.409c., to 4.659c., Philadelphia, with the mills filled up for the first quarter at least.

Old Material.—Heavy melting steel has not undergone much change in this territory because of any activity therein, but it is stronger as a result of what is happening in the Pittsburgh district. Pittsburgh is reported strong at $26.50 to $27 and material is going to its mills which ordinarily would come here. For carwheels it is reported that $25, Pittsburgh, has been paid. The railroad offerings last Friday were taken to a large extent by mills at high prices. From $26 to $30 was paid for different grades. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	[illegible]
Old steel rails, rerolling	[illegible]
Low phos. heavy melting steel	[illegible]
Old steel axles (for export)	45.00
Old iron axles (for export)	45.00
Old iron rails	[illegible]
Old carwheels	22.50 to 23.50
No. 1 railroad wrought	27.00 to 28.00
Wrought-iron pipe	19.00 to 20.00
No. 1 forge fire	16.50 to 17.50
Bundled sheets	16.50 to 17.50
No. 2 busheling	13.00 to 14.00
Machine-shop turnings	13.50 to 14.00
Cast borings	14.50 to 15.00
No. 1 cast	[illegible]
Grate bars, railroad	[illegible]
Stove plate	[illegible]
Railroad malleable	[illegible]

Rogers, Brown & Co., on Dec. 15, will remove their Philadelphia branch office from the Pennsylvania Building to suite 1800 in the Morris Building.

Cleveland

CLEVELAND, OHIO, Dec. 12, 1916.

Iron Ore.—The Lake shipping season will close today, the last boats being scheduled to leave Lake Superior ports before midnight. With the close of the record-breaking season there is probably more ore on Lake Erie docks than ever before at a corresponding date. On Dec. 1 the docks held 9,958,306 gross tons, the largest amount since Dec. 1, 1912, when it totaled 10,053,836 tons. However, the dock stocks on Dec. 1 have been increased by considerable ore shipped since then. Furnaces supplied by Lake Erie docks took 90 per cent of the ore receipts direct during the season, as compared with 94 per cent last year. Late in the season considerable ore was placed on docks that would have gone direct to the furnaces had it not been for the car shortage. Some ore sales are reported, but the market is not active. A general advance of 10 per cent in wages in the mining districts will go into effect Dec. 15. We quote prices as follows, delivered lower Lake ports: Old range Bessemer, $5.95; Mesaba Bessemer, $5.70; old range non-Bessemer, $5.20; Mesaba non-Bessemer, $5.05.

Pig Iron.—The market has quieted down considerably. While there has been no further advance in prices, they have reached such a high level that jobbing foundries are unwilling to buy pig iron until they close their castings contracts for the coming year. Sales of foundry iron for the last half in the past few weeks have been largely to manufacturers who will be in a position to add an increased cost to their products. The demand for malleable iron is less active than for foundry grades, although malleable foundries are probably fully as busy. Cleveland furnaces are quoting foundry iron at $31, or $1 per ton higher than is quoted by Valley and Toledo furnaces. The demand for Southern iron has continued quite active, many of the consumers substituting this iron for Northern because of its lower price. Scarcely any Southern iron is to be had for delivery before July 1. It is quoted at $23, Birmingham, for No. 2 for last half, but sales have been made at $25 for the second quarter. The price on Virginia foundry iron has been advanced $1 per ton, or to $28 at furnace, making the Cleveland delivered price practically the same as that of Northern iron. We quote, delivered Cleveland, as follows:

Bessemer	$35.95
Basic	30.95
Northern No. 2 foundry	$30.95 to 31.30
Southern No. 2 foundry	27.00 to 29.00
Gray forge	29.95
Ohio silvery, 8 per cent silicon	38.62 to 39.62
Standard low phos., Valley furnace	50.00 to 51.00

Coke.—The coke market shows practically no change. Foundry coke is quoted at $9.75 per net ton at oven for standard Connellsville makes, for prompt shipment, and $6.50 for contract. We note the sale of a small lot of furnace coke at $8.25 at oven.

Finished Iron and Steel.—The car shortage and railroad embargoes are tending to make deliveries worse, and steel badly wanted by consumers is held in mill yards awaiting shipment. The new demand is active, and further advances have been made by several mills for anything they have to sell for delivery during the next few months. One Pittsburgh district mill has marked its price up to 4.50c. on tank plates, 6c. on ship plates, and to a minimum of 3.25c. on steel bars and structural material. Eastern mills are quoting sheared plates at 5c. at mill; universal plates at 4c., and structural material for western shipment at 3.50c. The demand for tank plates is heavy. New structural contracts include 3400 tons for a new foundry for the National Malleable Castings Company, Cleveland, taken by the McClintic Marshall Company; 220 tons for a factory building for the Morgan Engineering Company, Alliance, Ohio, and 500 tons for a plant for the Massillon Pressed Steel Company, both taken by the Massillon Bridge & Structural Company. The Nickel Plate Railroad is in the market for 10,000 tons of rails for 1918 delivery. The demand for wire is heavy, and most consumers want considerable tonnage in addition to their regular contracts, but this is hard to find. Hard-steel bars have been further advanced to 2.90c. to 3c. at mill. Railroad spikes have been advanced to [illegible] for 4½ x 9/16 in. and larger. The sheet situation is growing worse, and consumers are now having as much difficulty in buying sheets as other finished-steel products. Sharp advances have been made in warehouse prices on black and blue annealed sheets. We quote mill prices on sheets as follows: No. 28 black, 4.25c. to 5c. at mill; No. 10 blue annealed, 3.75c. to 4.25c.; No. 28 galvanized, 6.50c. to 7.50c. Warehouse prices are as follows: Steel bars under 2 in., 3.75c.; squares and rounds, 2 in. and over, 4.25c.; structural material, 3.85c.; plates, 4.35c.; iron bars, 3.70c.; hoops, 4.50c.; blue annealed sheets, 4.50c. for No. 10; Bessemer black sheets, 4.65c. for No. 28.

Bolts, Nuts and Rivets.—A large volume of bolt and nut business is being placed in first quarter and first half contracts and specifications on contracts are heavy. Another advance is not unlikely. Rivet specifications are heavy. We quote rivets at 4.25c., Pittsburgh, for structural and 4.35c. for boiler. Bolt and nut discounts are as follows:

[illegible] bolts, [illegible] x 6 in., smaller or shorter, 1 thread, 50; cut thread, 40 and 7½; larger or longer, Machine bolts with h.p. nuts, ⅜ x 4, smaller or shorter, 1 thread, 50 and 5; cut thread, 40, 10 and 5; larger or longer, 40. Lag bolts, gimlet or cone point, 50. Square and hexagon h.p. nuts, blank, $2.60 off the list; tapped, $2.40 off. C.p.c. and t. hexagon nuts, all sizes, blank, $2.50 off; tapped, [illegible] off. Cold pressed semi-finished hexagon nuts, 60 off.

Old Material.—The market continues active in steelmaking scrap. Three Cleveland mills are reported to have purchased about 30,000 tons of heavy melting steel scrap from a Cleveland dealer late last week for delivery in the first quarter at $27 to $27.50 delivered, or considerably higher than the usual quotations by dealers for small lots. Prices are higher on most grades. Rerolling rails are scarce and have sold as high as $30. Cast scrap, borings and turnings, stove plate and grate bars are fairly plentiful, and prices on these show more

of a tendency to remain on their recent levels. In fact this is particularly true of turnings, which are not firm. Dealers claim that the new railroad demurrage rates will result in considerable hardship to them, especially when mills are congested. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton

Steel rails	$23.50 to $24.00
Steel rails, rerolling	28.00 to 29.00
Steel rails under 3 ft	30.00 to 31.00
Iron rails	31.00 to 32.00
Steel car axles	30.00 to 32.00
Heavy melting steel	23.00 to 24.00
Carwheels	23.00 to 24.00
Relaying rails 50 lb. and over	37.00 to 38.00
Agricultural malleable	16.50 to 17.00
Railroad malleable	23.50 to 24.00
Steel axle turnings	17.00 to 17.50
Light bundled sheet scrap	14.50 to 15.00

Per Net Ton

Iron car axles	$17.00 to $18.00
Cast borings	11.00 to 11.75
Iron and steel turnings and drillings	10.00 to 10.75
No. 1 busheling	18.00 to 19.00
No. 1 railroad wrought	26.00 to 27.00
No. 1 cast	19.00 to 19.50
Railroad grate bar	14.00 to 15.00
Stove plate	14.50 to 15.00

Cincinnati

CINCINNATI, OHIO, Dec. 13, 1916.—(*By Wire.*)

Pig Iron.—The scarcity of iron in the South for near-by shipment has created a price condition claimed to be unprecedented. For instance, the quotations for prompt or first half shipment are from $24 to $25, Birmingham, but for the last half $23 can be done. A number of contracts for the first half have been made at $25 and a few at the same figure for last half. Several thousand tons of Southern foundry iron was sold last week by two firms who have been holding back in quoting for last half delivery, and some of this iron went as low as $22, Birmingham, but the larger part of it was booked around $22.50 to $23. The buyers of this iron are scattered through southern and central Ohio and Indiana and one lot of 1000 tons was taken by a northern Ohio consumer. The Ohio silvery irons are more active, but no large sales are reported. For spot shipment the silvery iron furnaces are asking around $40 for an 8 per cent analysis, and contract prices range all the way from $36 to $40 at furnace. Northern basic is quiet, but one special sale was made of 2000 tons to a central Ohio melter at $30, Ironton, for first half shipment. The furnaces in that district are firm at $30 for foundry or basic for the last half, and authentic reports are circulated that an advance is contemplated for this week. Several Virginia foundry-iron contracts were made in this territory last week with prices ranging from $28 to $29 at furnace. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	$26.40 to $26.40
Southern coke, No. 2 f'dry and 2 soft	25.90 to 27.90
Southern coke, No. 3 foundry	25.40 to 27.40
Southern coke, No. 4 foundry	24.90 to 25.40
Southern gray forge	24.40 to 26.40
Ohio silvery, 8 per cent silicon	37.25 to 38.25
Southern Ohio coke, No. 1	31.76
Southern Ohio coke, No. 2	31.26
Southern Ohio coke, No. 3	30.76
Southern Ohio malleable Bessemer	31.26
Basic Northern	31.26
Lake Superior charcoal	28.70 to 29.70
Standard Southern carwheel	27.90 to 28.40

(*By Mail*)

Finished Material.—Both black and galvanized sheets continue advancing. Quotations of nearby mills are now on a basis of 5c., Cincinnati, or Newport, Ky., for No. 28 black sheets, and 6.90c. to 7c. for No. 28 galvanized. Quotations from some outside mills may run lower, but the question of shipment on contract time is one that the buyer is now most interested in. The mills are doing everything possible to keep their customers supplied, and so far have been reasonably successful. No. 10 blue annealed sheets, from jobbers' stocks, have been advanced to 4.40c. Other store prices are unchanged as follows: Steel bars and small structural shapes 3.70c.; structural material, 3.80c., base; rounds and squares, 2 in. and over, 4.25c.; flat bars, 1 in. and over, 4.25c.; cold rolled shafting, 10 per cent plus list. Wire nails are unchanged at $3.40 per keg, base, from stock and the demand from the hardware trade is better than at any previous year-end period. Jobbers quote barb wire at $4.40 per 100 lb. base. Stove makers complain that they are not able to obtain shipments of rivets and stove bolts on scheduled time.

Coke.—Some Wise County foundry coke was sold last week for prompt shipment at $8.75 per net ton at oven, and this is now considered a moderate price on coke urgently needed. Most foundry coke consumers are fairly well covered for the first half of next year. Contracts running through the entire year would be accepted around $5.50 to $6 in the Connellsville, Wise County and Pocahontas fields. Furnace coke is not a matter of interest except as to rushing forward shipments on contracts.

Old Material.—Not a single item in the scrap line is without an advance this week. Bundled sheet scrap went up $1 per ton and rerolling steel rails $2. Borings and turnings have also been advanced 50c. All kinds of cast scrap are much higher than 30 days ago. Even at the present figure cast scrap is not on a parity with pig iron. The following are dealers' prices, f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton

Bundled sheet scrap	$14.75 to $15.25
Old iron rails	26.00 to 26.50
Relaying rails 50 lb. and up	35.00 to 36.00
Rerolling steel rails	25.00 to 25.50
Heavy melting steel scrap	21.00 to 21.50
Steel rails for melting	21.00 to 21.50

Per Net Ton

No. 1 railroad wrought	$21.75 to $22.25
Cast borings	14.00 to 14.50
Steel turnings	14.00 to 14.50
Railroad cast	16.00 to 17.00
No. 1 machinery cast	18.00 to 18.75
Burnt scrap	11.00 to 11.00
Iron axles	24.00 to 25.00
Locomotive tires (smooth inside)	27.00 to 27.50
Pipes and flues	14.00 to 14.50
Malleable cast	15.00 to 15.50
Railroad tank and sheet	15.00 to 15.50

St. Louis

ST. LOUIS, MO., Dec. 11, 1916.

Pig Iron.—With practically all consumers covered for the first half of 1917 and probably 50 per cent covered for the last half, the market is one of interest chiefly to the consumer who has overstayed. No open quotations are being made on any brands or grades or deliveries. Among transactions may be noted one of 800 tons of No. 2 foundry and another of about 850 tons of 12 to 13 per cent Bessemer ferrosilicon which went at $48 furnace with an advance immediately thereafter to $50 per ton.

Coke.—Sales of foundry grades continue to be made for spot and early delivery at abnormal prices. One lot of about 800 tons went at $10.50 the past week, the purchase being made as much for insurance on futures delivery as because of immediate need. The figure noted was paid for Virginia product. For first half a price of $8.50 is being made, though with no important transactions.

Finished Iron and Steel.—Prices continue to be quoted in a nominal way. A Southwestern road bought 6000 tons of standard section rails for 1918 delivery. Deliveries on light rails are made in two to three months' time, the mills being in better shape on this class of material than any other. Light spikes have stiffened still more and are quoted at 3.50c., base, with advances expected with the first influence of spring track laying in heavy spikes, angle bars and bolts. New business is accepted only on 15 to 18 months' basis. Movement out of warehouse continues at capacity to handle with these prices quoted and freely paid for stock out of warehouse: Soft steel bars, 3.65c.; iron bars, 3.60c.; structural material, 3.75c.; tank plates, 4.40c.; No. 10 blue annealed sheets, 4.30c.; No. 28 black sheets, cold rolled, one pass, 4.90c.; No. 28 galvanized sheets, black sheet gage, 6.85c.

Old Material.—Mills are again paying the prices asked by the dealers and the supply is insufficient to meet requirements. Dealers are clearing up their short interests as rapidly as possible, and this still has its influence on the quotations, all grades and classes of material being affected. Open-hearth consumers are reported utilizing carwheels and cast iron wherever possible to economize on their pig-iron supplies, which they

are understood to fear will be very short the coming year in spite of their heavy purchases ahead. This arises out of the heavy business presenting itself in excess of their calculations. Lists out included 5500 tons from the Big Four, 2000 tons from the Southern Railway, 150 tons from the Cotton Belt, 1000 tons from the Union Pacific, 350 tons from the Vandalia, 200 tons from the Missouri, Kansas & Texas and 100 tons from the Missouri Pacific. Prices are marked up sharply on many items and in the present excited condition of things no predictions can be made as to the future or as to the limit of the advance. Relaying rails and iron and steel axles are altogether unobtainable. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton	
Old iron rails	$28.00 to $28.50
Old steel rails, rerolling	30.00 to 31.00
Old steel rails, less than 3 ft.	30.00 to 31.00
Relaying rails, standard section, subject to inspection	35.00 to 36.00
Old carwheels	22.00 to 22.50
No. 1 railroad heavy melting steel scrap	25.50 to 26.00
Heavy shoveling steel	21.50 to 22.00
Ordinary shoveling steel	18.50 to 19.00
Frogs, switches and guards cut apart	25.50 to 26.00
Ordinary bundled sheet scrap	14.50 to 15.00

Per Net Ton	
Iron angle bars	$26.00 to $26.50
Steel angle bars	23.50 to 24.00
Iron car axles	37.50 to 38.00
Steel car axles	37.50 to 38.00
Wrought arch bars and transoms	27.50 to 28.00
No. 1 railroad wrought	26.00 to 26.50
No. 2 railroad wrought	25.00 to 25.50
Railroad springs	24.50 to 25.00
Steel couplers and knuckles	25.50 to 26.00
Locomotive tires, 42 in. and over, smooth inside	28.00 to 28.50
No. 1 dealers' forge	20.00 to 20.50
Cast-iron borings	10.50 to 11.00
No. 1 busheling	19.00 to 19.50
No. 1 boilers, cut to sheets and rings	15.00 to 15.50
No. 1 railroad cast scrap	15.50 to 16.00
Stove plate and light cast scrap	11.00 to 11.50
Railroad malleable	17.00 to 17.50
Agricultural malleable	14.00 to 14.50
Pipes and flues	16.50 to 17.00
Heavy railroad sheet and tank scrap	15.50 to 16.00
Railroad grate bars	13.00 to 13.50
Machine shop turnings	11.00 to 11.50
Heavy axle and tire turnings	12.50 to 13.00

Birmingham

BIRMINGHAM, ALA., Dec. 11, 1916.

Pig Iron.—With barely more than 10 per cent of the productive capacity of the first half of 1917 unsold, and something like half of the last half capacity sold and with foundry stocks on Alabama yards reduced during November by 30,000 tons, the Southern iron makers will enter 1917 in a condition attended by only one embarrassment—that of satisfying their regular customers. On Friday of last week the largest foundry-iron producer, which had retired from the market a week before when the price reached $22, re-entered with its price for all deliveries in 1917 marked up to $24. The same day another company, which had re-entered a few days before, reported the sale of 15,000 to 20,000 tons for Southern delivery at $23 for the second quarter of 1917 and $22 for the last half, one lot of 1000 tons for the last half bringing $23. This interest announced its prices as $22 for last half and $23 for first half. The former figure has by this time probably disappeared. The leading producer is not doing much selling but $21 iron is still heard of in that quarter. It remains that the only two interests selling real quantities of iron quote from $22 to $24. Iron secured through brokers continues to bring as much as $25, but no furnace operator had up to the end of last week acknowledged quoting higher than $24, or selling at higher than $23. In the variance of statements and position of those seeking the spot market arises the apparent confusion as to furnace prices. In general, it may be said that, effective last Friday, consumers expecting immediate attention stood a better chance for it on a minimum of $23 than at anything below that. Republic will blow in its third furnace this week and has taken on additional iron contracts in anticipation. C. E. Buek of Chattanooga, and associates, are reported as considering the leasing of the Trussville furnace, owned by the Michigan Trust Company. The Gulf States Steel Company has an equity in the furnace, but that equity is understood to be under option by third parties seeking to lease the plant. The Buek interests have ore mines which would serve advantageously in case they take hold. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	$23.50 to $25.50
No. 2 foundry and soft	23.00 to 25.00
No. 3 foundry	22.50 to 24.50
No. 4 foundry	22.25 to 24.25
Gray forge	22.00 to 24.00
Basic	23.00 to 25.00
Charcoal	25.00 to 26.00

Cast-Iron Pipe.—To the surprise of the water and gas pipe makers, specifications for renewals and for quantities of pipe that must be had come in regularly and amount to an aggregate that does not point to the diminution of foundry operations for some time to come. Reports from the field since the last raise in prices are more encouraging than was expected would be the case. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., $37, 6-in. and upward, $34, with $1 added for gas pipe and special lengths.

Coal and Coke.—Steam coal brings $3 to $4 and domestic $4.50 to $6 per ton for spot consumers, of whom there is a mass owing to lack of preparedness in this respect. Coke is bringing as high as $8 and even $10 per net ton at oven, according to the customer and the seller. The Alabama Company will save all surplus coke for its own furnaces. Republic will quit serving Sloss-Sheffield, needing its coke for its own purposes. A coke famine appears to prevail. We quote standard beehive coke, f.o.b. oven, at $8 per net ton; furnace coke, $4.

Old Material.—The scrap market is very active. Steel has almost disappeared from the yards. More low grade pig iron is used as a substitute for scrap than in some time. Very little Birmingham scrap now goes outside the State. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old steel axles	$26.00 to $32.00
Old steel rails	17.50 to 18.00
No. 1 wrought	17.50 to 18.00
Heavy melting steel	16.50 to 17.00
No. 1 machinery cast	16.00 to 16.50
Carwheels	17.00 to 18.00
Tram carwheels	16.00 to 17.00
Stove plate and light	12.00 to 12.50

New York

NEW YORK, Dec. 13, 1916.

Pig Iron.—There is less activity than was noted last week, which in turn showed a lessening of buying from the week previous. However, there is quite a little foreign business still before the trade. Domestic buyers are generally covered for the first half, and for a part of the second half. A good many furnaces are quoting high prices that are not stimulating business. Deliveries are not up to schedules, car shortages still being troublesome. Advances are not expected to be rapid or large from this point on, but winter troubles might cause scarcity in certain districts. Winter interruptions to traffic, however, bear both on the producer and the consumer so that the balance between supply and demand might not be greatly changed, taking the country through. New England foundries have provided against shortages due to traffic troubles and pig iron is still on the embargo list of the New Haven road. Buffalo furnaces have advanced their asking prices, but have no considerable inquiry. The market in that district is indeterminate. Business was done only a few days since on the $30 basis and a lower price is mentioned in connection with an Eastern transaction, but the furnaces there are now reported to be asking $35 for No. 2 X. In New Jersey a steel plant has bought some iron for the second half of 1917, variously stated at 2000 to 5000 tons. Some of this iron came from the Central West. At Elizabethport a 1000-ton sale of No. 1 and No. 3 iron is reported for second half and at Jersey City an inquiry has come out for 1000 tons for the first half. A few sales of Virginia iron have been made at $27 at furnace. We quote at tidewater for early delivery: No. 1 foundry, $30 to $31;

No. 2 X, $29.50 to $30.50; No. 2 plain, $28.50 to $29.50; Southern iron at tidewater, $29 to $30 for No. 1 and $28 to $29 for No. 2 foundry and No. 2 soft.

Ferroalloys.—A sale of 2500 tons of domestic ferromanganese by a Middle Western producer, for delivery through 1917, to a steelmaker in Wisconsin at $165, delivered, is the only large sale reported in the last week. Besides, a few lots of 60 to 100 tons each of domestic alloy have sold at the above price. Very little if any British product has been disposed of lately, the quotation for which is still $164, seaboard. The market for domestic ferromanganese is considered firmer, but outside of a recent inquiry for 1000 tons, new business is scarce. A sale of 500 tons has just been made to a foreign consumer in Italy. Spiegeleisen is quiet, the inquiries for several thousand tons reported last week not having resulted as yet in definite orders, except the sale of 500 tons to a foreign consumer. The quotation is $50 to $55, furnace, for forward delivery. Receipts in November through three of the principal Atlantic ports were about 5300 tons, and the production in the United States was about 21,000 tons. The market for 50 per cent ferrosilicon continues strong and active at $99 to $100 for future delivery with little spot material available, for which a higher price is asked.

Structural Material.—Further bridge work has been closed, including 1250 tons for the Pennsylvania, awarded to the American Bridge Company, which has also taken about 500 tons of Lehigh Valley work, most of which, as stated last week, or close to 6000 tons, was placed with the Bethlehem Steel Bridge Corporation. The Interborough Rapid Transit Company is in the market for 750 tons for four stations and an addition to the Boston Edison Company calls for close to 1200 tons. Another large letting of the week is for 750 tons for the Standard Shipbuilding Company, Staten Island, taken by the Blaw Steel Construction Company. Fabricators are not concerned over the volume of work offered, as the scarcity of labor and low average output for those employed mean that several months' work is still ahead of the shops. We quote mill shipment in two to five months at 3.419c., New York, and warehouse shipments at a minimum of 3.75c., New York.

Steel Plates.—The offer to buy shipbuilding material for a period of five years from 1917, even at a price to be established by the mill over the whole period, has found no takers, nor has the steel wanted by this Swedish buyer for 1917 been covered. There are signs that tank plates, without Lloyd specifications, are sold to be put into ships, the assumption being the builder is taking the chance that the ship would not have to change hands to the extent of requiring a Lloyd specification. A quotation of this nature appears to have been made at 4.25c. for the first quarter of 1917. No considerable amount of cars have been bought, but there are additional inquiries, including 1000 hopper cars for the Baltimore & Ohio, 1200 hopper cars for the New York Central and 100 gondola and 100 box cars for the Long Island. With the likelihood that 3.75c., Pittsburgh, quotations have practically disappeared for anything like early 1917 delivery, there is some talk now that even 5c. will obtain before very long for car plates. For ship plates 6c. is getting common and a quotation of 6.25c. on 2000 tons is noted and a refusal to consider 5000 tons at 5c. One mill with universal plates at 4c. in three or four months wants 5c. for sheared tank plates in five to six months. One boiler manufacturer, it is noted, has covered for at least 10,000 tons for last half of 1917. We quote universal and ordinary tank plates at 4.169c. to 4.669c., New York, but Lloyd specification plates at 5.169c. to 6.169c., with little available before the third quarter of 1917 and for plates in the fourth quarter of 1917 and the first quarter of 1918 at 3.669c., New York. Out of store we quote 4.75c., New York.

Bars.—It appears that in some of the late offers to buy shell steel it is agreed that in the event that shell quality of steel is ultimately not wanted soft steel may be substituted without loss of the profit involved in the shell steel transaction. Some offers of shell forging contracts for the last half are also under consideration. Here it is felt that the desire is to secure protection with plants which might otherwise dismantle their shell forging equipment and would have no protection for the raw steel. In these cases perhaps contracts might be cancelled for a consideration or specifications in the event of a cessation of hostilities might be long in coming. A number of the larger manufacturing consumers have covered for the last half of 1917. We quote mill shipments of steel bars at 3.069c. to 3.419c., New York, the lower price for indefinite delivery and the higher for small quantities in, say, 3 mo. Bar iron is again $5 per ton higher, and we quote mill shipments of bar iron at 3.169c., New York. Out of warehouse iron bars are 3.50c. and steel bars 3.75c., New York.

Cast-Iron Pipe.—The only public letting of importance in sight is that of Worcester, Mass., on which bids will be opened on Thursday of this week for 800 to 900 tons. Private buying has kept up well, but the time is rapidly approaching when seasonable dullness is to be expected. Pipe manufacturers have made another advance of $2 per ton, and the price of carload lots of 6-in. class B and heavier, is now $41.50 per net ton, tidewater, with class A and gas pipe taking an extra of $1 per ton.

Old Material.—Conditions continue strong, and on some commodities prices have been advanced. A particularly good demand has prevailed for heavy melting steel scrap for delivery in western Pennsylvania and for borings and turnings for blast-furnace use. For a few days prices of borings and turnings were quite close together, but in the past day or two the demand has subsided and the quotations are again on about their previous relation to one another. No. 1 railroad wrought has sold at much higher prices and the export demand is keeping up quotations on such commodities as relaying and rerolling rails and car axles. Brokers quote buying prices about as follows to local dealers and producers, per gross ton, New York:

Heavy melting steel scrap (for Eastern Pennsylvania shipment)	$21.00 to $21.50
Old steel rails (short lengths) or equivalent	22.50 to 23.00
Relaying rails	37.00 to 38.00
Rerolling rails	27.50 to 28.00
Iron and steel car axles (for export)	45.00 to 47.00
No. 1 railroad wrought	25.00 to 26.00
Wrought iron track scrap	22.50 to 23.00
No. 1 yard wrought, long	22.00 to 22.50
Light iron (nominal)	6.50 to 7.00
Cast borings (clean)	11.50 to 12.00
Machine shop turnings	11.00 to 12.00
Mixed borings and turnings	10.50 to 11.00
Wrought pipe (not galvanized or enameled)	17.00 to 17.50

The demand for cast scrap has increased decidedly. Good inquiries are in the market from large consumers. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

No. 1 cast	$22.50 to $23.00
No. 2 cast	19.50 to 20.00
Stove plate	15.50 to 16.00
Locomotive grate bars	15.50 to 16.00
Old carwheels	21.50 to 22.00
Malleable cast (railroad)	18.00 to 18.50

British Steel Market

Export Demand for Pig Iron Active—Ferromanganese Advanced—Billets Higher

(By Cable)

LONDON, ENGLAND, Dec. 13, 1916.

Pig-iron business is restricted and the export demand is active, but restrained by permits. Tin plates are quoted at 34s. and ferromanganese at £36, with business being done for delivery on the continent. Business in semi-finished steel is difficult. Four-in. billets for first half delivery vary in quotations from $82 to $92 c.i.f. Wire rods are obtainable at £23 c.i.f. We quote as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 34s. against 33s. last week.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £19 5s. against £24 a week ago.

Hematite pig iron, f.o.b. Tees, 142s. 6d., compared with about 140s. a week ago.

Sheet bars (Welsh) delivered at works in Swansea Valley, £15 5s. nominal.

Ferromanganese, £36 against £35 a week ago.

Ferrosilicon, 50 per cent, c.i.f., £30 against £27 last week.

Iron and Industrial Stocks

NEW YORK, Dec. 13, 1916.

Values of securities were well maintained for a few days and higher prices seemed almost assured. On Friday, however, liquidation set in which became more pronounced each day. The decline in values was at first attributed to over-speculation, then it was quickened by advanced rates of interest for call loans, and finally it was greatly accelerated by peace talk coming from Germany. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com.	29⅝	- 35¾
Allis-Chal., pref.	88	- 91
Am. Can, com.	55	- 63⅜
Am. Can, pref.	114	-114½
Am. Car & Fdy., com.	71½	- 78½
Am. Car & Fdy., pref.	118½	119½
Am. Loco., com.	84½	- 94
Am. Loco., pref.	106⅞	107½
Am. Ship, com.	65½	- 68
Am. Ship, pref.	96	- 99½
Am. Steel Fdries.	66½	- 73
Bald. Loco., com.	73½	- 81¾
Bald. Loco., pref.	103	-107½
Beth. Steel, com.	599	-649
Beth. Steel, pref.	150	-160
Cambria Steel		130
Carbon Stl., com.	109	-127
Case (J. I.), pref.	89¼	- 89½
Central Fdry., com.	26	- 32
Central Fdry., pref.	45	- 49
Chic. Pneu. Tool.	72½	- 75½
Colo. Fuel	49½	- 57¾
Cruc. Steel, com.	75	- 87⅜
Cruc. Steel, pref.	120⅛	-124⅞
Deere & Co., pref.	97	- 99⅝
Driggs-Seabury	70¼	- 79⅝
Gen. Electric	174	-183
Gt. No. Ore Cert.	39½	- 44⅞
Gulf States Steel.	141	-169½
Gulf States Steel, 1st pref.	108	-110
Harb-Walk. Refrac., com.		125
Int. Har. of N. J., com.	120	125
Int. Har. of N. J., pref.	120	-121½
Int. Har. Corp., com.	79	- 82
Int. Har. Corp., pref.	113½	114½
La Belle Iron, com.	90	- 94
Lackawanna Stl.	97¼	-102¾
Lake Sup. Corp.	20¾	- 20⅝
Midvale Steel	64½	- 70
Nat. En. & Stm., com.	360	- 360½
Nat. En. & Stm., pref.	99½	-100½
N. Y. Air Brake	150	-175
Nova Scotia Stl.	141	-149
Pitts. Steel, pref.	103	-104
Pressed Stl. Car, com.	79½	- 85¼
Pressed Stl., pref.	104½	-106⅞
Ry. Steel Spring, com.	57½	- 59¾
Ry. Steel Spring, pref.	99½	-102
Republic, com.	70¾	- 80½
Republic, pref.	114	-116½
Sloss, com.	73	- 74
Sloss, pref.	99	-100
Un. Alloy Steel.	50	- 56
U. S. Pipe, com.	58¾	- 63⅜
U. S. Pipe, pref.	60	- 66
U. S. Steel, com.	116¾	-127¼
U. S. Steel, pref.	121	-122
Va. I., C. & Coke	57½	- 61
W. Va.	113	-114
Westing. Elec.	49¾	- 54¾

Dividends

The American Steel Foundries 1¼ per cent [illegible] Dec. 31.

The Standard Coupler Company, semi-annual, 1½ per cent on the common, and semi-annual, 4 per cent on the preferred stock, both payable Dec. 23.

The Electric Storage Battery Company, regular quarterly, 1 per cent on the preferred and 1 per cent on the common stock, both payable Jan. 2.

The Western Electric Company, 1½ per cent on the preferred and 2 per cent. on the common stock, both payable Dec. 30.

The American Can Company, regular quarterly, 1¾ per cent on the preferred stock, payable Jan. 2.

The Ingersoll-Rand Company, regular semi-annual, 3 per cent on the preferred stock, payable Jan. 2.

The Union Switch & Signal Company, regular quarterly, $1.50 a share each on the common and preferred stock, payable Jan. 15.

The Sloss-Sheffield Steel & Iron Company, regular quarterly, 1¾ per cent on the preferred stock, payable Jan. 2.

The International Harvester Company of New Jersey, regular quarterly, 1¼ per cent on the common stock, payable Jan. 15.

The General Fireproofing Company, regular quarterly, 1¾ per cent each on the common and preferred stock, payable Jan. 1.

The Standard Sanitary Mfg. Company, extra, $1 per [illegible] payable Dec. 23.

The United Alloy Steel Corporation, initial dividend, $1 per share, payable Jan. 10.

The Baltimore Tube Company, regular quarterly on both the common and preferred stock, 1¾ per cent, payable Jan. 2.

The Chandler Motor Car Company, quarterly, 2 per cent and extra 1 per cent, payable Jan. 2.

The Charcoal Iron Company of America, 20c. per share payable Jan. 31.

The Torrington Company, 3½ per cent on the preferred stock, payable Jan. 1.

The Willys-Overland Company, regular quarterly, 1¾ per cent on the preferred stock, payable Jan. 2.

Device to Detect Critical Point in Heat-Treating Steel

Prof. R. B. Fehr, of the department of mechanical engineering of the Pennsylvania State College, State College, Pa., has recently patented an apparatus (U. S. 1,188,430) to be used in the treatment of alloy and other steel where hardening, tempering and annealing are of special importance. The new instrument is said to permit a more accurate determination of the critical point, the accurate location of which is very important in obtaining the most efficient heat treatment of steel. Careful experiments made by Professor Fehr are reported to have shown that in order to get the best results the temperature must be controlled within a few degrees and must be uniform throughout the heated parts. The device is located on the outside of the heating furnace, and the method of determining the time at which the specimen has reached the proper temperature is indicated by an electro-magnetic device which is very small and which is claimed to require no calibration in itself. The apparatus is not expensive and the operation is so simple, according to Professor Fehr, that it will probably be used by firms treating steel on an extensive scale. Professor Fehr has this to say:

> Many results that I have obtained on various carbon steels have convinced me that careful control of the temperature within a few degrees of the magnetic critical point will confer on steel properties which, in regard to magnitude, cannot be obtained by present methods of heat treating. I am not making any predictions, however, as to special alloy steels because I have not made any tests on them; nevertheless, I believe that my method will enable these steels to be treated better by establishing the Ac_2 point from which the proper heat-treating temperature can be measured by thermocouple which, as a means for measuring differences of temperature, is much more reliable than for measuring absolute temperature.

In the original patent the inventor states that he determines the proper point for heat treatment by passing a magnetic flux through the iron or steel while heating and locates the jog in the heating curve instantly, when it occurs, on an electrical indicating instrument inductively related to the magnetic lines of force threading the iron and steel.

Italian Iron and Steel Imports

Italian imports of iron and steel for the first six months of 1916 and for the same period in 1914 and 1915 are reported as follows in metric tons:

	1914	1915	1916
Scrap iron and steel	177,340	89,642	189,725
Pig iron	122,006	96,794	138,343
Steel ingots and blooms	10,997	56,575	5,953
Bars	66,463	58,516	33,163
Sheets and plates	19,604	15,158	13,404
Rails	3,214	1,548	4,852
Tin plates and coated sheets	9,166	6,378	9,713

The increased imports of scrap iron and steel and of pig iron and the decreased demand for ingots and blooms this year are the outstanding facts.

The Acme Steel Goods Company, Chicago, of which James E. MacMurray is president, has announced the institution of a profit-sharing plan for its employees. The plan is so arranged as especially to reward continuous service. A bonus of 10 per cent of the amount earned by employees who have worked continuously through the month with a loss of less than 10 hours, and a bonus of 5 per cent to employees who have lost more than 10 hours, will be paid each month.

The Canadian Steel Foundries, Ltd., Welland, Ont., has let a contract for the construction of two more open-hearth furnaces and an extension 100 ft. long to the machine shop. One new open-hearth furnace has recently been completed.

The Fort Pitt Bridge Works, Pittsburgh, has opened a Cleveland office at 612 Marshall Building, in charge of Ivor M. Williams, who formerly represented the Massillon Bridge & Structural Company in Cleveland in a similar capacity.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c. Denver, pipe, 76.1c., minimum carload, 46,000 lb.; structural steel and steel bars, 83.6c.; minimum carload, 36,000 lb. Pacific coast (by rail only), pipe, 65c.; structural steel and steel bars, 75c., minimum carload, 50,000 lb.; structural steel and steel bars, 80c., minimum carload, 40,000 lb. No freight rates are being published via the Panama Canal, as the boats are being used in transatlantic trade.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 3c. to 3.25c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	[illegible]
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs	[illegible]
Angles, 3 in. on one or both legs, less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	[illegible]
Tees, structural sizes, except elevator, bar iron, car truss and conductor rail	[illegible]
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	[illegible]
Handrail tees	[illegible]
Cutting to lengths, under 2 ft. to 2 ft. inclusive	[illegible]
Cutting to lengths, under 2 ft. to 1 ft. inclusive	[illegible]
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Plates.—Tank plates, ¼ in. thick, 6 in. up to 100 in. wide, 3.50c. to 5c., base, net cash, 30 days, or ½ of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras

	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers)	.10
Boiler and flange steel plates	.15
"A. B. M. A." and ordinary firebox steel plates	.20
Still bottom steel	[illegible]
Locomotive firebox steel	[illegible]

Marine steel, special extras and prices on application.

Gage Extras

Rectangular, ¼ in. thick, over 6 in. wide to 100 in. wide	Base
Lighter than ¼ in., to 5/16 in., up to 72 in. wide	.10
*Lighter than ¼ in., including 3/16 in., over 72 in. to 84	.20
*Lighter than ¼ in., including 3/16 in., over 84 in. to 96	.30
*Lighter than ¼ in., including 3/16 in., over 96 in. to 100	.40
*Lighter than ¼ in., including 3/16 in., over 100 in. to 102	.45
Lighter than 3/16 in., including No. 8, up to 72 in. wide	.10
*Lighter than 3/16 in., including No. 8, over 72 in. to 84	.25
*Lighter than 3/16 in., including No. 8, over 84 in. to 96	.35
Lighter than No. 8, including No. 10, up to 60 in. wide	.30
Lighter than No. 8, including No. 10, over 60 in. to 64	.35

Up to 72 in. and not less than 10.2 lb. per sq. ft. will be considered ¼ in.
Over 72 in. must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.
Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.
Over 72 in., ordered weight 3/16 in., take No. 8 price.
Over 72 in., ordered weight No. 8, take No. 10 price.

Width Extras

Over 100 in. to 110 in. inclusive	.05
Over 110 in. to 115 in. inclusive	.10
Over 115 in. to 120 in. inclusive	.15
Over 120 in. to 125 in. inclusive	.25
Over 125 in. to 130 in. inclusive	.50
Over 130 in.	1.00

Length Extras

Universal plates 80 ft. long up to 90 ft. long	.05
Universal plates 90 ft. long up to 100 ft. long	.10
Universal plates 100 ft. long up to 110 ft. long	.20

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over.	
Lengths under 3 ft. to 2 ft. inclusive	.25
Lengths under 2 ft. to 1 ft. inclusive	.50
Lengths under 1 ft.	1.55
Circles 3 ft. in diameter to 100 in.	.30
Circles over 100 to 110 in. (width extra)	.35
Circles over 110 to 115 in. (width extra)	.40
Circles over 115 to 120 in. (width extra)	.45
Circles over 120 to 125 in. (width extra)	.55
Circles over 125 to 130 in. (width extra)	.80
Circles over 130 in. (width extra)	1.30
Circles under 3 ft., to 2 ft., inclusive	.55
Circles under 2 ft., to 1 ft., inclusive	.80
Circles under 1 ft.	1.85
Half circles take circle extras.	
Sketches not over four straight cuts, inc. straight taper	.10
Sketches having more than four straight cuts	.20
Plates sheared to a radius take complete circle extras.	

*Including extra for width.

Wire Rods.—Including chain rods, $70 to $75.

Wire Products.—Prices to jobbers effective Nov. 27: Fence wire Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, $2.95; galvanized, $3.65. Galvanized barb wire and staples, $3.85; painted, $3.15. Wire nails, $3. Galvanized nails, 1 in. and longer, $2 advance over base price; shorter than 1 in., $2.50 advance over base price. Cement coated nails, $2.90. Woven wire fencing, 53 per cent off list for carloads, 52 off for 1000-rod lots, 51 off for less than 1000-rod lots.

Wrought Pipe.—The following are the jobbers' car load discounts on the Pittsburgh basing card in effect from Dec. 4, 1916, all full weight:

Butt Weld

Steel			Iron		
Inches	Blk.	Galv.	Inches	Blk.	Galv.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
⅛ and ¼	[illegible]	31½	[illegible]	18	31
⅜ and ½	[illegible]	48½	[illegible]	49	22
¾ to 3	60	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	¼ to 1½	[illegible]	[illegible]

Lap Weld

[illegible]	59	46½	[illegible]	43	27
2½ to 6	62	49½	[illegible]	48	34
7 to 12	59	44½	2	49	33
13 and 14	49½	[illegible]	[illegible] to 4	51	38
15	47	[illegible]	[illegible] to 6	54	38
[illegible]	[illegible]	[illegible]	[illegible] to 12	[illegible]	[illegible]

Reamed and Drifted

1 to 3, butt	64	50½	¼ to 1½, butt.	[illegible]	34
2, lap	57	44½	1¼, lap	[illegible]	31
2½ to 6, lap	60	47½	1½, lap	43	28
[illegible]	[illegible]	[illegible]	[illegible], lap	44	29
[illegible]	[illegible]	[illegible]	2½ to 4, lap	47	32

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	55	37½	⅛, ¼ and ⅜	48	31
½	60	47½	½	53	40
¾ to 1½	64	51½	¾ to 1½	57	42
2 to 6	65	52½	[illegible]	[illegible]	[illegible]

Lap Weld, extra strong, plain ends

2	57	45½	1¼	41	29
2½ to 4	60	48½	1½	43	30
4½ to 6	59	47½	[illegible]	51	38
7 to 8	55	41½	2½ to 4	37	41
9 to 12	50	36½	4½ to 6	[illegible]	40
[illegible]	[illegible]	[illegible]	7 to 8	16	34
[illegible]	[illegible]	[illegible]	9 to 12	41	29

To the large jobbing trade an additional 5 per cent is allowed over the above discounts, which are subject to the usual variation in weight of 5 per cent. Prices for lap weld carloads are two (2) points lower being cleared under the above discounts on black, and three (3) points on galvanized, but in some sections of the country discounts on less than carloads are three (3) points less cheaper prices than the carload discount on both black and galvanized steel pipe.

On butt and lap weld sizes of black iron pipe discounts for less than carload lots to jobbers are four (4) points lower cheaper prices than carload lots, and on butt and lap weld galvanized iron pipe are five (5) points lower cheaper prices.

Boiler Tubes.—Discounts on less than carloads, freight to be added, effective from Nov. 1, 1916, except 3 to 4½ in. steel from Nov. 20, are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1½ in.	31	1½ in.	23
1¾ and 2 in.	43	1¾ and 2 in.	35
2¼ in.	40	2¼ in.	32
2½ and 2¾ in.	46	2½ and 2¾ in.	38
3 and 3½ in.	46	3 and 3½ in.	43
3½ to 4½ in.	46	3½ to 4½ in.	44
5 and 6 in.	[illegible]	5 and 6 in.	37
7 to 13 in.	42	7 to 13 in.	34

Locomotive and steamship special charcoal grades bring higher prices.

1¾ in., over 18 ft. and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Sheets.—Makers' prices for mill shipments on sheets of United States standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Blue Annealed Sheets (cents per lb.)

Nos. 3 to 8	3.75 to 4.00
Nos. 9 to 12	3.70 to 3.75
Nos. 13 to 16	3.65 to 3.80

No. 17 and lighter gages to based on 84 per 100 lb. for No. 28 Bessemer Black sheets.

Box Annealed Sheets, Cold Rolled

Nos. 17 to 21	[illegible] to 4.30
Nos. 22 and 24	4.10 to 4.35
Nos. 25 and 26	4.15 to 4.40
No. 27	4.20 to 4.45
No. 28	4.25 to 4.50
No. 29	4.30 to 4.55
No. 30	4.40 to 4.65

Galvanized Sheets of Black Sheet Gage

Nos. 10 and 11	[illegible]
Nos. 12 to 14	[illegible]
Nos. 15 and 16	[illegible]
Nos. 17 to [illegible]	[illegible]
Nos. 22 and 24	[illegible]
Nos. 25 and 26	[illegible]
No. 27	[illegible]
No. 28	[illegible]
No. 29	5.90 to 6.40
No. 30	[illegible]

Blue Annealed Sheets

Nos. 10 and 11	[illegible] to 4.05
Nos. 12 to 14	[illegible] to 4.10
Nos. 15 and 16	4.00 to 4.15
Nos. 17 to 21	4.05 to 4.20
No. 22	4.15 to 4.30
No. 24	4.15 to 4.30
No. 25	4.15 to 4.30
No. 26	4.15 to 4.30
Nos. 27 and 28	4.20 to 4.35
No. 29	[illegible]
No. 30	[illegible]

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin,	Lead		Spelter	
Dec	Lake	Electro-lytic	New York	New York	St. Louis	New York	St. Louis
6	35.00	35.00	43.50	7.62½	7.50	12.06½	12.37½
7	35.00	35.00	43.62½	7.75	7.65	12.12½	11.87½
8	35.00	35.00	43.50	7.75	7.65	12.00	11.75
9	35.00	35.00		7.90	7.85	12.00	11.75
11	35.50	35.50	43.25	8.00	7.90	12.06	11.75
12	35.50	35.50	43.00	7.90	7.80	11.75	11.60

NEW YORK, Dec. 13, 1916.

Germany's peace move had a quieting effect on all metals, although none was really active prior to the announcement. Copper prices are strong. Tin is lower. Lead is higher with but little offered. Spelter has declined. Antimony remains unchanged as to price.

New York

Copper.—The market has been quiet but it was rendered more so by Germany's peace proposal, yet prior to it the volume of business was unquestionably restrained by the lack of prompt metal. The producers are practically sold up for the first quarter, and have under contract about 80 per cent of their second quarter production. Commitments into the third and fourth quarters cannot be called heavy. January electrolytic and Lake are quoted at 35.50c.; first quarter, 35c.; second quarter, 33.50c. to 34c.; third quarter, 32.50c. to 33c., and fourth quarter, 31.50c. to 32c. Spot is nominally around 36c., with reports of considerably higher prices, but these latter are credited to Wall Street. It is to be remembered that where desirable business in involved negotiations may effect some concession from the prices named. The exports this month, including yesterday, total 8925 tons. The London market yesterday was quoted at £168, against £170 a week ago. The market here was stirred but slightly by news it received on Monday that the British Government had again sought to restrain the advance of prices by ordering the suspension of trading in copper. All transactions are forbidden, except under special permit, and all holdings and contracts must be made known to the authorities, and the use of copper is prohibited except for government work.

Copper Averages.—The average price of Lake copper in New York for the month of November, based on daily quotations in THE IRON AGE, was 32.32c., and of electrolytic, 32.32c.

Tin.—The week has been a quiet one with the trend of prices downward, seemingly for no particular reason, except pressure to sell inspired by a desire to take profits. Spot Straits yesterday was quoted at 43c. The supply of Banca tin is practically exhausted except for a few odd lots which do not cut much of a figure. The question of securing licenses to ship from England is still bothering importers. The arrivals this month total 675 tons and there is afloat 6228 tons, most of which is due to arrive this month.

Spelter.—Quotations have continued to decline and on its face the market looks weak, but producers' representatives say that it is fundamentally as strong as ever and that January will see higher prices. Quotations show considerable variance, as, for instance, when on Monday, December, January and February sold for 11.50c., St. Louis, although another seller quoted the same positions at 12.25c. Late December and January brass mill spelter is 13c. to 13.25c. The exports this month, including yesterday, total 1606 tons. The London quotation for spot yesterday was £57 as compared with £58 10s. the week previous.

Lead.—As stated last week the leading interest advanced its New York quotation Dec. 5 to 7.50c., but it has not been selling at that figure. It is known that it will be ready to take business about Dec. 15 for January delivery at a price based on its monthly average. Meanwhile the quotations of independent producers have continued their upward march, and some have asked 8c., New York. Nearby delivery continues scarce and there are those who want the metal but cannot get it. There are intimations that speculative interests are holding lead, but this has not been confirmed. On the other hand, it is known that transportation difficulties are hampering the refineries. Yesterday small lots were offered at 7.90c., New York, but found no buyers, the peace talk having evidently made buyers timid. The St. Louis quotation yesterday was 7.80c. The exports this month, including yesterday, are small, amounting to only 51 tons. The London quotation for spot lead as compared with a week ago is unchanged at £30 10s.

Antimony.—Reports that ammunition makers are likely to buy have strengthened the market a little, although the business has not actually appeared and quotations are unchanged at 14c. to 14.50c., duty paid.

Aluminum.—The quotation for No. 1 virgin aluminum is unchanged at 63c. to 65c.

Old Metals.—The market maintains its strength. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible	32.50 to 33.75
Copper, heavy and wire	30.00 to 31.50
Copper, light and bottoms	27.50 to 28.50
Brass, heavy	18.00 to 19.00
Brass, light	15.00 to 16.00
Heavy machine composition	26.00 to 27.75
No. 1 yellow rod brass turnings	19.00 to 19.50
No. 1 red brass or composition turnings	22.00 to 24.00
Lead, heavy	7.00
Lead, tea	6.50
Zinc	10.00 to 10.75

Chicago

DEC. 11.—Further advances in the price of Lake copper established by the renewal of buying by foreign interests for first quarter were a feature of the week. Tin, on the contrary, showed decided weakness. We quote: Casting copper, 33.75c.; Lake copper, 34.75c. to 35c.; tin, carloads, 43.75c., and small lots, 45.75c.; lead, 7.80c. to 8c.; spelter, 12c.; sheet zinc, 21c.; Cookson's antimony, 50c.; other grades, 17c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 28c.; copper bottoms, 24.50c.; copper clips, 27c.; red brass, 24c.; yellow brass, 18c.; lead pipe, 6.25c.; zinc, 9c.; pewter, No. 1, 26c.; tinfoil, 34c.; block tin pipe, 38c.

St. Louis

DEC. 11.—Non-ferrous metals have been rising steadily, with transactions quite large, particularly in lead and spelter. Quotations are as follows: Lead, 8c.; spelter, 11.75c. to 12c., in carload lots. In less than carload lots: Lead, 8.10c.; spelter, 14c.; tin, 49c.; Lake copper, 36c.; electrolytic copper, 35.50c.; Asiatic antimony, 16c. In the Joplin district zinc blende fell off about $5 per ton and the range was $85 to $100, with the week's average for the district $94. Calamine sold at $50 to $60, with the week's average $54. Lead ore was higher and brought $97, which is only $5.50 per ton less than the record price of last spring. The average for the district for the week was $91. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 10.50c.; heavy yellow brass, 14c.; heavy red brass and light copper, 19c.; heavy copper and copper wire, 22c.; zinc, 7c.; lead, 5.50c.; tea lead, 4c.; pewter, 25c.; tinfoil, 34c.

The U. S. Reduction Company, Chicago, with works at East Chicago, Ind., has just completed an additional building, 80 x 250 ft., three stories, and has installed three more furnaces of the latest type. These enlargements will increase the company's output approximately 24,000 lb. of aluminum every 12 hours.

Tin exports from the Straits Settlements in 1915 were 22,724 tons to the United Kingdom, 32,286 tons to the United States, and 13,778 tons to other countries. In 1914 the corresponding figures were 35,506 tons, 19,350 tons, and 11,377 tons. They were 35,215 tons, 17,735 tons, and 12,800 tons in 1913.

In October the largest quantity of radium for one month was received by the U. S. Bureau of Standards for test, the value being $77,000. The value of radium tested by the Bureau up to the present is more than $1,000,000.

The Canadian Nickel Output

The value of the nickel production of Canada in 1916 is estimated at $23,000,000 against $20,423,348 in 1915 and $13,655,381 in 1914. Ten years ago the valuation was $8,948,834 and in 1896 it was $1,188,990, but only $498,286 in 1889. In the first half of 1916, says the *Engineering and Mining Journal*, the output was 42 per cent greater than for the corresponding period in 1915.

The first and largest producer of nickel in the world is the International Nickel Company which does its refining in New Jersey but produces matte at Sudbury, Canada, through the Canadian Copper Company, which it controls. Another corporation is the Mond Nickel Company of Great Britain, of which the head is Sir Alfred Mond. This company smelts its ore at Conniston, Ontario, and the matte is refined at Clydach, Wales, the plant having been greatly enlarged in 1914. The International Nickel Company shipped 59,000,000 lb. to the United States in 1915 and the Mond Company sent 12,000,000 lb. to Great Britain. Each company uses its own process, developed after extensive experimenting and great expense.

A third corporation was organized in July, 1913—the Canadian Nickel Corporation—but the name was soon changed to the British-American Nickel Corporation. The British Government will take part of its output and the bonds will be guaranteed by that government. Undoubtedly this is part of a plan to increase the supply of nickel for the government without dependence on foreign countries. Not long ago it was announced that very soon actual operations on the building of another refinery for the British-America Company would begin and that the new refinery of the International Nickel Company at Welland, Ont., would be turning out refined metal within 12 months. The work of the British-American Company will be directed by E. P. Mathewson, who has recently left the Anaconda Copper Mining Company to associate himself with the new undertaking.

Reclaiming Zinc from Galvanized Scrap

The reclaiming of zinc from galvanized scrap by the New Jersey Chemical Company, Trenton, N. J., is referred to by the *Engineering and Mining Journal*. The process, the invention of Thomas A. Shegog, is not disclosed, but it is believed to be hydrometallurgical and the statement is made that the zinc is recovered as an oxide. Many years ago J. Richards treated galvanized scrap commercially in Philadelphia. He dissolved the zinc with dilute chlorhydric acid and crystallized zinc chloride from the solution. It is possible to precipitate zinc oxide from a solution of zinc chloride by means of magnesia, magnesium chloride being formed, from which magnesia may be regenerated. Edouard Hunebelle of Paris, France, describes a process for doing this in U. S. Patent 1,201,586, and there is some interesting chemistry in this.

The C. & G. Cooper Company, Mount Vernon, Ohio, has recently taken orders for a number of large gas engines. Among them are the following: Two 480-hp. single tandem to the American Zinc, Lead & Smelting Company, Caney, Kan.; one 960-hp. twin tandem, B. B. Stroud Company, Bradford, Pa; one 560-hp. single tandem, Charles Boldt Company, Huntington, W. Va.; three 480-hp. single tandem, Columbia Gas & Electric Company, Cincinnati; two 960-hp. twin tandem, United Fuel Gas Company, Charleston, W. Va.; one 1150-hp. twin tandem, National Carbon Company, Clarksburg, W. Va.; one 150-hp. duplex, Moores & Ross Milk Company, Columbus, Ohio, for direct driving ammonia compressor cylinders. Two Cooper 480-hp. engines have just been placed in operation in the compressor station of the Berea Pipe Line Company, Berea, Ohio.

The United Smelting & Aluminum Company, Inc., New Haven, Conn., has opened a new branch sales office in the Dime Bank Building, Detroit, Mich. Frederick Lowber, who was in charge of the company's former Detroit office in the Penobscot Building, has severed his connection with the company.

Sheet and Tin-Plate Contract Form Adopted

A new form of contract was adopted by the National Association of Sheet and Tin Plate Manufacturers on Dec. 5. "The buyer's failure to furnish specifications," it stipulates, "shall be deemed a refusal to accept the tonnage unspecified, which thereupon shall be deducted from the contract, and the buyer shall pay to the seller, as liquidated damages and not as penalty, the difference between the contract price of such material for which the buyer has failed to furnish specifications (less freight allowance, if any) and the market value thereof at the time of such failure, but such damages shall not be less than 10 per cent of said contract price."

Similarly, if the buyer has kept his part of the contract, but the seller has not made the shipments as agreed, the tonnage which the seller has failed to ship is to be deducted from the contract and the buyer may collect the difference between the contract price of such material and the market price at the time of failure to ship, such damages to be not less than 10 per cent of the contract price. Average prices quoted in THE IRON AGE and the *Iron Trade Review* are to determine the market price.

If the buyer fails to make his payments, the seller may defer further shipments or terminate the contract. The seller may require security at any time and may bring damage claims aside from the contract.

When freight rates increase or decrease after the signing of a contract, the difference shall be added to or subtracted from the price as the case may require.

Delays caused by fire, strikes, floods, casualties, car shortage, etc., may not be charged against the seller, but the buyer upon written request to the seller may deduct such remaining material as has not been shipped or is not in process of manufacture. If such accidents impair the business of the buyer the seller may likewise deduct the remaining material or hold the material for future delivery.

Chain Prices Advance

Manufacturers have again made an advance in prices of chain to the following basis:

Three-eighths-inch proof coil chain, 6c., base, per pound; 3/16-in., 10.10c.; ¼-in., 7.55c.; 5/16-in., 6.55c.; ⅜-in., 6c.; 7/16-in., 5.85c.; ½ and 9/16 in., 5.70c.; ⅝ and 11/16 in., 5.60c.; ¾ and 13/16 in., 5.50c.; ⅞ and 15/16 in., 5.40c.; 1-in., 5.30c.; 1 1/16 to 1¼ in., 5.40c. B. B. quality, 3/16 and ¼ in., $1.25 per 100 lb. over proof coil prices; 5/16 and larger, $1 advance. B. B. B. quality, 3/16 and ¼ in., $1.75 advance over proof coil, and 5/16 in. and larger, $1.50 advance. All these prices are f.o.b. Pittsburgh.

The new plant of the Standard Car Construction Company at Masury, near Sharon, Pa., of which C. H. Todd is president, is about completed, and some tank cars are already being turned out. The company is building the underframes for the cars, the tanks being secured from other sources. The plate department has not yet been started, and until it is in operation the company will build only the underframes. It will have a capacity for turning out about 10 tank cars per day, and will do other kinds of plate work except making boilers. When fully completed, the plant will employ close to 300 men.

The Trojan Electric Steel Company, Thirty-fourth Street and Hoyne Avenue, Chicago, is now manufacturing, by the electric furnace process, alloy steels to any specified analysis, cast to billet sizes. Walter E. Hadley and Eugene Guy Lilly, for the past 15 years connected with the United States Steel Corporation, are personally in charge of operations.

The M. Speer Iron & Metal Company, dealer in scrap iron and metals, has removed from the Stambaugh Building, Youngstown, Ohio, to room 310, Hamory Building, Sharon, Pa. A storage yard has also been opened at Sharon.

BRITISH STEEL EXPORTS

October Shipments Low, as Were Imports—Valuations Much Higher

British exports of iron and steel in October, made up largely of supplies sent to the Allies, were 241,261 gross tons, excluding iron ore and including scrap. This compares with 231,335 tons in September, this year, and 312,141 tons in October, 1915. The October exports are next to the lowest since February, 1915, when they were 198,804 tons. The largest exports in 1916 were 395,750 tons in May. The decided decrease in the last few months is due to the effect of government prohibitions. The average for the first 10 months of this year was 297,466 tons comparing with a monthly average in 1915 of 270,858 tons.

Pig-iron and ferroalloy exports for October were 72,187 tons against 78,973 tons in October, 1915. To Nov. 1, 1916, these shipments were 818,868 tons as compared with 450,616 tons to Nov. 1, 1915. France took 486,418 tons of pig iron and Italy 111,933 tons of this year's total.

Steel-bar exports in October were 37,976 tons (29,623 tons going to France) against 31,486 tons in September of this year and 51,658 tons in October, 1915. To Nov. 1, 1916, the total was 536,049 tons as compared with 395,305 tons to Nov. 1, 1915. France has taken 449,833 tons this year. Rail exports in October were only 6929 tons in contrast with 13,640 tons in October, 1915. The total rail exports for the first 10 months of 1916 were only 43,387 tons against 219,592 tons for the same period in 1915. Of this year's total 17,656 tons went to British India.

The galvanized sheet movement is still about 50 per cent of that of last year, the total to Nov. 1, 1916, being 113,707 tons against 257,122 tons. Tin-plate exports continue about the same as last year's. The total to Nov. 1, 1916, was 291,051 tons as compared with 312,405 tons in the same 10 months in 1915. Of the former total France took the largest amount, 59,783 tons. The October exports fell to 10,929 tons from 19,226 tons in September, this year.

October imports of iron and steel, excluding iron ore and including scrap, were small—68,065 gross tons, against 66,657 tons in September, this year, and 102,914 tons in October, 1915. The imports to Nov. 1, this year, are only three-fourths of those for the same period last year, or 768,998 tons, against 1,091,087 tons.

Blooms, billets and slabs imported in October were 12,407 tons comparing with 10,802 tons in September of this year and 27,001 tons in October, 1915. The total to Nov. 1, 1916, was only one-third of that for the same period last year, or 130,207 tons and 386,878 tons respectively. The United States contributed 106,531 tons of the former total and 312,642 tons of the latter. Steel ingot imports are large, having been 16,290 tons to Nov. 1, 1916, against 14,481 tons to Nov. 1, 1915.

Iron-ore imports continue large, those for October having been 507,023 tons against 399,724 tons in October, 1915. The total for the first 10 months of this year was 5,988,532 tons, which compares with 5,108,770 tons in the same 10 months of 1915.

The valuation of the steel exports for the first 10 months of this year is placed at £49,517,489 against £32,886,095 for the same 10 months of 1915, but this year's exports are only four-fifths of those for last year. The valuation of steel imports for the 10 months of this year is reported as £9,913,377 and for the same period in 1915 as £9,159,516. The tonnage of imports this year is only about two-thirds that for last year.

The report that the Eastern Steel Company will start up the old Anvil blast furnace at Pottstown, Pa., owned by the Pottstown Iron Company, is incorrect. The Warwick Iron & Steel Company, whose property the Eastern Steel Company leases, did at one time operate this furnace and until a few years ago had a lease on it. This lease, however, is not now in effect.

Wage Advances Become General

The Jones & Laughlin Steel Company, Pittsburgh, has announced an increase of 10 per cent in wages of all employees in its plants in Soho and South Side, Pittsburgh, and Aliquippa, Pa. The increase is effective from Dec. 15.

The Sharon Steel Hoop Company, Sharon, Pa., and the Valley Mold & Iron Company, Sharpsville, Pa., have announced an increase in wages, effective from Dec. 15.

Employees of the Harris Automatic Press Company, Niles, Ohio, who have been on strike since May 1, have voted to return to work on the original terms proposed by the company.

The Allegheny Steel Company and the West Penn Steel Company, both operating plants at Brackenridge, Pa., have given their employees a voluntary advance in wages of 10 per cent, effective from Dec. 15.

The H. B. Smith Company, Westfield, Mass., has granted over 700 of its laborers an increase in wages of 25c. a day, effective Dec. 25. The company employs 1200 hands, but those not affected by this increase are working under contracts or term agreements.

The Norton Iron Company, Ashland, Ky., has announced an increase in wages of 10 per cent, effective from Dec. 15.

The General Electric Company announces a bonus plan which will cost it about $500,000 a month, and will benefit 50,000 employees. It will pay to all employees receiving $2,500 a year or less, monthly bonuses amounting to 10 per cent of the monthly salary. This bonus is in addition to that declared by the company last summer, the first payment of which, made Aug. 1, divided $550,000 among 19,000 employees.

Notice of an increase of 10 per cent in wages for all employees, including salaried men, was posted at the plants of the Pittsburgh Steel Company, at Monessen and Glassport, Pa., Dec. 6. The higher schedule will take effect Dec. 16. About 5000 men are employed at Monessen and about 500 at Glassport. The new schedule also will apply to the employees of the Pittsburgh Steel Products Company, a subsidiary, numbering about 1500.

The steel shipbuilding yards, foundries and other metal industries in Portland, Ore., recently announced that beginning Dec. 1, employees would receive 9-hr. pay for 8-hr. work. At one or two of the largest plants, where work is particularly rushed, the men will work 9 hr. a day, receiving time and a half in pay for the last hour. The employees have now granted practically everything the union men have asked except the granting of a minimum scale and entering into a written agreement with them.

The Ohio Seamless Tube Company, Shelby, Ohio, has advanced wages 10 per cent.

The International Steel Tube & Rolling Mills, Inc., capitalized at $2,500,000, will begin the erection of a plant in Ecorse, near Detroit, Mich., within 60 days. The first tube mill is to be in operation early in the spring. H. K. Flagler, president and general manager of the company, has been active in the steel tube business for years.

It is reported from New Glasgow, N. S., that the Nova Scotia Steel & Coal Company has been asked by a large British shipbuilding company to supply its entire requirements of ship plates. Before the war these plates were secured largely from Germany because of the low price at which they were sold.

The Kentucky State Railroad Commission has fixed the rate on iron dust from Newport, Ky., to Ashland at $1.05 per ton. The Eaton-Rhodes Company, Cincinnati, had filed a complaint against the Chesapeake & Ohio Railroad, alleging overcharge. The commission ordered $223.27 refunded.

The Oregon-Washington Railroad & Navigation Company, it is announced, will expend about $5,000,000 for box cars, automobile cars and other equipment in 1917. This expenditure does not include rails or locomotives.

Pittsburgh and Nearby Districts

Stockholders of the Westinghouse Air Brake Company, Wilmerding, Pa., and the Union Switch & Signal Company, Swissvale, Pa., both near Pittsburgh, will shortly be asked to approve a plan for a merger of the two companies. If it is carried out it will involve an increase in the capital stock of the Air Brake Company from $20,000,000 to $30,000,000, and the exchange of four shares of Air Brake stock for five shares of Switch & Signal preferred stock, and two shares of Air Brake stock for three shares of Switch & Signal common. The two companies are closely allied and it is believed that by consolidating them many economies in operation would result.

Directors of the Westinghouse Electric & Mfg. Company have authorized the issuance of $15,000,000 of additional common stock to be offered to present shareholders at par in the ratio of one share of new for every four shares now held. A special meeting of stockholders will be held in East Pittsburgh, Feb. 15, to approve the new issue. Chairman Guy E. Tripp, in a circular to stockholders, says that it has been found impossible to keep pace with the growing demand so that much profitable business offered has had to be declined. To provide additional manufacturing facilities needed there has been purchased on the Delaware River at Essington, Pa., just outside of Philadelphia, a tract of land having a deep water frontage and large enough to accommodate an ultimate factory development several times as great as that of the East Pittsburgh works. It is planned to begin immediately the erection on this land of a new plant to cost between $5,000,000 and $7,000,000. The company's net income from all sources after deducting interest charges is now averaging over $1,600,000 per month. The contract for 1,800,000 rifles of Russian type being performed for the British Government by its subsidiary the New England Westinghouse Company, and which for a time presented unusual problems, is now proceeding favorably.

About Jan. 1 the Youngstown Sheet & Tube Company will have filled all the contracts for pig iron taken by the Andrews & Hitchcock Iron Company, and will then have the output of both Hubbard furnaces available for its own use. It has been taking the output of one furnace, which has been running on mill iron for some months, but will now change it over to Bessemer and will put the other Hubbard stack on Bessemer early in January. The output of both will be used in the company's own Bessemer steel plant.

The United States Horse Shoe Company, Erie, Pa., has filed notice at Harrisburg, Pa., of an increase in debt from $100,000 to $300,000.

The Pittsburgh Radium Company, recently organized at Pittsburgh, states that it has taken over the Bureau of Mines plant at Denver, Col., erected by the National Radium Institute two years ago and utilized since that time by the Bureau of Mines, in perfecting a process for treatment of American carnotite ores for their vanadium, uranium and radium content. The company has bought the plant outright and takes possession of the property Jan. 16. It will retain a number of the staff experts of the Bureau of Mines in their present positions at the plant. The acquirement of the Denver property will allow the company to begin operations at once, pending the equipment of the abandoned plant buildings purchased recently at Beaver Falls, Pa., for remodeling.

With the purchase of the plant of the former Croxton Motor Car Company, Washington, Pa., plans have been completed for its occupation by the Stungo-Radium Rubber Company, Pittsburgh. This company is incorporated under a Delaware charter with an authorized capital of $3,000,000, and will specialize in the manufacture of automobile tires. Floyd Rose, Pittsburgh, is president.

The Pittsburgh Coal Company has sold all the equipment, tugs, and colliers of its subsidiary, the Monongahela River Consolidated Coal & Coke Company, at the port of New Orleans, to the Corona Coal & Iron Company, Birmingham, Ala. The price is reported to be $600,000.

E. W. Mudge, of E. W. Mudge & Co., pig iron, steel, coal and coke factors, Frick Building, Pittsburgh, has bought the Conestoga Building, a mercantile and office structure located at Wood and Water Streets in that city. The building was erected some years ago by Capt. J. J. Vandergrift, deceased, and Mr. Mudge bought it as an investment.

The Leetsdale Foundry & Mfg. Company, Leetsdale, Pa., has been organized with a capital of $30,000, and will operate a foundry.

Parson coke breeze stokers are in use in the boiler house of the coke-oven plant of the Youngstown Sheet & Tube Company, described in THE IRON AGE of Dec. 7, and not those mentioned in the account. The Parson stoker is made by the Parson Mfg. Company, New York.

The Pittsburgh Tap Company, Pittsburgh, capital $5,000, has been incorporated by Harrison Bock, 1728 Main Street, Sharpsburg; Abram L. Wolk, 5507 Harp Street, Pittsburgh, and others.

Royersford Foundry Changes Ownership

Y. C. Freed, who was the founder and sole owner of the Royersford Foundry & Machine Company, Royersford, Pa., has disposed of his interest in the company and retired from active business. He expects to travel extensively. The company has been purchased by Frank H. Deisher of Spring City, Pa., and H. R. Willi of Williamsport, Pa. Mr. Deisher has been connected with the company as secretary for the past 11 years. Mr. Willi has been identified with a similar company at Williamsport, Pa., for 24 years. Mr. Willi will be president and general manager and Mr. Deisher, secretary and treasurer. The business of the company is that of engineer, founder and machinist and maker of punches and shears.

Locomotive Orders

Definite orders for locomotives in the first week in December amounted to 119. The Baldwin Locomotive Works will build 100 large locomotives for the Russian Government and the American Locomotive Company will furnish the Erie Railroad with 10 Pacific locomotives. It is reported but not officially confirmed that the Russian Government has placed orders with the American Locomotive Company for 66 additional locomotives, with the Baldwin Locomotive Works for 66 and with the Canadian Locomotive Company for 21. Inquiries in the week referred to were over 70, of which 40 came from the Great Northern and 30 from the St. Louis & San Francisco. The Canadian Pacific is also reported as about to inquire for a large number.

National-Acme Company's Plans Approved

Formal approval of the sale and reorganization plan of the National-Acme Mfg. Company, Cleveland, has been voted by the stockholders, and the plans as previously outlined will be carried out. The new company will be known as the National-Acme Company, an Ohio corporation, with a capital stock of $25,000,000 in shares of $50 par. Present stockholders will receive $150 in cash and five shares of the new stock for each share now held. This will give them $7,500,000 in cash and $12,500,000 in new stock for the $5,000,000 common stock now outstanding. Eastman, Dillon & Co., New York bankers, have underwritten the remaining stock. Under the terms of the transaction, the present management will remain for five years.

The Dayton Iron Company, Chattanooga, Tenn., has been incorporated with a capital stock of $500,000 by M. M. Allison, John Stagmaier, N. B. Thomasson, J. J. Lynch and others. The promoters of this company are working on plans to purchase the properties of the bankrupt Dayton Coal & Iron Company, Dayton, Tenn., and propose to renovate and put the blast furnaces in operation as soon as possible.

PERSONAL

Officers of the American Steel & Wire Company visited Birmingham and the company's mill at Fairfield, Ala., the past week. Included in the party were W. P. Palmer, president; J. S. Keefe, vice-president; Frank Baackes, vice-president and general sales agent; E. E. Stone, general purchasing agent; H. E. Baldwin, superintendent of order and warehouse department; A. F. Allen, secretary; H. A. Barren, general superintendent of blast furnaces, and others.

Albert E. Wells, professor of machine construction, Sibley College, Cornell University, will deliver Dec. 21 the next lecture in the course recently inaugurated for the employees of the Shepard Electric Crane & Hoist Company, Montour Falls, N. Y. The lecture will be on "Measuring Instruments and Systems," illustrated by lantern slides.

J. C. Maben, Sr., president; W. H. Goadby, chairman of the Executive Committee, and Theodore C. Camp and H. Parsons, directors of the Sloss-Sheffield Steel & Iron Company, have spent the past two weeks in the Birmingham district of Alabama inspecting the company's plants. It is announced that the projected building of a by-product coke oven plant awaits further consideration, but a number of other improvements will be made in the coming year.

N. B. Ford, who for 10 years traveled for the Corbin Screw Corporation from its Chicago office, having his headquarters in Kansas City, and who left some two years ago to become connected with the Ford Chain Block & Mfg. Company, Philadelphia, has re-entered the employ of the Corbin Screw Corporation as salesman, with headquarters in New Britain, Conn., and covering the territory formerly traveled by A. H. Harrop.

T. J. Bray, president Republic Iron & Steel Company, inspected the company's Alabama blast furnaces last week. He stated that the building of a by-product coke oven plant had been considered by the directors, but that the present high cost of materials and machinery was practically prohibitive.

The Standard Parts Company, Cleveland, recently organized to merge the Perfection Spring Company and the Standard Welding Company, has completed its organization by the election of Christian Girl president; F. F. Prentiss, first vice-president; Ernest W. Farr, second vice-president; P. A. Connelly, secretary, and T. E. Borton, treasurer. Messrs. Girl and Connelly were president and secretary respectively of the spring company. Six directors have been elected: Christian Girl, E. W. Farr, T. E. Borton, Chester C. Bolton and Arnold H. Goss.

Axel Sahlin of the International Construction Company, Ltd., successor to Julian Kennedy, Sahlin & Co., Ltd., 56 Kingsway, London, W. C., is at present in this country, but may sail on Saturday. He is negotiating for plates for a Swedish shipbuilder.

Samuel A. Benner, who has represented the American Steel Export Company in London and Petrograd and returned to the United States a few days ago, has been made general manager of sales of the company, with headquarters in the Woolworth Building, New York. W. H. Olthoff, the company's agent for Holland and the Dutch East Indies, recently sailed for Rotterdam.

George L. Shook, formerly of the Northern Iron Company, Port Henry, N. Y., has assumed charge of the blast-furnace department of the Central Iron & Steel Company, Harrisburg, Pa.

Herbert Chase, who has been connected with the Automobile Club of America for several years as laboratory engineer and chief engineer, has joined the office staff of the Society of Automobile Engineers in the capacity of assistant secretary. He is treasurer of the society and a member of its Council. His long service on the publication committee of the society will enable him to assume readily editorial work on its *Bulletin* and other publications.

William M. Boone, secretary of the Richard De Cou Company, Philadelphia, has severed his connection with that company, and Jan. 1 will become associated with Henry Potts & Co., 650 Real Estate Trust Building, Philadelphia. He will give his attention to structural steel and builders' cast-iron work.

A. Brice Moore has become manager of the United American Iron & Steel Company, Albany, N. Y., dealer in iron and steel scrap. He was formerly connected with John J. Caine, steel broker, New York City.

C. W. Forcier, formerly storekeeper of the Pittsburgh Railways Company, has resigned to become purchasing agent of Mackintosh, Hemphill & Co., Pittsburgh.

Meyer Davis, formerly chief engineer of the Asbestos Protected Metal Company, Pittsburgh, has been appointed manager of its San Francisco office.

William B. Anderson has been elected president of the Buckeye Iron & Brass Works Company, Dayton, Ohio, succeeding Edward G. Pease, who has retired on account of ill health, after serving the company for a number of years and will make his home in the South.

Justice Grugan, who recently resigned as manager of the Northern Ore Company's zinc operations in St. Lawrence County, N. Y., has resumed his former practice as mining engineer and has opened offices at 30 Church Street, New York. In addition to general work in examining mining and mineral properties, he will specialize in iron and the ores of tungsten, molybdenum, vanadium, etc.

John T. Boone, chief engineer for the John O. Heinze Company, Springfield, Ohio, has become chief engineer for the Disco Electric Starter Corporation, Detroit.

Alden W. Baldwin, formerly with the engineering department of the Deane Steam Pump Company at Holyoke, Mass., is now an instructor in mechanical engineering in the Towne Scientific School, University of Pennsylvania, Philadelphia.

Charles F. Quincy, chairman, Elmer M. Sperry and John F. Wallace are acting as a committee of New York engineers looking to the organization of an engineers' country club with a national membership. The location in view is at Roslyn, L. I.

Wisconsin Manufacturers Hold Annual Meeting

The Wisconsin Manufacturers' Association, at its recent annual meeting in Milwaukee, elected as president F. H. Clausson, general manager Van Brunt Mfg. Company, farm implements, Horicon, Wis. He succeeds Harry W. Bolens, president Gilson Mfg. Company, Port Washington, Wis., who served two terms. A. Hirshheimer, president LaCrosse Plow Company, LaCrosse, Wis., was elected vice-president; William George Bruce, Milwaukee, secretary; Frank J. Sensenbrenner, Neenah, Wis., treasurer, and James A. Fetterly, Milwaukee, assistant secretary-treasurer. The directors are Messrs. Clausson and Bruce; L. N. Burns, J. I. Case Plow Company, Racine, and George Ingersoll, Fairbanks, Morse & Co., Beloit, Wis. At the banquet following the meeting James A. Emery, New York, general counsel of the National Association of Manufacturers, made an address urging greater interest by business men in public affairs, particularly with respect to industrial legislation. Gov. E. L. Philipp, of Wisconsin, spoke against government ownership of railroads.

Spain's iron-ore reserves, according to estimates reported by U. S. Consul-General Carl B. Hurst of Barcelona, are 700,000,000 tons, capable of yielding about 50 per cent. of iron. The province credited with the largest deposits is Leon with 150,000,000 tons; Teruel with 135,000,000 tons, and Vizcaya with 70,000,000 tons. About 9,000,000 tons have been mined annually in the past decade, with half of it now coming from the province of Vizcaya.

Benzol and Toluol Market

Depending on the quantity involved, the price of pure benzol, for either spot or contract delivery, is 55c. to 60c. per gal. at producer's plant. The quantity available for next year's delivery has largely been sold, covered either by old contracts extending into next year or by recent new contracts covering from one to three years. There is considerable new inquiry and it is considered sufficient to absorb a large part of the new product likely to come on the market from new plants that start up early in the year, so that there is some indication of a scarcity in 1917. There is no large amount of spot benzol available and a strong market next year is looked for.

All the toluol authorized to be sold has been disposed of by contract well into the future, and there is little spot available. In fact, inquiries for contract material are going begging. It expected that there will be more to sell a little later from new plants. For domestic consumption, outside of the manufacture of munitions, some toluol is expected to be available. The quotation is $1.50 to $2 per gal., producer's plant, for toluol on contract and $2.50 per gal. for spot material.

The market for solvent naphtha is weak and spot and contract material are quoted at 25c. to 30c. per gal., producer's plant, depending on the quantity. Sales have been numerous in the last few weeks.

New Chinese Pig-Iron Producers

The Penhsihu Colliery & Iron Mining Company, in Manchuria, China, produced 3804 tons of pig iron in 1915, as reported by U. S. Consul General P. S. Heintzleman of Mukden. It is estimated that the annual output will average 36,000 tons, which will be shipped to Japan, from Darien in the winter and from Newchwang in other seasons.

The Anshanchan iron mines are to be worked under joint Chino-Japanese management under the name of the Anshanchan Chenhsing Company. The South Manchuria Railway Company will represent Japanese interests. The ore contains 40 to 60 per cent iron, but lacks uniformity. A blast furnace will be erected near the deposits and a steel plant is projected.

Holland's Iron Works in Co-operation

A co-operative society of Dutch iron works has been formed, with headquarters in Amsterdam, the main objects of which as described by U. S. Consul Frank W. Mahin of Amsterdam, Holland, are the creation and operation of bureaus for the purchase and sale of all raw materials, other materials, implements and machinery used in iron working; the maintenance of regulations as to economical conditions and the conduct of business between the members and their customers, suppliers, employees, etc.; regulating production and distribution of product; also organization and promotion of co-operative credit.

Civil service examinations for junior fuel engineer and junior mechanical engineer will be held Jan. 3 and 4 in the leading cities of the country. The Ordnance Department at Large, Springfield Armory, Mass., requires a junior mechanical engineer at a salary of $1000 per year. Practical questions in mechanical engineering will form the questionaire. Only graduates of civil, mechanical or electrical engineering colleges are eligible. The junior fuel engineer, with a salary of $1200, is required by the Bureau of Mines. Information may be obtained by addressing the United States Civil Service Commission, Washington, D. C.

The National Malleable Castings Company will build a large modern malleable foundry in Cleveland on a new site that it has acquired at East Eighty-third Street and the Belt Line Railroad. This plant will replace the company's old foundry on Platt Avenue. Considerable crane and other equipment will be required.

OBITUARY

CHARLES CLARENCE LINTHICUM, for many years professor of patent law at Northwestern University and a patent attorney of Chicago, Pittsburgh, New York and Washington, died at his home in Evanston, Ill., Dec. 12 from acute indigestion. He was patent counsel for the United States Steel Corporation and president of the Patent Law Association of Chicago. He was born in McLean County, Illinois, in 1857.

FREDERIC HOLLY REED, vice-president of J. G. White & Co., Inc., contracting engineers, 43 Exchange Place, New York, died suddenly Dec. 9 from heart disease in his home in New York City, aged 51 years. He was a civil engineer and had been active in railroad development in the Philippines. He was vice-president of the Manila Electric Railroad & Light Company.

Gen. GEORGE A. GARRETSON, Cleveland, died Dec. 8, aged 73 years. He was president of the Bank of Commerce National Association, Cleveland; chairman of the Great Lakes Towing Company, treasurer of the Montreal Iron Company, and long identified with industrial development along the Great Lakes.

CHARLES WILEY, vice-president and treasurer of John Wiley & Sons, publishers of scientific works, at 132 Fourth Avenue, New York, died Dec. 10 at his home in Orange, N. J. He was a member of the Engineers' Club and the Aldine Association, New York.

OTTO MANNESMANN, one of the brothers who founded the Mannesmann Tube Company, has been killed at Tabora, East Africa, where he was serving with the German forces against the British.

Standardizing Electrodes for Electric Furnaces

The standardization of carbon electrodes for electric furnaces in Germany has recently been accomplished and the rules were reported to go into effect Aug. 1, 1916. They are as follows:

Round carbons for steel furnaces are to be made in sizes varying in thickness from 100 mm. (4 in.) up by steps of 25 mm. (1 in.) up to 250 mm. (10 in.) diameter and by steps of 50 mm. (2 in.) for larger sizes, the tolerance varying from 3 mm. to 6 mm., according to size. For rectangular electrodes used with other kinds of furnaces the standard size has been fixed at 500 mm. (about 19½ in.) square. For smaller sectional areas, required for special purposes, one of the sides is to remain at 500 mm., and the other is to be reduced by 50 mm. or multiples thereof. For electrodes used for tapping furnaces, the standard size is to be 120 mm. (say 4¾ in.) square. As regards length, the standard length may ultimately be raised to 2.4 m. (nearly 8 ft.), but for the time being was fixed at 2 m. (say 6½ ft.) for all electrodes except those used for tapping furnaces, which are to be 1.60 m. (5¼ ft.) long. All lengths, however, may be varied in multiples of 20 mm. (say 13/16 in.) and the tolerance is to be 20 mm. A table has been published giving the standard dimensions to be adopted for upper holders with cylindrical threads screwed into the carbons. The dimensions of conical threads and the standard designs for other kinds of suspensions are still under consideration.

New Installations of Heroult Furnaces

Licenses have been granted by the United States Steel Corporation for the installation of two Heroult electric steel furnaces as follows:

Atlas Crucible Steel Company, Dunkirk, N. Y., a 3-ton furnace for the manufacture of tool steel.

Crucible Steel Company of America, Harrison, N. J., a 3-ton furnace for the production of alloy steels. This is in addition to its 6-ton Heroult furnace which has been operating for some time.

These two contracts bring the number of Heroult furnaces contracted for or operating in the United States and Canada to 82.

The blast furnace of the Bessie Furnace Company, New Straitsville, Ohio, was blown in Dec. 1 on ferrosilicon after being idle for about a month for relining and repairs.

UNIFORM BOILER CODE

Conference at Washington to Further Adoption of A. S. M. E. Standards

WASHINGTON, D. C., Dec. 12, 1916.—A long stride toward the adoption of uniform laws for the manufacture and installation of boilers was taken in the past week, when a convention in this city attended by 75 delegates appointed by the governors of 28 States adopted resolutions indorsing the standard boiler code of the American Society of Mechanical Engineers. As a result of this action the legislatures of all the States will be urged to adopt a uniform law embodying the approved code and it is hoped that at an early date uniform regulations will be in force throughout the country.

The meeting held here of the American Uniform Boiler Code Congress was brought together at the instance of the Ohio Industrial Commission and was presided over by J. C. Callery, chief deputy of the Ohio Bureau of Boiler Inspection. In addition to the delegates many engineers and prominent Government officials were present, several of whom delivered addresses.

Dr. F. R. Hutton of Columbia University urged uniform State legislation, declaring that every boiler explosion added to the cost of living. The great majority of explosions, he said, could be prevented if reasonable regulations were everywhere enforced enabling manufacturers to construct boilers that would be passed by the inspection laws of all the States. Insurance is now based upon the current frequency of casualties, he said, and places a heavy burden on both the construction and maintenance of boilers. Uniform laws would lift the greater part of this burden.

Henry Hess, chairman of the Standardization Committee of the American Society of Mechanical Engineers, advocated the adoption by all the States of the boiler code of that organization, which he described at length, pointing out its advantages over the widely diversified regulations now in force in those States which attempt to exercise any control over the manufacture and maintenance of boilers. Mr. Hess emphasized the fact that at present boilers which meet all the requirements of the law in certain States cannot be used at all in other States. The general subject of boiler safety has received so little attention in some States, he said, that there are no laws whatever dealing with the matter and the public has no safeguards against the installation and maintenance of boilers so constructed that they are almost certain to explode under ordinary service conditions. Mr. Hess expressed the opinion that the adoption by the States of a uniform code standardizing boiler construction would materially reduce the cost of boilers and greatly increase the territory within which manufacturers would be able to do business.

Edward N. Hurley, chairman of the Federal Trade Commission, declared that "standardization is the foreword of business efficiency," and asserted that in no feature of industrial activity was it more important to bring about standardization than in power plants and especially in boilers. Much progress in this direction, he said, had been made through Federal legislation, but the specific objects of the Congress could not be met except by the concurrent and uniform action of the State legislatures.

Resolutions, the preamble of which stated that from 400 to 500 persons in a year are killed by boiler explosions and strongly urging the passage of State laws embodying the code of the American Society of Mechanical Engineers, were unanimously adopted. A committee will take up the matter of drafting a uniform bill for introduction in the State legislatures and the co-operation of power users in all branches of industry will be sought to secure early action.

W. L. C.

The United Alloys Steel Corporation, Canton, Ohio, placed its 35-in. blooming mill in its new plant B in operation Dec. 5 and will shortly start up its 18-in. sheet-bar and billet mill.

Steel Manufacturers to Co-operate with Engineers' Boiler Code Work

American steel manufacturers are to work closely with the Boiler Code Committee of the American Society of Mechanical Engineers as the result of a petition presented at the public hearing held by the code committee in the Engineering Societies Building, New York, on Friday, Dec. 8. Through C. F. W. Rys, metallurgical engineer Carnegie Steel Company, Pittsburgh, the Association of American Steel Manufacturers asked that a committee of that association serve with a committee selected by the Boiler Code Committee. As a result of the suggestion Dr. D. S. Jacobus, advisory engineer Babcock & Wilcox Company, S. F. Jeter, Hartford Steam Boiler Inspection & Insurance Company, and William F. Kiesel, Jr., assisant mechanical engineer Pennsylvania Railroad, were appointed to represent the Boiler Code Committee, and Mr. Rys, F. J. Cole, chief consulting engineer American Locomotive Company, Schenectady, and C. D. Young, engineer of tests Pennsylvania Railroad, Altoona, represent the manufacturers' association.

At the hearing, Mr. Rys argued for the elimination of the copper content limit specified in firebox steel for boilers and mentioned the desirability of changes in bending tests, now under consideration by the American Society for Testing Materials and the steel manufacturers.

Mr. Young endorsed a 10,000-lb. range in the tensile strength for firebox steel against the 55,000 to 63,000 lb. range of the existing specifications, stating that the boiler code's specification was the only one in existence with this shorter range. The Boiler Tube Manufacturers of America put in a number of suggestions, asking for a manganese range of steel tubes of 0.30 to 0.60 per cent, instead of 0.30 to 0.50 per cent, and covering also flange tests and workmanship.

United States Shell Bids and Awards

The chief of the Bureau of Ordnance, Navy Department, Washington, will receive proposals until noon Jan. 3, 1917, for furnishing the following projectiles: 7200 16-in. armor-piercing shells; 8100 14-in. armor-piercing and 900 14-in. class B shells.

An award has been made to the Midvale Steel Company, Philadelphia, by the chief of the Bureau of Ordnance, Washington, for furnishing 1200 12-in. deck-piercing shells. Bids for this material were opened Aug. 29.

The following bids were received by the commanding officer, Frankford Arsenal, Nov. 7, under proposal 210, for furnishing 98,287 shrapnel cases for 4.7-in. shrapnel: The Hydraulic Pressed Steel Company and the Metal Products Company (combined bid), $8.53 each, accepted. The Bethlehem Steel Company, $9.47 each. The Bridgeport Projectile Company, $9.75 each. The Worthington Pump & Machinery Corporation, $10.50 each.

French War Steel Output

An arrangement has been made by the French Government concerning the output of steel in France, for the utilization of all minerals for the state and the immediate development of all potential resources. A committee has been formed in Cherbourg to superintend the re-opening of the Dielette mine of which the Germans had obtained control before the war broke out. About 20,000 tons of iron ore has been brought to the surface ready for use, while 50,000 tons more is ready for removal. The Dielette mine, according to Herr Thyssen's engineers, was to have produced at least 100,000 tons a year of ore averaging 56 per cent iron. It is the only high grade magnetic oxide found in France.

Bertsch & Co., Cambridge City, Ind., have shipped to a customer at Canton, Ohio, a shearing machine weighing 50 tons, having a 17-ft. stroke, capable of cutting ¼-in. steel plates. This is the longest blade the firm has thus far constructed.

First Year of the American International Corporation

President Charles A. Stone of the American International Corporation presented to its stockholders at the annual meeting Dec. 6 a report covering its first year's activities. In that time 1230 propositions were submitted to the corporation for consideration, 29 of these coming from Africa, 73 from Asia, including 45 from China; 41 from Canada, 47 from Central America, 347 from South America, 326 from the United States and 256 from Europe outside of the countries of the Teutonic allies. Reference is made to the taking over control of the Pacific Mail Steamship Company, acquiring all the stock of the Allied Machinery Company of America, acquiring an interest in the International Mercantile Marine Company, also in the United Fruit Company and other corporations. In connection with getting control of the New York Shipbuilding Company, Camden, N. J., it is announced that the facilities of this yard will be extended materially. Contracts for ships under construction amount to $20,000,000, besides $22,900,000 for two battleships to be built for the Government. The American International Terminals Company has been organized to study terminal problems at New York and ultimately to develop an organization for the construction of terminals, port works and harbor facilities in other places.

The American International Corporation is jointly interested with Stone & Webster in the Latin-American Corporation, which will undertake South American development under the direction of W. S. Kies of the National City Bank. Important work has been started in Russia under the direction of Frederick Holbrook. After nearly a year in Russia, Mr. Holbrook came to New York to perfect a Russian organization and on Sept. 20 returned to Russia in company with a number of experts to investigate railroad, steel and coal enterprises. The corporation is now filling orders from the Russian Government for a large amount of steel rails and other railroad equipment. It has advanced $500,000 to China to be expended by the government on surveys for railroads to be built under contract with the American International Corporation. Willard D. Straight, a vice-president of the corporation, gives particular attention to Far Eastern matters.

The German Steel Trade

The statement of the German Steel Works Union issued at its regular meeting, Oct. 26, 1916, had the following to say regarding the condition of the German steel trade:

In semi-finished steel the domestic demand exceeds the output and deliveries to neutral countries are suspended. Orders for railroad material from the collieries and from the military authorities for mine and portable rails are considerable. Deliveries to neutral countries of both heavy and light material are still suspended. The demand for shapes from the army authorities has increased and only small quantities are available for merchants. Demand from neutral countries is very keen, but in most cases it cannot be met.

Germany's steel output in September was 1,393,434 metric tons, or 53,594 tons per day, against 1,414,097 tons or 52,374 tons per day in August. In September, 1915, it was 1,174,350 tons. The war record was 54,990 tons per day in June, this year, and the largest month was 1,414,097 tons in August. The September output was made up of 670,646 tons of Bessemer ingots, 585,713 tons of open-hearth ingots, 109,639 tons of steel castings, 9961 tons of crucible steel and 17,475 tons of electric steel. This last is the largest month's output ever recorded, the electric steel produced in August having been 17,093 tons. The steel output for the first nine months of this year was 11,930,000 tons, against 9,673,000 and 12,225,000 tons in the same periods of 1915 and 1914 respectively. The steel output from January to September, inclusive, was only 3 per cent below that of 1914, which included seven months of peace.

Russian exports of manganese in the first six months of this year were less than 50 tons, as against none to July 1, 1915, and 633,825 tons to July 1, 1914.

BIGGEST SHIPBUILDING MONTH

November Total of Completed Vessels, 100 of 90,636 Gross Tons

WASHINGTON, D. C., Dec. 12, 1916.—American shipyards in November completed 100 vessels of 90,636 gross tons, thereby breaking all records for a single month in the history of the industry. All of these ships were officially numbered for the American flag except two steamers of 7847 gross tons for Norwegian owners. There were also built and officially numbered during the month 9 yachts aggregating 237 gross tons. November's output brings the production of American shipyards for the 11 months of the calendar year 1916 up to 1115 vessels aggregating 522,083 tons, a figure materially in excess of the record for this period in any year.

The following table shows the distribution of the month's construction by material and rig:

	No.	Gross Tons
Wood:		
Sailing	1	[illegible]
Steam	[illegible]	[illegible]
Gas	[illegible]	1,349
Unrigged	31	[illegible]
	72	14,838
Metal:		
Sailing		
Steam	14	[illegible]
Gas	[illegible]	[illegible]
Unrigged	2	1,219
	26	67,714
Totals:		
Sailing	4	2,168
Steam	27	61,197
Gas	34	9,006
Unrigged	33	10,181
Grand total	98	82,552

Atlantic and Gulf shipyards constructed more than one-half the November output, completing 57 vessels of 48,476 gross tons, of which 9 aggregating 35,605 tons were of steel and 48 aggregating 12,871 tons were of wood. The output of the Pacific yards included 10 vessels, aggregating 4427 gross tons, of which 1 vessel of 3820 tons was of steel and 9 aggregating 607 tons were of wood. The yards on the Great Lakes turned out 18 vessels of 28,757 tons, of which 15 of 28,280 tons were of steel and 3 aggregating 477 tons were of wood. Thirteen vessels, aggregating 892 tons, were built on the Western rivers, 1 of 9 tons being of steel and 12, aggregating 883 tons, of wood. Of the 2 vessels built for Norwegian owners 1 was of 5729 tons and the other of 2118 tons.

During November 39 American vessels, aggregating 29,809 tons, were transferred to foreign flags, these vessels ranging from small gas yachts of 9 tons to steel steamers of 2667 tons each. Since July 1, 1916, returns show the sale of 87 American vessels of 106,689 gross tons to foreigners, of which 40,601 were sold to Norwegians, 19,689 to French, 11,276 to Japanese, 11,140 to Uruguayans, 7955 to Dutch, 7370 to British, 2357 to Nicaraguans, 1393 to Spanish, 1083 to Cubans, 974 to Russians, 962 to Portuguese, 838 to Danish, 366 to Venezuelans, 232 to Dominicans, 222 to Mexicans, 203 to Costa Ricans, and 28 to other foreigners.

W. L. C.

A Small Steel Plant in Chile

Steel manufacture on a small scale has recently been started at Santiago, Chile, as reported by U. S. Commercial Attaché V. L. Havens. The raw material is scrap formerly exported to Europe. The high price of steel due to the war led to the building of the plant through the efforts of an engineer, Mateo Vucetich, and a capitalist, Bernado Granello. It was difficult at first to find skilled workmen, but Spaniards were finally secured from Bilbao. Chileans were made apprentices and the force now employed is 100. A special foundry had to be built to make the necessary machinery. Chilean coal is being used. The products include bars, plates, angles, tees, steel for concrete, bolts, nuts, nails, horseshoes, tires, etc. The Chilean steel sells for 20 per cent less than the imported and the demand is large.

MUNITIONS AT PRIVATE WORKS

Government Co-operation with Manufacturers—Scientific Management Again

WASHINGTON, D. C., Dec. 12, 1916.—Urgent recommendations that favorably located and well equipped private plants for the manufacture of munitions, which have been developed in this country as the result of the European war, should not be permitted to be dismantled, but rather should be preserved for co-operation with the Government in any emergency, are contained in the annual report of Secretary of War Newton D. Baker. The Secretary also devotes considerable space to a discussion of the conditions in the Government arsenals brought about by the legislation forbidding the further use of scientific shop management systems and deplores the fact that the Government can no longer secure maximum production with a minimum cost and cannot properly reward zeal and superior workmanship on the part of its employees.

ORDERS FOR PRIVATE PLANTS

Under former laws, the Secretary says, the Federal Government in time of war would have to enter the markets of the country to obtain munitions, arms and other supplies on the same basis as an individual; but legislation enacted at the last session of Congress authorizes the President in time of war "to exercise a power analagous to that of eminent domain over the various manufacturing plants in the country and gives Government orders precedence over all private orders." Authority was also given to the Ordnance Department to prepare in time of peace the necessary gages, jigs, dies and other special tools required in the manufacture of arms and ammuntion, and to give to specially equipped manufacturers educational orders, which, while limited in amount, will insure private manufacturers having the necessary experience and force to enter rapidly upon the manufacture of munitions in the event of necessity. Congress authorized the appointment of a board to study and report to Congress upon the advisability of exclusive Government manufacture of war materials. This board has been appointed and is proceeding with its investigation. No forecast can as yet be given of the conclusions, but the subject is one of very great importance. Concerning the utilization of existing private munitions plants after the close of the European war, the Secretary makes a suggestive statement indicating at least his own personal opinion as to the advisability of exclusive Government manufacture of war materials. He says:

> There are in the United States at the present time a great many industrial establishments which have turned aside from their ordinary business to the manufacture of war materials, and large plants have been established for this special object. After the passage of the occasion for which these enterprises were established the difficulty will arise as to whether their facilities are to be transformed and devoted to other industrial uses or any part of them preserved in readiness for similar supplies for the United States. Some of these plants are located on the seacoast and others at more remote places. It will therefore be incumbent upon the department to select for patronage and encouragement certain of them, and in determining which are to be so chosen a variety of military considerations arise. It would seem, however, that with such facilities in existence it will be unwise to allow them to be dismantled, and the necessary large additions made to existing Government facilities which would be required to equip the Government to supply its own needs under war conditions, and as any war condition requires a mobilization of the entire industrial resources of the nation, there would seem to be no reason why munitions of war should be separated out for Government monopoly, unless that course should turn out to be necessary to prevent the appearance of prospective war profits as a disturbing element in the policy of the nation.

THE GOVERNMENT AS "MODEL EMPLOYER"

Taking up the question of scientific shop management, Secretary Baker says that the question of the relation between the Government as employer and its employees in the arsenals is a part of the general labor of the country. The theory which the department attempts to follow is in general terms that the Government should be the model employer and to a large extent this theory is successfully applied. In the matter of hours of labor, sanitary conditions, holidays and sick leave, the Secretary says, there is no better industrial condition in the United States than that maintained by the War Department in these industrial plants. The question of wages and the basis thereof is, however, under more or less constant discussion. Roughly speaking, the department undertakes to establish wage rates by determination of the prevailing rate of wages in similar employments within the district in which the particular arsenal is located and it uses Department of Labor statistics in reaching its conclusions. The result is, the Secretary says, that the employees of the Government receive the prevailing rate of wage in their respective occupations, "but usually for a day of shorter hours than is observed in the private industries from which the information is drawn, and clearly for work done under conditions much more favorable to the public employee than to the private employee." Taking up the subject of scientific management, the Secretary says:

> A system of time studies and premiums known as the "Taylor system" was adopted in part in some of the arsenals, but it met with the opposition of organized labor and Congress prohibited the use of the system. We have been obliged, therefore, to fall back upon the less scientific and less just methods previously employed.
>
> It seems without doubt that an efficiency system properly constructed and justly applied is fairer alike to the Government and to the employee than any more haphazard method. The objection of organized labor is not unnatural; it proceeds from the belief that all efficiency systems tend to become "speeding-up" systems and that their logical operation increases the output without a corresponding increase of wage. This, however, must, of course, be due to the method of applying the system rather than to the system itself, and after examining the results obtained in Government arsenals where the system was in whole or in part followed, I am persuaded that no such evil effects as these were permitted to occur. How far the action of Congress was dictated by a belief that efficiency systems inevitably tended to the enervation of the employee I have not the means of knowing, nor do I know what evidences of such results in private establishments were considered; but under law as it now is the department is prohibited from using time studies and premiums, and is therefore deprived of the means of acquiring the sort of knowledge without which just wage regulation is impossible, or of offering inducements to zeal and good workmanship, which if offered in moderation constitute a just recognition of individual skill and energy.

Secretary Baker strongly recommends the enactment of an equitable law providing for the retirement of superannuated and disabled employees along the lines adopted in recent years by various industrial and transportation companies. Such a law, in his opinion, would enable the Government to replace employees who have served the Government long and faithfully, but who are no longer competent to perform the work assigned to them. Such a system would cost but a moderate sum annually and would greatly increase the efficiency of the service. W. L. C.

New Lock Washer Company

The Mansfield Lock Washer Company, recently organized, has purchased the plant of the Triumph Valve Company, Mansfield, Ohio, taking immediate possession. The main building is 40 x 140 ft., built of brick, two stories. A wing will be constructed as quickly as possible. As much of the machinery used by the Triumph Valve Company will be available for the new company, it is expected that the plant will be in active operation inside of two months. Patents are owned on machines used in the production of lock washers which will enable greatly increased output over usual methods. The bulk of the product of the company will be sold to the automobile trade. William H. Davey, president and general manager of the Mansfield Sheet & Tin Plate Company, is president of the new company. Charles F. Ackerman, president Mansfield Savings Bank, is vice-president. A. E. Witter, formerly of Massillon, is secretary and treasurer. F. E.

Kessel, who has been associated with Mr. Witter and who holds patents on various machines to be used, is general superintendent.

New Malleable Iron Foundry

The Richmond Malleable Castings Company, Richmond, Ind., is entirely a new industry, but the organization, such as the manager, superintendent, melters, and foremen, represents an old organization of long experience. The company even has quite a body of experienced molders available. The two main buildings are 100 x 350 ft. and 85 x 250 ft., with two wings, one 60 x 125 ft. and the other 40 x 60 ft. All buildings are of concrete, brick, and steel, with automatic sprinkler protection throughout. The equipment comprises three air furnaces, each of 20 tons capacity, and six annealing ovens that are more than sufficient to take care of the daily capacity. For the present the company will be in position to produce 25 tons of castings daily.

Quality and service will be the aim of this new enterprise. Its annealing process covers eight days, which indicates the intention to produce only first-quality castings. No expense has been spared in installing modern devices to aid in economical production. Every casting will be cleaned by sand blast. The plant will handle any class of castings from light to heavy, having various types of squeezers and molding machines, while bench and floor work will be used for the more intricate.

Die Casting Companies Merged

The entire business of the Van Wagner Die Casting Corporation and that of the Precision Die Casting Company, Syracuse, have been purchased from Charles Van Wagner and the two companies merged into the latter corporation, which has been incorporated with a capital stock of $315,000. The plant of the new company, manufacturing die castings, is at Fayetteville, N. Y., and employs about 100 workmen. Alterations and extensions are now being made to increase the capacity and efficiency of the plant.

T. G. Meachem, vice-president and general manager of the New Process Gear Corporation, Syracuse, has been elected president; J. W. Knapp, former treasurer of the Van Wagner Die Casting Corporation, vice-president; H. S. Tenney, treasurer, and E. J. Quintal, secretary. The officers and A. P. Bellinger of the Solvay Process Company, Syracuse, and W. A. Ball of the Semet-Solvay Company, Syracuse, and G. W. Bowen of the Bowen Mfg. Company, Auburn, N. Y., make up the board of directors.

Chicago Machinery Houses Merge

The Stocker-Rumely-Wachs Company, Chicago, has been formed as successor to the H. A. Stocker Machinery Company and the Rumely-Wachs Machinery Company, effective Jan. 1, 1917. It will be located at 117-119-121 North Jefferson Street, Chicago, the present location of the Rumely-Wachs Machinery Company. The officers of the new organization are H. A. Stocker, president; William N. Rumely, vice-president; H. J. Reeve, treasurer; O. A. Wachs, assistant treasurer; Edward H. Wachs, Jr., secretary. The capital stock of the new organization will be $225,000. The selling force of both concerns will be retained, and, in addition to the lines already handled, a number of other lines will be taken up.

The first open-hearth steel ingot to be poured in the new plant of the Llewellyn Iron Works, at Torrance, near Los Angeles, Cal., has been on exhibition at the Los Angeles Chamber of Commerce. The ingot weighs 1230 lb. It is expected that the steel plant will be under regular operation early in January.

Shortage of coke has necessitated the closing down of furnace No. 2 of the Eastern Steel Company, Pottstown, Pa. The stack is to be rebuilt by April 1. The last blast was started March 19, 1914, and since that time 457,000 tons of pig iron has been turned out.

Tests of Cast Steel Bars, Annealed, Forged and Heat Treated

Some interesting physical tests have been made on cast steel bars subjected to varying heat treatment or heat treatment similar to that given forgings. The steel was basic open-hearth made from acid scrap by the Federal Steel Foundry Company, Chester, Pa. High-grade scrap, low in sulphur and phosphorus, is further refined on a basic bottom—the only foundry, it is believed, where such practice is followed.

All test bars used were annealed by the regular practice of slow cooling from just above the recalescence point. Some were then forged and tested, or heat-treated after forging and then tested. The results, with the heat treatment given each bar, were as follows for bars having a diameter of 0.505 in. or 0.200 sq. in. of area.

Bar	Elastic Limit Lb. per Sq. In.	Tensile Strength, Lb. per Sq. In.	Elongation in 2 In., Per Cent	Reduced Area, Per Cent	Fracture
1	44,000	85,500	20.0	29.2	¾ silky
2	49,000	97,500	20	31.5	½ cup
3	46,500	86,000	23.5	40.3	cup
4	48,000	94,000	22	19.1	½ cup
5	45,000	87,500	22.0	34.4	½ cup
6	48,000	94,500	16.0	21.3	silky-flaw

Bar — Heat Treatment

1. Annealed as in ordinary practice.
2. Annealed as in ordinary practice and then forged from 1¼ in. down to ⅝ in.
3. Annealed as in ordinary practice and then forged from 1¼ in. down to ⅝ in. and reheated to 1400 deg. Fahr. and quenched in oil, then annealed at 900 deg. Fahr.
4. Annealed as in ordinary practice, reheated to 1400 deg. Fahr. and air chilled.
5. Annealed as in ordinary practice; reheated to 1400 deg. Fahr., quenched in oil and reheated to 900 deg. Fahr.
6. Annealed as in ordinary practice; reheated to 1400 deg. Fahr. and quenched in oil.

The extent to which the forging alone has increased the tensile strength of the simply annealed metal is surprising—from 85,500 to 97,500 lb. per square inch, as in bar No. 2—with no loss of ductility and little change in elastic ratio. Heat treatment after forging bar No. 3 maintains the strength where it was, but increases the ductility and the elastic ratio. Even air chilling or oil quenching after reheating the annealed bar to 1400 deg. Fahr., as in bars Nos. 4 and 6, did not bring the tensile strength up to the forged bar No. 2. Tempering the oil-quenched bar by reheating to 900 deg. Fahr. did not produce as good static results as the same treatment on the forged bar. Forging the annealed cast steel before special heat treatment evidently in this case benefits the metal, in that superior results are obtained.

The chemical composition of the steel was as follows:

	Per Cent		Per Cent
Carbon	0.28	Sulphur	0.038
Manganese	0.81	Phosphorus	0.026
Silicon	0.341 per cent		

The high manganese and the low phosphorus and sulphur are the striking features of this metal. By such a composition, relatively low carbon and high manganese, a high tensile metal of good ductility and of tough quality is obtained which will meet the Government specifications for class A steel, requiring a minimum of 80,000 lb. per square inch of tensile strength. Usually most foundries produce a steel of 0.40 per cent carbon and 0.60 to 0.65 per cent manganese for this purpose—a metal very difficult to make and cast free from blow holes, etc.

Important Foundry Consolidation

It is announced that the plants of the Medina Foundry Company, Medina, Ohio, and the T. E. Henry Furnace Company, Cleveland, and foundries controlled by the same interests in Canton and Chagrin Falls, Ohio, will be consolidated under one company with a capital stock of $600,000. W. H. Hobart resigned as secretary and treasurer of the Medina Foundry Company Dec. 1.

The Colt's Patent Fire Arms Company, Hartford, Conn., has received from the Government an order for 75,000 pistols, according to press report. The total value of the order is reported to be $1,125,000.

Machinery Markets and News of the Works

WESTERN RAILROADS BUY

Large Shop Equipment Lists in Chicago

Lines Not so Active in the East, but Doing a Little—Electric Motors and Control Devices Are Advanced

News from Western cities, Chicago in particular, dwells on the greater extent to which several of the railroads have entered the market for machine tools and shop equipment. For its West Burlington shops the Chicago, Burlington & Quincy has issued a list of 75 tools on which it expects to close Dec. 24, and also has in preparation a list for a smaller shop.

The Chicago, Minneapolis, St. Paul & Omaha division of the Chicago & Northwestern has issued from St. Paul a list of 50 machines wanted for its car-building shops. The Rock Island and Santa Fe also are in the market.

The Pennsylvania Lines East have been doing some quiet buying in Cincinnati, taking lathes and drilling machines, among other tools.

In the East the Pennsylvania and the Baltimore & Ohio have purchased or opened bids on a few machines.

The general industrial demand is good everywhere. In Detroit it is expected that machine-tool prices will advance, and sellers are urging their customers to act quickly. From elsewhere it is reported that electric motors and control devices have each been advanced 10 per cent. Lathe prices have been advanced in Chicago. Deliveries are worse in Detroit, and this probably accounts for a slight falling off in the volume of business in that city.

In Cleveland buyers are anticipating their needs, some having contracted for deliveries 14 months ahead. Following a period of comparative quiet, the Cleveland trade is again working under a fairly heavy demand. Milwaukee reports no let-up in the active scattered business, so strong of late.

The Pacific coast continues prosperous. The demand in San Francisco is active enough to keep merchants' stocks depleted. In the Pacific Northwest new shipbuilding plants are nearing completion and others are projected.

New York

New York [illegible]

Inquiry from scattered sources for [illegible] continues to come out at a lively [illegible] the more expensive tools buyers are rather slow in closing, and with the makers of these machines [illegible] it was last month. Deliveries [illegible] to improve. Some makes of [illegible] likely to be very scarce again.

The Baltimore & Ohio Railroad has purchased two [illegible] lar machines (turret) for its shops at [illegible] Md., and the Pennsylvania Railroad [illegible] for one 2-in. turret lathe and one 3-in. turret lathe for its Trenton shops, evidence that the railroads are [illegible] interested in machine tools. The Oxweld-Acetyl[illegible] has purchased eight hand screw machines.

The F. H. Lovell Company, Arlington, N. J., ha[illegible] several tools, including a few engine lath[illegible] machines.

The machine-tool trade is being reminded that freight conditions are as likely to be as bad this winter as they were last. The Pennsylvania Railroad has embargoed certain export shipments and a shipper was informed last week that the New York Central had placed an embargo on export shipments that originate at points east of Chicago.

Electric motors have been advanced 10 per cent in price, and a maker of electrical control devices announces a similar advance.

The Steel Equipment Corporation, Avenel, N. J., has taken over the Fireproof Furniture & Construction Company of Miamisburg, Ohio, maker of steel office equipment. This follows the taking over of the U. S. Steel Furniture Company of Syracuse, N. Y., by the Fireproof Furniture Construction Company. The Steel Equipment Corporation will have a capitalization of $700,000 and outstanding bonds to the amount of $74,000. It is now erecting at Avenel at a cost of $500,000 a factory exclusively for the manufacture of steel furniture. The plant at Miamisburg, Ohio, has already been moved to Avenel, and the work of the Syracuse factory will also be transferred there soon. The officers of the new corporation have been for the most part identified in similar capacities with the Fireproof Furniture & Construction Company. They are M. Taylor Pyne, Jr., president; W. I. Seaman, vice-president; H. D. Tucker, treasurer and general manager, and A. E. Pattison, secretary. The directors are Messrs. Pyne, Seaman, Pattison, James S. Rogers, Thomas D. Wood, Levi Chapman, and John J. Flynn.

Feist & Feist, Inc., 738 Broad Street, Newark, N. J., have sold to the Talbot Engine Company, 120 Liberty Street, New York, two buildings of the old Lozier motor plant at Plattsburgh, N. Y., together with a plot of land covering 3 acres. One building is 60 x 300 ft. and the other 50 x 200 ft. A siding from the Delaware & Hudson Railroad enters the property. The company will use the buildings for the manufacture of marine boilers and engines.

The Mutual Electric Company, 122 Water Street, New York, is in the market for power presses from 5000 to 20,000 lb. in weight; also for planing machines, shaping machines, and lathes.

The Universal Ice Mfg. Company, 391 East 149th Street, New York, is receiving bids for ice-making equipment and for the construction of its proposed plant on a site 80 x 133 ft.

The Buffalo Foundry & Machine Company, Buffalo, is having plans prepared for a three-story pattern shop and storage building, 53 x 243 ft., estimated to cost $50,000.

The new plant of the United States Alloys Company on the River Road, Buffalo, contract for construction of which has been let to the Lackawanna Bridge Company, Buffalo, will consist of four buildings, 55 x 135 ft., 40 x 90 ft., 32 x 90 ft., and 32 x 62 ft., respectively.

The Pierce-Arrow Motor Car & Truck Corporation, Buffalo, has been incorporated with a capital stock of $11,250,000 and has taken over and will operate the plant of the Pierce-Arrow Motor Car Company, at Elmwood Avenue and the New York Central Railroad Belt Line in that city, for the manufacture of automobiles and motor trucks. The directors of the new corporation are Arthur P. Bush, Garden City, L. I., N. Y.; Basil B. Elmer, Leonard D. Adkins, Rufus J. Trimble, Edward S. Hemphill, and Vivian C. Ross of New York City; Richard Lukeman and Joseph H. Snyder, Brooklyn; Charles Clifton, Henry May, and Joseph G. Dudley, Buffalo. Charles Clifton is president and Henry May vice-president.

The factory to be erected at New Rochelle, N. Y., by the [illegible], New York, will be 100 x 200 ft., six stories. F. F. Manville is president.

The Bayer Chemical Company, Rensselaer, N. Y., has let [illegible] for erection of a boiler house, 50 x 75 ft., one story.

[illegible]rs, N. Y., has authorized the installation of a pump [illegible],000 gal. per day capacity in the tube well station, [illegible] station. Elward L. Peene is superintendent.

The Rome Brass & Copper Company, Rome, N. Y., will build a casting shop, 100 x 200 ft., one story, from private plans.

The cement plant to be erected at Phelps, N. Y., by the Bennett Corporation, Syracuse, N. Y., will comprise a two-story building, 120 x 120 ft., a one-story building, 100 x 150 ft., and a power house. Plans are being drawn. The total cost is estimated at $1,250,000. The Kennedy Engineering

Company, 120 Broadway, New York, is the architect and engineer.

Oswego, N. Y., has plans practically completed for its proposed hydroelectric plant to be constructed at Oswego River dam No. 6, the estimated cost of which is $600,000. The initial building will be 50 x 120 ft., one story. John A. Bensel, 111 Broadway, New York, is consulting engineer.

The Newark Rivet Works, 268 Lafayette Street, Newark, N. J., manufacturer of umbrella hardware, will build a one and two-story brick addition, 68 x 78 ft., to cost $11,000.

The Valley Forge Cutlery Company, Newark, N. J., manufacturer of pocket knives, will build an addition to its plant on South Sixth Street, to cost about $3,500.

The Standard Stove & Light Company, Newark, N. J., has been incorporated with a capital stock of $200,000 to manufacture hydro-carbon burners and kindred specialties. Thomas B. Ferguson, James L. Goodwin and John S. Sheldon are the incorporators.

Cyrus Currier & Sons, Newark, N. J., manufacturers of machinery, will build a new one-story foundry at 190 Commerce Street to cost about $2,000.

Fire Dec. 8 destroyed part of the wire nail manufacturing plant of Igoe Brothers, Avenue A and Poinier Street, Newark, N. J., with loss estimated at $15,000.

The Jewel Lamp Company, Newark, N. J., has been incorporated with a capital stock of $125,000 to manufacture lamps. Joseph J. Steinharter, Joseph and Samuel E. Hollander are the incorporators.

The Witteman Aircraft Company, Stapleton, Staten Island, N. Y., manufacturer of aeroplanes, etc., has acquired 8 acres of land on Meadow Street, Newark, N. J., as a site for a new plant. The present two-story building on the property, about 65 x 200 ft., will be utilized to commence operations. Charles R. Witteman is president and L. C. Lewis is vice-president.

The Egyptian Lacquer Mfg. Company, Rahway, N. J., has acquired a tract of land, about 670 x 850 ft., on Passaic Avenue, Kearny meadows, Newark, N. J., as a site for a new plant to replace its factory recently destroyed by fire. The proposed plant will comprise 6 buildings, 3 of which will be erected at once at a cost of $100,000. The Turner Construction Company, 11 Broadway, New York, has the contract for erection.

The New Jersey Tube Company, Harrison, N. J., manufacturer of sheet brass and brass tubing, will build a one-story addition to its plant, 120 x 280 ft., on Kingsland Avenue.

The Perth Amboy Cornice & Skylight Works, Perth Amboy, N. J., has been incorporated with a capital stock of $100,000 by Samuel and Joseph Diamond, Perth Amboy, and Victor Diamond, Philadelphia.

The Babcock & Wilcox Company, Bayonne, N. J., manufacturer of watertube boilers, will build an addition to its plant at Lexington Avenue and Third Street, to cost about $100,000. A portion of the new structure will be used as a drum shop.

The Bayonne Casting Company, Bayonne, N. J., manufacturer of monel metal, bronze and steel castings, etc., has awarded a contract for improvements in its plant to cost about $4,500.

The Hudson Consumers Ice Company, Hoboken, N. J., has broken ground for an ice-manufacturing plant at Monroe and Thirteenth streets, to cost about $300,000. Anthony J. Volk is president.

The Wilson Wire Works, 100 Devon Terrace, Kearny, N. J., has been incorporated with a capital of $10,000 to take over and operate the wire and metal manufacturing plant heretofore carried on in this name. John J. Wilson 414 Chestnut Street, Arlington, and John W. Gleason, 417 John Street, East Newark, are the principal incorporators.

The Air Reduction Company of New Jersey, Jersey City, N. J., has been incorporated with a capital stock of $150,000 to manufacture oxygen and kindred specialties. C. H. Jarvis, Philip L. Nieser and J. R. Turner are the incorporators.

Thomas A. Edison, Inc., Belmont Avenue, Bloomfield, N. J., will build a one-story addition to its storage battery manufacturing plant to cost about $8,000.

The Belleville Copper Rolling Mills, Belleville, N. J., manufacturer of copper sheets, bars, etc., will build a one-story addition to its plant.

G. D. Miller, H. T. Corce and J. L. Fox, Dumont, N. J., have incorporated in New York the High Speed Tool Corporation with a capital of $1,000,000 to manufacture high-speed tools, etc.

New England

BOSTON, MASS., Dec. 11, 1916.

[redacted], former president of the American Zinc, [redacted] president of the National [redacted] of New York, [redacted] former president of the American Zinc, [redacted] has been elected chairman of the [redacted] Mr. Kemp has been made president, succeeding Mayo. Hayden [redacted] W. S. Hawley, formerly president of the Lorain Car Company, has become associated with the company as treasurer.

The Mayo Rubber Company, New Haven, Conn., will be completed [redacted] month by James E. Wheeler, appointed temporary receiver by the Superior Court. An effort to depose Virginius J. Mayo as president by action of the board of directors brought about the temporary receivership. James Duncan Livingston has been elected president by the directors and E. B. Shoemaker has been chosen vice-president and general manager. A hearing set for Jan. 5 will determine if the receivership shall be made permanent.

The Hendee Mfg. Company, motorcycle manufacturer, Springfield, Mass., will have a special stockholders' meeting, Dec. 15, to vote upon the sale of the company's East Springfield plant, its realty now occupied by the Harley Company, and the stock of the Harley Company, which it owns. The plan is to consolidate all the manufacturing activities of the company at the Winchester Square plant, including the drop forging, which has been done by the Harley Company. The East Springfield factory is a building of modern construction and contains 3½ acres of floor space.

The Beach Mfg. Company, New Haven, Conn., has been organized, with William J. Beach, president; Howard E. Adt, vice-president, and Thomas M. Steele, secretary and treasurer. Its authorized capital stock is $50,000, not $500,000, as was erroneously reported in THE IRON AGE of Nov. 23.

The H. G. Thompson & Sons Company, New Haven, Conn., has bought a site for a new plant at Chapel and Mill River streets and Saltonstall Avenue.

The Commonwealth Screw Company, Worcester, Mass., has been incorporated with capital stock of $50,000. The directors are Iver Johnson, president; Frederick W. Lodding, 7 West Lake Street, Worcester, treasurer, and George M. Faulkner.

Landers, Frary & Clark, New Britain, Conn., have awarded a contract for a factory, 38 x 238 ft., two stories.

E. E. Bussey, Inc., operating a general foundry and machine shop, Boston, Mass., has been incorporated with a capital stock of $1,000. C. A. Bussey is president; Everett E. Bussey, Malden, treasurer, and J. N. Johnson.

The Waterbury Farrel Foundry & Machine Company, Waterbury, Conn., has awarded a contract for an addition, 34 x 74 ft.

The Forkas Company, Providence, R. I., has been incorporated with capital stock of $10,000 to manufacture machinery by Karl Forkas, Henry C. Hart, and Patrick P. Curran.

The Weco Mfg. Company, Boston, Mass., has been incorporated with capital stock of $50,000 to manufacture electrical, gas, and oil heating appliances. The directors are Hans R. Boker, president; Harry B. Eaton, Waban, treasurer, and J. Leo Hickey.

The United States Steamship Company, New York, has selected Hamilton & Chambers, New York, it is reported, as engineers to design its new shipbuilding plant at Groton, Conn.

The Warren Brothers Company, Cambridge, Mass., is to build a machine shop, 41 x 170 ft., one story.

The Superior Mfg. Company, Bridgeport, Conn., has been organized with Edward L. Hyde president, Daniel J. Sullivan, treasurer, and Bessie M. Hyde, secretary.

The Metz Company, Waltham, Mass., has awarded a contract for an addition, 40 x 80 ft., one story.

The Hyde Windlass Company, Bath, Me., has awarded contract for a machine shop, 80 x 100 ft., one and two stories, and an office building, 55 x 60 ft., two stories.

The recent announcement that the General Mfg. Company, Waterbury, Conn., has awarded contract for a four-story factory is [redacted] The building will be 40 x 98 ft. and 25 x 60 ft., [redacted] being erected by the American Fastener Company, which at present occupies buildings belonging to the General Mfg. Company.

The Becker Milling Machine Company, Boston, Mass., incorporated last week for $2,250,000, has elected Robert F. Herrick president and Joseph W. Lund, Hyde Park, treasurer.

The Boston Cost Recorder Company, Boston, Mass., has been incorporated with capital stock of $50,000. The directors are Charles E. Russell, president; Robert E. Walmsley, Hyde Park, treasurer, and Albert Stonestreet.

The Taunton Copper Company, West Water Street, Taunton, Mass., is building an addition, 24 x [illegible] ft., one-story

The Chase Metal Works, Thomaston Avenue, Waterbury, Conn., has been granted a permit to erect additions, 60 x 100 ft. and 20 x 140 ft.

The Stanley Works, New Britain, Conn., having secured a controlling interest in the Farmington River Power Company, has begun the building of a transmission line, 23 miles long, from the power plant at Poquonnock, Conn., and will use the entire output of the power station.

The Bancroft Razor Company, Worcester, Mass., has been incorporated with capital stock of $10,000. The directors are Charles A. Hamilton, president; C. Gustaf A. Hammarberg, Worcester, treasurer, and George P. Hughes.

Philadelphia

PHILADELPHIA, Pa., Dec. 11, 1916.

The American Metal Works, Armat and Heiskel streets, Philadelphia, has purchased a site of about [illegible] on the Reading Railroad, near Wayne Junction. It has a frontage of 553 ft. on Stenton Avenue. The company will erect a factory on part of the plot at an estimated cost of $100,000, and will sell the remainder to other manufacturers.

The International Fabricating Corporation, Wilkes-Barre, Pa., is in the market for new or second-hand plain, internal or universal grinding machines for tool work only and equivalent to Brown & Sharpe type Nos. 11, 1, and 2. Morse, Brown & Sharpe, Pratt & Whitney, or Heald machines preferred.

The Camden Iron Works, Camden, N. J., has had plans drawn for a one-story erecting shop, 50 x 78 ft., to cost about $15,000.

Horn & Devling, contractors for hardware, plumbing, heating, and building, Galeton, Pa., are erecting a five-story reinforced concrete plant, 55 x 75 ft., to replace a former one destroyed by fire.

Herman L. Winterer, 908 Beach street, Philadelphia, will purchase a 15-ton hand or electric crane of 30-ft. span.

The Pennsylvania Tubing Company, Philadelphia, has awarded a contract for the erection of a one-story brick addition, 44 x 92 ft., at Seventy-third Street and Powers Lane.

The Weidermann Machine Company, Philadelphia, will build a new one-story brick machine shop at Sedgley Avenue and Gratz Street.

F. R. Hansell, Philadelphia, and associates, have incorporated in Delaware the Cosmic Metal Company, with a capital of $500,000 to manufacture bearing metals. George H. B. Martin and S. C. Seymour, Camden, N. J., are active in the company.

J. Durbin Nevius, Milo D. Baldy and Henry F. Sanville, Philadelphia, have incorporated in Delaware the Spring City Steel Company, with a capital stock of $350,000 to manufacture steel and malleable castings.

The Northeastern Mfg. Company, Bordentown, N. J., will establish a plant in the Martin Garage Building for the manufacture of incubators and brooders. John F. McKay is president.

Ernest H. Fairbanks, Merchantville, N. J., and associates, have incorporated in Delaware the Haag Cabinet Company, with a capital of $100,000 to manufacture talking machines. Frank P. Slocomb, Philadelphia, and Alfred H. Haag, Newport News, Va., are also incorporators.

The American Hollow Tile Company, Hightstown, N. J., recently organized, has acquired the brick yards of B. H. Reed & Brothers, and will establish a plant for the manufacture of hollow tile, brick and similar specialties. An addition will be erected to the present factory, to include the installation of new conveying equipment. Robert W. and William J. Lyle, New Brunswick, are promoting the company.

The Federal Automobile & Supply Company, Camden, N. J., has been incorporated with a capital of $100,000 to manufacture motor vehicles and equipment. Charles M. Reeves, Camden; William A. Walton, Oxford; and Thomas R. Roberts, Philadelphia, are the incorporators.

The Philadelphia & Reading Railroad will build an addition to its foundry at Pottstown, Pa., to cost about $15,000. William H. Wiand, Pottstown, has the contract.

Fire Dec. 4 destroyed the wheelwright shop of William Rockhill, Tullytown, Pa., with loss of about $8,000.

The Homer City Coal Company, Homer City, Pa., will bulid a plant for the manufacture of mine cars for company use. Offices are maintained in the Stephen Girard Building, Philadelphia.

Baltimore

BALTIMORE, MD., Dec. 11, 1916.

The Monumental Heel Company, 2401 West Baltimore street, Baltimore, manufacturer of rubber heels and soles, of which Joseph T. Mahon is general manager, is considering the construction of a plant

The C. E. Hosbach Company, 808 East Fayette Street, Baltimore, manufacturer of automobile tops and wagons, will build a one-story machine shop, 34 x 69 ft., to cost about $1,500.

The Alexander Milburn Company, 1420 to 1426 West Baltimore Street, Baltimore, acetylene light contractor and welder, has increased its capital stock from $200,000 to $227,500.

The Weis Safe & Lock Company, 224 West Pratt Street, Baltimore, has been incorporated with $25,000 capital stock to manufacture safes, filing cabinets, etc. The incorporators are Anthony and Mary E. Aub and John M. Bellamy.

The Baltimore Tube Company, Wicomico and Ostend streets, Baltimore, will build a one-story office building.

Plans are being made to rebuild the roundhouse, blacksmith shop, boiler house and tin shop of the Norfolk & Western Railway, Shenandoah, Va., recently damaged by fire.

The Piedmont Motor Company, Lynchburg, Va., is planning the construction of an automobile assembling plant.

About $30,000 will be spent to improve the municipal electric light plant at Franklin, Va.

Chicago

CHICAGO, ILL., Dec. 11, 1916.

The market is featured by the long delayed but now voluminous railroad inquiry for shop equipment. The list issued by the Chicago, Burlington & Quincy for closing Dec. 24 covers the full range of tools for its new West Burlington shops, a list of some seventy-five machines, together with auxiliary equipment and motor drives. The same road has another list in preparation for a smaller shop which will be sent out shortly. The Chicago, Minneapolis, St. Paul & Omaha division of the Chicago & Northwestern has sent out from St. Paul a list of about fifty tools of the types suitable to car building shops, on which it is asking prices. The Rock Island and Santa Fé railroads are also buying a number of machines. Added to this is a large list closing Dec. 15 for the new small arms plant of the Rock Island Arsenal, requirements embracing a general equipment of some fifty machines, including turret and standard lathes and milling, drilling and shaping machines. The general industrial demand continues abnormally heavy and sales of tools in lots of two and three machines up to $10,000 and $15,000 equipments are of regular and daily occurrence. An inquiry is in this market for 200 shell-turning lathes. Some of the lathe manufacturers have again advanced prices. Deliveries are generally unimproved, though turret lathes appear to be available more promptly.

H. C. Williamson, manufacturer of metal band sawing machines, 1840 West Lake Street, Chicago, will equip his new shop for general machine and tool work as well.

Plans for a two-story garage and machine shop, 60 x 150 ft., are being prepared by A. G. Burtar, 3958 West Madison Street, Chicago.

The Wahl Adding Machine Company, 232 East Ohio Street, Chicago, is building a three-story factory to cost $95,000.

Arnold Schwinn & Co., 1718 North Kildare Avenue, Chicago, manufacturers of bicycles, will build a one-story factory, 95 x 134 ft., to cost $15,000.

The Octigan Drop Forge Company, Twenty-fifth Street and Lowe Avenue, Chicago, advises that the plans for its new shops provide for a forge plant with capacity of thirty drop hammers, machine shops and auxiliary departments, the whole to cover approximately 4 acres.

The Chicago Flexible Shaft Company, Chicago, has been under the necessity of temporarily renting floor space outside of its present factory to take care of the exceptional growth of its business in gasoline engines and gas blast furnaces until the new factory space becomes available about March 15. The new building will be one story, of sawtooth roof and mill type construction, with a floor space of about [illegible],000 sq. ft.

The Hanna Engineering Works, Chicago, which some months ago sold its property to the Erie Railroad, has purchased the Gates Iron Works plant of the Allis-Chalmers Mfg. Company at Chicago and will occupy it about April 1.

The W. F. Hall Printing Company, Chicago, has acquired [illegible] building at Superior and Kingsbury streets and will erect an addition to cost about $750,000.

The Venn Severing Machine Company, 1317 West North

Avenue, Chicago, will build a one-story brick addition to its shop to cost $2,000.

The Riverside Foundry & Machine Works, Chicago, will build a machine shop, 42 x 132 ft., to cost $12,000. Hornbeck & Bacon, 562 East Sixty-third Street, are the architects.

Chatten & Hammond, architects, 64 East Van Buren Street, Chicago, have completed plans for the four-story factory building, 100 x 140 ft., for the Excelsior Steel Furnace Company, to cost $100,000.

The Strandberg Motor Service Company, Chicago, will erect a six-story concrete factory building at 58 East Twenty-fifth Street, to cost $65,000.

E. R. Klein, 1413 Austin Avenue, Chicago, has had plans prepared for a two-story machine shop, 24 x 156 ft., to cost $15,000.

The Wilson Stove & Mfg. Company, Valley Park, Mo., will erect a one-story factory, 72 x 80 ft., at Metropolis, Ill. Gustave P. Wuest, St. Louis, is the architect.

The Vermillion Malleable Iron Company, Hoopeston, Ill., will build a one-story addition to its foundry, 40 x 56 ft., and an addition to its pattern shop, 40 x 56 ft.

The Champion Motor Company will establish a factory at Fulton, Ill., for the manufacture of light delivery trucks.

The Baker Mfg. Company, Springfield, Ill., which is adding 50 per cent to its floor space with an addition to its factory, has purchased most of the new machinery to be required, except one drill press. M. W. Baker of this company, together with J. G. Miller, secretary, is also equipping a gray-iron foundry at Springfield, to be known as the B. & M. foundry.

The Gardner Governor Company, Quincy, Ill., advises that it has purchased a 10-ton Pawling & Harnischfeger crane to be installed in its new factory building, which has a floor space of about $24,000 sq. ft.

Webster City, Iowa, will install a new [illegible] boiler and stokers.

The Western Mfg. Company, Oskaloosa, Iowa, maker of concrete mixers, valves, etc., has plans for the enlargement and improvement of its plant.

The Northern Pacific Railroad has plans for new shops to be built at Mandan, N. D., to cost $1,500,000.

The Fourteen Patent Company, Terrace Building, Duluth, Minn., advises that it contemplates an expenditure of $18,000 for a new factory and that it is in the market for turret lathes and other brass-working tools to the amount of $10,000. The equipment will also include air chucks on the turret lathes and the necessary compressor and storage tank equipment for the pneumatic system.

The Winnipeg Machine Exchange, Sutherland and Gladstone streets, Winnipeg, Manitoba, is in the market for a boring mill with a 10 to 12 in. table.

Detroit

DETROIT, MICH., Dec. 11, 1916.

Machine tool dealers are urging customers to immediately [illegible] machinery as a general rise in prices is anticipated. Business in this district is good, although a slight falling off is noticed due to the lack of large orders. Deliveries have become worse instead of better, and the 3 to 6 months delivery has been lengthened on some kinds of tools.

The Hind Sons Company, jobber of hardware, iron and steel, tools, mine, factory and railroad supplies, will shortly begin the erection of three large buildings at the foot of Antoine and Wight streets to care for increased business. The buildings will cost several hundred thousand dollars. The main building will be 80 x 102 ft., of reinforced concrete construction, equipped with a motor-driven [illegible].

The Evans Truck Mfg. Company, Detroit, has been incorporated for $10,000 by Robert H. Evans, 962 Bush Street, William M. Dowling and Alva Patterson.

The Universal Tool Company, Detroit, has been incorporated for $20,000 by Robert E. Roseberry, Keatley Green and Thomas A. E. Weadock, 811 Hammond Building, Detroit.

The J. E. Bolles Iron & Wire Works, Detroit, has awarded the contract for a new factory building, 170 x 260 ft., which will double its capacity. One of the largest brakes ever made for forming and bending sheet steel is now being manufactured by the Scully Steel & Iron Company for this plant.

The Republic Motor Truck Company has purchased the plant of the Little Giant Hay Press Company at Alma, Mich., and will use it for an axle plant.

James Bates, Wayne, Mich., has purchased property at Ypsilanti where he will erect a plant for the manufacture of die casting machines.

The Buss Machine Works, Holland, Mich., has increased its capital stock from $25,000 to $100,000.

Cleveland

CLEVELAND, OHIO, Dec. 11, 1916.

[illegible] equipment for a new manufacturing plant. The demand for [illegible] continues large.

The Steel Car Company, Cleveland, recently incorporated with a capital [illegible], has acquired a site of 40 acres along the Nickel Plate Railroad, east of Cleveland, and has contracted for the erection of [illegible], the first expected to be 60 x 200 ft. P. J. Jones, president of the Lorain Car & Mfg. Company, Chicago, is president; J. F. Farrell, vice-president and N. J. Clark, secretary of the Upson Nut Company, Cleveland, treasurer. The company will repair wood and steel cars.

The United Foundry & Machine Company, Ravenna, Ohio, is erecting the first unit of [illegible], including 50 x 200 ft., to be used for making castings weighing up to 5000 lb. When completed a second unit to manufacture chilled and sand rolls and heavy castings will be built. This will have a roll turning shop and, it is stated, a machine shop will be built later for the manufacture of roll-mill machinery. W. H. Blecker, Canton, Ohio, heads the enterprise.

The Premier Mfg. Company, Ravenna, has been organized to manufacture lock washers and will occupy the plant formerly used by the Cleveland Chain Company. W. E. R. Dowd and C. H. Judkins are active in the company.

The Kauffman Mfg. Company, Bellefontaine, Ohio, has been organized to make automobile accessories and will occupy one of the buildings of the Humphrey Pipe & Foundry Company. J. G. Morris is president, J. S. Kauffman, vice-president and general manager, and C. M. Johnson, secretary.

The Ladel Mfg. Company, New Philadelphia, Ohio, recently incorporated with a capital stock of $5,000 to build a foundry and machine shop, has elected Fred F. Heil, president, Ivor Harris, vice-president and E. C. Brewer, secretary, treasurer and manager.

The American Bow Socket Company, Ashtabula, Ohio, is enlarging its forge department by the erection of a building, 40 x 60 ft.

The Gilliam Mfg. Company, Canton, Ohio, which recently purchased the John Danner Mfg. Company's plant in Canton, has increased its capital stock from $[illegible] to $[illegible] and will build a one-story shop extension, 125 x 210 ft., for the manufacture of automobile parts.

The Canton Electric Company, Canton, will build a two-story repair shop and garage.

The McIntyre Motor Company, Toledo, Ohio, has been formed and will have a capital stock of $[illegible] to manufacture a new type of motor. W. H. McIntyre and others are active in the company.

The Portage Iron & Wire Company, Akron, Ohio, has been incorporated with a capital stock of $50,000. Emil Vogebeer, H. A. Herman, William Hoffman, and others, are interested.

Indianapolis

INDIANAPOLIS, IND., Dec. 11, 1916.

The Ott Grinder Company, Indianapolis, has been incorporated with a capital stock of $[illegible] to manufacture grinders. The incorporators are Albert J. Ott, Conrad L. Ott and Samuel Dowden. The company will move its plant from Chicago to Indianapolis. It manufactures grinders for finishing shells, [illegible].

The Burdsall Motor Company, Indianapolis, has been incorporated with $[illegible] capital stock to manufacture motor cars. The directors are Alexander and L. Burdsall and Noble H. Weir.

The Standard Company, Indianapolis, has leased a plant at Connersville, Ind., to the Standard Motor Corporation, Detroit, which will [illegible].

The B. & M. Truck Company, Indianapolis, has been incorporated with $[illegible] capital stock to manufacture motor vehicles. The directors are Alfred H. McFlarian, Burton M. Barrows and Arthur Dixon.

The Battery Service Company, Lafayette, Ind., has been incorporated with $5,000 capital stock to manufacture automobile batteries. Lafayette Jamison, Herbert H. Johnson and Franklin E. Hall are the directors.

The Meloy-Hert Mfg. Company, Shelbyville, Ind., has been

incorporated with $10,000 capital stock to manufacture furniture and wooden novelties. The directors are John F. and Carl K. Meloy and Anthony F. Hert.

The U. S. Slicing Machine Company, Laporte, Ind., has been incorporated with $1,000,000 capital stock to manufacture meat-slicing machines. The directors are J. C. Woodington, E. E. Gore and B. F. Irving.

The Enterprise Seed Cleaning Machine Company, Newcastle, Ind., has been incorporated with $10,000 capital stock by Orland C. Hatfield, Thomas J. Hatfield and Fred P. Davis.

The Wasmuth-Endicott Company, Andrews, Ind., manufacturer of kitchen cabinets and novelties, has increased its capital stock from $60,000 to $110,000.

The Chesapeake & Ohio Railway Company will immediately rebuild its car repair shops at Peru, Ind., recently destroyed by fire.

The National Spring Company, Newcastle, Ind., has increased its capital stock from $25,000 to $50,000.

The Standard Wheel Works, Terre Haute, Ind., has plans for a one-story foundry, with annealing ovens, 60 x 140 ft., and 60 x 180 ft.

The Farmers Utility Company, Evansville, Ind., has been organized by William J. Schuler, H. C. Weber and Hayward Flickner. It has a capital stock of $50,000 and will manufacture farm machinery.

Cincinnati

CINCINNATI, OHIO, Dec. 11, 1916.

Eastern railroads have lately been buying machine tools in this vicinity. Contrary to the general rule, no complete lists were sent broadcast, but negotiations were quietly conducted with manufacturers for the particular kind of machines on which they specialized. The Pennsylvania Lines East bought a considerable number of lathes and drilling machines, and also some milling machines. It is reported that the Western railroads have some inquiries out. Concerning export business, France is now the best customer for machine tools, although both Canada and Russia are still calling for lathes. Shipments to the latter country now consume so much time en route that business is slow in closing. Automobile and auto truck manufacturers are buying steadily, but not at the same rate as at this time last year. Jobbing foundries, which cater to the machine-tool trade, were never as busy as at the present time. Makers of electrical equipment report business excellent, with the majority of orders coming from domestic customers.

The Corcoran Mfg. Company, Cincinnati, recently incorporated, has purchased a site at Winton Place on which it intends to erect a building to manufacture automobile bodies. Preliminary plans are for a factory, 75 x 470 ft., four stories. The company also expects to increase its present plant for the manufacture of automobile specialties.

The Main Auto Machine Company, Cincinnati, will construct a two-story storage addition to its plant on Reading Road, and will add to its repair shop equipment.

The new plant of the Pfau Mfg. Company, Norwood, Cincinnati, manufacturer of plumbing supplies, will be 60 x 344 ft., four stories, of mill construction. Equipment details have not been given out.

The Charles Boldt Glass Company, Cincinnati, has let contract to the Ferro-Concrete Construction Company, Cincinnati, for a paper mill and box factory to be erected in East End.

The Central Foundry Company, Hamilton, Ohio, suffered a fire loss Dec. 6, estimated at $10,000. Rebuilding plans are under way.

The Maxfer Auto Truck Sales Company, Dayton, Ohio, has been incorporated with $10,000 capital stock by George H. Connelley and others. A repair and paint shop will be operated in connection with the storage rooms.

The John-Starr Company, Springfield, Ohio, will soon be incorporated by H. H. Starr and others to manufacture a hardware specialty. It is reported that its work will be done under contract for the present, and no equipment will be needed.

The Ramey Company, Chillicothe, Ohio, maker of [illegible] vacuum cleaners, is preparing to remove its plant to Columbus, Ohio, and will double its capacity.

The Phelps Mfg. Company, Colum[illegible] bile wire wheels, has increased its capital stock from $100,000 to $400,000 and will carry out [illegible] plans for enlarging its plant.

The Columbus Hoop Company, Columbus, recently suffered a fire loss estimated at $7,500. It will [illegible] portion.

The Jones Heel Company, Dayton, [illegible] sidering the erection of a plant at Columbus. No confirmation of this has been obtained.

The Buckeye Iron & Brass Works Company, Dayton, Ohio, manufacturer of oil mill machinery, is contemplating the erection of a plant in Edgemont, a suburb.

Milwaukee

MILWAUKEE, WIS., Dec. 11, 1916.

No let-up in the demand for machine tools has been noted in the Milwaukee district in the first 10 days of December, although in some quarters it was felt that this condition might be expected at this time. Inasmuch as bookings are for delivery a long time forward, the seasonable aspect of tool demand has disappeared almost entirely and buyiug is well maintained. Requirements continue to be for one or two machines, with here and there a half dozen, to be delivered not much earlier than July 1. The car shortage is causing some inconvenience in making deliveries eastward and has aroused complaints from buyers who feel that they have already been obliged to wait long enough for deliveries because of the sold-up condition of shops, without suffering further delay on account of car shortage. General industrial activity continues at a high level. With the exception of strike troubles in the foundry trade at Racine, Wis. industry is singularly free from labor difficulties, although the shortage of skilled men is still acute in all metal-working lines.

M. P. Winther, Kenosha, Wis., who recently announced plans for establishing a large motor truck works at that point, has organized two companies, as follows: The Winther Motor Truck Company, capital stock $300,000, and the Winther Securities Company, Kenosha, capital stock $50,000. The incorporators are identical and include M. P. Winther, William Martinson and W. M. Burke.

The Electric Tool & Appliance Company, Milwaukee, organized with a capital stock of $20,000 by Oscar Werwath and William Baum, Stroh Building, will lease temporary quarters for the manufacture of patent box cutters and scientific laboratory apparatus, pending the erection of its own plant some time in 1917. Mr. Werwath is president and Mr. Baum is secretary and treasurer.

Joseph Sairs, Beloit, Wis., is having plans prepared for a two-story factory and warehouse, 50 x 160 ft., for the manufacture of brake linings and other automobile specialties. It will be erected in the spring.

The Continental Motor Truck Company, Superior, Wis., has completed work on its new factory and machine shop and is now erecting and equipping a power house. J. C. Barnsdale, 618 Tower Avenue, is general manager.

The American Grinder Mfg. Company, 2203 Sycamore Street, Milwaukee, has increased its capital stock from $25,000 to $100,000 to cover the larger demands for working capital resulting from rapid growth of its business. L. E. Barteno [illegible] secretary.

The Line Drive Tractor Company, organized recently in South Dakota with an authorized capital stock of $1,000,000, with Milwaukee capital holding the principal interest, will establish works in South Milwaukee, Wis., immediately after Jan. 1. I. W. Davis, superintendent of the Stowell Company, South Milwaukee, will be works manager. David E. Ross, of the Ross Tool & Gear Company, Lafayette, Ind., is to be chief consulting engineer. The initial annual production will be 1200 machines.

It is reported from Port Washington, Wis., that John Gilson, Jr., until recently holding a large interest in the Gilson Mfg. Company of that city, has purchased the South Side Foundry and will take possession Jan. 1.

The Vollrath Company, Sheboygan, Wis., maker of enameled ware and sanitary goods, has started work on razing its old foundry and the original enameling shop, to make room for important additions and extensions to be erected early next spring.

The A. Z. Metal Works, Thiensville, Wis., specializing in automobile and tractor radiators, lost its entire plant by fire. It is probable that a new factory will be erected.

The E. H. Karrer Company, 278 West Water Street, Milwaukee, manufacturing surgical supplies and instruments, will build a four-story fireproof factory and warehouse, 20 x 127 [illegible] 246 West Water Street. Plans will be prepared about Jan. 1.

Frank Hamacheck, Kewaunee, Wis., manufacturing farm [illegible] inery and cannery harvesting tools and equipment, has [illegible] eted work on a new assembling building, 71 x 121 ft., [illegible] l will increase his output.

[illegible] mpany, 217 West Water Street, Milwau[illegible] has increased its capital stock [illegible] preparation for extension of [illegible] Arthur L. Richards is president.

H. J. Chesick, South Milwaukee, Wis., is negotiating for

the purchase of the property of the Vesper Foundry & Machine Company, Vesper, Wis., which has been idle for some time. Mr. Chesick is trying to interest local capital to take a small interest as a condition of purchase.

The Central South

LOUISVILLE, KY., Dec., 11, 1916.

Although there has been a marked increase in the car supply for the last three weeks, recurrence of the shortage is an ever present apprehension with carriers and shippers in this section, and some disposition is found to curtail business accordingly. Coal operators are inclined to believe that January will see higher prices than have as yet been reached. Numerous fires are responsible for inquiries as to replacements for power and special machinery. Capacity operations continue the rule in the manufacturing plants of Louisville and orders insure continued good business. The farm implement companies, it is predicted, will shortly announce advances in price.

The Bader-Vonderhite Company, Louisville, will be incorporated by George D. Bader and others to establish an electric garage. A site has been purchased and a plant to cost $48,000 will be erected, General Electric equipment to be installed.

W. H. G. Herses, Louisville, Ky., and Charles Walls, Lebanon, Ky., have purchased the plant of the Campbellsville Public Utilities Company, Campbellsville, Ky., and will install one 100-hp. engine and one 25-hp. engine.

The Hull Pump & Tank Company, Owensboro, Ky., has increased its capital from $100,000 to $200,000. J. W McCulloch is president.

Armour & Co., Knoxville, Tenn., will remodel their plant at Knoxville and install refrigerating machinery at a cost of $9,000.

The Chattanooga Buggy & Auto Company, Chattanooga, Tenn., has been incorporated with capital stock of $3,500 by W. R. Beise, C. W. Beise, and others.

It is reported in Knoxville, Tenn., that the Southern Railway proposes extensive trackage, terminal, and possibly shop construction, in connection with acquisition by the company of 600 acres contiguous to its tracks east of the city.

The John G. Duncan Company, Knoxville, Tenn., is asking for prices on a new or second-hand squirrel-cage, three-phase 60-cycle, 220 volt induction motor of 900 r.p.m., a 125-hp. unit preferred, but can use one up to 150-hp.

The Illinois Central Railroad will build machine shops at Louisville, Ky., to cost $18,000.

St. Louis

ST. LOUIS, MO., Dec. 11, 1916

No decrease is apparent in the demand for machine tools. Deliveries continue the chief problem for consideration. Dealers have little or no difficulty in placing all equipment available, either for present or future delivery. A notable incident of the week was an auction sale of a large quantity of second-hand wood-working machinery of the best type, comprising the equipment of a big plant. It was disposed of at especially gratifying prices, in most cases approximating the original cost and in some cases at greater than cost. Threatened increases in second-hand machinery supplies have had no apparent effect upon the market. Plants are working up to capacity and are in need of equipment for replacement.

The Williams Boltless Rail Joint Company, incorporated in Arizona, will establish headquarters in St. Louis and utilize $50,000 of its capital in a plant.

An oil refinery to cost $1,000,000 equipped, is to be built at St Louis, Mo., by the Roxana Petroleum Company, subsidiary of the Royal Dutch Shell Company, and a 10-in. pipe line with necessary pumping equipment will be built from Cushing, Okla., to St. Louis.

The North American Oil & Refining Corporation, Kansas City, Mo., will equip an oil refinery near Sheffield, Mo., at an initial cost of about $100,000, and will then gradually triple the initial capacity.

Joplin, Mo., will expend about $175,000 to the equipment of an ice-making and an electrical power plant for the city.

R. M. Pearson, Little Rock, Ark., will erect a garage and machine shop, 50 x 140 ft. About $10,000 of machinery will be required.

The Williams Rotary Ditching Machine Company, Jonesboro, Ark., will have its devices manufactured under contract for the present. In the meantime it will proceed with the establishment of its proposed plant, estimated to cost $100,000.

The Pierce Oil Company, St. Louis, Mo., will equip a pipe line with pumping stations, etc., from the Healdton, Okla., [illegible] Fort Worth, Tex. About 25,000 bbl daily capacity is contemplated.

The Oklahoma Cotton Cleaner Company, Durant, Okla., has been incorporated with a capital stock of $20,000 by L. E. Lee, J. R. McKinney and W. F. Pendleton to manufacture cotton-cleaning apparatus.

The Solar Oil Heating Company, Muskogee, Okla., has been incorporated with a capital stock of $10,000 by John M. Coe, C. R. Teter and M. G. Young to manufacture heaters.

The Clinton & Oklahoma Western Railway, Clinton, Okla., W. S. Haid, general manager, will reconstruct its shops at Clinton, burned in November.

The Southwestern Power, Light & Railway Company, 406 Security Building, Oklahoma City, Okla., will expend about $1,000,000 [illegible] hydroelectric plants on the Washita River; about five are proposed with a total capacity of 75,000 hp. The ultimate investment will be about $3,000,000.

The United Iron Works, Okmulgee, Okla., will erect two additions to its plant, to be used for a machine shop and a boiler shop, at an approximate cost of $35,000.

W. H. Wilson, mayor, Independence, La., will receive bids on waterworks plant equipment. Crude oil engines, pumps, etc., are wanted.

E. L. Knight, Bogalusa, La., will equip a garage and machine shop to cost about $15,000.

Doullant & Williams, New Orleans, La., will add to its shipyard facilities, including a dry dock, with pumps, etc.

The Standard Gas Generator Company, New Orleans, La., will equip a plant. Louis A. Murphy is the engineer in charge.

The Richardson Aeroplane Corporation, New Orleans, La., recently organized with a capital of $500,000, will build a large plant in that city.

Birmingham

BIRMINGHAM, ALA., Dec. 11, 1916.

While the machinery business remains active there is more or less complaint of increasing inability of buyers to meet the rising prices. Various structural enterprises are being deferred for this reason. Inability to secure machine tools with any degree of promptness is also hindering construction. The Alabama graphite field continues to take a large amount of hydroelectric apparatus, the rapid development there partaking of the character of a gold fields rush.

The Semet-Solvay Company, Birmingham and Syracuse, N. Y., will spend $250,000 opening coal mines in Tuscaloosa County, Ala.

The American Box Company, Cleveland, Ohio, will build a box and shook plant at McDowell, Ala., investing about $50,000.

The American Pine & Cypress Company, Leland, Ohio, will establish a sawmill for pine and cypress lumber at Jacksonville, Fla.; daily capacity of 25,000 ft.

The Gress Mfg. Company, 18 Broadway, New York, will rebuild its lumber mill at Jacksonville, Fla., recently destroyed by fire with a loss estimated at $100,000.

The Montgomery Lumber & Mfg. Company, Montgomery, Ala., has purchased a large tract of timber and will manufacture pine and hardwood lumber

Texas

AUSTIN, TEX., Dec. 9, 1916.

R. F. Godwin has purchased the plant of the Wellington Light & Power Company at Wellington. Improvements will be made.

The Texas Power & Light Company, Dallas, which some time ago entered into a contract with the city of Denison, involving the construction of an electric power plant near by on the Red River, will apply for a three-year extension of its contract. The proposed plant is to cost about $600,000.

The City Council, Shiner, will install a crude oil engine, dynamo and other equipment in the municipal electric light plant.

The Pierce-Fordyce Oil Association plans to build an 8-in. oil pipe line from the Healdton field in Oklahoma to its refinery at Fort Worth, a cost approximately $1,000,000.

The Texas Brewing Company, Fort Worth, has plans for building an ice plant to be equipped with crushers, hoisting machines and conveyors sufficient to ice twelve refrigerating cars at one time.

San Francisco

SAN FRANCISCO, Cal., Dec. 7, 1916.

The machinery market continues quite active. Except for small lathes, machine tool deliveries are about as slow as ever, and the car situation causes further delay. While merchants are getting good-sized deliveries on old orders, most of the tools are spoken for and it is impossible to build up any stock. Buying is principally in small lots, though a few important inquiries are coming out. In miscellaneous lines, sugar mill equipment is of considerable importance. Mining and smelting companies continue to buy freely. Considerable expansion is contemplated by lumber interests, but the car shortage retards business. Irrigation and reclamation projects are producing considerable business and electrical equipment is moving well. Development in the oil fields is exceptionally active.

Bradley, Bruff & Labarthe, San Francisco, engineers, are taking figures on a list of tools for two shops of the Arizona-Hercules Copper Company, which includes large lathes, planing, shaping and milling machines, drill presses, two 1100-lb. steam hammers, etc.

Henry A. Hyde, 143 Second Street, agent for several Eastern lines of gas engines, is retiring, turning over the business to W. A. Eckberg.

The Fontana Power Company, Colton, Cal., has plans for a hydroelectric plant of 1800 kw. capacity.

The Southern Pacific Railroad has completed plans for shops and yards to be built in Visitacion Valley, at the south end of San Francisco.

H. W. Leach has had plans drawn for a machine shop at Broadway and Piedmont Avenue, Oakland.

The Santa Fé car shops and depot, at San Bernardino, Cal., were destroyed by fire Nov. 16 with an estimated loss of $225,000. The company has purchased additional land and will rebuild on a larger scale, adding a shop to handle refrigerator car repairs for its Pacific territory.

The Warman Steel Casting Company has had plans drawn for a plant at Los Angeles.

The Baker Iron Works, Los Angeles, will erect a machine shop at 927 North Broadway.

The Southern Pacific car shops at Sacramento, Cal., suffered a fire loss of about $50,000 Nov. 27.

The Pacific Northwest

SEATTLE, WASH., Dec. 7, 1916.

Unless the present car supply is greatly increased it is probable that the lumber and shingle mills will be forced to discontinue operating until the usual Christmas shutdown. While two or three exceptions exist, lack of cars for shipping lumber in Washington and Oregon has shown a substantial improvement in the past three weeks. The car shortage has not been able to offset the optimism prevailing over the great bulk of trade which it does not directly affect. Manufacturers state that they are swamped with work. Demand for mining equipment is unusually active. Many lumber plants are now under construction. This work calls for considerable mill equipment, including a fair amount of second-hand machinery.

The plant of the Washington Overseas Shipbuilding Construction Company, Aberdeen, Wash., is nearing completion and will lay the keel for the first vessel about Dec. 15. The company's headquarters are in Seattle, and it is stated that about $400,000 will be expended in rigging and outfitting the seven auxiliary-powered schooners which it has contracted to build. P. J. Donahoe is superintendent.

A dry sulphide paper pulp mill of 60 tons daily capacity will be constructed in Port Angeles, Wash., by Whalen Brothers, Vancouver, B. C. It will be the initial unit of a larger paper-making business to be established there. The company also plans the erection of a sawmill of 100,000 ft. daily capacity, to prepare timber for the pulp mill.

The Todd Shipbuilding & Dry Dock Corporation, of New York, which controls the Seattle Construction & Dry Dock Company, has announced through Tacoma stockholders that a shipbuilding plant will be erected in Tacoma. According to Chester Thorne, a Tacoma banker, the company has purchased 100 acres of land on the tideflats.

The plant of the Power-Wilson Company, Conrad, Mont., implement manufacturer, was destroyed by fire recently with a loss estimated at $80,000. Plans are under way for rebuilding on an enlarged scale.

The Albina Engine & Machine Works has announced that its proposed shipbuilding plant will comprise ten ways instead of two as previously planned. The extra ways are required by the closing of contracts for four 3 steamers. The machine shop of the plant will be 500 ft. long.

The Libby Water Works, Electric Light & Power Company, Libby, Mont., plans to install an auxiliary power plant, to be driven by a crude oil engine, at a cost of $10,000.

The American Nitrogen Products Company, Securities Building, Seattle, has started preliminary work on construction of the first unit of a nitrate plant at La Grande, Wash., which will cost $500,000. C. F. Graff is president and general manager, and E. L. Blaine is secretary. The company has recently closed contract with the city of Tacoma to furnish it electrical energy. The company had filed on a power site on the Sauk-Suiattle River, near Everett, Wash., but this site is held by the Seattle municipal power plant. The proposed plant will extract nitrates from the air and is to be completed within a year, although a portion will be operated in a few months.

The Pacific American Fisheries, Bellingham, Wash., plan the construction of two additional sea-going freighters, the keels to be laid shortly after Jan. 1. The company also plans the construction of a new three-line cannery at False Pass, Alaska, to cost $150,000.

The Erickson Shipbuilding Company, Seattle, Wash., has been organized with C. J. Erickson, president, and E. L. Grondahl, secretary. It will establish a cannery in Alaska, and will construct its own ships for service in Alaska.

The New Bay Park Lumber Company, North Bend, Ore., announces that it will immediately begin the construction of a shipbuilding plant in that city. It will have three ship ways.

Machinery valued at $65,000, en route to the Montana Power Company, Great Falls, where machinery to give 10,000 additional kw. is to be installed, was damaged by fire in the yards of the Butte, Anaconda & Pacific Railway in Butte recently. The power company, it is reported, will erect new equipment.

The Ever Ready Indoor Clothes Drier Company, Seattle, has been organized with $1,000 by E. C. Woodworth, D. J. Cooper and D. H. Deane and it is stated will establish a plant for the manufacture of a patented device.

The Seattle Construction & Dry Dock Company, Seattle, Wash., proposes to add to its machinery equipment and erect several buildings to provide facilities for work on the contract for building one of the four 3-knot light cruisers authorized by Congress.

Owing to congestion in Eastern mills, the Portland Rubber Mills, Portland, Ore., has been asked to bid on an order for several carloads of rubber washers. The company reports its business three times that of a year ago, and the plant is being enlarged in order to supply demands.

Canada

TORONTO, Dec. 9, 1916.

Very active conditions prevail at metal manufacturing industries throughout Canada. Manufacturers of locomotives, cars, parts, automobiles, machinery, etc., have had a very busy month and prospects are bright for the coming year. The Imperial Munitions Board is still placing large orders for the manufacture of munitions. In fact, since the outbreak of war in 1914 the board and the War Purchasing Commission in Canada have placed orders for upward of one billion dollars. The shops and foundries on the Pacific coast expect to be kept busy for the next six months turning out shells at the rate of 30,000 per week. It is announced that a number of plants will find it necessary to install additional machinery in order to make up the shortage. The scarcity of labor is a handicap drawback to many lines of manufacture.

The shipbuilding industry is showing greater activity than for years. The insistent demand from neutral countries for ships which has been stimulated by the war has revived interest in the Amalgamated Engineering & Drydock Company, which a few months previous to the outbreak of war had plans completed for the construction of the largest dry-dock, shipbuilding and engineering plant on the Pacific coast at Victoria, B. C. J. V. Spratt of the Victoria Machinery Depot, Victoria, B. C., was at the head of the undertaking. The company is now going ahead and has applied to the United States for the erection of plant, at approximately $5,500,000.

Canada Steamships, Ltd., has taken over the plant and property of the Collingwood Shipbuilding Company, and is to-day taking over the shipyards and equipment. It is expected to have a capital stock of $2,000,000. The formal transfer will take place Jan. 2 and the lands and plant at Collingwood, also the Collingwood Shipbuilding Company's interest in the shipyard at Midland.

The Kalamazoo Paper Company, Kalamazoo, Mich., and the Rumford Paper Company, Rumford Falls, Me., have purchased the Edward Partington Pulp & Paper Company, St. John, N. B.

for $3,000,000. A total of 372,000 acres of land is involved. A new company has been organized as the Nashwaak Pulp & Paper Company, and others will be maintained in New York City. Improvements to cost $250,000 will be made.

The Nova Scotia Steel & Coal Company, New Glasgow, N. S., has commenced the erection of a steel foundry which will obviate the necessity of ordering steel castings from the United States for use in its car shops.

The new Grand Trunk shops at Port Huron which are to replace the old shops destroyed by fire some time ago, will cost about $1,000,000. They will be used principally for the repair of freight and passenger cars and will consist of a power house containing six 1,000-hp boilers and two double steam generating units of 300 kw., a passenger car shop of two units, 135 x 540 ft., a freight car shop, 160 x 360 ft., a cabinet shop, 75 x 250 ft., a blacksmith and machine shop, 100 x 300 ft., a wood mill, 90 x 240 ft., etc. All equipment will be motor-driven.

The M. Brennan & Sons Mfg. Company, Hamilton, is in the market for a 15-hp steam engine.

The Hydro Electric Power Commission, University Avenue, Toronto, proposes to construct a plant at Port Arthur, Ont., for the development of about 30,000 hp, at a cost of several million dollars.

The plant owned by J. H. Connor, Preston Avenue, Ottawa, manufacturer of washing machines, etc., was destroyed by fire with a loss of $25,000. It will be rebuilt.

Plans for rebuilding the cold storage plant of Flavelles, Ltd., at Lindsay, Ont., are being prepared by the Mahon Cooper Company, New York City. It will cost $75,000.

The Mueller Mfg. Company, Sarnia, Ont., is making arrangements to double the capacity of its brass plant.

The Adams Brothers Harness Mfg. Company, Ltd., McDermot Avenue East, Winnipeg, has secured a site at Saskatoon, Sask., and will build a factory in the spring to cost $125,000.

Sheldons, Ltd., Galt, Ont., manufacturer of light sheet steel, steam specialties, fans, etc., has awarded a contract for an addition to cost $18,000.

Work has commenced on the erection of a temporary plant for the Hamilton Steel Wheel Company, Hamilton, to cost $8,000.

The Canadian Shovel & Tool Company, Imperial Street, Hamilton, has commenced the erection of an addition to cost $4,000.

The Shanks Machine Works and the Vulcan Iron Works, at present located in New Westminster, B. C., propose to move their plants to Vancouver, B. C. Additions will be made to both plants to double the output.

The Vancouver Drydocks, Ltd., Vancouver, B. C., has completed arrangements for the erection of a 16,000-ton double-section floating drydock capable of handling boats up to 18,000 tons. A repair and shipbuilding plant will also be constructed. The project will cost $2,000,000. Charles Meek, Vancouver, B. C., is active in the enterprise.

The Canadian Aeroplanes, Ltd., Toronto, has been incorporated with a capital stock of $500,000 by Reginald H. Parmenter, 93 Dunvegan Road; Arthur J. Thomson, William S. Morlock, and others, to manufacture aeroplanes, etc.

S. Freemes & Co., Ltd., Toronto, has been incorporated with a capital stock of $40,000 by Oscar H. King, 15 Wellington Street East; William Cherry, Samuel King, and others, to manufacture clocks, watches, jewelry, etc.

The Provist Mfg. Company, Ltd., Edmonton, Alberta, has been incorporated with a capital stock of $50,000 by Oscar T. Ross, George H. Stoddart, Ludger Trudel, and others, to manufacture automobile and stump pullers, trucks, etc.

The International Mfg. Company, Ltd., Ottawa, has been incorporated with a capital stock of $1,000,000 by John A. Harriss, Rufus L. Patterson and Alfred O. Hoyt, all of New York City; Wilfred J. Hawkins, Montclair, N. J., and others, and is a subsidiary of the International Arms & Fuse Company of America, New York. The company has secured a site on the north side of Notre Dame Street, just west of Dominion Park, Montreal, and work has begun on the erection of a plant 250 x 750 ft. The new plant will cost $1,000,000 and will manufacture time fuses, explosives, shells, cartridges, etc.

The Canada Truck Company, Ltd., Montreal, has been incorporated with a capital stock of $49,000 by Richard E. Hannan, John W. Blair, and Francis J. Laverty, all of Westmount, Que.; Charles A. Hale, Montreal, and others, to manufacture motor trucks, etc.

The Bissell Carpet Sweeper Company of Canada, Ltd., Niagara Falls, Ont., has been incorporated with a capital stock of $100,000 by William B. Sturrup, Thomas S. H. Giles, 6 Adelaide Street East; John S. Duggan, and others, to manufacture vacuum and carpet sweepers, etc.

[illegible] Canadian Consolidated Stores Mfg. Company, Ltd., Hamilton, and will manufacture [illegible] capital stock of $[illegible]. Archibald H. Gibson, Gabriel H. Levy, Charles H. [illegible] and others, incorporators.

Government Purchases

WASHINGTON, D. C., Dec. 11, 1916.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until [illegible] for one [illegible] double [illegible] one double [illegible] engine lathe, all for Norfolk; one double [illegible] one [illegible] engine lathe, all for Boston; one [illegible] machine, all for Boston; one [illegible] machine, all for Boston, and schedule 502, for one hobbing machine, all for Boston.

Sealed proposals will be received at the Bureau of Yards and Docks, Navy Department, Washington, until 11 a. m., Dec. 26 for furnishing one [illegible] bridge cranes, twelve [illegible] crane motors and eight 2-ton wall cranes, more or less, for each of the new [illegible] at the Norfolk and the Philadelphia navy yards; until 11 a. m., Dec. 18, for furnishing two fitting-out cranes for Mare Island. The time for opening proposals for two fitting-out cranes for Mare Island, under specification 1262, is extended to 11 a. m., Dec. 18.

The U. S. engineer office, Pittsburgh, will receive sealed proposals for furnishing two [illegible] turbine complete with gear drive until noon, Dec. 29.

The general purchasing officer of the Panama Canal, Washington, will receive sealed proposals until Dec. 18, under proposal 2093, for furnishing pneumatic hoists, etc.

Bids were received at the Bureau of Supplies and Accounts, Navy Department, Washington, Dec. 5, for supplies for the naval service as follows:

Schedule 362, Ordnance

Class 111, Washington—One universal nailing machine—Bid 20, $2,709; 51, $2,355; 73, $2,465; 152, $300.

Class 112, Washington—One surface grinding machine—Bid 20, $560; 51, $492; 73, $484.

Schedule 363, Construction and Repair

Class 121, Norfolk—One oxy-acetylene machine—Bid 36, $2,500.

Class 122, Norfolk—Two punch press and riveting machines—Bid 44, $375; 94, $805; 102, $868.

Schedule 364, Steam Engineering

Class 131, Charleston—Two turbo-generating sets with spares—Bid 140, $5,242.50; 151, $5,917.45.

Schedule 365, Steam Engineering

Class 132, Boston—One turret lathe complete with tools and electrical equipment—Bid 52, $4,990; 124, $5,166.

Schedule 376, Ordnance

Class 192, Washington—One steam locomotive crane—Bid 67, $14,420 and $14,570; 87, $15,547.

Schedule 377, Ordnance

Class 193, Washington—Two 5-ft. radial drilling machines—Bid 1, $3,037; 73, $3,340; 94, $3,270; 101, $1,966.

Class 194, Washington—One motor-driven heavy-duty drill press—Bid 73, $2,145, $2,345 and $2,395.

Schedule 378, Ordnance

Class 195, Newport—Two turbine bucket cutting machines—No bids.

The names of the bidders and the numbers under which they are designated in the above list are as follows:

Bid 1, Aumen Machinery Company; 20, Brown & Sharpe Mfg. Company; 36, Davis-Bournonville Company; 44, Excelsior Tool & Machine Company; 51, Fairbanks Company; 52, Gisholt Machine Company; 67, Industrial Works; 73, Kemp Machinery Company; 87, Link Belt Company; 94, Manning, Maxwell & Moore, Inc.; 101, Niles-Bement-Pond Company; 102, D. Nast Machinery Company; 124, Sherritt & Stoer Company; 140, Terry Steam Turbine Company; 151, Westinghouse Electric & Mfg. Company; 152, Ward & Co.

The Aluminum Goods Mfg. Company, with general offices at Manitowoc, Wis., has covered the lives of all employees in its plants at Manitowoc and Two Rivers, Wis., and Newark, N. J., with an insurance policy of $1,000 each, under the group insurance plan. The insurance is taken out in the Aetna Life without any expense to employees.

Ten new boilers will be installed by the Lalance & Grosjean Mfg. Company in its tin-plate mills at Harrisburg, Pa., and the plant will be closed this month. The mills will resume operation about Jan. 1.

NEW TRADE PUBLICATIONS

Gasoline Pump and Measuring Tank.—[illegible] Company, York, Pa. Circular. Deals with a gasoline pump and measuring tank which [illegible]. Provision is made for varying the [illegible] into the measuring tank by an indicator on the side of the pump. Any excess gasoline pumped flows back to the underground storage tank while the liquid in the measuring tank is delivered to the car by gravity, which eliminates any chance for gasoline to remain either in the measuring tank or the delivery hose.

Flexible Shafting.—Stow Mfg. Company, Binghamton, N. Y. Miniature bulletin No. 102. Treats of a line of flexible shafting and the various tools supplied for use with it. The bulletin is a reduced edition of the company's standard one and measures 3¼ x 4⅞ in. Its small size is designed to make it readily available for reference purposes, as it can be kept in a convenient place, which might not be the case with the larger bulletin.

Engineering Construction.—Westinghouse Church Kerr & Co., 37 Wall Street, New York City. Folder. Contains a brief announcement of the work which the company has done in the harbor at New Haven, Conn., for the Winchester Repeating Arms Company. Emphasis is laid upon the fact that since the original contract was signed five years ago more than 60 different assignments, varying from the design and construction of brass rolling mills, foundries and machine shops to the making of engineering reports, have been received from this company.

Portable Electric Tools.—Black & Decker Mfg. Company, Baltimore, Md. Two folders. The first refers to a line of portable electric drilling machines designed for close corner work and equipped with a pistol grip and trigger switch control. Emphasis is placed on the features of elimination of drill breakage, ease of handling, light weight and strength of construction. A list of the six different sizes, which have a maximum capacity of a ⅝-in. hole in steel, is given, together with a view of the machine in use. The other folder gives general description and specifications for a motor-driven air pump for supplying air in garages, tire salesrooms, repair shops, filling stations, etc. Views of the device, which is made in either portable, wall, or carriage types, are included.

Portable Electric Hoists and Air Hose and Fittings.—Chicago Pneumatic Tool Company, Fisher Building, Chicago, Ill. Two bulletins. The first, E-45, superseding E-40, lists a line of portable electric hoists for use on direct-current circuits. A description of the hoist is presented, supplemented by a halftone engraving and a sectional view of the hoist. A table of the sizes, weights and dimensions and a view of the hoist in use are included. The other bulletin, No. 129, calls attention to a line of hose, hose couplings and hose clamp tools for use with compressed air. The various forms of couplings are illustrated, together with portions of the hose showing the trademarks of the three grades made. Tables of the sizes in which the different kinds of hose can be supplied are included, together with brief illustrated descriptions of the clamping tools employed.

Cork Insulation.—Armstrong Cork & Insulation Company, Pittsburgh, Pa. Two pamphlets. The first illustrates a line of corkboard insulation for cold storage warehouses, ice plants, creameries, freezing tanks, refrigerators, etc. The importance of proper insulation is discussed, followed by statements of the advantages of the company's Nonpareil insulation, the text being supplemented by a number of engravings. The other pamphlet pertains to the record made by this insulation in covering brine lines, which was removed after 15 years' service and found to be in good condition. An illustration of a section of the covering is included.

Hand Traveling Cranes and Trolleys.—[illegible] Browning & Co., 17,701 Lake Shore Boulevard, Cleveland, Ohio. Bulletin. Calls attention to a line of single I-beam hand traveling cranes and push [illegible] trolleys. Engravings of the trolleys are presented with condensed specification tables, and a table giving the size of beam required for different sizes and spans of the [illegible] included. Mention is made of other products of the company, which include cranes of all types, monorail systems, revolving shovels, lifting magnets, clamshell buckets, etc.

Chain Screen Doors for Furnaces.—[illegible] pany, 700 South Caroline Street, Baltimore, Md. Pamphlet. Describes and illustrates a chain screen door for furnaces and ovens, which was illustrated in THE IRON AGE, Sept. 28. The doors, which are designed for use on gas and chemical furnaces, consist of [illegible] ing individual strands of steel chain [illegible] from a steel bar. This arrangement keeps the heat [illegible] parks from leaving the furnace and the cold air from entering, while the strands of chain are readily parted by the tools or other objects inserted in the furnace. In addition to this type of door, another is made in which the [illegible] terminate in a series of light steel tubes, designed to prevent the chain from catching in the crotch of the tongs used for handling the furnace or oven charge. A number of views of the screen in use are included.

Automatic Screw Machines.—Cincinnati Automatic Machine Company, Oakley, Cincinnati, Ohio. Catalog. Devoted to a five-spindle type of automatic screw machine for turning any length of round, hexagon or square stock up to 1 in. In the description a separate paragraph is devoted to each feature and a side-head in full face contrasting type indicates the subject covered. The various features are listed on a separate page and a table of the principal dimensions and specifications is given. The text is supplemented by a number of engravings of the machine, the tools employed and some of the work that has been turned out by it. A drawing of the single-belt drive arrangement is included.

Expansion Joint.—Ross Heater & Mfg. Company, Inc., 753 Bird Avenue, Buffalo, N. Y. Booklet. Illustrates and describes a cross-head guided type of expansion joint which was illustrated in THE IRON AGE, May 4, 1916. The special features of the joint, such as long traverse of free movement, prevention of sagging of the line and strain upon the sliding sleeve and sensitiveness to variation in the length of the pipe line, are briefly touched upon. A number of views of the joint and several typical applications of it are included. Instructions for calculating the number of expansion joints required in a piping system are given, and mention is made of a multi-head feed water heater.

Power Hammers.—Beaudry & Co., Inc., 141 Milk Street, Boston, Mass. Booklet. Points out the advantages of the company's two types of power hammers for light and heavy railroad, machine and general blacksmithing; swaging, collaring, drawing, plating, spindle making and general manufacturing, which are elasticity, control and the force of the blow. The device used to secure these results consists of two steel spring arms with hardened tool steel rollers operating within the ram upon a curved track. This device and several other parts of the hammer are illustrated and views of the complete hammer are presented. Specifications for both types of hammers, equipped for either belt or motor drive, are included.

Steel Plate Construction.—Treadwell Construction Company, Midland, Pa. Calendar hanger measuring 19 x 25 in. The dates for the months occupy about half of the leaves and are printed in heavy, easily read figures. The upper half of each leaf is given over to an illustration of some typical operation of the company, such as open-hearth steel ladles, coolers and scrubbers for a benzol plant, riveted steel pipe, oil agitators and stills, etc. A list of the various products is grouped around the engraving in each case.

Black and Special Sheets.—American Sheet & Tin Plate Company, Frick Building, Pittsburgh, Pa. Booklet No. 120. Relates to a line of black and special sheets that can be supplied either with or without a small percentage of copper. The various sheets covered include standard black Bessemer and open hearth, blue annealed, single pickled, automobile, stove and range, electrical, locker, furniture and office equipment sheets. In addition to describing the different sheets briefly, the trademarks of the several brands are reproduced in a number of cases. Mention is made of other specialties such as nickel plating, enameling, show card and tea tray stock; tack plate, cylinder lagging and locomotive jacket steel, etc. A bundling table of black sheets, giving the sizes, gages and weights is included, together with tables of the U. S. standard gage and thickness of steel sheets. A diagram of the manufacture of steel as used for sheet and tin-mill products is presented.

Hoisting Machine Accessories.—Clyde Iron Works, Duluth, Minn. Four circulars designed as supplements to catalog E. Illustrations and descriptive matter explain the use of the different accessories, which include an asbestos-lined friction ring, bucket-holding drums, an all-steel bull wheel and a group of banked levers to control the various [illegible] of six or more engines by a single operator at a [illegible] point distant from the machines. Condensed specifications are included in a number of cases.

The Wisconsin State Board of Industrial Education has fixed its requirements of State aid funds for continuation schools for the next two years at $212,000 a [illegible] compared with $150,000 for the period now closing. The attendance in these schools has increased [illegible] 10,000 the first year of operation to 40,000 at present. State aid is given cities on the basis of two-thirds of the salaries of teachers and instructors.

THE IRON AGE

New York, December 21, 1916

ESTABLISHED 1855 VOL. 98: No. 25

The Engineering Department Modernized

Designers in Individual Rooms—Responsible Heads for Blueprinting and Drawing Storage — How Records Are Kept—Single Machines Built First in Model Room

BY H. W. DUNBAR AND W. E. FREELAND

THIS article describes the organization, personnel and system of an engineering department drafting room as actually operated by the Northern Grinding Company, Worcester, Mass.

The details of the complete system of this engineering department and the procedure followed in the drafting room are applicable in any factory doing a considerable volume of business, a large part of which requires special attention, instructions or consideration on the part of the engineering department. The methods outlined will be found serviceable and successful in any drafting room with little change.



Fig. 1—In the Drafting Room of the Norton Grinding Company the Detailers and Tracers Are Placed in the Main Room and Designers and Men on Special Work Are Given the Small Rooms Extending Down Each Side of the Main Room

Organization, as is generally recognized, is one of the principal assets in the carrying on of a large volume of work in a drafting room where the product of the factory is employed for a diversified class of operations. To follow out the old procedure of letting Bill do this, that, or the other job and distributing the work through the department in a hit-or-miss manner would create chaos in these days when the machine-tool builder has to give to each machine special consideration of its individual and special purpose. In the drawing room organization to be described, Bill has his particular kind of work to do and becomes expert in doing it. By this it is not intended to convey the idea that each man becomes a specialist in some particular drawing room operation, such as drawing, tracing, designing, etc., but rather that he becomes expert on some special class of work. He may devote his time solely to the designing of machinery for use in the automobile industry; to handling that line of work known as standard drawing practice which includes such work as standardization of drawings, changes in existing drawings to facilitate manufacture or to keep them to the standards of present-day manufacturing practices; tool designing; sales engineering work; the clerical work such as scheduling of parts; listing and supplying repair orders; or again, such a



Fig. 2—Each Man on Special Work Has a Separate Booth to Which He Has the Key. The rooms serve to eliminate distraction and lessen the chance for leakage of undesirable information concerning undeveloped problems

division of the work as the handling of record cards and the filing of drawings.

When one considers what constitutes a thoroughly successful drafting room, it becomes quickly apparent that not alone the scheme of organization, but also the personnel of the organization plays a very important part. The men of a department usually reflect in their work, their attitude and their character, the characteristics of their superiors. It is essential that there shall be harmony between those directing the work and those actively employed in carrying it out. Loyalty is a chief aim. Pleasant surroundings, convenient places to work, contentment, a sense of security in one's job and a system which is a servant and not a master of the organization will go a long way toward developing this sense of loyalty, both to the department and to the company—a loyalty which yields returns in quality and quantity of work that can hardly be measured by any standard.

Here enters the problem of the selection of men, the sources from which they can be obtained and the standards by which their service value is measured. As this article is not to deal with these questions, no comment will be made on these points.

The development of team work among divisions in the drafting room, as well as among individuals, is carried out consistently. The work is organized to abolish, so far as possible, cliques or personal jealousies. Each individual, while knowing that he is a part of a big machine, is made to feel also a sense of responsibility and a broad interest in the welfare of the company. The prime thought in the development of the system is that it must be so explicit as not to make it burdensome, but so simple that its routine working furnishes the easiest way to do the job; so concise that there will be no tendency to cut corners.

This preface to a detailed description of the practices employed by the Norton Grinding Company in operating its engineering drafting room has been written to make plain the attitude of the management, a factor which forms the foundation upon which all successful organizations stand.

LAY-OUT OF DRAFTING ROOM

Before proceeding to a description of the organization itself, let us glance for a moment at the lay-out of the drafting room. In the engineering department of a manufacturing plant where the problems come from so many different classifications of manufacturing, the question of properly handling the drafting work has always been a big problem. Many undertakings are of such a nature that it is often desirable that as few people as possible be acquainted with the work as there are at best too many channels for undeveloped problems to find their way outside of the engineering department. Many considerations point to the necessity of providing those engaged in specialized study work on engineering problems with inclosed working quarters where they can carry on their special work to the best advantage with little or no interruption or interference from their coworkers.

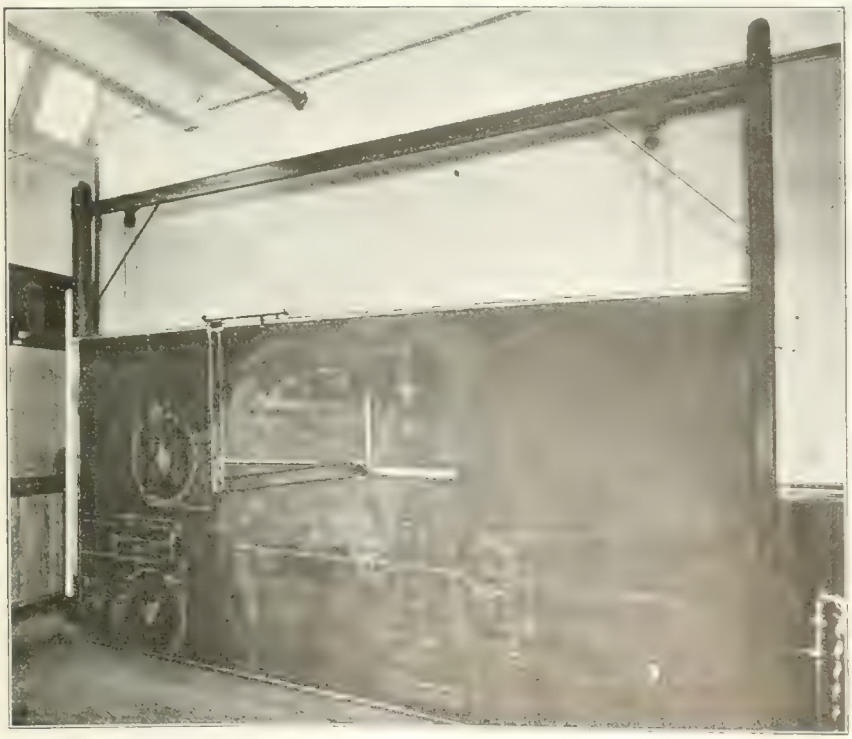


Fig. 3—With This Large Blackboard [illegible] Full Scale. It is possible thus to make plays [illegible] convenience and accessibility of levers and hand wheels. The board is counterbalanced for quick adjustment to desired height

It will be noticed in the illustration of the drafting room that separate booths for this special work are located on either side of the main drafting room. Fig. 2 shows a detailed arrangement of an individual booth in which one of the men assigned to the study of difficult problems is located. The inclosure of these rooms is by partitions of riffle glass about 8 ft. high and set up 12 in. from the floor, providing adequate means for keeping the floors clean and insuring good lighting facilities and ventilation for the whole room. As the glass is not clear and cannot be seen through, the possibil-

ity of distraction from work, either by sound or sight, is greatly lessened. The rooms are ample in size for one man, and, if pressure of work demands it, will accommodate two men comfortably. Each room has a window and heating facilities and all are under lock and key, no two keys in the entire room being alike.

Personal comfort and convenience always yield good returns. The view of the main room will immediately create the impression that little has been spared in this direction. The lighting is by indirect diffused daylight from a northern exposure. The walls are tinted in a color which absorbs the light rays most disturbing to the eye and yet has good reflecting power for light distribution.

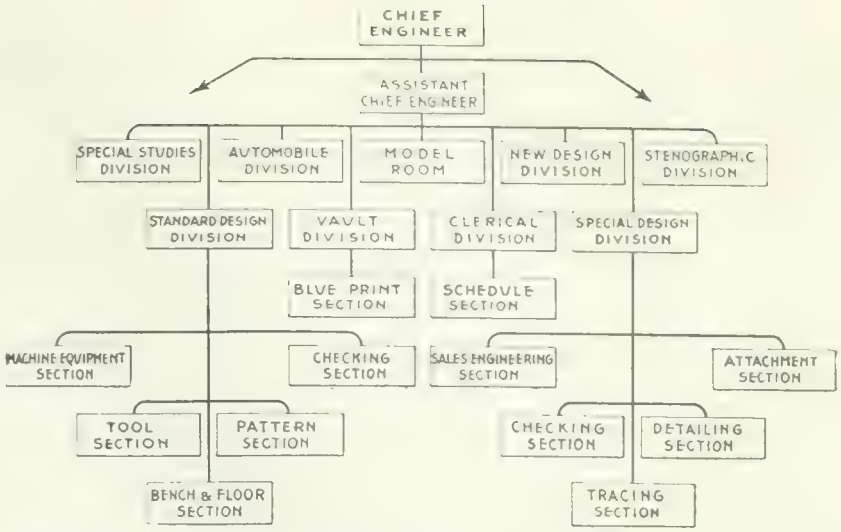


Fig. 4—Chart of the Subdivision of Responsibility in the Engineering Department of the Norton Grinding Company, Worcester

A most serviceable feature of the drafting room is a blackboard for full-size drawings. It is arranged to slide up and down and is held at any desired height by counterweights. It is equipped with a special Universal drafting machine. A drawing to full scale of a machine is started at the bottom of the board so that when the board rests on the floor it is possible to judge accurately the location and convenience of levers and hand-wheels on machines being designed.

Each drafting board is equipped with individual lamps and the latest type of Universal drafting machine is used exclusively. The drawing tables are especially designed with chests of drawers arranged for the particular class of work to be handled. Much thought has been given throughout the whole department to the use of those modern appliances, which lighten the work or increase the efficiency of an engineering staff, such as the curvograph, photostat, continuous blue-printing machine, and washing and drying machine and other appliances of similar character.

The curvograph with its rapid and convenient method of drawing arcs of unusually long radius is of particular use in this department owing to the fact that the Norton Grinding Company does a considerable business in the design and manufacture of equipment for grinding automobile cam shafts. The photostat has been utilized to copy original drawings sent in by customers in place of the older method of making or tracing shop drawings with the consequent elimination of errors in the copy.

PLAN OF THE ORGANIZATION

The chart of the department organization shows how the various activities and responsibilities are co-ordinated, and needs no explanation. The only point which needs emphasis is that division of responsibility, as shown by the chart, really exists and that most of the questions arising among the men at work on the boards are settled by a division head without reference to the department head.

That division of engineering or drafting work which comes under the classification of vault management has always been a source of annoyance in nearly every drafting room, primarily because of the fact that it is difficult to locate drawings where thousands of them are active, difficult to get clerical help with the needed qualifications of neatness and accuracy to keep up the vault system, and difficult because of the variety of work and need for good, sound common sense and judgment at all times. It is probably true that the reason for the usual conditions in vaults can be charged largely to the fact that most drafting rooms employ the services of a young man or an inexperienced boy as clerk to carry on this work, holding out this position as a stepping stone to the drawing board.

It has been quite thoroughly demonstrated in the experience of the Norton Grinding Company that this practice causes not only annoyance but needless expense. The vault system now is in charge of a competent man, paid a reasonable salary for his services; he has the interest of his division at heart and is not looking forward to the time when he can jump from his present position to one on the drawing board. The ordinary blueprint boy simply considers the vault work as a position where he must serve a certain length of time as a penalty for the privilege of becoming a tracer, whereas the man paid to do that duty makes that his one job—in other words, his vocation—and he is always trying to improve the condition of his work, enhance the



Fig. 5—The Curvograph is Commonly Used to Lay Out Cam Outlines. It enables one man on a single board to do what formerly required two or three men and the use of four or five boards joined together



Fig. 6—The Working Quarters of the Vault Department. The filing cases on the right, which hold the schedules, are on casters so that they can be rolled into the vault at night. Over them is a permanent shelf on which are trays to hold each size of drawing so that the drawings are partly sorted as they are returned

value of his department and make it easier for him to perform his duties. The layout of the vault is arranged so that it occupies as little space as possible and is neat and convenient.

The unit size of drawings is 7 x 10 in., and all larger sizes are multiples of this unit. The two smaller sizes, 7 x 10 in. and 10 x 14 in., are filed vertically in special fiber envelopes. Tracings, drawings, blueprints, etc., are all placed in the same envelope in numerical order. One envelope holds ten successive numbers, which represents about fifty drawings and prints, and each tenth envelope has an index tab to designate the hundreds. These envelopes keep the drawings in good condition and the unit grouping makes reference easy. The larger drawings up to 28 x 40 in. are filed flat in drawers in the same type but larger envelopes.

Schedules are placed in envelopes and filed flat in cases mounted on castors so that they can be rolled into the vault at night. A shelf over the schedule cases holds trays designed to receive each size of drawing returned to the vault so that the drawings on blueprints are sorted ready for filing as they are received. Fig. 7 shows the envelope in which the records are kept in a systematic and simplified way.

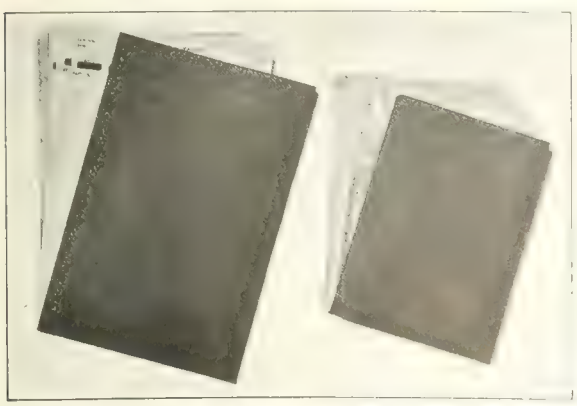


Fig. 7—Envelopes, Closed at the Bottom and at One Side, to Hold Schedules and Drawings. The envelope at the right contains in numerical order all drawings and blueprints of ten successive numbers—usually about fifty in all. By this grouping any drawing desired may be quickly located

HOW DRAWINGS ARE CHARGED OUT

One of the newest things in the work of the vault system at this plant is the method of charging out drawings, blueprints and schedules. The old system of charging out drawings was to have each draftsman leave a list in the vault in the form of a little ticket with his name and the number of the drawing written upon it, whether it was an original, blueprint, tracing, record, pattern print, or whatever it might be. That system made it necessary for the vault attendant to search a card file to find the size of the drawing issued in order to get a means of locating it in the drawing file. Under that system he must thumb over a large number of cards and eventually find the number and size of the sheet which is an index to its place in the file. Then the attendant goes to the drawer where the drawings are supposed to be filed, and after running through a number of drawings finds the place where the drawing needed should be located and eventually discovers that this drawing is out, so he refers to a third file where the little cards were put away and there finds that a certain member of the department has the drawing, blueprint or whatever it is that he is looking for.

A more convenient system for handling the charging out of drawings is accomplished by the Rand visible card record index, which opens like the leaves of a book and can be readily referred to. At the bottom of each card is typewritten the number of the drawing and its name and size. This size determines its place in the files. If any of the various records are charged out to the departments, a celluloid signal is placed in the pocket of the index, which is also of celluloid. These signals are of different colors and identify the different types of drawings: a red signal represents the original drawings; a blue signal the blueprint; a

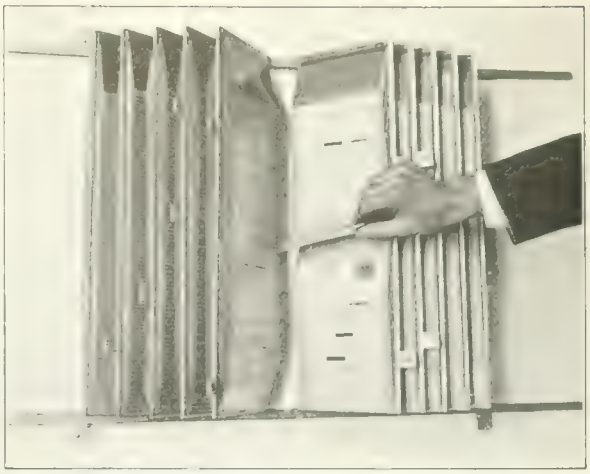
green signal the pattern print; an orange signal the record print, etc. These little signals have numbers stamped or printed on them to correspond with each individual in the department.

The procedure to find a drawing is materially simplified by this system. Each name and number is in clear view by simply turning to the proper index, whereon the numbers are arranged numerically. The number is asked for and the vault assistant refers to the proper leaf indexed with the drawing number called for and locates the position of the drawing on the individual leaf. He finds the size of the sheet, which directs him to the proper drawer in the file. He also notices as he looks for the number that there are two signals against that number. One is red and one is blue. Immediately he knows that the blueprint and the original of that drawing have been taken out. He observes that both the signals have "10" stamped on them. By referring to his index he finds that No. 10 is Jones, so he replies immediately to the inquirer that the original and blueprint are in the hands of Mr. Jones, therefore he cannot produce them.

It is evident that a great deal of time is saved by this system and its convenience is made plain by a glance at Fig. 8.

SOME DEPARTMENTAL FEATURES

As it is the practice of the Norton Grinding Company to put out new blueprints with each new lot of parts to be built, it is necessary to make a considerable number of blueprints each week. Experience has proved that it is cheaper and better to issue new blueprints than it is to collect, correct and preserve old ones. Changes in drawings are not overlooked, as may occasionally happen when old blueprints are used. At the present time about 8,000 or 9,000 sq. ft. of paper is printed weekly. The blueprint equipment is of the latest improved type, including a Revolute mercury vapor continuous blueprinting machine and a Revolute washing and drying machine.



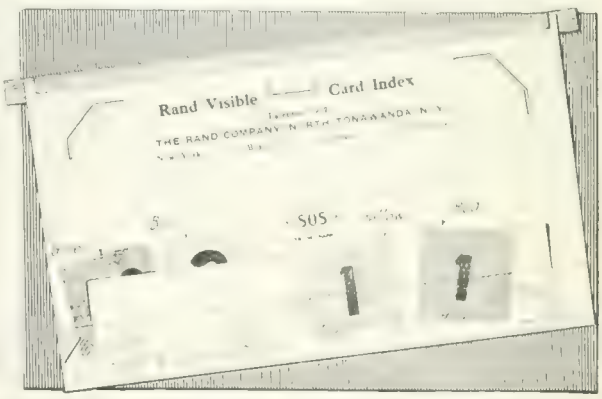


Fig. 8. The Vertical Index is Used for Charging Out Drawings. Each draftsman has a set of celluloid markers of different colors which he surrenders when obtaining anything from the vault. The markers bear a number indicating the man and are of different colors to indicate whether he has taken a drawing, blueprint, pattern print, etc. This file tells the vault clerk at a glance whether any drawing requested is in the vault or who has it

The work of the blueprinting room is carried on entirely by a young woman, and it has been found that the advantages of a permanent oper-



Fig. 9—The Blueprint Room is Equipped with a Revolute Mercury-Vapor Printing Machine and a Revolute Washing and Drying Machine. The average time to make a blueprint in the ordinary routine is 1 min. A photostat is used to make copies of customer's drawings



Fig. 10.—The Pattern Supervisor Has Commodious Quarters in Which to do His Work

ator on such work are practically the same as having a permanent head of the vault department, inasmuch as operators regularly employed take more interest in their work and are always striving for improvement.

As all patterns, both new and old, are controlled by the engineering department, it is necessary to employ the services of a pattern supervisor who is thoroughly familiar with the patterns, with the company's way of making them, and with the foundries' ways of handling them. His duties include the checking up of all patterns as they come from the pattern shops; the control of their movements from one foundry to another under the direction of the manufacturing organization; the making of contracts for new patterns, and the keeping of an accurate record of their condition. Fig. 10 shows the convenient and comfortable quarters of the pattern supervisor's department.

One of the unusual features of the engineering department of the Norton Grinding Company is the model department, which employs half a dozen skilled mechanics under the direction of the engineering department. This department is well equipped with all the machines necessary for carrying on machining operations, including small tool equipment and accurate measuring instruments. All new machine attachments or mechanisms de-



Fig. 11.—All Machines and Mechanisms Designed by the Engineering Department Are First Built in This Model Room Before Manufacturing Orders Are Issued. This is to be sure that they perform their proper functions and manufacturing problems are solved before regular machining operations are started

signed in the engineering department are first built in this department. Here, before it is marketed, is proved out everything made by the Norton Grinding Company, so that when the blueprints for new construction are turned over to the manufacturing department as a manufacturing proposition the machines or parts have been built. The machine operations are known factors which have been reduced to the simplest possible form and from the designer's point of view it is known that an attachment for a machine will successfully perform its proper function. By having work first built in this model room all questions of design, adjustment and workmanship are brought promptly to the attention of the engineering department and decisions are more readily made.

(To be concluded, the second part covering among other things the way engineering work in progress is followed up, the way work is assigned and the way changes in existing shop drawings are made, and also the special shop instruction given to draftsmen.)

No Change in Thomas Iron Company Ownership Is Now Expected

Concerning the recent negotiations for the purchase of the Thomas Iron Company's blast furnace, iron ore, railroad and other properties in the Lehigh Valley, the company has issued the following statement:

"The management of The Thomas Iron Company wishes the trade to understand that no option to purchase its plants exists. At a meeting of the stockholders in September a Mr. Person, who claimed to represent Philadelphia bankers, read a statement to the effect that he was making the stockholders a cash offer of $3,500,000 for the assets of the company as of June 30, 1916. The stockholders appointed a committee to confer with the parties represented by Mr. Person and passed a resolution stating that it was the sense of those shareholders attending the meeting that they would sell on the basis of $3,500,000. Meetings of the committee have been held but there has been no evidence shown that the parties represented by Mr. Person have the ability to carry out the offer made at the meeting of the stockholders. Statements have been made that 10 per cent or more of the purchase price would be deposited in various banks, but no money has been deposited and no evidence furnished that Mr. Person or his associates have any such sum as is required at their command. Owing to the improvement in the company's business affairs, due to the improved condition of the iron business in general, it is hardly possible that a majority of the stockholders would approve a sale on the basis of Mr. Person's offer at this time. Operations have continued at the various plants and no change in ownership has been or is now expected."

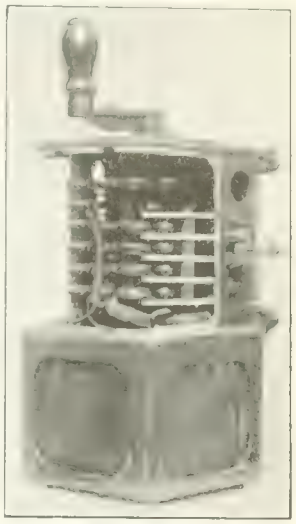
Another Steel Plant at Canton

The Canton Sheet Steel Company, Canton, Ohio, will build an open-hearth steel plant to supply its requirements of sheet bars. The plans provide for three 50-ton open-hearth furnaces, two soaking pits and a combined continuous blooming mill and sheet-bar mill. It is the intention to provide an ingot capacity of about 100,000 tons a year. The company is at present consuming about 90,000 tons of sheet bars per year. Its rolling equipment now includes 12 hot mills and 6 cold mills and its galvanizing department has a capacity of about 60,000 tons a year.

Creditors of the Wisconsin Engine Company, Corliss, Wis., which went into bankruptcy early in 1913, are receiving checks in payment of the fourth and final dividend of 2.59 per cent, amounting to $8,213.73. The total disbursement is $43,097.97, or 13.59 per cent. Claims allowed amounted to $317,129.48.

Controller for Machine-Tool Motors

A drum-type controller for use in connection with any class of motor-driven machine tool has been developed by the Cutler-Hammer Mfg. Company, Milwaukee, Wis. It is made in standard sizes for use with motors ranging from 1 to 25 hp. and provides speed regulation with a maximum range of 3 to 1. The former is obtained by inserting resistance in the shunt field circuit, the resistance in the armature circuit being intended for use in starting only.



A Special Resistance Is Inserted by this Controller in the Field of a Shunt Motor Driving a Machine Tool to Provide Speed Regulation in a Range of 3 to 1

The field regulating unit consists of a commutator mounted on the drum shaft and the necessary resistances in the form of ferrule type units located in a ventilated case underneath the controller proper. Contact clips at each end provide the connections to this special commutator and eliminate all lead wires. The starting resistance in the armature circuit is mounted on a separate frame. The contact fingers and segments of the armature circuit used in starting are of solid copper and, it is pointed out, are readily renewable. When the drum is returned to the off position, the arrangement of the fingers and segments is such that dynamic braking is provided.

If desired, the handle can be removed and a gear or sprocket drive to the controller spindle substituted. This arrangement, it is emphasized, enables the control to be brought to a convenient point, such as the apron of a lathe. If protective panels are used in connection with the controller, they are mounted upon the frame containing the resistance used in starting.

New Method of Sintering Ore Fines

A new method of sintering fines consists in first forming a porous hearth on the bed of a sintering pan about ½ in. deep, made usually of limestone screenings. On top of this moist or dry fines are placed, mixed with coke dust if necessary. The charge is then ignited similar to the Dwight-Lloyd process and the combustion is maintained by drawing air through the charge. The new feature, as patented by Max McMurray, Benjamin J. Mullen, and Harry Peppel of Cleveland and Leetonia, Ohio (U. S. 1,183,891), consists in adding water to the charge continually or intermittently, as required, after a sintering heat has been attained. This water forms steam, which passes through the charge with the air. The claims of the patentees embrace the following: The time required is reduced from 25 to 50 per cent.; the product is more uniform; the exhaust apparatus may be run at a lower vacuum, and the grate bars have a longer life.

The Gulf States Steel Company reports its November net operating income at $304,490, being an increase of $221,600 over November, 1915, and of $87,269 compared with the average for 10 preceding months of this year. After allowing for depreciation, taxes and reserves, the net income for November was $281,788 and for 11 months $2,226,982 against $532,950 for the same period in 1915.

A news special from Lewistown, Pa., says that 33 carloads of rolled steel wheels mounted on axles and ready for service left the yards of the Standard Steel Works Company Dec. 11 for export, being part of a large order from China.

The Organization of Manufacturing Plants*

The Close Relations That Need to Be Established Among the Estimating, Designing, Production and Manufacturing Departments to Secure the Best Efficiency

BY A. D. C. PARSONS

THE most convenient way of considering the manufacturing side of works organization is to examine each section in the order in which these sections will have to deal with any particular contract, and then to discuss some system of production designed to follow through the manufacture methodically. Two natural divisions present themselves, (1) Preliminary to receipt of contract, (2) After the contract has been obtained.

WORK PRIOR TO RECEIPT OF ORDER

Before an order for any particular machine is received an estimate must be prepared in accordance with the specifications of the intending purchasers. The estimating department must have from the designing staff the information which will enable it to determine the requirements of new tools and special appliances to carry out the manufacture. It will also require to know with considerable accuracy the amount of labor and material necessary. The majority of specifications are necessarily somewhat lengthy, and it is essential that the estimators should be competent to investigate all details, and foresee any possible causes of trouble and expense which might result should any of these be overlooked.

In determining the time promised for delivery the capacity of the works and the number of orders on hand must be carefully considered. Guesswork must be as far as possible eliminated. It will be useful, therefore, to have some graphical representation of the fullness of the factory. Fig. 1 shows one way of arriving at this.

The ordinates in Fig. 1 may be in any convenient unit such as £'s, hp., kw., or number of machines, but in many cases the most convenient unit will be "machine time per week." In the majority of works each machine-tool will be rated at a certain figure per hour, depending upon the capital expenditure on the tool, and all work done on any particular tool will be charged with that rate per hour.

The estimating department will know approximately the amount of machine time necessary for each order, and if by means of some equation this can be spread

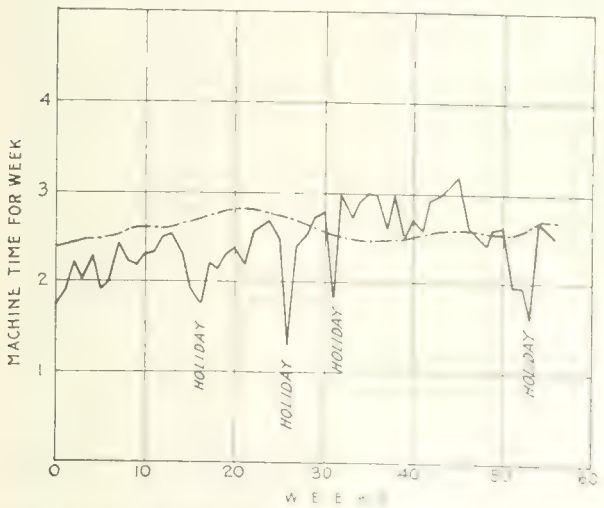


Fig. 1—Diagram Which Prevents [illegible] Promises

out over the time during which the order is in the works, an approximation can be made of the machine time to be expended per week. This is done for each order and the results superimposed on one another, thus obtaining the curve shown by the continuous line in the figure. It is also possible to plot the total actual machine time used in the manufacture of these orders, thus giving a fair idea as to whether the output bears a satisfactory relation to the amount of work actually on the books. The latter curve is shown dotted, and from this a measure of the capacity of the works can be found by averaging the actual machine time per week over the period of, say, one year.

Diagrams of the nature of Fig. 1 should prevent unreliable promises being made as to the deliveries. To manufacture an article cheaply and efficiently it is necessary that every part required shall be ready when it is wanted. If details are not ready when they should be the assembling is delayed, and the organization of that department greatly diminished.

SUPPLYING MANUFACTURING INFORMATION

After the contract has been obtained it is best to determine how long can be given to the various operations such as drawings, patterns, obtaining raw material

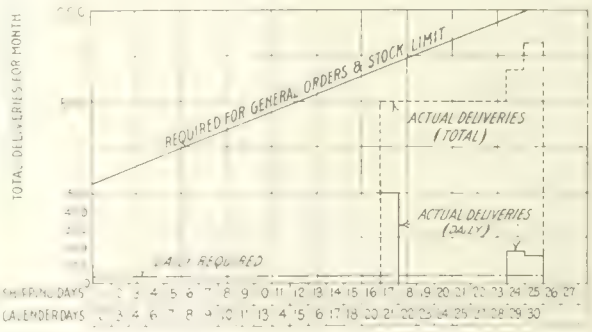


Fig. 2—A Case of Irregular Production

such as castings and forgings, machining of these parts, completion of details, assembling, testing, etc. A convenient means of doing this is to lay out a rough time table covering the various operations, starting with the delivery date and working backwards to the date of receiving the order. This is, of course, only approximate, but after taking into consideration the present condition of the works, it can be estimated from past experience how much time these various stages in the manufacture will occupy. Any surplus time can be apportioned to those departments where there is likely to be congestion.

We have now determined how long the drawing office can be given for completing full working drawings. From this a list can be prepared which is sent to the drawing office specifying when full manufacturing information for the various parts must be sent into the shops. In addition to the full working drawings, this information should consist of a detailed specification giving particulars of drawing numbers, pattern numbers, and complete details of all parts. Each department concerned in the manufacture receives a copy.

When the design is well advanced, the purchasing department will ask bids for the necessary raw material and manufactured parts. On receipt of these, the official orders will be given and these will state the date that the materials must be delivered.

PRODUCTION DEPARTMENT

The specification sheets furnished by the drawing office should pass through the production department on their way to the shops. It is the work of this department to see that all details required, whether manufactured in the works or supplied from outside, shall come

*From a paper on "Works Organization" read at a meeting of the North East Coast Institution of Engineers and Shipbuilders, Newcastle-upon-Tyne, [illegible]

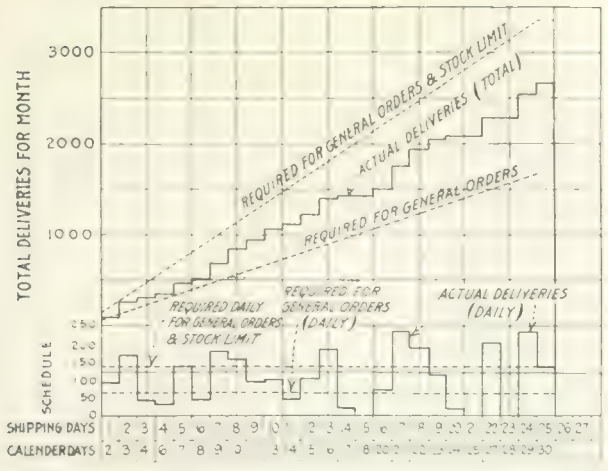


Fig. 7. Example of a Good Record

to hand when required by the machining or assembling departments. Some method must be adopted whereby all material can be traced in a systematic way, for on this will depend the satisfactory feeding of the factory.

The general time table of manufacture is based on the expected delivery of the material, and should this be much overdue the time given for the completion of the various parts must be seriously interfered with. It is therefore essential that this work shall be done well and efficiently. In any system designed to accomplish this, the aim must be to anticipate any possible cause of delay in obtaining material, whether due to lateness in ordering or delay in delivering.

It will be convenient to keep a record arranged in a suitable form enumerating in as much detail as is thought necessary those parts required for each machine. From this record the production department can see at a glance how the material is coming in, what remains to be ordered, and what requires to have pressure applied to urge forward delivery. As soon as the order is placed those columns indicating when the drawings will become due can be filled in by the aid of the rough time table already laid down. This can be used by the production department in keeping the drawing office advised of any drawings which are unduly delayed. When the drawings are complete they are forwarded to the works, *via* the production department, and the other columns under this heading are filled in.

When the specifications have been received by the works it is necessary to have some system whereby each foreman can at any time see what his shop has to complete and when. In the departments machining large pieces there is comparatively little difficulty, for the number of parts are few and move slowly. Probably marking the specifications with the date when each piece must be complete will prove sufficient. In detail departments, however, the parts may be small and very numerous; they may also be required at different periods. Here delays may prove serious, for the final assembling of the machine will be much delayed should any essential part be wanting when required. In these departments there must be some means of tabulating the work in hand in the order in which it is required, so that at any time the foreman will know whether he is up to date, what orders are overdue, and what amount of work is ahead. Without such an index it will be necessary for the foreman to spend a considerable time, in finding out from those departments which he has to supply, what they require at the moment and what their needs will be in the near future. Anything which can be done to obviate the absence of a foreman on this work is a direct gain in efficiency.

A convenient form in which to lay out an index of this sort is to have a book, or cards if these are preferred, so that each week has a certain space allotted to it. As the specifications are received marked with the date when the material must be completed, the details are entered concisely under the week in which they become due. As the work is completed the index is marked off, so that uncompleted items stand out conspicuously.

ASSEMBLING DEPARTMENT

It is in assembling that all delays which may have occurred in completing details in the feeder departments are reflected as a much more serious delay in the finished article. If these delays are prevented the output is greater, it is assembled more cheaply, and the men work better if the supply of material is constant and is received when required. Furthermore, it is far from satisfactory and decidedly inefficient to have partly assembled machines lying about, all held up by the lack of some small part.

To prevent this the foreman naturally does not like to commence assembling until he is sure of being able to carry the work through without stoppage. He must be able to ascertain exactly how the material stands for any particular machine. This information can be obtained by referring to the specifications, which must be kept up to date as regards completed material and all stock parts which are supplied directly by the stores. The method usually employed for keeping these specifications posted is for the detail departments to forward to the assembling sections receipts for all completed materials as soon as these are handed over to the stores, some similar method also being adopted for those parts delivered complete from outside sources and for stock material not manufactured in the works.

STORES

Although the manufacturing feeder departments play such an important part in the organization of the factory, the various stores for raw materials and manufactured parts supplied from outside sources are vital to the successful feeding of the factory. These stores, too, will contain stocks of expensive materials, which should be kept down to the lowest possible limit. The storekeeper should keep a systematic record covering all items in his stock, specifying the maximum and minimum allowed, the ordering quantity and the ordering level. This record can be kept in a loose-leaf ledger or on some card index system. As material is issued the details are entered in the ledger, debiting the order number for which the material is required.

MANUFACTURING OF STANDARD APPARATUS

It has been assumed heretofore that the product is not manufactured chiefly to standard designs. When, however, the factory is employed in turning out large

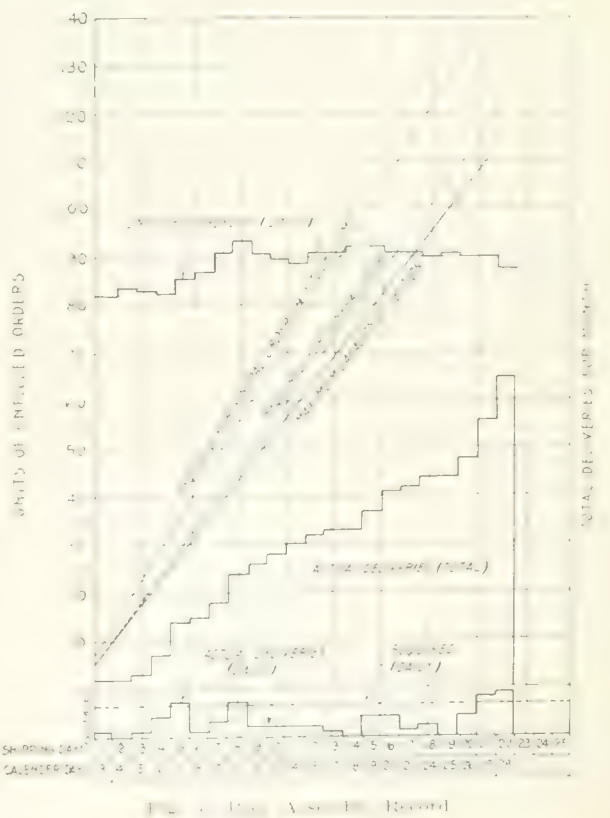


Fig. [illegible] Example of a Good Record

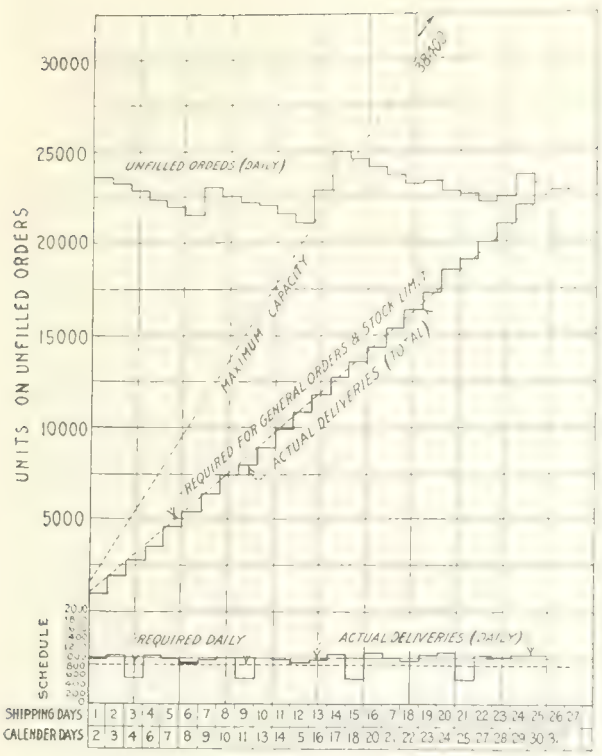


Fig. 5—Good Assembly Record

quantities of an approved design, the system may require some modifications, and possibly some elaboration which would not be warranted where the output is not standard and where the designs are frequently changing. In factories of this kind, the sales will to a great extent be made straight from a price list. Deliveries will also to some extent be standardized for any particular size and type of machine.

To obtain these deliveries it is essential that no time be lost in getting the manufacturing information into the works. On receipt of the order the designing staff will decide whether the standard machine is capable of fulfilling the requirements, and if so will pass the order on to the specification clerks to make out specifications for the works.

These specifications will probably be standardized and it will only be necessary to select those applying to the order, fill them in for the required number of machines, to forward them via the production department. The specifications, together with the detailed drawings, will constitute the entire manufacturing information. To expedite the completion of this information in the minimum time, various printed forms are used so as to save any unnecessary clerical work. To give examples of these forms and to describe their details would be of little general interest. But in any system adopted care must be taken to guard against the building up of a system of forms only, and so eliminating the human element of interest and responsibility. If such care is not taken there is a great danger of the whole system developing into so much waste paper and the work being completed before the system designed to assist in its manufacture can come into use. In such case it will be more likely to hinder than assist production.

The production department will distribute orders and specifications as previously, each being marked with the date when the various components have to be completed. In most cases a large portion of the details required will be manufactured for stock, and each feeder department will have put through these stock parts in suitable batches. This will be regulated by the production department under the supervision of some higher authority, to insure that the stock does not reach too high a level, and so tie up too much capital, or fall too low and so jeopardize the delivery of the final product.

As previously stated, it is in the assembling department that the efficiency of the works in production is best gaged. It is, therefore, well to have some method whereby the management can see whether the organization of the works as a whole is such as to [illegible] the factory producing the right quantity at the right time.

A large American works manufacturing all kinds of electrical machinery, and where the output of machines and accessories, all more or less standard, is large, has devised a system for accomplishing this. Graphical records are kept of the output of the feeder and assembling departments. These records, known as load diagrams, contain curves indicating for each day the total number of units on order not delivered, the number of units wanted each day, and the number of units actually delivered each day. Figs. 2 and 3 are typical curves for feeder departments, and Figs. 4 and 5 for assembling departments. Examination of these shows whether any section of the works is ahead of or behind schedule.

In addition to the load diagrams, a delivery efficiency chart is made showing how delivery promises are met. A typical case is shown in Fig. 6. On this chart are plotted curves showing the daily percentage of dates kept, the average percentage of apparatus shipped on time for the past 30 days, and the percentage of overdue orders on hand. In some cases this chart is amplified by adding curves showing the percentage of orders overdue by varying amounts such as 5, 10, or 20 days late. Copies of these charts are circulated through the works. Considerable interest is taken by the departments concerned, and a certain amount of friendly rivalry exists between them.

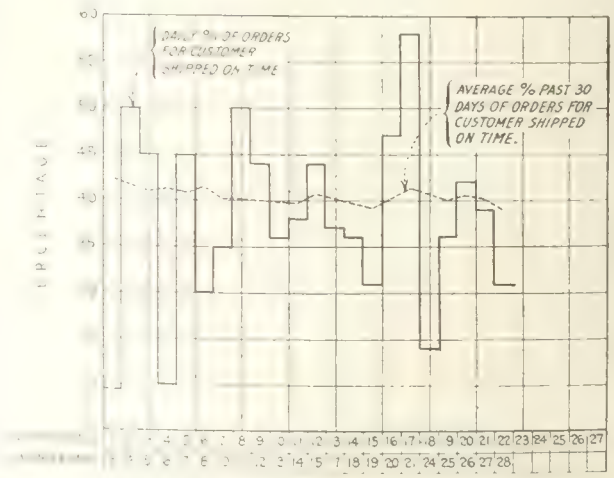
In such works the detail and assembling departments naturally specialize to a much greater extent in the manufacture of certain parts than in those works where the product is not so standardized. This will also entail a more systematic grouping of certain classes of machines, for the tendency is to make each detail in large quantities for stock, from which the assembling departments will draw.

From the nature of this manufacture it is obvious what an important part will be played by jigs used for these standard details. Without these jigs it would be impossible to manufacture cheaply, nor could the great advantage of interchangeability and the supply of spare parts be attained.

CONCLUSION

Whether the works are large or small, whether the apparatus manufactured is standard or special, the human element is bound to play an all-important part. No works can ever be independent of this factor. The co-operation of individuals and departments is so vital that it may well be considered as the foundation of any system.

Heads of the departments must be men of broad mind, capable of handling those under them, so as to encourage them to have real interest in their work, to treat their profession as something in which they can have real pleasure and not just as a dull monotony. The result will be that individuals in subordinate positions will gradually be found capable of taking more responsibility, so that when the time does come for the heads of the departments to move on, there will be someone so trained to carry on the organization of the department.



Showing Meeting of Delivery Promises

Much might be said about co-operation but it is so obviously necessary and it stands out so conspicuously in every walk of life, that it need only be mentioned in connection with the present question. Unfortunately, however, one often finds that individuals and departments are not worked at their highest efficiency, due to the lack of this essential. Without perfect co-operation the effectiveness of any system, no matter how good it may be, will be greatly reduced.

Disintegration of Labor and Efficiency

In an address before the American Society of Mechanical Engineers in New York on Sept. 29, on "Social Preparedness and Engineering," Walter N. Polakov, chief engineer of the Power Plant Management Company, New York City, spoke in part as follows:

In the heat of the present struggle for existence, the European governments have been forced by circumstances to admit principles which even two years ago would have imperiled the lives of their advocates. The higher law of national self-preservation took the upper hand, and several governments resorted to the proclamation, unparalleled in history, that the industry shall serve the country, not the individuals. War profit tax is one of the evidences of this point of view. In its ultimate development, this statement means the abolition of the right to derive the profits from the socially necessary production. The reshaping of industrial relations is close at hand. To-day hardly one of the ultra-radical measures of yesterday is not realized, at least to some extent.

The real need to workmen and good to society lie in the thorough utilization of all available scientific knowledge for the perfection of such shop methods as shall result in the increased productivity of labor. Especially will the productivity of labor rise through the discontinuance of the present enormous disintegration of labor, in hundreds of thousands of petty establishments, conducted with imperfect tools. But even the large establishments could, with hardly any exception, be conducted far more rationally than now, so that, aided by the most highly perfected technical process, an infinitely larger demand could be supplied.

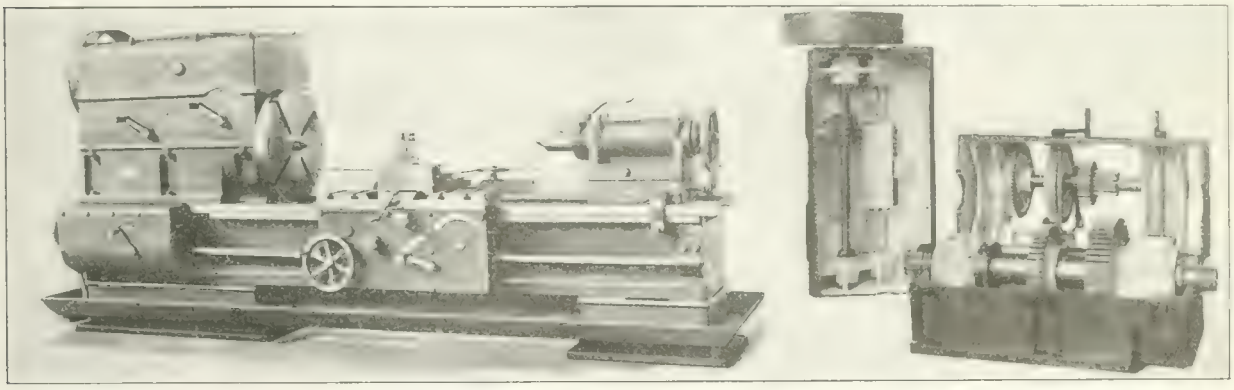
E. N. Hurley, chairman of the Federal Trade Commission, says: "Over 100,000 of the business corporations in the country report no net income whatever. In addition, 90,000 make less than $5,000 a year, while only the 60,000 remaining, the more successful ones, make $5,000 a year or more." Now, if 75 per cent of business corporations are managed not to get any profit (or not to show it) it means that they cannot progress, that they waste natural resources, that they cannot properly take care of their employees. Under such conditions the low productivity of labor is as inevitable as the efforts to exploit labor with imperfect tools and by imperfect methods. Antagonism of interests and of relations between labor and capital follows necessarily.

Engineers have been working for the last decade or two to solve this problem by means of scientific studies of working processes and devising methods whereby the increased productivity of labor may overtax none and secure cheap product from expensive labor. Even untrained imitators have met with a measure of success, the inefficiency being so glaring and universal. While certain parts of workmen's organizations objected to this movement for political reasons, the class conscious workman has welcomed it.

A 26-In. Heavy-Duty Engine Lathe

The Riter-Conley Company, Pittsburgh, Pa., has placed on the market a 26-in. heavy-duty geared head engine lathe. The spindle speed changes are obtained through a somewhat interesting arrangement of gears in the headstock.

The machine, as will be noted, is of massive construction, the weight with a 16-ft. bed being 16,000 lb. A high-speed pulley is employed to drive the spindle, eight changes being regularly obtained through steel gears running in oil, although in the case of the tool illustrated only four are available. The bearings in the headstock are piped to an oil reservoir in the upper part, the lubricant being supplied by a pump in the interior of the headstock. The spindle, which is of high-carbon forged steel, is 56 in. long, and is finished by grinding. It runs in bronze bearings, the front one being 6 in. in diameter and 10 in. long, while the rear one is 5 in. in diameter and 8 in. in length.



The Eight Spindle Speed Changes Available with this 26-In. Heavy-Duty Engine Lathe Are Obtained Through the Somewhat Novel Geared Headstock Arrangement Shown at the Right

A special design of feed box is employed and 14 quick changes are provided through cut steel gears, although but three are available in the lathe shown. The tailstock is of heavy construction in keeping with the rest of the machine and a pawl engaging a rack cast in the bed is relied upon to assist in keeping it in place. A special taper attachment is provided for use in connection with shell work.

Standard Engineering Company Sold

John W. Hubbard, president of Hubbard & Co. and the National Nut & Bolt Company, also identified with other large manufacturing interests in Pittsburgh, a large stockholder in the Canton Sheet Steel Company, Canton, Ohio, and connected with other outside interests, has purchased a controlling interest in the Standard Engineering Company, Ellwood City, Pa., and is gradually acquiring additional stock in that company. The company is a large manufacturer of tube-mill machinery, rolling-mill equipment, sand and chilled rolls, pipe-threading machinery, and also a full line of gray, semi-steel, cupola and air-furnace castings. It also builds machine work to drawings. It is the intention of Mr. Hubbard to make large additions to the plant, these to include doubling the foundry capacity, while the output of the engineering department will be increased about 50 per cent. It is stated that the price paid for the plant was in excess of $300,000, and probably close to this amount will be spent in making additions. As yet no changes have been made among officials, or operating heads, but after Jan. 1 a reorganization of the company will be made, and Mr. Hubbard will be president.

The Standardization of Machine Tools*

Suggestions Regarding Standards of Speed and Feed Series and Standardized Power for Machine Tools—Tool Posts and Lathe Centers

BY CARL G. BARTH

The objection is often raised to the adoption of standards of any kind that standardization blocks the way for further development and improvement. If this were unqualifiedly true, standardization would almost be a crime; but if we adopt a standard merely as representative of the best a trade or profession knows of at any one time, with the understanding that as soon as a decided improvement is brought out, a new standard will be adopted to parallel temporarily and eventually replace the former standard, the danger of stagnation will be obviated.

During his many years of experience the writer had gradually been forced to see an enormous advantage in also standardizing the machine equipment as a whole, aside from the standardization of the mathematical and certain constructive features of each machine. Wherever possible his effort is to have only the very same make of machines in a certain productive group, and in the expansion of such a group to add machines of exactly the same design, even in some cases to the extent of having a manufacturer furnish what is no longer his most recent product.

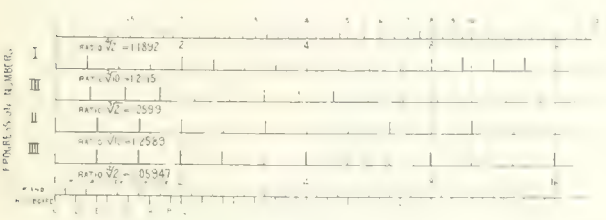


Fig. 1.—Logarithmic Plot of Suggested Alternative Standards for Speeds and Feeds

STANDARD SPEED SERIES

As in the present state of the science and the art of cutting metals, it is, on the average, impossible to determine the most economical or suitable speed and feed at which to run a machine for any set of conditions closer than a certain percentage, it is now almost universally accepted that the available speeds of a machine should be in a geometrical progression. It being agreed that a geometrical series of speeds should be provided for any one machine, the writer's idea is that a universal speed series should be adopted by all machine tool builders for all machines such as lathes, boring mills, milling machines, drill presses, etc., that are provided with a spindle for either the work or the cutting tool, and which, except in the case of certain single purpose machines not included in this discussion, may be rotated at different speeds.

In 1888 the writer designed for William Sellers & Company, Inc., of Philadelphia, a large lathe which had 30 speeds in a practically perfect geometrical progression, with a ratio of a little over 1.15, obtained by a correct relation between a 5-step cone, two back-gear reductions and two forward speeds of the countershaft. Again, in 1892, he designed another with 36 speeds which had a practically constant ratio of but little over 1.14, obtained by a 6-step cone, two back-gear reductions and two forward speeds of the countershaft.

Later, in designing some special lathes for the Bethlehem Steel Company for the better utilization of the then new high-speed tools, he adopted 1.2 as a more rational ideal, and he has never since found any reason for deviating materially from this ratio, though it was several years later before he recognized the desirability of an absolutely constant ratio, not only for all lathes, but, as referred to above, for all machine tools with a revolving spindle.

However, it we construct a geometric progression with this simple ratio 1.2 and beginning with 1, all subsequent terms of this will naturally be found to be anything but simple numbers, thus: 1 1.2 1.44 1.728 2.074 2.488 2.986 3.583 4.300 5.160 6.192 7.430 8.916 10.70 12.84 15.41 18.49 22.19 26.62 31.95 38.34 46.00, etc. In reality, therefore, we will have a simpler progression by slightly modifying this ration 1.2 such that the fifth term becomes 2 instead of $1.2^4 = 2.074$, for then the whole progression becomes

$$1 \quad 2^{\frac{1}{5}} \quad 2^{\frac{2}{5}} \quad 2^{\frac{3}{5}} \quad 2^{\frac{4}{5}} \quad 2 \quad 2\,2^{\frac{1}{5}} \quad 2\,2^{\frac{2}{5}} \quad 2\,2^{\frac{3}{5}} \quad 2\,2^{\frac{4}{5}} \quad 4 \quad 4\,2^{\frac{1}{5}} \quad 4\,2^{\frac{2}{5}} \quad 4\,2^{\frac{3}{5}} \quad 4\,2^{\frac{4}{5}} \quad 8, \text{ etc., or} \qquad [I]$$

$$1 \quad 1.1892 \quad 1.4142 \quad 1.6818 \quad 2 \quad 2.3784 \quad 2.8284 \quad 3.3636 \quad 4 \quad 4.7568 \quad 5.6569 \quad 6.7272 \quad 8, \text{ etc.}$$

with every fourth term a power of 2, the simplest of all numbers except unity itself.

If the ratio $\sqrt[5]{2} = 1.1892$ be considered unnecessarily small, a somewhat larger ratio preferred in order to obtain a larger final ratio between the slowest and the fastest speeds of a machine, with a rather limited total number of speeds, the writer's answer is that he has had in mind also, as a possibly more generally acceptable progression, one with the constant ratio $\sqrt[3]{2} = 1.2599$; that is,

$$1 \quad 2^{\frac{1}{3}} \quad 2^{\frac{2}{3}} \quad 2 \quad 2\,2^{\frac{1}{3}} \quad 2\,2^{\frac{2}{3}} \quad 4 \quad 4\,2^{\frac{1}{3}} \quad 4\,2^{\frac{2}{3}} \quad 8, \text{ etc., or} \qquad [II]$$

$$1 \quad 1.2599 \quad 1.5874 \quad 2 \quad 2.5198 \quad 3.1748 \quad 4 \quad 5.0397 \quad 6.3496 \quad 8, \text{ etc.}$$

Again, as a compromise between progressions [I] and [II] and to favor a possible preference for a progression with 10 rather than 2 as a periodically re-

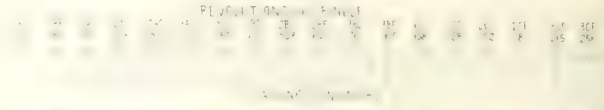


Fig. 2. Logarithmic Plot of Revolutions of Spindle Against Hardness Numbers

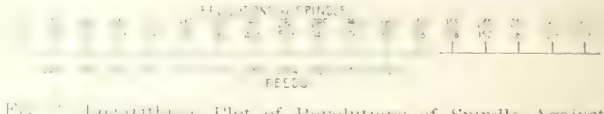


Fig. 3. Logarithmic Plot of Revolutions of Spindle Against Feeds



Fig. 4. Slide Rule Developed from Logarithmic Plots of Figs. 2 and 3

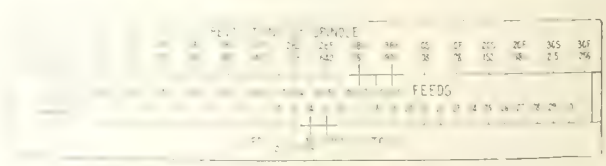


Fig. 5. Slide Rule Developed from Fig. 4 by Addition of Life Relation of Tool

*From a paper read before the [illegible] chanical Engineers, New York, Dec. [illegible]

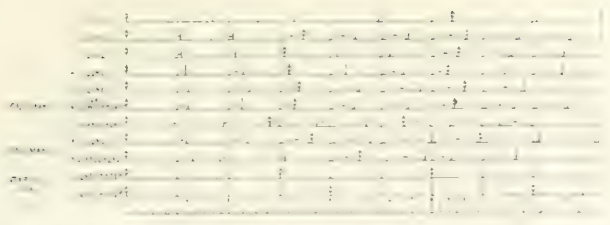


Fig. 6.—Logarithmic Plot of Single Countershaft Speed Series of Nine Lathes Submitted by Different Manufacturers in February, 1914

curring ratio, the following progression may also be looked upon as a candidate:

$$1 \quad 10^{\frac{1}{10}} \quad 10^{\frac{2}{10}} \quad 10^{\frac{3}{10}} \quad 10^{\frac{4}{10}} \quad 10^{\frac{5}{10}} \quad 10^{\frac{6}{10}} \quad 10^{\frac{7}{10}} \quad 10^{\frac{8}{10}} \quad 10^{\frac{9}{10}} \quad 10 \quad 10^{\frac{11}{10}} \quad 10^{\frac{12}{10}} \text{ etc., or} \qquad \text{III}$$

$$1 \quad 1.2115 \quad 1.468 \quad 1.778 \quad 2.154 \quad 2.610 \quad 3.162 \quad 3.831 \quad 4.642 \quad 5.623 \quad 6.813 \quad 8.254 \quad 10 \quad 12.115 \text{ etc.}$$

The constant ratio of this progression $\sqrt[10]{10} = 1.2115$ is very close to the geometrical mean of the ratios of progressions [I] and [II], which is $\sqrt{2^{\frac{1}{4}} \cdot 2^{\frac{1}{3}}} = 2^{\frac{7}{24}} = 1.224$.

Finally, a certain interesting simplicity would also be introduced by the adoption of the constant ratio $\sqrt[12]{10} = 1.2589$, thus:

$$1 \quad 10^{\frac{1}{12}} \quad 10^{\frac{2}{12}} \quad 10^{\frac{3}{12}} \quad 10^{\frac{4}{12}} \quad 10^{\frac{5}{12}} \quad 10^{\frac{6}{12}} \quad 10^{\frac{7}{12}} \quad 10^{\frac{8}{12}} \quad 10^{\frac{9}{12}} \quad 10^{\frac{10}{12}} \quad 10^{\frac{11}{12}} \quad 10 \text{ etc., or} \qquad \text{IV}$$

$$1 \quad 1.2589 \quad 1.5848 \quad 1.9953 \quad 2.5119 \quad 3.1623 \quad 3.981 \quad 5.012 \quad 6.310 \quad 7.943 \quad 10 \quad 12.59 \text{ etc.}$$

It will be noticed, however, that there is in reality a theoretical difference only between progression [II] and this progression, the tenth number (7.9431) of this being less than 0.8 of one per cent smaller than the tenth number (8) of the former.

But the best comparison of these four progressions is made by plotting them on a logarithmic scale, as in Fig. 1, on which is also plotted the progression that represents the relations between the number of vibrations of the strings of a piano, the constant ratio of which progression is $\sqrt[12]{2} = 1.05947$.

Having thus indicated that there may be a choice of standards, the writer will further on give some pretty strong reasons for favoring progression [1], admitting at the same time that under certain conditions every other term may be omitted, thus leaving the progression:

$$1 \quad \sqrt{2} \quad 2 \quad 2\sqrt{2} \quad 4 \quad 4\sqrt{2} \quad 8 \quad 8\sqrt{2} \quad 16 \text{ etc., or} \qquad \text{V}$$

$$1 \quad 1.4142 \quad 2 \quad 2.8284 \quad 4 \quad 5.6568 \quad 8 \quad 11.3137 \quad 16 \text{ etc.}$$

What has been said above in discussing the adoption of a standard speed series holds equally good for a standard feed series, except for the most up-to-date designs of lathes, in which the feeds for plain turning are obtained as a constant fraction of the screw-cutting feeds. For these latter it is suggested that both the cross feeds and the longitudinal feeds be made the same fraction of the screw-cutting feeds for all lathes regardless of size.

In paragraph 1134 of Mr. Taylor's "On the Art of Cutting Metals," the author gives his original classification of hardness of metals in terms of their relative cutting speeds, all other conditions being maintained uniform, thus: If 0 stands for the ideally softest grade of any kind of metal, he made class 1 represent a metal just enough harder to reduce the cutting speed by 1.1; class 2 by 1.1^2; class 3 by 1.1^3, etc., or by factors in the following geometrical progression:

Class	0	1	2	3	4	5	6	7	8	9	10, etc.
	0	1.1	1.21	1.331	1.464	1.6105	1.776	1.949	2.144	2.358	2.594

The writer has since modified this to

Class	0	1	2	3	4	5	6	7	8	9	10, etc.
	1	$2^{\frac{1}{12}}$	$2^{\frac{2}{12}}$	$2^{\frac{3}{12}}$	$2^{\frac{4}{12}}$	$2^{\frac{5}{12}}$	$2^{\frac{6}{12}}$	$2^{\frac{7}{12}}$	$2^{\frac{8}{12}}$	$2^{\frac{9}{12}}$	$2^{\frac{10}{12}}$ etc., or
	1	1.0905	1.1892	1.2968	1.4142	1.5422	1.6818	1.8340	2.2	1.8100	2.3784 etc.

VI

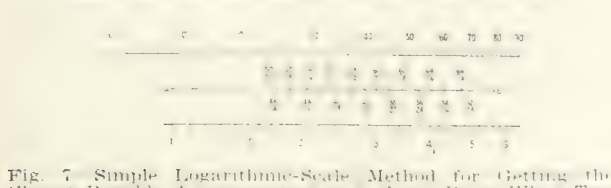


Fig. 7.—Simple Logarithmic-Scale Method for Getting the Closest Possible Approximation to a Given Ratio When Two Sets of Gears Are Involved

as being more rational, because then we have the great simplicity that a difference of eight hardness classes corresponds to a difference of exactly 2 to 1 in cutting speeds. It will be seen that this progression is just the same as progression [1] with intermediate terms interpolated, and hence the simplicity of this for a speed progression in conjunction with [VI] for a hardness scale. It would mean that a tool would last just the same length of time on two materials two hardness classes apart, if run on the softer grade with a certain speed and upon the harder grade with the next slower, as perhaps best brought out by the logarithmic plot in Fig. 2.

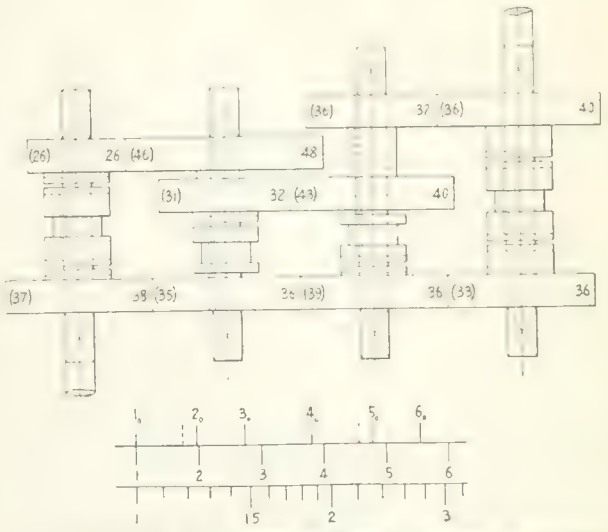


Fig. 8.—Diagram of Gearing of Speed Variator of a Well-Known Make of Planer

Figures in parentheses show number of teeth in gears as made; other figures show number of teeth in gears to improve the speed series. 1 to 6, logarithmic plot of original relative speeds; 1 to 6, logarithmic plot of improved relative speeds

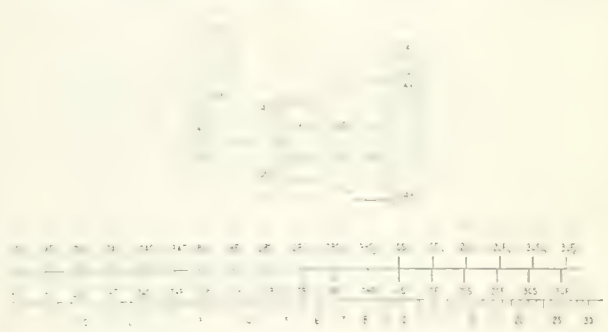


Fig. 9.—Diagram of Live Head of a Well-Known Make of Lathe

Figures in parentheses show respectively the number of teeth in the gears and the diameter of the cone pulleys as made; the other figures indicate a simple change that would further improve a very good speed series. 1AS to 3CF, logarithmic plot of original speeds; 1AS to 3CF, logarithmic plot of improved series

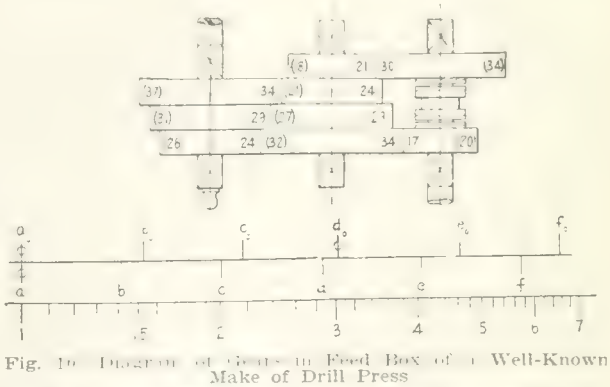


Fig. 10.—Diagram of Gears in Feed Box of a Well-Known Make of Drill Press

Figures in parentheses show number of teeth as made; other figures show improved number of teeth; a_0 to f_0, logarithmic plot of original relative feeds; a to f, logarithmic plot of improved relative feeds; these conform quite closely to progression [V]

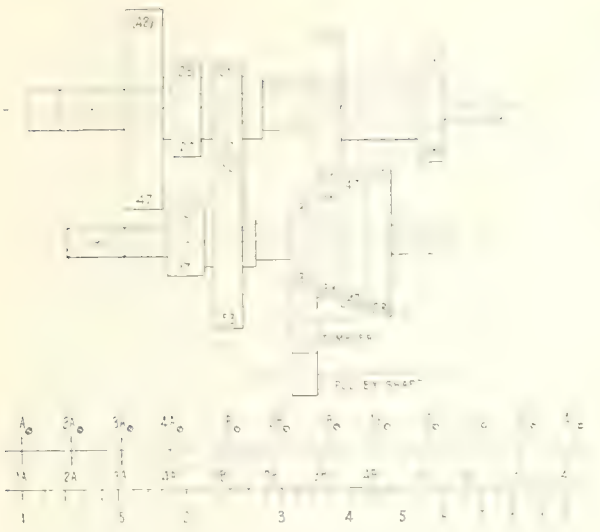


Fig. 11—Diagram of Driving Gear of a Well-Known Make of Milling Machine

Figures in brackets show number of teeth in gears as made; other figures indicate number of teeth in gears to further improve an already excellent speed series; $1A_0$ to $4C_0$, logarithmic plot of original speed series; 1A to 4C, logarithmic plot of improved speed series

Again, in paragraph 732 of On the Art of Cutting Metals, it is stated that, approximately, the cutting speed varies inversely as the square root of the feed, which is a compromise between the special laws for steel and cast iron. Therefore, if in connection with a series of speeds conforming to progression [I] we also have a series of feeds in the same progression, the relation of these feeds and speeds to each other will, in order to maintain all other conditions uniform, be as represented by the logarithmic plot in Fig. 3. In general, in dropping or increasing the speed by a step at a time, we would increase or drop the feed by two steps at a time.

By combining the plots in Figs. 2 and 3, as done in the slide rule Fig. 4, we also most readily recognize that a change of one or more numbers in the hardness class of the metal cut will have no effect on the cutting speed if we meet this with a change of feed involving a corresponding number of steps, increasing the speed as the hardness goes down, decreasing it as the hardness goes up.

Finally, in paragraph 700 of On the Art of Cutting Metals is given the relation between cutting speed and the life of a tool in cutting steel, which is that the speed varies inversely as the eighth root of the time the tool will last, all other conditions remaining uniform. Adding this relation to the slide rule in Fig. 4, we get the rule shown in Fig. 5.

Progression [I] represents a fair average of the speed series provided by certain well-known machine-tool builders in some of the machines produced by them in recent years, after they had realized that the time had come for the provision of closer speed regulation, even if this meant a considerable reduction of the ratio of the fastest to the slowest speeds obtainable. An example of this fact is represented in Fig. 6, which shows the speed ratios of nine 16-in. lathes offered by six different manufacturers in answer to an inquiry in February, 1914. One manufacturer offered three different designs and a second two different designs. It will be noted that the difference between the speed series provided in the different designs of the same maker differ as much among themselves as do the designs of different makers, except in the case of lathe No. 1, which represents the least up-to-date design. To make the diagram clearer, the speed ratios are laid out for a single forward countershaft speed only, thus showing only every other ratio of the full progression intended.

Most designers of the present day, whether mathematically inclined or not, are familiar with the use of the simple slide rule in selecting practical numbers of the teeth for a gear and pinion of a single set of gears

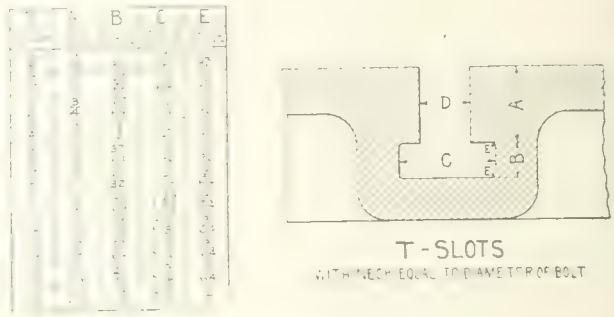


Fig. 12—Proportions for T-Slots

to give a certain ratio as closely as possible; but a simple logarithmic-scale method for getting the closest possible approximation to a given ratio when two sets of gears are involved, which the writer has used for some years past, is not generally known, if indeed at all known to anybody who has not worked with the writer in connection with these matters.

This method will be fully disclosed by a single illustration embodied in the diagram Fig. 7, and we will take for our example the ratio $4\sqrt{2} = 5.6568$, with the restriction that neither pinion is to have less than 14 teeth, and that the sum of the numbers of the teeth in the one set of gears is to be 80 and in the other 60.

By means of a logarithmic scale, which is shown just below the significant part of the diagram, lay off the ratio 5.6568 from a to b. Now place the graduation point for 14 on the logarithmic scale, representing a pinion of 14 teeth, at a, and make a mark at the graduation point representing the gear that would be a mate to this pinion; namely, one having $80 - 14 = 66$ teeth. This operation is indicated by the logarithmic scale above the significant part of the diagram. The distance ac then represents the ratio 66/14. Similarly, 15 is placed at a and a mark made at 65, 16 is placed at a and a mark made at 64, and so on, as far as will eventually appear necessary. Next, below the line place the graduation point 14 at b, and mark off toward a the point for the mate for this pinion in the second set of gears; namely, $60 - 14 = 46$. Repeat for 15 and 45, 16 and 44, etc. On completion of this repeated operation we at once discover that the closest coincidence between the marks on both sides of the line ab is for the two sets of gears 65/15 and 34/26, whose combined ratio is 5.6667, which is less than 0.2 of 1 per cent [illegible] 68. It will also be seen that the two [illegible] 21×40 20 and $58/22 \times 41/19$ come [illegible] the required ratio.

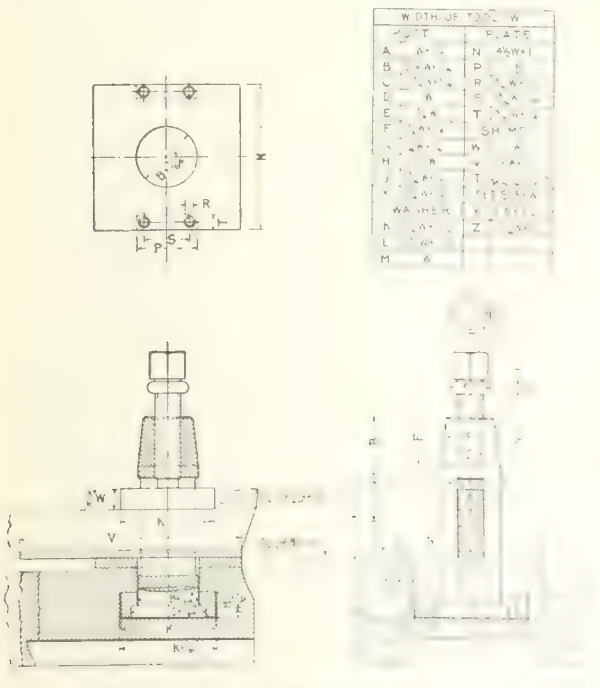


Fig. 13—Proportions Used by Author in Designing Tool Post for Modern [illegible]

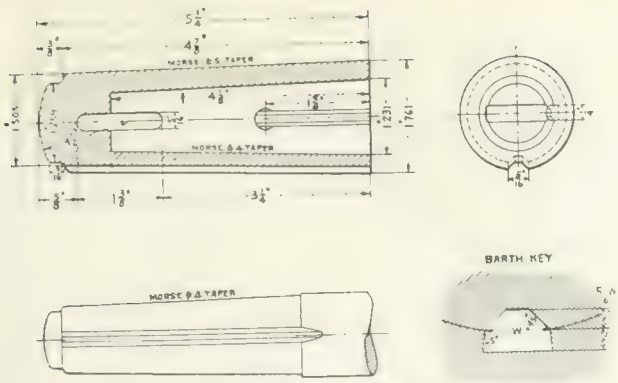


Fig. 14—Barth's Key Method of Driving Drill, Arbor and Boring-Bar Shanks

Among additional helps in arranging speed and feed series as advocated, any otherwise desirable group of gears of the following numbers of teeth will be found to lend themselves admirably for use with a tumbler gear:

Comparing these ratios with the writer's ideal progression [I], it will be seen that the deviation is nowhere greater than 0.7 of 1 per cent.

Cone gears made with teeth of any multiple of the following also give ratios differing less than 1.02 per cent from conformity with the same progression:

16	15	14	13	12	11	10	9	
8	9	10	11	12	13	14	15	16
2	1.6667	1.4000	1.1819	1	1 / 1.1819	1 / 1.4000	1 / 1.6667	1 / 2

To further emphasize how even some fair attempts at regular progressions of speeds and feeds have fallen short of what might have been attained, Figs. 8, 9 and 10 are submitted as a few of numerous cases that have been investigated by the writer.

Fig. 11 also shows how even a quite excellent speed series may be further improved.

TOOL POSTS FOR LATHES

In On the Art of Cutting Metals, which Mr. Taylor wrote under great pressure, and in which accordingly the proper consideration was not given to certain subjects, the mistake was made of advocating cutting tools with moderate clearance angles, without at the same time calling attention to the fact that these can be used only in connection with tool posts in which the body of the tools is raised parallel to itself as the tool is ground down to a smaller height.

In Fig. 12 are shown proportions for the swivel form of the tool post for moderate-sized lathes which the writer has used as a standard for several years past. The most essential part of this, as regards size, is the width of the slot, which is for a tool body of approximately 1/30 of the swing of the lathe over the bed, and a distance from the center of the lathe to the tool-supporting plate that corresponds to the ground height of the roughing tools shown in On the Art of Cutting Metals. The propriety of these propositions is decidedly open to discussion, however, particularly the latter.

An exceedingly important part of the machine equipment of a shop are the T-slots in various machines. Many years ago experiments were made by William Sellers & Co. to ascertain the strength of T-slots relatively to a T-headed bolt, and on the strength of these that company adopted a standardized set of slots, which, as later modified by the writer, have also been used by him for several years past. They are shown in Fig. 13.

LATHE CENTERS AND DRILL-PRESS SOCKETS

It is well known that the Morse standard sockets are no standards at all, but a perpetuated, laudable, though unsuccessful, attempt of years ago to establish standards. However, compelled for the time being to accept them as they are, everybody has now at least two standard tapers for sockets and shanks to contend with; namely, the Morse and the Brown & Sharpe. The best the writer has been able to do, therefore, has been to make all lathe centers conform to a Morse standard so as to enable drills or drill sockets to be directly inserted in either spindle of certain or all lathes in a shop; and to make all milling-machine sockets conform to the Brown & Sharpe standard, with Morse drill sockets having Brown & Sharpe shanks for use with these whenever holes have to be drilled in a milling machine.

The writer unqualifiedly recommends the universal adoption of the Brown & Sharpe standards all around and the use of Morse sockets with Brown & Sharpe shanks during the change. He also recommends the universal abandonment of the tang as a means of driving. We have for years had the ridiculous inconsistency of drill makers that they still furnish taper-shank drills with the old-style tang as a means of driving, and along with this extensively advertise and sell various forms of "use-them-up" sockets for drills with the original tang broken off.

More than 12 years ago the writer adopted a modification of William Sellers & Co.'s key method of driving as a substitute for the tang of drills, arbor and boring-bar shanks. This is illustrated in Fig. 14, and differs from the Sellers method in the use of a special form of key that has become somewhat known as the Barth key. The virtue of this as a means of driving consists in its being subjected to crushing pressures only, and that it has no tendency to work out of its seat; and for a taper drill socket it has the additional great advantage over the Sellers straight key that the drill shank can be inserted rapidly without any special care.

Hassler Motor Company's New Plant

Robert H. Hassler, Inc., Indianapolis, manufacturer of automobile accessories, has completed a group of building on six acres of land at Naomi Street and the Indianapolis Union Railway Company, which will be occupied by the recently incorporated Hassler Motor Company, with $250,000 capital stock. The company expects to have the plant in operation Feb. 1, and will manufacture a high-grade motor car of medium price. The plant was built by the Austin Company, Cleveland, and is a duplicate of extensive additions recently built by the same company for the Perlman Rim Corporation, Jackson, Mich., and the General Electric Company, Schenectady, N. Y. The general arrangement is that of one-story buildings without basements. The largest, 100 x 300 ft., is entirely of glass, steel and concrete. The company has moved four times since 1913 to procure larger quarters. Robert H. Hassler is president and treasurer; Edward D. Fouts, vice-president and director of sales; David G. Ong, secretary and general manager, and James A. Hittle, production manager.

Fuel Savings Possible with Economizers

The Green Fuel Economizer Company, 90 West Street, New York City, has compiled data showing the savings secured by the installation of fuel economizers in 26 large industrial plants. With a boiler pressure of 150-lb. gage, the saving in fuel effected was 9.26 per cent. The average results obtained in these plants were: Temperature at which gases enter economizer, 530 deg. Fahr.; temperature at which gases leave economizer, 343 deg.; temperature at which water enters economizer, 157 deg.; temperature at which water leaves economizer, 256 deg.; increase in temperature of feed water due to economizer, 99 deg. Among the plants from which data were secured were the American Iron & Steel Mfg. Company, Lebanon, Pa.; Johnston Harvester Company, Batavia, N. Y., and the American Brass Company, Waterbury, Conn.

The proper kind of stairs and stairways from the standpoint of safety are described and illustrated at some length in the second issue of what is called "Safe Practices," published by the National Safety Council, Commercial & Continental Bank Building, Chicago.

Russian Industrial Progress in War Time

National Organization of Manufacture, Particularly in Metal-Working Lines—American Opportunities When the War Ends

BY STERLING H. BUNNELL*

American manufacturers are interested to-day, as never before, in Russia as a market for their products. Great quantities of machinery and industrial supplies are being shipped to that country by every available steamer, and the demand far exceeds the ship space available. It is promised by those who know that after the war Russia will enter upon a period of remarkable industrial development, during which all kinds of mechanical appliances will be in active demand, taxing the resources of manufacturers of all exporting nations to supply the quantities wanted. The development is already under way under the pressure of war. As an indication of the possibilities of advancement under normal conditions, the record of progress since the beginning of the war is of much interest.

Russia differs from the other principal European countries in being distinctively an agricultural nation, almost devoid of manufacturing plants when the war began. In transportation facilities the deficiency is marked, for the extensive system of water routes and canals cannot make up for the lack of railroads in handling material and the products of manufacture. With bank deposits and accounts totaling nearly two billion dollars, Russia had about one-fiftieth of the proportion of railroad track to area of country, which is the average of all other European countries. The United States, just now feeling the effect of deficiency in railroad capacity at a time of intense industrial activity, is in position to appreciate to some extent the difficulties of doing business in a country where railroad facilities exist only along a few favored routes, while large regions have no track connections whatever.

WAR ORGANIZATION OF INDUSTRY

In starting on the upbuilding of industries to meet the immediate needs of war, co-operative action typical of Russian methods of work took the prominent part. A committee of war industries was formed by leading men, mostly residents of Moscow, for the direct purpose of developing the manufacture of munitions in Russia. About the same time the Union of Cities and Zemstvos of all Russia was organized, with the purpose of aiding the wounded. This union gradually extended its field until its work embraced the production of war material of all kinds. The union took orders from the war department for materials needed, and provided plants and organizations to produce the goods. It also took charge of important special work, such as the removal of plant equipment and valuable supplies from invaded portions of the empire. Up to the beginning of 1916 the union had built a number of complete manufacturing plants to supply the most urgent needs of the country. These needs were not all for materials required at the fighting front, but included many commonplace articles formerly imported from Germany and Austria and not made in Russia. Among the factories provided by the Union of Cities and Zemstvos of all Russia are a bureau of standards, measuring-instrument works, benzol plant, needle factory, telephone instrument works, surgical instrument factory, and several plants for the production of chemicals.

Building factories was, however, only the beginning of the work. It was an even greater task to find the workers to operate them. In January, 1915, one-fifth of all Russian factories were shut down entirely, and the rest were 30 per cent undermanned. The principal cause of short production was lack of fuel and raw materials, caused mostly by inadequate transportation, which again hindered shipment of finished goods. The production of oil and all minerals decreased at first, the latter from lack of mine labor. Russian miners work in the country at farm labor in summer, and in the mines only in winter, so that mining and agriculture are competitors for the same hands. Pig-iron production decreased at first, but later the employment of prisoners of war and of women and children helped to bring up the output to normal figures.

METAL INDUSTRIES OF THE URALS

In the Ural districts the mining and metal industries have been able to show a small increase in production from the first of the war. This is due to the fact that foreign capital had been obtained for development, and extensive improvements were already in progress. In consequence, reduction of output due to loss of labor and other causes was offset by the increasing output of new plants. The metal industries of the Urals are already of great importance. As an indication, the Organization of Representatives of Metal Industries is open only to concerns having capital stock of $5,000,000 or more and employing upward of 1000 men. There is unlimited room for further development of mineral industries in the Urals and elsewhere in Russia, and the demand for equipment will be enormous.

When the war began, the chemical industries of Russia were completely in German hands. Most of the factories were branches of German corporations and all depended for technical talent on German chemists and engineers. This condition has been changed so that Russian factories produce chlorine, bromine, iodine, sodium salts, bisulphite of ammonium, and chloroform and other anæsthetics. Chemical companies have increased in number, and the average capital has increased from $200,000 in 1913 to $600,000 in 1915. There has been a great increase in the number and output of by-product coke plants and of benzol, toluol, and other chemicals, and many new plants are under construction.

FARM LABOR DRAWN TO FACTORIES

Agriculturally, the lack of new farm machinery and of repairs and replacements for that already in use is causing a serious decrease in the production of farms. The cereal crops of 1914 were of normal amount, and the quantity was maintained in 1915 by greater productiveness of the smaller area of land worked. But in 1915 the autumn sow-

*Chief engineer R. Mather[illegible]

ing of rye was far short of normal, and the spring sowing was even less. Farm labor was short 31 per cent in 19 departments in the year 1913, and decreased progressively to 70 per cent short in 43 departments in 1915. This deficiency was not entirely caused by enlistment in the army. The high wages paid in cities by munition factories caused many men to leave the farms for the shops. In the region of Moscow, before the war, about one-fourth of the laboring men were employed in farm work, but in 1915 the proportion had decreased to one in twenty. Undoubtedly the lack of the usual imports of farm machinery has worked with the increase of factories for war materials in decreasing the proportion of farm labor to factory labor.

Of all countries in the world, Russia would seem most able to provide its own food. But as the facts show that even the deficient factory equipment of Russia has taken more men from agriculture than can be spared from the business of producing food, it is not difficult to appreciate how the tremendous industrial development of the United States has resulted in food shortage in every direction. There is a real world famine, though fortunately not of starvation proportions, in most countries. As the food is not there to be eaten, some or all must eat (or waste) less than in other times.

The close of the war will give opportunity for the Russians to import large quantities of harvesting machinery, machine tools, railroad supplies and factory equipment. The shortage of all these will then be acute, so that American stocks for immediate delivery will command good prices. But it must not be forgotten that to make a sale the goods must be brought to the attention of the buyer. The names of American manufacturers, so familiar to all of us, are as unknown to the Russians as the names of their great works are to us. How many readers of this article recognize Vseobshaia Kompania Electrichestva as our own General Electric Company in Russia? The barrier of language cannot be overlooked in preparing for Russian business. The best evidence of Russian intention to buy largely in America is perhaps in the promise of Russian importing houses, which have established organizations in the United States to study American resources and bring them to the attention of Russian buyers even while the business is almost at a standstill from lack of sufficient shipping.

Continuous Plating and Cleaning Outfit

Patent rights on a machine which accomplishes automatically or mechanically all the movements heretofore performed manually in the still plating process have been acquired by the Munning-Loeb Company, Matawan, N. J. The machine, which is being offered to the trade for the first time, it is pointed out, can be applied to any plating plant, and among the advantages claimed for its use are an increased output and a greater uniformity of deposits.

The machine consists of a series of tanks containing the cleaning, rinsing, dipping and plating solutions arranged in the form of an oval about 50 ft. long. A carrier system, consisting of two endless chains driven through sprockets by a ½-hp. motor and carrying a series of vertical rods from which the work is hung on racks such as are shown in foreground is located above the tanks. Each rod is moved forward, raised or lowered at predetermined points by a simple cam mechanism. This arrangement is relied upon to pass the work through the different baths, raising it over the dividing walls between adjacent tanks and lowering it into the baths in the proper sequence of operation, the completed work being finally delivered at the starting point on the right of the machine.



The Small Metal Articles to be Plated Are Placed on the Metal Racks Shown in the Foreground Which Are Attached to the Vertical Rods and Are Lowered into and Raised from the Various Plating and Cleaning Tanks Automatically by a Cam Arrangement

The movement of the work, it is explained, provides the agitation of the plating bath that permits current densities in excess of those possible in still tank plating to be employed without danger of burning. This fact, together with the elimination of handling, produces the economy of time that is a feature of the apparatus. The speed of the machine is fixed by the foreman of the plating room to give the best results, thus definitely determining the time of immersion in the various baths.

The number of standard units in the assembly of the machine and the arrangement of the tanks and lifting cams can be modified as may be desired to meet any unusual requirements. A speed ratio of 3 to 1 is provided and if conditions require this can be made even greater. The speed of 2 ft. per min. is recommended for ordinary plating conditions, which means that the work will complete the circuit of the tanks in approximately 1 hr. which, it is pointed out, is sufficient for all cleaning baths, rinses and dips, in addition to the actual plating. If light deposits are desired, the speed may be increased and the time reduced, a slower speed and a greater time in the baths, of course, producing heavy deposits.

Pig-Iron Exports Growing Rapidly

Pig-iron exports in September were 64,122 gross tons and in October 101,756 tons, both of these figures exceeding those for any previous month. To Oct. 1, 1916, the total was 302,504 tons against 156,939 tons to Oct. 1, 1915, and 92,014 tons to Oct. 1, 1914. Adding the October exports brings the total to Nov. 1 to 404,260 tons or 40,426 tons per month. In 1913, the record year, the monthly export rate was only 23,137 tons. The total to Nov. 1, 1916, is 126,612 tons in excess of the total for all of 1913.

The Superior Shipbuilding Company, Superior, Wis., will start work at once on an order for four ocean freighters for Norwegian owners. The boats will be 261 ft. long, with a beam of 43 ft. and depth of 20 ft.

The Kilby Frog & Switch Company, Birmingham, Ala., has increased its capital stock from $150,000 to $200,000, and will make additions to its plant.

Labor Shortage Affects Navy Yards

Government Working Program Curtailed — Standardizing Specifications for Material—Larger Stocks Planned

WASHINGTON, D. C., Dec. 19, 1916.—The shortage of skilled labor in the shipbuilding trades is seriously affecting the progress of construction work in the Government navy yards and constitutes a very embarrassing factor in the problem of expanding the yards according to the recently adopted policy of the department to equip eight yards for the construction of warships, according to the annual report of Admiral Taylor, chief of the Bureau of Construction and Repair. Important recommendations are embodied in the report respecting the standardization of all forms of material purchased by the Government and urging a large increase in the stocks on hand of construction material and equipment. The experience of the department, as frankly stated by Admiral Taylor, is not encouraging as to the success of the department's expansion policy, and the difficulties encountered by the Bureau of Construction and Repair during the past year furnish official confirmation of the statements so frequently put forward of late by private shipbuilders as reasons for their inability to meet the views of the department with regard to the cost of constructing warships and the impossibility of making deliveries as in the past.

PRIVATE PLANTS BID FOR LABOR

The greatest difficulty, Admiral Taylor says, has been found in avoiding serious delays in the construction of all the vessels now being built in Government yards, due to the abnormal conditions existing in both the material and labor markets. There is available only a limited number of skilled men in the shipbuilding trades, and as these were in great demand in the various private establishments, where an unprecedented volume of merchant tonnage was under construction, it proved impracticable to obtain men to increase the navy yard forces to the point warranted by the large amount of work in hand. In fact, it has been hard to avoid serious depletion of the force already employed, as the opportunities existing in private plants for increased earnings through overtime work form an inducement which goes far to offset other advantages possessed by Government employment. This condition promises to become more acute when the large volume of work involved in the new naval program is taken in hand, as there appears to be no reason to look for a decrease in the demand for additional new tonnage for the merchant marine.

Several yards have had difficulty in pushing new construction work on hand, Admiral Taylor says, without interference with work of repair and maintenance of the active fleet in commission. It is hoped that conditions as regards the matter above will improve, but the bureau does not anticipate material improvement during the next 18 months, and during this period additional new construction work must be undertaken at the yards with great caution and the recognition of the probability of delays in case such a step becomes necessary.

SIMPLIFYING SPECIFICATIONS

Concerning the work of the bureau in the standardization of materials purchased by the Government, Admiral Taylor says:

"The activities of this division of the bureau have, as heretofore, been constantly directed toward the standardization of specifications and of materials as to quality, grades, sizes, etc., carried by the principal navy yards for work under this bureau. This standardization is essential if an adequate stock of all materials necessary to ship repairs and alterations is to be on hand when needed. Other bureaus of the Navy Department have been freely consulted in the preparation of specifications for materials used by more than this bureau. Effort has been constantly made to simplify and standardize the several requirements of the bureaus into an identical specification for all bureaus rather than a number of similar specifications with minor and unimportant differences resulting in a higher unit cost for materials of essentially the same grade and quality. Such multiplicity of specifications also gives confusion to prospective bidders in differentiating between the several similar grades of material as well as entailing an unnecessarily large variety of stock in small amounts of essentially the same materials.

"Improvements in specifications have been made possible by experience gained in actual work, by a close observation through the bureau's inspection force of outside commercial manufacturing practices and purchasing methods, by active participation by the bureau's representatives in the activities of the principal engineering and technical societies, and by utilizing whenever possible the services and technical knowledge of other expert departments and bureaus of the Government, such as the Bureau of Chemistry, Bureau of Standards, the Forest Service and others.

"In all of its relations with manufacturers and contractors the bureau has endeavored, when possible, to give accurate and prompt information when asked as to the reasons for the technical requirements of specifications and, by properly preparing its specifications and requirements, present proposed purchases in such a way as to make the navy business attractive to desirable manufacturers and to secure the broadest competition on a sound basis with consequent low costs."

LARGER STOCKS TO BE CARRIED

Experts of the Bureau of Construction and Repair have become convinced that one of the most serious handicaps that would be experienced in the event of a national emergency would be the difficulty in obtaining immediately the materials necessary to prosecute the greatly increased amounts of work that would be thrown into the navy yards, including, in addition to work on naval vessels, the alterations, repairs, etc., necessary to be made on merchant vessels which would be taken over by the Government for use as auxiliaries. This bureau has actively co-operated with the Bureau of Supplies and Accounts during the last year to materially increase the amounts of stock materials carried at the yards, particularly with regard to industrial stock used by this bureau in work under its cognizance, such as structural plates, shapes, rivets, wrought iron for the manufacture of the larger chain cables, and in equipment not ordinarily readily obtainable in the open market, such as chain cable, anchors, wire, manila and hemp for the manufacture of rope, cables, etc.

Throughout the year the high prices of materials, and in special cases, their scarcity as well, has impressed upon the bureau the soundness of the policy of carrying a much greater stock of the principal materials and supplies than has been the past practice, not only those materials ordinarily used by the Navy Department in times of peace, but also such as may become necessary to use in event of extraordinary conditions. When such stocks have been established it will be less necessary to purchase considerable amounts of material at exorbitant prices when market conditions are abnormal and delays incident to inability to get certain classes of material can be avoided. With such large stocks generally carried and properly standardized advantage can be taken of favorable market conditions for purchasing in replenishing depleted stocks.

Admiral Taylor's recommendation with regard to stocking up on material will appeal strongly to Congress and will no doubt result in the authorization to the department to go into the market for large quantities of materials at such time in the future as substantially lower price levels may be reached.

Due to outside business conditions that have prevailed during the year, Admiral Taylor says, it has been necessary to increase materially the output of the yard manufacturing plants in many directions. Progress is steadily being made in the standardization of articles manufactured and in the improvement of the mechanical processes involved. Considerable additions to the plant equipments of the several navy yards have been made throughout the year to outfit the yards not only for peace time work, but also to provide them with facilities for handling the larger operations involved in repair work to vessels that would become necessary in the event of a national emergency.

DESIGNS FOR SUBMARINES

Admiral Taylor foreshadows the early standardization of complete designs for submarines by the Bureau of Construction and Repair. Last year a design for a fleet submarine was prepared and issued to bidders, but no bids were received thereon, the contract being awarded on the basis of a bidder's design. This year, however, the naval bill contemplated the inclusion of three submarines of about 800 tons, this being the size recommended strongly by the Commander of the submarine force. The design of one of these vessels has been practically completed by the bureau and it is the intention to build this vessel in a navy yard. The other two 800-ton submarines have already been contracted for in private yards. Work on all these vessels will be rushed with a view to obtaining from the results of their trials data in regard to the comparative value of the different types with a view to the selection of that which is likely to prove most efficient under service conditions.

W. L. C.

Producing Brass and Bronze Die Castings

To overcome the limitations then existing to the universal application of die castings to general engineering practice, the Doehler Die-Casting Company, Brooklyn, N. Y., at the beginning of 1913, began a series of experiments. The work undertaken by the engineering and metallurgical departments of the company was divided into four branches, the improvement of the zinc alloys then in use, the elimination of air holes, the die casting of aluminum and its alloys and the die casting of the higher fusible copper alloys such as brasses and bronzes.

The elimination of the air holes occurring was brought about, it is stated, by a careful study of gating and venting conditions. As die castings are made by forcing metal into a steel mold under high pressure, it follows that air cannot pass through the mold, which, it is pointed out, results in air being trapped unless vents are provided in the die, since the metal chills almost as soon as it enters the mold. A considerable number of experiments was required to produce, for example, uniformly solid bearing castings.

In January, 1914, the experiments had proceeded far enough for the company to exhibit die castings made from virgin aluminum and 8 per cent electrolytic copper.

The final stage in the process has been reached, it is now announced, and at the present time commercial brass and bronze die castings, which will be marketed under the trade name of Do-Di castings, have been made. The castings produced by this process are made from yellow and red brasses and phosphor, aluminum and manganese bronzes.

The Western Drydock & Shipbuilding Company, Fort William, Ont., has closed a contract for the construction of 8 steamers, 6 ocean-going and two 600-ft. Great Lakes freighters. The capacity of the plant is to be doubled.

Electric Pig-Iron Production in New Zealand

Electric furnace pig-iron production in New Zealand is being looked into by the authorities and the chief electrical engineer of the government has made a report. Iron ore and water power are plentiful. Referring to electric smelting in Sweden the report says:

> Where water power is cheap and where a special grade of iron is produced [in the blast furnace] from pure ores with the use of charcoal, electric smelting is cheaper than the blast-furnace smelting. . . . On the contrary, where low grades of ore only are obtainable (and this applies to the vast bulk of ore in the world), and where coal is cheap, and where the demand is such that pig iron can be produced on a large scale at the rate of 700 to 2000 tons per week per furnace, electricity has not a hope of competing with the blast furnace. That is to say, where pig iron has to be produced of ordinary every-day quality from average quality of ore, a blast furnace is unrivaled.
>
> For remelting and refining iron, electricity is coming into general use at a very rapid rate. It is also being used at a rapidly increasing rate for foundry purposes, and is especially adapted for this class of work, as it will deal with a greater variety of material than the ordinary converter in use in foundries and engineering works is capable of doing. Another use to which the electric furnace is being put very largely is for reheating and annealing purposes, and it has a special field all its own in the production of special alloys of iron which cannot be produced in any other way, or not so economically.

As regards New Zealand, the report further states, the two principal sources of iron are the Parapara iron and the Taranaki iron sands. The Parapara ore is of medium quality as regards the iron content, and can probably be more economically produced and smelted by the blast-furnace process as long as coke is available in New Zealand. As regards the Taranaki iron sands, there exists here a source of considerable industry which will be developed in time for making special pig iron in which titanium will play an important part, and also for the purpose of making alloys of iron and titanium for special purposes, and, given a demand for special pig iron and for ferrotitanium alloys, these could be more economically produced from the iron sands by means of an electric furnace than by the blast-furnace process. The reason of this is that the fine grains are not suitable for use in a blast furnace, because they tend to choke the furnace, and also are liable to be carried away by the blast. Consequently some form of briquetting has to be adopted, which adds to the expense, and moreover does not permit the blast furnace to work at its best advantage.

Fabricated Steel Work in November

The fabricated steel work put under contract in November amounted to 78 per cent of the capacity of the bridge and structural shops of the country, or close to 135,000 tons, according to the records of the Bridge Builders and Structural Society collected by its secretary, George E. Gifford. This compares with 77 per cent for October. In the period from and including March, 1915, when the improvement after the shock of the European war was first felt, to and including May, 1916, or a period in which there was a considerable amount of plant extension, contracting was done at the rate of 138,500 tons per month. Thus in the last two months the contracting has been done at nearly as high a rate. In the four months of June, July, August, September of this year, following the brief spell when buying from foreign sources fell off momentarily and when high prices began to count, the engagement of bridge and structural shops averaged about 95,000 tons.

J. Winfield Reed, receiver of the Standard Sheet Metal Mfg. Company, Washington, Pa., will sell the plant at auction, Jan. 11, at 1:30 p. m. The property consists of over two acres of land on which is a concrete and steel building equipped with machinery for the manufacture of sheet-metal goods, stated to be in good repair and ready for operation.

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THE IRON AGE

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Co-operation in Readjustment

In referring to the address of Chairman Hurley of the Federal Trade Commission at the May meeting of the American Iron and Steel Institute in New York, it was said in these columns:

When Commissioner Hurley tells us, and with good reason, that a study of the methods of the European steel syndicates "will suggest to us methods of meeting this competition successfully," the inevitable destination of his logic is some form of regulation of prices and output at home.

Mr. Hurley had been telling the steel manufacturers in attendance at the meeting how successful the European steel syndicates had been, and in describing the procedure of the different organizations he had told how they "pooled their forces" or "combined" or "had an agreement" or "organized and co-operated." In view of these very effective organizations among the foreign competitors of American manufacturers, the Federal Trade Commission has been actively supporting the Webb bill and has argued that Congress never intended the anti-trust act to "prevent Americans from co-operating in export trade for the purpose of competing effectively with foreigners, where such co-operation does not restrain trade within the United States and where no attempt is made to hinder American competitors from securing their due share of the trade."

In commenting on Mr. Hurley's address we pointed out the well-known fact that the success of the steel syndicates of Europe which are held up as patterns is due largely to their ability to maintain in their domestic markets higher prices than those at which they sell for export. It was added that these syndicates would consider government permission or even encouragement of combination for exports a doubtful gift, if with it came government prohibition of co-operation in the home trade. The same observation is pertinent now in view of President Wilson's full committal to the Webb bill, so that as he puts it our manufacturers may have "a free hand in the matter of combined and concerted effort" to extend the export trade. He would clear away "all legal obstacles and create a basis of undoubted law for it [foreign commerce] which will give freedom without permitting unregulated license."

What essential difference in its moral aspect is to be found in the conduct of American manufacturers when combining in the interest of the nation to extend our foreign trade and their conduct in so acting when the exigencies of domestic trade require such concert? The question of some form of co-operation in domestic industry to bridge over the period of world-wide readjustment following the war is certain to come up for decision at an early day.

The steel industry in the warring countries has been the most active in the past two years and will come to the end of the war nearer its normal strength and better equipped for international competition than any other. It is not too soon, therefore, to consider what steps the steel manufacturers of the United States will take, when war demand ceases, to insure an orderly readjustment of prices to conditions then prevailing and of production to consumption in the period of uncertainty that is known to be ahead, and of which the least determinable factors are its beginning and its duration. What way can be found, if any, of applying the Supreme Court's "rule of reason" in the regulation in an industry of conditions that might prove disastrous and of realizing at the same time what the President describes as "freedom without permitting unregulated license." There is no authority granted the Federal Trade Commission in such matters, it is true. But if public sentiment is really to be the arbiter—and that is the basis on which official investigations of important labor disputes are undertaken—there are possibilities of very important public service in a Trade Commission investigation of the procedure of manufacturers who set out to plan together for the proper conduct of their industry in a trying time.

It may be expected that the Supreme Court decision on the Steel Corporation dissolution suit, in which the Gary dinner movement was made by the Government counsel to be the climax of the corporation's offending, will go farther than that court has yet gone in saying how far business men may act in concert for the good of their industry. If it does not, then steps should be taken to clear away not only the legal obstacles to which the President directly refers in advocating the Webb bill, but also those logically involved in his plea, such as an attorney general might invoke to prevent co-operation at home for the welfare of domestic trade.

There will be abundant concert in Europe after the war. It will be found among business men in the same country and among countries having mutual interests—all operating against American trade extension abroad and for a larger entry of foreign products into this market. In such a time it is only folly to allow the Sherman act to stand as it is, making a fetish of its vagueness, and penalizing at home the very procedure which our Federal Trade Commission finds to have worked wonders for industrial Germany.

The Mind and the Market

The famous "law of supply and demand" in the making of markets really works through a tortuous course. Dealings are in goods in various stages of manufacture, and even the oft-cited "ultimate consumer" is frequently found to be an elusive individual. Is the railroad the ultimate consumer of steel rails, or is the consumer the one who ships foodstuffs, or the one who eats the foodstuffs, or the employer of the man who eats the foodstuffs?

To seek for the real consumptive demand, the demand of the ultimate consumer, is, on the whole, a fruitless task. At the other extreme there is for a specified commodity the actual expressed demand of the buyer, of the man who inquires as to the price of the commodity and indicates a willingness to buy it. That demand may have, and usually does have, but a remote connection with the ultimate consumption of the commodity or the goods made from it, if, indeed, the ultimate consumer can be found at all. It is for the prospective buyer to determine by his own mental processes, equipped with various items of information, what his demand really should be. Thus it is what is in the minds of men that determines the specific demand for a commodity at a given time.

If the decision of the possible buyer rested exclusively upon consideration of material things, of physical conditions, his expressed demand would be in direct and exact relation thereto, but this is very far indeed from being the case. Both buyer and seller endeavor to determine what is in the other's mind, as well as what is in the mind of competitive sellers and buyers.

Thus the market is made by the mind, and the mind is controlled by many influences other than those resting upon physical conditions. When physical conditions change rapidly the market is apt to fluctuate even more widely, because the mental appraisement diverges widely. For instance, the breaking out of the European war saw an advance in pig tin from 31 cents on July 30, 1914, to 65 cents on August 7, eight days later, on the assumption that it might be impossible to ship tin by water to the United States. Spelter advanced from 4.82½ cents, St. Louis, on July 30 of that year, to 5.95 cents on Aug. 27, on the assumption that large quantities of spelter would be shipped out of the United States by water. These market movements were not due to physical conditions, for it could not reasonably have been expected that it would be impossible to ship tin by water and easy to ship spelter. On Sept. 25 following, pig tin returned to 31 cents, while on Nov. 4 spelter returned to 4.82½ cents. The subsequent advance of spelter to 25 cents, in the following June, was due partly to physical conditions, but in considerable part to the mental appraisement, subsequent events showing that the appraisement was too high.

The iron and steel markets, as traced by the movement of prices and the daily or weekly turnover in actual tonnages, cannot be read aright unless very full allowances be made for the influence of the mind upon the market. The fluctuations in the volume of business from time to time since the beginning of the war, and the greatly varying rates at which iron and steel prices have advanced from time to time, have occurred chiefly through varying mental attitudes. The change in physical conditions has been practically continuous.

As a suggestion for the future, therefore, it is well to consider how far from a steady course the movement in the iron and steel market has been. Ordinarily pig iron and finished steel prices move together as to direction. Finished steel prices began to advance in January, 1915, but pig iron fluctuated, and during six months of advancing steel prices scored no general advance whatever. In the closing months of last year there was a rapid advance, to be followed by a practically stationary market for the first seven months of this year. Since Sept. 1 prices have been advancing much more rapidly than they did a year earlier. There are no conceivable physical conditions which could change in such manner as to comport with this course of the market.

In finished steel prices there were moderate, almost halting, advances during the first nine months of last year. For six months thereafter prices advanced very sharply. Then, during four months, they advanced very slightly, while in the past four months, beginning with last August, they have again advanced very sharply. As to the volume of business, the Steel Corporation's unfilled obligations decreased 20,000 tons in August, 1915, increased 1,000,000 tons in the following November, decreased 300,000 tons last June and increased 1,000,000 tons last November. The wide variations from time to time in the rate of price advances, and in the volume of buying, did not agree with any conceivable changes that could have occurred in things material. The fluctuations were due chiefly to changing judgments.

The advent of the war plunged industry in the United States into still deeper depression than had previously existed, and while physical conditions improved and the financial fabric was made sound by the establishment in November, 1914, of the Federal Reserve System, the building up of confidence was very slow. Under date of July 15, 1915, THE IRON AGE market summary said: "July developments have gone so far to strengthen the situation that steel manufacturers now speak with assurance concerning the remainder of the year"; but the steel industry was then operating only at 90 per cent of its capacity. The war was then nearly a twelvemonth old. On Sept. 23, when the war was only two months older, came the first reference to "scarcity," the phraseology being "special influences that have produced a scarcity of steel." During the following six months steel prices advanced by leaps and bounds. The war was simply proceeding. There was a new physical condition, that

the steel mills were filled with orders beyond their capacity, but they became so well filled chiefly because it had been concluded that steel might become very scarce.

At one time a combination of circumstances and views makes men buy freely. At another time a combination, and perhaps a chance combination, tends to make them leave off buying. It was probably no chance coincidence that the great steel-buying movements of 1909 and 1912 both ended at the close of the respective years. The holidays always bring a lull, and that influence, acting in the same direction with other influences, brought about a change in the general market trend.

A buying movement such as has occurred lately is certain to spend its force, either by business being placed so far ahead that still later deliveries cannot be considered, or by prices going to such a level as to make buyers pause. Fortuitous circumstances help to delay, or to hasten, such a pause. At this time we have the German peace proposal, which has made men stop to think that the war certainly will end some time, a mental operation which could have occurred at any earlier time, but did not, and we have also the advent of the holidays. Here is an unusually strong combination of influences upon the minds of men, tending to reduce the market activity. Physical conditions are certainly of minor consequence at this time. If, next month, activity is resumed at the pace of the past few months, or at that of a year ago, the resumption will be due to physical conditions taking control.

Extent of Automobile Ownership

While the growth of the automobile business is the subject of frequent comment, it is, nevertheless, interesting to note what an automobile authority gives as the present status of automobile use in this country. President John N. Willys, of the Willys-Overland Company, addressing the Association of Life Insurance Presidents Dec. 14, at the Hotel Astor, New York, stated that 10 years ago there were only 120,000 automobiles in the United States; in 1912 the 1,000,000 mark was passed; on Dec. 1 of this year the total number was 3,352,000, representing an approximate value of $2,000,000,000. When it is considered that the automobile industry is practically less than 20 years old, these figures are staggering. Not only is the growth of the business one of the marvels of the age, but the steadily accelerating vigor of its growth has been even more marvelous. Frequently, especially in periods of business depression, the subsidence of what has often been termed "the automobile craze" has been predicted. These predictions have so far been set at naught. Possibly at some time the production of automobiles in this country may exceed the demand and the industry will then go through a period of depression, with reorganization on a different basis, but it must be admitted that no indication of such a condition is yet apparent.

The office of the Grant Iron & Metal Company, Detroit, Mich., dealer in scrap material, is now located at 1821 Dime Bank Building. The company maintains its yard at 300 Franklin Street, as heretofore.

Second Koppers By-Product Coke Plant in Canada

The Dominion Iron & Steel Company, Sydney, Nova Scotia, has closed a contract with the H. Koppers Company, Pittsburgh, for the construction of 120 Koppers by-product coke ovens, together with a Koppers by-product plant for the recovery of tar and the manufacture of ammonium sulphate. These ovens will be similar in every way to ovens recently built in the United States, except that they will be reduced in width and will take but 11.4 net tons of coal per charge. This narrower width is to adapt the oven to the high volatile coal to be used. The Dominion Company now has in operation a by-product coke oven plant, consisting of 400 Otto ovens and an Otto by-product recovery plant. The new installation will be a separate plant from the Otto installation, and will be complete in every respect. It will be intended for the production of blast-furnace coke for the company's own furnaces and will use the company's own coal, mined in Nova Scotia. This is the second by-product coke plant to be built by the H. Koppers Company in Canada. Some years ago it built 120 ovens for the Algoma Steel Company, Sault Ste. Marie.

Accidents at Metallurgical Plants

Fatal accidents reported at metallurgical plants in the United States in 1915 were 68, of which 30 were at ore-dressing plants and 38 at smelters. In 1914 these were 23 and 33 respectively. These data are from the second report of the Bureau of Mines on accidents at metallurgical works, and cover returns from 110 smelting plants in 1915 as compared with 94 in 1914, and include copper, lead, zinc and quicksilver smelters, as well as refineries, but do not include iron-blast furnaces. They represent also concentrating plants for copper, lead and zinc ores, stamp mills, cyanide plants and iron-ore washers. Non-fatal injuries at ore-dressing plants in 1915 were 2095 and at smelters 5718; these were 1434 and 5673 respectively in 1914. There were 63 permanent partial disabilities at ore-dressing plants and 87 at smelters. Total men employed were 49,891 in 1915, as compared with 41,461 in 1914.

German Steel Shipments Decreasing

Monthly shipments of the German Steel Works Union continue to decrease, those for October having been only 230,544 metric tons, as compared with 244,212 tons and 250,831 tons in September and August respectively. In October, 1915, the total was 257,278 tons. The average for the 10 months to Nov. 1, 1916, was 276,929 tons, as against 293,471 tons per month to July 1, 1916, and 270,510 tons per month for 1915. The October shipments were made up of 26,384 tons of semi-finished steel, 81,447 tons of railroad material and 72,723 of shapes.

Coke will be produced at the new plant of the Seaboard By-product Coke Company at Jersey City, N. J., early next year, estimating from the present stage of the construction work. By first erecting only temporary steel sheds to cover the 110 ovens while under construction, the H. Koppers Company, Pittsburgh, which started work May 1 this year, has been able to bring the ovens rapidly toward completion. The by-product building, boiler house, quenching track, purifiers and coal and coke-handling apparatus have been started in the order named. The benzol plant will be the last structure undertaken.

The Henry Miller Foundry Company, Cleveland, has been incorporated with a capital stock of $1,000,000. This new company has been formed to merge the T. E. Henry Furnace Company and the foundries controlled by the same interest in Medina, Canton and Chagrin Falls, Ohio. T. E. Henry is president; C. H. Miller, vice-president, and E. S. Moncrief, secretary and treasurer.

British Supervision of Steel Tightens

U. S. Vice-Consul Richard Westacott, London, England, sends the following, under date of Nov. 28, which appears in *Commerce Reports* of Dec. 18:

An order has been issued by the Ministry of Munitions of War concerning steel bought and sold or manufactured in this country, and also steel imported from any other country. A clause of the order shows that the regulation affects all imported steel made by the open-hearth or Bessemer process, in so far as its distribution on arrival in the United Kingdom is concerned. The chief provisions of the order are:

No order for steel made by the open-hearth or Bessemer process (other than shell-discard quality) shall be accepted for manufacture, and no such steel shall be manufactured unless the purpose for which the steel is required has been approved.

Full and accurate returns shall be made weekly to the Director of Steel Production, Ministry of Munitions, Whitehall Place, London, S.W., on the form provided by him, showing particulars of all steel manufactured and delivered.

No special form of certificate to accompany an order is required, but the following particulars must accompany all orders: Government contract reference and number, with purpose, or Ministry of Munitions permit reference and number, with priority classification, and purpose, and a declaration that the whole of the material specified is required for the purpose covered by the references and classification.

For the purpose of this order the term "manufacture" shall include casting, rolling, or rerolling, forging, and pressing, and the term "steel" shall include all forms of open-hearth or Bessemer steel made in this country or imported whether new, second hand, defective, or scrap for rerolling.

Bethlehem Ingot Mold Foundry

The rapid expansion of steel production facilities at South Bethlehem, Pa., and the acquisition of subsidiary plants have created a necessity for greater ingot-mold-producing capacity. The Bethlehem Steel Company, therefore, has planned an ingot-mold foundry with a nominal capacity of 500 tons per day, or 150,000 tons per annum, to be located at the eastern end of its Saucon plant. The building will be 550 x 250 ft., of brick and steel construction, and will be equipped with all the latest facilities for economical production of ingot molds, flasks and stools. It is planned to use direct metal, and for this purpose a 400-ton mixer will be installed as well as two 7-ft. cupolas to melt from cold stock when desired.

The building and yard storage will be covered with high-power traveling cranes to economize handling of materials. A pneumatic sand-handling apparatus will deliver the various sands from their respective mixers to points required in forming molds. The foundry is to be well equipped with core ovens, cranes, cupolas, sand-handling machinery, compressors, and toilet and wash rooms. The cost of the building and equipment will approximate $750,000. About 250 skilled employees will be required for operation to full capacity.

Wellston Furnace Reconstruction

The Wellston Iron Furnace Company, Wellston, Ohio, has completed the reconstruction of its No. 1 stack, which will be operated in conjunction with the No. 2. These furnaces are controlled by M. L. & S. Sternberger, Jackson, Ohio, as noted in THE IRON AGE of June 10, 1916. At the time the plant was taken over, the stoves and power equipment were in good condition, but No. 2 stack required relining and No. 1 stack complete rebuilding. This work has been accomplished, No. 2 having been in operation since early in August and No. 1 being ready for operation as soon as a supply of coke can be relied upon. The Frazier-Sheal Company, Cleveland, did the engineering for this work; the Morrow Mfg. Company, Wellston, the steel work, and John Rinehart, Cleveland, the brickwork.

Following a campaign which resulted in nearly trebling the membership of the Merchants & Manufacturers' Association of Baltimore, Md., that body plans to establish a foreign trade bureau, a retail credit bureau and a national and international advertising campaign in the interests of Baltimore and merchants of that city.

Important Measure for Large Shippers

WASHINGTON, D. C., Dec. 19, 1916.—A measure of much importance to large shippers who, in the ordinary course of business, load on railroad cars a considerable proportion of their own freight, has been introduced in the Senate by Senator Pomerene, of Ohio, as an amendment to the bill of lading act passed by Congress at the last session. The new bill is designed to remedy a serious defect in the law due to the haste with which it was necessary to force its consideration in order to secure its passage on the eve of the adjournment of the session.

Few, if any, measures of interest to the business community passed by the present Congress are more important than the negotiable bill of lading act which became a law last August. This legislation, estimated to affect annually consignments of merchandise valued at the enormous sum of twenty-five billion dollars, was first brought to the attention of Congress early in 1912 by the Commission on Uniform State Laws of the American Bar Association, the leading railroad systems and the largest shippers' associations of the country. The original measure was introduced by Senator Pomerene and in a slightly modified form as applied to interstate transactions has already become the law in 10 of the leading States of the Union. The chief purpose of the bill was to render bills of lading a sound basis for bank advances, by prohibiting, under severe penalties, the alteration, forging or counterfeiting of bills or any other irregular practice calculated to detract from the value of bills for banking and credit purposes. An important provision of the bill prohibited carriers from indorsing bills of lading "Shippers' weight, load and count," for the purpose of evading responsibility for loss in transit.

When the Pomerene bill, after passage by the Senate, was reported to the House by the Committee on Interstate and Foreign Commerce a provision was inserted relieving carriers from responsibility for goods actually loaded by the shippers. The bill as thus amended was passed by the House and sent to conference. Believing that one of the most important features of the bill was nullified by the House amendment, Senator Pomerene was strongly disposed to prevent the adoption of the conference report, which, in view of the parliamentary situation, he could easily have done, but he also realized the importance to shippers of the early passage of the other provisions of the bill and he, therefore, accepted the House amendment, but gave notice that upon the reconvening of Congress he would introduce a new bill intended to close the gap in the original measure. He has, therefore, presented in the Senate a substitute for section 21 of the bill of lading act, to read as follows:

That when goods are loaded by a shipper at a place where the carrier maintains an agency such carrier shall, on written request of such shipper and when given a reasonable opportunity by the shipper so to do, count the packages of goods, if package freight, and ascertain the kind and quantity, if bulk freight, within a reasonable time after such written request, and such carrier shall not, in such cases, insert in the bill of lading or any negotiable receipt, contract, rule, regulation, or tariff "shippers' weight, load and count," or other words of like purport, indicating that the goods were loaded by the shipper and the contents thereof are unknown. If so inserted, contrary to the provisions of this section, said words shall be void, but shall not affect the rights of any person otherwise entitled under the bill of lading or receipt therein.

The new measure will probably pass the Senate at an early date, having been approved by that body no less than three times in as many years, but it will have to run the gauntlet of the House Committee on Interstate and Foreign Commerce, which for some occult reason stubbornly opposed the original Pomerene bill and, in finally yielding to public opinion, emasculated one of the most important features of the measure.

W. L. C.

The Cutler-Hammer Mfg. Company, Milwaukee, has leased the main arena of the Milwaukee Auditorium for the first annual Christmas celebration for its employees on Dec. 22. Provision is being made for more than 5000.

Wage Advances and Bonuses

To avert a general tie-up, with ruinous results for the trade, the stovemakers of the country, through the wage committee of the Stove Founders' National Defense Association, agreed Dec. 16 to the largest single wage advance ever accorded workers in that industry. Under the agreement, first acceded to by a subcommittee and ratified later by the committee of the whole of the stove manufacturers and the International Molders' Union, men who work in stove plants are to receive wage advances aggregating a little more than 18½ per cent. On Jan. 1, when the new scale takes effect for one year, stove foundry workers also will have a working day shorter by 30 minutes than that stipulated in the agreement effective for the last four years. The conference was held at Atlantic City and had been in session since Dec. 6. The men asked for an advance of 25 per cent.

Striking molders and coremakers have returned to work at the plant of the Simms Foundry Company, Racine, Wis., after being out two weeks. This is the first relief from the general foundry strike declared by the unions Dec. 1. The Simms Company made no concessions and continues as an open shop.

The Blaw Steel Construction Company, Pittsburgh, whose works are located at Hoboken, Pa., has announced that bonuses will be given to all employees not participating in the existing profit-sharing arrangement, who have been in the service of the company six months or more. Employees of longer than three years' standing will receive 7 per cent of their 1916 salary; from two to three years, 6 per cent of this year's salary, and from six months to two years, 5 per cent.

The Ohio Seamless Tube Company, Shelby, Ohio, has granted its employees a voluntary advance in wages of 10 per cent, effective from Dec. 15.

Effective Dec. 16, the H. C. Frick Coke Company announced a general advance in wages of about 10 per cent, and later other leading coke producers, notably W. J. Rainey, Washington Coal & Coke Company and Hostetter-Connellsville Coke Company, announced a similar advance. Wages at the advanced rate are as follows:

Pick mining and loading room, run of [illegible] coal, per 100 bu.	$1.82
Pick mining and loading heading coal, per 100 bu.	[illegible]
Pick mining and loading wet heading coal, per 100 bu.	2.20
Drawing coke, per 100 bu. charged	1.05
(All the above by same measurement as at present)	
Drivers and rope riders (shafts and slopes), per full run	[illegible]
Drivers and rope riders (mules), per full run	[illegible]
Cagers, per full run	3.50
Fire bosses, per day	[illegible]
Tracklayers, blasters and timbermen (shafts and slopes), per day	3.50
Tracklayers, blasters and timbermen (mules), per day	[illegible]
Assistant tracklayers and assistant timbermen, per day	[illegible]
Inside laborers, per day	[illegible]
Dumpers and tipplemen, per full run	[illegible]
Leveling, per oven charged	[illegible]
Chargers, per day	[illegible]
Forking cars, 40,000 lb. capacity and less	[illegible]
Forking cars, 50,000 and 60,000 lb. capacity	[illegible]
Forking cars, over 60,000 lb. capacity	[illegible]

The prices for all other labor [illegible] operation of the plants will be proportionate with the "Full run" men to be paid for extra [illegible]

It is said this advance in wages affects close to 100,000 coal miners and coke workers, and places the wage rate for these classes of labor at the highest point it has ever reached. It is the third advance in miners' and coke workers' wages made since Jan. 1, 1916, the first having been announced Feb. 1, and the second May 8. In spite of the very high wages being paid, there is a serious shortage in labor in the Connellsville coal and coke fields, which [illegible] the output.

The A. O. Smith Corporation, Milwaukee, has given each of its 1400 employees a life insurance [illegible] the group plan, and in addition increased the wages of all in the service more than three months, and receiving less than $125 per month, by 10 per cent.

The New Jersey Zinc Company has decided upon a profit-sharing distribution by which its employees will receive 14 per cent of their wages the past year, payable in quarterly installments in 1917. Under the plan no employee is to receive in excess of $1,000.

The Willys-Overland Company, Toledo, Ohio, has announced a voluntary increase in wages to its employees. The advance is on a sliding scale, depending on the man's present earnings, and ranging from 7½ per cent for those earning 40c. per hour to 10 per cent for those earning 30c. per hour. Piece-work rates will be raised 5 per cent.

The Doehler Die-Casting Company, Court and Ninth streets, Brooklyn, N. Y., with factories in Brooklyn, Newark, N. J., and Toledo, Ohio, has offered all its employees the following inducements in the form of an extra participating dividend on their wages: Beginning Jan. 1, 1917, whenever the company declares the regular dividend on its stock it will also declare a wage dividend amounting to 10 per cent per annum to all employees based on all wages actually received, including piece work and overtime. This wage dividend is subject to certain conditions as to the employee's term of service. He must first be in the company's employ without interruption for a full year before he can participate. Also, beginning Jan. 1, 1917, all employees who have been working on the basis of 50 hr. per week will be put on a basis of 48 hr. at the same pay. The company employs 1200 men, and has a weekly payroll of approximately $25,000.

Locomotive Orders Continue Large

Locomotive orders reported in the past week have been 243. The American Locomotive Company will furnish the Wheeling & Lake Erie with ten Mallets, the Tata Iron & Steel Company with five switching engines, and the Philadelphia, Bethlehem & New England with four switching engines. The Baldwin Locomotive Works will build fifty Mikado locomotives for the Great Northern, thirty Mallets and ten Pacifics for the Baltimore & Ohio and four switching engines for the Duluth, Missabe & Northern. The Canadian Government Railways have ordered ten Santa Fes from the Montreal Locomotive Works. The American Locomotive Company will also build 110 decapod locomotives for the Russian Government, each locomotive having 52-in. driving wheel centers and weighing 202,000 lb. It is understood that this brings the total now ordered by the Russian Government to 331 engines, divided as follows: American Locomotive Company 150, Baldwin Locomotive Works 140 and Canadian Locomotive Company 41. It is stated that a total of 350 will be placed at this time and probably more later. Recent inquiries amount to forty-six locomotives, the New York, New Haven & Hartford negotiating for forty Santa Fes. To Dec. 16 inclusive the total orders for the month are estimated at 357, of which 210 are for export.

W. E. Welborne of Welborne & Co., 44 Whitehall Street, New York, will probably be president of the new Louisville Steel & Iron Company, Louisville, Ky., which will take over the old plant of the Louisville Bolt & Iron Company. Mr. Welborne and D. E. Potter, San Antonio, Tex., have acquired a large part of the holdings of George Holzbog, Jeffersonville, Ind., in the property and propose to begin the manufacture of bar iron and steel about Jan. 1. E. S. Quirke, formerly with the Swedish Iron & Steel Corporation, Brooklyn, N. Y., will be superintendent. The company has a capital stock of $400,000.

The United Alloy Steel Corporation, Canton, Ohio, plans the erection of a new combination 14 and 12-in. [illegible] mill for rolling merchant bars. The company is understood to have not yet decided whether to build [illegible] in Canton or in Detroit, Mich., where a site is under consideration.

STEEL CORPORATION'S BONUSES

Annual Stock Offer Also—Employees' Increase for Year, $33,000,000

Chairman Elbert H. Gary made the following statement this week relative to the annual subscription by employees to the stock of the corporation and the annual distribution of bonuses. In the same connection he gives an idea of the vast sum involved in the wage increases of the year and the special compensation to be distributed at its close:

The United States Steel Corporation will, in accordance with the plan in force during the last thirteen years, offer to employees the opportunity to subscribe, during the month of January, for 35,000 shares of stock at a price somewhat below the market; and also will distribute the usual special compensation. The total amount of the latter has not yet been definitely determined, but it will be calculated on the basis heretofore fixed. A part will be paid in cash and the balance in preferred stock in the same proportions and on the same terms as last year. It is hoped distributions will be made to the smaller salaried men about Christmas and to the others about New Year's. Also many of the men in offices, particularly those not receiving special compensation above referred to, will receive increases in salaries to take effect Jan. 1.

As a rough estimate, it may be stated that the three wage increases, made Feb. 1, May 1 and Dec. 15 respectively, the increases in salaries from time to time, and the special compensation will aggregate for the year about $33,000,000.

Imports of Ferromanganese

Ferromanganese imports into the United States in November, according to returns made to THE IRON AGE, were 7410 gross tons. In October they were 7914 tons; in September, 9237 tons, and in August, 8515 tons. The November imports bring the average for the 11 months of this year to 6390 tons per month. In 1915 it was only 4600 tons per month, while for the five years from 1910 to 1914 it was 8399 tons per month. The November imports were received as follows: 3264 tons through the port of Baltimore, 1371 tons through Philadelphia, 1238 tons through New York (818 tons of this from India), 927 tons through New Orleans and 610 tons through Newport News.

Spanish Steel Plants Extending

The war has caused the Spanish steel trade to burst into remarkable activity, according to a French trade paper. Exceptional profits made by a few steel companies fill other manufacturers with regret that they have not improved their plants. Recent events indicate a change: The Sociedad Altos Hornos de Vizcaya has increased its plant on a large scale; the Altos Hornos de Malaga has resumed after lying idle a long time; the Sociedad de Construcciones Mechanicos is increasing its capital to cope with orders for the French railroads, and another important company has very largely increased its capital.

Fire early in the morning of Dec. 18 damaged the electrical equipment of the universal mill of the Central Iron & Steel Company, Harrisburg, Pa., to the extent of about $10,000. As the high power services for the 72 and 89-in. plate mills pass through the universal mill and were also somewhat damaged, this caused a temporary shut-down of these departments. It is expected to have everything in operation again within a few days.

Local committees in Italy have been formed to collect and forward scrap metals, for which prices will be fixed by the government. The appeal is made to the press, teachers, doctors and priests.

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THE EMPLOYER AND ACCIDENTS

His Duty Toward Their Prevention—What Has Been Done in a Large Steel Plant

One of the papers presented at the fourth annual welfare and efficiency conference of the State of Pennsylvania, held at Harrisburg, Nov. 21, 22 and 23, was by George T. Fonda, safety engineer, Bethlehem Steel Company. The subject was "The Employer's Duty Toward Accident Prevention." From this paper the following extract has been taken:

The employer's duty toward accident prevention is only one side of a most vital problem. In my mind the duty is no greater on the part of the employer than it is on the part of the employee, and the converse is just as true. The duty of the employer must be fully realized at the beginning, otherwise there can be no accident prevention in a given industry. Perhaps you will say that if this is true then the duty of the employer is certainly the most important, but I say to you the beginning of such a propaganda, while it is indeed important, would do little if the employee could not be made to see his duty in its fullest importance. The beginning would be a miserable failure and productive of little or nothing, if this had to be the full extent of our effort.

The prevention of accidents is only one small part of a great industrial problem—the conservation of the human machine. It is difficult to understand why the necessity for such conservation has not been more generally recognized by industry long before this, but it is most commendable to note the tremendous strides which have been taken in such a comparatively short time. Employers all over this great country are alive to the general situation, and they are in many cases doing much more than their duty.

Let us not forget that the workman is placed in industry to produce. This is his first function and if he fails at his task what will become of him? The average workman is ever mindful of the particular part he is taking and of the fact that his very existence is dependent upon his ability to do his work and do it right. Many times the faithfulness and conscientious endeavor of an employee is the direct cause of his being injured and here it is clearly the duty of the employer to promote safety to such an extent that the workman will know that it is part of his job to turn out the work without injury to himself or any one else. This is clearly the duty of the employer and cannot possibly be denied as being fundamental.

Workmen do not intentionally get hurt. Ignorance or carelessness describes the cause of not less than 90 per cent of our industrial accidents to-day and here again the employer cannot overlook his direct responsibility.

THE NEED FOR EDUCATION

Education, in any phase you care to look at it, is the first and foremost duty of every employer in the promotion of accident prevention. It has been said many times that the plant must be safeguarded before you can do much preaching, and I need not dwell upon this particular point, because no one would ever deny the psychology of this statement. As a matter of fact, there are very few employers who have not been spending thousands of dollars on safeguards and will continue to do so just as long as they can find unguarded machines inside of their plants. Strange to say, the education of workmen in its relation to accident prevention has not been taken up so generally. Many employers have recognized the full value of educational work of this kind, but have been at a loss as to how the situation can best be handled. This condition has existed more particularly in the smaller plants as a rule, these plants having found it difficult to organize the work. It seems to me that a co-operative [illegible] ment on the part of the various interests in any [illegible] section would satisfactorily solve this problem and in view of the success which has been experienced among the larger industries throughout the United States, it would appear that a movement of the kind mentioned would deserve careful consideration.

Education, the keynote to many economic problems, certainly stands out above everything else as an activity which must be recognized by the employer not only as a duty, but as an absolute necessity. The foreigner in our industries is the first individual to be reached. He knows nothing of the whirl and rush of American industry and with it all he is unable to speak or understand our language. A study of the accident statistics of the company which I have the honor to represent shows that from 60 to 70 per cent of all workmen losing two days or more as a result of injury are foreign born. A situation of this kind must be met, otherwise little progress can be expected and it is certainly the duty of the employer to see to it that proper consideration is being given to this most absorbing question.

There are a number of things much more easily accomplished than successfully teaching the English language to foreigners, but in the majority of cases you will find these men most eager for this knowledge, once you have made them understand what it is all about. In South Bethlehem, we are conducting a free evening school for foreigners and there are to date over 1000 workmen enrolled, including 28 different nationalities. These men are not forced to attend these classes, but are urged to do so for their own good and the Bethlehem Steel Company feels that any effort or money expended along these lines can only be productive of the best results.

The next step in any educational safety campaign is carefully organized shop committees appointed to serve for a definite period of time, after which part or all of these committees are replaced by new men. This is not a new suggestion to any one, but the handling of these committees has all to do with the success or failure of a most valuable part of the work under consideration. I have heard it stated that shop committees were not of particular value any longer because their usefulness could not last beyond a very limited period of time in any plant that was completely safeguarded, etc. Such a statement simply proves that the work has not been properly organized and a valuable opportunity is being lost.

WORK AT BETHLEHEM STEEL COMPANY

I trust you will pardon a reference here to the organization we have worked out in connection with the activities of my own company. We have organized departmental safety committees in each department and in a number of instances these committees are made up entirely of foreigners. They are started out under careful instruction and are taught to look for dangerous conditions in their respective departments which are reported as a result of departmental inspections made periodically by these committees. In addition to being taught to look out for dangerous conditions and eliminate them, these committees are thoroughly drilled in first-aid work, and as a team are required to enter the interdepartment meet held the latter part of each summer. The winners of the first three places in these meets are given prizes well worth the effort and a great deal of interest has been stimulated through our annual meets. This year, for example, the winning team was taken on a trip to Boston to one of the games of the World's Series and was fortunate enough to see the only 14-inning game ever played in a World's Series. You can well imagine that this particular departmental committee found out that "safety" was well worth while and it is this sort of stimulation that makes for success in the work and which, of course, is in direct proportion to the employer's appreciation of the services rendered by the departmental committees.

The constant changing of these committees must gradually change the atmosphere of the entire working force and the effect will be productive of good results. The work we have been doing at Bethlehem has been most successful, and in the face of great odds with a considerable number of "green men" being employed, we have had a decreasing accident rate even including [illegible]

Just another thought in the matter of education as affecting injury to workmen. We would indeed like to feel that accidents would no longer occur; however, we must admit that such is not the case, and more or less frequently there is an unfortunate accident. In many cases a rather slight injury almost causes a death or at the best causes much anxiety over a period of weeks and sometimes months. The injured is lacking in the necessary vitality to convalesce quickly, and here education again can help the general situation. A filthy home and an unhealthy body are indirectly the cause of numerous accidents and if the problem is to be attacked from all sides these facts cannot be overlooked. Where the employer has seen his duty in its fullest sense, it has been found that this duty toward accident prevention has led into many by-ways, but the outcome in every single instance has proven the value of the effort and few employers to-day are attempting to sidestep their known responsibilities.

Solid Oxides of Nickel and Copper Reduced by Iron

To determine whether solid oxide of nickel or solid oxide of copper would react on solid iron at temperatures far below their melting points several pieces of 1-in. round bars of Armco iron containing 0.02 per cent carbon were drilled down the center and filled respectively with nickel oxide and copper oxide and consolidated by forcibly driving in a plug of the same iron. The bars thus prepared were placed in a muffle furnace and heated to about 1000 deg. C. for about 6 hr. for 3 days. When drawn from the muffle they were sectioned by sawing vertically through the center and then examined.

Dr. J. E. Stead, who made the experiments and who presented the results to the Iron and Steel Institute at its autumn meeting in London, Sept. 22, 1916, offered the following conclusions:

1. It has been proved that solid iron is capable of reducing solid oxide of nickel and oxide of copper to the metallic state with the formation of iron oxide.

2. That the interchange is not confined to the surfaces of contact, but extends for a considerable distance from the surface of the iron, suggesting that there is interdiffusion of iron and nickel and iron and copper, and of the oxides of these metals.

3. That surface tension plays an important part in causing the reduced metals and the oxides to segregate into coherent independent masses.

4. There is some evidence that the reduced metals, copper and nickel, are alloyed with some iron. More research is being made to determine whether this is so.

New England Foundrymen Meet

The most largely attended meeting of the New England Foundrymen's Association this year took place at Young's Hotel, Boston, Dec. 13. The speaker of the evening was Dr. Richard Moldenke, whose subject was "Physics of Cast Iron." The address was marked by the introduction of many interesting figures on shrinkage and kindred subjects and by a recital of numerous recent experiments which have not yet found their way into print.

The Reliable Auto Heater Company, 735 Guardian Building, Cleveland, has secured a lease, with option to purchase the plant and equipment, in Ashtabula, Ohio, formerly occupied by the Ashtabula Mfg. Company and will establish a plant there for the manufacture of automobile heaters. S. T. Campbell, former general manager of the Cuyahoga Stamping & Machine Company, Cleveland, is interested in the new company.

It is stated that the Stamford Rolling Mills Company, Stamford, Conn., has taken a contract from the Ford Motor Company for $2,000,000 worth of radiator brass, to be delivered within the year 1917. This company will have completed all its war contracts by Jan. 1.

LAKE ORE, 64,734,198 TONS

Adding All-Rail Shipments, Total May Exceed 66,000,000 Tons

The final reports from Lake Superior iron ore docks show that the total movement of lake ores by water in the season just closed was 64,734,198 gross tons. As already indicated in these columns the movement by water, together with the all-rail shipments (which are not known until the close of the year), will probably make a total for 1916 of more than 66,000,000 tons. The usual all-rail movement has been augmented in the past year by the ore shipped to the two Duluth furnaces of the Minnesota Steel Company, which went in blast a year ago, probably amounting to more than 500,000 tons. The movement of ore by vessel in December was extraordinary, amounting to 1,085,900 tons. In the table below are given the shipments by ports for 1916 and the three preceding years.

Iron Ore Shipments from Upper Lake Ports, Gross Tons

	1916	1915	1914	1913
Escanaba	7,457,444	5,649,289	3,664,454	5,399,444
Marquette	3,852,082	3,089,289	1,765,796	3,137,617
Ashland	5,067,814	3,146,772	3,383,119	1,358,220
Two Harbors	12,787,046	8,642,942	7,619,262	10,611,118
Superior	21,837,949	8,342,793	11,309,748	13,788,343
Duluth	10,735,853	15,437,419	6,318,291	12,331,126
Total by lake	64,734,198	46,318,504	34,021,000	49,076,478
Total all rail	953,947	707,826		876,638
Total shipments	47,272,751	32,729,726		49,947,116

It will be seen that the shipments from Minnesota alone—over 45,300,000 tons—were nearly equal to the entire ore movement of 1915. The Marquette shipments show that the Marquette range is capable of only a limited response to such a demand as this year. The Menominee range did somewhat better, while the Gogebic increased nearly 60 per cent upon its production of 1915. The Mesaba and Cuyuna ranges contributed more than two-thirds of the entire movement.

Indiana Manufacturers Meet

At the annual meeting of the Indiana Manufacturers' Association at Indianapolis, Dec. 14, B. A. Van Winkle, Hartford City, was re-elected president. It will be his fourth term. H. M. Clemmons, Cannelton, was elected vice-president; Henry C. Atkins, Indianapolis, second vice-president; F. M. Smith, Indianapolis, secretary; George O. Rockwood, Indianapolis, treasurer. Directors elected were: C. C. Hanch, South Bend; J. M. Herron, Connersville; Lee Rodman, Cannelton; B. F. Behren, Evansville; F. S. Hunting, Fort Wayne, and S. E. Swayne, Richmond.

The association adopted a resolution opposing eight-hour and minimum wages laws and resolved further to oppose honorably the introduction and passing of all such bills. In the discussion of the resolution it was said such altruistic measures would put Indiana manufacturers under a handicap in competing with those in foreign countries and eventually drive them out of business. It was further argued that labor neither wishes nor expects an eight-hour day. Alfred P. Thom, Washington, D. C., general counsel for the Railway Executives' Advisory Committee, was the chief speaker at the association's annual banquet. He made a plea for exclusive Federal control of railroad regulation.

Iron-Ore Deposits in Africa

Iron-ore deposits in the German colonies of West Africa are reported as large by a French authority. In Togoland the iron ore is hematite, containing 89.51 per cent. iron oxide, 9.47 per cent. infusorial earth, 0.24 per cent. alumina, 0.16 per cent. manganese oxide, and 0.30 per cent. phosphorus acid. The deposit probably represents 20,000,000 gross tons. In the Kamerun district an abundant deposit analyses 42.29 per cent. metallic iron; manganese, 0.35 per cent.; phosphorus, 0.17 per cent., and infusorial earth, 12.26 per cent.

Iron and Steel Markets

APPRAISING PEACE TALK

First Steel Trade Halt Short Lived

Fresh Foreign Buying of Shell Steel and Cars—Price Advances Not Over

The first effect of peace talk upon the steel trade was a halt in new orders. That was confined, however, to last week. The market of the past three days shows a practical return to conditions of ten days ago. Domestic consumers are working just as hard to get steel from the mills, inquiry keeps up for all forms of product and the new foreign demand is greater than can be considered.

Here and there is a change of attitude as to placing orders for the far future, and a resurvey of projects based on indefinite continuance of the war. What has happened mainly is that peace is taking a definite place in calculations, whereas it had no place before or was thought of as too far in the future to affect present plans.

The difficulties of getting any early deliveries of pig iron or steel or any concessions in prices for such deliveries are unchanged by the peace proposal. That the war may end in 1917 is more seriously thought of than heretofore, and it is granted that price readjustments will anticipate the end. Yet the immediate movement of some prices may even be upward. Billets are $5 and light rails $3 higher this week. Early advances in contract plates, shapes and bars are looked for, and wire products apparently have not yet reached their high point. It is an interesting fact that the buyers for the Allies have lately made a more determined set for lower prices on forging contracts for the second half of next year.

Some mills have not yet opened their books for the second quarter of 1917; more have made no sales for the second half, but there is now every indication that all the deliveries promised for the first half cannot be made in that period.

In view of the large contracts for shell steel already on the books for the Allies to be shipped in 1917, probably 3,000,000 to 3,500,000 tons, it is significant that France and Italy have placed additional orders in the past week—Italy for upwards of 25,000 tons. Italy only lately bought 25,000 tons of barb wire here, part of a total of 75,000 tons of wire products for export taken by the Steel Corporation in November.

Car builders have been large buyers of plates and shapes, estimates ranging above 100,000 tons. A 3000-car order for Russia was divided between two companies and all told 10,000 cars have been ordered in a week. Russia's recent locomotive contracts cover 350 and both Great Britain and France are buying locomotives here.

Transportation machinery is breaking down in all directions and the situation is most acute in the Pittsburgh and Valley districts. More blast furnaces have banked because short of coke, and steel is piling up at the mills. The deplorable shortsightedness of the railroads promises more or less blockade at Pittsburgh throughout the winter. There will be no ten-day shut down there, as has been proposed; such a thing, with the present demand for steel, is out of the question. Pittsburgh district producers are hurt also by serious lack of natural gas.

Apart from car material, plate mills still have a large business offered them. Italy is making new efforts to get 10,000 tons of plates, and the demand from neutral countries is unabated.

Europe's need of railroad steel is seen in the taking up of 100,000 tons of rails in Canada for shipment to France. A similar removal of Canadian track was made some months ago. The replacement of such steel will be but one factor in the after-the-war demand.

Producers of wrought pipe are generally sold up for six months; with business from usual customers added, some have little to offer in the second half. Late gas and oil line business includes 100 miles of 8-in. pipe, and 500 miles of 8-in. pipe for Oklahoma and Texas oil lines will soon be placed. For a Canadian natural-gas line 80 miles of 10 to 16-in. pipe will be wanted.

Domestic pig-iron inquiry has fallen off sharply, and export business is less. Italy has just taken 10,000 tons more of Bessemer iron. Steel-making pig iron in the Pittsburgh district is very quiet.

Blast furnaces are facing much higher coke cost. They refused to contract at $4 for the first half, but $4.50 is now the producers' figure. Spot coke has sold in considerable quantity at $9.

The general use of 50 per cent ferrosilicon in steel-works operations makes important the reported limitation of Canadian electric power now employed at Niagara in making this product for the American market. The movement is causing concern to other American users of Canadian power.

The scrap trade, with its well-known speculative features, was more affected by the peace proposal than any other department of the market. Demand fell off precipitately, and material has only been moved at the expense of prices.

Pittsburgh

PITTSBURGH, PA., Dec. 19, 1916.

A decided halt occurred in new steel business the latter part of last week because of the peace talk started by Germany. While there was no decline in prices, buyers were in the air as to what might happen and many negotiations for purchases of steel were either called off entirely or held up. Yesterday and to-day this feeling had largely disappeared, due to the announcement by Lloyd George before the British Parliament that no peace negotiations would be entered into with Germany until England and its allies knew what Germany has to offer. The belief now is that the war is bound to go on for a year at least. The transportation situation in this district is deplorable, steadily getting worse. There is a decided lack of cars and power to handle the freight being offered to the railroads, and the movement of passenger trains is also affected. The Wabash has placed an embargo on all kinds of freight except perishable goods and coal, and it is said the Pittsburgh & Lake Erie, one of the New York Central lines, operating between Pittsburgh and Youngstown, is on the point of declaring an embargo. Blast furnaces are suffering greatly

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton	Dec. 20, 1916	Dec. 13, 1916.	Nov. 22, 1916.	Dec. 22, 1915.
No. 2 X, Philadelphia	$29.50	$29.50	$25.50	$19.50
No. 2, Valley furnace	31.00	31.00	26.00	18.50
No. 2 Southern, Cin'ti	28.90	28.90	25.00	17.40
No. 2, Birmingham, Ala.	23.00	23.00	21.00	14.50
No. 2, furnace, Chicago*	30.00	30.00	27.00	18.00
Basic, delol, eastern Pa.	30.00	30.00	26.00	18.50
Basic, Valley furnace	30.00	30.00	27.50	18.00
Bessemer, Pittsburgh	35.95	35.95	30.95	19.95
Malleable Bess., Ch'go*	30.00	30.00	27.00	18.50
Gray forge, Pittsburgh	29.95	29.95	26.95	18.10
L. S. charcoal, Chicago	34.75	34.75	26.75	19.25

Rails, Billets, etc., Per Gross Ton				
Bess. rails, heavy, at mill	38.00	38.00	38.00	28.00
O.-h. rails, heavy, at mill	40.00	40.00	40.00	30.00
Bess. billets, Pittsburgh	**60.00**	55.00	52.50	32.00
O.-h. billets, Pittsburgh	**60.00**	55.00	52.50	33.00
O.-h. sheet bars, P'gh	**60.00**	55.00	52.50	33.00
Forging billets, base, P'gh	80.00	80.00	78.00	52.00
O.-h. billets, Phila.	60.00	60.00	55.00	40.00
Wire rods, Pittsburgh	70.00	70.00	65.00	40.00

Finished Iron and Steel, Per Lb. to Large Buyers	Cents.	Cents.	Cents.	Cents.
Iron bars, Philadelphia	3.159	3.159	2.659	2.059
Iron bars, Pittsburgh	3.25	3.25	2.90	1.80
Iron bars, Chicago	**3.00**	2.75	2.65	1.75
Steel bars, Pittsburgh	3.00	3.00	2.90	2.00
Steel bars, New York	3.169	3.169	3.069	2.169
Tank plates, Pittsburgh	4.25	4.25	4.25	2.25
Tank plates, New York	4.419	4.419	4.419	2.419
Beams, etc., Pittsburgh	3.25	3.25	3.00	1.90
Beams, etc., New York	3.419	3.419	3.019	2.069
Skelp, grooved steel, P'gh	2.85	2.85	2.85	1.70
Skelp, sheared steel, P'gh	3.00	3.00	3.00	1.80
Steel hoops, Pittsburgh	3.25	3.25	3.25	2.00

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire, Per Lb. to Large Buyers	Dec. 20, 1916 Cents.	Dec. 13, 1916. Cents.	Nov. 22, 1916. Cents.	Dec. 22, 1915. Cents.
Sheets, black, No. 28, P'gh	**4.50**	4.25	3.65	2.50
Sheets, galv., No. 28, P'gh	**6.25**	6.00	5.25	4.75
Wire nails, Pittsburgh	3.00	3.00	2.85	2.10
Cut nails, Pittsburgh	3.00	3.00	2.80	1.90
Fence wire, base, P'gh	3.00	2.95	2.80	1.95
Barb wire, galv., P'gh	4.25	4.25	3.70	2.90

Old Material, Per Gross Ton				
Iron rails, Chicago	$29.00	$29.00	$25.00	$16.00
Iron rails, Philadelphia	24.00	24.00	21.00	19.50
Carwheels, Chicago	24.00	24.00	18.00	14.50
Carwheels, Philadelphia	22.00	22.00	19.00	16.00
Heavy steel scrap, P'gh	25.00	25.00	21.00	17.50
Heavy steel scrap, Phila.	24.00	24.00	21.00	16.00
Heavy steel scrap, Chicago	23.50	23.50	21.00	15.75
No. 1 cast, Pittsburgh	23.00	22.00	17.00	15.25
No. 1 cast, Philadelphia	21.00	21.00	19.00	16.75
No. 1 cast, Chicago (net ton)	16.50	16.50	16.00	13.75
No. 1 RR. wrot, Phila.	27.00	27.00	24.50	21.00
No. 1 RR. wrot, Chicago (net)	25.00	26.00	22.00	15.25

Coke, Connellsville, Per Net Ton at Oven				
Furnace coke, prompt	**$9.00**	$7.50	$6.50	$3.25
Furnace coke, future	4.00	4.00	3.75	2.40
Foundry coke, prompt	**9.00**	8.00	7.00	3.25
Foundry coke, future	6.00	6.00	5.00	3.00

Metals, Per Lb. to Large Buyers	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	32.50	35.50	34.00	20.25
Electrolytic copper, N. Y.	32.50	35.50	34.00	20.25
Spelter, St. Louis	10.00	11.50	12.25	17.25
Spelter, New York	10.25	11.75	12.50	17.50
Lead, St. Louis	7.40	7.80	7.00	5.30
Lead, New York	7.50	7.90	7.15	5.40
Tin, New York	42.87½	43.00	45.12½	39.50
Antimony (Asiatic), N. Y.	**14.25**	14.00	14.00	39.00
Tin plate, 100-lb. box, P'gh.	**$7.00**	$6.50	$6.00	$3.50

for lack of coke, and several have had to bank, while others will do so in a few days unless the situation quickly gets better. Reports of a concerted movement by manufacturers in the Pittsburgh and Valley districts to close down for a week to allow the railroads to relieve the freight congestion are incorrect. Anything that may be done in this direction by furnace men, steel makers and other manufacturers will be done individually. Some furnaces are running only from day to day, not knowing whether the coke supply for the next day will be received or not. Billets are being quoted at $60 to $65 per ton and are reported sold up to $65. Prices on sheets among independent mills are up probably $5 per ton. The feeling is growing that perhaps top prices have about been reached on pig iron and semi-finished steel, if not on most lines of finished steel. Consumers find they cannot place contracts except for delivery very far ahead and at abnormally high prices, and they are getting to think that it would probably be better to hold off and take chances on getting on the books of the mills at about the time they will need the material.

Ferroalloys.—Some negotiations for quite large lots of domestic ferromanganese that were on before the statement from Germany came out are stopped, but may shortly be taken up actively again. Domestic 80 per cent ferromanganese is held at $165 to $170 at furnace and English 80 per cent at about $160, seaboard. No sales of note were made in the past week. We quote 18 to 22 per cent spiegeleisen at $50 to $55 and 25 to 30 per cent at $65 to $75, delivered. We quote 50 per cent ferrosilicon for delivery next year, in lots up to 100 tons, at $100; 100 tons to 600 tons, $99, and over 600 tons, $98, all per gross ton, f.o.b. Pittsburgh. We now quote 9 per cent ferrosilicon at $39 to $41; 10 per cent, $40 to $42; 11 per cent, $41 to $43; 12 per cent, $42 to $44; 13 per cent, $43.50 to $45.50; 14 per cent, $45.50 to $47.50; 15 per cent, $47.50 to $49.50, and 16 per cent, $50 to $52. We quote 7 per cent silvery at $29.50 to $30; 8 per cent, $30 to $31; 9 per cent, $30.50; 10 per cent, $31; 11 per cent, $32, and 12 per cent, $33. These prices are f.o.b. at furnace, Jackson or New Straitsville, Ohio, and Ashland, Ky., all of which have a freight rate of $2 per gross ton to the Pittsburgh district.

Billets and Sheet Bars.—We are advised of several sales of sheet bars on the basis of close to $65, Pittsburgh. One sale is said to have been 1000 tons, while another is given at 15,000 tons. The latter sale was by a nearby plant, and the price was $65, maker's mill. It is doubtful whether any billets or sheet bars could be picked up from any source at less than $65, and they might be hard to find even at this price. It is said one sheet mill in the Youngstown district that is ready to operate remains idle because sheet bars cannot be secured. There is still some export inquiry for billets and sheet bars of ordinary carbons, and also for high-carbon billets, but none of these inquiries is being figured on by local mills, as they do not have the steel to spare. We now base sizes and base carbons of Bessemer and open-hearth billets and sheet bars at $60 to $65, maker's mill, Pittsburgh or Youngstown, and forging billets $80 to $85, for sizes up to but not including 10 x 10 in. and for carbons up to 0.25.

Pig Iron.—The local pig-iron market has been very quiet. Sales were fewer in number and less in quantity than in any week for some months. As prices are higher than they have been in many years, buyers are inclined to hesitate before making contracts for iron that they will not be able to get for some months. One sale of 1000 tons of Bessemer was made here last week for export at $35, Valley furnace, and there was a sale of 500 tons a month of basic iron for January-March at a price equal to $30 or less, Valley furnace, the iron having been sold by a furnace located near where it is to be used and having a nominal freight. We quote standard Bessemer iron, $35; basic, $30 to $31; gray forge, $29; malleable Bessemer, $30, and No. 2 foundry, $31 to $32, all at Valley furnace, the freight rate for delivery in the Pittsburgh or Cleveland district being 95c. per ton.

Plates.—New inquiry for steel cars is active, but few orders are being placed. The Clark Car Company has ordered 500 dump cars from the Cambria Steel Com-

pany, and the New York Central Lines have placed 1200 50-ton steel hopper cars with the American Car & Foundry Company, while the Norfolk & Western will build at its Roanoke shops 1000 60-ton steel hopper cars and has placed orders for the plates and shapes, about 6000 tons, mostly with Pittsburgh mills. The Wheeling & Lake Erie is in the market for 500 gondolas and 500 steel hoppers, while the Northern Pacific is inquiring for 1000 box cars and 500 automobile cars, the Minneapolis and St. Louis for 500 steel gondolas, the Illinois Central for the same number, and the St. Louis, Brownsville & Mexico for 500 stock cars. The nominal prices of ¼-in. and heavier sheared plates is still 3.50c., but only the Carnegie Steel Company is naming this price and it is sold up on plates for all of 1917. Other mills are quoting 4c. to 4.50c. for second and third quarter delivery, and several sales of good-sized lots have been made at 5c. at mill for second quarter. On small lots for fairly prompt shipment, prices quoted range from 5c. to 6c. at mill, f.o.b. Pittsburgh.

Structural Material.—New inquiry is active and some large contracts have been placed. The McClintic-Marshall Company has taken about 2500 tons from the H. Koppers Company, to be used in steel work for the Maryland Steel Company and the Colorado Fuel & Iron Company, also 2500 tons for extensions to the plant of the John A. Roebling Sons Company. The American Bridge Company has taken 500 tons for transmission towers for the American Gas & Electric Company, Wheeling and Windsor, W. Va. The Pittsburgh Bridge & Iron Works has taken 500 tons for an extension to a power house at Lowellville, Ohio, and the Blaw Steel Construction Company, 750 tons for a new erecting shop for the Standard Shipbuilding Company, Staten Island. The Massillon Bridge & Iron Company has taken 500 tons for plant extension for the National Pressed Steel Company. We quote beams and channels up to 15 in. at 3c. at mill, with no promise of delivery, and from 3c. to 3.25c. for second and third quarter shipment in 1917; small lots from warehouse stock, 3.50c. to 3.75c., Pittsburgh.

Steel Rails.—Effective Monday, Dec. 18, the Carnegie Steel Company advanced prices on light rails as follows: 25 to 45 lb. sections, $50.16, and 20 lb., $48; 12 and 14 lb., $52; 8 and 10 lb., $53, in carload lots, f.o.b. mill, with usual extras for less than carloads. As yet nothing has been heard here of the contemplated order of the Pennsylvania Railroad for 205,000 tons. We quote standard section rails of Bessemer stock at $38 and of open-hearth, $40 per gross ton, Pittsburg.

Cold-Rolled Strip Steel.—New buying is light and confined mostly to small lots for fairly prompt shipment, consumers having covered their needs for first quarter. Makers have not opened their books for sales for delivery in second half, but are being importuned to do so by consumers. On current orders for fairly prompt shipment, makers quote $7 for fair-sized quantities up to $7.50 per 100 lb. for small lots. Terms are 30 days net, less 2 per cent off for cash in 10 days, delivered in quantities of 300 lb. or more when specified for at one time.

Hoops and Bands.—The new demand is light, as nearly all consumers are covered over the first quarter or first half, and mills report specifications active. The nominal price of the Carnegie Company on hoops is 3.25c. and on steel bands, 2.90c., but it is reported sold up for practically all of next year. Other makers are quoting 3.25c. and higher on steel bands, with extras as per the steel-bar card, and steel hoops at 3.50c. or higher at mill.

Wrought Pipe.—An inquiry has been in the market for some little time for 80 miles or more of 10, 12, 14 and 16 in. line pipe for shipment to Canada for a natural gas line, but none of the mills can make the deliveries wanted, and it is doubtful whether the order will be placed. The Sinclair Oil & Refining Company is in the market for 500 miles of 8 in. to be used in paralleling its present oil lines from the Oklahoma and Texas fields to the Gulf. This is the largest and most active pipe inquiry in the market. [illegible] Ltd., this city, has taken the contract for laying 100 miles of 8 in. for the Pierce Fordyce Oil Association, operating in Oklahoma and Texas, and the pipe has been placed with two or three mills. Several of the large makers say they are sold up to July 1, and, with orders from their regular trade that will come voluntarily, they are practically sold up for all of next year. If the mills could only make the deliveries wanted there would be some very large contracts placed for line pipe for gas and oil lines as the new inquiry is very heavy. Discounts on black and galvanized iron and steel pipe are given on another page.

Boiler Tubes.—Makers of both iron and steel tubes are sold up for the first half or longer, and on seamless tubes for practically all of next year. Premiums over regular prices are readily paid for either iron or steel tubes for fairly prompt delivery. An advance in prices is looked for at any time. Discounts in effect at this writing are given on another page.

Sheets.—A very wide range in prices is being quoted. On galvanized, this range amounts to from $10 to $12 per ton, and on Bessemer black and blue annealed from $5 to $10 per ton. The American Sheet & Tin Plate Company has no sheets for the first quarter, and other makers that can deliver in January can get almost any price they ask. This condition also applies largely on first quarter delivery. As an instance, a sale of a good quantity of No. 28 Bessemer black sheets was made a few days ago at 5.50c., f.o.b. Pittsburgh. Galvanized has sold at 7c. and higher for No. 28 for fairly prompt delivery. Consumers are having trouble in finding mills that have any sheets to spare for delivery before April. The tendency of prices is decidedly toward higher values. We quote blue annealed sheets, Nos. 3 to 8, at 4c. to 4.25c.; box annealed, one pass, Bessemer cold-rolled sheets, No. 28, 4.50c. to 5c.; No. 28 galvanized, 6.25c. to 7c.; No. 28 tin-mill black plate, 4.25c. to 4.50c., all f.o.b. mill, Pittsburgh. These prices are for carloads or larger lots, and the higher prices quoted are for reasonably prompt shipment.

Tin Plate.—A consumer who recently wanted to buy some more tin plate for first half delivery placed part of the order with one mill at about $7 per box at mill and is said to have paid for the remainder about $8. Positively no tin plate could be bought on current orders at less than $7, and the more general prices quoted range from $7.50 to $8 at mill. A genuine famine prevails which promises to grow worse. Consumers are specifying freely against contracts. While the mills are making a record output, they will carry over at least two months' production into 1917. We now quote the market for delivery in the first half of next year at $7 to $8 per base box, f.o.b. mill. We quote I. C. terne plate, 107 lb., at $7.15 to $7.65, and 200 lb. carrying 8-lb. coating, at $11, the usual advances applying for heavier weights and coatings.

Shafting.—Several makers of shafting that have not been trying to sell in the open market, but to take care of their regular customers, are now in position to ship to their trade in five to six weeks from date of order. Other makers that are sold ahead for some time cannot ship on new orders inside of two to three months. Most consumers are covered for first quarter on their needs at 15 to 20 per cent off list, and a few over first half. Prices are firm, and it is claimed the 20 per cent discount off list will soon disappear. It is said the output of shafting this year will be fully 25 per cent heavier than in any previous year. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots and 10 per cent off in less than carload lots for first quarter and first half of 1917, f.o.b. Pittsburgh, freight added to point of delivery.

Railroad Spikes and Track Bolts.—Railroads that have contracts for spikes that expire this year are specifying freely, as any part of these contracts that is not specified for will be canceled Dec. 31. These were taken months ago when prices were much below what they are now. Most of the large roads are covered on spikes for the first half, and there is some inquiry for the second half, but local makers are not quoting for

delivery so far ahead. The demand for track bolts is reported quite heavy. We quote track bolts with square nuts at 4.85c. to 5c., to railroads, and 5c. to 5.25c. in small lots to jobbers, base. In the Chicago district lower prices than these are being named. Track bolts with hexagon nuts take the usual advance of 15c. per 100 lb. We quote railroad spikes as follows: 9/16 in. and larger, $3.40, base; 7/16 and ½ in., $3.50, base; 5/16 and ⅜ in., $3.75, base; boat spikes $3.65, base, all per 100 lb., f.o.b. Pittsburgh.

Wire Products.—One local mill is quoting $3.25 on wire nails, when it does quote, to customers to whom it is not obligated, and has made sales at $3.15, base, per keg. There has been no announcement of another advance in wire products, but this is looked for. The demand for wire nails and wire is still heavy, and several makers say they are turning down as much business as they are taking, if not more. All are sold up for two to three months, and some for a longer period. The car situation is bad, and this is holding back shipments. Prices are as follows. Wire nails, $3, base, per keg; galvanized, 1 in. and longer, including large head barbed roofing nails, taking an advance over this price of $2, and shorter than 1 in., $2.50. Bright basic wire is $3.05 per 100 lb.; annealed fence wire, Nos. 6 to 9, $2.95; galvanized wire, $3.65; galvanized barb wire and fence staples, $3.85; painted barb wire, $3.15; polished fence staples, $3.15; cement-coated nails, $2.90, base, these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to the point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing are 53 per cent off list for carload lots, 52 per cent for 1000-rod lots, and 51 per cent for small lots, f.o.b. Pittsburgh.

Wire Rods.—Prices are higher, and the new demand is urgent. We are advised of sales of 1500 tons or more of soft carbon Bessemer and open-hearth rods at close to $75 at mill. It is said that rods for export to Canada have sold at about $80 at mill for base carbons. The demand is heavier than the makers can fill. We quote soft Bessemer, open-hearth and chain rods at $70 to $75 per gross ton, f.o.b. Pittsburgh, but it would be difficult to find any mills that would sell at less than $75.

Iron and Steel Bars.—There are no signs of any falling off in the demand for iron or steel bars, which is much beyond the capacity of the mills. Consumers are suffering severely in deliveries of bars by the mills, which are unable to get cars. When they do load several cars, these often stand in the shipping yard for hours before motive power is found to move them. The nominal price of steel bars remains at 2.90c. at mill, with no definite promise of delivery, but mills that can ship in the first quarter and first half are quoting 3c. to 3.25c. at mill. The demand for refined iron bars is heavy and prices are firm. The high cost of materials and labor has not apparently restricted the demand for reinforcing steel bars, which is very heavy; prices are firm and likely to be higher. We quote refined iron bars at 3.25c. and railroad test bars at 3.40c. in carload lots, f.o.b. Pittsburgh.

Rivets.—The new demand is reported fairly heavy, but most consumers are covered for the first quarter and some for the first half. There is a heavy export demand, but local makers are not quoting freely on these inquiries, as they need their entire output for their domestic trade. Makers' prices are as follows:

Buttonhead structural rivets, ½ in. in diameter and larger, $4.25 per 100 lb., base, and conehead boiler rivets, same sizes, $4.35 per 100 lb., base, f.o.b. Pittsburgh. Terms are 30 days net or one-half of 1 per cent for cash in 10 days.

Coke.—Due to the abominable situation in cars and motive power, furnaces are unable to get coke promptly and are buying wherever they can pick it up. One sale of 25 cars was made to-day (Tuesday) at $9 and another of 15 cars at $9.50 per net ton at oven. The Carnegie Company has banked one Clairton furnace and the Shenango Furnace Company one of its stacks for lack of coke. Others will have to be banked soon unless coke is received more freely. The high prices obtainable for spot coke have a natural tendency to induce producers to ask high prices for contract coke, and some are quoting $5 per ton at oven, and seem indifferent about selling at this price. Reports that two contracts for furnace coke had been closed at $5 per ton for first half are denied. We now quote best grades of furnace coke for prompt shipment at $9 to $9.50, and on contracts from $4 to $5 per net ton at oven, but it is doubtful whether any producers would sell at less than $4.50. Best grades of 72-hr. foundry coke for spot shipment are held at $9 to $10, and several makers are refusing to book any contracts at less than $6 per net ton at oven. The Connellsville *Courier* gives the output of coke in the upper and lower Connellsville regions for the week ended Dec. 9 at 424,765 net tons, an increase over the previous week of 5388 tons.

Nuts and Bolts.—The expected advance has not yet been made by the makers. They say their costs are steadily going up, and the output is curtailed by the shortage in labor, while shipments are bad, as cars are scarce. The new demand is active, and all the makers are back in deliveries eight to ten weeks or longer. Discounts are as follows, delivered in lots of 300 lb. or more where the actual freight rate does not exceed 20c. per 100 lb., with terms 30 days net or 1 per cent for cash in 10 days:

Carriage bolts, small, rolled thread, 50 per cent; small, cut thread, 40 and 7½ per cent; large 35 per cent.

Machine bolts, h. p. nuts, small, rolled thread, 50 and 5 per cent, small, cut thread, 40, 10 and 5 per cent, large, 40 per cent.

Machine bolts, c. p. c. and t. nuts, small, 40 and 5 per cent, large, 50 and 5 per cent. Bolt ends, h. p. nuts 40 per cent, with c. p. nuts 30 and 5 per cent. Lag screws (cone or gimlet point), 50 per cent.

Nuts, h. p. sq. and hex., blank, $2.60 off list, and tapped, $2.40 off; nuts, c. p. c. and t. sq., blank, $2.20 off, and tapped, $2 off; hex., blank, $2.50 off, and tapped, $2.25 off. Semi-finished h. x. nuts, 60 per cent. Finished and case-hardened nuts, 60 per cent.

Rivets, 7/16 in. in diameter and smaller, 45 and 10 per cent.

Old Material.—Due to the willingness of Germany to enter into peace negotiations, or for some other cause, likely the high prices ruling, the local scrap market has been quiet the past week. While prices are fairly firm, they are no higher. Local consumers seem to be pretty well covered, and are not actively seeking scrap. The market in the Youngstown district is more active than it is here, and we can note that one leading Youngstown consumer bought last week 20,000 to 25,000 tons of heavy steel scrap at around $27, delivered. In the local market low phosphorus melting stock is scarce, and dealers have offered as high as $37 for it. Borings and turnings are also quite active and firm. Prices being named by dealers at this writing for delivery in Pittsburgh and other consuming points that take Pittsburgh freight rates, per gross ton, are as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	$27.00 to $28.00
No. 1 foundry cast	23.00 to 24.00
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	30.00 to 31.00
Hydraulic compressed sheet scrap	22.00 to 23.00
Bundled sheet scrap, ples and ends, f.o.b. consumers' mills, Pittsburgh district	17.50 to 18.50
Bundled sheet [illegible] scrap	15.00 to 16.50
No. 1 [illegible] sheet stock	21.00 to 22.00
Railroad grate bars	13.00 to 14.00
Low [illegible] stock	36.00 to 37.00
Iron car axles	48.00 to 50.00
Steel car axles	48.00 to 50.00
[illegible]	0.00 to 21.00
No. 1 [illegible] scrap	19.00 to 20.00
Machine shop turnings	13.00 to 14.00
[illegible]	23.00 to 24.00
Cast iron borings	14.00 to 14.50
*Short [illegible]	29.00 to 30.00
No. 1 railroad wrought scrap	23.00 to 24.00
[illegible]	17.00 to 18.00
Heavy breakable cast scrap	19.00 to 20.00

*Shipping point

Philadelphia

PHILADELPHIA, PA., Dec. 19, 1916.

Bringing home, as it did, the fact that the European war has got to end, and that its termination may be nearer than had been suspected, Germany's peace proposal had a sobering effect on the minds of those who contract for future supplies of materials, and they include pretty much everybody. The pig-iron market has been quieter, but prices are as firm as ever. No change downward is noted in the quotations for any of the commodities, with the exception of old material. The dealers in scrap, in the absence of business, quote nominal prices, but they themselves are not offering as much as they did a week or two ago. So far as the pig-iron producers are concerned, their anxiety is chiefly in getting a sufficient supply of coke with which to keep their furnaces in operation. Some have paid $8, oven, for prompt coke. The plate situation is unchanged, except that prices are more nearly uniform. Most of the makers of structural shapes quote 3.659c., Philadelphia. Steel bars are quoted at 3.159c., Philadelphia, but the market is nearer 3.409c. Discarded shell steel is in active demand at $40 to $50 per ton. The domestic makers of ferromanganese have raised their price to $175, delivered, an advance of $10.

Iron Ore.—No arrivals of iron ore were reported in the week ended Dec. 16.

Ferroalloys.—Domestic makers of 80 per cent ferromanganese have advanced their quotation to $175, delivered, an advance of $10, for any position up to July 1. Foreign material is unchanged at $164, seaboard, but very little is to be had this side of March. Fifty per cent ferrosilicon is unchanged at $100, Pittsburgh, for carloads and $99 for 100 tons or more, but these quotations are nominal, particularly so far as prompt is concerned. A leading producer is said to be confronted with a curtailment of its power which would affect its output seriously. Spiegeleisen is held at about $55, furnace. Blast-furnace ferrosilicon is quoted by local dealers at $48.44, delivered.

Pig Iron.—Speculative holders of pig iron, also consumers who have bought heavily of future deliveries on the assumption that present prices and demand will be supported by an indefinite continuance of the war, were made uneasy by the news of Germany's peace suggestion. The announcement put a further check on a market that already was tending toward quiet, but it cannot be said that prices have softened to any appreciable degree. Furnace operators are more concerned over the problem of securing sufficient and dependable deliveries of coke than they are over the peace talk. Some of them are struggling to get a sufficient supply to carry them over the holidays, and have paid $8 per ton at oven for comparatively poor coke. For eastern Pennsylvania No. 2 X $30, furnace, is the base usually quoted by producers, although an occasional lot may be had at a few cents under this figure; therefore, $29.50 to $30.50 is given as a fairly inclusive range, although quotations run higher. One maker quoting $30, furnace, and under $31, delivered, is not anxious to sell because of coke uncertainties and his heavy commitments. Virginia No. 2 X is quoted at $28 to $29, furnace, or $30.75 to $31.75, Philadelphia, depending on quantity and delivery, with the probability that $27.50, furnace, might be done. For 500 tons of 5 per cent silicon Virginia iron $30, furnace, or $32.75, Philadelphia, was paid; and for two lots of 3 to 4 per cent silicon, each of 500 tons, $29.25, furnace, or $32, Philadelphia, was paid. A local locomotive works is reported to have taken 5000 tons of Virginia, but all that can be definitely located is 400 tons. Virginia furnaces have been having a troublous time in shipping. Their New England customers have been clamoring for deliveries, and when the New York, New Haven & Hartford Railroad raised its embargo the producers shipped all the iron they could to relieve New England, whereon consumers in other districts began to complain. Two lots, each of 500 tons, of Southern No. 2 have been [illegible] in the week at $25, Birmingham, equal to $29.53, Philadelphia, and $29.85 at nearby points. Buffalo iron is held at $35, furnace (freight to Philadelphia, $2.58), and small sales have been made at this price. Standard Bessemer is quoted at $37.50 to $38, furnace, with less desirable iron selling down to $36, furnace. It is subject to a heavy export demand. A few hundred tons of basic have been taken at $30, furnace. Standard low phosphorus ranges from $52 to $55, delivered, according to specifications and delivery. Copper-bearing low phosphorus ranges from $50 upward. Practically all the buying of the past week has been of small miscellaneous lots for early shipment. Quotations for standard brands delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa. No. 2 X foundry	$29.50 to $30.50
Eastern Pa. No. 2 plain	29.00 to 30.00
Virginia No. 2 X foundry	29.00 to 30.00
Virginia No. 2 plain	28.75 to 29.75
[illegible]	28.25 to 28.75
[illegible]	30.00
Standard low phosphorus	52.00 to 55.00

Plates.—The mills are gradually approaching a uniform high level. One large producer, who is sold up to the last quarter, quotes 4.159c., Philadelphia, on universal plates, 5.159c. on tank steel and 6.159c. on ship plates. For ship plates it has quoted up to 6.659c., Philadelphia. The foreign demand is as strong as ever, one would-be Italian purchaser asking for a quotation on 4000 to 5000 tons of ship steel regardless of delivery or other conditions. Two other mills ask 4.909c., Philadelphia, for tank plates, but are in no position to quote on ship plates for any delivery they care to consider.

Bars.—A mill which has been out of the market for several months is taking business for the second quarter on plates, shapes and bars. Steel bars are quoted at 3.159c. to 3.409c., Philadelphia. For small miscellaneous lots up to 3.659c., Philadelphia, is quoted. For 2000 tons 3.409c., Pittsburgh, has been offered. Iron bars are active at 3.159c., Philadelphia, for carload lots. Steel reinforcing bars rolled from discarded shell steel have been sold at 2.75c.

Structural Material.—Three producers agree on 3.50c., Pittsburgh, or 3.659c., Philadelphia, as their minimum on shapes. No new fabricating jobs are reported in this territory.

Billets.—Open-hearth soft rerolling billets are unchanged at $60 and forging steel at $75 to $80. Discarded shell steel is quoted at $40 to $45. It is taken both from the bloom and the bar, with most buyers preferring the latter. The high price of billets, coupled with the high ocean freight, operates to restrain exports to England, yet one export inquiry called for 8000 to 10,000 tons. At least one maker declined to quote on this inquiry.

Sheets.—The market is active. Local makers quote 4.409c. to 4.659c., Philadelphia, for No. 10 blue annealed. They are practically sold out for the first quarter, and well into the second.

Old Material.—The peace talk seems to have hit this trade harder than any other, probably for the reason that prices have advanced so rapidly in the last two or three weeks. Very little business has been done in the week, and quotations are more or less nominal. Incidentally, the week before Christmas usually is a quiet one. The dealers themselves are marking time until there is less uncertainty, and admit that they will not pay what they did two or three weeks ago. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

[illegible] melting steel	$24.00 to $25.00
Old steel rails, rerolling	28.00 to 30.00
Low phos. heavy melting steel scrap	33.00 to 36.00
[illegible] (export)	45.00
[illegible] (export)	45.00
[illegible]	27.00 to 28.00
Old carwheels	22.50 to 23.50
railroad wrought	27.00 to 28.00
[illegible]	19.00 to 20.00
[illegible]	16.50 to 17.50
ed sheets	16.50 to 17.50
busheling	13.00 to 14.00
p turnings	13.50 to 14.00
[illegible]	14.50 to 15.00
[illegible]	21.00 to 22.00
bars, railroad	16.00 to 16.50
[illegible]	17.00 to 17.50
[illegible]	18.50 to 19.00

Coke.—For furnace coke not considered high grade, $8, oven, has been paid. Anticipating a falling off in production during the holidays, furnace managers have been endeavoring to hurry up their shipments on contract and to obtain spot coke when they can. The coke producers appear to be trying to give everyone a square deal by prorating their shipments. Prompt foundry is around $9.50 per net ton at oven. Contract furnace is about $4 to $4.25 per ton at oven and contract foundry $6 to $6.50. Freight rates from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Chicago

CHICAGO, ILL., Dec. 19, 1916.

Though not lacking in the inquiry for finished steel for early shipment such as has been pressing for consideration right along, the past week was comparatively quiet with respect to business closed. Some hesitancy has been introduced into the consideration of purchases for future delivery, but even this has not been pronounced. The inability of the mills to supply materials when desired, or their unwillingness to contract very far ahead, continues the strongest negative factor in checking purchases. The mills that have not yet opened their books for second quarter or second half deliveries are still being pressed with considerable persistence by their regular customers who desire to cover for those periods. The leading interest is not in position to accept further orders which contemplate delivery in 1917, although it seems likely that some additional car business will be accommodated in view of the exceptional need in that direction. The prices named on orders that have been taken for materials to be delivered promptly are steadily mounting and 6c., f.o.b. mill, has been paid for tank plates, though an advance of $5 per ton by one of the large independents last week brought its quotation only to 4.50c. The contract quotations of the largest interest remain unchanged. Buying of pig iron was less active and prices continue at the level last quoted. In the scrap market a well defined reaction made itself felt and, on offerings by sellers of scrap, prices were generally lower, but the situation is so sensitive that the appearance of firm inquiry might easily harden the market.

Pig Iron.—Domestic buyers displayed little interest in further purchases last week and for last half delivery appeared to be somewhat more cautious, though one sale of 1000 tons of Northern iron at $30 for that delivery is noted. One of the large Southern interests which had been out of the market for some time found that offerings of last half iron on the basis of $23, Birmingham, were not considered especially attractive and comparatively few sales were made. For prompt shipment, a stronger market tone prevails, both for the reason that first half iron is well sold up and because melters generally are using iron even more rapidly than it can be shipped to them. Sales of spot and prompt iron in small lots from the South are noted at prices ranging from $23 to $25, f.o.b. Birmingham. In the North there is very little first half iron remaining to be disposed of and quotations range from $28 to $30, depending upon the silicon and phosphorus content. For Lake Superior charcoal iron, we quote delivery prices at Chicago to include a freight rate of $1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic irons, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton.

Lake Superior charcoal, Nos. 2 to 5	$31.75 to $32.75
Lake Superior charcoal, No. 1	32.25 to 33.25
Lake Superior charcoal, No. 6 and Scotch	32.75 to 33.75
Northern coke foundry, No. 1	30.50
Northern coke foundry, No. 2	30.00
Northern coke foundry, No. 3	29.50
Northern high phosphorus foundry	28.00
Southern coke No. 1 f'dry and 1 soft	27.50 to 28.50
Southern coke No. 2 f'dry and 2 soft	27.00 to 28.00
Malleable Bessemer	30.00
Basic	30.00
Low phosphorus	40.00
Silvery, 8 per cent	35.50 to 36.00
Bessemer ferrosilicon, 10 per cent	40.50 to 42.50

Rails and Track Supplies.—Although such important buyers of rails as the Pennsylvania Lines, Rock Island, Baltimore & Ohio, Chesapeake & Ohio, Chicago & Eastern Illinois, Northern Pacific and others have not yet arranged for their requirements in 1918, there was in the past week, aside from the outstanding inquiry from the Pennsylvania, no additional inquiry. It would not be surprising to find some of the railroads seeking a preference for steel going into cars over that to be rolled into rails. Quotations are as follows: Standard railroad spikes, 3.50c. to 3.60c., base; track bolts with square nuts, 4c. to 4.50c., base, all in carloads, Chicago; tieplates, $55 to $60, f.o.b. mill, net ton; standard section Bessemer rails, Chicago, $38, base; open hearth, $40; light rails, 25 to 45 lb., $44; 16 to 20 lb., $45; 12 lb., $46; 8 lb., $47; angle bars, 2.25c.

Structural Material.—The Nickel Plate Railroad is understood to have closed with the Pullman Company for 750 gondolas, but of the remaining inquiry pending no other portions are understood to have been closed. Contracts placed last week with the fabricators include 1130 tons for the Calumet & Hecla Mining Company, Lake Linden, Mich., taken by the American Bridge Company; 250 tons for the Utah Copper Company, taken by the Kansas City Structural Steel Works, and three small jobs for a total of 500 tons. Users of plain material find little steel to be had for delivery even as far away as the third quarter, and for such steel from 3.25c. to 3.50c. is being asked. While most of the mills have not yet opened their books for the second half and others not even for the second quarter, this fact is without much significance in that deliveries within those periods are not likely to be available even when the books are opened. We quote for Chicago delivery of structural steel from mill 3.189c. to 3.439c.

We quote for structural steel out of jobbers' stocks for Chicago delivery 3.70c.

Plates.—The plate mills that have been taking orders for early delivery report little or no cessation in the flow of inquiry upon which they are asked to quote. Quotations as high as 6c., f.o.b. mill, intended to operate as a check upon buying, have accomplished little, and one order for 1200 tons of tank plates is noted as placed at that price. For delivery in 30 to 60 days, tank plates can be had, however, on the basis of 4.50c., Pittsburgh. We quote for Chicago delivery of plates from mill, at its convenience, 3.689c.; for prompt shipment, 4.689c. to widths up to 72 in., and for wide plates, 4.939c. to 5c.

We quote for Chicago delivery of plates from jobbers' stocks, 4.35c.

Sheets.—Inquiry for sheets in all grades persists in large volume, regardless of prices, and many of the mills are in or out of the market from week to week, so rapidly is the small tonnage absorbed they have to offer from time to time. We quote, for Chicago delivery, No. 10 blue annealed, 4c. to 4.50c.; box annealed, No. 16 and lighter, 4.50c. to 5c.; No. 28 galvanized, 6.50c. to 7c. These quotations are minimum prices for contracts. Early shipment quotations are $5 to $10 per ton higher.

Further advances [illegible] sheets from store have been announced and we quote for Chicago delivery out of [illegible] No. 10 blue annealed [illegible] No. [illegible] galvanized 7c.

Bars.—The price of iron bars is now generally quoted on the basis of 3c., Chicago, with more business offered than mills can comfortably accommodate. Hard steel bars are likewise held at 3c., and the scarcity of rerolling rails is the occasion of especially conservative selling policies. There is a miscellaneous demand for soft steel bars for reinforcing purposes. We quote mill shipment, Chicago, as follows: Bar iron, 3c.; soft steel bars, 3.089c. to 3.439c.; hard steel bars, 3c.; shafting, in carloads, 20 per cent off; less than carloads, 15 per cent off.

We now quote store prices for Chicago delivery as follows: [illegible] reinforcing bars, [illegible] sizes ½ in. and up, [illegible] sizes shafting list plus 5 per cent.

Rivets and Bolts.—There is enough new business in both rivets and bolts, emanating, particularly in the case of the former, from shipbuilding activity, to estab-

lish firmly existing contracts. We quote as follows: Carriage bolts up to ⅝ x 6 in., rolled thread, 50; cut thread, 40-7½; larger sizes, 35; machine bolts up to ⅜ x 4 in., rolled thread, with hot pressed square nuts, 50-5; cut thread, 40-10-5; large size, 40; gimlet-point coach screws, 50; hot pressed nuts, square, $2.60 off per 100 lb.; hexagon, $2.60 off. Structural rivets, ¾ to 1¼ in., 4.15c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

Store prices are as follows: Structural rivets, 4.50c.; boiler rivets, 4.60c.; machine bolts up to ⅜ x 4 in., 40-10-5; larger sizes, 40; carriage bolts up to [illegible]; larger sizes, 35; hot pressed nuts, square, $3, and hexagon, $3 off per 100 lb.; lag screws, 50.

Cast-Iron Pipe.—Award has not yet been made of the pipe business outstanding at St. Paul, amounting to about 1500 tons, and no other sales of size are reported. We quote as follows, per net ton, Chicago: Water pipe, 4-in., $44.50; 6-in. and larger, $41.50, with $1 extra for class A water pipe and gas pipe.

Wire Products.—Manufacturers report that conditions with respect to demand and to the available supply of wire in its principal forms point strongly to a further advance in prices. In domestic channels the trade shows seasonal activity. We quote as follows per 100 lb.: Plain wire, Nos. 6 to 9, base, $3.239; wire nails, $3.189; painted barb wire, $3.339; galvanized barbed wire, $4.039; polished staples, $3.339; galvanized staples, $4.039; all Chicago.

Old Material.—What with the introduction of an element of hesitancy into the situation and the freer movement of scrap into the market, sellers of old material found themselves last week under the necessity of making concessions in order to move such scrap as they desired to dispose of. While buyers were themselves displaying little interest, considerable quantities of scrap were taken in at the lower prices offered. Weakness appeared especially pronounced in connection with rerolling rails, shoveling steel, wrought scrap and busheling. The market, however, is in a condition of pronounced sensitiveness and a disposition to buy on the part of any large user would doubtless restore prices to their previous level. Offerings of scrap are being made by the Soo, Vandalia, Lake Erie & Western, Chicago & Alton, Omaha, Great Northern and Union Pacific in the amount of about 14,000 tons. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	[illegible]
Relaying rails	[illegible]
Old carwheels	[illegible]
Old steel rails, rerolling	28.50 to 29.00
Old steel rails, less than 3 ft	[illegible]
Heavy melting steel scrap	[illegible]
Frogs, switches and guards, cut apart	23.50 to 24.50
Shoveling steel	[illegible]
Steel axle turnings	[illegible]

Per Net Ton

Iron angles and splice bars	[illegible]
Iron arch bars and transoms	[illegible]
Steel angle bars	22.50 to 23.00
Iron car axles	[illegible]
Steel car axles	42.00 to 43.00
No. 1 railroad wrought	[illegible]
No. 2 railroad wrought	[illegible]
Cut forge	[illegible]
Pipes and flues	[illegible]
No. 1 busheling	[illegible]
No. 2 busheling	[illegible]
Steel knuckles and couplers	[illegible]
Steel springs	24.50 to 25.00
No. 1 locks cut to sheets and rings	[illegible]
Boiler punchings	[illegible]
Locomotive tires, smooth	25.00 to 26.00
Machine-shop turnings	[illegible]
Cast borings	[illegible]
No. 1 cast scrap	[illegible]
Stove plate and light cast scrap	12.75 to 13.25
Grate bars	[illegible]
Brake shoes	[illegible]
Railroad malleable	[illegible]
Agricultural malleable	15.50 to 16.00

The three new 75-ton open-hearth furnaces of the Ashland Iron & Mining Company, Ashland, Ky., will begin to make steel in January and the new plant will get into full operation shortly after. Fires have been started in the furnaces to dry them out. Work is under way on three more furnaces and the plans of the company provide for four additional. Four soaking pits will be installed instead of two, as originally planned. Construction of the plant was begun in April.

Cincinnati

CINCINNATI, OHIO, Dec. 20, 1916.—(*By Wire.*)

Pig Iron.—Buying is at a standstill, except for a few lots of special iron that are needed by different melters. Prices are unchanged. Southern furnaces are almost uniform in asking from $24 to $25, Birmingham basis, for first half shipment, but several of them are not averse to taking on business at $23 for the last half. Some prompt Southern No. 2 foundry has been offered at $23, Birmingham, but this only covers a comparatively small lot that has to be moved before Jan. 1, and most of it is loaded on cars. Hanging Rock producers are holding firm at $30, Ironton, and there is no resale iron to disturb this quotation. In fact, contracts have been made for first half shipment at $31. An Ohio melter bought approximately 1700 tons of Bessemer at a reported price of $35 at furnace for shipment before July 1. The Ohio silvery irons are inactive, but practically all the furnaces in Jackson County have sufficient business booked to carry them almost through 1917. Lake Superior charcoal irons are off the market for nearby shipment. No inquiries are out for either malleable or basic. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	$26.40 to $28.40
Southern coke, No. 1 f'dry and 2 soft	25.90 to 27.90
Southern coke, No. 3 foundry	25.40 to 27.40
Southern coke, No. 4 foundry	24.90 to 25.40
Southern gray forge	24.40 to 26.40
Ohio silvery, 8 per cent silicon	37.25 to 38.25
Southern Ohio coke, No. 1	31.76
Southern Ohio coke, No. 2	31.26
Southern Ohio coke, No. 3	30.76
Southern Ohio malleable Bessemer	31.26
Basic, Northern	31.26
Basic, Southern, delivered	28.70 to 29.70
Standard Southern carwheel	27.90 to 28.40

(*By Mail*)

Finished Material.—No changes in prices are to be noted. Mill and warehouse business are both fairly brisk, which is somewhat out of the ordinary for the near approach of the holidays. Jobbers state that they are still having calls for structural material in spite of the cold weather that has retarded building operations in the past week. It has not been definitely decided whether the rolling mills in this locality will shut down through the entire holiday season as heretofore, and it is understood that they have left this question with the men. The mill price of No. 28 black sheets is 5c., Cincinnati or Newport, Ky., and from 6.90c. to 7.15c. for No. 28 galvanized. We quote local store prices as follows: No. 10 blue annealed sheets, 4.40c.; steel bars and small structural shapes, 3.70c.; structural material, 3.80c., base; rounds and squares, 2 in. and over, 4.25c.; flat bars, 1 in. and over, 4.25c.; cold-rolled shafting, 10 per cent plus list; wire nails, $3.40 per keg, base; barb wire, $4.40 per 100 lb., base.

Old Material.—Quotations are unchanged. Buying has slackened considerably, but hesitancy of consumers to cover for their future requirements is said to be due principally to the fact that the rolling mills and foundries are fairly well supplied for the first half of next year, while the holiday season also can be considered as a factor in slowing up purchases at present. The following are dealers' prices, f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton

[illegible] sheet scrap	$14.75 to $15.25
[illegible]	25.00 to 25.50
[illegible] lb. and up	28.50 to 29.00
[illegible] rails	25.00 to 25.50
[illegible] scrap	21.00 to 21.50
[illegible] melting	21.00 to 21.50

Per Net Ton

[illegible]	$21.75 to $22.25
[illegible]	7.00 to 7.50
[illegible]	7.00 to 7.50
[illegible]	16.50 to 17.50
[illegible]	18.25 to 18.75
[illegible]	10.50 to 11.00
[illegible]	33.25 to 33.75
[illegible] tires (smooth inside)	27.00 to 27.50
[illegible]	14.00 to 14.50
[illegible]	15.00 to 15.50
[illegible]	12.00 to 12.50

Coke.—Little furnace or foundry coke has been sold for shipment to this territory in the past week. Some Wise County 72-hr. coke that was loaded on cars

brought $10 per net ton at oven. Some Connellsville foundry coke was sold around $9.50 for nearby shipment. For first half delivery all the way from $6 to $8 at oven is quoted on any kind of furnace coke and from $6.50 to $9 on foundry coke. Contracts for the entire year for furnace coke could be made at $5 to $6.50 and on foundry coke from $5.50 to $7.

Birmingham

BIRMINGHAM, ALA., Dec. 18, 1916.

Pig Iron.—Consumers anxious for spot iron have paid as high as $25 f.o.b. furnaces in several instances. The usual quotation for the last half is $23, with $24 for the first half or spot. The majority of transactions in the week ended Dec. 16 were on the basis of $23 for either delivery, the greater business booked being for the last half. Capacity is so well booked for the entire year that makers have marked up prices as much in the hope of staving off spot inquiries as for anything else; but the inquiry comes, and the advanced prices are paid. Some last half iron was sold at $22.50, about the same amount as went at $25 for immediate delivery. Export metal is going out of the district at the rate of about 35 000 tons per month to Great Britain alone, with some additional tonnage to Denmark and other countries. England takes care of her vessel room, so there is little trouble in that direction. Much of the movement is out of Mobile. The Republic Company's overhauled stack will not go in until the latter part of the month. Woodward will blow out a stack for relining. Movements of metal are gratifying. The Alabama Car Service Association reports total November movements of 92,600 cars, as compared with 78,000 cars in the preceding month and 83,000 cars in November, 1915. The record is within a few cars of the highest ever attained. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	$23.50 to $25.50
No. 2 foundry and soft	23.00 to 25.00
No. 3 foundry	22.50 to 24.50
No. 4 foundry	22.25 to 24.25
Gray forge	22.00 to 24.00
Basic	23.00 to 25.00
Charcoal	25.00 to 26.00

Cast-Iron Pipe.—Prices have advanced another $2 per ton. Makers agree that the danger point has been reached, and look forward to a considerable falling off in new business. Only absolute needs are now being contracted for, postponement being the order of the day. This is the usual dull season, but high prices bid fair to accentuate it. Output has slightly decreased already. Demand for flange oil pipe is good. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., $39; 6-in. and upward, $26, with $1 added for gas pipe and special lengths.

Old Material.—The scarcity of wrought scrap and the high prices obtained for it feature the old-material trade. Embargoes serve to keep the Southern supply at home, but for which it might go considerably higher. Much scrap has come into the market owing to the persistent gleanings of country and railroad yards. While Southern consumption is at its maximum, supply and demand are rather harmonious, and a mutual advantage is thus enjoyed by dealer and purchaser. Steel axles command as high as $36 per ton, when obtainable in quantities. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old steel axles	$34.00 to $36.00
Old steel rails	20.00 to 21.00
No. 1 wrought	21.00 to 22.00
Heavy melting steel	17.00 to 18.00
No. 1 machinery cast	17.00 to 18.00
Carwheels	16.00 to 17.00
Tram carwheels	15.00 to 16.00
Stove plate and light	12.00 to 13.00

Coal and Coke.—Spot steam coal is bringing around $2.50 to $3 per net ton at mine to regular customers. Domestic coal is selling at $5 in Birmingham. Fancy prices are obtained from new and rush customers. The car shortage is still acute, but hundreds of new cars are being rushed to the district, thus improving the situation. One standard beehive coke maker says his company sold 30 cars of coke recently for California, Oklahoma and Texas, as well as locally, for $10 per net ton. The Pacific demand is especially strong, owing to the desire to anticipate advanced freight rates. A furnace interest is selling its by-product coke at $5 per ton. A small coke operator has contracted for his year's output with a Mexican smelter at $6 per ton. Spot coke ranges from $6 to $10. Furnace coke, when obtainable, brings $4.50 to $5 at oven.

San Francisco

SAN FRANCISCO, CAL., Dec. 12, 1916.

The usual year-end contraction of business has been conspicuously absent. Merchants and other large buyers are seeking to cover their requirements for first and second quarters as far as possible by contracts, but while most mills are endeavoring to take care of regular customers, they are taking on very little outside business. New inquiries are numerous, both local and foreign, and a great deal of business that would ordinarily be attractive is being refused. Many buyers are drawing more heavily than usual on merchants' stocks, causing exceptional activity for this season.

Bars.—Many of the larger buyers have been placing steel-bar contracts with local mills for the first half of 1917, covering their principal requirements, at about 3.25c., which is much lower than anything can be had from the East. The demand from the Orient continues active, and considerable business is going through, though many of the orders have been placed with difficulty. The jobbing movement shows a tendency to increase. The high cost of structural shapes is causing a perceptible gain in reinforcing-bar business, though few really important orders are appearing. The jobbing price on small lots remains at 4.25c.

Structural Material.—Large contracts continue scarce, and many projects have been delayed on account of prices. The volume of important work in more or less definite prospect, however, continues to accumulate, and from present indications there should be considerable activity next year. It is announced that bids will be taken in March for the 10-story Matson Building. Preliminary arrangements are under way for the 6-story Ogden Mills Building, and plans are under way for the S. F. Stock & Bond Exchange Building in the same district. The new building adjoining the Merchants' Exchange will be much larger than originally reported. Most local shops are fairly well occupied on small work. Fabricators are contracting ahead for plain material in a rather conservative way, but manufacturers are making liberal provision for the future.

Plates.—Routine needs are being covered well in advance, with provision in many cases for increased tonnage. There is a strong foreign demand, but outside buyers are in competition with local shipbuilders, and are unable to place much business here. Ship construction is proceeding about as fast as the arrivals of material will permit. No new tank or pipe business of special importance has appeared, but manufacturers in this line continue in the market, and the general distributive movement of tank and boiler plates is active, with a price on small lots of 5.15c.

Sheets.—A further advance in mill prices, with considerable actual difficulty in placing orders, has caused another rise in the local resale price of galvanized sheets, No. 28 being quoted at 7.84c. The movement is somewhat restricted, though there is a strong demand. Blue annealed sheets are moving well in a small way, but no special work requiring large tonnage has come up in the last fortnight.

Wrought Pipe.—While the rainy season usually curtails business in the oil country, inquiries are still coming from that section in good shape, the tonnage so far being very satisfactory. With oil still going rapidly out of storage, the outlook is favorable for new development. Merchant pipe remains comparatively inactive, with nothing to indicate increasing activity in the near future.

Cast-Iron Pipe.—There is no large buying now by

either corporations or municipalities, and it is expected that the high prices prevailing will have a deterrent effect. The town of Whittier, Cal., placed an order Dec. 4 for about 200 tons, and Santa Monica will take bids Dec. 18 for a small lot. Prices are quoted here at $47 per net ton for 6-in., $50 for 4-in., and $1 extra for gas pipe.

Pig Iron.—There has been more buying for shipment before the first of the year to avoid the freight advance, with comparatively little contracting for extended delivery. Foundry operations are on a fairly large scale, with little fluctuation. Local values are rather uncertain, owing to the rapid advance in the East.

Coke.—Local values are too unsettled to quote at present, being contingent on Eastern changes. Buying has been fairly active, though the tonnage is hardly as large as that booked at the end of last summer.

Old Material.—The movement of steel melting scrap continues large, with rather more current buying than before, and prospects of further increase in requirements before long, though there is no shipping movement to distant markets. There is plenty of scrap scattered through the country, but accumulations are firmly held, being quoted at a general range of $11 to $14 per gross ton. Cast-iron scrap finds a ready market with the foundries at about $16 per net ton.

The Rennerfelt electric steel furnace installed by Woods, Huddart & Gunn for the Samson Sieve-Grip Tractor Company, Stockton, Cal., is now in successful operation.

Buffalo

BUFFALO, N. Y., Dec. 18, 1916.

Pig Iron.—The market is somewhat quieter. While inquiry keeps up in fair volume, it is of a more desultory nature. Considerable demand is noted from melters who had previously contracted for their requirements but have had their supply curtailed through the inability of furnaces to make shipments owing to the shortage of coke, labor and railroad cars. Sales, however, are scant, owing to the unprecedented scarcity of iron to be found at this time not under contract and obtainable at the delivery periods desired by the consumers. Very little resale iron is left in the market—hardly worth taking into account—there being only 1500 tons on hand here at present, of which only 500 tons is now available, and is held at $35 per ton flat, although a small lot was sold 10 days ago at $31. The price situation is as unusual as the sold-up condition of the furnaces. Grade schedules have given way to a flat price of $35 per ton, irrespective of grade differentials or deliveries. One leading producing interest is out of the market entirely and a second announces that it has very little, if anything, to sell for the next six months. Some buyers are disposed to hold off, believing that the stiffness of the situation may later be eased. There are indications, however, that prices may go to higher levels. One sale of a small amount of foundry iron was reported today at $35.50 at furnace. The lack of a spread on grade differentials necessitates quoting the price of any kind of coke iron, f.o.b. furnace, Buffalo, at $35. Charcoal iron sales are subject to prices quoted by producers on a basis of analysis, tonnage and deliveries required. No open quotations are being made at present time.

Finished Iron and Steel.—Quieter conditions are noted than for some weeks. Sellers are not pressing sales and buyers seem inclined to wait until January before making further effort to purchase. Quite a number of the largest users of steel are now taking inventory and holiday conditions are in evidence. Prices for most finished products remain largely nominal. Sheet prices have strengthened. Mills are quoting 4.50c. on No. 28 black sheets, with some sales reported at 5c. Galvanized sheets have been advanced to a minimum of 6.25c., some sellers asking 6.50c. The demand for billets has been so heavy that one producing interest in this market has contracted to the extent of its capacity for the first half of 1917, and is not selling beyond that period. The Strong Steel Foundry Company has awarded contract to the Progressive Structural Steel Company for 200 tons of steel for an addition to its foundry. The John W. Cowper Company, Buffalo, which has the general contract for a laboratory building, requiring 700 tons, and for an ice-machine building, power plant and boiler house, 700 tons, all at the plant of the Schoellkopf Aniline & Chemical Works, Buffalo, has sublet the steel work to the Ferguson Steel & Iron Company, this city. The Cowper Company has also sublet to the Ferguson Company 100 tons for a new plant for the Transmission Ball Bearing Company, for which it has the general contract. Architect Neal Dunning, Builders Exchange Building, Buffalo, will soon call for bids for 600 tons required for school buildings at Lackawanna City, N. Y., and for 200 tons for a building for the Lackawanna Trust Company, Lackawanna City.

Old Material.—A succession of advances has taken place since last report in many commodities in the scrap list. Heavy melting steel is now being quoted at $26 to $27 and iron and steel axles are up to $45. The peace talk has not as yet materially affected the market situation, although a slight lull in buying is now noted. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	$26.00 to $27.00
Low phosphorus	32.00 to 34.00
No. 1 railroad wrought	30.00 to 31.00
No. 1 railroad and machinery cast	23.00 to 24.00
[illegible]	45.00
[illegible]	45.00
[illegible]	23.00 to 24.00
Railroad malleable	23.00 to 24.00
Machine shop turnings	11.50 to 12.00
Heavy axle turnings	17.50 to 18.00
[illegible]	11.50 to 12.00
[illegible]	25.00 to 26.00
[illegible]	15.50 to 16.00
[illegible]	16.00 to 16.50
Wrought pipe	17.00 to 17.50
[illegible]	21.50 to 22.50
[illegible]	15.00 to 15.50
[illegible]	15.00 to 16.00

New York

NEW YORK, Dec. 20, 1916.

Pig Iron.—Pig iron inquiry has fallen off the past week though the preceding week was by no means active. Only small lots are being put before the trade, and these are mostly for delivery in the first half. Buffalo furnaces are reported to be asking $35 at furnace for all grades with the possible exceptions of No. 3 foundry and forge iron. In New England the activity is mostly by way of pressing for delivery of iron, the embargo by the railroads there having been lifted on Dec. 10. A number of furnaces are behind on their schedules, but they are confronted with requests by some foundries for the anticipation of shipments, in the effort of the latter to guard against traffic derangements due to winter weather. In the Lehigh Valley one or two furnaces have banked again because of coke shortage and in another case a shutdown was only averted by an increase in wages. Of recent buying by the Baldwin Locomotive Works only 500 tons taken by a Virginia furnace can be traced. The largest inquiry that has come up in this district is for 2000 tons of steel making iron from a New Jersey interest. We quote at tidewater for early delivery: No. 1 foundry, $30 to $31; No. 2X, $29.50 to $30.50; No. 2 plain, $28.50 to $29.50; Southern iron at tidewater, $29 to $30 for No. 1 and $28 to $29 for No. 2 foundry and No. 2 soft.

Ferroalloys.—Sales of about 7000 tons of British ferromanganese at $164, seaboard, for delivery in the last half of 1917 have been made in the past week, after a period in which very few sales of this product have been made. Most representative of British makers are out of the market for the first half of 1917 and have been for some time, one broker having sold practically all of the supply available for the first half of 1917 some [illegible] ago at $175, seaboard Receipts from abroad [illegible] ember were 7410 tons, but the indications are that the December receipts will be less. In fact, there is been a gradual decline since September. While the [illegible] ion for domestic ferromanganese has been advanced to $175, delivered, about 3000 tons has been sold

in the past week at $165, delivered, besides 300 tons for export. Inquiries are not large outside of one for about 2500 tons for fairly early delivery. The spiegeleisen market is more active and firmer at $55 to $60, furnace, for the 20 per cent grade for forward delivery, principally for first quarter. Besides a sale of about 500 tons for export at not less than $60 per ton there have been sales of about 3000 tons for delivery in the first quarter. The market for ferrosilicon, 50 per cent, continues strong and active at $99 to $100 for forward delivery, with considerably higher prices obtained for much needed material. Previous indications of a scarcity in the coming year have been recently strengthened by information to the effect that a large producer in this country, with which many important steel companies have large contracts, is likely in the near future to have its supply of electric power considerably lessened. It is reported that this interest has already declined to renew one important contract for next year.

Finished Iron and Steel.—Peace talk in connection with the European war has not apparently affected inquiry from abroad in any way and the domestic market is normal for the holiday season. The disturbing elements are the shortage of cars and, as the result, scarcity of fuel, including also natural gas, particularly at Pittsburgh and Youngstown, with embargoes against shipments to different points. Opinions are much mixed as to the trend of prices in the event of advanced peace negotiations and cessation of warfare, with perhaps a preponderance believing that prices will remain strong through 1917. This is predicated on the needs abroad for ship material and for rails both under direct negotiations and obtainable by substitution if shell steel is not taken; the occupation of rolling mills on this account is expected to maintain prices in other lines. At the moment structural steel is not moving fast, but it now appears that fabricators have four months' work on their books based on ideal running conditions, which with inefficient and scarce labor represent six months' work. Some mills have put their minimum for shapes at 3.50c., Pittsburgh, but 3.25c. is still obtainable. The structural work lately put under contract includes 900 tons for the Dreicer loft, Fifty-seventh Street, and 200 tons for an eye, ear and nose hospital, both to Harris, Silver, Baker Company; 1200 tons for the Niagara Chemical Company, Perth Amboy, N. J., to the Hedden Iron Construction Company; 1600 tons for the addition to the power house of the Boston Edison Company at South Boston to the New England Structural Company; 750 tons for bridge work for the Baltimore & Ohio to the Toledo Bridge & Crane Company and the Fort Pitt Bridge Works, and 250 tons for the De Laval Steam Turbine Company, Trenton, N. J., to Lewis F. Shoemaker & Co. It is believed that the American Bridge will supply the Baltimore & Ohio pier shed at Baltimore, 2600 tons, and that the McClintic-Marshall Company will furnish the 7000 tons for the New York Shipbuilding Company. The Maine Central has decided not to purchase the 2200 tons of bridge work on account of high prices, believing that it can wait a year or so and buy for less money. We quote mill shipments of shapes in two to five months at 3.419c. to 3.669c., New York, and warehouse shipments at a minimum of 3.75c., New York. We quote universal and ordinary tank plates at 4.169c. to 4.669c., New York, but Lloyd specification plates at 5.169c. to 6.169c., with little available before the third quarter of 1917 and for plates in the fourth quarter of 1917 and the first quarter of 1918 at 3.669c., New York. Out of store we quote 4.75c., New York, for plates under 36 in. in width and 5c. on wider plates. We quote mill shipments of steel bars at 3.069c. to 3.419c., New York, the lower price for indefinite delivery and the higher for small quantities in, say, three months. We quote mill shipments of bar iron at 3.169c., New York. Out of warehouse iron bars are 3.50c. and steel bars 3.75c., New York.

Cast-Iron Pipe.—Greater activity prevails than for the past two or three weeks. Municipalities in New England are taking up the purchase of supplies for next year and some lettings are now being advertised while others are known to be in course of preparation. The city of Holyoke, Mass., will open bids on 200 tons on Thursday, Dec. 21, and Boston on 2500 tons on Tuesday, Dec. 26. Private buying is running much beyond expectations for the season. Prices are firmly held on the basis of $41.50 per net ton, tidewater, for carload lots of 6-in., class B and heavier, with class A and gas pipe taking an extra of $1 per ton.

Old Material.—A decided change took place when announcement was made of Germany's overture for peace. Inquiries fell off and negotiations were checked, while prices on some commodities weakened perceptibly. The underlying strength of the market, however, is shown by the fact that on most classes of old material prices have been maintained. The discontinuance of the blast-furnace demand for borings and turnings caused a sharp decline in these classes of scrap. Other adverse influences than peace talk were new embargoes at some of the eastern Pennsylvania works and the higher demurrage charges now being imposed. Brokers quote buying prices about as follows to local dealers and consumers, per gross ton, New York:

Heavy melting steel scrap (for eastern Pennsylvania shipment)	$20.00 to $20.50
Old steel rails (short lengths) or equivalent	22.00 to 22.50
Relaying rails	37.00 to 38.00
Rerolling rails	27.50 to 28.00
Iron and steel car axles (for export)	45.00 to 47.00
No. 1 railroad wrought	25.00 to 26.00
Wrought-iron track scrap	22.00 to 22.50
No. 1 yard wrought, long	22.00 to 22.50
Light iron (nominal)	6.50 to 7.00
Cast borings (clean)	11.00 to 11.50
Machine shop turnings	9.50 to 10.00
Mixed borings and turnings	7.00 to 7.50
Wrought pipe (not galvanized or enameled)	16.50 to 17.00

Cast scrap appears to be in somewhat better condition than steel scrap. Foundries have been buying quite well and further inquiries are in hand. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

No. 1 cast	$22.00 to $22.50
No. 2 cast	19.00 to 19.50
Stove plate	15.50 to 16.00
Locomotive grate bars	15.50 to 16.00
Old carwheels	21.50 to 22.00
Malleable cast (railroad)	18.00 to 18.50

British Steel Market

Ferromanganese Selling Higher—Italy Buying American Billets

(*By Cable*)

LONDON, ENGLAND, Dec. 20, 1916.

The Cleveland pig iron market is quieter but firm, and conditions in hematite iron are easier. Tin plates are quoted at 34s. 6d. and ferromanganese is more active, with £38 paid for delivery in Spain. Business in semi-finished steel is difficult. Italy has bought 5-in. billets for January-February delivery at $63 f.o.b. Baltimore. We quote as follows:

Tin plates [illegible] f.o.b. Wales, 34s. 6d. against 34s. last week.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £19 5s. [illegible]

Hematite pig iron, f.o.b. Tees, 142s. 6d., compared with [illegible]

Sheet bars (Welsh) delivered at works in Swansea Valley, £15 5s. nominal.

[illegible]

What is practically the new furnace of the Pulaski Iron Company, Pulaski, Va., went into blast Dec. 18, and at last reports was working smoothly. The stack is new and the stoves were installed but a few months ago. A General Electric turbo-blower is a part of the new equipment, also an Ingersoll-Rand blower of the same type. An electrically-operated skip hoist is new, the boiler capacity has been increased and other improvements have been made. The furnace has a capacity of 300 tons a day.

St. Louis

ST. LOUIS, MO., Dec. 18, 1916.

Pig Iron.—The fact that all large consumers and a considerable number of the smaller users had covered for a considerable period ahead gave little opportunity for the peace talk to affect the market at this point. Buying during the week was in small lots, ranging from 500 tons downward. The sales made showed no weakness in price. Some call was noted for fluorspar at $20, and there was a sale of ferromanganese, about 30 tons, at $164.50, while $175 is the present quotation at this point.

Finished Iron and Steel.—The pressure for delivery of contracted steel was quite heavy during the week, and consumers are urging forward their specifications because of accentuated needs to meet demand, particularly on structural material. An inquiry for 2500 tons of standard section steel rails appeared but was not closed. This is for 1918 delivery. Movement out of warehouse has continued good, with prices firmly held. We quote for stock out of warehouse as follows: Soft steel bars, 3.65c.; iron bars, 3.60c.; structural material, 3.65c. to 3.75c., according to size and weight; tank plates, 4.30c.; No. 10 blue annealed sheets, 4.30c.; No. 28 black sheets, cold-rolled, one pass, 4.90c.; No. 28 galvanized sheets, 7.10c.

Old Material.—The peace talk had a temporary effect and for the moment weakened prices, but at the close of the week and to-day the figures quoted were steady for the most part. This being the inventory period and the holidays near at hand, the situation is likely to remain rather quiet until after the first of the year. Previous to the developments of the past week there had been some considerable buying by Eastern and Chicago interests. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton

Old iron rails	$28.00 to $28.50
Old steel rails, rerolling	30.00 to 31.00
Old steel rails, less than 3 ft	30.00 to 31.00
Relaying rails, standard section, subject to inspection	35.00 to 36.00
Old carwheels	22.00 to 22.50
No. 1 railroad heavy melting steel scrap	25.50 to 26.00
Heavy shoveling steel	21.50 to 22.00
Ordinary shoveling steel	18.50 to 19.00
Frogs, switches and guards cut apart	25.00 to 26.00
Ordinary bundled sheet scrap	14.50 to 15.00

Per Net Ton

Iron angle bars	$26.00 to $26.50
Steel angle bars	31.00 to 31.50
Iron car axles	32.50 to 33.00
Steel car axles	34.00 to 35.00
Wrought arch bars and transoms	27.50 to 28.00
No. 1 railroad wrought	24.00 to 24.50
No. 2 railroad wrought	23.00 to 23.50
Railroad springs	24.00 to 24.50
Steel couplers and knuckles	25.00 to 26.00
Locomotive tires, 42 in. and over, smooth inside	23.00 to 23.50
No. 1 dealers' forge	20.00 to 20.50
Cast-iron borings	10.50 to 11.00
No. 1 busheling	19.00 to 19.50
No. 1 boilers, cut to sheets and rings	15.00 to 15.50
No. 1 railroad cast scrap	12.00 to 12.50
Stove plate and light cast scrap	11.00 to 11.50
Railroad malleable	17.00 to 17.50
Agricultural malleable	14.00 to 14.50
Pipes and flues	10.00 to 10.50
Heavy railroad sheet and tank scrap	15.50 to 16.00
Railroad grate bars	12.00 to 12.50
Machine shop turnings	11.00 to 11.50
Heavy axle and tire turnings	13.00 to 13.50

Iron and Industrial Stocks

NEW YORK, Dec. 20, 1916.

With the subsidence of the furious general demand for stocks and the disposition of values to recede, it needed only such a mild movement toward peace as that of Germany to precipitate a violent decline. This decline has been termed a "peace panic," which seems a most appropriate description of the heavy fall that took prices of all stocks owing their advanced value to the war down to the lowest point in a great many months. The movement went through its first severe spasm on Friday, Dec. 15, after which there was some recovery, followed by another and even sharper lapse on Tuesday of this week. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Adams Coal com.	26 - 32
Allis-Chal., pref.	85⅜ - 89
Am. Car com.	484 - 577½
Am. Car pref.	109½ - 114
Am. Car & Fdy. com.	67½ - 72¾
Am. Car & Fdy., pref.	116 - 117¼
Am. Loco., com	78 - 87¾
Am. Loco. pref	106 - 106¼
Am. Ship. com.	62 - 64¾
Am. Ship. pref.	95 - 96½
Am. Steel Fdries.	63 - 69½
Beth. Steel com.	65 - 76¼
Bald. Loco., pref.	100¼ - 102¼
Beth. Steel com.	525 - 595
Beth. Steel pref.	145 - 147
Cambria Steel	120 - 125
Central Stl. com.	97 - 114
Central Fdry., com.	23 - 30
Central Fdry., pref.	39 - 47½
Chic. Pneu. Tool	71⅝ - 78¼
Colo. Fuel	44¾ - 52½
Cruc. Steel, com.	73¾ - 78
Cruc. Steel, pref.	111 - 119⅞
Deere & Co., pref.	99 - 99⅝
Driggs-Seabury	70 - 69⅝
Gen. Electric	168½ - 177
Gt. No. Ore Cert.	38⅜ - 42½
Gulf States Steel	120 - 159
Gulf States Steel, 1st pref.	108
Gulf States Steel, 2nd pref.	110
Harb-Walk. Refrac., pref.	107 - 108½
Int. Har. of N. J. com.	118½ - 123½
Int. Har. of N. J., pref.	120
Int. Har. Corp., com.	81 - 87
Int. Har. Corp., pref.	114¾
La Belle Iron, com.	78 - 86
Lacka. Steel	84 - 102¼
Lake Sup. Corp.	18 - 25
Midvale Steel	59 - 64¾
Nat. En. & Stm., com.	30 - 34
Nat. En. & Stm., pref.	99¾
N. Y. Air Brake	149 - 160
Nova Scotia Stl.	126 - 141
Pitts. Steel, pref.	102¾ - 103
Pressed Stl., com.	74 - 81
Pressed Stl., pref.	102 - 105
Ry. Steel Spring, com.	50⅜ - 56⅛
Ry. Steel Spring, pref.	101 - 101¼
Republic, com.	75 - 84⅜
Republic, pref.	105 - 115
Sloss, com.	60 - 75
Sloss, pref.	100
Un. Alloy Steel	48¼ - 53½
U. S. Pipe, com.	21 - 24¼
U. S. Pipe, pref.	59⅞ - 60¼
U. S. Steel, com.	109¼ - 120⅜
U. S. Steel, pref.	118¾ - 121⅜
Va. I. C. & Coke	49 - 57
Warwick	9¾
Westing. Electric	51¼ - 58½

Dividends

The E. W. Bliss Company, regular quarterly, 1¼ per cent and extra 100 per cent on the common stock, and regular quarterly, 2 per cent on the preferred, payable Dec. 23.

The Allis-Chalmers Mfg. Company, regular quarterly, 1½ per cent and 1½ per cent on back dividends on the preferred stock, payable Jan. 15. Dividends in arrears on the preferred now amount to 10 per cent.

The Transue & Williams Steel Forging Corporation, initial quarterly, $1 a share, payable Jan. 11.

The Brier Hill Steel Company, regular quarterly, 1½ per cent, and extra, 2 per cent, on the common stock.

The Empire Steel & Iron Company, 3 per cent on the preferred, payable Jan. 1.

The Ingersoll-Rand Company, $20 a share on the common, payable Dec. 28.

The Packard Motor Car Company, increased dividend from 7 per cent to 8 per cent on the common stock. Quarterly 2 per cent, payable Feb. 1.

The American Brake Shoe & Foundry Company, regular 8 per cent on the preferred stock, payable in four quarterly instalments of 2 per cent each, on Dec. 30, March 31, June 30 and Sept. 29 next and similarly a regular 7 per cent on the common stock, in four quarterly instalments of 1¾ per cent each. Also an extra of 2 per cent on the preferred, payable Dec. 30.

The Torrington Company, regular quarterly 3 per cent and extra 1 per cent, payable Jan. 3.

The American Laundry Machinery Company, regular quarterly, 1¾ per cent on the preferred stock, payable Jan. 15.

The American Seeding Machine Company, regular quarterly, 1 per cent, on the common stock, and 1½ per cent on the preferred stock, payable Jan. 15.

The American Rolling Mill Company, regular quarterly, [illegible] extra, 1 per cent, on the common stock, and [illegible] the preferred stock, all payable Jan. 15.

The Canadian Crocker-Wheeler Company, regular quar[illegible], on the common and preferred stock, payable Dec. 31.

The Canadian Locomotive Company, regular quarterly, 1¾ per cent, on the preferred stock, payable Jan. 31.

The J. I. Case Threshing Machine Company, regular quarterly, 1¾ per cent on the preferred stock, payable Jan. 2.

The International Harvester Company of New Jersey, [illegible], 1¼ per cent, on the common stock, payable

The National Enameling & Stamping Company, regular [illegible] per cent, on the preferred stock, payable Dec.

The Scovill Mfg. Company, regular quarterly, 2 per cent, [illegible]nt, payable Jan. 1, and special of 25 per cent [illegible]nch bonds, payable Jan. 5.

[illegible]ard Sanitary Mfg. Company, extra 1 per cent on [illegible]ps, p[illegible] Dec. 23.

Republic Iron & Steel Company, initial dividend of 1½ [illegible] stock, payable Feb. 1.

The Crucible Steel Company of America, extra, 2 per cent, on the preferred stock, on account of deferred dividends, pay-

[illegible]rd Screw Company, extra, 20 per cent on the [illegible]ddition to the regular semi-annual divi[illegible] per cent on the common and A preferred stocks, [illegible]½ per cent on the B preferred, all payable Jan. 2.

The Trumbull Steel Company, regular quarterly, 1½ per [illegible] on the common stock, and regular [illegible]¼ per cent on the preferred, all payable Jan. 1.

[illegible] & Steel Company, regular monthly, 1 per [illegible] 5 per cent, payable Jan. 1, making 17 per cent

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin,	Lead		Spelter	
		Electro-		New	St	New	St
Dec	Lake	lytic	New York	York	Louis	York	Louis
13	34 25	34 25	42 87½	7 80	7 70	11 75	11 50
14	34.00	34 00	42 75	7 75	7 65	11 50	11 25
15	33 50	33 50	42 87½	7 50	7 40	10 75	10 50
16	33 50	33 50	...	7 50	7 40	10 50	10 25
18	32.50	32 50	42 50	7 50	7 40	10 50	10 25
19	32.50	32.50	42.37½	7.50	7.40	10.25	10.00

NEW YORK, Dec. 20, 1916.

Copper is quiet and lower, with all concerned inclined to sit still and await developments. Tin is lower after a quiet week. Lead conditions have been reversed, and it is being offered at lower prices. Spelter has continued to decline. Antimony is dull, but prices are firm.

New York

Copper.—The peace talk of recent days brought a halt to business in all the metals. In copper there has been a little inquiry, with some resultant sales, although most sellers and consumers have been satisfied to simply watch the situation. Despite the sold-up condition of the producers, on which so much stress has been laid of late, copper began to come out rather freely, following the German peace proposal. Second hands, including some consumers, have been offering the metal. One offering of last week consisted of 1,000,000 lb. of prompt prime Lake which a mill was willing to let go at 30c. It is predicted that most of the business in the next few months will be done by second hands, who are making the market to-day. Lake and electrolytic were to be had yesterday at 32.50c. for January delivery, electrolytic being sold at that figure. First quarter was offered yesterday at 31.50c. With all the change in metal prices, the quotations for brass and copper rolling-mill products are unchanged. A buyer who was in the market yesterday stated that he would not close until he was sure of a prospective contract. The London market for spot electrolytic yesterday was £161, against £168 a week previous, the decline being a manifestation of Great Britain's purpose to fix the price of copper and to control its consumption. The exports this month, including yesterday, are fair, amounting to 14,040 tons.

Tin.—The market has been at almost a complete standstill except on two days of the week, when moderate quantities were taken. On Dec. 18 a few buyers took about 200 tons, it being understood that the metal was needed to cover old contracts in cases where shipments had failed to arrive because of the difficulty in getting licenses to ship. Yesterday about 100 tons changed hands. The trade considers that the coming of peace would be a bull point for tin, inasmuch as a much wider market would then be possible. New York prices have continued to decline, the quotation yesterday being 42.37½c. for spot Straits. The arrivals this month total 1070 tons, and there is afloat 6393 tons.

Lead.—Since Dec. 18 the market has undergone a complete change, as on that day it was strong at 8c., New York, and higher, with very little metal being offered, whereas yesterday there were plenty of offerings at 7.50c., New York, this being the price of all interests. Last Tuesday second hand lots were offered freely at concessions, and likewise on Wednesday, at still lower figures. On Friday the market dropped $5 per ton—to 7.50c., thereby wiping out all premiums. As was the case with copper, sellers who were supposed to be sold out discovered they had metal to sell. The St. Louis price yesterday was about 7.40c. The London spot quotation yesterday was unchanged at £30 10s. The exports this month, including yesterday, were small, amounting only to 122 tons.

Spelter.—On Monday, nearby spelter sold at 10c., New York, for delivery to Perth Amboy, N. J., which is about equal to 9.75c., St. Louis. Prompt metal ranges from 10c. to 10.50c., St. Louis, for December, and 9.75c. to 10.25c. for first quarter, the New York prices being about ¼c. higher. Second quarter has sold at 9.25c. to 9.50c., St. Louis. Prices show a wide range for the reason that some of the producers will not concede that the market possesses any inherent weakness. They continue to predict higher prices in January, and in view of their comfortably sold-up condition are not inclined to make any concessions at present. The London market for spot was quoted yesterday at £54 5s., as compared with £57 the week previous. The exports this month, including yesterday, are running somewhat lighter than of late. They amounted to 2787 tons.

Antimony.—Asiatic grades are firmly held at 14.25c. to 14.37½c., but there is little or no demand.

Aluminum.—No. 1 virgin aluminum, 98 to 99 per cent pure, is unchanged at 63c. to 65c. per lb.

Old Metals.—The market is quite unsettled, owing to the peace talk. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible	32 50 to 33 00
Copper, heavy and wire	29 00 to 30 50
Copper, light and bottoms	27 00 to 28 00
Brass, heavy	18 00 to 18 50
Brass, light	14 00 to 15 50
Heavy machine composition	25 00 to 26 00
No. 1 yellow rod brass turnings	18 50 to 19 50
No. 1 red brass or composition turnings	21.00 to 23 00
Lead, heavy	7.00
Lead, tea	6 50
Zinc	8 00 to 9 00

Chicago

DEC. 18.—Free offerings of metals by those who desired to sell promptly for the realization of profits had its effect on prices and quotations are generally lower. We quote: Casting copper, 32.50c.; Lake copper, 33.75c. to 35c.; tin, carloads, 43c., and small lots, 45c.; lead, 7.55c. to 7.60c.; spelter, 10.50c.; sheet zinc, 21c.; Cookson's antimony, 50c.; other grades, 17c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 27c.; copper bottoms, 23.50c.; copper clips, 26c.; red brass, 23c.; yellow brass, 17c.; lead pipe, 5.75c.; zinc, 8.50c.; pewter, No. 1, 26c.; tinfoil, 33c.; block tin pipe, 37c.

St. Louis

DEC. 18.—In some of the non-ferrous metals, especially spelter, there has been a weakening of tone and of prices. Quotations to-day, carload lots, were: Lead, 7.50c.; spelter, 10.50c., by sellers. In less than carloads quotations were: Lead, 7.90c.; spelter, 13c.; tin, 47½c.; Lake copper, 35c.; electrolytic copper, 34.50c.; Asiatic antimony, 17c. In the Joplin ore district zinc blende was lower and very weak, but lead ore was stronger. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, $10.50; heavy yellow brass, 14c.; heavy red brass and light copper, 19c.; heavy copper and copper wire, 22c.; zinc, 7c.; lead, 5.50c.; tea lead, 4c.; tinfoil, 34c.; pewter, 25c.

Germany's New Record in Pig Iron

Germany's pig iron output in October exceeded that for any month since the war started. It was 1,161,005 metric tons, against 1,116,752 tons in September. The largest previous war output was 1,145,292 tons in August, 1916. The daily rate in October also exceeded all war records at 37,452 tons per day, against 37,225 tons in September, the previous record. The October output was made up of 160,055 tons of foundry iron, 16,150 tons of Bessemer iron, 762,115 tons of Thomas iron, 205,840 tons of so-called steel making iron and spiegeleisen and 16,845 tons of forge iron. The total output for the ten months to Nov. 1, 1916, was 11,054,334 tons, against 9,742,917 tons to Nov. 1, 1915.

Advance information gives the October steel output at 1,423,555 metric tons, also a war record.

The Badger Foundry Company, Racine, Wis., has taken the contract for casting the cylinders, valves and other gray-iron parts of a 24-cylinder motor for a hydroplane for Commodore James Pugh, Chicago. The bore of the motor is 6¾ in., and it is expected to develop 2000 b.h.p.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c. Denver, pipe, 76.1c., minimum carload, 46,000 lb.; structural steel and steel bars, 83.6c.; minimum carload, 36,000 lb. Pacific coast (by rail only), pipe, 65c.; structural steel and steel bars, 75c., minimum carload, 50,000 lb.; structural steel and steel bars, 80c., minimum carload, 40,000 lb. No freight rates are being published via the Panama Canal, as the boats are being used in transatlantic trade.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 3c. to 3.25c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in. on one or both legs	.10
Angles, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and coupler tee)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .30
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Plates.—Tank plates, ¼ in. thick, 6 in. up to 100 in. wide, 3.50c. to 5c., base, net cash, 30 days, or ½ of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras

	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers)	.10
Boiler and flange steel plates	.15
"A. B. M. A." and ordinary firebox steel plates	.20
Still bottom steel	.30
Locomotive firebox steel	.50

Marine steel, special extras and prices on application.

Gage Extras

Rectangular, ¼ in. thick, over 6 in. wide to 100 in. wide	Base
Lighter than ¼ in., to 3/16 in. up to 72 in. wide	.10
*Lighter than ¼ in., including 3/16 in., over 72 in. to 84	.20
*Lighter than ¼ in., including 3/16 in., over 84 in. to 96	.30
*Lighter than ¼ in., including 3/16 in., over 96 in. to 100	.40
*Lighter than ¼ in., including 3/16 in., over 100 in. to 102	.45
Lighter than 3/16 in., including No. 8, up to 72 in. wide	.10
*Lighter than 3/16 in., including No. 8, over 72 in. to 84	.20
*Lighter than 3/16 in., including No. 8, over 84 in. to 96	.35
Lighter than No. 8, including No. 10, up to 60 in. wide	.30
Lighter than No. 8, including No. 10, over 60 in. to 64	.35

Up to 72 in. and not less than 10.2 lb. per sq. ft. will be considered ¼ in.
Over 72 in. must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.
Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.
Over 72 in., ordered weight 3/16 in., take No. 8 price.
Over 72 in., ordered weight No. 8, take No. 10 price.

Width Extras

Over 100 in. to 110 in. inclusive	.05
Over 110 in. to 115 in. inclusive	.10
Over 115 in. to 120 in. inclusive	.15
Over 120 in. to 125 in. inclusive	.25
Over 125 in. to 130 in. inclusive	.50
Over 130 in.	1.00

Length Extras

Universal plates 80 ft. long up to 90 ft. long	.05
Universal plates 90 ft. long up to 100 ft. long	.10
Universal plates 100 ft. long up to 110 ft. long	.20

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over.	
Lengths under 3 ft. to 2 ft. inclusive	.25
Lengths under 2 ft. to 1 ft. inclusive	.50
Lengths under 1 ft.	1.00
Circles 3 ft. in diameter to 100 in.	.50
Circles over 100 to 110 in. (width extra)	.35
Circles over 110 to 115 in. (width extra)	.40
Circles over 115 to 120 in. (width extra)	.45
Circles over 120 to 125 in. (width extra)	.55
Circles over 125 to 130 in. (width extra)	.75
Circles over 130 in. (width extra)	1.00
Circles under 3 ft., to 2 ft., inclusive	.75
Circles under 2 ft., to 1 ft., inclusive	.50
Circles under 1 ft.	1.00
Half circles take circle extras	
Sketches not over four straight cuts, inc. straight taper	.10
Sketches having more than four straight cuts	.20

Plates sheared to a radius take complete circle extras.

*Including extra for width.

Wire Rods.—Including chain rods, $70 to $75.

Wire Products.—Prices to jobbers effective Nov. 27: Fence wire Nos. 6 to 9, per 100 lb., to [illegible] per cent discount in 10 days, carload lots, annealed, $2.95; galvanized, $3.65. Galvanized staples, $3.85; painted, $3.15. Wire nails, $3. Galvanized nails, 1 in. and longer, $2 advance over base price; shorter than 1 in., $2.50 advance over base price. Cement coated nails, $2.90. Woven wire fencing, 53 per cent off list for carloads, 52 off for 1000-rod lots, 51 off for less than 1000-rod lots.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from Dec. 4, 1916, all full weight:

Butt Weld

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
[illegible]	59	32½	⅛ and ¼	48	21
[illegible]	62	44½	⅜	49	22
[illegible]	66	52½	½	53	35
			¾ to 1½	56	40

Lap Weld

	59	46½	1¼	42	27
[illegible]	62	49½	1½	48	34
[illegible]	59	47½	2	49	35
13 and 14	49½	..	2½ to 4	51	38
	4.		4½ to 6	51	38
			7 to 12	50	37

Reamed and Drifted

[illegible] butt	64	50½	¾ to 1½, butt	51	34
[illegible] lap	57	44½	1¼, lap	37	21
[illegible] lap	60	47½	1½ lap	43	28
			2 lap	44	29
			2½ to 4, lap	47	32

Butt Weld, extra strong, plain ends

¾ and ⅞	57	37½	⅛, ¼ and ⅜	48	31
[illegible]	60	47½	½	53	40
[illegible]	64	54½	¾ to 1½	57	42
[illegible]	66	57½			

Lap Weld, extra strong, plain ends

	57	45½	1¼	44	29
2½ to 4	60	48½	1½	49	35
4½ to 6	[illegible]	47½	2	51	38
7 to 8	[illegible]	44½	2½ to 4	53	41
9 to 12	46	36½	4½ to 6	52	40
			7 to 8	46	34
			9 to 12	41	29

To the large jobbing trade an additional 5 per cent is allowed over the above discounts, which are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized, but in some sections of the country discounts on less than carloads are three (3) points less (higher price) than the carload discount on both black and galvanized steel pipe.

On butt and lap weld sizes of black iron pipe, discounts for less than carload lots to jobbers are four (4) points lower (higher price) than carload lots, and on butt and lap weld galvanized iron pipe are five (5) points lower (higher price).

Boiler Tubes.—Discounts on less than carloads, freight to be added, effective from Nov. 1, 1916, except 3 to 4½ in. steel from Nov. 20, are as follows:

Lap Welded Steel		Standard Charcoal Iron	
[illegible]	31	1½ in.	23
[illegible]	43	1¾ and 2 in.	35
[illegible]	40	2¼ in.	32
[illegible]	46	2½ and 2¾ in.	38
[illegible]	46	3 and 3¼ in.	43
[illegible]	46	3½ to 4½ in.	44
[illegible]	47	5 and 6 in.	37
7 to 13 in.	42	7 to 13 in.	34

Locomotive and steamship special charcoal grades bring [illegible] prices.

[illegible] 13 ft. and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Sheets.—Makers' prices for mill shipments on sheets of United States standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Blue Annealed Sheets

	Cents per lb.
[illegible]	4.00 to 4.25
[illegible]	3.75 to 4.00
[illegible] 16	3.85 to 4.10

[illegible] are based on $4.50 per 100 lb. for [illegible] Blue Annealed.

Box Annealed Sheets, Cold Rolled

Nos. 17 to 21	4.30 to 4.55
[illegible] 24	4.35 to 4.45
and 26	4.40 to 4.65
[illegible]	4.45 to 4.70
No. [illegible]	4.50 to 4.75
No. [illegible]	4.55 to 4.80
No. [illegible]	4.65 to 4.90

Sheets of Black Sheet Gage

[illegible] 15	5.25 to 5.75
Nos. [illegible]	5.35 to 5.85
[illegible] 18	5.50 to 6.00
[illegible]	5.65 to 6.15
[illegible]	5.80 to 6.30
26	5.95 to 6.45
[illegible]	6.00 to 6.50
[illegible]	6.25 to 6.75
[illegible]	6.40 to 6.90
[illegible]	6.55 to 7.05

Box Annealed Black Plate

[illegible]	4.05 to 4.20
[illegible]	4.10 to 4.25
[illegible]	4.15 to 4.30
[illegible]	4.20 to 4.35
[illegible]	4.25 to 4.40
[illegible]	4.30 to 4.45
[illegible]	4.30 to 4.45
[illegible]	4.35 to 4.50

Utilizing Waste Heat to Generate Steam*

Advances Made in Recent Years—Savings Possible with Open-Hearth Steel Furnaces —Suggestions on Explosion Prevention

BY ARTHUR D. PRATT†

THE utilization of waste heat from various industrial processes for the generation of steam is not new. The advance within the last few years, however, in methods of utilizing such gases and in the results secured from their utilization has been so remarkable as to make of interest a comparison of former with present-day methods and results.

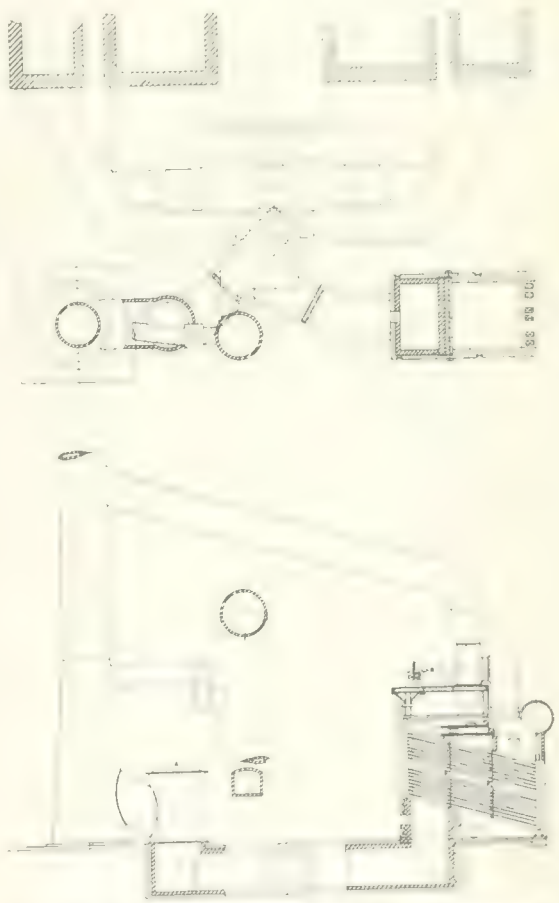
The design of waste-heat boilers has progressed to a point where it is to-day possible to generate steam successfully from gases whose temperatures are as low as 950 to 1000 deg. Fahr. It is but a few years since it was considered absolutely impracticable from a commercial standpoint to attempt to produce power from such gases, and it is in its ability to utilize these gases satisfactorily that the development of the modern waste-heat boiler has its most far-reaching effect.

The sole theory on which early waste-heat boiler installations were made has as its basis the non-interferences in the operation of the primary furnace. This resulted in the installation of a given amount of heating surface arranged in such manner that the frictional resistance to the gases in their passage through the boiler should be a minimum. As a result of minimizing this draft loss, such boilers as were installed were ordinarily entirely without baffles and the gases were given a straight passage through the boiler, though partially baffled boilers were used occasionally. High exit-gas temperatures were considered rather desirable than otherwise to assist the stack in giving the required drafts. Boilers installed in this way were considered practicable only with gases whose temperatures approached those of coal-fired practice. The users accepted the steam generated as "something for nothing" and no particular endeavor was apparently made toward increased capacities.

Present-day waste-heat practice has come about with a more thorough understanding of the laws governing heat transfer and an appreciation of the function of gas velocity as affecting transfer rates. It may be broadly stated that the rate of heat transfer is dependent upon gas velocity and temperature difference between the gas and the absorbing surface. Experiments have shown that at even the highest velocities now used in waste-heat work the effect of increased temperature difference is small as compared with that of increased gas velocity.

In coal-fired boiler practice, the average temperature difference between gases and boiler surfaces is approximately 1150 deg. The heat-transfer rate corresponding to a boiler's rated capacity is about 3 B.t.u. per hr. per sq. ft. of surface per degree difference, or a heat absorption of 3450 B.t.u. per sq. ft. of surface per hr. In waste-heat work the temperature difference varies widely with the class of waste heat. With a gas temperature of, say, 1250 deg. entering a boiler, the average temperature difference between boiler surface and gas for a working pressure of 170 lb. per sq. in. will be about 500 deg. For such a temperature difference the transfer rate to give an absorption per square foot of surface equal to that of the coal-fired boiler at rating would have to be 6.9 B.t.u. per hr. per sq. ft. per degree difference. This rate is slightly higher than the rates corresponding to velocities that are as yet ordinarily used, but, with somewhat higher entering-gas temperatures, the absorption per square foot of surface is such as to enable a boiler's rated capacity to be developed without difficulty. With gas temperatures entering the boiler of 1800 to 2000 deg., which approach coal-fired practice, high overloads are being developed.

The gas velocity necessary to give what is now considered a desirable transfer rate lead to a frictional resistance through waste-heat boilers which makes the use of a natural-draft stack impracticable. Let us consider what is probably the extreme case insofar as draft conditions are concerned, namely, the open-hearth steel furnace. Common practice in this class of work is to use stacks 160 ft high, which give a draft as their base of approximately 1.4 to 1.6 in., depending upon the gas temperatures. For the present purpose, assume that the draft loss through a modern waste-heat boiler installed with an open-hearth furnace is 2.0 in., a figure which approximately represents the practice of to-day. With a natural-draft stack the



Applied to an Open-Hearth Steel Furnace

draft at the checkers corresponding to the 1.4 to 1.6 in. given above is approximately 1.3 to 1.5 in., and this amount is necessary for the proper operation of the furnace. With a waste-heat boiler installed, then the draft necessary at the exit of the boiler must be sufficient to overcome the resistance through the boiler, 2 in.; that necessary to overcome resistance through the flues, say 0.75 in., and 1.5 in. necessary at the checkers, or a total of 4.25 in. It is to be remembered that with a waste-heat boiler installed, the temperature of the gases entering the stack, instead of being 1000 or 1200 deg., will be 450 or 500 deg., under which conditions a stack of 160 ft. instead of giving a draft of 1.4 to 1.6 in. at its base would give approximately

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0.9 in., and to give the necessary 4.25 in. the stack height would have to be somewhat over 700 ft.

While this is perhaps the extreme case, the same reasoning applies in practically all waste-heat work, and an induced-draft unit is now almost universally used with the modern design of waste-heat boiler. In certain classes of waste-heat work, such a fan not only furnishes the required draft suction, but is of a decided advantage in the operation of the primary furnace.

As may be inferred, the successful utilization of waste gases becomes more difficult with decreasing gas temperatures. It was in connection with regenerative furnaces and low-temperature gases that the principles of high gas velocity were first applied and the modern waste-heat boiler was developed. The success of the early installations in this particular class of work led to the application of this theory to all classes of waste-heat practice. Waste-heat boilers of the modern design are in successful operation to-day with copper refining furnaces, cement kilns, open-hearth steel furnaces, beehive coke ovens, zinc refining furnaces and heating furnaces of various types, both regenerative and non-regenerative. The waste-heat boiler of to-day was developed with low-temperature gases, and its largest field, until the present, has been with open-hearth steel furnaces.

This particular phase of waste-heat work may be considered new. In the open-hearth steel furnace we have the best and by far the most numerous examples of the regenerative furnace. From the very nature of the operation of such furnaces, gas temperatures passing to the stack are low, and the ability of the modern waste-heat boiler to utilize successfully these gases for the generation of steam is, without question, the best proof of the progress in the development of this particular class of boiler.

An experimental waste-heat boiler for this work, embodying the principles but possibly not the design of the modern waste-heat boiler, was installed at the South Chicago plant of the Illinois Steel Company, in 1910. The results from this installation, while by no means comparable with those secured to-day with the more highly developed design, so clearly indicated possible savings in the practically untried field of open-hearth practice that two boilers, the design of which may be considered well past the experimental stage, were purchased for this same plant in 1911.

C. J. Bacon, steam engineer of the Illinois Steel Company, presented before the American Iron and Steel Institute in May, 1915, a paper,* "Waste Heat Boilers for Open-Hearth Furnaces," in which he describes the experimental boiler referred to, and traces the development in this class of work through the first three installations made. The first of these, at the plant of the Illinois Steel Company, in South Chicago, consisted of two Stirling boilers equipped with special cross baffles to give the desired gas velocities over the heating surfaces. The second installation, made at the Gary plant of the Indiana Steel Company, consisted of 28 special six-drum Rust boilers equipped as in the case of the Stirling boilers with special cross baffles. The third installation described is that made at the Pencoyd works of the American Bridge Company and consists of a cross-drum Babcock & Wilcox boiler, the width of boiler and the tube length being such as to give the gas-passage areas necessary for the required gas velocity. For low-temperature waste-heat work, the type of boiler of which this installation is an example is in general best suited.

Table 1 gives the results secured from the Stirling and Rust boilers described and from Babcock & Wilcox boilers similar in design to that installed at Pencoyd, though set with considerably larger open-hearth furnaces. That the three installations described by Bacon are truly progressive, at least from the aspect of heat absorption, may be seen from the results given in this table. Tests 1, 2 and 3 are as given in Bacon's paper and its discussion. Test 4 is included as being of interest in indicating the results that may be secured with gases at a temperature considerably below that ordinarily found in open-hearth work. At this particular plant, the gas temperatures leaving the checkers were not appreciably lower than in other tilting furnaces, but the necessary flue arrangement was such that there was an excessive radiation loss between the checkers and the boiler from flues and reversing valves.

In Table 1, the proper basis for the comparison of results is the rate of heat transfer, but in order that such a comparison may be intelligent, it is necessary in connection with the transfer rates to give proper consideration to the gas weights per square foot of heating surface, entering and exit gas temperatures, and the percentage of rated capacity developed. To give a direct comparison of the performance of two different boilers, the gas weight per square foot of heating surface and the entering-gas temperature should be the same. It is possible from our present knowledge of the laws of heat transfer to compute with surprising accuracy the results that may be expected from any boiler for a given set of conditions. Let us consider, then, the results which the boiler of Test No. 4 would give under the gas conditions of Test No. 1. For a weight of gas per square foot of surface corresponding to Test No. 1, the total weight of Test No. 4 would become 98,950 lb. per hr. With this weight passing through the boiler of Test No. 4, at the temperature actually existing in No. 4, the boiler would develop approximately 363 hp., or 67 per cent of its rated capacity. With an entering temperature equal to that in Test No. 1, the boiler would develop approximately 500 hp., or 92 per cent of its rated capacity. These figures are included simply to show the importance of giving all factors proper consideration where a comparison of results is to be made.

In connection with waste-heat boilers there are certain features of installation and operation, some of

Table 1.—Results of Tests of Waste-Heat Boilers to Open Hearth Furnaces

Test No.	1†	2	3	4
Plant and location	Illinois Steel Company, South Chicago, Ill.	Indiana Steel Company, Gary, Ind.	Bethlehem Steel Company, South Bethlehem, Pa.	Lackawanna Steel Company Buffalo, N. Y.
Rated capacity of furnace, tons	65	75	80.0	....¶
Actual production, tons	72‡	85	82.6	....
Boiler	Stirling	Rust	B. & W.	B. & W.
Heating surface, sq. ft.	1,600	1,880	5,232	5,107
Superheat, deg. Fahr.	128	176	121	97
Gas weight, lb. per hr.	73,000	83,434	75,271	78,947
Gas per hr. per sq. ft. of heating surface, lb.	18.3	17.1	14.4	14.6
Temperature of gas entering boiler, deg. Fahr.	1,227	1,155	1,362	986
Temperature of gas leaving boiler, deg. Fahr.	691	530	493	468
Drop, deg. Fahr.	606	625	869	518
Draft at boiler inlet, in.	....	1.47	1.55	1.76
Draft at boiler damper, in.	....	3.95	3.29	3.63
Draft loss, in.	1.78	2.48	1.74	1.87
Gross power developed, hp.	334.5	393.0	425.8	306.0
Per cent of rated capacity**	83.6	80.6	81.4	56.7
Boiler horsepower to fan	....§	661	24.3§	....
Net horsepower	....	386.0	401.5	....
Approximate transfer rate	.08	6.92	4.77	5.12

†Average of 10 tests.
‡Approximate.
§Motor-driven fan.
¶Hp. returned in feed-water heater.
**All ratings are on the basis of 10 sq. ft. per hp

*This paper was printed, substantially in full, in THE IRON AGE, June 17, 1915.

which refer specifically to open-hearth work and others to waste-heat work in general, that are of interest.

LOCATION OF BOILERS AND CONNECTING FLUES

The early boiler installations were made with open-hearth furnaces already in operation. With these furnaces it was necessary to connect the boiler to the flue between the reversing valves and the stack, the boiler thus being on a branch flue while the stack was on the more direct connection. It was, and is, common practice, in laying out open-hearth furnaces, to place the stack central with the furnace, and wherever such an arrangement is followed the boiler would of necessity be on the branch flue. It is recommended, and to-day this recommendation is being more or less followed, that the boiler be placed central with the furnace and the by-pass stack on the branch connection. Such an arrangement will give a straight gas passage to the boiler, minimizing frictional resistance in the connecting flues due to the absence of turns, and will have a tendency to give an equal distribution of the gases across the width of the boiler. A further advantage of such an arrangement is that better protection is given to the by-pass stack damper. These dampers are ordinarily of cast iron, and where they close a direct passage to the stack, they are subjected to temperatures considerably higher than if the stack were on the branch connection and this damper installed on such connection.

The flues from the reversing valves to the boiler should be as short as possible to minimize radiation losses. The location of such flues, with the same object in view, is also of importance. Ordinarily these are placed underground, and their depth beneath the surface should be such as to furnish a sufficiently thick insulating layer of earth on top. The best practice is to make this layer from 3 to 4 ft. thick. In one installation where, because of certain unavoidable conditions, the thickness of the earth covering on the top of the flue was something less than 1 ft., the temperature of the surface of this earth was over 400 deg. The loss from radiation from such a flue is obvious.

Ample means should be supplied for keeping these connecting flues clean, and the area should be such as to allow a certain amount of accumulation of dust when the furnace is down without impeding the draft. The average life of an open-hearth furnace is probably around 300 heats, though occasionally 350 are obtained. When the amount of dust carried in the gases is considered, it is readily conceivable how there can be an accumulation between furnace lay-off periods that will seriously affect the draft. In one instance where, because of press of work, the connecting flue was not cleaned out during two periods when the furnace was down, the dust filled the flue to more than a third of its cross-sectional area.

AIR LEAKAGE

Too much importance cannot be attached to keeping flue connections and boiler settings tight, to minimize air leakage, the effect of which is to reduce gas temperatures, decrease boiler capacity and place an added burden on the fan unit.

The effects of air leakage and the possible improvement in results through its reduction may be shown by an example: One of the early boilers installed was with a small furnace which had been in operation for some time. The boiler was first put into service with no particular attention given to the tightnes of existing flues, and a continuous run of 119 hr. was started. For the first day or two, the gas temperatures entering the boiler were very low, the temperature drop between the checkers and the boiler entrance being some 650 deg. This excessive cooling of the gases was found to be due to air infiltration through the length of the flue and an excessive amount of leakage at the stack by-pass valve. Nothing could be done toward remedying the latter defect, while the furnace was in operation, but flue leaks were stopped as far as possible without stopping the test. The reduction in these leaks increased the gas temperatures entering the boiler at the end of the run to approximately 1000 deg., as against 600 to 650 deg. at the start. The average gas temperature entering the boiler during this run was 855 deg.

The furnace was then shut down, the sources of air leakage more thoroughly gone over, and the leaky dampers repaired and sealed. A second run of 120 hr. was then started, during which the average gas temperature entering the boiler, with the furnace conditions as nearly as possible like those in the first run, was 1153 deg. The loss between checkers and boiler was reduced to approximately 300 deg., most of which was due to a faulty reversing valve that could not be repaired without replacing.

The results of the two runs, showing the effect of reducing leakage, are as follows:

Run No.	1	2
[illegible]	[illegible]	10.49
[illegible]	11.46	[illegible]
Gas temperature entering boiler, deg. Fahr.	855	1,153
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
Draft boiler inlet, in.	1.85	1.85
Draft drop in.	2.14	1.92
[illegible]	[illegible]	[illegible]
Power developed, hp	[illegible]	260.29
Per cent of rated capacity	53.80	81.40

It is of interest to note from these figures that by minimizing the air leakage the draft loss through the boiler was reduced 0.22 in., which made possible a lower fan speed with a considerably higher economical rate for the fan turbine. A saving was effected of 7.5 b.hp. for the fan drive, and there was an increase of 67 gross hp. Although this may be an extreme case, the enormous gains secured by reducing the air leakage to a minimum are obvious.

Air leakage through the flues can be minimized through proper design and location. Leakage through the boiler setting is reduced by the use of a compact design, well erected and bricked in, with precautions to prevent leakage about all cleaning and dusting door frames. Much can be done by painting the settings with asphaltum paint.

CLEANING

The waste gases from open-hearth furnaces are very dirty; and because of the low temperatures, it is, perhaps, of more importance in this class of work than in coal-fired practice that the heating surfaces be kept clean. In the early installations, fears were expressed that dirt would have a tendency to stick to the tubes and be difficult, if not impossible, to remove. Experience has shown, however, that ordinary methods of dusting give perfectly satisfactory results.

In practically all plants now operating waste-heat boilers in connection with open-hearth furnaces, the boilers are dusted once in 24 hr. In one plant which operates 11 such boilers and in which the results are checked perhaps more closely than in the average steel plant, the engineers have concluded as the result of actual experience that it pays to dust every 8-hr. shift.

Some figures showing the effect of dusting on exit-gas temperatures are of interest. In a certain plant a series of tests were run with cleaning intervals of 20, 10 and 6 hr. When the boiler was allowed to go 20 hr. without cleaning, the reduction in gas temperatures after cleaning was 60 deg.; where the cleaning intervals were 10 hr., 50 deg., and where 6-hr. intervals elapsed, the reduction varied from 10 to 30 deg. In a second plant, with larger boilers, after an undusted period of 24 hr., for an unchanged entering temperature the exit temperature was reduced 35 deg. by a thorough cleaning. In this instance, with the gas weight passing through the boiler, this 35-deg. reduction was equivalent to an increase of 22 hp. This increase in capacity would not, of course, hold over a period of 24 hr., but it would appear conservative to state that the 24-hr. cleanings for such conditions would correspond to at least a net saving of 10 hp. as against 48-hr. cleanings. At $40 a year per hp.—a rough estimate of the yearly value—this would mean an annual saving of $400 per boiler.

The draft loss through a clean boiler will be less than through one not dusted; and while the decrease in load on the fan due to cleaning may not be great, it will at least be appreciable.

Customary practice has been to use a vertical cast-iron sliding damper for the stack by-pass. Considerable difficulty has been experienced in keeping such dampers tight, and where the stack connection, rather than that to the boiler, is the direct connection, difficulty through warping has sometimes occured. While as far as is known it has never been tried, it would appear that a damper similar in design to reversing valves warranted a trial, to reduce leakage at this point. Such a damper would automatically close the passage to the stack when that to the boiler was open, and vice versa, at the same time stopping all air leakage at a point where this might be excessive. It is possible that such a design of by-pass damper would require a small amount of cooling water, but the loss in heat to this water would, it is believed, be more than offset by the gain through reduced air leakage.

EXPLOSIONS

In the operation of open-hearth furnaces certain characteristic explosions are liable to occur during the reversal of gas valves. These vary in intensity from slight puffs to rather heavy explosions and are caused by a mixture of fresh air with carbon monoxide which must pass off during the operation of reversal. Such explosions, often unnoticed with furnaces directly connected to a stack, become very evident where boilers are installed and every effort is made to keep flues and settings tight. It was feared, and rightly, that with the installation of waste-heat boilers the heavier explosions might have a destructive effect on the boiler settings and connecting flues. For this reason particular attention should be given to proper buckstay construction, and an ample number of explosion doors should be furnished to relieve the pressure within the setting, should explosions take place.

A thorough investigation of the trouble from explosions showed that by a proper system of reversing-valve operation the difficulty would be practically overcome; certainly to an extent where sufficient and properly designed explosion doors would obviate the possibility of wrecking or injuring the settings.

The essential feature in such operation is to avoid opening the stack valves from gas and air checkers simultaneously, or nearly enough together to allow the hot producer gas and air from the checkers to mingle and ignite within the flues or boiler settings. In this system of reversal the air stack valve is opened a sufficient interval after the opening of the gas stack valve to allow the gas pocketed in the checkers to pass away and mingle with the existing gases before the hot air from the other set of checkers is admitted to the flues through opening the air stack valve. In reversing the operation, similar precautions should be taken respecting the corresponding gas and air stack valves.

In a plant where this system was followed, explosions were reduced from approximately 40 per day (about one each two reversals), varying in intensity, to 4 in 411 consecutive reversals covering a period of five days, and of these 4 but 2 could be called heavy and were directly traceable to a leak in a hydraulic valve, which through the operation of the ram, caused the gas valve to unseat.

Another system used is one of interconnected valves, sets of valves being operated simultaneously. Perhaps the best method would be a combination of the two; that is, valves interconnected to assist in manipulation but so arranged that the first order will be followed. The connections should be designed so that sufficient time will elapse between opening the stack valves and gas and air valves to make impossible the mingling of hot producer gas and air.

SAVINGS

Great savings have been made possible by the installation of waste-heat boilers with open-hearth furnaces, and some approximate figures are of interest. There have been installed, or ordered, over 90,000 rated b.hp. for this class of waste-heat work alone. These boilers are set with over 190 open-hearth furnaces, the annual total production of which is considerably in excess of 9,200,000 tons of steel. Experience has shown that through the use of waste-heat boilers the net cost of production of this material is reduced from 20c. to 25c. per ton, which would mean a net annual saving for the production weight given above of $1,840,000, using the lower figure.

From another aspect: A conservative estimate of the power delivered by the boilers in this class of work through a year's operation would be 60 per cent of their rated capacity, or 54,000 hp. The value of a boiler horsepower in a steel mill varies widely with any number of factors, and ranges from $35 to $50 per year. On the basis of the lower figure, which is certainly conservative, the value of the 54,000 hp. produced would represent a saving of $1,890,000.

Waste-heat boilers, because of their special design, are more expensive than coal-fired boilers, and the expense is increased by the cost of fans, connecting flues and structural material. The latter expense is the greatest where boilers are installed with existing furnaces. Regardless of this increased cost the return on the investment is such as beyond question to warrant the expenditure. Mr. Bacon, in the paper to which reference has been made, states that this return on the investment is 60 per cent or over, and recent experience would seem to indicate that this figure is conservative.

In the early days of this work, open-hearth steel furnace operators were fearful that the installation of waste-heat boilers with their fan units would seriously affect the operation of the furnace and that the production would be cut down, the cause of such reduction being in the necessity of longer heats. By actual experience just the contrary was found to be true, and furnaces equipped with boilers showed a decrease in time of heats. In one instance, a 35-ton furnace equipped with a waste-heat boiler and fan was set in a line with five other furnaces not so equipped. The operation of all furnaces was alike and the size of the heats the same. Over a period of six days the average time of heat for the furnace equipped with the waste-heat boiler was 9.17 hr., while the average for the other five furnaces was 11.17 hr. Eight different sets of furnaces in all were investigated in connection with the saving in heat length. These furnaces varied in rated capacity from 35 to 75 tons, the actual production ranging from 40 to 87 tons per heat. The normal length of heat in the furnaces connected direct to the stack, from records secured previous to the installation of the waste-heat boilers, averaged, for the eight furnaces, 12.1 hr. The average length of heat for the same furnaces, after the installation of the waste-heat boilers, was 10.8 hr., the saving in time varying in individual furnaces from but a few minutes to 2.9 hr. The total tonnage per heat of the eight furnaces in question was 507 tons. The increased tonnage of the eight furnaces due to the decrease in heat length would amount to 42,000 tons per year, or approximately a 12 per cent increase in the total tonnage of these furnaces.

There is a further saving due to the use of the induced-draft fan with which these waste-heat boilers are equipped. This is in the increased life of the furnace and results from the fact that a fan makes it possible to run economically a heat from a furnace which under ordinary natural-draft conditions would take so long that it would not pay.

Russian Women Replacing Technical Men

Because of the increase in munitions plants in Russia, considerable difficulty is being experienced in securing a sufficient number of trained technical men to direct them. The French *L'Echo des Mines* states that an imperial Russian decree has been issued by which all female students who have attended the Polytechnic Institute at Petrograd are authorized to take examinations for the degree of engineer and that 47 women have already been accepted.

The world's tin-smelting capacity is placed at 137,- according to the *Mining World*. Asia is credited with 89,000 tons, England with 28,000 tons, Ger- with 11,200 tons, the United States with 11,200 a with 400 tons.

PERSONAL

Arthur H. Young, for some years supervisor of labor and safety of the Illinois Steel Company, Chicago, will take up his new duties as director of the American Museum of Safety, New York, on Jan. 1. He began his business career at the age of 13 as a messenger boy for the Illinois Steel Company. He became successively leverman, assistant in chemical laboratory, timekeeper, pay-roll clerk, statistician and assistant supervisor of labor and supervisor of labor and safety, the last covering oversight over accident prevention, personal injury settlements, employment, fire, police, plant cleanliness, sanitation, plant restaurants, visiting nurses and other welfare matters, including pensions. In addition to this, the duties involved the administration of discipline and review of all cases of discharge by superintendents and foremen, complaints of improper working conditions or equipment, with full power to make any necessary adjustments.



J. E. Johnson, Jr., 52 William Street, New York, sails from Vancouver Dec. 28 on the Empress of Asia for Shanghai, China, on professional business. He will return in the latter part of April.

Eli Webb, formerly superintendent of the Pittsburgh Crucible Steel Company's blast-furnace department, Midland, Pa., who resigned to accept the position of general superintendent of the Virginia Iron, Coal & Coke Company's blast furnaces, entered upon his new duties Dec. 15, with headquarters at Roanoke, Va.

The Youngstown Chemists' Club, Youngstown, Ohio, has been organized with the following officers: President, Edwin G. Pierce, consulting chemist; secretary, Carl W. Weesner, Carnegie Steel Company; treasurer, H. E. Moyer, Brier Hill Steel Company. Housing plans presented at the first regular meeting, Dec. 14, met with much enthusiasm.

Thomas W. Moran, president Moran Flexible Steam Joint Company, Louisville, Ky., is recovering from an operation to correct an internal disorder. He had been seriously ill for several weeks.

C. Brown, formerly of Worcester, Mass., on Jan. 1 will succeed M. A. Williamson as manager of the Southern office of the Norton Company, Worcester, Mass., located at Chattanooga, Tenn. Mr. Williamson resigned to become business manager of the *Journal of Industrial and Engineering Chemistry*, Easton, Pa.

A. E. Adams, president of the First National and Dollar Savings banks, Youngstown, has been elected a director of the Ohio Iron & Steel Company, succeeding Samuel Mather, resigned.

Edward T. Corbus, production manager of the Union Drawn Steel Company, Beaver Falls, Pa., has resigned, effective Jan. 1. After that date he will be connected with the Columbia Steel & Shafting Company, Carnegie, Pennsylvania.

The Anderson Forge & Machine Company, Detroit, Mich., has elected the following officers: R. A. Alger, president; F. M. Alger, vice-president; F. A. Hinchman, secretary and treasurer; C. E. Wade, general manager; H. S. Beebe, sales manager; J. F. White, purchasing agent.

W. Y. Shaw, Skinner Engine Company, Philadelphia, was scheduled to deliver an illustrated talk on the universal unaflow engine before the Engineers' Club of Trenton, N. J., on the evening of Dec. 21.

In response to a special request from the Russian-American Chamber of Commerce in Moscow, asking the American-Russian Chamber of Commerce in New York to send a special delegate to Russia to confer in regard to a number of important matters relative to Russian-American trade, E. C. Porter, executive secretary of the American-Russian Chamber of Commerce, will sail for Russia early in January and will remain in that country for two months, visiting the important industrial centers, including Petrograd, Moscow, Kieff, Charkoff, Odessa, and Tiflis

S. B. Taylor, sales manager of the S K F Ball Bearing Company, Hartford, Conn., has been made vice-president, succeeding F. B. Kirkbride, who remains on the board of directors. Mr. Taylor will continue in charge of sales. G. A. Ungar, former representative of the company in Cleveland, Detroit and Pittsburgh, has been appointed technical manager and chief engineer, succeeding Uno Forsberg, who returns to Sweden, having completed his work of creating the American manufacturing organization.

C. A. McMasters, treasurer of the Alaska Steamship Company, Seattle, has resigned to become president and managing director of the Washington Shipbuilding Company, Tacoma, recently incorporated. He is one of the organizers of the company and will have active charge of building the plant.

Henry Maerz, formerly with the Hamilton Machine Tool Company, Hamilton, Ohio, has resigned to accept a position in the sales department of the Cullen Machinery Company, Cleveland, Ohio.

C. W. Cullen, of the C. W. Cullen Machinery Company, Cincinnati, Ohio, announces the merger of his company with the E. S. Cullen Machinery Company, Cleveland. The new company will be operated under the name of the Cullen Machinery Company, with headquarters in Cleveland, but a branch office will probably be established in Cincinnati at an early date.

Herbert H. Halliday, formerly assistant cashier, secretary and treasurer of the Citizens Trust & Savings Bank, Columbus, Ohio, has resigned to accept a position with the Ironsides Company, Columbus, dealer and manufacturer of factory supplies and lubricating oils.

J. O. Smith has been appointed sales manager of the Hampden Corundum Wheel Company, Springfield, Mass. For more than the past ten years he was in the employ of the American Emery Wheel Works, Providence, R. I.

A. S. Blagden has been elected president of the American Malleables Company, which has offices at 30 Church Street, New York, and works at Bloomfield, N. J., and Lancaster, N. Y. He succeeds W. G. Pearce, who was elected chairman of the board.

James A. Constantine has been elected president and general manager of the Colonial Foundry & Machine Company, Columbia, Pa., recently organized. J. E. Baker has been elected vice-president, and George Sheuberger, secretary and treasurer.

F. O. Stallman, formerly manager of the Pacific Tool & Supply Company, San Francisco, has opened a new store at 129 First Street, San Francisco, under the name of the F. O. Stallman Supply Company, carrying a line of high grade machine tools, shop supplies, and garage equipment.

A. J. B[illegible] superintendent of the machine shop to general superintendent of the Hoopes & Townsend Company, Philadelphia. He has been with this company for several years, and was formerly with the Midvale Steel Company and the Enterprise Manufacturing Company in positions of importance.

W. A. Linn has been appointed purchasing agent of the Chicago, Milwaukee & St. Paul Railway Company, Chicago, succeeding John T. Crocker, retired, effective Jan. 1.

Pittsburgh and Nearby Districts

The car problem at Youngstown has become so serious that a leading official of the Baltimore & Ohio Railroad has been sent there to straighten out the tangle and secure a better movement. Not only is the output of pig iron, semi-finished steel and finished steel being seriously restricted, but when material is ready for shipment it is impossible for producers to get cars in which to load it. The chief trouble is said to be lack of motive power, but there is also a serious shortage of cars.

The Youngstown Foundry & Machine Company, Youngstown, has received a contract for all the finishing housings, bed plates, etc., for the 8-in. hoop mills, 8-in. bar mills and 10-in. bar mills for the new mills to be built by the Carnegie Steel Company at McDonald, near Youngstown. It had previously received the contract for the pinion housings. Orders have also been booked for one 34-in. inclosed type headstock roll lathe for the Youngstown Sheet & Tube Company, for another for the New Castle works of the Carnegie Steel Company, and for three large shears for the Mansfield Sheet & Tin Plate Company, Mansfield, Ohio.

The Ladel Mfg. Company, New Philadelphia, Ohio, which recently took over the business of the Spicer Mfg. Company, will erect a new foundry and machine shop. It will be in the market shortly for a complete equipment for these buildings, including one or two 15-ton traveling cranes. The company will build a general line of foundry and machine work, and will also manufacture industrial trucks. Fred F. Hall is president; Ivor Harris, vice-president; E. C. Browne, secretary and treasurer, and U. D. Miller, works manager.

The regular monthly meeting of the Association of Iron and Steel Electrical Engineers of Pittsburgh was held in the Fort Pitt Hotel in that city on Saturday evening, Dec. 16, preceded by a dinner. The meeting was under the direction of the standardization committee, of which F. D. Egan is chairman. The January meeting will be held in the same hotel on Saturday evening, Jan. 20. Papers on direct current and alternating current automatic skip and bell hoists will be presented by H. D. James, Westinghouse Electric & Mfg. Company; Frank Smith, Otis Elevator Company; R. H. McLain, General Electric Company, and F. J. Burd, Cutler-Hammer Mfg. Company.

In addition to the purchase of about 1200 acres of the Josiah V. Thompson coal lands by the H. C. Frick Coke Company, it has bought between 200 and 300 acres formerly operated by the Dilworth Coal Company, located in Greene County, Pa.

The General Fireproofing Company, Youngstown, will issue $194,700 of new preferred and $250,000 of new common stock for the purpose of making plant extensions.

The Johnstown Fuel Company, Johnstown, Pa., has notified manufacturing consumers that after Jan. 1 it will discontinue supplying natural gas to manufacturers because of a shortage in the supply.

The December meeting of the Pittsburgh Foundrymen's Association, which took the form of a Christmas celebration, was held in the Fort Pitt Hotel, Pittsburgh, on Monday evening, Dec. 18. W. W. Sanderson, Pittsburgh representative of the Carborundum Company, Niagara Falls, N. Y., was chairman of the entertainment committee, and vaudeville and other forms of entertainment were provided.

The Sharon Foundry Company, Sharon, Pa., is increasing its capital stock from $250,000 to $460,000.

The city of Erie, Pa., has awarded a contract for waterworks improvements as follows: Twenty million-gal. low-service pumping engine and 600 tons of cast-iron pipe and fittings to R. D. Wood & Co., Camden, N. J.; 24-in. Venturi meter to the Simplex V[illegible] Meter Company, Philadelphia, Pa.; and gate valves to the Eddy Valve Company, Waterford, N. Y.

The report that the Jones & Laughlin Steel Company will shortly complete the building of a n[illegible] mill at its Aliquippa works is untrue. It has no new construction work under erection at present, having completed recently its new tube mills. These comprise two butt and two lap weld furnaces, one of each now being in operation.

The general offices of the Memphis Steel Construction Company, whose plant is at Greensburg, Pa., have been removed to the Magee Building, Pittsburgh. The company specializes in steel-plate construction.

OBITUARY

E. P. BORDEN, vice-president, secretary and treasurer, Pulaski Iron Company, Pulaski, Va., and Philadelphia, died suddenly Dec. 15 at his home in Philadelphia, aged 81 years. He had been associated with the company since its organization about 28 years ago. He was a New Englander by birth and heavily interested in textile enterprises. He was a member of the Union League and Manufacturers' Club of Philadelphia, and of the New England Society. He leaves one son, E. Shirley Borden.

WILLIAM J. HOWARD, for 45 years associated with the Illinois Steel Company and its predecessors at Milwaukee, and for 10 years chief auditor at the Bay View plant, died Dec. 14, aged 71 years. He was a native of England and went to Milwaukee in 1871, taking the position of purchasing agent of the old Milwaukee Iron Company.

Argentina's Iron and Steel Imports

Argentina's imports of iron and steel in the first half of 1916 have fallen off decidedly from those before the war, as the following table shows. Metric tons are used:

	1914	1915	1916
Pig iron	74,930	9,254	16,104
[illegible]	36,352	19,659	3,907
[illegible]	29,483	25,429	8,314
[illegible]	4,873	3,079	1,031
[illegible]	69,008	3,970	1,512
[illegible]	4,429	6,593	7,595
[illegible]	18,730	6,597	10,048
[illegible]	4,489	4,547	3,525
[illegible]	13,497	6,479	9,167
[illegible]	17,799	2,074	236

The pig-iron imports are less than one-fourth of what they were before the war and the steel rails less than 2½ per cent.

Some Interesting Government Contracts

The contract for furnishing 85,500 1-pounder anti-aircraft projectiles, bids for which were opened Nov. 29 by the chief of the bureau of ordnance, Navy Department, Washington, has been awarded to the Worthington Pump & Machinery Company, New York.

The Armored Motor Car Company, Detroit, has been awarded the contract for furnishing the Bureau of Ordnance, War Department, with two armored automobiles under bids opened Nov. 24, at $5,300 each.

The contract for furnishing a locomotive crane for Pearl Harbor, Hawaii, has been awarded to Victor R. Browning & Co., Cleveland, at $94,852.

A supervising mining engineer and metallurgist is desired by the Bureau of Mines for field service at a salary of $4,000 a year. By an act of Congress mining experiment stations have been created to study and improve local conditions in mineral industries and a supervisor is required to direct one of these stations. The Civil Service Commission, Washington, D. C., announces that competitors will not be required to report for examination, but that they must submit complete data on their education and experience and a thesis or some report or publication by Jan. 16, 1917.. Special [illegible]ication form 2118 may be obtained from the com[illegible] or from the civil service boards in large cities. [illegible]nts must be graduates of mining engineering [illegible]etallurgy and have had at least five years of re[illegible]le experience, two of which were in metallurgical lines.

Railroad Car Business

Close to 10,000 cars have been put under contract, counting 3000 for Russia, divided between the American Car & Foundry Company and the Standard Steel Car Company. There is a possibility that these represent cars which it was thought three or four months ago were placed with the Bettendorf Company. Deliveries in April are named.

Other awards include 1000 box and 500 automobile cars for the Northern Pacific, ordered of the Western Steel Car & Foundry Company; 1000 general service cars for the Los Angeles & Salt Lake, placed with the Pressed Steel Car Company; 1200 hopper cars for the New York Central, bought of the American Car & Foundry Company; 750 gondolas for the Nickel Plate, to be built by the Pressed Steel Car Company; 500 cars for the Clark Car Company, awarded to the Cambria Steel Company, and 1500 cars for an Eastern road divided between two companies. The Great Northern is to build 500 stock cars in its own shops and the American Car & Foundry has closed lately on about 1000 tank cars.

The Atlantic Coast Line is inquiring for some 20 passenger equipment cars and it is understood that the Erie has bought 50 wooden express cars.

The Superior Steel Company, Carnegie, Pa., manufacturer of hot and cold rolled strip steel, has been purchased by a group of Eastern bankers, who announce a reorganization of the company. The bankers interested are Cassatt & Co. and Frazier & Co., Philadelphia; Merrill, Lynch & Co. and White, Weld & Co., New York. The new company will have a capitalization of $11,500,000, of which $3,500,000 will be in 8 per cent cumulative convertible first preferred stock, $2,000,000 in 8 per cent cumulative convertible second preferred stock and $6,000,000 in common stock. The plant is stated to have a capacity of 115,000 tons a year.

The corporation of S. Cheney & Son, Manlius, N. Y., is passing its fiftieth successive year in business, which was started by Stephen Cheney in 1866, and the third generation is now connected with it. The company celebrates its fiftieth anniversary by starting a branch foundry at Oneida, N. Y., where it has excellent shipping facilities on the New York Central and New York, Ontario & Western. This new plant is completely equipped, having electric cranes, molding machines, exhaust mills and other modern appliances, besides automatic sprinklers. It is located on a plot covering eight acres, thus providing ample room for expansion.

Fire, said to have been of incendiary origin, as it followed an explosion, virtually destroyed the plant of the Llewellyn Iron Works, Los Angeles, Cal., Dec. 16, causing a loss of several hundred thousand dollars. This is the plant which was partly wrecked by an explosion on Christmas Eve, 1910, caused by a bomb planted by Ortie McManigal, confessed dynamiter, who destroyed also the *Times* newspaper establishment. The recent fire came a few hours after David Caplan, charged with murder in connection with the *Times* dynamiting six years ago, had been convicted of voluntary manslaughter.

The Reeves Pulley Company, Columbus, Ind., received a cable from an importer at Tokio, Japan, asking for a quotation on a variable-speed transmission for a paper mill. The price was cabled back and an acceptance received with orders for immediate shipment. It was all done in 48 hours.

French iron and steel imports for the first eight months of 1916 were 1,100,000 tons, against 31,600 tons in the same period in 1914. Of this year's total the United States sent 600,000 tons, against only 1100 tons to September 1, 1914.

NEW BETHLEHEM PURCHASES

Lebanon Valley Blast Furnaces and American Iron & Steel Mfg. Company Included

Besides acquiring the property of the American Iron & Steel Mfg. Company, as noted in these columns on Dec. 7, the Bethlehem Steel Company has also taken over five blast furnaces, and further control of the Cornwall Ore Banks and also the Cornwall Railroad, represented by the ownership of and leases held by the Lackawanna Iron & Steel Company, Lebanon, Pa. The negotiations are about concluded, and it is expected that the Bethlehem Steel Company will take title as of Jan. 1.

The blast furnaces include the two Colebrook furnaces owned by the Lackawanna Iron & Steel Company and rated at 130,000 tons of pig iron annually, and the two Bird Coleman, and the one North Cornwall furnace, all three at Cornwall, Pa., with a combined capacity of 115,000 tons, which were held under lease by the Lackawanna company. At the Colebrook furnaces are 232 Otto-Hoffmann by-product coke ovens and a benzol plant.

The ore acquisition means that in addition to holding a majority control of the Cornwall Ore Banks through the purchase of the Pennsylvania Steel Company, the Bethlehem Steel Company will now have substantially complete control, as the Lackawanna Iron & Steel Company had a one-sixth interest in the ore property outright, with an additional voting interest of about one-sixth. The Cornwall Railroad, which goes with the sale, is 13 miles long and owns 172 cars.

According to an announcement by James Lord, president American Iron & Steel Mfg. Company, the price paid for the latter company was $6,556,800. As the capital stock was made up of $3,000,000 in preferred shares and $2,550,000 in common stock, it appears that the price averages about $59 per share of a par value of $50. As noted in the issue of Dec. 7, the American Iron & Steel Mfg. Company, with plants at Lebanon and Reading, Pa., has an annual capacity of 170,000 tons of bar iron and steel.

New Boiler with By-Product Recovery

A new type of boiler, with the object of eliminating the smoke nuisance and saving by-products from coal, has been designed by George Wilkinson, borough electrical engineer of Harrogate, England. The patent claims are:

The coal is distilled, yielding tar and ammoniacal liquor.

The coke obtained gravitates while incandescent into the furnace, being consumed there without smoke.

The gas, after removal of by-products, is passed into the furnace under considerable pressure with the necessary air; it burns with a smokelss flame until it enters the retort flue, where it is transformed into radiant heat, absorbed partly by the retort and partly by the water of the boiler. Active steaming surfaces are produced not only in the furnace but on the whole flue surface.

The inventor expects to get from 20 to 25 lb. evaporation per square foot of heating surface. The boiler is automatically fed with coal which passes automatically through the various stages of distillation and combustion.

A safety code for hoisting chains developed by Earl B. Morgan, safety engineer, Norton Company, Worcester, Mass., has been published by the National Safety Council, Commercial and Continental Bank Building, Chicago, and a copy can undoubtedly be had on application. It is known as No. 344 of the service series issued by the Council.

Austria-Hungary's total steel output in 1916, it is estimated, will reach 3,350,000 tons, as compared with 2,690,000 tons in 1915, 2,190,000 tons in 1914 and 2,790,000 tons in 1913. The production of all kinds of iron and steel this year is expected to exceed that of any previous year.

Machinery Markets and News of the Works

NO HOLIDAY LULL SO FAR

Demand Unaffected by Talk of Peace

Scattered Purchasing of Miscellaneous Machine Tools Holding Up Well Everywhere—Rising Cost of Castings May Advance Prices

There is every indication, as was the case last year, that the midwinter holiday lull will be of short duration. Some very good orders were placed on the eve of Christmas, a year ago, and it is not improbable that similar Christmas presents may be given this year. Business is holding up in a satisfactory manner everywhere, and appears to have suffered no ill effects from the talk of peace, which is probably accounted for by the fact that the existing demand comes almost entirely from industrial sources.

The Cleveland market is fairly active, with a scattering demand absorbing the attention of the trade, although one inquiry from a new company which is to manufacture wheels for automobile trucks calls for machine tools worth about $50,000.

Domestic business continues to lead in Cincinnati, although export buying is by no means absent. It is pointed out in Cincinnati that the higher cost of castings will compel some makers of heavy machinery to advance their prices. Some central Ohio manufacturing plants have been compelled to curtail operations recently because of their gas supply being shut off by the cold weather.

In Chicago, the small-lot buying is unabated, and the number of new plants and extensions is notable.

Some big buying has been done in Detroit by the Harroun Motors Company for its new plant at Wayne, Mich. There is a feeling in Detroit that the city may become the aeroplane center of the country. Several companies which manufacture, or intend to manufacture, aircraft are planning to locate in Detroit.

Business in Milwaukee holds up in a way that precludes the shortening of deliveries.

The shipyards in the Pacific Northwest have been active buyers in the West as well as in the East.

The New York market continues active, with the buying pleasing because of its diversity. A recent inquiry called for 700 screw machines for export to England.

New York

NEW YORK, Dec. 26, 1914.

The demand in this territory continues extremely good, and is notable because of its diversity, both as regards the tools wanted and the various industries from which the inquiries come. Practically no orders have been coming from munitions plants for some time. Purchasing is largely confined to one or two tools by each buyer, but it is a healthy kind of business and very satisfactory to sellers.

The inquiry for 700 No. 4 screw machines, to which reference was made in the issue of Dec. 7, was issued by the Singer Mfg. Company, Elizabethport, N. J., for England. It is understood that the company merely undertook to obtain bids and deliveries on certain machines and cable the information to London, where the Ministry of Munitions was to pass on the propositions submitted.

The Hamilton & Chambers Company, 29 Broadway, New York, engineer for the shipbuilding plant which the United States Steamship Company, C. W. Morse, president, is to build on the Thames River, New London, Conn., is making the necessary surveys and laying out shop plans.

The Loew-Victor Engine Company, Chicago, Ill., maker of marine engines, has decided to move to Newark, N. J., where it will acquire or build a plant, and is preparing a list of the equipment which will be required. The company is said to be contemplating the manufacture of automobile engines as well.

The Aeromarine Plane & Motor Company, Nutley, N. J., has recently purchased a few machine tools and expects to move into a new plant soon.

The Eastern railroads are by no means as active as the Western lines in the acquisition of new shop equipment. They are buying an occasional machine for replacements, but in several cases they have yet to act on inquiries they issued months ago for tools whose prices have been advanced recently. The New York, New Haven & Hartford has recently bought some roundhouse equipment.

The export demand for machines seems to have entered quite largely into the hands of a few of the larger companies who are best equipped to handle such business and who, in preparation for it, have stock orders placed with the tool builders. Russia is buying principally for delivery next spring and summer.

Egleston Bros. & Co., 166 South Street, New York, are in the market for a gate shear to cut ½-in. plates 12 ft. long and 60 in. wide.

The Mutual Electric Company, 122 Water Street, New York, is in the market for power presses from 5000 to 20,000 lb. in weight, and also for planing machines, shaping machines and lathes.

The Habirshaw Electric Cable Company, 10 East Forty-third Street, New York, has let contract for the construction of a two and three-story addition to its manufacturing plant at Yonkers, N. Y., 200 x 300 ft.

The Bridgeman Smith Company, 487 Kent Avenue, Brooklyn, N. Y., manufacturer of paper boxes, has acquired 12 acres in the Kingsland section, Lyndhurst, N. J., for the erection of a plant, to which it proposes to remove its present factory.

The Duryea Mfg. Company, Jersey City, N. J., manufacturer of belting, has awarded contract for a new factory on Avenue C, Bayonne, to cost $91,900, to James Mitchell, Inc., contractor, 76 Montgomery Street, Jersey City.

Robert A. Van Voorhis, Jersey City, N. J., and associates, have incorporated in Delaware the Hammond-White Mfg. Company with a capital stock of $1,000,000 to manufacture sound-recording machines. Cornelius A. Cole, Hackensack, N. J., and Arthur R. Oakley, Pearl River, N. Y., are also active in the company.

The American Concrete-Steel Company, Essex Building, Newark, N. J., has been awarded contract by the Harrison Mfg. Company, Lockport, N. Y., maker of automobile radiators, for the construction of a reinforced concrete manufacturing building, 170 x 400 ft., two stories and basement, which is to be completed April 15. James R. Tyler, Rochester, N. Y., is the architect.

The Lehigh Valley Railroad took title recently to a tract of land extending 3600 ft. along New York Bay on the New Jersey side, with extensive rights to land under water just north of the Pennsylvania Railroad's freight yards at Greenville, N. J. The property was acquired as a site for the freight terminal which, it is reported, the railroad expects to build at this point at a cost estimated at $10,000,000.

John Campbell & Co., Newark, N. J., manufacturers of [illegible] binders' materials, will build a new pigment plant, 18 x [illegible], on Plum Point Lane.

C. H. Reiman & Co., Inc., Newark, N. J., have been incorporated with a capital stock of $50,000 to manufacture wire punches, tools, etc. Henry Audley, White Plains, N. Y.; Walter B. Hall, Brooklyn, N. Y., and John A. Larkin, New York City, are the incorporators.

The Charles Burroughs Company, Commerce Street, Newark, N. J., manufacturer of hydraulic pumps and presses, [illegible] tools in its plant to cost about $18,000. M. Waldron, Inc., 207 Market Street, Newark, is the contractor.

[illegible]hs, Ltd., Newark, N. J., has been incorporated [illegible]apital of $100,000 to manufacture talking machines. [illegible]am A. Hardy, Frederick Bachmann and Jacob Unger are [illegible]orporators.

The Aluminum Goods Mfg. Company, 699 Springfield Avenue, Newark, N. J., is having bids taken through its architect, E. F. Ficken, Oliver Building, Pittsburgh, Pa., for the construction of a five-story factory, 60 x 300 ft., on Belmont Avenue, Newark.

The Merrick-Scale Mfg. Company, 225 Main Street, Passaic, N. J., has let contract for the erection of a one-story shop, 75 x 85 ft.

The Bausch & Lomb Optical Company, Rochester, N. Y., wants to purchase new lathes for delivery at its plant not later than Jan. 10 next. It is in the market for five 14-in. x 6-ft. or 8-ft. cone-driven engine lathes, S. B. G., Hendy or LeBlond type preferred.

The Transmission Ball Bearing Company, Buffalo, has let contract to the J. C. Cowper Company, Fidelity Building, Buffalo, for the construction of a one-story manufacturing plant on Military Road. It will be 20 x 100 ft. C. M. Murray, Toronto, Ont., is general manager.

The Elmira Foundry Company, Elmira, N. Y., has let contract for the construction of a one-story foundry, 50 x 160 ft., to cost about $25,000.

The Thomas Aeromotor Company, Ithaca, N. Y., in readjusting certain internal matters has dissolved itself and reincorporated with a capital stock of $67,000. Jerome A. Fried is general manager.

The McCord Mfg. Company, Millbrook, N. Y., has been incorporated with a capital stock of $1,375,000 to do a contracting manufacturing business, including the production of automobiles, accessories, etc. The incorporators are F. D. Stoke, 25 Corbin Avenue; A. J. Gathercole, 165 Wilkinson Avenue, Jersey City, and E. A. Gingras, Cross Street, Englewood, N. J.

The Geneva Furnace Company, Geneva, N. Y., has filed articles of incorporation with a capital stock of $200,000 to manufacture stoves, ranges, furnaces, hardware, etc.; E. H. Palmer, L. G. Hoskins and M. E. Sheridan are the incorporators.

Pass & Seymour, Solvay, N. Y., manufacturers of electrical fittings, will build a factory 60 x 200 ft., three stories and basement, from plans of Russell & King, architects, Syracuse. J. W. Brooks is manager.

The Commerical Electrolytic Company, 105 Liberty Street, New York, has let contract for a boiler house and coal-storage building at its new Buffalo plant at Colgate Avenue and the South Buffalo Railroad.

The Equipment Mfg. & Foundry Corporation, Buffalo, has filed incorporation papers with a capital stock of $150,000 to manufacture foundry equipment, castings, etc. R. Linton, Brisbane Building, is manager. Charles J. Staples, 1040 Ellicott Square Building, Buffalo, is the company's attorney.

New England

BOSTON, MASS., Dec. 18, 1916.

The Providence Engineering Works, Providence, R. I., has been sold to the Providence Engineering Corporation, just incorporated with capital stock of $500,000 by William E. Hussey, William B. Dukeshire and Edgar H. Mead, all of Brooklyn, N. Y. The new owners are now or have been connected with the Standard Shipbuilding Corporation and the incorporation papers permit the company to carry on a general shipbuilding business. No attempt will be made for the present to carry on this branch of the business, but the plant will continue to turn out the engines formerly made there and will build a new line of marine engines and nautical appliances.

The American Electric Welding Company, Boston, Mass., has been incorporated with capital stock of $15,000. The directors are George Vetter, East Boston, president and treasurer; A. M. Doering and C. E. Thomann.

The L. P. Brown Machine & Tool Company, Attleboro, Mass., has been incorporated with capital stock of $20,000. Lester P. Brown, president; Josiah A. Martin, Mansfield, treasurer; and George M. Faulkner are the directors.

The Colt Patent Fire Arms Mfg. Company, Hartford, Conn., has voted to ask permission to increase its capital stock. The present capital stock is $2,500,000 and it is reported that the new authorized capital will be $10,000,000; but the further issues will be authorized in amounts as needed to care for the growth of the business.

The Mohawk Iron & Metal Company, North Adams, Mass., has been incorporated with capital stock of $10,000. The directors are William G. Todd, president; Alice C. Smith, 35 Congress Street, Boston, treasurer; and J. M. Bullard.

The Foster, Merriam Company, Meriden, Conn., has increased its capital stock from $240,000 to $320,000.

The Chase Metal Works, Waterbury, Conn., has begun work on an addition, 60 x 100 and 20 x 140 ft., one story.

The Quality Saw & Tool Works, Springfield, Mass., has awarded a contract for an addition, 50 x 100 ft., one story.

The Electric Cable Company, Bridgeport, Conn., has awarded a contract for an addition, 57 x 130 ft., four stories.

The Bridgeport Iron & Metal Company, Bridgeport, Conn., has been incorporated by William Olderman, Ansonia; P. Nowitz, Bridgeport, and Aaron Olderman, Ansonia.

George Muench, Stamford, Conn., has awarded a contract for a machine shop, 38 x 65 ft., one story.

Landers, Frary & Clark, New Britain, Conn., are receiving estimates for an addition, 30 x 178 ft., four stories, to the Humanson & Beckley plant. They have also awarded the contract for a new factory building, 38 x 238 ft., two stories, to be located on Elm Street.

The directors of the Lake Torpedo Boat Company, Bridgeport, Conn., have authorized the erection of a third large addition to the machine shop, a large storehouse for naval supplies and several smaller structures. Substantial additions will also be made to the docks.

The Locomobile Company of America, Bridgeport, Conn., is expected to award soon a contract for an addition, 100 x 160 ft., one story, and of a roof, 30 x 600 ft., over a space between two of the present buildings.

The General Electric Company, according to press reports, has voted authorization for three new buildings at its Pittsfield, Mass., plant and has appropriated $100,000 for the first of them. The old plant of the Triumph Voting Machine Company in the same city has been deeded to the General Electric Company and is to be used for manufacturing purposes.

The Stanley Works, New Britain, Conn., is to build an addition 60 x 160 ft.

The capital stock of the Taylor Machinery Company, 8 Oliver Street, Boston, Mass., recently incorporated, is $13,000, not $3,000 as stated in THE IRON AGE of Dec. 7.

Philadelphia

PHILADELPHIA, PA., Dec. 18, 1916.

Trenton manufacturers, hampered by freight congestion, plan, it is said, a concerted movement to prevent the closing of the Delaware and Raritan Canal, Dec. 20. An appeal will be made to the Pennsylvania Railroad, lessee, to keep it in operation this winter, except when the ice becomes too thick.

The Trenton plant of the American Bridge Company, which recently added a steel barge-building department has already launched four barges and has two others on the ways. It has orders for additional barges which will tax this department to its full capacity until 1918.

The Lehigh Coal & Navigation Company has spent so far approximately $75,000 on improvements at the Cranberry mines at Hazleton, Pa., which were acquired from A. Pardee & Co. last July. It is stated that the operations are to be completely electrified by 1920, but they will probably be finished much before that time.

The blacksmith shop and foundry of the William Cramp & Sons Ship & Engine Building Company, Philadelphia, were damaged by fire, Dec. 13, with an estimated loss of $25,000.

The Ross-Tacony Crucible Company, Philadelphia, will build a three-story brick plant, 70 x 100 ft., at Robbins and Milnor streets, to cost $33,900.

The E. Wahl Mfg. Company, Philadelphia, manufacturer of bone goods, will make alterations to its factory at 3970 Pulaski Avenue to cost about $4,600.

The J. E. Lonergan Company, 211 Race Street, Philadelphia, brass founder, has awarded a contract for a new two-story reinforced concrete building, 45 x 100 ft., at Second and Florist streets to the William Steele & Sons Company, 16 Arch Street, Philadelphia.

The Penn Metal Ceiling & Roofing Company, Philadelphia, has awarded a contract for the erection of an addition to its plant at Twenty-fifth and Wharton streets to cost $5,500.

R. D. Wood & Co., Philadelphia, manufacturers of machinery, will increase the capacity of their steel casting plant at Florence, N. J., to handle work for the Bethlehem Steel Company.

George Sahsenmaier, 930 North Third Street, Philadelphia, will make alterations to his machine shop, to cost about $8,000.

The L. H. Gilmer Company, Philadelphia, manufacturer of belting, has awarded a contract for the erection of a two-story plant, 50 x 160 ft., at Keystone Street, Tacony, to the Nickson-Duggan Construction Company.

The addition being constructed by the Lifter Ice Cream Company, Philadelphia, will be used as a garage, not as a machine shop, as has been stated.

The Modern Aeros Corporation, Ltd., Broad Street Bank Building, Trenton, N. J., recently incorporated with a capital of $100,000, has acquired property on the Miller and Margerum tract near Pennington Avenue, and will immediately

commence the erection of a plant for the manufacture of aeroplanes. Armand W Allyn is secretary and general manager.

The Utah Potash Company, Trenton, N. J., has acquired property near Ingham Avenue, and has commenced the erection of a plant, 40 x 180 ft., to cost $20,000. The structure will be equipped with machinery for the reduction of ores to be shipped from the company's mines at Marysvale, Utah.

The Positive Lock Bolt Company, Camden, N. J., has been incorporated with a capital stock of $100,000 to manufacture bolts, nuts, spindles, etc. Charles A. Cogan, Camden; Charles Metrus, W. M. Leslie, and Samuel Friedenburg, Philadelphia, are the incorporators.

The Penn Counties Truck Company, Allentown, Pa., has acquired the former De Journo Soap Company property along the Central Railroad of New Jersey, as a site for a plant for the manufacture of motor trucks. The main factory will be 90 x 475 ft. The plant will have a capacity of about 2000 trucks from ½ to 2 tons capacity. Martin E. Kern is vice-president.

The Macungie Brass Mfg. Company, Macungie, Pa., is planning to enlarge its foundry to specialize in iron castings.

The Hale Motor Car Company, Wayne, Pa., has awarded a contract to John D. Lengel, Wayne, for a one and two-story addition to its plant.

The Mauch Chunk Iron Works, Mauch Chunk, Pa., is planning for the installation of new machinery.

The Lancaster Steel Products Company, Lancaster, Pa., is having plans prepared for a new addition to its plant to provide for an increased capacity.

The Slaymaker Lock Mfg. Company, Lancaster, Pa., manufacturer of padlocks, has had plans prepared for an addition, 35 x 165 ft., to enable it to rearrange its tool and press departments now too crowded by continual additions to its machine-tool equipment.

The Landis Tool Company, Waynesboro, Pa., has voted to increase the capital stock from $1,000,000 to $2,000,000 to provide for business extensions.

The Abrasive Material Company, Bridesburg, Philadelphia, has awarded contract to John R. Wiggins & Co., 1215 Filbert Street, Philadelphia, for a three-story addition to its plant, 82 x 86 ft., to cost about $40,000.

In connection with its taking over of the Slatington Rolling Mills, the recently incorporated Slatington Iron & Steel Company, Slatington, Pa., has increased its capital stock from $10,000 to $100,000. No additions to the plant are contemplated. B. Frank Conner is general manager.

The report that the McCullough Iron Company, foot of Seventh Street, Wilmington, Del., had been sold to the Wilson Steamship Company is untrue. Capt. Wilson, however, has bought some stock in the iron company, which is continuing its operations as before. Vice-president Bush has recently resigned and his office is now vacant.

The Baldwin Locomotive Works, Philadelphia, is taking bids for the construction of four bays, each 50 ft. wide and 145 ft., 240 ft., 295 ft. and 310 ft. long each, to be added to its foundry building at Eddystone, Pa.

Catalogs Wanted

The Lebanon Gear & Machine Company, Lebanon, Pa., has taken over the plant formerly occupied by the Lebanon Foundry & Machine Company at Lebanon, and has it partly equipped with machine tools and in operation. The company contemplates installing additional machine tools, including gear cutters, with the intention of operating the plant as a jobbing and specialty shop, and for the production of cut and cast gears. It has at present some machine tools in operation turning out disk-type steel automobile wheels and plans shortly to produce a new type of tool holder and expanding mandrill. Catalogs from manufacturers would be appreciated. H. T. Gerdes, treasurer of Gerdes & Co., Inc., contracting engineer, 30 Church Street, New York, is also treasurer of the new company.

Baltimore

BALTIMORE, MD., Dec. 18, 1916.

Plans are being made to establish the Commercial Ship & Hydroaeroplane Company of America in this city with $300,000 capital stock to manufacture a new hydroaeroplane. J. Frank Fox, attorney, 211 Law Building, is in charge of the plans. William Barcus, 1717 West Fayette Street, is in the company.

Rogers & Abels, automobile repairers, 421-423 North Front Street, Baltimore, have leased a building at 815-817 Hillen Street, which it will equip as a machine shop. Work will be started immediately.

The Commonwealth Light & Power Company, Baltimore, recently incorporated for $11,000,000 by John C. Jackson and Roger Sherman, 30 Pine Street, New York City, and George R. Gaither, 111 North Charles Street, Baltimore, has increased its capitalization to $15,000,000.

The Visible Non-Refilling Bottle Stopper Company, 232 Courtland Street, Baltimore, recently incorporated by Caleb R. Kelly, William N. Garthe, and others, is considering the establishment of a plant at Decatur and Nicholson streets.

The Artillery Fuse Company, Wilmington, Del., will build a plant addition to cost $3,500.

Plans are being made by the Newport News Shipbuilding & Drydock Company, Newport News, Va., for the construction of new buildings next year.

The main building which will be constructed by the Baltimore Enamel & Novelty Company, Woodall Street, Baltimore, will be 250 x 450 ft., and cost about $200,000. It will be located at Westport, Md.

The Southern Steel Construction Company, 207 Hoffman Building, Baltimore, has leased a lot, 75 x 300 ft., at Thirtieth Street and York Road and plans are being made to establish a steel fabricating plant.

Chicago

CHICAGO, ILL., Dec. 18, 1916.

The pressure of general buying of machine tools in small lots is unabated and machinery dealers without exception report inability to accumulate representative stocks because of the steady demand. The number of plant additions and new enterprises continues to run very high. This new construction is creating a demand for power equipment in relative proportions. An illustrative inquiry is that of the William D. Gibson Company, Chicago, for a 150-hp. internal combustion engine and a number of japanning and tempering furnaces. The Chicago, Burlington & Quincy has issued its supplemental list of machinery required for new shops, mention of which was made last week.

The Sherwin-Williams Company has plans for a three-story brick factory at 542-4 Kensington Avenue, Chicago, at a cost of $25,000.

The Appleby Hinge Mfg. Company, Chicago, has been organized with a capital of $2,500, by William K. Appleby, Daniel S. Gillespie and William A. Jennings, 69 West Washington Street.

The Acme Steel Goods Company, 2834 Archer Avenue, Chicago, is taking figures on an addition to its factory, 94 x 99 ft., to cost $15,000.

The Aldon Company, manufacturer of railroad supplies, 53a Jackson Boulevard, Chicago, will build a one-story factory building, 50 x 110 ft., to cost approximately $10,000. Bids are being received by R. G. Pierce, architect, 10 South LaSalle Street.

R. Lavin & Sons, metals, 715 West Fourteenth Street, Chicago, will build a one-story foundry, 50 x 150 ft., at East Chicago, at a cost of $15,000.

H. Nelson, 569 West Van Buren Street, Chicago, is building a two-story machine shop, 52 x 125 ft., the cost to approximate $25,000.

The Inland Pump Mfg. Company, Chicago, has been incorporated with a capital of $2,500 by Fred M. Clarke, 105 North Clark Street, T. Frank Quilly and George L. Hipple.

The Industrial Mfg. Company, Jackson and Clinton streets, Chicago, will build a one-story brick factory at 408 Sacramento Boulevard to cost $10,000.

Eugene Gusler, 1055 West Forty-seventh Street, Chicago, will build a two-story brick factory at 4709 Aberdeen Street to cost $6,500.

The Chicago Malleable Castings Company, Chicago, will erect a two-story brick factory at 1219 West 120th Street, Chicago, at a cost of $15,000. A. C. Coffin is the architect.

The Rockford Tool Company, Rockford, Ill., has increased its capital stock from $50,000 to $100,000.

E. R. Klemm, 1439 West Austin Avenue, Chicago, Ill., is erecting a two-story service station for motor trucks, 32 x 132 ft., to be added to his present plant. The second story will be devoted to manufacturing purposes and drill presses and other small machinery will be installed. The present plant is equipped with heavy lathes and finishing machinery.

The Standard Spiral Pipe Works, Chicago, is in the market for a motor-driven or steam-driven hammer with capacity for forging ¾-in. material of 32-in. outside diameter. A. J. Berger is vice-president.

The Kansas City Structural Steel Company, 1012 Baltimore Avenue, Kansas City, Mo., is making additions to its plant to cost about $35,000 in buildings and $15,000 in equipment, which latter has already been purchased. H. A. Fitch is president. The company is employing about 400 workmen

The 4-S Safety Razor Company, Hutchison, Kan., has let

contract for the erection of a one-story factory, [illegible] cost about $50,000, on a site [illegible] recently acquired.

The Fountain Faucet Company, Torrey Building, Duluth, Minn., would like to get in touch with [illegible] manufacturers and will want motor-driven [illegible] equipment in addition to its other needs [illegible]

The Jackson Compressor Company, 1130 Twelfth Street, Denver, Col., plans the erection of a new plant at Alameda and Cherokee streets, consisting of the following structures: A two-story building, 65 x 256 ft., the ground floor of which will be used for heavy machine tools, such as boring mills, planers, planer type milling machine and slotting machines; a building 30 x 122 ft., containing coal storage, boiler room, engine room, pattern shop and pattern storage; a building 40 x 140 ft., for a forge and drop forge shop, and a two story building, 65 x 256 ft., for metal working machines, including lathes, vertical turret lathes, medium-sized cylinder boring machines and screw machines. The entire plant will be built of cement, brick and steel and will be served by siding from the Santa Fe Railroad. Two 25-ton cranes will be installed in the larger buildings. The power plant equipment has been purchased. It is planned to complete the power building and heavy machine shop by March 15 next, and operate them in connection with the present plant at Twelfth Street. The company is purchasing machine tools worth about $80,000 and about doubling its present investment in equipment.

The Weston Mfg. Company, Oshkosh, Iowa, L. W. McOmber, general manager, will soon be in the market for lathes and drill presses.

The Hikawa Iron Company, Duluth, Minn., has been incorporated with a capital of $200,000 by Thomas A. Walker, W. A. and W. P. Hicken, Alexander Hamfield and Frank Crassweller.

Milwaukee

MILWAUKEE, WIS., Dec. 18, 1916.

Bookings by Milwaukee machine-tool builders continue to be at a volume that gives little hope of shortening the period of deliveries. Metal-working shops which are preparing for extensions and additions next year have been placing orders now to protect their requirements 6 to 8 months hence. The high pressure on shop equipment the past year is making replacements necessary in greater volume than ever before and from this results a steady flow of orders for single tools. Large-lot buying still is conspicuous by its absence.

The Filer & Stowell Company, Milwaukee, sustained a loss estimated at from $350,000 to $400,000, Dec. 15, when its four-story pattern shop, drafting room, office and carpenter shop was destroyed by fire. Much of the damage is due to the loss of valuable patterns. The building was 70 x 150 ft., and was erected in 1893. At this time no plans for reconstruction have been made, but it is considered likely that work will be undertaken without delay. Thomas J. Neacy is general manager.

The Stegeman Motor Car Company, on Lamb Street, Milwaukee, has enlarged its plans for extending its motor truck manufacturing facilities. The size of the new assembly shop has been increased to 150 x 240 ft., and a new administration building, 65 x 65 ft., will be erected. The assembly shop will be reinforced concrete, one-story, with sawtooth roof. The equipment will include three one-story Pawling & Harnischfeger cranes. The present assembly shop will be released to the manufacturing department and will be equipped with new tools, now being contracted for. The list includes a boring mill, boring bar, milling machine, radial drilling machine, grinding machines, etc. The company will make its own rear axles and transmissions. The additions will be completed about March 1 and will make it possible to increase the capacity to from 800 to 900 worm-drive trucks, of 1½ to 7-ton capacities per year. Its business in 1916 was double that of 1915. Oscar Stegeman is president.

The Aluminum Goods Mfg. Company, Manitowoc, Wis., is reported contemplating the establishment of a rolling mill in connection with its main works in Manitowoc, to serve also the plant in Two Rivers, Wis. A third plant is located at Newark, N. J. The project is under consideration, but details are not available at this time. George Vits is president.

The La Crosse Tractor Company, organized recently at La Crosse, Wis., with a capital stock of $1,150,000, is completing the consolidation of the Happy Farmer Tractor Company, Minneapolis, with the Sta-Rite Engine Company, La Crosse. The new company will occupy the Sta-Rite plant, which will be more than doubled in size in the coming 6 months. B. F. Hamey, Minneapolis, is general manager.

John Gilson and J. E. Gilson, Port Washington, Wis., have purchased the South Side Foundry Company of that city and have assumed control. A general gray iron foundry and machine shop business will be conducted. John Gilson is the founder of the Gilson Mfg. Company, Port Washington, [illegible] with which concern J. E. Gilson was associated. The Gilson Company passed into the ownership of Harry W. Bickel and Carl Eber some time [illegible] the Gilson [illegible]

The Industrial Controller Company, 886 Greenbush Street, Milwaukee, has [illegible] a second story on its one-story shop, 60 x 125 ft.

The Badger Brass Works, Baraboo, Wis., has [illegible] equipment [illegible] shop. The company [illegible] large scale.

The Vaughn Mfg. Company, maker of [illegible] seeders, etc., has arranged for a small production of light motor trucks [illegible]

The Stiles Iron Works, Algoma, Wis., will establish a foundry in connection with its machine shop. The complete equipment has been purchased.

Allbaum & Co., 64 Second Street, Milwaukee, have awarded contract for the erection of a plot to garage and service shop, 50 x 100 ft., three stories and basement, to cost $30,000 to the Rudi Company, 3 Patton Building. T. C. Graves is manager.

Stanley F. Kadow, 988 Kinnickinnic Avenue, Milwaukee, will prepare plans for a brass foundry, to be located on the south side. Owner's name withheld. It will be 40 x 80 ft., one-story and basement, of brick and steel. The project will mature in February.

Hartford, Wis., capital has taken an option on the gray iron foundry at Beaver Dam, Wis., established about six years ago, and operated by the promoters for only a short time. It is planned to close the deal so that operations may be resumed Jan. 2.

E. H. Manning, La Crosse, Wis., is preparing to establish a factory for the production of wind motors, the first models which will be manufactured under contract with the Dodge Mfg. Company, Mishawaka, Ind.

The Marshfield Airoator Company, Marshfield, Wis., has been organized by Michael Duval of Lincoln, Wis., to manufacture milk coolers and aerators of his design. A factory is now being equipped.

The Ajax Rubber Company, Trenton, N. J., has purchased the Racine Rubber Company, Racine, Wis., and proposes to make extensions of the facilities next year. Plans have not yet assumed definite shape. Stuart Webster is president of the Racine Company.

The plant of the Fred M. Prescott Steam Pump Company, Greenfield and Sixtieth avenues, West Allis, Milwaukee, comprising a machine shop and foundry, is being offered for sale by Nathanael Greene, Camp Building, Milwaukee. It has not been operated since the company was absorbed by the International Steam Pump Company, now the Worthington Pump & Machinery Corporation, operations being transferred to the branch works at Cudahy, near Milwaukee.

The factory erected at Sauk City, Wis., for the Sheip Motor Company, Chicago, but never occupied, has been leased by Earl McEntarfer and John Wachtveit, Jr., Wis., for the manufacture of steel [illegible]. Some new equipment will be required.

The Hamilton Mfg. Company, Two Rivers, Wis., has purchased the Fritz Mfg. Company, Grand Rapids, Mich., manufacturing drafting-room fixtures. The machinery is being moved to Two Rivers and operations will be consolidated.

Detroit

DETROIT, MICH., Dec. 18, 1916.

Machine-tool men who have been anticipating the usual falling off in trade in December have been agreeably surprised that the market has remained strong. The expected advance in prices has begun, but manufacturers continue to buy, although the orders are generally small, the single exception being the Harroun Motor Company, which has ordered considerably more machinery for its new plant at Wayne, Mich. Local jobbers are expecting a new market for their machines [illegible] will [illegible] the aeroplane manufacturing center of the country. Companies for the manufacture of aeroplane motors and equipment are planning to organize and locate in this city, and it is expected that several of the large motor companies here will add an aeroplane motor department to their plants. Deliveries on standard machines are still from 3 to 6 months behind, with the period between order and shipment gradually lengthening.

The Union Truck Company, Bay City, Mich., has leased the old plant of the Pioneer Boat Company in that city and will manufacture its own commercial automobile bodies. The new light commercial body being manufactured by W. H. Kelly, Bay City, backed by a syndicate of business men,

has been well received by the trade and the [illegible] manufacturing many bodies

The Bardeen Paper Company, Owosso, Mich., has increased its capital stock from $175,000 to $1,000,000.

The Kuhlman Electric Company, which recently removed from Elkhart, Ind., to Bay City, Mich., has increased its business three-fold, and will construct an addition to its plant.

The National Machine Producer Company, Detroit, has been organized with a capital stock of $150,000. William H. McGregor, Detroit, holds one-third of the stock.

Montgomery Ward & Co., Chicago, have purchased the plant of the Field-Brundage Company, Jackson, Mich., manufacturer of machinery. An addition to the plant will be erected and additional capital invested to enable the company to catch up on back orders. The present officials of the company will retire.

The National Body & Trimming Company, Detroit, has been incorporated by A. Cornelius Knapp, Thomas J. Gillan and Joseph M. Ackerson, of Detroit, wtih capital stock of $100,000. The company will manufacture automobile bodies, tops and trimmings.

The Morrill C. Morley Mfg. Company, Benton Harbor, Mich., has increased its capital stock from $35,000 to $75,000.

The Continental Motors Company, Detroit, plans a reorganization, with a capital stock of $18,500,000, of which $15,000,000 will be common stock.

The Morton Salt Company and Harris Brothers, Chicago, have purchased the plant of the R. G. Peters Salt & Lumber Company, near Manistee, Mich.

A recent fire necessitated the rebuilding of part of the third floor of the fender department of the Briscoe Mfg. Company, manufacturer of automobile radiators, sheet-metal parts, and stampings, Detroit, Mich., and this will be completed within the next 10 days.

The Fuller & Sons Mfg. Company, Kalamazoo, Mich., maker of transmissions, will erect additions to its plant to double its output. The company expects to spend $150,000 in new buildings and equipment in 1917.

Robinson & Campau, architects, Grand Rapids, Mich., took bids Dec. 18 on an addition to the plant of the Clipper Belt Lacer Company.

Cincinnati

CINCINNATI, OHIO, Dec. 18, 1916.

Many manufacturing plants in central Ohio were compelled to curtail operations last week due to the cutting off of the natural gas supply on account of the recent cold spell. No factories in Cincinnati proper have been inconvenienced. Domestic orders for machine tools continue to hold precedence over foreign business, although the latter has by no means been stopped. Corliss engine makers in southern Ohio are very busy and have considerable business in sight, but a few of them are devoting a part of their time in building machine tools and sugar-making equipment. The high cost of plates has compelled makers of boilers and heavy tanks to advance their selling prices. The advancing cost of castings will also compel makers of heavy machinery to mark up prices at an early date. The labor situation is improving, although more skilled mechanics could be employed by a number of plants. It is currently reported that several nearby manufacturers of munitions have laid off several hundred men, due partly to the slowness in securing material.

W. F. Robertson, president Robertson Steel & Iron Company, Cincinnati, Ohio, and also president Tower Mfg. Company, whose plant at Madison, Ind., was destroyed by fire Dec. 14, advises that a much larger building was obtained the day following the fire that will be fully equipped for making cold rivets, tacks and other specialties. The output of the old plant will be nearly doubled and every effort will be made to have the new plant in operation so as not to delay shipments to any appreciable extent. The company is in the market for rivet-heading machines, for making cold rivets, tack machines, transmission and power equipment. All communications should be addressed to the Cincinnati office.

The Columbia Machine Tool Company, Hamilton, Ohio, has been incorporated with $50,000 capital [illegible] E. Goldsmith, E. S. Rich and others. It is not yet ready to give out its plans further than that it will [illegible] for the manufacture of machine tools.

The Dayton Insulating Die Company, Dayton, Ohio, recently formed, is equipping a plant for the manufacture of Bakelite dies.

The American Foundry & Castings Company, [illegible] Ohio, has recently received a large [illegible] automatic stokers from different parts [illegible] has made no plans for an immediate [illegible]

The Elwood Myers Company, Springfield, Ohio, has had plans prepared for a brick addition to its plant, 40 x 80 ft., two stories, principally for storage.

The Hamilton Smoke Consumer Company, Hamilton, Ohio, has been incorporated with $10,000 capital stock by A. O. Rolfe, and others. It is understood that the company's smoke consumer will be manufactured under contract for the present.

The Trump Mfg. Company, Springfield, Ohio, has increased its capital stock from $100,000 to $125,000, and will increase its manufacturing facilities. The company makes water wheels and the principal new equipment to be installed just now is a traveling crane for its foundry and machine shop.

The Humpton-Scott Company, Columbus, Ohio, maker of stamped metal goods, has had plans prepared for a factory in Grove City, a suburb.

The Chamber of Commerce, Columbus, Ohio, is planning to erect a factory power building to house light manufacturing plants.

Harley Minchall, Xenia, Ohio, now operating an automobile repair shop, has purchased a new building and will fit it up for doing general machine-shop work

John Hill, director of Public Service, Nelsonville, Ohio, will open bids Jan. 6 next for one compound duplex pumping engine, one steam-driven air compressor and one air receiver for the municipal waterworks.

The Marietta Mantel Company, Marietta, Ohio, has commenced work on its new factory, 50 x 150 ft., three stories, of regular factory construction. A four-story warehouse will also be erected.

The recent statement in THE IRON AGE that the Love Foundry & Machine Company, Winchester, Ky., had been merged with the Cincinnati Machine Tool Company, was incorrect. The Love Company was recently incorporated, and some of the stockholders and officers are in a similar capacity with the Cincinnati Pulley Machinery Company, at Covington, Ky. The officers of the Love Foundry & Machine Company are J. G. Hey, president; D. W. Hopkins, vice-president; L. B. Patterson, secretary and treasurer, and James Love, general manager.

Catalogs Wanted

The Dayton Time-Lock Company, Dayton, Ohio, is preparing plans for the erection of a complete plant in Dayton. The company will be pleased to receive catalogs covering machinery, small tools and kindred equipment suitable for the manufacture of adding machines, etc. George L. Baker is president.

Cleveland

CLEVELAND, OHIO, Dec. 18, 1916.

The market continues fairly active. The largest inquiry that has come out the past few days is for about $50,000 worth of machine tools for a plant to be built in Cleveland to manufacture steel wheels for motor trucks. The company that will operate this plant will be organized about Jan. 1. A new building will be erected shortly. The National Carbon Company has purchased a number of machine tools, including two large planing machines. A good scattering demand is noted for single tools and lots of two or three machines. The call for turret lathes continues brisk, orders being for one or two machines.

C. H. Miller, formerly with the Champion Stove Company, Cleveland, has purchased a site on the Belt Line Railroad, on which, it is announced, he will build a new foundry to be used for general jobbing purposes and the manufacture of stove castings.

The Harris Automatic Press Company, Niles, Ohio, will move to Cleveland, having acquired a site on Seventy-first Street and the Belt Line Railroad. A plant will be erected for building printing machinery.

The Columbia Clutch Company, recently incorporated, will establish a plant in Cleveland to manufacture a new type of automobile clutches on a large scale. Operations will be started in January

The Michigan Smelting Company, Detroit, Mich., has purchased the plant of the Komito Smelting Company, Cleveland. The latter has been incorporated with a capital stock of $250,000 and will be known as the Valley Smelting Company.

The Doyle Machinery Company, Cleveland, has been incorporated with a capital stock of $10,000 by J. A. Doyle and others.

[illegible] announced that a plant representing an investment [illegible]00,000 will be erected in Charleston, W. Va., by the [illegible] an Bottle Company, a subsidiary of the Owens Bottle Machine Company, Toledo, Ohio.

[illegible] Toledo Scale Company, Toledo, has purchased a site [illegible] ns to erect a new plant.

The Ladel Mfg. Company, New Philadelphia, Ohio, has acquired the plant of the Spicer Mfg. Company, and will erect additional buildings for machine and pattern shops.

The Transue & Williams Steel Forging Corporation, Alliance, Ohio, will make some additions to its forge shop, plans for which are being prepared by George S. Rider & Co., Cleveland.

The Allie J. Miller Company, Bellefontaine, Ohio, builder of automobiles, will enlarge its plant by the erection of a three-story building, 55 x 150 ft.

The Central South

LOUISVILLE, KY., Dec. 18, 1916.

Price advances are getting more and more attention in the steel and machinery trades in this section. Distributers of contractors' equipment note with a good deal of perturbation several recent advances on lines which they had felt could stand no more without immediately limiting sales. Shortages of materials is another item which is causing complaints. Eastern Kentucky coal operators had only a two-day car supply last week. Inquiries in all lines canvassed continue numerous, however, and manufacturers are busy. Steam pumps have been especially active, local manufacturers reporting some export orders.

The Kentucky & Indiana Terminal Company, Louisville, Ky., proposes to construct a large terminal warehouse at Louisville on Main Street between Fourteenth and Eighteenth, to cost about $1,500,000, and to include the Southern, Monon and Baltimore & Ohio Railroad companies.

The Dixie Motor Car Company, Louisville, Ky., manufacturing an automobile in connection with the Kentucky Wagon Mfg. Company, has increased its capital from $150,000 to $400,000. L. V. Board is president.

The Boyd County Electric Company, Ashland, Ky., has increased its capital stock from $32,000 to $155,000.

The Wilson Stove Company, Metropolis, Ill., has let a contract to the Sherrill-Russell Lumber Company, Paducah, Ky., to construct a foundry 160 x 200 ft., a nickel shop, 70 x 94 ft., and a crate shop, 25 x 130 ft., at a cost of $45,000.

C. E. Gibbons, Winchester, Ky., owner of the property, has let a contract to R. P. Scobee & Son, Winchester, for erection of a building to be occupied by the Love Foundry & Machine Company.

The Federal Dye Stuff & Chemical Company, Kingsport, Tenn., will make a 100-per cent increase in its capacity, raising the daily output to 100,000 lb. of dyes, chemicals, etc. George T. Bishop, 11 Pine Street, New York, is president.

The O. B. Andrews Company, Chattanooga, Tenn., is erecting 32,000 sq. ft. of additional factory space and will equip it at a cost of $25,000 for the manufacture of folding boxes. S. H. Robertson is manager.

The Handy Tool Mfg. Company, Chattanooga, Tenn., has been incorporated with capital stock of $10,000 by A. J. Corley, Sam P. Foster, A. J. Rogers and others.

The Southern Motor Company, Memphis, Tenn., has been incorporated with capital stock of $50,000 by R. E. McKellar, S. H. Butler and J. M. Constable and others.

The Chickasaw Cooperage Company, Memphis, Tenn., whose plant was recently destroyed by fire at a loss of $300,000, has let contract to L. T. Lindsey, Memphis, for rebuilding the factory.

The Memphis & Rugby Railroad, Memphis, Tenn., proposes to establish a power plant at Rugby Park.

Indianapolis

INDIANAPOLIS, IND., Dec. 18, 1916.

The Highway Tractor Company, Indianapolis, has been incorporated with $2,000,000 capital stock to manufacture tractors. It has purchased 25 acres for a plant to cost about $200,000. Ground has been broken near the Indianapolis Speedway for the main building, 200 x 400 ft., of steel and concrete. The company expects to manufacture 5000 10-ton tractors the first year. Among the stockholders are Carl G. Fisher and James A. Allison of the Prest-O-Lite Company; Henry F. Campbell of the Stutz Motor Company, Indianapolis; B. R. Parrott, Jackson, Mich.; A. E. Schaaf, Poughkeepsie, N. Y.; Louis Goodhart, St. Louis, and M. N. Stewart and Forrest C. Bagley, Jackson, Mich.

The Oakes Company, Indianapolis, manufacturer of automobile parts, has increased its capital stock from $250,000 to $450,000.

The Ferguson Mfg. Company, Indianapolis, has been incorporated with $50,000 capital stock to manufacture beet harvesters. The directors are W. M. Ferguson, L. and W. Rentz.

The E. B. Lamman Company, East Chicago, Ind., has been incorporated with $20,000 capital stock to manufacture nuts, vehicle parts and specialties. The directors are C. Seddon, H. A. and E. B. Lamman.

The Noblesville Heat, Light & Power Company, Noblesville, Ind., has increased its capital stock from $100,000 to $250,000.

The Marion Association of Commerce, Marion, Ind., has closed a contract with Morton Murphy and William Allmur, Janesville, Wis., for the construction of a factory to manufacture electric cookers.

The C. R. Folsom Iron Works, Inc., Walkerton, Ind., has been incorporated with $35,000 capital stock to manufacture iron tanks and other metal products. The directors are Oscar C. Shockney, William A. Endley and V. W. Hardenbrook.

The Just Right Candlestick Company, Indianapolis, has been incorporated with $10,000 capital stock to manufacture novelties. The directors are Johan Hansen, H. C. Schmidt and J. E. McNamara.

The Brazil Ice Company, Brazil, Ind., will build a new plant which will treble its capacity.

The Cellulite Furniture Company, Evansville, Ind., has been incorporated with $5,000 capital stock to manufacture furniture. The directors are M. D. Helfrich, O. R. Braun and H. F. Weaver.

The American Safe Company, Anderson, Ind., has been incorporated with $25,000 capital stock to manufacture safes and vaults. The directors are M. G. Reynolds, J. C. Groble and Henry Schmidt.

The American Radiator Company, Bremen, Ind., is erecting an addition to its plant which will double its capacity.

The Allmur Mfg. Company, manufacturer of electric stoves, will move its plant from Janesville, Wis., to Marion, Ind.

The National Automatic Tool Company, Richmond, Ind., will build a second addition to its plant, giving 3000 sq. ft. of floor space, which will be used for storage and painting of small castings.

The foundry now under construction for the Standard Wheel Company, Terre Haute, Ind., will be for the manufacture of malleable iron castings for wheels and automobile hubs. It will be completed about Feb. 1.

St. Louis

ST. LOUIS, MO., Dec. 18, 1916.

Machine tool buying has continued actively the past week. Requirements are now for domestic needs and not much affected by the peace talk. The aggregate of business is keeping all sources of supply under pressure from practically all directions. No lists are appearing at all, aside from some grouped railroad inquiry for repair shop needs, but for the most part this call is subdivided into negotiatory quantities and general lists not put on the market. The roads of the Southwest are probably buying a considerable equipment, but the purchases are being made in such manner as to render it difficult to determine the aggregate.

The Beaker Mfg. Company, St. Louis, has been incorporated with a capital stock of $12,000 by Otto E. Kaiser, Evelyn C. Koenig and Guy Golterman to manufacture metal and other products.

The Modern Brass Foundry Company, St. Louis, has been incorporated with a capital stock of $15,000 by Carl G. Strotz, John P. Hill and Louis C. Strotz and will equip a brass and bronze foundry.

The Key Boiler Equipment Company, St. Louis, has been incorporated with a capital stock of $30,000 by N. P. Finigan, G. E. Southwick and M. M. Myers to manufacture boiler plugs, etc.

The Wagner Electric Mfg. Company, St. Louis, has plans for increasing its capital stock from $2,000,000 to $5,000,000 and to add still further to its manufacturing plants.

The Magnet Mfg. Company, St. Louis, recently incorporated by I. Korsch, M. D. Frumberg and A. L. Jacobs, will equip a plant for the manufacture of electric switch boxes.

The Thwing-Evans Company, Kansas City, Mo., has been organized by Fred H. Thwing, Harry W. Evans, and others, and will erect a plant for the manufacture of coal, etc., at a cost of $1,000,000.

The Brass & Metal Mfg. Company, Kansas City, Mo., A. U. Dann, president, will equip an addition to its cartridge manufacturing plant covering about 35,000 sq. ft. of floor space.

The Arkansas Lime Company, Ruddells, Ark., will install equipment for the manufacture of [illegible] wrench

The Oklahoma Structural Steel Company, Tulsa, Okla., has been incorporated with capital stock of $[illegible],000 by

J. W. Sloan, P. M. Iverson [illegible] a steel fabricating plant.

The Drane-Owen Tank Company, Tulsa, Okla., has been incorporated with a capital stock of [illegible] C. A. Mechling, and others, to manufacture tanks.

The White Star Refining Company, Oklahoma City, Okla. has been incorporated with a capital stock of $[illegible] LeRoy Paddock, John B. [illegible] and George M. [illegible]

The Oneta Refining Company, Oneta, Okla., has been incorporated with a capital stock of $[illegible] Charles F. Bisett, and others, and will equip a plant there, as well as one at Tulsa, under the corporated title of the Misener Gasoline Company.

The Oklahoma Tool & Supply Company, Tulsa, Okla., has been incorporated with a capital stock of $10,000 by J. W. Sloan, P. M. Iverson, and others.

The Weleetka Waterworks Company, Weleetka, Okla., C. A. Parish, general manager, will install a filtration plant of 500,000 gal. per day capacity, with motor-driven pumps.

The C. F. Massey Company, 122 South Michigan Avenue, Chicago, tank manufacturer, will equip a plant at Meridian, Miss., for the manufacture of reinforced concrete railroad trestles, bridge decks, culvert, sewer pipe, etc.

The Caddo Oil & Refining Company, capitalized at $10,000,000, will equip several plants in the Caddo field. R. E. Robinson & Co., 30 Broad Street, New York, and E. W. Clark & Co., 321 Chestnut Street, Philadelphia, bankers, are active in the development of the business.

Texas

AUSTIN, TEX., Dec. 16, 1916.

The plant of the Amarillo Sash & Door Company, Amarillo, recently destroyed by fire, will be rebuilt at a cost of about $50,000.

Schneider Brothers, Vidor, will build a brick manufacturing plant, consisting of four kilns and 18 drying sheds, with a daily capacity of 50,000 brick.

San Benito has voted $600,000 in bonds to purchase the pumping plants and canals of the San Benito Land & Water Company and to enlarge and extend the system.

The plant of the E. B. Hays Machinery Company, Marshall, which was recently destroyed by [illegible] at a cost of about $30,000.

The Texas Company of Houston is reported to be considering plans for the construction of an electric power plant at or near Tampico, Mexico, to furnish power for operating the oil pipe line pumping plants and other machinery connected with its oil industry and that of other large companies in the Tampico oil fields.

It is announced that the Pierce-Fordyce Oil Association will enlarge its refinery at Texas City at a cost of about $300,000, and build a case and can factory at Galveston to cost $100,000. It will also enlarge [illegible] from 8000 to 20,000 bbl. per day and will lay an 8-in. pipe line from the Healdton, Okla., fields to the Fort Worth plant at a cost of about $1,700,000, including pumping stations.

California

LOS ANGELES, CAL., Dec. 13, 1916

The Los Angeles Shipbuilding Company, Los Angeles, has filed application with the Harbor Commission for lease of a site on the west side of Los Angeles Harbor, San Pedro, upon which it proposes to erect a shipbuilding plant to cost $500,000. E. G. Eckstrom, 237 I. W. Hellman Building, Los Angeles, is president.

Joseph Patrick, 1041 South Broadway, Los Angeles, will build a new brick machine shop, 17 x 50 ft., at 1035 South Broadway.

The Aston Motor Car Company, Los Angeles, has leased the building to be erected by W. G. Hutchinson on Figueroa Street, near Eleventh Street, about 50 x 150 ft., as a garage.

The Baker Iron Works, North Broadway, Los Angeles, will build a steel frame machine shop, 80 x 180 ft., at a cost of $7,250.

The Axelson Machine Works, 1406 San Fernando [illegible] Los Angeles, specializing in oil well machinery, has had plans prepared for a plant to comprise seven buildings [illegible] erected at Huntington Park, as follows: Machine shop, [illegible] 126 ft.; foundry, 100 x 156 ft.; [illegible] tern shop, 25 x 80 ft.; pattern storage [illegible] 25 x 100 ft.; and office, 30 x 100 ft.

The city of Los Angeles will build a one-story machine shop, 40 x 156 ft., at 217 San Fernando Boulevard.

The Warman Steel Castings Company, 650 South Los Angeles Street, Los Angeles, has had plans prepared for a plant at Huntington Park, to consist of foundry, 113 x 240 ft., with a 10-ton traveling crane; pattern shop, 40 x 60 ft.; [illegible] rn storage, 40 x 40 ft.; and office, 24 x 30 ft. The company plans to remove its present plant at Redondo to the new [illegible]

The Greer-Robbins Garage, Flower Street, near Twelfth Street, Los Angeles, plans a two-story addition, 70 x 155 ft.

The Union Oil Company, Los Angeles, has acquired 200 acres at Los Angeles Harbor, Wilmington section, and is reported to be planning for the erection of an oil-refining plant to cost $2,000,000. A franchise for a pipe line has been granted, and the company is now arranging with the city [illegible] construction of a wharf.

The Arrowhead Springs Company, 801 South Spring Street, Los Angeles, has had plans prepared for a bottling plant, 150 x 250 ft., at Washington Street and Compton Avenue, of reinforced-concrete, estimated to cost with machinery $150,000. [illegible] W. Hancock is general manager.

The Western Metals Company, Security Building, Los Angeles, will build a new one-story plant, 17 x 96 ft., on Belle Port Avenue, at Harbor City.

The Southern Counties Gas Company, Santa Ana, Cal., will build a one-story machine shop at 501 North Sycamore Street at a cost of $2,200.

The Santa Fé Railroad, San Bernardino, will build the following additions to its local shops to replace structures recently destroyed by fire: Coach and car-building shop, 150 x 245 ft.; mill building, 80 x 230 ft.; cabinet and upholstery shop, 73 x 132 ft.; and refrigerator car repair shop.

The Valley Ice Company, Fresno, Cal., has acquired a site near Modesto for the erection of a new ice manufacturing plant, of concrete, 115 x 600 ft., with a capacity of 200 tons per day. James R. Erskine is general manager.

The American Beet Sugar Company, Chino, has had plans prepared for a machine shop, 60 x 154 ft. L. M. Edmunds is local manager.

The Magnesite Refractories Company, Porterville, has been incorporated with a capital of $200,000 to build a reduction [illegible] t for the manufacture of magnesite products. Charles B. Stetson, San Francisco; J. L. Mitchell, Porterville; F. J. Shuhl, Porterville, and E. J. Heinor, San Francisco, are the [illegible] orators.

The Santa Fé Railroad, Los Angeles, Cal., has acquired property near the city limits of Old Town, San Diego, and is [illegible] to be planning for the erection of a machine shop, blacksmith shop, roundhouse and repair plant. The company has had plans prepared for an ice plant at Winslow, Ariz., [illegible] W. Harris Kirkhoff Building, Los Angeles, is chief engineer.

The Pacific Northwest

PORTLAND, ORE., Dec. 12, 1916.

The machinery business is holding up remarkably well for this time of year, and shows little curtailment. Shipbuilding plants on Puget Sound and the Columbia River have placed a number of important orders, and continue in the market for tools of large capacity, although large lists are the exception. Considerable single-tool business from lumber and mining companies is also noted and the aggregate of orders from implement shops and small manufacturing plants is large. Inquiries for mill and wood-working machinery are numerous, but business is being closed slowly, except for routine needs. Improvements are under way at several of the paper mills, with some new development in prospect. Hydroelectric machinery and equipment for reclamation work and general heavy construction is in good demand.

The continued shortage of cars is likely to be slightly improved by the annual shut-down of the mills and logging camps in the Northwest for the holidays, lasting at least 10 [illegible] At present lumbermen are averaging about 50 per cent of their immediate requirements in cars. Orders are good, but mills are only accepting those on which they can make deliveries. Production has been curtailed almost 25 per cent. These conditions have had the effect of stiffening the market, and further advances are anticipated.

[illegible] demand from railroad companies who are building new equipment and adding to their rolling stock, has created a brisk business for car manufacturers, particularly in Portland and Seattle. Several large contracts are [illegible]

The British Government recently placed an order for 12,000,000 ft. of spruce lumber for knock-down houses and aeroplane stock with R. A. Wernich and Louis Nicolai, of Portland, to be delivered within one year.

[illegible] Coast Welding Company, Seattle, has been

incorporated with a capital of $5,000 by J. P. and B. D. Engstrom.

The Bellingham & Northern Railroad, Bellingham, Wash., is preparing to add new equipment, including four 70-ton locomotives and a lot of logging cars.

A number of mine owners have purchased the Nevada Engineering & Supply Company, Reno, Nev., the officers of which are George Wingfield, president; J. L. Kirchen, vice-president; L. F. Curtis, secretary-treasurer. The company has a foundry and machine shop, which will be greatly enlarged to handle work on mining machinery. It will also add a stock of general equipment and supplies.

The Northern Pacific Railway Company has awarded a contract for the construction of new terminals on Hanford and Occidental streets, Seattle. The work will cost $150,000, and includes roundhouse, machine and blacksmith shop, etc.

It is announced that the Southern Pacific Railway Company plans improvements in Marshfield, Ore., amounting to more than $250,000.

The People's Shipbuilding Company, Tacoma, Wash., has recently been incorporated for $250,000, and plans the immediate construction of shipyards for building wooden vessels, according to E. Knapp Darien, one of the trustees. The original plant will cost $50,000 and work will begin immediately.

The Chicago, Milwaukee & St. Paul Railway will build additional docks and warehouses, as large as those now under construction at its terminals in Tacoma. Plans are now being drawn.

Plans have been completed by the Vancouver Dry Docks, Ltd., Vancouver, B. C., for construction of a floating drydock to handle a boat of 18,000 tons. A shipbuilding and repair plant will be constructed as soon as the dock is completed. Charles Meek is president.

The Cameron-Genoa Shipbuilding, Ltd., Victoria, B. C., plans the construction of 25 auxiliary schooners. J. H. Price is president.

The plant of the Electric Heating & Mfg. Company, Seattle, Wash., manufacturer of water heaters, radiators, etc., was destroyed by fire recently. It will be rebuilt.

A. J. Capron, Ainsworth Building, Portland, representative of the Goheen Mfg. Company, Canton, Ohio, states that his company recently purchased a site on the South Waterway, on which it will erect a paint plant to cost $250,000, and to include four main buildings of concrete. Work will start about Jan. 1.

The Specialty Box Mfg. Company, St. Johns, Ore., manufacturer of folding crates, step ladders, lawn swings, etc., has been purchased by W. G. Pennock and William Christman, who will enlarge the plant and install more machinery.

Plans are nearing completion for the proposed paper manufacturing plant to be built at Port Angeles, Wash., by Whalen Brothers, who operate a paper plant at Mills Creek, B. C. The original plans called for a daily capacity of 60 tons, but it will be built on a much larger scale. The company will be incorporated shortly for $1,000,000, and is said to be backed by Peabody Houghteling & Co., Chicago.

The Willamette Iron & Steel Works, Portland, has recently signed contracts for the construction of 12 boilers, costing about $250,000, for installation in 6 steel steamers under construction by the Albina Engine & Machine Works, for Norwegian interests. The Willamette Works has now under contract construction of 51 boilers for steel steamers now being built on the Pacific coast, the work totaling between $1,500,000 and $2,000,000.

Canada

TORONTO, Dec. 18, 1916.

Mark Workman, president Dominion Steel Corporation, Montreal, states that his recent visit to the United States was for the purpose of looking over a few industrial plants and also for the securing of additional equipment for his corporation to increase the output of finished products. The new equipment will include a substantial number of Koppers by-product coke ovens.

The Hayes Wheel Works, Chatham, Ont., will be converted into a munitions plant. The British Government has awarded a contract to the company for the manufacture of 50,000 shells to be completed before June 1. Additions will also be made to adapt the plant to this work.

The plant of the Quaker Oats Company at Peterboro, Ont., was destroyed by fire Dec. 11 with a loss to buildings and machinery of nearly $2,000,000. This was one of the largest plants of its kind in Canada and it is stated it will take at least two years to rebuild. The whole plant with the exception of the concrete elevator will be a total loss. O. C. Kerr, chief engineer of the company, is at present in Peterboro.

The Sherbrooke Construction Company has received the contract for the erection of a blacksmith shop for the Imperial Paper Company at Sherbrooke, Que., to be of brick construction and cost $20,000.

The Dominion Copper Products Company has increased its capital stock from $1,000,000 to $5,500,000. The company is one of the subsidiaries of the Dominion Bridge Company of Montreal, which started with a capital of $400,000 and increased it to $1,000,000 last August. Another subsidiary of the Bridge Company is Montreal Ammunitions, Ltd., with a capital of $500,000. It has been intimated that a consolidation of the two companies is under consideration.

The Corbett Foundry & Machine Company, Owen Sound, Ont., is in the market for an iron planer, 30 x 30 in. with 4 or 8 ft. bed.

J. J. Carrick, Port Arthur, Ont., was the successful tenderer for the Pic River pulp and timber limits, comprising 1400 square miles of timber, south of the Nipigon game reserve. As a consideration of the lease he is required to erect a pulp mill costing $1,000,000, to have a daily output of 150 tons.

The Canadian Desmon-Stephen Mfg. Company, Market Street, Hamilton, recently incorporated to manufacture steam ejectors, abrasive wheels, etc., is preparing to erect a plant there. The head office of the company is at Urbana, Ohio.

An addition will be made to the plant of the Ford Motor Company of Canada at London, Ont., to cost $25,000. Plans are being prepared at the head office of the company at Ford City, Ont.

The Acme Tire & Rubber Company, 471 Yonge Street, Toronto, proposes to erect a plant at Oakville, Ont., and is carrying on negotiations for a site and concessions.

The Keenan Woodenware Mfg. Company, Owen Sound, Ont., proposes to build an addition to its plant at a cost of $20,000.

The Pembroke Machinery Company, Pembroke, Ont., is preparing plans for a machine shop to cost $12,000. New lathes and other machinery will be required.

The Sarnia Metal Products Company, Sarnia, Ont., plans an addition to its plant.

The H. Mueller Mfg. Company, Sarnia, Ont., will erect and equip buildings to manufacture brass. The number of its employees will be increased from 600 to nearly 1000.

The C. & J. Hadley Company, Chatham, Ont., has commenced the erection of a sawmill to cost $10,000; equipment and electrical supplies will be purchased.

The Dominion Wire Cloth Mfg. Company, Ltd., Armstrong Street, Ottawa, will build an addition to cost $4,000.

The Canadian National Carbon Company, 99 Paton Road, Toronto, has commenced the erection of a factory to cost $12,000.

The Dominion Machinery Company, 110 Church Street, Toronto, will erect a plant at a cost of $5,500.

The Nashwaak Pulp & Paper Company, St. John, N. B., will make extensions and install additional machinery in the plant of the Edward Partington Pulp & Paper Company, recently purchased. The improvements will cost $250,000.

The Pembroke Electric Light Company, Pembroke, Ont., is having plans prepared for a power house at Black River, Ont., to cost $7,000. It will be in the market for one generator, water wheels, etc.

L. S. O'Connor, superintendent of the waterworks, Thorold, Ont., is in the market for a new turbine pump and electric motor.

The plant of the Dickson Bridge Works Company, Ltd., Campbellford, Ont., was destroyed by fire with a loss of $60,000.

Cornwall, Ont., will erect a pumping station to cost $25,000.

J. H. Connor, Pretoria Avenue, Ottawa, is making arrangements for the erection of a plant for the manufacture of washing machines, etc.

The Cobourg Steel Company, Cobourg, Ont., will make additions to its plant.

The International Mfg. Company, Ltd., Montreal, has been incorporated with a capital stock of $1,000,000 by John A. Harriss, Rufus L. Patterson, Alfred O. Hoyt and others of New York City, to manufacture ordnance, firearms, fuses, etc. The company recently commenced the erection of a plant at Montreal to cost $1,000,000.

The Lytle Engineering Company, Ltd., Montreal, has been incorporated with a capital stock of $40,000 by Frances G. Beck, Gertrude R. Dennison, Herbert H. Jackson and others to manufacture boilers, engines, etc.

The Atlas Metal & Alloys Company of Canada, Ltd., Mon-

treal, has been incorporated with a capital stock of $50,000 by Charles M. Holt, Alexandre Chase-Casgrain, Errol M. McDougall and others.

A. H. Chave & Co., Ltd., Montreal, have been incorporated with a capital stock of $50,000 by Archibald H. Chave, Woodlands, Que., Clifford L. Morham, Phillip Brais and others of Montreal, to manufacture lumber.

The Michipicoten Power & Paper Company, Ltd., Toronto, has been incorporated with a capital stock of $6,500,000 by William A. J. Case, 801 Dominion Bank Building; James B. Taylor, William M. Smith and others.

E. C. Gatien, secretary of the City Council, Sherbrooke, Que., is in the market for a 4-ton traveling crane.

The Steel Company of Canada, Hamilton, Ont., proposes to make additions to its plant.

The Beacon Match Company, Bracebridge, Ont., proposes to build a factory there at a cost of $45,000.

Fire destroyed the boiler department and coal elevators at the plant of the Aetna Power Company, Drummondville, Que., on Dec. 5. The damage will be repaired without delay.

The North Bay Toy Company, North Bay, Ont., will erect shortly a factory to cost $25,000.

The William Galloway Company, Waterloo, Iowa, will erect an agricultural implement plant at St. Boniface, Man. J. B. Payne, Winnipeg, Man., is active in the enterprise.

Government Purchases

WASHINGTON, D. C., Dec. 18, 1916.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until, date not set, schedule 508, for one 16-in. automatic tapping machine for Boston; schedule 529, for one 24-in. bench drilling machine, one double emery grinding machine and one screw-cutting engine lathe, all for Mare Island.

Bids were received at the Bureau of Supplies and Accounts, Navy Department, Washington, Dec. 12, for supplies for the Naval Service as follows:

Schedule 390, Ordnance

Class 121, Newport—Two universal grinding machines—Bid 12, $951.50; 79, $1,949 and $1,499; 109, $890.

Class 122, Newport—One grinding outfit—Bid [illegible] and $1,269.

Schedule 391, Ordnance

Class 123, Washington—One selective lever lathe—Bid $1,898.50; 52, $2,261; 74, $2,320; 96, $2,415; 104, $2,195.

Class 124, Washington—One motor-driven milling machine—Bid 12, $3,660; 74, $4,856; 136, informal.

Class 125, Washington—One boring, drilling and milling machine, complete—Bid 81, $6,940; 104, $5,800.

Class 126, Washington—One universal [illegible] 104, $2,725.

Class 127, Washington—Two [illegible] $1,875; 96, $3,095; 114, $2,201.

Class 128, Washington—One [illegible] Bid 114, $1,055.

Class 129, Washington—Two sensitive drilling machines—Bid 52, $68; 96, $200; 114, $107.25; 144, $87 and $192.

Class 130, Washington—One universal grinding machine—Bid 12, $960; 82, $995; 109, $925; 136, informal.

Class 131, Washington—One universal milling machine—Bid 12, $1,840; 49, $1,759 and $2,11[illegible]; 52, $1,823; 74, $2,180; 136, informal; 165, $1,316.

Class 132, Washington—One [illegible] machine—Bid 12, $2,558; 74, $2,730; 165, $2,484.

Class 133, Washington—Two universal grinding machines—Bid 74, $2,460; 82, $2,322.50.

Class 134, Washington—One universal tool and cutter grinder—Bid 12, $798; 49, $610.50; 74, $590; 104, $754; 109, $515; 144, $497; 165, $615.

Class 135, Washington—Three [illegible] Bid 52, 118; 109, $154 and $176; 136, informal.

Class 136, Washington—One flat turret lathe—Bid 74, $2,760.

Schedule 592, Steam Engineering

Class 151, Boston—One disk grinder [illegible] 29, $1,025; 58, $1,026; 112, $76[illegible] $1,150.

The names of the bidders and the numbers under which they are designated in the above list are as follows:

Bid 7, Aumen Machinery Company; 12, Brown & S[illegible] Mfg. Company; 29, Chandler & Farquhar Company; 49, Federal Sales & Service Company; 52, The Fairbanks Company; 58, Gardner Machine Company; 74, Kemp Machine Company; 79, Knickerbocker Supply Company; 81, Lucas Machine Tool Company; 82, Landis Tool Company; 96, Maxwell & Moore, Inc.; 104, Niles-Bement-Pond Company; 109, D. Nast Machinery Company; 112, Oliver Machinery Company; 114, Pratt & Whitney Company; 118, Henry Prentiss & Co.; 136, Swind Machinery Company; 144, Uni[illegible] Trading Company; 165, Oesterlein Machine Company.

NEW TRADE PUBLICATIONS

Grinding Machines.—S. B. Patch & Sons Company, Streator, Ill. Circular. Mentions two types of grinding machines for use with wheels 18 in. in diameter and having a 3-in. face. Engravings of the machine with and without wheel guards are presented, and a brief description of the machine, supplemented by a condensed table of specifications, is included.

Storage Battery Industrial Trucks.—Jeffrey Mfg. Company, Columbus, Ohio. Bulletin No. 200 Describes a line of storage battery trucks which are adapted for use in industrial plants, factories, warehouses, foundries, lumber yards, copper smelting plants, etc. Emphasis is laid upon the savings in time, labor and expense effected by the trucks, which are adapted to transfer all classes of material and are designed to carry the load as well as push or pull loaded cars, no skilled labor being required for operation or handling. Another feature that is prominently brought out is the flexibility of the track system used, which gives a wide range of operation and permits the truck to run over tracks and in and out of buildings or anywhere about the plant with safety, as no overhead wires are required. Illustrations in the bulletin show different types of trucks working under widely [illegible] conditions, the captions of the cuts hanging out the [illegible] of the truck, where it is used and the work it is doing. In this connection condensed specification tables of the trucks are presented in almost every case.

Twist Drills and Reamers.—Whitman & Barnes Mfg. Company, Akron, Ohio. Calendar hanger measuring 13½ x 19 in. Engravings of a standard twist drill and reamer of the company are presented in the upper portion of the hanger [illegible] a view of the plant at Akron where these tools are [illegible], and another one of the Chicago plant, which is devoted to the manufacture of screw and drop forged [illegible], hob, engine spring cutters, etc. The leaves, which occupy about half of the hanger, have the dates for the [illegible] a large block, figures set off by rules, the number of days that have elapsed being indicated by small figures in each box. Calendars for the preceding and succeeding months are given on each leaf, together with a brief [illegible] of the company's lines. The back of the leaf contains a number of illustrations of different tools [illegible] for the years 1916, 1917 and 1918 is given on the last sheet.

Machine Tools.—Hilles & Jones Company, Wilmington, [illegible] No. 8. Size, 9 x 12 in., pages, 221. Presents illustrations and brief descriptions of a line of machine tools for working plates, bars and structural shapes. These include vertical punching and shearing, coping, planing and bending and straightening machines, spacing tables, plate bending rolls and flanging clamps. A brief general description of the construction of each class is given at the beginning of the section devoted to it and each division contains illustrations, brief descriptions and specification tables of the various sizes and styles of machine going to make up that particular group. [illegible] included.

Fuel Oil Engines.—Chicago Pneumatic Tool Company, [illegible] Building, Chicago, Ill. Bulletin No. [illegible]-W. Covers a line of oil engines employing low-grade fuel. The description of the engine is quite complete and the text is supplemented by a number of halftone engravings of the various parts, as well as views of the engines themselves. Condensed specification tables of the single and duplex types of engines are included, together with a number of engravings showing the engine in use.

Hoisting Machinery.—Brown Hoisting Machinery Company, Cleveland, Ohio. 1917 calendar, 12¼ x 18½ in., white [illegible] illustrations, the largest 6⅜ x 10⅜ in., views of the Brown plant and of machinery which it has built for service in ore and coal handling. One reproduction is [illegible] hoists at Vladivostok, Russia, another three traveling bridges commanding the ore yard of the Federal Furnace Company, South Chicago, Ill. A view [illegible] docks of the Pittsburgh Coal Company, Duluth, Minn., includes several traveling bridges, vessels and [illegible] piles. Two car dumpers of the Hocking Valley Railroad Company, Toledo, Ohio, were photographed for

THE IRON AGE

New York, December 28, 1916

ESTABLISHED 1855 VOL. 98 : No. 26

The Engineering Department Modernized*

How Progress of Engineering Work May Always Be Ascertained—Compulsory School for Draftsmen—Practice in Assigning Work

BY H. W. DUNBAR AND W. E. FREELAND

ONCE the work has been made up to standard and turned over to the manufacturing organization, changes are only possible through a change request properly signed and approved by the superintendent. Such change requests include added dimensions, changed limits, changed shapes, etc., which are asked for to facilitate manufacturing operations and methods. To regulate this change procedure a change slip has been designed, Fig. 13, the original half of which is filled out by the person desiring the change. In so doing, the slip is folded on the perforated line, a carbon sheet is placed between the two folded parts of the sheet and a carbon copy of the original request is made on the back of the reply half of the slip. When reply is made the same procedure is followed, which makes a copy of the reply on the original half of the change request. The party making the request thus gets a complete copy of the request and the reply by the engineering department, while the original section with the reply on the back is filed away. When change slips come to the department they are numbered and assigned to the proper division, and the work done and the reply sheet is returned to the sender.

A similar form and method is followed out on sub-standard parts, as shown by Fig. 14. In the shop parlance of this plant, a sub-standard part is one which has been made in the shop and which has not met the requirements of the engineering department as laid down by the drawings. This form is used to determine whether such parts as castings with too little finish on them, parts above or below given limits, in fact, anything which does not come within the engineering department requirements, but which has been submitted for consideration, may be permitted to enter into the machine assembly.

In order that the work of the room may be car-

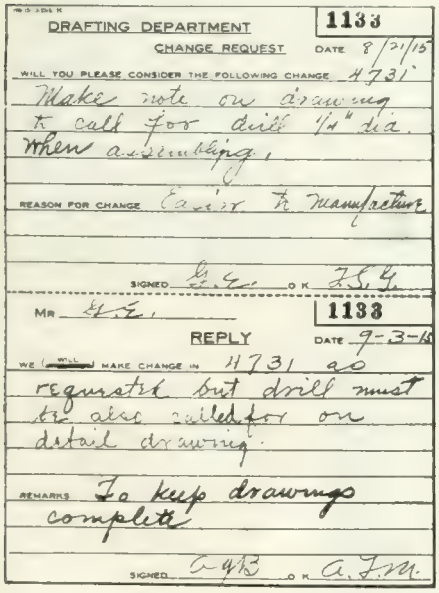


Fig. 13—A change in a drawing desired by the manufacturing department is requested on a special form. In making the request the form is folded on the perforated line and a carbon copy of the request is made on the back of the bottom or reply section. The same procedure is followed in making the reply

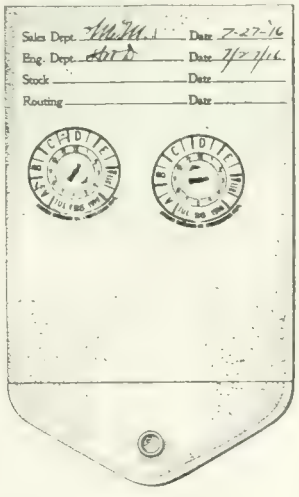


Fig. 12—The order envelope is the basis of authority for work in the engineering department and carries the engineering information to the shop. A time stamp shows time of receipt of envelope and of completion of the work in the department, this stamp having letters and spaces for assignment to the division which is to do the work

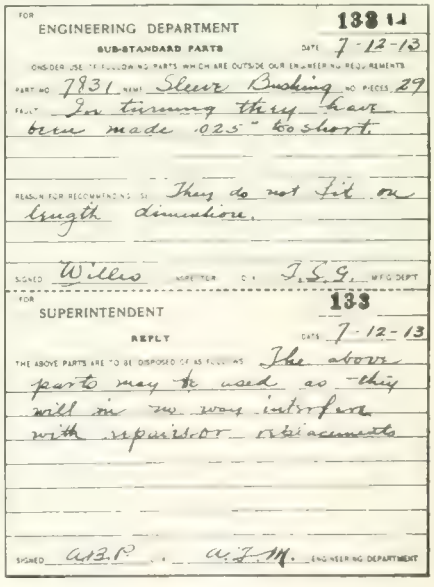


Fig. 14—To determine the final action on all parts which may be made that do not meet the requirements of the engineering department, a sub-standard part form is in use. This is employed in the same manner as the change request form. Thus each department has a copy of request and reply

*Second and concluding part, the first, describing how designers have separate offices apart from general drafting room, how the blueprinting is done and the drawing records are kept, and how single machines are first built under the study of the engineering department, appearing in THE IRON AGE of Dec. 21. The practices are those of the Norton Grinding Company, Worcester, Mass.

ried on easily, and according to the established system and every man put in a position where he knows just what to do and how to do it, a drafting room bulletin folder has been devised in which is found the rules and regulations of the drafting room. It also includes data for the use of the individual designer or draftsman such as standards for screws, nut washers, studs, oil covers, etc. This bulletin gives the draftsman the necessary information in a concise, positive manner, obviating any possibility of misunderstanding, and making it possible for the new man to secure this information without taking up the time of the division head in explanation. The folder now contains about 65 bulletins, and new ones are issued as fast as new conditions arise.

On the time stamp the outer circle is divided into spaces for each division. Each space has two symbols, a letter for the department designation and one of the four numbers, noted below, to indicate the action desired:

1 = Act immediately on this.
2 = Send for verbal information. Forward to any other designated division or to the file.
3 = Collect all records, letters or other information pertaining to this subject and bring them to the assistant chief engineer.
4 = Come to department head's office or call him on telephone.

Following the assignment of the orders by the assistant chief engineer, he immediately proceeds with the assistance of the clerk of the department to follow up the work by two methods. The first and most important method consists of a progress board, Fig. 15, which follows the work on all important jobs as the order passes through the various operations. This board handles only those questions of interest to the engineering department, which are as follows:

Order Issued, Investigation Started, Engineering Approval, Manufacturing Approval, Sales Approval, Designing Started, Finished, Detailing Started, Detailing Finished, Started, Tracing Finished, Pattern Drawings Started, Drawings Finished, Checking Started, Checking Finished, Route Sheets Started, Route Sheets Finished, Schedule

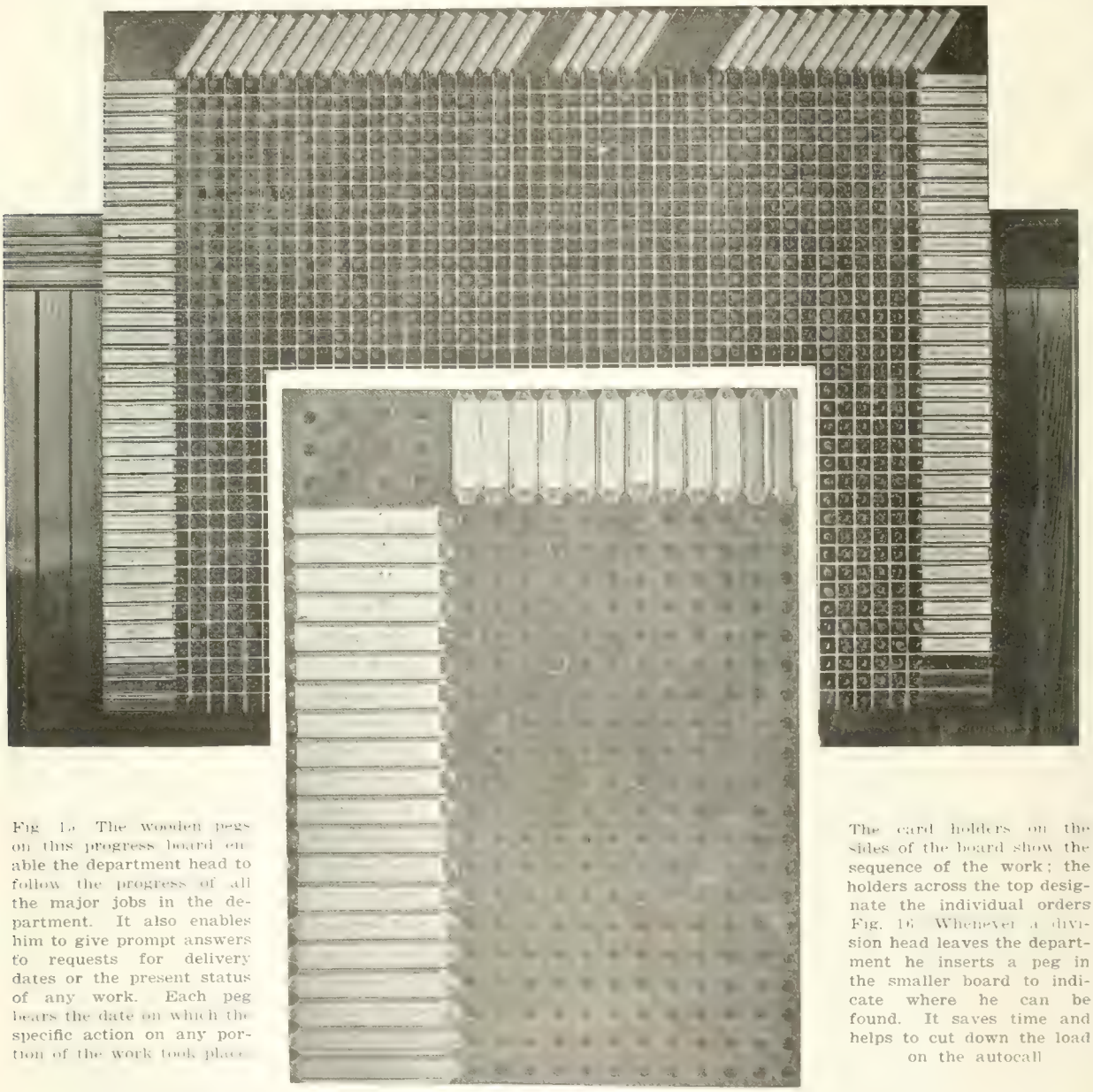
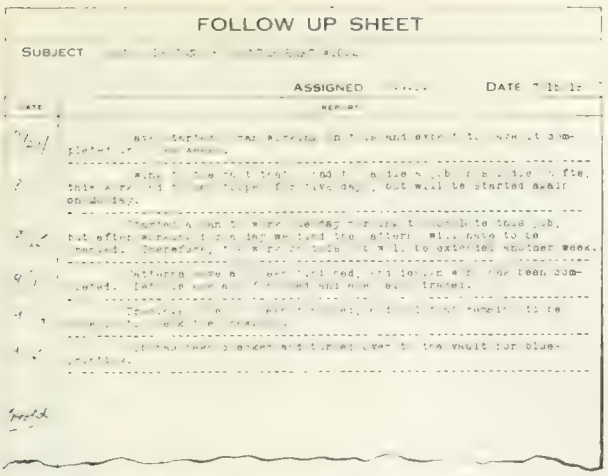


Fig. 15. The wooden pegs on this progress board enable the department head to follow the progress of all the major jobs in the department. It also enables him to give prompt answers to requests for delivery dates or the present status of any work. Each peg bears the date on which the specific action on any portion of the work took place.

The card holders on the sides of the board show the sequence of the work; the holders across the top designate the individual orders. Fig. 16. Whenever a division head leaves the department he inserts a peg in the smaller board to indicate where he can be found. It saves time and helps to cut down the load on the autocall.

FOLLOWING-UP WORK IN PROGRESS

A copy of all orders issued by the order department is sent to the engineering department for consideration. As soon as received they are stamped by the department clerk and the time when they enter the department is recorded. The form of stamp provides a place so that assignments can be made to the different divisions. All orders are passed to the office of the assistant chief engineer who assigns them to the proper division.


FOLLOW UP SHEET

SUBJECT

ASSIGNED DATE

DATE REPORT

Fig. 17—For all jobs not sufficiently important to appear upon the progress board a follow-up sheet is in use. Reports are obtained at dates predetermined by the department head and noted upon the margin. The department clerk has these reports in charge, filing them in such manner that all reports dated for attention on the current day are at the front of the file. The clerk visits the division heads and secures the needed information, typewriting it on the form and submitting it to the department head, who then places on the margin the day for the next report

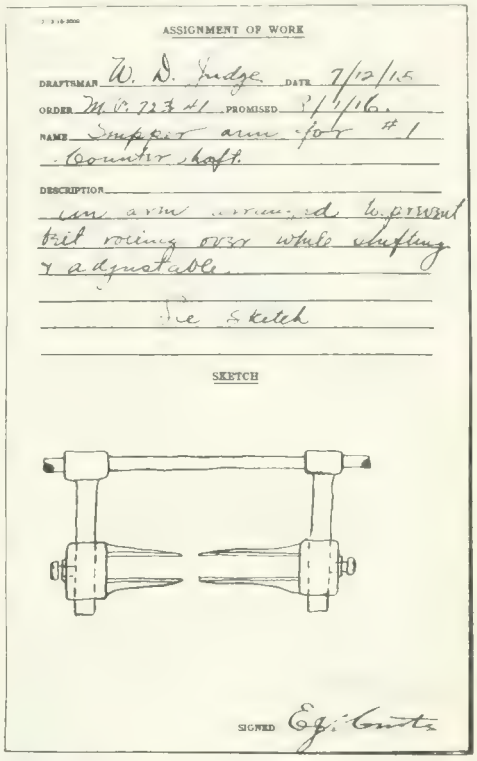
Started, Schedule Finished, Records Started, Records Finished, Patterns Started, Patterns Finished, Patterns Sent to Foundry, Order Sent to Manufacturing Department, Electric Equipment Ordered, Engineering Department Approved Shipment, Circular Letter Written, Model Room Work Started, Model Room Work Finished, Job Completed, Held Up, Hold Released

These items appear in the usual order that they should come up for attention in the engineering department. Of course, they are of importance only to this particular concern, but they serve as a memorandum by which similar arrangements could be utilized in other lines of business.

The different jobs which are large enough or which are to remain in the department long enough to warrant a position on the board are listed across the top and for convenience in locating the work, they are divided into sections covering the various classes of work handled in the engineering department. These slips are held in place by means of card holders of suitable size and proportion to allow for the information one desires on each job, and usually carry the subject matter of the order or job being worked upon, the order number, and the initials of the division head to whom the work is assigned.

The different items are separated by white lines lined with black to make them stand out more prominently. These white lines extend across the board horizontally and vertically, forming little squares, in the center of which are holes to receive, as fast as action occurs on the individual jobs, little wooden plugs with quite large heads. Once each day the department clerk goes to the various division heads who have the different jobs under their supervision and obtains from them a report on the work accomplished since the previous day so that the board is always up to date within that limit of time. This task actually consumes about one-half an hour each day of the department clerk's time.

For convenience in obtaining the information from the division heads, a blueprint of the board is prepared which covers in duplicate the items and


ASSIGNMENT OF WORK

DRAFTSMAN W. D. Judge DATE 7/12/16

ORDER M.C. 723 #1 PROMISED 7/14/16.

NAME Stripper arm for #1 Counter shaft

DESCRIPTION

Arm arm arranged to prevent bit rising over work shifting & adjustable

See Sketch

SKETCH

SIGNED E. J. Gutz

Fig. 18—No work is assigned to a draftsman by oral order. An assignment-of-work sheet is filled out by the division head with details and rough sketches, which give the draftsman a reasonably definite idea of the work to be done

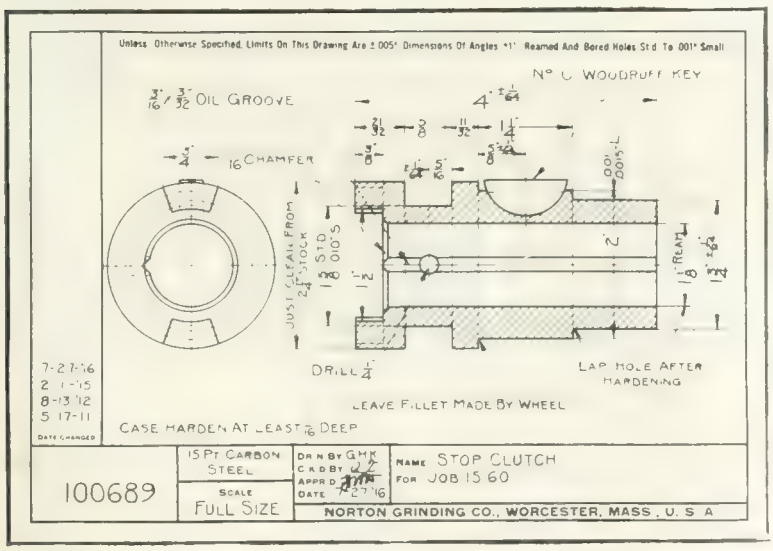


Fig. 19—Standard drawings are made on a unit size of 7 x 10 in. or multiples of this size. All limits are established on the drawing and all other needed information is put on the drawing in the simplest language. A smaller size, 3 x 5 in., is used for parts purchased from outside or which have a slight amount of work to be done on them after such purchase, such as springs, set screws, levers, etc.

jobs that appear on the chart. These blueprinted forms are filled in daily, and, when they have been in existence a considerable length of time and are filled in with job numbers and other records, are filed away for future reference, thus making a permanent record of the progress of each job as it passes through the engineering department.

As the forms used by the department clerk for collecting the information for the board are always filed away, it is always possible to refer back to any job and see the exact progress it made through the department. This has been found of much assistance in planning new work and in deciding how long certain operations will take. This also gives a key to the cost of engineering work on a similar new job.

The heads of the little wooden plugs in the board have numbers on them, showing the month and the

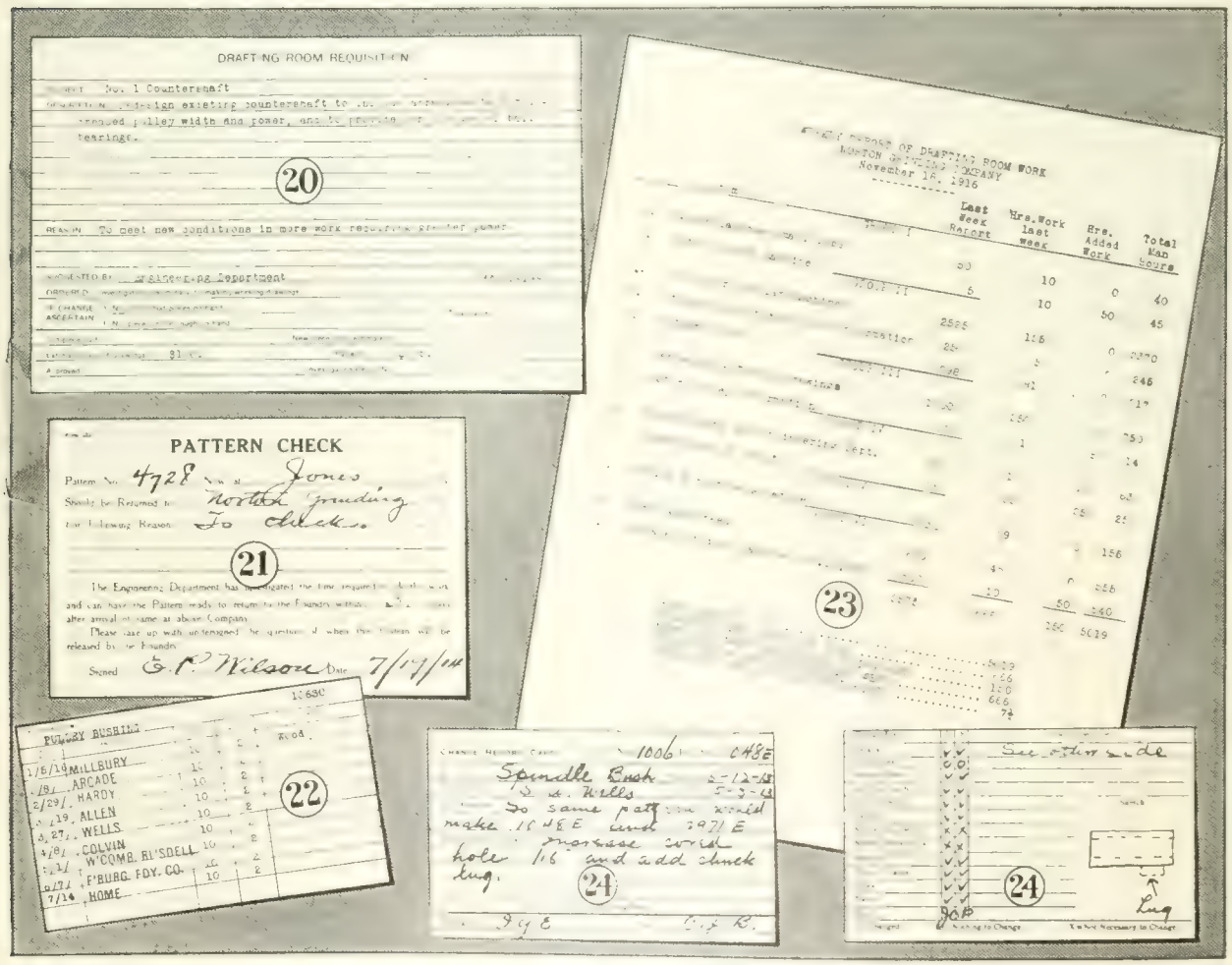
day of the month that action takes place, and when these plugs are in position under the respective jobs being reported upon, one can tell at a glance the status of any particular job in which he is interested. This board has proved to be extremely convenient in answering questions over the telephone where it is not desirable to delay an answer and where detailed reply is required as to the various steps certain jobs have passed through and how much work has been completed. It is also convenient in making promises for the completion of jobs, the length of time required to finish various operations still unfinished, and in telling when the job will be ready to turn over to the manufacturing department where it actually passes through the machining operations.

With such a comprehensive and accurate chart of the general conditions of all major jobs at one's elbow, it is quite possible to make prompt promises of delivery date on rush work. It is the purpose of this board to record only such jobs as have sufficient work on them to warrant an appearance on the board.

After the job has been completed it remains on the chart for a stipulated length of time (generally a week is sufficient) when it is automatically removed and gives place to the new jobs which are constantly coming in.

The same idea is worked out in a smaller board, Fig. 16, in which plugs are used to designate where division heads are when absent from the department. This has been found useful, as it helps to prevent overloading of the autocall system. It enables the shopman, who comes seeking one of the division heads—and few shopmen are inclined to use the telephone—to learn quickly where to find the man wanted.

As a means to keep in touch with the jobs of less importance, or jobs which may be considered as less active than those appearing on the progress board, a follow-up sheet, Fig. 17, is employed. This sheet (which forms a "tickler" for division heads for jobs of this minor class assigned them and on which they must make a report at predetermined and stipulated times indicated on the margin of the sheet) is filled with successive reports showing the progress of the work since the previous time that it had attention. This gives most conveniently an exact record of the work as it was being carried out and gives reasons for delays, interruptions, etc. The work of carrying on this follow-up system is assigned to the department clerk who arranges the



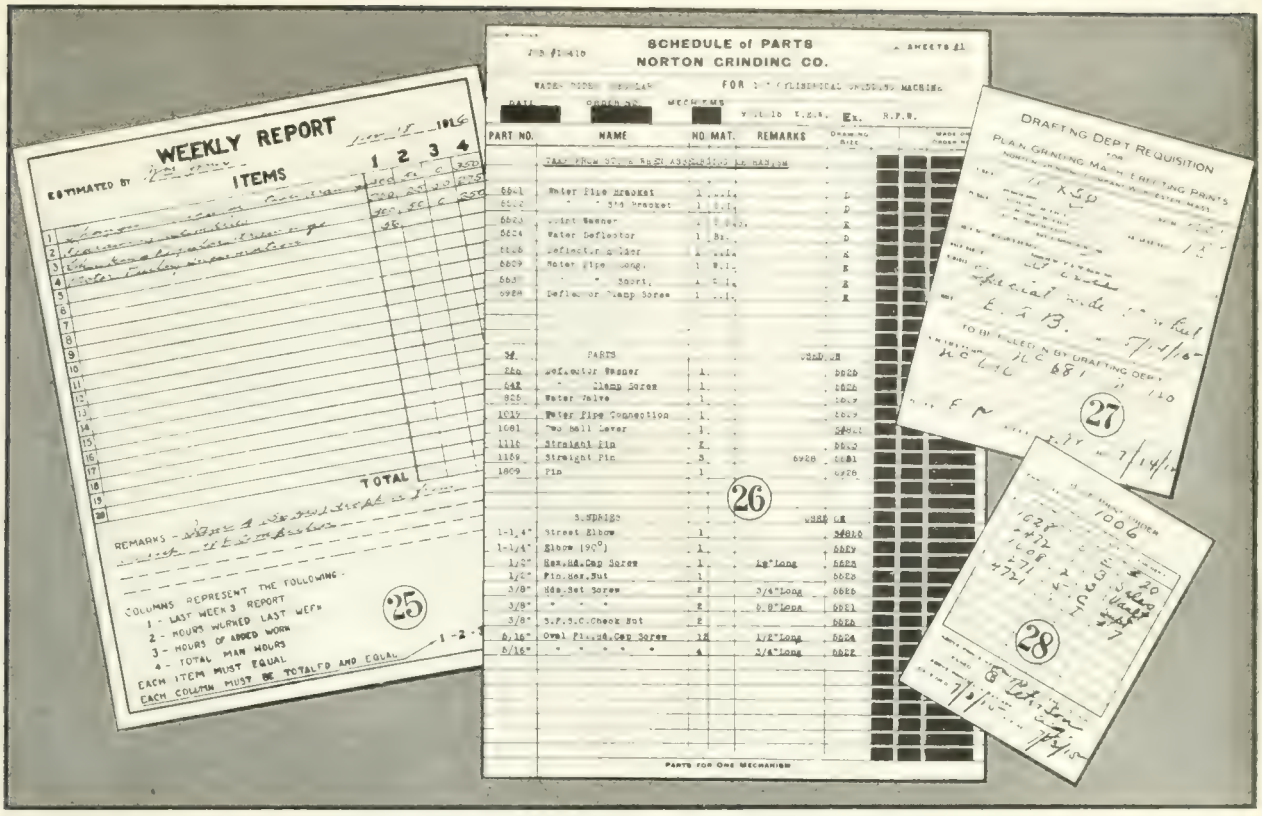
SOME OF THE FORMS USED IN DEPARTMENTAL ROUTINE

The drafting room requisition, Fig. 20, is prepared to advise the general manager of just what is affected by any design or change. It must be approved by the general manager before an order can be issued. For all work to be done outside the department a simple requisition form made in duplicate is used.

To convey to the stock clerk of the manufacturing department information of renewals, repairs, changes or movements of patterns from one foundry to another, a pattern check form, Fig. 21, is filled out by the pattern supervisor. This conveys information as to how long a pattern will have to remain out of the foundry so that the stock [illegible] his orders and records.

The pattern supervisor fills out a pattern record form, Fig. 2, which shows the location of all patterns and their movement from one foundry to another.

When any change is made in a drawing which has become standard by having parts made a change record card, Fig. [illegible] is always filled out regardless of how small or how extensive the change. This card gives sufficient information to trace the change and is filed under the part number affected. On the back, as indicated, is a list of items which must be [illegible] by the draftsman and examiner to insure that all [illegible] by the change are cared for.



OTHER FORMS USED IN DEPARTMENTAL ROUTINE

For the convenience of division heads who are obliged to give a weekly report of the status of work in their divisions a blueprint form, Fig. 25, is used. From these a typewritten form, Fig. 23, is made up for the information of the general manager.

A schedule of parts of a machine or mechanism is made out on a special sheet, Fig. 26. This is used by the manufacturing department to draw materials from stores for machines, in the cost department for figuring costs, and in the stores department for governing stock records.

A special requisition form is filled out for erection prints, which are sent out with each size and type of machine to assist customers in setting them up. The upper half of the sheet, Fig. 27, is filled in by the person requesting the erection prints, and as a check the lower half is filled in by the engineering department with a list of the prints supplied.

Blueprints are ordered by the vault division on a special form, Fig. 28. This form is always required, and no prints beyond the quantity specified can be accepted, as the form is used as the basis of payment if done at piece work rates. When any part is changed or becomes obsolete a special form is made out advising the shop of such changes so that existing drawings can be returned for correction or destroyed.

The regular form of time clock cards is used, a brown card for direct labor, a yellow card for overtime and a pink card for departmental expense. These time cards are filled in with ink by each man. No time clock is used; in fact, the whole department is run on the honor system.

sheets in the order of their dates, so that the sheets for attention on a given date are always on top and can be taken off, reported on and turned over to the department head, who, after receiving the report, places another date for the follow-up on the margin and returns the sheet to the clerk.

ASSIGNMENT OF WORK

An interesting feature of the routine of the drafting room is an arrangement which compels the division head to give some consideration to each and every job which passes through his division. In giving out a job to one of his draftsmen, he is required to use an assignment-of-work slip, Fig. 18, the use of which obviates any possibility of a misunderstanding between the division head and the man who is to do the work. It also makes it imperative for the division head to be sure of his ground—to know exactly what work is to be done and how he wishes it accomplished. It must be planned at some time and there is little question that handing the work over to the individual in a systematic way by some such method is an advance on the older hit-or-miss method which left a draftsman to flounder around until he found himself. It really aids the department head in planning his work. He can pile up jobs ahead of a man who is particularly adapted to some special class of work and it gives the man on the job a fair chance to make a good showing by furnishing him with a reasonably definite idea of what is wanted or what it is desired to accomplish. These slips when once turned over to the draftsman become his personal property and no record or file is kept of them. It is felt that the draftsman in the interest of protecting his own work, will keep these slips for ready reference at any time, and this has proved to be a fact.

STANDARD DRAWING FORMS AND CONVENTIONS

As the work at the Norton Grinding Company is highly specialized, it is quite essential that the standard drawing form shall convey complete information to the manufacturing department or operator. To this end considerable study has been given to the standardization of notes placed upon drawings, their relative position for different purposes, the size of sheet used for a given size of drawing, the title, form, etc. Fig. 19, a reproduction of one of the drawings, shows clearly the effort made to convey to the workman everything the draftsman knows about that particular piece and how it should be made and used.

The application of limits on drawings has been successfully accomplished by determining the proper commercial limits and insisting that every other dimension which can stand a limit larger than the commercial, or which of necessity must be closer than the commercial limit, shall always be specified in connection with the dimensions to which they are applied. The illustration shows clearly how this system is carried out. The note, which is printed on the tracing in a convenient place, gives to the operator directions as to how these limits are applied. It is too often the case that these limits are left to the operator's discretion, when it is ob-

viously true that the drawing room is generally in possession of this information and should be able to furnish it on the drawings.

Records and pattern prints are obtained in a simple way by making a blueprint from the machine drawing on cloth which can be used in making up the pattern and in turn preserved as a record of how the pattern is made. On this blueprint, which carries from the original nothing but the machining figures, is placed the pattern figures with black india ink. The cloth print, after having been dried and ironed, presents a surface which will take this ink readily and retain it permanently.

In order to make each man feel that he has a part, as well as a division or the department head, in increasing the success of the drafting room, weekly conferences are held each Friday afternoon from 5 to 5:30, and the interest taken in these conferences is so keen that they frequently last until after 6 o'clock. At these conferences any one in the department discusses ways and means he may have in his mind to simplify the work and suggestions are brought forward for improvements in conducting the work or carrying out the system.

Each day the division heads get together the first thing in the morning and go over the important matters for the day and the interesting incidents of the previous day.

A complete catalog file of all materials and machinery used in the business is maintained, and there is a somewhat limited department library which includes reference books. The general company library, containing an extensive list of technical books, is also available for the use of all employees.

Many trade and technical publications pass through the hands of the department head and such articles as are of material interest or are closely allied to the work are either clipped or abstracted and filed for future use. All such papers are circulated through the department for the information of those members who would be benefited by reading them, and all are privileged to take the papers out and carry them home for reading in leisure hours.

TRAINING COURSE FOR DRAFTSMEN

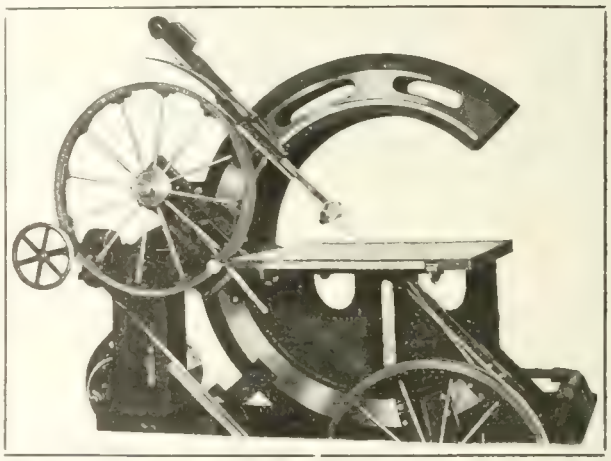
Every man in the department, regardless of his position, is required to take a drafting-room training course, during the period of which he is paid on the same basis as though he were working in the department. It is an investment on the part of the company designed to broaden the knowledge and viewpoint of each man. The first two weeks are spent in the grinding wheel manufacturing plant, at which time he simply observes the process of making wheels so that he understands their adaptation to certain kinds of work. Then he has two weeks on the assembly floor, actually taking part in the assembling of machines. He then has two weeks in the routing department, so that he is made to realize how drawings must be made to facilitate machining, and learns the limitations of the various machine operations in the manufacturing department. Two weeks in the inspection department teaches him the importance of the limits which he establishes on his drawings. Then follows two weeks of actual grinding practice during which he becomes accustomed to the operation of grinding machines.

Then for one week he has to make sand molds of a number of patterns. The patterns are constructed so that some of them can be molded and some of them cannot, and he is simply thrown on his own resources to see what he can do. Then he goes to the foundry for a week, where he observes molding and foundry practices. By this he is made to realize the importance of thinking how the part he is making on his drawing board can be actually reproduced in cast iron.

A Tilting Wood Band Sawing Machine

A special type of band sawing machine for use in shops where heavy straight and curved cuts have to be taken in wood has been placed on the market by the J. A. Fay & Egan Company, Cincinnati, Ohio. The saw in this machine can be moved by power while in operation from the position shown to a corresponding angle, 45 deg., on the other side of the central vertical position. Among the plants for which this machine is designed are pattern shops turning out large work, railroad and bridge shops, plants handling heavy vehicle and implement work, lumber mills that get out large timbers sawed to special shapes, shipyards, etc.

The column is a massive one-piece casting with broad floor bases, this form of construction being relied upon to carry the wheels without vibration at any angle



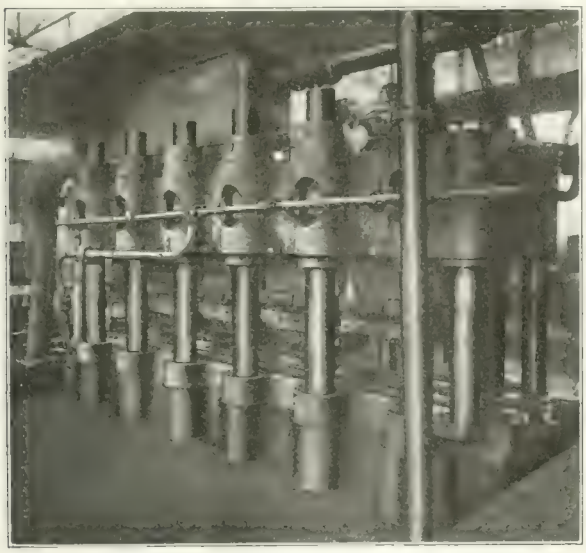
The Saw at This Special Band Sawing Machine Can Be Tilted by Power from the Position Shown to a Corresponding Angle on the Opposite Side of the Central Vertical Position or to Any Intermediate One

between the limits of 45 deg. on either side of the vertical. The face of the main column is planned and fitted with roller bearings to carry the saw carriage, guides, etc. An auxiliary column at the rear supports the mechanism for moving the blade to approximately the desired position, a handwheel adjustment being employed to give the final fine setting. The table, which is 48 in. square, is of iron, and is rigidly mounted on the main column. It is emphasized that the table, which is fitted with rollers to facilitate handling the stock, is always maintained in a level position irrespective of the angle at which the saw may be set.

The maximum width of blade handled is 3½ in. The wheel shafts are mounted in self-aligning ball bearings and the wheels are mounted on a heavy circular carriage, gibbed to the main frame and having means for taking up any wear. Provision for vertical adjustment, side lining and tracking of the blade is furnished. The carriage supporting the wheels travels on self-lubricating roller bearings mounted in the main column. This arrangement is relied upon to enable the blade to be shifted from the position shown to a corresponding one of 45 deg. on the other side of the vertical by power, a handwheel adjustment being employed for very fine setting. The exact angle at which the blade is tilted is shown by an index. It is pointed out that as the wheels move simultaneously and in the same plane at all times, the cutting point of the blade is at one point on the table irrespective of the angle. The power angling device is controlled by a handle at the operator's position and has a device upon which stops can be set to check the movement automatically at any predetermined point.

Press for Forming Truck Side Rails

A six-cylinder hydraulic side rail press has been developed by the Southwark Foundry & Machine Company, Philadelphia, Pa. It is intended for forming and



Two Side Members of Automobile and Motor Truck Frames Can Be Formed Simultaneously by This Six-Cylinder Hydraulic Press

shaping the side members of automobile and motor truck frames. The capacity of the press is two rails 175 in. long of 5/32-in. stock at the same time.

The press is built of steel castings and forgings throughout. A filling tank is located on top of the press. Operating the valve lever raises the press table, admits water under pressure to the lifting cylinders, while the press cylinders are filled from the tank. When the dies touch the material to be formed water under high pressure which performs a portion of the work is admitted and by supplying water at intensified pressure to the six press cylinders, the work is completed. This arrangement, it is emphasized, enables two side rails to be produced at each stroke of the press with a minimum amount of water at high pressure. The rate of operation of the press is 100 strokes per hr.

Electric Furnaces as Absorbers of Idle Electric Units

The installation of electric furnaces in towns in order to utilize the electric units lying idle at the power station in slack time is suggested by a writer in *L'Echo des Mines et de la Metallurgie*, as referred to by the London *Iron and Coal Trades Review*. About eight years ago he saw the first installation of this kind near Turin, Italy. It consisted of two small Stassano furnaces of 100 hp. each and of two of 1000 hp. each, taking their current direct from the town's supply. The writer finds the idea gaining in France, for just outside Limoges a Keller furnace has been installed capable of melting and refining 30 tons of steel and iron turnings and other cheap scrap per day and producing 25 tons of high-priced castings, etc., or turning out ordinary cast iron of high quality when the current is obtainable cheaply. The furnace takes up but little space in the tramway station and calls for little attention because of ample labor-saving devices. The current comes from a hydraulic power station to Limoges at 30,000 volts, and is transformed to 10,000 and then to 110 volts to suit the furnace. It is presumed that the first heat would begin about midnight, or soon after the peak load is passed at the power station.

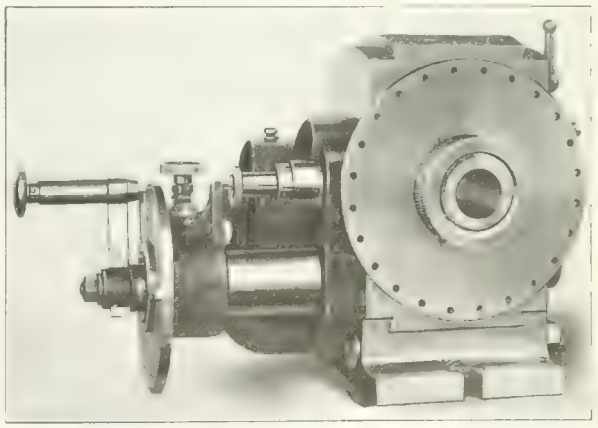
It is reported in Bristol, Tenn., that the Bristol blast furnace and the Crescent rolling mill, which have been closed for eight years, have been sold by the Virginia Iron, Coal & Coke Company, Roanoke, Va. The buyers are not named, but it is understood that the plants are to be operated.

Indexing Head for Fine Graduations

The Brown & Sharpe Mfg. Company, Providence, R. I., has recently developed a new attachment for the spiral head and universal index centers. The special advantage claimed for this device, which is known as the micrometer index, is that irregular spacings in degrees and minutes can be readily secured, as well as results much finer than are ordinarily possible with regular equipment. In this way the careful consideration of index plates and calculations of differences which are likely to develop into errors are eliminated. With the largest plate regularly furnished for the builder's heads, which has a 49-hole circle, the smallest division obtainable by using one hole was 11.02 min., while with the micrometer index readings to ½ min. can be secured.

The attachment consists of a compact housing containing a worm on a vertical shaft which has a dial graduated to ½ min., located at the upper end. This worm meshes with a wormwheel, which is freely mounted on the spiral head wormshaft, the regular index plate being fastened directly to this wormwheel. The connection with the spiral head wormshaft is obtained by the regular index crank and pin engaging holes in the index plate. A single revolution of the index crank rotates the spindle through an arc of 9 deg., a 40 to 1 reduction mechanism being employed. This 9-deg. movement is reduced by a 36 to 1 reduction mechanism to ¼ deg. for each revolution of the vertical shaft. As the graduated dial on the worm shaft has 30 divisions, the movement of one graduation turns the spindle of the spiral head through an arc of ½ min., thus giving directly an indexing to this reading.

The index is attached to the machine easily and does not interfere with the regular performance of the work of the spiral head. When the index is in use, the index-plate stop pin engages a hole in the attachment casting and prevents it from rotating, rotation being permitted through the worm and wormwheel in the attachment. When spirals are being cut or differential indexing is being done, and it is not desired to use the micrometer index, the stop pin is withdrawn and the operation is carried on in the customary way. To apply the attachment to the machine the regular wormshaft, eccentric sleeve and gear are removed and a new wormshaft and



The Combination of the Horizontal Index Crank and the Knurled Nut Back of the Index Plate Enables Readings as Fine as ½ Min. to Be Secured

sleeve furnished with the attachment substituted. The remainder of the mechanism is then slipped into place over the wormshaft eccentric sleeve, the regular plates, sectors and crank being used and held in place the same as before.

An interesting demonstration of the reliability of motor drive is afforded by an installation at the Cleveland Salt Works, Cleveland, Ohio. In the rooms where the motors have operated for the past 10 years moist salt has been always present and has become caked into the windings until it is almost impossible to see them. In spite of this fact the motors, which were built by the Lincoln Electric Company, Cleveland, are reported to have remained in service without a single shutdown due to motor trouble.

Rail Rerolling Mill at Marion, Ohio

Works of Interstate Iron & Steel Company of 4000 Tons Monthly Capacity—Mill Structure 1100 Ft. Long—Waste Heat Utilization

THERE has been an interval of about four years since the completion, in the Central West, of the last mill designed exclusively for the rerolling of old rails. It is, therefore, a reasonable expectation that the Interstate Iron & Steel Company, Chicago, has had the benefit of an unusual perspective in planning its new plant at Marion, Ohio, to replace its rail-carbon bar mill formerly at Cambridge City, Ohio, and destroyed by fire in 1915. In locating the mill at Marion, with its four trunk-line railroads—the Pennsylvania, Big Four, Erie, and Hocking Valley—the expectation certainly appears to have been fully realized as regards transportation. The same line of rail-carbon steel products, including bars, small shapes, implement and bedstead steel, will be rolled, and the new mill has an output of approximately 4000 tons monthly.

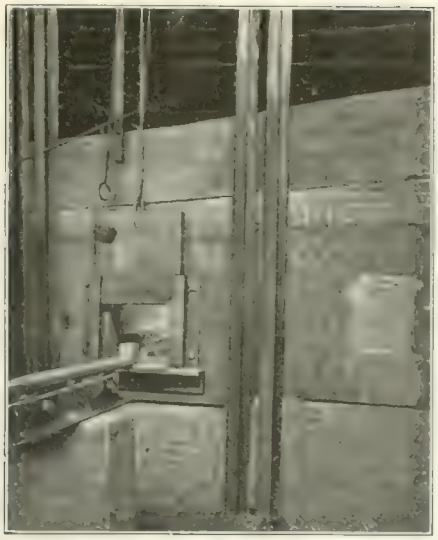


General View of the Mill Looking from the Heating Furnace Toward the Roll Stands and Hot Beds

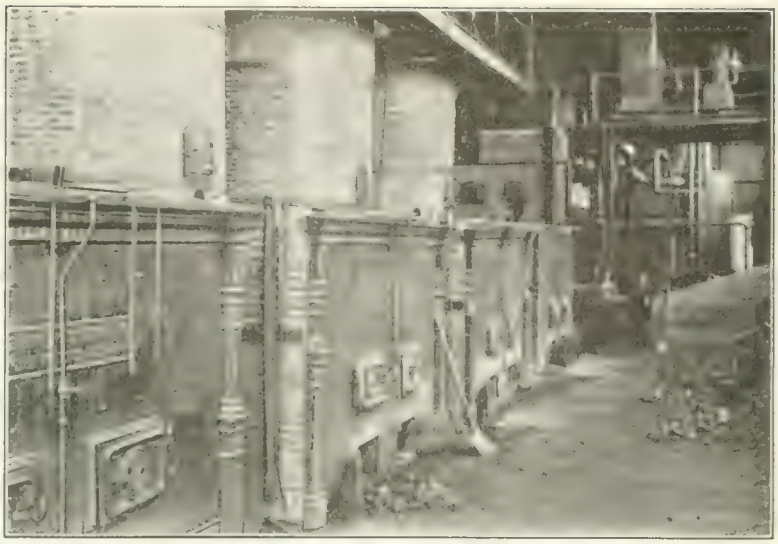
In the design of the works, two principal objectives have been sought: a straight-line process from raw material to finished product, and the reduction of manual operations to a minimum. Except for the housing of the power plant and mill shops and mill stores on opposite sides of the main building, the entire operation is confined within the one mill structure, 80 ft. wide and 1100 ft. long, having a continuous crane runway from end to end. The three general mill functions—storage, sorting, and preparation of the rail stock, the heating and rolling, and finally the cooling, shearing and shipping of the product—are thus linked together in fact as well as arrangement.

Of the total length of the craneway, 500 ft. of the south end spans and serves a yard for the storage and preparation of the rerolling rail stock. A 10-ton crane, with a span of 75 ft., traverses the entire length, and renders the handling of the stock entirely mechanical, as well as exceptionally rapid, both for distribution into piles of different sizes and for reclaiming when the rails are to be taken to the heating furnace. The rails coming into the plant by railroad are delivered on the spur which parallels the stock building, and are unloaded on inclined skids down which the rails slide to the rail breaker just inside the building and under the crane. This breaker is of an electrically-driven type, built by the Hogg Foundry Company from the company's design. The rails are broken to approximately 15-ft. lengths, the heating furnace and mill design dispensing with any provision for rolling from long rails, and may then be distributed in the stock yard according to size.

Preliminary to charging the stock into the furnace, it is weighed on a 20-ton Fairbank scale, whence the rails are skidded down to the charging end of the heating furnace. The furnace has an over-all width of 21 ft., and is 40 ft. long, and will receive from 75 to 90 pieces of rail at a time, or a charge of about 5 tons. A maximum length of rail that can be accommodated is 18 ft. The rails move along the furnace during the heating [illegible] on a distance of 30 ft. in an interval of approximately 30 min. Heating continuously, the



Rail Ejector for Pushing Heated Rail from the Furnace



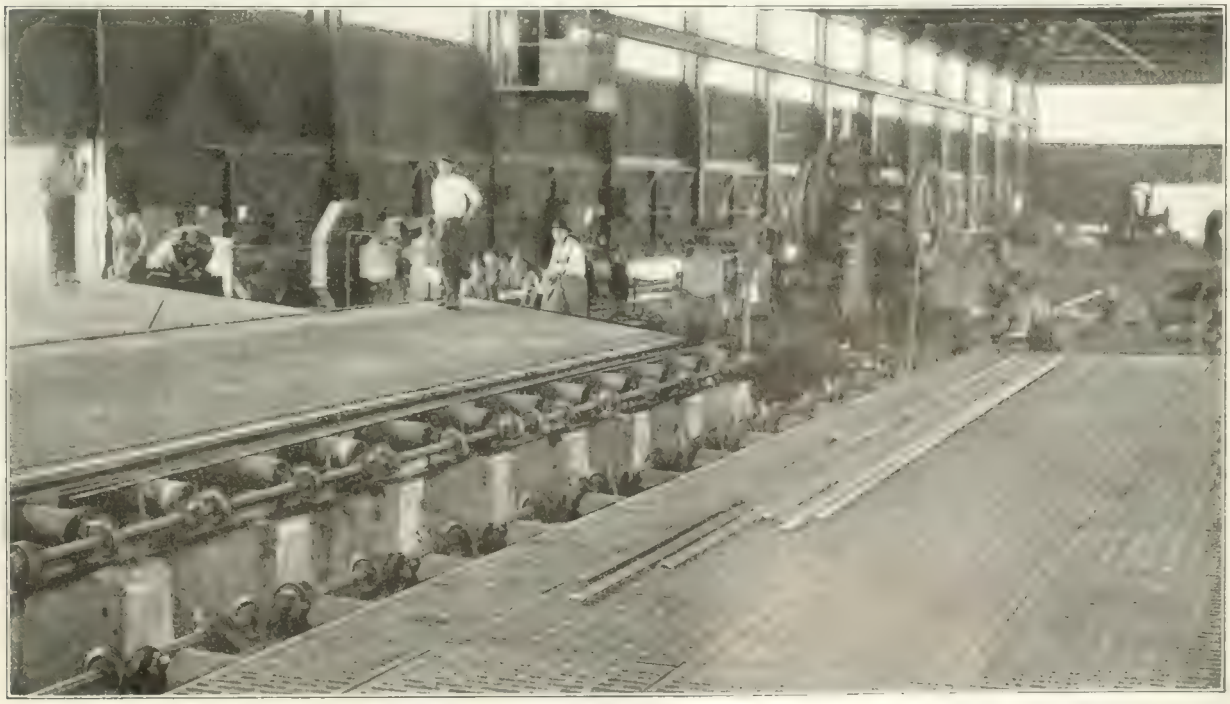
The Vertical and Horizontal Steam Boilers, the Last with Induced Fan Taking Waste Gases from Heating Furnace

furnace can deliver 50 tons of hot rails per hour, the rails discharging at the rate of three or four per minute. The charging mechanism consists of a ram mounted at a right angle with the furnace axis, with a rack-and-pinion mechanism. The drive for the charging ram is also connected with the ejector so that a heated rail is automatically discharged from the furnace as a cold rail is put in. A view of the ejector is shown.

The furnace is coal-fired, the proximity of the mill to the Ohio coal fields making the use of direct coal firing expedient and economical. A furnace temperature of 2200 deg. Fahr. is regularly maintained. The furnace is of standard reverberating design for coal firing, with modifications developed in the company's practice. The rails are carried on pipe skids through which cooling water is circulated. To avoid heat loss, the water heated in the skids is circulated through the feed-water heater in the boiler house and then used at the mill rolls. A hydraulic pusher at the charging end of the furnace moves the rails along the furnace bottom during the heating operation. A view of the end of the furnace, showing its relation to the mill, with the approach table to the slitting rolls in the foreground, is also here reproduced.

The mill consists of three two-high stands of 16-in. rolls and seven stands of 14-in. rolls, built by the West Penn Foundry & Machine Company. From the center line of the furnace to the center line of the 16-in. mill is about 80 ft., and from the 16-in. to the 14-in. mill the distance is 35 ft. The approach table delivers the rail to the center stand of the 16-in. mill, where it is slit three ways in the usual manner. The web passes directly to the 14-in. mill, and the base and head coming back on either side for two or more passes through the 16-in. stands, the mill operating after the manner of a Belgian mill. The rolling of the heavier base and head sections is thus equalized with the working of the lighter web section. In the general view of the mill and drives an alligator shear may be noted in the foreground, used for culling up cobbles and defective rails caught in the rolling.

The 16-in. mill is driven from an 800-hp. heavy-duty simple Allis-Chalmers Corliss engine, which



Cooling Beds at the Delivery End, Showing Also the Shear [illegible] Length

also drives, by means of a rope drive, two stands of the 14-in. mill. The remaining five stands of the 14-in. mill are driven by a 700-hp. Hamilton Corliss engine located on the opposite side from the larger power plant. Power is also obtained from the large engine for driving a 200-kw. Bullock generator, from which current is supplied for crane operation, the shop drive, the large shears and other auxiliary apparatus.

The cooling beds are arranged in three parallel units, each 150 ft. long, with motor-driven runout tables and cast-iron perforated cooling plates carried on concrete piers. A general view of the cooling beds, which were built from designs developed by the Interstate Iron & Steel Company, is reproduced. At the end of the cooling beds are heavy vertical gap shears of Long & Alstatter manufacture for cutting the product to length, the capacity of the shears being adequate to the full range of the company's product.

The finishing department of the mill is also equipped with four Kane & Roach straightening machines and three twisting machines for the twisting of reinforcing bars, the latter of a design adopted in the previous experience of this company. The finishing department is also under the span of the crane runway, carrying a 10-ton crane, and materials can be loaded directly into cars spotted on a long stub spur which parallels one wall of the building for a length of 400 ft.

The boiler plant serving the mill engines consists of four 250-hp. vertical water-tube boilers built by the Bass Foundry & Machine Company, and one 417-hp. horizontal water-tube boiler built by the Oil City Boiler Works. The vertical boilers are handfired with coal, but the horizontal boiler is heated with the exhaust gases from the heating furnace, circulated through the boiler by means of a Bayley slow-speed induction fan. The boilers are inclosed in a boiler house 40 x 120 ft., in plan erected as a wing of the main building.

The machine-shop equipment includes, in addition to a standard assortment of machine tools, a Stewart tempering furnace, a Victor pipe-threading machine, and a steam hammer of medium size. The machine shop is spanned by a 5-ton Pawling & Harnischfeger crane and has a floor area 36 x 140 ft. For turning rolls, a single Frank Kneeland Company lathe and a double lathe manufactured by the Preble Machine Works are installed.

The Interstate Iron & Steel Company has been assisted in the design and erection of the mill by Walter Rachals & Co., consulting engineers, Youngstown, Ohio. The water supply is derived from artesian wells and stored in a water tank of 25,000 gal. capacity. For use in the boiler plant the water is treated in a Bartlett-Graver water-softening plant. For the reclaiming of water from the mill rolls a reservoir and settling basin have been built, with a capacity of 50,000 gal.

Tampton Aubuchon, manager of the Louisville Industrial Foundation, which has a fund of $1,000,000 for industrial expansion of the city, has established headquarters in the Board of Trade Building, Third and Main Streets, Louisville, Ky. The board of directors of this body, it is proposed, will take rank as the Industrial Committee of the Board of Trade, so as to insure both organizations working together.

The American Association of Engineers will hold a national convention, Feb. 8, 9 and 10 in Chicago at the Hotel LaSalle. Work of a promotional nature will constitute the greater part of the program, which will be held under the slogan, "For the Good of the Engineer."

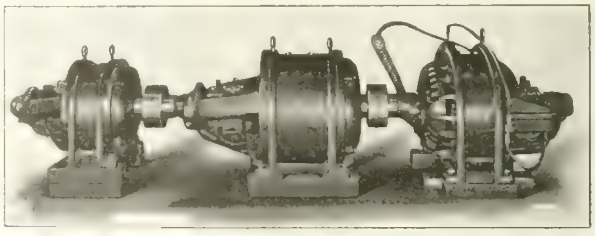
Constant-Current Arc Welding System

An electric arc welding system operating on the constant-current, closed-circuit principle has been developed by the Arc Welding Machine Company, Inc., 220 West Forty-second Street, New York City. This system operates the arcs in series, and it is pointed out that this arrangement enables one size of wire to be used throughout the system, as the current is uniform and independent of the length of the circuit, as well as the number of operators.

A special type of generator, consisting of two units, is employed with the system. One of the units is the generator proper which furnishes the energy required to make the welds, while the other is the regulator which automatically maintains the current at a constant figure. These two units are driven by a motor, all three armatures being connected together mechanically. Separate excitation is provided for the regulator and by varying this with an ordinary field rheostat it is pointed out that the main welding current may be set at any value that is desired within the range of the machine and will be automatically maintained there.

The circuit leading from the generator is a single wire having sufficient cross-section to carry the current for one arc. From the generator it is run to the nearest arc, from there to the next and so on back to the generator. At the points where it is desired to do welding switches are inserted in the line and a special arc controller, which is either a portable unit or is permanently mounted at the welding station, is plugged in across the switch at which the work is to be done. The function of this controller is to maintain the continuity of the circuit, thus preventing one arc from interfering with any of the others when it is cut in or cut out of the circuit, while at the same time the heat which can be put into the metal of the weld is also controlled.

The current through the arc, together with the size of the pencil employed, determines the flow of metal from the welding pencil. The value of this current is adjusted by shunting any portion of the main current



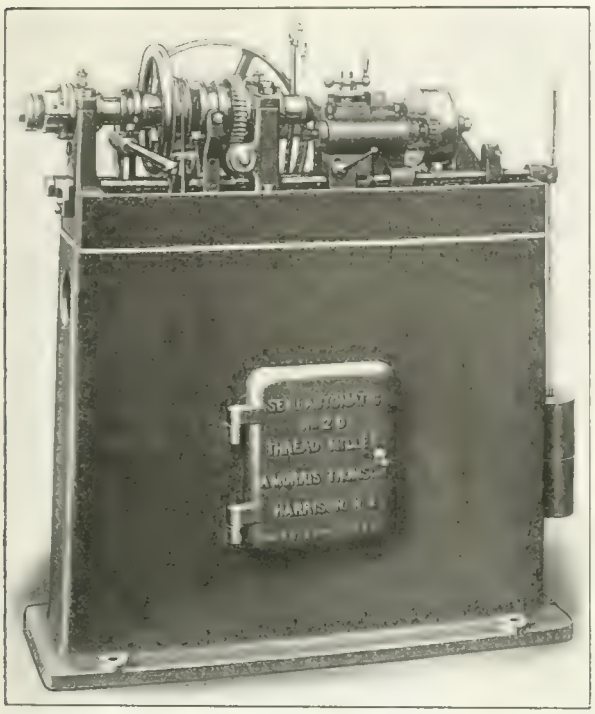
Constant-Current Closed-Circuit Arc Welding System Consisting of Generator to Furnish the Energy for Welding, a Regulator which Maintains the Current at a Constant Value and a Motor for Driving Them

around the arc through a series-parallel resistance. With this controller, it is emphasized, the length of the arc is adjusted to suit the work and the operator, and if it is exceeded the arc is automatically short-circuited and remains so until the welder is ready to make another weld. Provision is also made for stopping the arc at will without lengthening it. One of the points upon which special emphasis is laid is that when the welding operation is stopped the arc is not broken, but is killed by a short-circuit which is placed across it, thus eliminating a crater with pin holes in the metal.

An exposition of first-aid treatment is the subject of the last issue of the *Spirit of Caution* published by the Conference Board on Safety and Sanitation, West Lynn, Mass. An exhortation to have wounds treated immediately by first-aiders, so called, as a preventive and to follow this treatment by a physician's examination, is told in story form. A combination all metal sanitary cot and stretcher, a compact first-aid kit and a wire-gauze splint are illustrated as constituting articles of the first-aid outfit. Concise instructions for the treatment of common injuries and disorders are tabulated.

Semi-Automatic Thread Milling Machine

A series of semi-automatic thread milling machines is being built by the T. C. M. Mfg. Company, Harrison, N. J. They are designed for milling V-threads on rifle barrels, fuse bodies, primers and similar pieces primarily. With a multiple-cutter it is possible to mill



Milling V-Threads on Rifle Barrels, Fuse Bodies, Primers, and Similar Pieces Is the Work for Which This Special Semi-Automatic Thread Milling Machine Was Designed

threads on short pieces such as fuse bodies up to 2 in. in diameter, while if a rifle barrel or other long piece of work is being machined, the maximum diameter is reduced to 1¼ in. With this machine 129 bronze primers, ½ in. long and 1 3/16 in. in diameter, with 14 threads per in., have been produced in 1 hr. Fuse bodies ½ in. in diameter and 2 in. long made from an alloy of aluminum can be turned out at a slightly more rapid rate.

The work is held in a collet chuck operated by a hand lever the same as in a screw machine, this arrangement being relied upon to give quick action. The work spindle is rotated by a worm and wormwheel acting through a clutch which is automatically engaged by the advancing of the cutter into the work and disengaged when the spindle has made a complete revolution and the thread is finished. A weight is relied upon to assist the return of the work spindle to the starting position and thus serves to reduce the number of movements made by the operator to a small number, each of which is light and easily accomplished.

The cutter is set in a vertical head and the adjustment for depth of cut is secured by a screw having a large graduated collar reading to 0.001 in. A lever-operated cam is employed to advance the cutter into the work and automatic means for withdrawal are provided when the thread is complete. This arrangement, it is pointed out, enables work to be turned out rapidly as the operator does not have to give any thought to the size of the threads once a correct adjustment has been obtained, and the threads produced in this way are said to be both accurate and regular. The cutter head does not move when the cut is being made, the required lead being obtained by a steel threaded sleeve on the work spindle engaging with a split bronze nut. The machine is designed to produce large quantities of duplicate work rapidly but if a change of pitch is required this can be secured by removing the threaded steel sleeve and the split bronze nut and substituting others. The cutter and the work spindles are both hardened and run in large bronze bearings having an adjustment to compensate for wear.

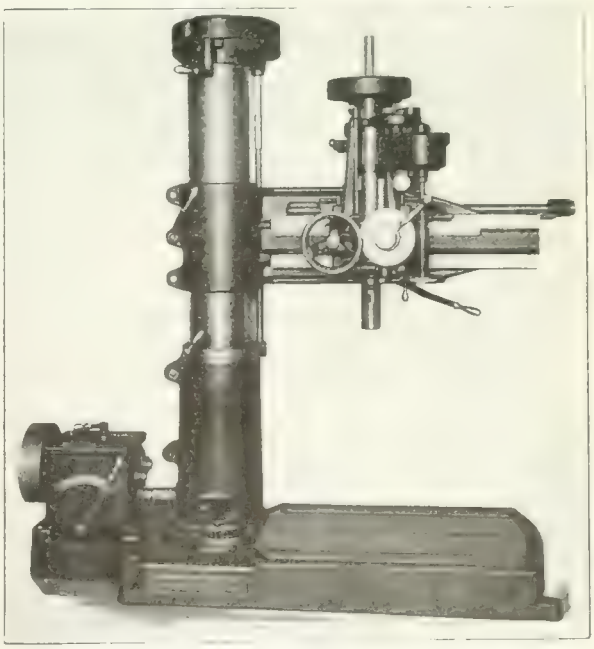
A reservoir for the cutting lubricant employed is formed by the base of the machine, a set of diagonal and vertical webs serving to separate the fine chips produced by the cutters from the lubricant. The machine occupies a floor space of 18 x 36 in. and weighs 1000 lb. The over-all height of the machine is 48 in.

Radial Drilling Machine with 3½-Ft. Arm

A new radial drilling machine is being constructed by the Morris Machine Tool Company, Cincinnati, Ohio. It is built in 2½, 3 and 2½ ft. arm reach sizes, and while no radical changes in its design are claimed, the manufacturer calls attention to the fact that steel gears are used throughout and that all bearings are made of bronze.

The machine is also constructed with a very large-diameter column that is well ribbed, and swivels on roller bearings in a heavily designed stump so as to insure perfect alignment under heavy strains. The arm bearing on the column is wide and is arranged to take up any wear. Only one lever is necessary to clamp it, and this is arranged within easy reach of the operator. The arm is raised or lowered by a screw actuated by tumbler gears on the cap. These gears are arranged so that they have a tendency to disengage, thus forcing the operator to keep his hand on the elevating handle while the arm is in motion. Should the operator forget to unclamp the arm, or should it reach either of the extreme positions, the gears would disengage themselves and he could not hold them in mesh.

The head is heavily ribbed and is moved along the arm in the usual manner by a rack and pinion through the left side as shown. The clutches are all heat treated and hardened. The reversing lever is at the right below the arm. The spindle is a hammered forging of high carbon steel. The spindle sleeve is



A Large-Diameter Column Reinforced by Ribbing and Turning on a Roller-Bearing Stump Is the Characteristic Feature of This Radial Drilling Machine, Which Is Built with 2½- and 3-Ft. Arms

graduated and a direct-reading depth gage and an automatic feed trip is provided. Ten spindle speeds are secured with the cone drive pulley and 12 with a speed box.

Motor drive can be arranged with an adjustable-speed motor with a four to one range or by a constant-speed unit in connection with the speed box.

One-Man Detachable-Tongue Shop Truck

The Howe Chain Company, Muskegon, Mich., has been manufacturing and is now about to market more generally a one-man foundry and shop truck of novel



When this One-Man Foundry and Shop Truck is Not at Use the Jack Tongue Is Readily Detached and the Truck Rests on the Pair of Wheels at the Rear and the Leg Adjacent to the Tongue Socket

design incorporating various desirable features. From the primary form of simple platform truck modified types with flaring side boards and box or rack equipment can be readily built up. The construction of this truck features roller bearing wheels of large size under the load to insure easy running qualities and a detachable jack tongue with roller bearing lead wheel. A supporting foot is provided at the front end of the truck to take the load when the tongue is detached.

The jack tongue is an especially convenient feature. Where a number of trucks are in service one tongue for each four or five has been found to be a good proportion. Being removable, the jack tongue is out of the way when the trucks are not being moved, a real convenience in the narrow aisles of a machine shop when the truck is being used as a temporary storage for parts to be machined and is available for the moving of other trucks. The tongue may be coupled with the truck at any angle and the truck may be turned out of line or from the position in which it is, through a very small radius. The tongue is made of malleable iron and steel, involves little occasion for repair and is inexpensive. The lead wheel is of the same type as the truck wheels except for being a little smaller.

The truck boxes and side boards are heavy and of durable wood and are secured in place with malleable corner irons and bolts. When worn out the wood parts are readily renewable. For foundry use a platform, 20 x 36 in., with side boards, 30 x 46 in., is a desirable size and for factory use a platform, 20 x 42 in., with a box to fit, 16 in. deep. In shops where quantity production of duplicate parts is the practice these trucks lend themselves admirably to the methods now generally used which provide for grouping machines in the order of consecutive operations. The partly finished pieces can be conveniently laid down on one of these trucks and picked up by the machine operators as they pass from one machine to the next and when finished can be as conveniently hauled away.

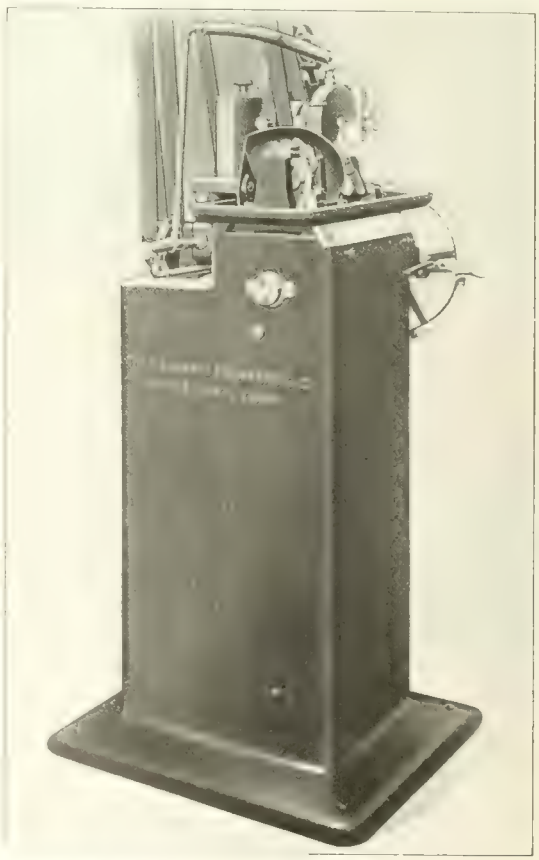
Other types of this truck are also being manufactured for special uses, as the handling of coke for cupola charging or pig iron and sprue for charging into air furnaces where overhead handling equipment is installed.



A Row of Trucks in Use for the Storage of [illegible] Parts

Automatic Machine for Grinding Hobs

The latest type of special grinding machine to be added to the line designed and built by the H. E. Harris Engineering Company, Broad Street, Bridgeport, Conn., is an automatic hob grinding machine. It is pointed out that with this machine it is possible to secure more



Hobs of All Types Are Ground without Any Attention on the Part of the Operator by this Automatic Hob Grinding Machine

accurate and uniform work than can be turned out by one operated by hand and in addition the machine possesses the advantage that it operates at a certain fixed speed and saves the operator's time. Other applications of the machine are for grinding flutes in taps and a number of similar purposes, while by adding an extra attachment it is possible to grind either right or left hand spirals as well as straight flute hobs.

The work table of the machine moves backward and forward at a uniform rate under the influence of a [illegible] camshaft located in the body of the machine. This shaft is operated by a wormwheel which in turn is driven by a belt from the countershaft. For convenience in setting up the work a handwheel is provided to give a reciprocating motion of the table.

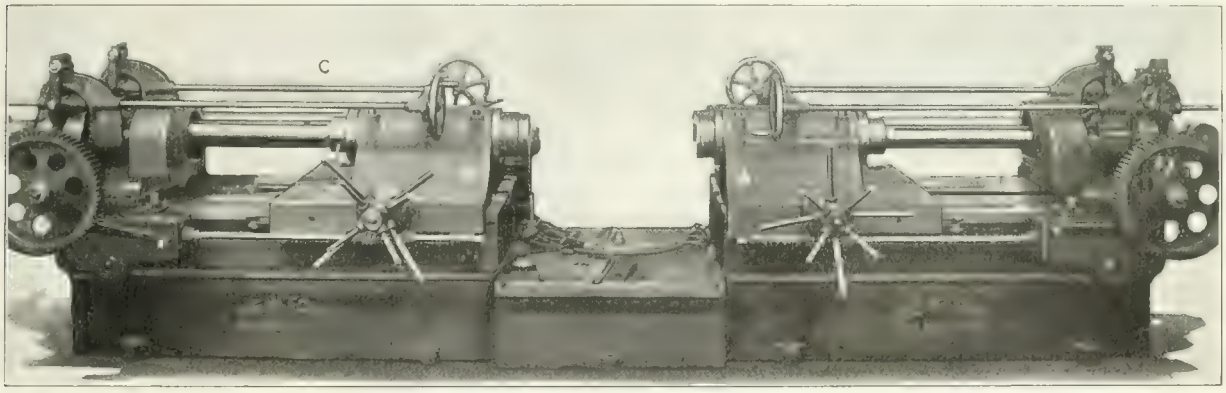
The indexing of the work is automatic and is operated by the camshaft which reciprocates the table. It is pointed out that the indexing is positive and ac-

curately spaced, so that there is no variation in the work produced A guard covers the indexing mechanism, and is relied upon to keep it dry at all times. An idler pulley working against the slack side of the belt is provided to take care of unevenness in tension, and a setting block is furnished for setting the work in the proper position. When this is done the block drops out of the way and leaves the work supported at its outer end by a rigid center carried on a swinging arm that is capable of clamping.

The grinding wheel spindle of the machine is mounted in large ball bearings on a horizontal slide which is adjusted with a micrometer screw. This slide in turn is mounted in a vertical one also having micrometer screw adjustment, this arrangement, it is pointed out, enabling the wheel to be positioned accurately either axially or perpendicularly. This construction enables the machine to accommodate any size or shape of wheel within its range and to grind any required degree of rake to the face of the teeth. The grinding is done under flooded lubrication, the wheel being covered by a close-fitting guard. The grinding lubricant is pumped from a tank in the lower part of the machine into this guard and falls to the pan-shaped work table from whence it drains back into the reservoir and is used over and over again. The ball bearings of the wheel spindle are adjusted to give a wheel which runs steadily without end thrust.

Four-Spindle Motor Boring Machine

The Newton Machine Tool Works, Inc., Twenty-third and Vine Streets, Philadelphia, Pa., has developed a new design of four-spindle boring machine. This is



The Axle and End Bearings and the Field Pads of Cast-Steel Motors for Street Cars and Mine Locomotives Are Bored at One Setting by This Four-Spindle Machine

designed for use in connection with the boring of street car and mine locomotive electric motors for the axle and field bearings, the armature shaft and bearing ends.

The machines are all built along the same general lines, although in some cases back gears in the drive of the main end bearing boring spindles are omitted and this is also true of the rapid traverse to the spindle saddles, gear feed boxes, hollow or solid spindle noses and auxiliary boring spindles inside the sleeves. The operating levers are varied in location according to individual requirements.

All spindles or sleeves have exterior threads on the nose for carrying cutter heads or boring bars. A worm and wormwheel drive with an independent clutch is provided for each spindle which revolves in a capped bushed bearing. The main spindles A and B have fixed positions in their saddles and their alignments coincide, although in special cases, however, the latter has been equipped with a large sleeve having a threaded nose to carry the boring heads and arranged with drift key slots to maintain the spindle at protrusion distances suitable for the location of the field pads to be bored. In such cases the boring bars are screwed into the nose of this spindle while the other is hollow bored and bushed to serve as a support to the outer end of the bars.

The axle bearings are bored by the spindle band C which coincides in vertical alignment with the corresponding one on the other side of the machine. Its saddles and rear driving gear brackets, however, are adjustable crosswise to give various desired center distances within the range of the machine. To facilitate the accurate duplication of center distances provision has been made for the use of spacing blocks.

The preferred form of drive for these machines is a single driving motor on each end of the two adjacent spindles. If desired, however, separate motors for each spindle can be employed or a belt drive can be substituted.

Hot Bed Practice in Rail Mills

That improvements should be made in hot bed work in rail mills is emphasized by Dr. P. H. Dudley, consulting engineer, rails, tires and structural steel, New York Central Lines, in an addendum to his report on transverse fissures in the heads of rails published at length in THE IRON AGE of Aug. 17, 1916. The report and the addendum have now been printed by the American Railway Engineering Association as report No. 59 to the Rail Committee of that association.

He asserts of course that the supports in the straightening presses should be widened to minimize the pressure of the gag in straightening rails of heavy and stiff sections. He reiterates also that rolling should be maintained with that regularity that will prevent rails being rolled too cold.

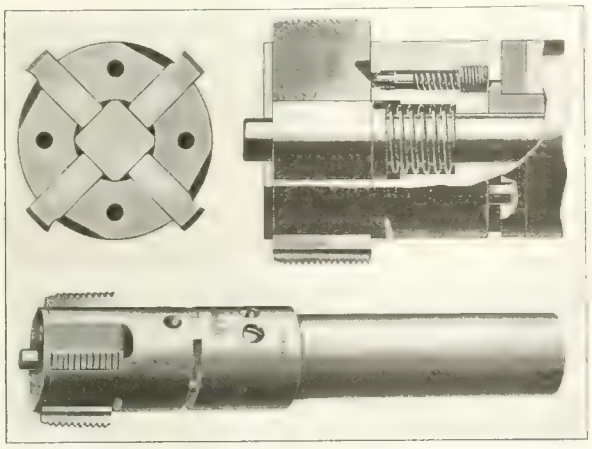
He urges particularly in this addendum the spacing of rails about 6 in. apart on the hot bed instead of the common method of bunching, leaving the relatively massive head close to the base section of the neighboring rail. His records show that the melts of basic open-hearth steel which are developing induced interior transverse fissures of the two types into which he divides them were rolled principally by "direct rolling" on days when the atmospheric temperatures were near or below freezing. In short, he regards the temperatures at time of rolling as important factors in cooling the rails on the hot beds. He has some further investigations in progress, covering rails rolled in the winters of 1892, '93 and '94, and since that time in service, and argues that the actual proof of service is more valuable to the railroads of the United States than the opinion which has been expressed that every rail, no matter how well designed and made, is subject to the development of interior transverse fissures under the present wheel loads.

The Blackburn-Smith Corporation, 105 West Fortieth Street, New York, through the purchase of the filter department of James Beggs & Co., has acquired all patents, etc., of the Blackburn-Smith feed water filter and grease extractor and the Blackburn-Smith sewage ejector system. The engineers and agents previously identified with these products have been engaged by the new corporation and will in future work under the direction of Irwin H. Kaufman, vice-president, who has supervised the manufacture, sale and installation of the Blackburn-Smith filter for the past ten years.

Collapsible Tap for Turret Machines

A new collapsible, adjustable tap designed for use on turret head machines, finishing lathes, screw machines, bolt threading machines and in fact for any line of work where threads to 1 in. or larger in diameter are to be tapped, has been brought out by the National-Acme Mfg. Company, Cleveland, Ohio. One of the most important features of this tap is that the body and shank are no larger in diameter than the cutting diameter of the chasers, so that instead of the tapping operation being limited by the length of the chasers, there is no limit to the depth to which work can be tapped. The tap has but few parts.

The chasers located in slots in the front face of the body or head are held in the slots by a disk screwed to the face of the head. Through the center of the body a hole is bored lengthwise of sufficient size to accommodate a core. The front side of this core has flattened edges, one for each cutter blade. The front end of the core is cylindrically formed and projects through the disk. The front portion of the bore of the body is of enlarged diameter to provide space for housing a



The Chasers in This Collapsible Adjustable Tap for Threading Work up to 1 In. in Diameter Are Located in Slots in the Front Face of the Body and Are Collapsed by a Tripping Pin Bearing Against the Disk Holding the Chasers in Position.

spring that bears against the corners of the flattened part of the core and against the bottom wall of the enlarged bore. The body also has a lengthwise bore for each chaser. Adjacent to the chaser slot is a bore of small diameter for receiving the tripping pin, the end of which projects into a V-shaped recess formed in the end of the chaser. The next section of the bore is of larger diameter to provide a shoulder for the tripping pin and a chamber for housing a spring which exerts a pressure against the head of the tripping pin and holds it firmly against the recess in the end of the chaser. The opposite end of the spring bears against a set screw threaded into the third section of the bore of still larger diameter.

The shank of the tap has a hub section on the front face of which is a central bore to receive a tripping sleeve dog. This has a groove around its circumference and at one end a flange that abuts against the face of the hub. It has a bore of sufficient size to permit the passage of the core shank. The tripping sleeve dog is secured to this shank by a pin. The hub has two radial openings or bores to receive binding screws, the ends of which project into the groove of the tripping sleeve dog and hold it against rotation within the bore of the hub. The flange of the tripping sleeve dog is cut away at opposite sides to leave two sections that act as stop members against which two driving pins in the rear face of the body abut at the proper time for eliminating the rotation of the body relative to the hub. The front face of the hub is also provided with two radial slots with which the driving pins cooperate for setting the tap in an operative position.

The chasers are in a withdrawn position when the driving pins are withdrawn from the slots in the hub and in contact with the stops and the flat sides of the core are in contact with the backs of the chasers, which are then located by pins projecting into the recesses in the chasers under spring pressure. When the tap is to be set to its greatest diameter the body is turned relative to the hub by a movable handle until the driving pins are brought into position so that the pressure of the springs will force the body backward and the driving pins will enter the recesses in the hub. At the same time the body has been rotated with relation to the core so that the corners of the flat section of the core engage the backs of the chasers, forcing them outward and holding them in that position. When the tap is open the V-shaped slots in the chasers permit their pins to be forced back against the action of the springs until the pins are almost withdrawn from the recesses and the pressure of the springs against the pins holds the cutters firmly against the disk at the end of the tap.

The tap can be adjusted to cut any diameter of work between the smallest when the chasers are in a withdrawn position and the largest when the chasers are projecting out to their full capacity by loosening the adjusting binding screws which project through the hub into the sleeve groove, and by means of the slot in the front end of the core revolve the core in either direction. In this way the relation between the corners of the flat core section with the backs of the cutters is changed. This is clearly shown in one of the illustrations. A greater range of capacity can be provided by having cores that will force chasers further upward than can be done with a flat-sided core.

When the turret travel is stopped the tap continues to cut until it has reached the required depth. The cutting lead will then disengage the driving pins and travel with the rotation of the work until it has reached the tripping stop when the chasers will collapse, releasing them from the work. Thus its operation is similar to that of the company's opening dies. Among the advantages claimed for this tap in addition to those enumerated above are that the chasers are supported their entire length on the core and no extra parts except left hand chasers are required for left-hand threads.

For use on a drilling or chucking machine the tap is furnished with an outside trip which insures collapsing at the given depth and thus gives a uniform depth of thread regardless of any irregularity on the face of the casting.

The Failure of Brass

"Failure of Brass—Initial Stress Produced by the Burning-in of Manganese Bronze," is the title of Technological Paper No. 84 by Paul D. Nierica and C. P. Karr of the U. S. Bureau of Standards. An investigation has been made of the initial stress produced by the burning-in, without preheating, of constrained parts of castings of manganese bronze. Results have shown that, in general, tensile stresses will be produced within the burned-in area equal in value to the true elastic limit of the material. The conclusion is drawn that burning-in of such material should not be practised without thorough preheating and subsequent annealing of the whole casting.

In Technological Paper No. 83 of the U. S. Bureau of Standards, entitled "Failure of Brass—Effect of Corrosion on the Ductility and Strength of Brass," by Paul D. Nierica, associate physicist, a study has been made of the effect of tensile stress on the electrolytic solution potential of brass to various solutions, the results indicating an increase of e.m.f. of about 0.1 millivolts for 10,000 lb. per square inch of stress. An explanation is given, based on this effect, of the decreased ductility and strength exhibited by brass when corroded while under tensile stress. The growth of fissure in brass under such conditions is described.

The Beloit Iron Works, Beloit, Wis., has taken the [illegible] to build a fifth paper mill unit for installation [illegible] the addition now being erected at Green Bay, Wis., [illegible] Hoberg Paper Company. The machine [illegible] ll have a 132-in. face, and is one of the largest ever [illegible] icted.

Germany's Supplies of Ferromanganese

The Situation as to Manganese Alloys Before and Since the War Began—The Question of Substitutes—Salient Points in Furnace Practice

BY EDWIN F. CONE

SPECULATION as to Germany's war supplies of manganese alloys for steelmaking purposes has been and is still active in this and other countries. It is known that the steel output has grown since the war started until it is now nearly 85 per cent of what it was in 1913, the record year. It is also known that the steel made contains manganese, as judged by British analyses of shells made over a year ago. There were some indications then that the manganese content was below normal—at least in certain cases. At any rate, it has hitherto been believed that proper steel could not be made without the use of manganese in some form. Whether Germany still has sufficent manganese supplies or is using some substitute effectively is therefore an interesting metallurgical question.

COMMENTS ON THE GERMAN SITUATION

Some of the interesting speculations that have appeared in various journals follow. A British translation of an article in the *Frankfurter Zeitung* last spring was in part as follows:

> There is no evidence that the German steel production has been adversely affected either in quality or quantity by a scarcity of manganese ore or ferromanganese. When the war broke out considerable stocks of manganese ore were held in Germany and some of the works have not entirely depleted theirs. The country also itself produces plenty of ore which, though not altogether a substitute for Caucasian or Indian ore, affords a partial substitute. This is the brown and red Nassau iron ore and the Siegerland spathic ore. Apart from the Seigerland ores, the German home production of manganese can in case of need be raised to 300,000 tons annually. The Siegerland mines yield about 1¾ million tons yearly of spathic iron which has a manganese content of about 12 per cent.

The deposits referred to are suitable only for conversion into spiegeleisen or into a manganese alloy containing 30 to 35 per cent manganese or less.

A Costly Substitute

Comment appearing in the engineering supplement to the London *Times* early this year was to the following effect:

> A paragraph has recently been circulated to the effect that Germany has solved the problem of a substitute for ferromanganese for the production of steel, that the substance can be produced in large quantities from internal raw materials, and that the process will make Germany independent of imports. This is no news to the metallurgists of Sheffield, who understand exactly what the statement means and are not inclined to be over-impressed by it. * * * The probability of Germany getting supplies of ore at all grows more remote and the chemists have found it necessary to go into the question of obtaining a substitute, however expensive. They have experienced considerable difficulty owing to the fact that the constituents necessary to provide anything in the place of manganese cannot be obtained without serious outlay. The announcement which is now made is, in the opinion of leading manufacturers in this country, but a restatement of a case which has previously been put forward and the substitute is believed to be most probably some alloy of aluminum and silicon. This would be used to supplement the limited proportion of manganese existing in the German native ore. According to one prominent Sheffield steel maker, this is quite feasible but very much more expensive.

Doubt As To the Substitute

In an issue of the London *Iron and Coal Trades Review* early this year was the following statement:

> Following the announcement by the enemy about a year ago that copper was no longer indispensable in the manufacture of their munitions because an efficient substitute had been discovered, we are now informed from the same quarter that the problem of finding a substitute for ferromanganese in the manufacture of steel has been solved. It is claimed that the new material can be made from elements abounding in profusion in the country and that already plants are at work upon its manufacture, while others are in course of construction for the same purpose. * * * We are inspired with some suspicion of these revolutionary discoveries announced from time to time. Latest accounts in Germany indicate that, despite the alleged remarkable properties of the copper substitute, the search for that metal is still unabated. It is, however, not at all difficult to devise a process whereby ferromanganese can be made in large quantities from the low grade ores which Germany possesses. The point is, at what price per ton can this material be produced?

The statement in the latter part of this quotation is to be questioned, because thus far it has not been regarded metallurgically possible to make standard ferromanganese or even a manganese alloy relatively high in manganese from low-grade manganese ores.

Another writer in one of the British trade papers has this to say regarding the statement that the new material can be made from elements abounding in profusion in Germany:

> While we do not accept these assurances quite at their face value, there is no doubt an element of truth in them. A spiegel running as low as 10 per cent in manganese—the Germans can make a great deal of this—will contain only 5 per cent of carbon and therefore in making a steel containing about 0.40 per cent of manganese only 0.20 per cent of carbon is introduced. Clearly in shell steels there is no insuperable drawback about this.
>
> While such statements do not necessarily constitute evidence that there is no shortage, it certainly is not safe to assume that the steel output of Germany will be materially restricted by a scarcity of manganese or any other element. When a nation's existence is at stake many expedients become possible which in normal times would be impracticable.

In another issue of the London *Iron and Coal Trades Review* there appeared not long ago the following comment:

> * * * But while it is known that Germany is suffering from a shortage of ferromanganese, it must be remembered that a large proportion of her steel output, probably larger now than previously, is basic Bessemer material for which the use of spiegeleisen instead of ferromanganese is suitable. Germany has no serious supplies of manganese ores proper, but she has certainly an ample native supply of manganiferous iron ore; the output of such ore running from 12 to 30 per cent of manganese was 300,000 tons in 1912 and of ore containing up to 12 per cent of manganese nearly 3,000,000 tons.

German Manganiferous Ores

In a later issue of the same paper we note the following:

> An item has appeared in German newspapers to the effect that the German substitutes for imported manganese ores are Nassau brown ore and also Styrian (Austria) manganese ore. If the Siegerland manganiferous ores are left entirely out of consideration the Germans have a production, it is stated, of 250,000 to 300,000 tons a year, whereas the imports from the Caucasus and India formerly amounted to about 500,000 tons yearly. The mines in the Siegerland produce about 1,750,000 tons of manganiferous iron ore annually which has an average manganese content of 12 per cent and which it is claimed fulfills the purpose.

The 800,000 tons referred to embraces ore of about 30 per cent manganese—not high-grade ore.

Germany has always been entirely dependent on foreign countries—India, Russia and Brazil—for her supplies of high-grade manganese ore from which alone can 80 per cent ferromanganese be made. The empire, like the United States, contains practically no deposits of such ore, but imports before the war ran to enormous

proportions. The total for the five years previous to 1914 was far in excess of the normal demands of the German steel industry.

IMPORTS AND EXPORTS OF MANGANESE ORE

The actual condition as to imported high-grade manganese ore is shown by the following data taken from German official statistics of imports and exports for the five years preceding the war:

German Imports and Exports of High Grade Manganese Ore
Metric Tons

Year	Imports	Exports
1909	384,445	22,436
1910	487,721	25,728
1911	420,709	24,392
1912	523,254	21,713
1913	680,371	25,[illegible]1
Total	2,496,500	119,2[illegible]
Exports	119,293	
Available for German consumption	2,377,207	

If the seven months preceding the war are also taken into account—January to August, 1914—it is fair to estimate that at least 250,000 tons more of ore was imported and perhaps 10,000 tons exported. Adding 240,000 tons to the total as of Jan. 1, 1914, we have 2,617,207 tons of high-grade manganese ore as representing the amount available for use in Germany in the five years and seven months previous to the war and since. Russia and India supplied 82.1 per cent of these imports in 1909, 83.2 per cent in 1910, 83.2 per cent in 1911, 86.6 per cent in 1912 and 91.27 per cent in 1913.

Experience has demonstrated that the yield of ferromanganese from high-grade ore, based on a comparison of ore imports and ferromanganese production over a long period, is 40 per cent of the weight of the ore. If this be taken as a basis, then the total amount of ferromanganese possible from the available manganese ore is as follows:

2,617,207 tons × .40 = 1,046,882 tons ferromanganese.

MANGANESE ORE IN BLAST-FURNACE BURDENS

This apparent supply of over 1,000,000 tons of ferromanganese has not all been used in the steel industry of Germany. Some of the factors which have cut into this supply are the following:

1. *Exports.*—While considerable manganese ore came from Russia, a good deal was sent back as ferromanganese. Statistics show that these exports, together with those to other countries, averaged 57,500 tons per year, which would bring the total for the five years before 1914 to 287,500 tons. To this must be added the estimated exports for the first seven months of 1914, which are 33,600 tons. The total ferromanganese exports can be safely put at 321,000 tons from Jan. 1, 1909, to Aug. 1, 1914, or five years and seven months.

2. *Consumption in Blast Furnaces.*—The basic Bessemer or Thomas pig iron of Germany, as made from available iron ores previous to the war, had a phosphorus content of only about 1.50 per cent. This is not sufficient, according to German practice, for use in making basic Bessemer steel, and it has been customary, therefore, to make up for the lack of phosphorus by using sufficient high-grade manganese ore to bring the manganese content in the final pig iron to at least 1.50 per cent. Manganese ore necessary to do this involved a cost of about 50c. (2 marks) per ton of pig iron produced. In the five years from 1909 to 1913, and in the seven months to Aug. 1, 1914, not less than 60,000,000 tons of basic Bessemer pig iron was produced in Germany.

The German practice also involves the incorporation of 4 to 5 per cent of manganese in the basic open-hearth pig iron. To accomplish this considerable manganese ore has been necessary, depending on the manganese content of the the iron ores from which this is made. At least 7,725,000 tons of such pig iron was consumed in basic open-hearth steel making in Germany in the five years and seven months previous to August 1, 1914.

The metallurgical reason for so large a manganese content in Germany's basic open-hearth pig iron is the belief that a better steel is the result of the presence of the manganese. This is without doubt correct, and the practice is gaining favor in the United States in many quarters.

It is also the practice in Germany to charge more scrap and less pig iron, about 75 per cent of the former and 25 per cent of the latter, in basic open-hearth practice, the higher manganese content being regarded as making such practice successful. In this way Germany is enabled to consume her large surplus of basic Bessemer scrap, the basic Bessemer steel output comprising 55 to 60 per cent of the total. The presence of considerable manganese in refining such highly oxidized scrap is not only helpful but necessary to the successful disposition of this scrap. These conditions are not met with in American practice.

The writer is reliably informed that all the manganese necessary in the two grades of German pig iron mentioned came entirely from the use of Russian manganese ore before the war. What the practice has been since the war started is not known. Conservation of high-grade manganese ores has been imperative. It is likely, however, that the foregoing practice has had to be radically changed unless the use of high manganese slags and low manganese iron ores has made it possible to compensate in part for the use of high manganese ores. In any event, the previous high standard has probably been lowered of necessity.

GERMANY'S CONSUMPTION OF FERROMANGANESE

Turning to the consumption of ferromanganese in Germany, we have to consider that this alloy is not really necessary in most steel made by the Bessemer process, spiegeleisen being used there. The amount of steel so made may be largely left out of consideration in estimating the ferromanganese consumption. It is a fair assumption that the average consumption of ferromanganese is about 17 lb. per ton of steel. On this basis the following table gives the estimated consumption of high-grade ferromanganese in Germany for the various periods under consideration:

Ferromanganese Consumption in Germany in Metric Tons

Period	O H Crucible and Electric Steel	Ferromanganese Consumed	Totals
1909-13 (5 years)	31,564,906 × 17 =	243,467)	259,088
1914 (7 months)	2,025,256 × 17 =	15,621)	
First War Year	5,635,361 × 17 =	43,467)	79,084
Second War Year	4,617,733 × 17 =	35,617)	
Total			339,172

It will thus be seen that at least over 259,000 tons of ferromanganese was consumed by Germany in the period named up to Aug. 1, 1914, and that up to Aug. 1, 1916, not less than 79,000 tons was necessary. This is assuming that spiegeleisen only was used in the Bessemer steel made. It is possible that in making low carbon Bessemer steel some high percentage alloy was necessary. If so the consumption would be higher.

Recapitulation

Recapitulating the foregoing analysis, we have the accompanying estimated statement of the manganese situation in Germany up to the war, Aug. 1, 1914.

It is impossible to figure accurately the manganese ore consumed in Germany, either in blast-furnace burdens or in regular ferromanganese furnaces. An English authority states that German statistics show that 500,447 tons of manganese ore, containing more than 30 per cent manganese, was consumed in blast furnaces in 1912 and 622,485 tons in 1913. This, of course, includes both ferromanganese and the pig iron for which manganese ore was used. Contrast with this the imports of 523,254 tons and 680,371 tons of manganese ore in 1912 and 1913 respectively. It is known that Germany produces practically no ore with above 30 per cent manganese.

Assuming that the following estimate is approximately correct, and that Germany's practice as to the use of manganese ore in blast furnaces and her consumption of ferromanganese were normal up to the war's inception, Germany had ore or ferromanganese on Aug. 1, 1914, equivalent to at least 66,794 tons. In the two war years, Aug. 1, 1914, to Aug. 1, 1916, there was need theoretically of 79,084 tons of ferromanganese

for the open-hearth steel made in that period. This would leave none of the alloy on hand Aug. 1, 1916, if there were no other demand for it and if the foregoing analysis is correct. It is possible, however, that some ferromanganese has been necessary in making Bessemer steel, and that therefore the shortage of available ore or alloy was still greater on Aug. 1, 1914.

Estimated Statement of the Manganese Situation in Germany

	Metric Tons	Metric Tons
High Grade Manganese Ore		
Imported, 1909 to 1913 inclusive	2,496,500	
Exported 1909 to 1913 inclusive		119,293
Imported in 1914 to Aug. 1	250,000	
Exported in 1914 to Aug. 1		10,000
Totals	2,746,500	129,293
	129,293	
Available for consumption 4 years and 7 months	2,617,207	
Ferromanganese		
2,617,207 tons of ore multiplied by 40	1,046,882	
Consumed in steelmaking to Aug. 1, 1914, 5 years and 7 months		259,088
Exported to Aug. 1, 1914, 5 years and 7 months		321,000
Total		580,088
Balance on hand Aug. 1, 1914, not taking account manganese ore consumed in blast furnace practice	466,794	

If the amount of high grade manganese ore consumed in blast furnaces to raise the manganese content in pig iron be put at 1,000,000 tons in the 5 years and 7 months (a low estimate if, as above stated, these manganese additions to pig iron represent 2 marks extra cost), then the manganese ore available for conversion into ferromanganese would be

				Ferromanganese
2,617,267	1,000,000	1,617,207	× 40	646,882 tons
Consumed and exported				580,088 tons
Balance on hand Aug. 1, 1914				66,794 tons

Regarded from the most favorable viewpoint, Germany's need of high-grade ferromanganese was probably very pressing within at least a year after the war started. It has come to the knowledge of the writer from a metallurgist who was at several of the large German steel plants 10 months after the war started that at that time the supply of standard ferromanganese was very low and expedients of various kinds were being tried as a substitute for the regular alloy and for the manganese ore. This situation fits in with the conditions as calculated above.

USE OF SLAGS CONTAINING MANGANESE

Large quantities of furnace slags exist in Germany containing varying percentages of manganese. It is known that quantities of these are being used in the regular blast-furnace burdens, instead of manganese ore, to raise the manganese content of the pig iron. To what extent some of the higher manganese acid slags are being used for making manganese-iron-silicon alloys in electric furnaces is not known. While an expensive operation, its success and efficiency is possible and has been demonstrated metallurgically in other countries.

THE LOW MANGANESE ALLOYS AND OTHER SUBSTITUTES

It is understood that German steelmakers have found a successful way to use a 30 to 35 per cent manganese alloy, of which large quantities can be produced from available manganiferous iron ores. Probably this is the principal substitute they are using. There is not likely to be any mystery about the reported substitute. There is no reason why, in shell, rail and most other steels, such an alloy could not be successfully used. In the lower carbon and special steels it is not improbable that a special alloy, such as silicon-aluminum, ferrosilicon, or a special silicon-iron-manganese alloy is being used in regular steels for partial deoxidation and cleansing. The invention of any mysterious substitute is not likely. There is no known element, analogous to manganese or otherwise, which bestows on steel the same properties or benefits. German, or even American inventive genius, may discover such an agent as the industry develops. Whether as good steel is being made or can be made under the present conditions in Germany is a question. Certainly more skill is necessary.

The use by the Germans of a calcium-silicide is also possible as a partial substitute for manganese. Calcium has been tried in the United States in this connection, but not extensively, partly because there was no necessity for it, and this is characteristic of Americans. Speculation points reasonably to either calcium-silicide or a 30 per cent manganese alloy as the probable substitutes as the war progressed.

The apparently impossible not infrequently turns out to be possible. If Germany's need for manganese is really more serious than has been outlined and if chemical and metallurgical research have really evolved a substitute, carrying with it radical changes in our ideas and in the practice in steel making, the literature after the war will present a very interesting discovery. The problems of the war are slowly bringing new developments in this country, and no doubt equally or more important ones in Germany.

THE LESSON TO THE UNITED STATES

A study of this analysis of Germany's situation as to manganese supplies under war conditions should be impressive to American steelmakers. At our present rate of steel production, 43,000,000 tons per year or upward, at least 304,000 tons of standard ferromanganese is necessary theoretically. To produce this amount of alloy over 760,000 tons of high-grade manganese ore is required. To us, even more than to others, is the need of manganese vital. Not only is our steel production larger than that of any other country, but the proportion of steel requiring ferromanganese is still greater. The question of a substitute is not only a more serious problem in these circumstances, but the fact that our supplies of manganese ore come entirely by sea from foreign lands is a weakness. Supplies of native manganiferous ores are not adequate to meet the situation should our regular supplies be cut off.

U. S. Electro Galvanizing Company Expanding

An extension of the U. S. Electro Galvanizing Company's plant, compelled by the growth of its business, has been started with the purchase of an additional building at 278-284 Park Avenue, Brooklyn, N. Y. This building will be devoted to the manufacture of automatic machinery for nickel plating and electro galvanizing, of which the company has six patented types. A laboratory for the testing of new solutions, materials and plating and cleaning methods is being installed. Job galvanizing will be confined to the building at 1 to 9 Park Avenue. The company, since 1896, has been a pioneer in the invention and development of automatic handling devices for cleaning, electro plating and electro galvanizing various material, and with the added facilities a number of new apparatus which are now in their inception will be perfected.

According to the United States Geological Survey, about 232 tons of stream tin was produced in Alaska in 1916. Of this about 162 tons came from the York district, where two tin dredges were operated, and a third was working on placer ground carrying both tin and gold. Developments were also continued on the Lost River lode-tin mine. The rest of the concentrates were recovered incidentally to placer-gold mining in the Hot Springs district of the lower Tanana basin.

The Link-Belt Company fired the fifth furnace at its Belmont plant, Indianapolis, Ind., about the middle of December. The addition of this furnace materially increases the capacity for producing malleable Link-Belts for conveying, elevating and power transmission purposes.

ESTABLISHED 1855

THE IRON AGE

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Time to Act for the Webb Bill

As our Washington correspondence shows, the passage of the Webb bill through the Senate is by no means to be taken for granted. There are signs of maneuvering for delay which indicate a purpose to work the measure over into the crowded latter days of the session. It seems strange that a bill which it was generally agreed would help the business of the country and injure no domestic interest, should be put in peril by the obstructve efforts of a minority. There is no claim that sentiment throughout the country has changed or that there is any popular demand for the defeat of the bill. It is a case in which the opposition, well appreciating that it is going in the face of public opinion, is determined to use every technical expedient to carry its point.

It is not necessary, in view of the full consideration the proposal has had in the past year, to go again at this time into argument for this declarative piece of legislation relative to co-operation in foreign trade. The Federal Trade Commission cannot be accused of bias. Its investigation was long continued and thorough. All the work for the bill has been done in the open. It is pertinent to ask what foreign interest is at work to prevent the more effective marshaling of the business energies of the country in extending our exports. Business men have a week within which to express their mind to members of the Senate, and no time should be lost in doing this.

Industrial Census of 1916 Needed

The Director of the Census has asked for Congressional legislation authorizing him to take a census of the quantities and values of domestic manufactures for the present year. Under the prevalent system of census compilations, the five-year interval from the last collection of manufacturing statistics, which was for the year 1914, would fix 1919 as the year for again "taking stock." The year just ending, however, has been such an eventful period for American industries, having been a full twelvemonth of the most active operation of all kinds of manufacturing establishments, that it would be most gratifying to know precisely what has been accomplished. The figures would undoubtedly be stupendous, far exceeding those of any previous year, and perhaps setting a mark which may not be approached for some years to come. To wait until 1919, and take the census of that year, merely because it will be at the end of a five-year period, might perhaps take us into a time of trade depression, such as that of 1914, and the exhibit for the year would again have to be treated apologetically. By all means, let us have a census for 1916, so that we will know what this year has to show for the expansion of our industries. We know that our domestic trade was the largest in our history and we have the figures to prove that our export trade was far greater than that of any previous year, but we need authentic figures for the entire trade of the country. If the census should be authorized, however, it is to be hoped that the work can be completed within a few months after the close of the year.

Rolling Stock Scarcely Obtainable

A current news item is that the Paris-Orleans Railway has ordered 50 locomotives from the American Locomotive Company for delivery in November, 1917, while the French State Railways have ordered 100 locomotives from the same company for delivery in January and February, 1918. Presumably other locomotive builders offered still poorer deliveries. France is not ordering locomotives now because she has suspicions that a year hence they may come in handy. Whatever may be said about the slowness of American railroads in placing orders for locomotives, the fault was committed long ago. Lately it has been impossible to place orders for anything like early delivery. It is not that the locomotive shops are unable to make early deliveries because they have sold such large numbers of locomotives, for current reports would indicate that not as many as 5000 locomotives have been ordered all this year—about 60 per cent domestic and 40 per cent export—while the *Railway Age Gazette* statistics show only 1573 locomotives ordered by the railroads of North America in 1915, and show, also, that as long ago as 1907 about 7000 locomotives were built in a year. Locomotives exported have been as follows:

1913	491
1914	269
1915	621
1916*	539

*Ten months only.

A still more striking comparison can be made with respect to freight cars. The orders this year appear to have totaled about 160,000 freight cars, domestic and export, while last year's domestic orders were given by the *Railway Age Gazette* at 107,796 cars. In 1913 the total of cars built in the United States and Canada was 207,684, and in 1907, the record year, 284,188 cars.

Evidently a part of the slow deliveries of rolling stock is due to difficulty in securing raw materials. Another difficulty is the securing of parts. Car and locomotive manufacturers, as well as those from whom they buy, have other urgent business arising from the war. They have too many irons in the fire, from the viewpoint of the railroads.

Compelling Workers to Earn More Money

Among the various elements of premium and bonus which the people at large, including the average Congressman, do not understand is the rule that in the planning preliminary to displacing hourly wage or piecework, the engineer shall figure to give the workman more money for his time than he has been earning previously at the same task. The usual practice is to provide a 25 per cent advance. The experts determine the time required for each piece of work under practical shop conditions—which time is far greater than the theoretical time—and also plan so that the worker may obtain the greatest possible production without increasing unduly his physical and mental effort. All these things having been determined, the rates are fixed with the deliberate purpose that the employee's earnings shall be greater by the prescribed percentage. If this be 25 per cent and he has been getting $12 weekly, the intention is that his future pay envelope be $15; if he has earned $15 he is to get $18.75. In fact, the owner demands that the man receive more, because the more he earns the more he produces, and the more he produces the more the equipment earns. If, under the advantageous conditions in operating tools and handling work which are effective coincidently with the starting of the new system, he cannot earn more than he has been getting, then he is rated as an undesirable whose place should be filled.

The owner who adopts a premium system is the kind that realizes that it is unprofitable in the long run to overwork men, because to do so increases the percentage of idle hours due to sickness; increases the accident hazard, since men are more likely to be hurt when they are fagged than when their vitality is normal, and also increases the always expensive factor of transient employment.

Branch Plants in Canada

Canadian commercial papers are discussing the continued tendency of United States manufacturing establishments to locate branches on their side of the border. Prior to the European War there were about 450 of such branches in Canada, and since its outbreak about 50 more have been opened, representing a total investment of at least $150,000,000. An impetus has been given to the movement, according to the Toronto *Monetary Times*, by the possibility of the enactment of preferential tariffs among the Entente Allies and the Dominion after the war. In such an event the United States manufacturers in Canada expect to be regarded as Canadian manufacturers and thus participate in the benefits of this tariff legislation. They will also secure a share of the growing Canadian home trade.

The Plant Improvements to Come

When demand slackens and pressure on the machinery of production lightens, we may look for an active period of plant beneficiation. Money will be available for the things that promote efficiency. The factories are legion where machines are poorly placed, where materials in process are toted hither and thither, and in which there are points of congestion which cause loss of time, money and temper. But when the call is incessant for output, and machines, men and equipment can be idle only for short intervals, improvements in the existing order get scant consideration. Where plants are extended to meet large sales possibilities, full provision is made for economy and speed in manufacture. But in many cases long-existing departments, for which money could not be spared formerly, could be rearranged so as to make further plant enlargement unnecessary.

It is the real misfortune of many industrial establishments that the flood of business has been so overwhelming. Had the volume been spread over a longer period, the opportunity might have been seized to study out the situation along ideas of modern management, without involving the much greater capital charges of a new structure. Both by reducing the cost of individual operations and by the handling of larger outputs great economies are possible to going plants, simply by giving to the manufacturing problem as much attention as, for example, is given to the problems of selling.

Plant Office Buildings Get Attention

Another chapter of industrial history is now being written. In the present era of domestic prosperity many factories whose growth through the years had given them little above the safe margin have at last found themselves. Having become established, they begin to take on the air of permanence. Just as communities develop civic pride after the period of settlement and the ensuing steady growth, and add art to the utilitarian, so new factory buildings of going concerns are no longer regarded as mere shelters for expensive machines, but as attractive habitats of a business, pleasing inside and out, and exhibiting a condition of stability which reacts on the community.

One of the late manifestations of this new sense of the relation of the industrial plant to the community is the erection of commodious and substantial office buildings which are a credit to architecture. Whereas a few years ago the notable office building of the large industrial plant was the exception, the next few years promise a large addition of this sort of structure. No longer will Europe remain conspicuous in this regard, with plant office structures commonly of the proportions, design and appointments of the best in governmental buildings.

Piece Work the Practice at Arsenals

Data Accumulated Under Scientific Management Regime Are of Much Use —Men Satisfied with Bonus System

WASHINGTON, D. C., Dec. 23, 1916.—That the legislation prohibiting the use in manufacturing establishments under the War Department of certain specified devices in scientific shop management has not altogether accomplished its purpose and that the arsenals are still able to compensate certain classes of skilled labor on an output basis and in other cases are able to employ data gathered before the prohibition took effect for use in rate setting are made clear in the annual report of Gen. William Crozier, chief of the Bureau of Ordnance. Manufacturers of munitions will be especially interested in figures presented by General Crozier showing the cost of producing certain material made in both Government and private establishments. The heavy increase in the prices of nearly everything entering into the manufacture of small arms, fixed ammunitions, shells and shrapnel and the high scale of wages which the Government has been forced to pay during the past year, not only to meet the requirements of the law fixing wage scales, but to prevent private manufacturers from securing the most competent of the arsenal workmen, are also commented upon.

The Army appropriation act of March 4, 1915, prohibited the making of time studies and the payment of premiums, as far as work done under that act was concerned. This operated to stop time studies, since these were made under the direction of officers who were paid out of the army act appropriations. But as most of the premiums which had been paid in the department had been paid from funds appropriated in the fortifications act, it had little effect upon these. At its last session, however, Congress placed the restrictive legislation not only upon the army appropriation bill, but also upon the other supply bills affecting this department, so that time studies and premium payments are now effectively forbidden.

RATE SETTING STILL POSSIBLE

That the legislation, in spite of its prohibitions, has not prevented rate-setting, General Crozier frankly asserts. He says:

> A time study is a scientific method for determining the best order and sequence in which a given piece of work should be performed, and for ascertaining the time which it ought reasonably to be expected to take; so as to permit the setting of a fair rate to compensate for the job. The reliability of the method depends upon the degree to which the scientific character which it ought to have is attained. The restrictive legislation interferes with the scientific character of the method, by prohibititing the division of a job into component parts for separate timing, but it does not abolish the method altogether, and a less perfect method of rate setting than the time study is therefore still possible.
>
> A premium is a means of payment of a workman for output, with an assured minimum of his regular wage. The employment of this means has been prohibited, but the Comptroller of the Treasury has decided that the piecework method of payment for output, which makes the compensation correspond with the production, but without an assured minimum, is not prohibited, and is therefore still available. Piece work has prevailed to a large extent in the Ordnance Department for many years, and is still pursued. At the Watertown Arsenal, where there is not much repetition work, there has heretofore been little piece work, and the compensation for output has been in the form of premiums, which are now forbidden. With the assistance of such time studies as have been made in the past it will be possible to [illegible] deal of this work under the piece-work system, and this possibility is under study. In the meantime premium [illegible] ceased, to the expressed dissatisfaction of a number of the employees. If a good method of rate setting is avail[illegible] does not make much difference whether the stimulus to extra earnings is afforded by the piece-work, the premium, the bonus, or any other system of payment; and if such stimulus is to be avoided and payment made altogether irrespective of the output it must be by the prohibition altogether of payment for output

OBJECTORS DID NOT EARN PREMIUMS

Referring to conditions in the Frankford, Pa., Arsenal, General Crozier says the system of shop management which was begun in connection with the manufacture of small arms ammunition and which was subsequently extended to the manufacture of artillery ammunition, has proved entirely satisfactory and has effected savings of approximately $1,865,000. The premium and bonus systems of compensation at this arsenal were abolished by act of Congress, and General Crozier states that "notwithstanding reports to the contrary every employee engaged in the manufacture of the small arms ammunition or in the assembling of artillery ammunition, who was paid under this system, was perfectly satisfied therewith; the real objectors to the premium system of compensation on the part of the employees of this arsenal were almost entirely those who did not enjoy the benefits thereof." Inasmuch as the operations at the Frankford Arsenal are largely in the nature of repetition it has been found practicable to put a considerable part of the work on a piece-rate basis.

At the Watervliet Arsenal there have been compiled in the planning room card records indicating the times taken to perform all important steps in the work of gun manufacture under various orders covering a period of about five years. Similar records of current work as completed are being entered for ready comparison, to serve as an indication of relative efficiency. There has been installed in this connection a merit record system which provides for recognition of work done in an especially expeditious or economical manner. This serves as the basis for raising a workman's efficiency rating, thus placing him in a position to secure higher pay.

The Watertown Arsenal was operated under the scientific management system for several years, but since the enactment of prohibitory legislation all time studies have been discontinued and no premiums paid from appropriations carried in the army appropriation act. Owing, however, to the large amount of standardized data secured in connection with the system of management, it has been possible to continue rate setting with no considerable difficulty, without the use of time study.

GREAT ADVANCES IN MATERIAL AND LABOR

Concerning the increase in cost of material and labor, which the Ordnance Bureau has been obliged to meet during the past year, General Crozier says:

> [illegible] ost of material and labor has increased so extensively, even in the last year, and a continuation of the in[illegible] likely, that it is anticipated the procurement [illegible] artillery material and many other [illegible] nce supplies in the quantities covered by the estimate submitted at the last session of Congress will not be possible unless additional funds be appropriated at the [illegible] ssion to complete the work. While the increase [illegible] and not in accordance with any fixed rule, it is conservatively estimated that the average [illegible] material during the past 12 [illegible] hs is from 25 to 40 per cent.

At the Frankford Arsenal the year was marked by great advances in the wages of employees and a further increase is contemplated at the present time. In this connection General Crozier says:

> [illegible] e most noted increases have been of machinists and [illegible] he extent of 20 per cent; of instrument makers [illegible] cent, of automatic screw makers to [illegible] nt of 16 per cent; of machine operators to the extent [illegible] cent; and of assistant foremen to the extent of 35 [illegible] The cost of materials has been even more marked [illegible] dvanced 621 per cent; high-speed steel, 573 optical glass, 416 per cent; trinitrotoluol, 266 per [illegible] ronze, 200 per cent; cartridge brass, 145 per cent. [illegible] economies and dispatch in manufacture cannot [illegible] conditions

The average appropriation cost of rifle ammunition during the year was $24.32 per thousand, as compared with $22.15 per thousand for the preceding year. There was, however, an increase in the cost of material per thousand cartridges of $3.37, as compared with the cost of the same material for the preceding year. The cost of pistol ball cartridges, caliber .45, was $14.52 per thousand, as compared with $11.58 per thousand for the preceding year; much of this increase is due to the increase in cost of material, which amounted to $2.39 per thousand.

An important chapter of the report deals with the co-operation which the Government hopes to secure from private establishments which have been either enlarged or brought into existence by the European war. Reference is made particularly to the appropriations for special jigs, dies, fixtures, etc., for fitting private establishments for the manufacture of the particular models of arms and ammunition which are employed in the military service. How inadequate these provisions are, General Crozier points out with great force. He says:

These special provisions are all in the right direction, and will materially aid this department in its plans for utilizing private industry for supplying such emergency needs as may arise. Unfortunately, they do not constitute the only kind of legislation found in the supply bills upon the special utilization of private industry, and are to a certain extent offset in their intentions by restrictions upon the employment of appropriations in general for such patronage of private manufactures as would of itself operate to prepare them for the Government's use, or to keep in existence plants which have already fitted themselves for the manufacture of war material in order to meet the orders of European governments.

Some of the appropriations are accompanied by the provision that they shall not be used for placing orders with private manufacturers at prices exceeding by more than 25 per cent the cost of manufacturing the same material in the Government arsenals, or the estimated cost of such material when it has not been previously manufactured in the arsenals. As the Government has been able, in some cases, to manufacture quite cheaply, this may operate to prevent the placing of orders with private manufacturers. Other appropriations are accompanied by the provision that they shall not be expended in such a manner as to prevent the operation of the arsenals at their most economical capacity. As this capacity is probably that of a two-shift rate, the effect of the legislation is to prevent any of the funds appropriated from being applied to private orders until after the arsenals shall be running at full capacity upon a two-shift basis, and then only to the extent of the excess of the appropriations over the amounts necessary to keep the arsenals going upon this basis.

Many of the appropriations are of such size as to afford some excess for private orders, but the number of private establishments which can be utilized and trained in time of peace will be less than it would be if there could be employed for the purpose the funds in excess of the amounts which will be necessary to operate the arsenals upon a one-shift basis only, at which rate they would themselves also have a larger reserve of expansibility for the needs of war time. There are thus opposing tendencies in the legislation which has been enacted with reference to what has sometimes been spoken of as the mobilization of industry.

Ordnance experts are now engaged in studying the problem as to how the appropriation for equipment to be installed in private establishments shall be distributed, but it is doubtful if a decision will be reached within the next month.

W. L. C.

At Columbus, Ohio, last week, the State Utilities Commission ordered that the East Ohio Gas Company discontinue gas service to all consumers in the Cleveland district, using 100,000 cu. ft. or more of gas per month. This is done to increase the supply for domestic purposes, a previous order by the commission shutting off large consumers having failed to bring relief to Cleveland. The new rule may be made to apply all over the State, regardless of the contracts between gas companies and consumers. A serious shortage exists, especially in Cleveland and Cincinnati.

Spain's steel output in 1915, according to recent statistics published by the Spanish Consejo de Minera, comprised 439,835 tons of pig iron and 387,314 tons of finished iron and steel, against 382,044 of the former and 330,000 tons of the latter in 1914.

THERMO-PHYSICS OF CAST IRON

Factors Having an Important Bearing on the Problem of Shrinkage

The following data from notes taken at the December meeting of the New England Foundrymen's Association, at which Dr. Richard Moldenke gave an address on the "Physics of Cast Iron," will be of interest to foundrymen:

The expenditure of heat during the cupola melting process may be divided into three parts, namely: Heat to bring stock up to point of melting, heat absorbed during melting without rise in temperature, and heat for super-heating the metal. This is summarized as follows:

	B.t.u. Per Lb. of Gray Iron	B.t.u. Per Lb. of White Iron
Heat up to melting	360	360
Heat melting	790	150
Heat superheating	100	150
Total	1250	1060

The figures show that at least two-thirds of the total heat expended in the cupola melting process goes into the stock before actual melting takes place. Hence the importance of utilizing all the heat possible from the products of combustion ascending through the stack. High charging doors and allowing the cupola to stand charged as long as possible before blast is put on are a great help to efficient practice.

A further point of interest is the relatively smaller amount of heat required to melt white iron as well as to superheat it for proper pouring temperature. The bearing of this will be seen from the table above given, as follows: The heat necessary to be dissipated through the mold walls to make cast iron set fully is found by deducting the heat units of the metal as just set from the total amount when superheated. In the case of gray iron this is complicated by the fact that the freezing point is lower than the melting point. In white iron this is practically identical. The carbon in all molten cast iron being combined, the freezing (setting) point, whether the iron will set gray or set white, corresponds to the melting point of a white iron with equal combined carbon content. Hence the following data will serve:

Gray iron—1150 B.t.u. minus 790 B.t.u. (at melting point of white iron) equals 360 B.t.u., or a matter of 300 deg. F. drop available before it sets.

White iron—1060 B.t.u. minus 790 B.t.u. equals 270 B.t.u. or 150 deg. F. drop only available before it sets.

Then there is the additional heat given out when graphite separates out as the iron sets gray. This retards the freezing point somewhat. The above figures account for the quicker setting of white iron and the difficulty of holding it in the ladle for any time with safety.

In connection with the ever-present shrinkage problem in cast iron, the figures below will prove illuminating. The specific gravity of cast iron can be given thus:

Gray iron—sp. gr. 7.10, 443 lb. per cu. ft., or 0.256 lb. per cu. in.

White iron—sp. gr. 7.50, 468 lb. per cu. ft., or 0.271 lb. per cu. in.

This is for averages. For purposes of closer comparison gray iron may be taken at 7.00 and white iron at 7.70 sp. gr., while molten iron runs about 6.65 sp. gr.

If these figures are studied it will be noticed that the solid metal is heavier than the molten; and in another form, an equal weight of solid metal takes less space than the liquid. Actually,

Gray iron contracts about 6 per cent. White iron contracts about 10 per cent.

This shows the seriousness of the shrinkage problem in cast iron. Unless feeding proceeds until the casting can set sound—before the gates and risers freeze up—spongy, porous and weak castings will result. The tremendous effect of this characteristic of cast iron is easily seen in white-iron castings, but does not get the attention it should in gray-iron work. The gating of castings is therefore one of the most important items in the foundry and should not be left to the molder entirely but should receive the foreman's earnest study in addition.

WEBB BILL IN DANGER?

Delays in Senate and Threatened Amendments Arouse Its Friends

WASHINGTON, Dec. 26, 1916.—An extraordinary situation has developed in the Senate with respect to the Webb bill, designed to promote export trade by legalizing combinations of American manufacturers and merchants in foreign business, and fear that it may fail of passage in the present Congress is being frankly expressed by its friends in both houses and among Administration officials. Energetic steps are being taken to arouse the Senate in behalf of the bill and to secure the co-operation of the business men of the country in hastening final action, but in view of the very definite opposition that has recently developed the position of the measure is distinctly precarious.

The Webb bill originated in the House and bears the name of the chairman of the Judiciary Committee of that body, who introduced it in the form in which it had been drafted by the Federal Trade Commission and approved by the President and his advisers. The rapid progress made in the House augured well for its early enactment. Introduced on Aug. 8, it was reported one week later and within a fortnight was passed and sent to the Senate. The Senate leaders planned a parliamentary short cut which contemplated adding the measure as an amendment to the omnibus revenue bill; but this idea was abandoned when two or three Senators gave notice that such action would imperil the revenue measure, the early passage of which was greatly desired. The Webb bill was then sent to committee, the Administration leaders of the Senate announcing that it would be reported, taken up and passed immediately upon the reconvening of Congress in December.

HEARINGS MEAN DELAY

Congress has now completed the preliminary work of the session and adjourned until Jan. 2, but no steps whatever have been taken looking to early action on the export trade bill. A semi-official statement has been made that hearings will be held on the bill in January, but this can hardly be taken as a favorable indication. The House committee massed all the necessary facts and arguments in a clear and convincing report on the measure, and the Federal Trade Commission, during the past month, has made public an elaborate two-volume compilation of the results of its own investigations of European trade combinations. What is to be gained by further hearings before the Senate committee is difficult to imagine. It is perfectly obvious, however, that the object of these hearings is delay and that if two or three weeks can be consumed before the bill is reported it will be entirely practicable for two determined Senators to prevent action during the few remaining days of the present Congress.

A recent development in this interesting situation is the sinister suggestion now for the first time heard that the bill 'is crudely drawn and needs amendment." As a matter of fact, the Webb bill has been scrutinized by a larger number of legislative experts than have been consulted as to any other measure pending in this Congress. Its terms are so simple and direct that he that runs may read. It provides that nothing in the anti-trust laws shall be construed to render illegal "an association entered into for the sole purpose of engaging in export trade and actually engaged solely in such trade, or an agreement made or act done in the course of export trade by such association, provided such association, agreement or act is not in restraint of trade within the United States"; that no provision of the Clayton act shall be construed "to forbid the acquisition or ownership by any corporation of any part of the stock or other capital of any corporation organized solely for the purpose of engaging in export trade"; that the prohibition against "unfair methods of competition," contained in the act creating the Federal Trade Commission, "shall be construed as extending to unfair methods of competition used in export trade against competitors engaged in export trade, even though the acts constituting such unfair methods are done without the territorial jurisdiction of the United States; and, finally, that every association organized under the proposed law shall within 30 days after its creation file with the Federal Trade Commission a verified written statement setting forth its place of business, the names and addresses of all its officers and stockholders, together with a copy of its certificate of incorporation or articles of association"?

BUSINESS MEN SHOULD ACT PROMPTLY

In the opinion of the ablest lawyers in Congress the concessions from the anti-trust laws embodied in the Webb bill are fully safeguarded, and it is the general belief that no one in the Senate who really desires the passage of the bill will attempt its amendment. The sole purposes are believed to be, first, to consume time, and, second, to so load down the measure as to bring about its direct defeat or its rejection by the House when returned to that body for concurrence in the Senate modifications.

Business men who are interested in the fate of the Webb bill have at least a week in which to signify their interest to their respective Senators and to bring to the attention of the Senate Committee the great desirability of early action on the measure. The prospect of an early termination of the European war, which appears to be steadily improving, is only another argument in favor of early action on the Webb bill which would serve as a strong bulwark for the protection of exporting organizations called upon to meet the government-aided combinations of Europe already launched for the recovery of trade lost during the great conflict.

W. L. C.

Iron and Steel Institute Associates

The annual meeting of the Iron and Steel Institute (British) will be held May 3 and 4, 1917, and the autumn meeting Sept. 20 and 21, 1917, in London. The secretary, George C. Lloyd, calls attention to the fact that a new class of associates has been established by the council, election to which will take place by ballot in the usual way at the general meetings. Candidates for the new class must be persons not exceeding 24 years of age and have one or other of the following qualifications:

Students of metallurgy taking courses at a university, university college, or technical school.

Pupils or apprentices to metallurgists or engineers, or in metallurgical or engineering works.

Persons employed in some practical or scientific capacity [illegible] metallurgical or engineering works.

Associates over 21 years of age, if qualified for membership, may be transferred by the council to full membership.

The Parkesburg Iron Company, Parkesburg, Pa., has purchased the Spring City Bloom Works, Spring City, Pa., of which the E. P. Leaf Company, Philadelphia, was the principal owner. The Spring City plant consists of eight forge fires, and for a number of years produced a fine quality of charcoal iron blooms. For some time, however, it has been standing idle. The new owner will remodel and overhaul the plant and place it in operation as soon as possible. The blooms will be shipped to Parkesburg where they will be manufactured into charcoal iron tubes. The tube mill of the Parkesburg Iron Company has been falling behind in its orders because its plant at Parkesburg is [illegible]le to turn out blooms fast enough.

Argentine Pipe Commission Arrives

The Technical Commission appointed by the Argentine Republic to supervise the manufacture of the 65,000 tons of cast-iron pipe awarded the United States Cast Iron Pipe & Foundry Company by the Obras Sanitarias de la Nacion in October, arrived in New York Dec. 25, on the steamer Pastores. The commission is composed of the following Argentine engineers connected with the department of the Obras Sanitarias de la Nacion: Alfredo F. Lasso, Bartolome Raffo, Guerino Talevi, Raul Calandra, and Alfredo Marino.

The contract in question is the largest single pipe contract ever placed by this department, as well as the first to be placed by the department with any United States manufacturer, and is one of the largest single cast-iron-pipe orders in the history of the industry. Its award to the American makers has, therefore, aroused great interest and comment. Competition for this business was very keen between the European founders and the United States Company. Upon the formal opening of the bids a cursory examination of the prices indicated that the Allied British Founders were about 2 per cent lower than the United States Company, which apparent advantage was nullified by the fact that the British Founders refused to bid in accordance with the conditions established by the department of the Obras Sanitarias de la Nacion. The United States Cast Iron Pipe & Foundry Company was the only company bidding in strict accordance with the specifications and invitation to tender.

The time and assurance of delivery were essential conditions of the contract, as the material was urgently needed, and the Argentine department had suffered seriously from the failure of foreign manufacturers to deliver on previous contracts. On this account, the government, in its official announcement of the award, made to the press on Oct. 27, stated that "After a detailed examination was made of each of the proposals presented, the directorate of the Obras Sanitarias de la Nacion resolved to accord the supplying of this material to the United States Company due to the fact that its offer was in strict accordance with the conditions specified, and in its final analysis was $60,000 lower than the minimum price of the British Founders."

Criticism emanating from circles that are controlled by interests closely allied to the competitors of American manufacturers has been directed against the award of this contract. It is to be regretted that more publicity has been given to this criticism in the United States than in the Argentine, where the reputation of the department making the award precludes criticism. Throughout the Argentine Republic, in governmental and responsible business circles, the award to the United States Company has been noted with approval and satisfaction.

It is a matter of congratulation that an American company has been able to secure this contract, assuring as it does the closer business relationship between the Argentine Republic and the United States and a new outlet for "United States-made" cast-iron pipe. The tonnage involved approximates 2500 miles of cast-iron piping, or what is ordinarily considered a sufficient amount of water piping to completely equip a city of at least a million people; and in this one order there are more miles of piping than are used in the entire water systems of either St. Louis, Baltimore, or Minneapolis. In Philadelphia, in the entire water-distribution system, which has been building since 1798, there are only about 3300 miles of piping. This is eloquent testimony of the growth of the Argentine Republic and its disposition to carry on public works on a large scale. The value of the contract is approximately $3,500,000 U. S. gold, and it will require at least 4500 standard freight cars to move the material from the works to port of shipment, and approximately 20 vessels to carry the material to the Argentine Republic.

Western customers received notice last week from manufacturers of abrasives and grinding wheels at Niagara Falls, N. Y., that Canadian embargoes on Niagara electric power have made it necessary to cease production.

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One of the Hubbard blast furnaces of the Youngstown Sheet & Tube Company has been banked for lack of coke and some other stacks in the Youngstown district and possibly in the Shenango Valley will bank before the week is out unless the supply improves. The sheet mills of the Youngstown Sheet & Tube Company are also down, but the tube mills, which have been off more than a week, started up on Wednesday, Dec. 27.

Iron and Steel Markets

TRANSPORTATION TROUBLE

Many More Blast Furnaces Banked

New Railroad, Shell Steel and Structural Demand —Holding Off on Forward Delivery Steel

Transportation troubles are the most obtruding factor in the steel market, just at a time when the trade is making every effort to appraise the effects of peace talk. Many blast furnaces have been banked in the past week for lack of coke, the Steel Corporation alone counting 19 on this list. The railroad rule, when in doubt declare an embargo, is being enforced right and left. Southern iron is being refused by Ohio railroads. Pig iron and steel for New York harbor points are refused by Central Western lines and in the Pittsburgh and Valley districts iron and steel works are suffering from their worst tie-up.

December from the standpoint of production and shipments and hence of earnings will fall considerably short of November with all the producers of steel. Unfilled tonnage statements will show an increase but it will not be a favorable one.

The fuel scarcity is more serious in all lines. Blast furnaces having by-product coke ovens have no advantage, since they are short of coal. A number of sheet and other rolling mills have been shut down by lack of coal for reheating furnaces.

With so many steel producers behind on their deliveries and loaded with orders that represent from four to eight months of operation, the possibilities of later price readjustments are not a matter of present concern. At the same time, the 5 per cent advance announced in the past week by bolt and nut makers and that of $2 a ton by a leading producer of bars, plates and shapes do not mean what such advances mean when buying is active.

The effect of peace discussions is chiefly seen in the holding off of buyers who have figured on extended deliveries. This applies to both pig iron and steel. In Ohio, a new steel company inquiring for 37,000 tons of basic iron, with first delivery in May, has put off buying. The late scramble for pig iron for the second half of 1917 was so far a speculation against a scarcity due to Europe's continued heavy buying, that the chance of Europe's demand falling off is bound to have its effect.

Railroad, shell steel and structural demand have figured in the curtailed operations of a holiday market. At Chicago 25,000 tons of rails, 15,000 tons of rail fastenings and 150,000 kegs of bolts and spikes were bought. The Wheeling & Lake Erie has closed for 5000 tons of rails, and an inquiry has come up for 5000 to 6000 tons of light rails for France. The Pennsylvania Railroad orders for 205,000 tons for 1918 are delayed by the usual contest over prices, in view of new departures in specifications.

The Baldwin inquiry for 30,000 tons of 6⅜-in. shell stock is the principal item in war steel. On foreign account the buying of 20,000 tons is reported and Italy's inquiry for 40,000 tons is still active.

In structural lines the pending award of 15,000 tons for Newport News shipyard extensions and the closing of 7000 tons for the New York Shipbuilding Company's improvement are of chief interest. For Brooklyn subway work 15,600 tons will come up for bids in the middle of January. The supply of structural work holds up well and industrial extensions continue to figure prominently.

It is expected that the 500 miles of 8-in. pipe for the Sinclair Oil & Refining Company's oil line through Oklahoma and Texas to the Gulf will be divided among several producers in order to get ...d deliveries and it will be several months before the mills can give it space.

All pig-iron markets are distinctly quieter. At Pittsburgh a 10,000-ton sale of Bessemer iron is presumed to have been made below the $35 Valley basis, and some resale basic iron is reported to have been offered at close to $29. In the Eastern market about 15,000 tons of basic iron has been sold to two steel companies at $30 at furnace.

Export pig-iron inquiry keeps up, but the difficulty of getting hold of iron is just as great. In New York sellers are figuring on 15,000 tons of foundry iron for neutral European countries on the west coast. Italy is still asking for Bessemer and low-phosphorus irons.

Pittsburgh

PITTSBURGH, PA., Dec. 26, 1916.

The opinion is gaining strength that top prices have been reached in the iron and steel market. The only advances in prices the past week were $2 per ton on plates, shapes and bars by the Carnegie Steel Company, and 5 per cent on nuts and bolts. These are unimportant because the Carnegie Company is practically sold up on the products named for all of 1917, and the nut and bolt makers are filled for the first quarter or longer. The transportation situation grows worse, embargoes being in force on all the New York Central Lines west of Youngstown and on the Erie to many important points, while cars for export shipments are furnished now only under special permits. All of the blast furnaces, rolling mills and steel works are running short-handed because they cannot get in raw materials, and their shipments are held up to a very great extent by the shortage in cars and motive power. However, after the holidays a better car ...ation may develop. Prices are maintained on pig iron, semi-finished steel and finished material, but if

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Dec. 27, 1916.	Dec. 20, 1916.	Nov. 29, 1916.	Dec. 29, 1915.
No. 2 X, Philadelphia...	$29.50	$29.50	$27.50	$19.50
No. 2, Valley furnace...	31.00	31.00	30.00	18.00
No. 2 Southern, Cin'ti...	25.90	25.90	24.40	17.40
No. 2, Birmingham, Ala.	23.00	23.00	21.00	14.50
No. 2, furnace, Chicago*	30.00	30.00	28.00	18.00
Basic, del'd, eastern Pa.	30.00	30.00	27.00	18.50
Basic, Valley furnace...	30.00	30.00	30.00	18.00
Bessemer, Pittsburgh ...	35.95	35.95	34.45	20.45
Malleable Bess., Ch'go*.	30.00	30.00	27.00	18.50
Gray forge, Pittsburgh..	29.40	29.40	29.40	18.29
L. S. charcoal, Chicago..	31.75	31.75	28.00	19.25

Rails, Billets, etc., Per Gross Ton:				
Bess. rails, heavy, at mill	38.00	38.00	38.00	28.00
O.-h. rails, heavy, at mill	40.00	40.00	40.00	30.00
Bess. billets, Pittsburgh..	60.00	60.00	55.00	32.00
O.-h. billets, Pittsburgh..	60.00	60.00	55.00	32.00
O.-h. sheet bars, P'gh...	60.00	60.00	55.00	35.00
Forging billets, base, P'gh	80.00	80.00	80.00	55.00
O.-h. billets, Phila.....	60.00	60.00	55.00	40.00
Wire rods, Pittsburgh....	70.00	70.00	65.00	40.00

Finished Iron and Steel, Per Lb. to Large Buyers	Cents.	Cents.	Cents.	Cents.
Iron bars, Philadelphia..	3.159	3.159	2.659	2.059
Iron bars, Pittsburgh....	3.25	3.25	2.90	1.80
Iron bars, Chicago	3.00	3.00	2.65	1.75
Steel bars, Pittsburgh...	3.00	3.00	3.00	2.00
Steel bars, New York....	3.169	3.169	3.169	2.169
Tank plates, Pittsburgh.	4.25	4.25	4.25	2.25
Tank plates, New York..	4.419	4.419	4.419	2.419
Beams, etc., Pittsburgh..	3.25	3.25	3.00	1.90
Beams, etc., New York..	3.419	3.419	3.019	2.069
Skelp, grooved steel, P'gh	2.85	2.85	2.85	1.70
Skelp, sheared steel, P'gh	3.00	3.00	3.00	1.80
Steel hoops, Pittsburgh..	3.25	3.25	3.25	2.00

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire,	Dec. 27, 1916.	Dec. 20, 1916.	Nov. 29, 1916.	Dec. 29, 1915.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Wire nails, Pittsburgh...	3.00	3.00	3.00	1.90
Cut nails, Pittsburgh....	2.95	2.95	2.95	1.85
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Barb wire, galv., P'gh..	3.85	3.85	3.85	2.95

Old Material, Per Gross Ton:				
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Iron rails, Philadelphia..	28.00	27.00	24.00	14.00
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Carwheels, Philadelphia..	22.00	22.50	21.50	16.00
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Heavy steel scrap, Phila.	23.00	24.00	23.00	16.00
Heavy steel scrap, Ch'go.	21.50	23.50	23.00	16.00
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
No. 1 cast, Philadelphia..	21.00	21.00	20.00	14.00
No. 1 cast, Ch'go (net ton)	15.50	16.50	16.00	13.75
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
No. 1 RR wrot, Ch'go (net)	[illegible]	[illegible]	25.00	16.00

Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt...	$9.50	$9.00	$7.00	$3.00
Furnace coke, future....	4.50	4.00	4.00	2.40
Foundry coke, prompt...	10.00	9.00	7.50	3.50
Foundry coke, future....	6.00	6.00	5.00	3.00

Metals, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York..	31.00	32.50	34.00	22.25
Electrolytic copper, N. Y.	31.00	32.50	34.00	22.25
Spelter, St. Louis.....	9.50	10.00	13.00	17.25
Spelter, New York ...	9.75	10.25	13.25	17.50
Lead, St. Louis ...	7.40	7.40	7.37½	5.00
Lead, New York ...	7.75	7.75	7.75	5.15
Tin, New York ...	42.87½	42.87½	41.25	29.75
Antimony (Asiatic), N. Y.	14.00	14.25	14.50	35.00
Tin plate, 100-lb. box, P'gh	$7.00	$7.00	$6.00	$3.60

active peace negotiations start, a readjustment of the whole market to a lower basis is to be expected.

Pig Iron.—The only local purchases of moment the past week were close to 10,000 tons of Bessemer iron and some low phosphorus by the Mesta Machine Company for delivery in the second half of 1917 at about current prices, or slightly under. Not enough pig iron has moved from sellers to consumers in the past two weeks to test prices. Some resale basic iron has appeared on the market, and it is said 1500 tons of this has been offered at $29, Valley, or lower. In the absence of definite sales we repeat prices given in last week's report, but on firm offers they could probably be shaded: Standard Bessemer iron, $35; basic, $30 to $31; gray forge, $29; malleable Bessemer, $30, and No. 2 foundry, $31 to $32, all at Valley furnace, the freight rate for delivery in the Pittsburgh or Cleveland district being 95c. per ton.

Billets and Sheet Bars.—Soft Bessemer and open-hearth billets and sheet bars are still held at $60 to $65 at maker's mill, with practically no steel being offered. Export inquiry is dull and, in fact, has practically stopped. We continue to quote base sizes and base carbons of Bessemer and open-hearth billets and sheet bars at $60 to $65, maker's mill, Pittsburgh or Youngstown, and forging billets $80 to $85, for sizes up to but not including 10 x 10 in. and for carbons up to 0.25.

Ferroalloys.—Most consumers of ferromanganese are covered for the first quarter and first half at prices ranging from $160 to $165, delivered. Domestic 80 per cent ferromanganese is strong at $165 to $170 at furnace. English 80 per cent remains at $164, seaboard, which is the official price, but this could be shaded. A large interest is in the market for 1500 tons of ferromanganese for first quarter. We quote 18 to 22 per cent spiegeleisen at $50 to $55 and 25 to 30 per cent at $65 to $75, delivered. We quote 50 per cent ferrosilicon for delivery next year, in lots up to 100 tons, at $100; 100 tons to 600 tons, $99, and over 600 tons, $98, all per gross ton, f.o.b. Pittsburgh. We now quote 9 per cent ferrosilicon at $39 to $41; 10 per cent, $40 to $42; 11 per cent, $41 to $43; 12 per cent, $42 to $44; 13 per cent, $43.50 to $45.50; 14 per cent, $45.50 to $47.50; 15 per cent, $47.50 to $49.50, and 16 per cent, $50 to $52. We quote 7 per cent silvery at $29.50 to $30; 8 per cent, $30 to $31; 9 per cent, $30.50; 10 per cent, $31; 11 per cent, $32, and 12 per cent, $33. These prices are f.o.b. at furnace, Jackson or New Straitsville, Ohio, and Ashland, Ky., all of which have a freight rate of $2 per gross ton to the Pittsburgh district.

Steel Rails.—A disagreement is reported between the rail mills and the Pennsylvania Railroad over the price to be charged on its inquiry for 205,000 tons of open-hearth rails, and it is said that the order may be held up for some time. The new demand for light rails from the coal-mining interests is very active, but from lumber and traction concerns is light. The recent heavy advances in prices of old steel rails have caused makers of rerolled light rails to advance their prices, and they are now quoting close to prices for new light rails. We quote new light rails as follows: 25 to 45 lb. sections, $50; 16 and 20 lb., $51; 12 and 14 lb., $52; 8 and 10 lb., $53, in carload lots, f.o.b. mill, with usual extras for less than carloads. We quote standard section rails of Bessemer stock at $38, and open-hearth, $40, per gross ton, Pittsburgh.

Plates.—Effective Thursday, Dec. 21, the Carnegie Steel Company advanced its prices on sheared plates $2 per ton, or to the basis of 3.60c., Pittsburgh, for ¼-in. and heavier. This, however, has no market bearing, as the company is sold up on sheared plates for all of 1917, and has taken some fairly large orders for ship plates for delivery in the first half of 1918. Other large plate mills that can deliver in the latter part of the first quarter and in the second quarter are quoting from 4c. to 5c. at mill, prices depending [illegible] on the quantity and delivery. One leading plate mill has sold recently several large lots of sheared plates for shipment in the second quarter at 4.50c. at mill. There is a heavy inquiry for small lots of cars ranging from 25 up, but large inquiry is not active. The Pressed Steel Car Company has taken 600 more general service steel gondolas for the San Pedro, Los Angeles

& Salt Lake Railroad, having previously received an order for 1000. Active inquiries in the market include 1000 composite gondolas for the Baltimore & Ohio, 200 steel hoppers for the Atlantic Coast Line, 100 steel gondolas and 100 box cars for the Long Island and 1000 steel hoppers for the Virginian. Small orders lately placed include 20 flat cars for the Birmingham & Southern with the Pressed Steel Car Company, 80 dump cars for the Oliver Iron Mining Company and 50 steel hoppers for the Vinginian with the Standard Steel Car Company. It is said several large active inquiries for cars have lately been withdrawn on account of the high prices quoted and unsatisfactory deliveries promised. We quote ¼-in. and heavier sheared steel plates at 3.60c., with no promise of delivery and from 4c. to 5c. at mill, depending on quantities and deliveries wanted.

Sheets.—The American Sheet & Tin Plate Company has established its price on blue annealed sheets, Nos. 3 to 16 inclusive, at 4c. per lb., and other mills are asking higher prices. The tardy deliveries on steel and scarcity of labor at some mills are holding down the output of sheets to some extent, and with the heavy present demand this is severely felt. Most large sheet mills have no material to offer for first quarter delivery, and some have made fairly large sales for second quarter. Prices on all grades of sheets continue to show a wide range, and the market is difficult to quote accurately. It is reported that No. 28 Bessemer black sheets have sold at close to 6c. for prompt delivery and galvanized at 7c. or above. Although prices are very strong, the belief is growing that the top has about been reached. We quote blue annealed sheets, Nos. 3 to 8, at 4c. to 4.25c.; box annealed, one pass, Bessemer cold-rolled sheets, No. 28, 4.50c. to 5c.; No. 28 galvanized, 6.25c. to 7c.; No. 28 tin-mill black plate, 4.25c. to 4.50c., all f.o.b. mill, Pittsburgh. These prices are for carloads or larger lots, and the higher prices quoted are for reasonably prompt shipment.

Tin Plate.—The American Sheet & Tin Plate Company has advanced its official price from $6.50 to $7 per base box, but it has no tin plate to sell for delivery in the first half of next year. On current orders from stock tin plate is selling at $7.50 to $8 per box and higher. It is evident that, if present conditions last, there will not be enough tin plate this year to meet the demand, and prices may be higher. Much tin plate has been sold for delivery in the second half of 1917, the price to be that fixed later for the second half period. We quote the market for delivery in the first half of next year at $7 to $8 per base box, f.o.b. mill. We quote I. C. terne plate, 107 lb., at $7.15 to $7.65, and 200 lb. carrying 8-lb. coating at $11, the usual advances applying for heavier weights and coatings.

Shafting.—Most consumers are covered for the first quarter and some through the first half of 1917, the larger of these contracts having been taken at 20 per cent off list and the smaller at 15 per cent. Several makers state they are in position to ship on new orders in from six to eight weeks. Prices are very firm and the 20 per cent discount is obtainable only on the most desirable contracts. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots and 10 per cent off in less than carload lots for first quarter and first half of 1917, f.o.b. Pittsburgh, freight added to point of delivery.

Railroad Spikes and Track Bolts.—Several makers state they have taken a few good orders for spikes at the new price of $3.40 base, but most railroads are covered for the first half, and as yet makers are not willing to sell for second half delivery. Specifications are active and the market is very strong. The new demand for track bolts is heavy, but shipments are held up very much on account of the car and motive power shortage. Railroad spikes in the Chicago district are held at $3.50 base. We quote track bolts with square nuts at 4.85c. to 5c. to railroads and 5c. to 5.25c. in small lots to jobbers, base. Track bolts with hexagon nuts take the usual advance of 10c. to 15c. We quote railroad spikes as follows: 9/16 in. and larger, $3.40, base; 7/16 and ½ in., $3.50, base; 5/16 and ⅜ in., $3.75 base; boat spikes, $3.65, base, all per 100 lb., f.o.b. Pittsburgh.

Wire Products.—Several makers state they have been able to get $3.15 to $3.25 for wire nails for fairly prompt shipment and proportionate advances on wire. New orders and specifications on wire and wire nails are showing the usual falling off incident to the holiday season. The car situation is worse and some wire mills in this district may shut down before the end of this week on account of shortage in cars and motive power. Shipments are now being badly held up. Prices have not changed, but may be advanced before Jan. 1. We quote as follows: Wire nails, $3, base, per keg; galvanized, 1 in. and longer, including large head barbed roofing nails, taking an advance over this price of $2, and shorter than 1 in., $2.50. Bright basic wire is $3.05 per 100 lb.; annealed fence wire, Nos. 6 to 9, $2.95; galvanized wire, $3.65; galvanized barb wire and fence staples, $3.85; painted barbed wire, $3.15; polished fence staples, $3.15; cement-coated nails, $2.90, base, these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to the point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing are 53 per cent off list for carload lots, 52 per cent for 1000-rod lots, and 51 per cent for small lots, f.o.b. Pittsburgh.

Wire Rods.—Further quite large sales of both soft Bessemer and open-hearth roads are reported at prices ranging from $70 to $75 at mill, while upward of $80 has been paid for rods for export to Canada. The new demand is still heavy and rods for anything like prompt shipment are almost impossible to obtain.

Iron and Steel Bars.—Effective from Thursday, Dec. 21, the Carnegie Steel Company advanced its prices on steel bars $2 per ton, or to 3c. at mill, but it is practically sold up on all the steel bars it can turn out during all of 1917. Other makers that can ship out in first and second quarters are quoting from 3.10c. to 3.25c. at mill. No large inquiries for steel rounds have come into this market lately. The new demand for reinforcing steel bars and refined iron bars is heavy and prices are strong. Some contracts for steel bars have been placed by implement makers lately for delivery in the first half of 1917 at 2.90c. to 3c. at mill. We quote steel bars at 3c. to 3.25c., depending on quantity and deliveries wanted. We quote refined iron bars at 3.25c. and railroad test bars at 3.40c. in carload lots, f.o.b. Pittsburgh.

Nuts and Bolts.—Late last week makers again advanced prices of nuts and bolts about 5 per cent. The demand is reported heavy and deliveries are bad on account of the car and motive power shortage. New discounts now in effect are as follows:

Carriage bolts, small, rolled thread, 40 and 10 per cent; small, cut thread, 40 and 2½ per cent; large 30 and 5 per cent.

Machine bolts, h. p. nuts, small, rolled thread, 50 per cent; small, cut thread, 40 and 10 per cent; large, 35 and 5 per cent.

Machine bolts, c. p. c. and t. nuts, small, 40 per cent; large, 30 per cent. Bolt ends, h. p. nuts 35 and 5 per cent; with c. p. nuts, 30 per cent. Lag screws (cone or gimlet point), 50 per cent.

Nuts, h. p. sq. and hex., blank, $2.50 off list, and tapped, $2.30 off; nuts, c. p. c. and t. sq., blank, $2.10 off, and tapped, $1.90 off; hex., blank, $2.50 off, and tapped, $2.30 off. Semi-finished hex. nuts, 50, 10 and 5 per cent. Finished and case-hardened [illegible] per cent.

[illegible] diameter and smaller 15 and 10 per [illegible]

Rivets.—Nearly all consumers are covered for the first quarter and some through the first half at prices considerably lower than are ruling now. Makers report the new demand active and specifications coming in quite freely. Makers' prices are as follows: Buttonhead structural rivets, ½ in. in diameter and larger, $4.25 per 100 lb., base, and conehead boiler rivets, same sizes, $4.35 per 100 lb., base, f.o.b. Pittsburgh. Terms are 30 days net or one-half of 1 per cent for cash in 10 days.

Cold Rolled Strip Steel.—Most consumers are covered for the first quarter and a few through the first

half and the new demand has quieted down. Prices are firm and makers are being importuned by consumers to open their books for second half, but have not yet done so. On current orders for reasonably prompt shipment, makers quote $7 for fair-sized quantities up to $7.50 per 100 lb. for small lots. Terms are 30 days net, less 2 per cent off for cash in 10 days, delivered in quantities of 300 lb. or more when specified for at one time.

Structural Material.—New inquiry is active. The American Bridge Company has taken 1850 tons of bridge work for a Western railroad, 260 tons for a pier shed for the Baltimore & Ohio Railroad, and three towboats of 1000 hp. each and 70 steel barges of the standard type, 1000 tons capacity each, for the Carnegie Steel Company. The Baltimore & Ohio also placed 700 tons of bridge work with the Fort Pitt Bridge Works and the Toledo Bridge & Iron Company. The Fort Pitt Bridge Works has also taken 1800 tons for a viaduct for the New York Central. The McClintic-Marshall Company has the order for 7000 tons of steel for extensions to the plant of the New York Shipbuilding Company, Camden, N. J. Effective Thursday, Dec. 21, the Carnegie Steel Company advanced its price on beams and channels up to 15 in. to 3.10c., Pittsburgh. We now quote beams and channels up to 15 in. at 3.50c. to 4c., depending on the size of the order.

Hoops and Bands.—Effective Thursday, Dec. 21, the Carnegie Steel Company advanced steel hoops $2 per ton to $3.35 and steel bands to $3.10, with extras as per the steel-bar card. These prices, however, are merely nominal, as the company is sold up on hoops and bands for the first half of 1917 and could not make any deliveries before the third quarter. Other mills that can ship more promptly are quoting 3.25c. to 3.35c. on steel bands and from 3.50c. to 3.75c. on steel hoops, depending on the quantity and delivery wanted.

Wrought Pipe.—The mills are now figuring on an active inquiry for 500 miles of 8-in. pipe for the Sinclair Oil & Refining Company to be shipped to Texas and Oklahoma for laying an oil line to the Gulf. The order will likely be divided among several mills, as no one mill is in position to make the deliveries wanted. Other large inquiries are in the market for pipe for gas and oil lines, but the mills are filled so far ahead they are not in position to quote for delivery on these before next summer. On lap-welded pipe the mills are sold up for six months or longer, but on butt-weld sizes can ship in six or eight weeks. One leading maker of pipe, with orders already taken, in connection with business that will come regularly from its customers, has practically its entire output of pipe sold for all of next year. Prices are very firm and on line pipe are more than double what they were this time last year. Discounts are given on another page.

Boiler Tubes.—Reports are out that an advance in prices will be made on both locomotive and merchant tubes on or before Jan. 1. Prices really cut very little figure, as the mills are sold up for nearly a year ahead, but any maker that can ship fairly promptly can get heavy premiums over regular prices. Discounts are given on another page.

Coke.—The car situation is steadily getting worse. On Saturday, Dec. 23, the Carnegie Steel Company banked three of its Ohio blast furnaces at Youngstown for lack of coke. Other stacks have had to bank for a day or two until coke arrived. Unless conditions improve, the end of this week will see more blast furnaces in this section banked. Furnaces in distress have paid up to $10 per ton for coke and were glad to get it at that price. None of the producers talks less than $5 per ton on contracts for coke for first half, their position being strengthened by the recent advance of 10 per cent in labor. We now quote best grades of furnace coke for spot shipment at $9.50 to $10 and on contracts, $4.50 to $5 per net ton at oven. Prices on foundry coke are also higher, spot shipments being held at $10 and more and contracts for best grades at $6 to $7 per net ton at oven. The Connellsville *Courier* gives the output of coke in the Upper and Lower Connellsville region for the week ended Dec. 23 as 375,501 net tons, a decrease over the previous week of 49,264 tons. This is the heaviest decrease in output in any one week.

Old Material.—The peace overtures from Germany are given as the cause of a severe decline in prices of scrap the past week. Some grades are off $2 per ton or more. The shortage in cars and the railroad embargoes are seriously handicapping shipments. As soon as the decline in prices started, about the middle of last week, new buying stopped and there have been no sales of note. Our quotations are nominal as no material is moving. Prices for delivery in Pittsburgh and other consuming points that take Pittsburgh freight rates, per gross ton, are nominally as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	$24.00 to $25.00
No. 1 foundry cast	21.00 to 22.00
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	28.00 to 29.00
Hydraulic compressed sheet scrap	21.00 to 22.00
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	16.50 to 17.00
Bundled sheet stamping scrap	14.00 to 15.50
No. 1 railroad malleable stock	20.00 to 21.00
Railroad grate bars	11.00 to 12.00
Low phosphorus melting stock	33.00 to 34.00
Iron car axles	46.00 to 48.00
Steel car axles	45.00 to 46.00
Locomotive axles, steel	48.00 to 49.00
No. 1 busheling scrap	18.00 to 18.50
Machine-shop turnings	12.00 to 12.50
Old carwheels	22.00 to 22.50
Cast-iron borings	13.00 to 13.50
*Sheet bar crop ends	28.00 to 29.00
No. 1 railroad wrought scrap	21.00 to 21.50
Heavy steel axle turnings	16.00 to 17.00
Heavy breakable cast scrap	18.00 to 18.50

*Shipping point.

Philadelphia

PHILADELPHIA, PA., Dec. 26, 1916.

Specifications for steel products show not the slightest tendency to slow up, but new business is a little lighter. The recent peace talk, stock market happenings and the holiday combined to slow things up a bit in some directions, but not in all. Orders continued to roll into the plate mills which can supply fireboxes, flanged plates, boilers and other material required for the great number of locomotives which are being placed, while the carbuilders are another prolific source of demand. The Baldwin Locomotive Works are inquiring for 30,000 tons of shell steel. One steel mill quotes 3.159c., Philadelphia, for steel bars, 3.409c. for structural shapes, and 4.159c. for plates, though it is not much of a factor in the last named. This mill is selling to its regular customers for the second quarter, but prorating shipments and not giving large consumers all they want. Billets are stronger. The foundry iron market has been quiet, but prices remain firm. A steel mill has purchased from 8000 to 12,000 tons of basic at $30 furnace. The coke troubles of the furnaces are unrelieved, and prices are tending toward higher levels. The old material market is almost at a standstill. Consumers have refused to consider heavy melting steel at $24. Rerolling rails and iron rails are stronger, but carwheels and wrought-iron pipe are lower. Great Britain has placed a ban on shipping news concerning ships leaving or arriving at her shores, which will place importers of ferromanganese more than ever in the dark concerning their supplies from abroad.

Pig Iron.—The only noteworthy transactions of the week were in basic. An eastern Pennsylvania plate mill has taken several thousand tons, at least 8000 and possibly 12,000 tons. Whether it has concluded buying is not stated. Orders were placed with at least three furnaces, it is understood, at $30, furnace. The mill in question is actuated by a desire to protect itself against a shortage of iron which might be brought about by a failure of deliveries on existing contracts. Another buyer took between 2000 tons and 3000 tons of basic at $30, furnace. Keeping their furnaces in operation in the face of a short supply of coke is the chief concern of pig-iron producers, while, on the other hand, the shortage of cars, with the time consumed in making deliveries, is another source of trouble. But little buy-

ing of foundry iron has taken place, but prices are firm, and in some cases even stronger. One maker advanced his quotation from $30 to $32, furnace, then withdrew from the market altogether. Another brand is held at $30, furnace, or $30.84, Philadelphia, and another at $31, furnace, or $32.90, Philadelphia. A moderate amount of resale iron is still available. For Virginia iron running 4 to 5 per cent silicon $29.25, furnace, or $32, Philadelphia, is quoted, and for 2½ to 3 per cent silicon (No. 2 X) $28.50, furnace, or $31.25, Philadelphia, is asked by one maker. These prices are for delivery over the first half, but none can be shipped before the middle of January. Standard low phosphorus is unchanged at $52 to $55, delivered, the minimum price commanding comparatively high phosphorus. For export over $55, seaboard, has been paid. No sales of Bessemer are reported. Quotations for standard brands delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa. No. 2 X foundry	$29.50 to $30.50
Eastern Pa. No. 2 plain	29.00 to 30.00
Virginia No. 2 X foundry	29.50 to 30.50
Virginia No. 2 plain	29.25 to 30.25
Gray forge	28.25 to 28.75
Basic	30.00
Standard low phosphorus	52.00 to 55.00

Iron Ore.—No arrivals of foreign ore at this port are reported for the week ended Dec. 23. There is a good bit of inquiry for manganese ore, but scarcity of ocean bottoms continues a detriment to business.

Ferroalloys.—No changes in price are reported. Domestic 80 per cent ferromanganese is strong at $175, delivered, for any delivery, with foreign at $164, but with no prompt available. The trade will be more than ever in the dark as to prospective arrivals now that Great Britain has placed a ban on shipping reports. The departure of vessels for the United States, or their arrival in British ports, will not be announced in the future, according to information recently received. Already, prior to the notice, the first that consignees knew of some shipments was when they arrived in Philadelphia or Baltimore. The nominal quotation for 50 per cent ferrosilicon is $100, Pittsburgh, for carloads, and $99 for 100 tons or more, but prices are really a matter of private negotiation. Arrivals of English ferromanganese at this port last week totaled 1106 tons. In January one consignee will receive 2000 to 3000 tons.

Plates.—The heavy placing of orders for cars and locomotives is piling up a large amount of work for the plate mills, especially those which have the equipment for flanging, bending, etc. One mill in this class, whose prices are 4.159c., Philadelphia, for universal plates, 5.159c. for tank plates, and 6.159c. for ship steel, is again contemplating a further advance; yet 4.159c., Philadelphia, can be done. Its deliveries are stiffening more than ever, and it is being pressed by Pittsburgh consumers who want plates. Two other makers quote 4.909c., Philadelphia, for tank plates. Neither is seeking business for ship steel, the demand for which seems without end.

Bars.—The Baldwin Locomotive Works have issued an inquiry for 30,000 tons of 6⅜-in. shell stock, delivery to be at the rate of 5000 tons a month. Ordinary steel bars are quoted at 3.159c. to 3.659c., Philadelphia, with 3.409c. the figure most commonly quoted. Iron bars are quieter but strong at 3.159c., Philadelphia.

Structural Material.—Quotations for shapes range from 3.409c. to 3.659c., Philadelphia, but the lower price is to be found only in quarters where shipments are being prorated among regular customers, many of whom are not getting all they want. Another maker quotes 3.409c. as a nominal price but asserts he has none to sell. An Eastern mill, which asks 3.659c., Philadelphia, has done business at that figure. It reports no let-up in demand and booked in December more tonnage than it can turn out in two months. It is believed that awards will be made very soon on bids submitted on improvements to be made at the Newport News Navy Yard. It has estimated that the material needed may run as high as 15,000 tons. It is understood that the New York Shipbuilding Company, Camden, N. J., has closed with the McClintic-Marshall Company for 7000 tons required for improvements to the shipbuilding plant. The Snare & Trieste Company will supply about 3000 tons required by the Cherry Street pier, this city.

Billets.—The situation is stronger than ever, with soft open-hearth rerolling billets quoted at $60 to $65 and forging steel at $75 to $85.

Sheets.—Light gage sheets are becoming very scarce. For sheets of all gages the demand is strong. No. 10 blue annealed are quoted at 4.909c., Philadelphia.

Coke.—The quotation for spot furnace coke changes from day to day, and prices are mentioned which seem impossible. While $9.50 to $10 would seem to be a rational quotation for spot furnace, $12, and even $15, per net ton at oven have been quoted. Contract furnace is quoted at $4.50 to $5, but no one wants to do business. Prompt foundry is quoted at $10 to $11 per net ton at oven, and contract at $6.50 to $7.50. No relief from the sparse shipments has yet been experienced. Freight rates from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Old Material.—The market has been inactive, and not much is expected to happen until January is under way. Heavy melting steel has been offered at $24, but the mills would not consider acceptance. Rerolling rails have sold at $30 and iron rails at $28. The recent peace talk, holidays and new car regulations are together held responsible for the situation. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$23.00 to $24.00
Old steel rails rerolling	30.00 to 31.00
Low phos. heavy melting steel scrap	33.00 to 36.00
Old steel axles (for export)	45.00
Old iron axles (for export)	45.00
Old iron rails	28.00 to 29.00
Old carwheels	22.00 to 22.50
No. 1 railroad wrought	27.00 to 28.00
Wrought-iron pipe	18.00 to 19.00
No. 1 forge fire	16.50 to 17.50
Bundled sheets	16.50 to 17.50
No. 2 busheling	13.00 to 14.00
Machine-shop turnings	13.50 to 14.00
Cast borings	14.50 to 15.00
No. 1 cast	21.00 to 22.00
Grate bars, railroad	16.00 to 16.50
Stove plate	17.00 to 17.50
Railroad malleable	18.50 to 19.00

Chicago

CHICAGO, ILL., Dec. 27, 1916.—(*By Wire.*)—A holiday season let-down is apparent in some of the activities of the market, but quietness attributable to that cause is overshadowed by the concern which is being occasioned by coal and coke shortage and the failure of transportation facilities. Manufacturing plants are crippled for power, foundries and blast furnaces are working from day to day on coke. One stack has already banked, while bad weather has multiplied existing delays due to car shortage. The principal buying of the week was for track work, and includes about 25,000 tons of rails, 15,000 tons of rail fastenings and about 150,000 kegs of spikes and bolts. It was a light week for shapes, plates and bars although there is a continuous demand for the latter from the manufacturing trade. A sharp break in the prices of scrap is coincident with a general liquidation, and consumers are limiting themselves to the offerings at concessions.

Track Supplies.—Buying of rails and track accessories was the important activity of the week. Michigan United Railways bought about 18,000 tons of standard section rails for interurban service, and other small lots brought the total for the week to about 25,000 tons. Purchases of rail fastenings totaled 15,000 [illegible] and contracts for spikes and bolts aggregated 150,000 kegs. Quotations are as follows: Standard [illegible] road spikes, 3.50c. to 3.60c., base; track bolts with square nuts, 4c. to 4.50c., base, all in carloads, Chicago; tie-plates, $55 to $60, f.o.b. mill, net ton; standard section Bessemer rails, Chicago, $38, base; open hearth, $40; light rails, 25 to 45 lb., $44; 16 to 20 lb., $45; 12 lb., $46; 8 lb., $47; angle bars, 2.25c.

Pig Iron.—The market was very quiet throughout the week and prices were stationary. A sale of 450 tons of Northern iron at $30 is noted, and several small lots [illegible]thern changed hands on the basis of $23, Bir[illegible]n, for No. 2. Blast furnaces in the Chicago

district are feeling the pinch of coke shortage, and one stack at Milwaukee has already been banked, while some of the steel-making iron furnaces are facing a like necessity. The offerings of pig-iron sellers are only in comparatively small lots, and an inquiry of size would with difficulty find accommodation. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of $1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic irons, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton.

Lake Superior charcoal, Nos. 2 to 5	$31.75 to $32.75
Lake Superior charcoal, No. 1	32.25 to 33.25
Lake Superior charcoal, No. 6 and Scotch	32.75 to 33.75
Northern coke foundry, No. 1	30.50
Northern coke foundry, No. 2	30.00
Northern coke foundry, No. 3	29.50
Northern high phosphorus foundry	28.00
Southern coke No. 1 f'dry and 1 soft	27.50 to 28.50
Southern coke No. 2 f'dry and 2 soft	27.00 to 28.00
Malleable Bessemer	30.00
Basic	30.00
Low phosphorus	40.00
Silvery, 8 per cent	35.50 to 36.00
Bessemer ferrosilicon, 10 per cent	40.50 to 42.50

Structural Material.—Contracts taken by bridge and structural shops last week totaled about 6000 tons, of which the more important work includes 1850 tons for Chicago, Burlington & Quincy bridges and 2230 tons for New York Central Lines bridges, the former going to the American Bridge Company and the latter to the Stroebel Steel Construction Company. Christopher & Simpson took a 400-ton building for Armour & Co., and the Jennet Bridge Company 560 tons for a theater building, Chicago. James Stewart & Co. let 300 tons for a sugar factory at Moroni, Utah. For plain material from mill the leading interest has announced an advance of $2 per ton for indefinite delivery and on second quarter reservation some of the independent mills are now entering specifications at 3.25c., Pittsburgh. We quote for Chicago delivery of structural steel from mill, 3.289c. to 3.439c.

We quote for structural steel out of jobbers' stocks for Chicago delivery 3.75c.

Plates.—New inquiry is reduced to imperative necessities, the mill situation making any other efforts to secure material fruitless. The price for contracts for indefinite delivery has been advanced $2 per ton, and for early shipment quotations continue to range from 4.50c. to 6c., depending upon the size of plates required and the delivery. We quote for Chicago delivery of plates from mill, at its convenience, 3.789c.; for prompt shipment, 4.689c. to widths up to 72 in., and for wide plates, 4.939c. to 5c.

We quote for Chicago delivery of plates from jobbers' stocks, 4.35c.

Sheets.—Makers of sheets continue to be importuned by their regular customers for further supplies of material, and if inquiry received represents actual needs many users of sheets are being forced to curtail operations, for the sheets are not to be had. We quote, for Chicago delivery, No. 10 blue annealed, 4c. to 4.50c.; box annealed, No. 16 and lighter, 4.50c. to 5c.; No. 28 galvanized, 6.50c. to 7c. These quotations are minimum prices for contracts. Early shipment quotations are $5 to $10 per ton higher.

Further advances in the price of galvanized sheets from 7c. have been announced and we quote for Chicago delivery out of stock, regardless of quantity, as follows: No. 10 blue annealed, 4.50c.; No. 28 black, 5c.; No. 28 galvanized, 7c.

Cast-Iron Pipe.—The award of 1500 tons of pipe at St. Paul is understood to have been made to the National Cast Iron Pipe Company. New lettings announced include 1600 tons at Sioux City, Iowa; 400 tons at Madison, Wis.; 250 tons at Portland, Ore., and 300 tons at Fort Wayne, Ind. We quote as follows, per net ton, Chicago: Water pipe, 4-in., $44.50; 6-in. and larger, $41.50, with $1 extra for class A water pipe and gas pipe.

Bars.—Inquiry for mild steel bars from the general manufacturing trade is continuous, but the inability of the mills to accommodate users restricts business to an almost negligible volume. Prices are up $2 per ton. Inquiries for large rounds for the manufacture of munitions are still being received, including one for 20,000 tons. Local rail-carbon rerolling mills are practically out of the market, and recent sales have been on the basis of 3.25c. at the mill. We quote mill shipment, Chicago, as follows: Bar iron, 3c. to 3.25c.; soft steel bars, 3.189c. to 3.439c.; hard steel bars, 3.25c.; shafting, in carloads, 20 per cent off; less than carloads, 15 per cent off.

We now quote store prices for Chicago delivery as follows: Soft steel bars, 3.60c.; bar iron, 3.60c.; reinforcing

Rivets and Bolts.—The excess of demand over the supply of bolts and nuts available for anything approaching prompt delivery is such as to establish a uniformity of quotations such as has rarely existed in this trade. A further lowering of discounts is announced this week and we have revised our quotations accordingly. We quote as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 40-10; cut thread, 40-2½; larger sizes, 30-5; machine bolts up to ⅜ x 4 in., rolled thread, with hot pressed square nuts, 50; cut thread, 40-10; large size, 35-5; gimlet-point coach screws, 50; hot pressed nuts, square, $2.50 off per 100 lb.; hexagon, $2.60 off. Structural rivets, ¾ to 1¼ in., 4.15c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

Store prices

Old Material.—The liquidation of stocks of scrap in the hands of dealers and brokers continued through last week, and this activity was augmented by short sales in considerable quantity. A further break in prices was the natural accompaniment. At present, sales to consumers are for the most part limited to material coming in on track and for this scrap prices are such as the urgency of the circumstances dictates. There is a considerable dealer activity in connection with the covering of short sales. Additional railroad offerings include 3000 tons from the Great Northern; 1500 tons from the Burlington; 1000 tons from the Soo and 500 tons from the Chicago & Eastern Illinois. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	
Relaying rails	
Old carwheels	20.00 to 21.00
Old steel rails, rerolling	27.00 to 28.00
Old steel rails, less than 3 ft.	25.00 to 26.00
Heavy melting steel scrap	21.50 to 22.00
Frogs, switches and guards, cut apart	21.50 to 22.00
Shoveling steel	
Steel axle turnings	14.00 to 14.50

Per Net Ton

Iron angle bars	
Iron arch bars and transoms	
Steel angle bars	
Iron car axles	
Steel car axles	40.00 to 41.00
No. 1 railroad wrought	23.50 to 24.00
No. 2 railroad wrought	22.50 to 23.00
Cut forge	22.00 to 22.50
Pipes and flues	
No. 1 machinery	
No. 2 machinery	
Steel knuckles and couplers	22.50 to 23.00
Steel springs	
No. 1 busheling	
Boiler punchings	
Locomotive tires	
Machine shop turnings	
Cast borings	
No. 1 cast scrap	
Stove plate and light cast scrap	
Grate bars	13.50 to 14.00
Brake shoes	
Railroad malleable	
Agricultural malleable	

The first of three 600-ft. Lake freight boats that are being built for the Pittsburgh Steamship Company will be launched at the Lorain yards of the American Shipbuilding Company, Jan. 6. It will be christened Eugene W. Pargny, in honor of the president of the American Sheet & Tin Plate Company. The other two vessels, when launched, will be named for August Ziesing, president American Bridge Company, and Homer D. Williams, president Carnegie Steel Company. One of these boats is being built by the American Shipbuilding Company and the other by the Great Lakes Engineering Works.

Cleveland

CLEVELAND, OHIO, Dec. 26, 1916.

Iron Ore.—Sales aggregating about 200,000 tons have been made in the past few days and several small lot inquiries are pending. These orders, however, will probably not be placed until after the holidays. We quote prices as follows, delivered lower Lake ports: Old range Bessemer, $5.95; Mesaba Bessemer, $5.70; old range non-Bessemer, $5.20; Mesaba non-Bessemer, $5.05.

Pig Iron.—With the holiday season and peace talk, the market has quieted down and there is practically no inquiry. Jobbing foundries and other consumers who have not covered for their last half requirements are following a waiting policy. The Cromwell Steel Company, which recently came into the market for 37,000 tons of basic iron for delivery next year, starting with May for its new plant in Lorain, Ohio, will probably defer buying. The car situation shows no improvement. Several Ohio furnaces have been banked because of inability to secure coke, and furnaces having by-product plants are experiencing about as much trouble in getting coal as others are having in getting coke. Many foundries are not getting pig-iron deliveries as needed. Practically all shipments of Southern iron are being held up by embargoes. The Ohio railroads are refusing pig iron from connecting lines in Cincinnati. Prices are unchanged. Northern foundry iron is quoted at $31 for No. 2, and Southern iron at $23 to $25, Birmingham, for No. 2 for the first half, and $22 to $23.50 for the last half. Virginia iron is higher, being quoted at $29, at furnace, for prompt shipment. We quote prices as follows, f.o.b. Cleveland:

Bessemer	$35.95
Basic	30.50
Northern No. 2 foundry	31.50
Southern No. 2 foundry	$26.00 to 29.00
Gray forge	29.50
Ohio silvery, 8 per cent silicon	38.62 to 39.62
Standard low phos., Valley furnace	50.00 to 51.00

Coke.—Many foundries are having difficulty in getting coke as fast as needed because of the car situation, and some have been compelled to partly suspend operations the past few days because of the lack of fuel. Others are securing their coke by hauling it in wagons from railroad sidings, the railroads being unable to deliver it to its destination. There is a fair demand for foundry coke for prompt shipment, and it is quoted at $10 per net ton at oven. For first half contracts quotations range from $7 to $7.50. A Cleveland furnace interest has paid as high as $11 for furnace coke for prompt shipment.

Finished Iron and Steel.—Peace talk has so far had little effect on the steel market, although some consumers who had inquiries out for steel for extended delivery are now holding off. The demand for steel for early delivery continues heavy. Lake shipyards are figuring on a number of foreign inquiries for boats. The Wheeling & Lake Erie Railroad has placed 5000 tons of rails for 1918 delivery and an inquiry has come out for 5000 to 6000 tons of light rails for France. The Wellman-Seaver-Morgan Company, Cleveland, has been awarded the superstructure for a floating crane for the Mare Island Navy Yard, requiring 700 tons of steel, which has just been placed. The Navy Department will erect a pontoon which will require 1000 tons. The demand for plates continues heavy, and a Cleveland mill is taking considerable business at 5c., Pittsburgh, for early delivery, quoting as high as 6c. in some cases. A Pittsburgh mill has advanced its price for tank plates to 4.75c. to 5c. Large inquiries for plates for export are coming out. Hard steel bars are firmer and are now quoted at 3.25c. by one mill. Sheets are apparently getting scarcer. A Cleveland jobber a few days ago wrote to 14 mills for sheet prices and only one would make quotations, its price being 5c. for black and 7c. for galvanized. Deliveries on sheet bars are becoming worse because of the railroad embargoes, and some Ohio mills have been forced to curtail production. Temporary shutdowns of other mills have been necessitated because of the lack of coal. The Stark Rolling Mill Company, Canton, Ohio, has shut down its 18 hot mills to Jan. 1. One Cleveland mill is temporarily out of the market on blue annealed sheets. We quote sheets at 4.50c. to 5.50c. at mill, for No. 28 black; 4.25c. to 4.75c. for No. 10 blue annealed, and 6.50c. to 7.50c. for No. 28 galvanized. Cleveland warehouse prices have been advanced to 3.75c. for steel bars under 2 in., 3.95c. for structural material, 4.60c. for plates, and 4.75c. for hoops.

Bolts, Nuts and Rivets.—Another advance in bolt and nut prices of about 5 per cent was made last week. In addition, manufacturers have decided to hereafter make an extra charge of 10 per cent for V threaded bolts, and 50c. per 100 lb. for nuts. The U. S. standard bolts and nuts are now generally used so that the demand for bolts and nuts with V threads has become quite light. A heavy volume of bolt and nut business is coming out, largely in contracts for the first half. Specifications for rivets continue heavy. We quote rivets at 4.25c., Pittsburgh, for structural and 4.35c. for boiler. Bolt and nut discounts are as follows:

Coach and carriage bolts, ⅜ x 6 in., smaller or shorter, rolled thread, 40 and 10; cut thread, 40 and 2½, larger or longer, 30 and 5. Machine bolts with h.p. nuts, ⅜ x 4 in., smaller or shorter, rolled thread, 50; cut thread, 40 and 10; larger or longer, 35 and 5. Lag bolts, cone point, 50. Square and hexagon h.p. nuts, blank, $2.50 off the list; tapped, $2.30 off. C.p.c. and t. hexagon nuts, all sizes, blank, $2.25 off; tapped, $2.00 off. Cold pressed semi-finished hexagon nuts, 50, 10 and 5 off.

Old Material.—The market has quieted down materially for the holiday season, and peace talk has had somewhat of a depressing effect. Considerable material has come out that was apparently being held for higher prices. Heavy melting steel, which recently sold at $27 to $27.50 in Cleveland, is now being quoted at $23 to $24. Carwheels are about $2 per ton lower and prices on borings, turnings, cast scrap and a few other grades are slightly easier. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton

Steel rails	$23.50 to $24.00
Steel rails, rerolling	28.00 to 29.00
Steel rails under 3 ft.	29.00 to 30.00
Iron rails	31.00 to 32.00
Steel car axles	50.00 to 52.00
Heavy melting steel	23.00 to 24.00
Carwheels	21.00
Relaying rails 50 lb. and over	37.00 to 38.00
Agricultural malleable	16.50 to 17.00
Railroad malleable	22.50 to 23.00
Steel axle turnings	17.00 to 17.50
Light iron and sheet scrap	14.50 to 15.00

Per Net Ton

Iron car axles	$47.00 to $48.00
Cast borings	10.25 to 10.50
Steel car axle turnings and drillings	10.00 to 10.25
No. 1 busheling	17.50 to 18.00
No. 1 railroad wrought	26.00 to 27.00
No. 1 cast	18.50 to 19.00
R. R. grate bars	14.50 to 15.00
Stove plate	14.50 to 15.00

Buffalo

BUFFALO, N. Y., Dec. 26, 1916.

Pig Iron.—Transactions have been confined largely to buying for emergency use. The aggregate of sales is exceedingly small, owing to limited amount of iron available and abnormally congested freight conditions resulting from severe weather, not to mention the scarcity of cars and labor as well as shortage of coke. Furnaces find it very difficult to get out shipments at all, as temporarily only a small proportion of cars requisitioned for loading can be supplied by the railroads. Local shipping troubles are intensified by the operation of the new rule governing the interchange of cars, which requires prompt return of cars to railroad owning them. Some users of malleable iron are obliged to substitute charcoal iron where this is procurable. Two stacks of the district have been obliged to bank for a few days owing to the inability to secure coke held up in transit by heavy snows. Most producers of the district have no coke iron to sell except for last half or last quarter delivery and only a small aggregate tonnage at that. Everything available is held at $35 per ton, flat, at furnaces for all grades. Some Southern iron has been sold for second and third quarter delivery in this vicinity at about the same prices as Northern iron or a shade lower owing to fact that local furnaces were unable to make the deliveries required.

Finished Iron and Steel.—Operating departments have been seriously affected by car shortage and em-

bargoes, and consumers are thus very much handicapped. Many shipments have been on the way for three to four weeks though they normally require only the same number of days. Mill agencies have advanced prices $2 per ton on bars, shapes and plates. Warehouse prices also advanced $2 on bars and shapes and $5 on plates. All mill prices are largely nominal with very few real transactions reported, owing to the unwillingness of mills to take on additional tonnage and to the somewhat more conservative stand of buyers. There is little surplus stock in the hands of users, practically everything moving forward going into actual consumption. A few contracts have been made for the second quarter for bars, plates and shapes, but the producer shows no disposition to solicit business on the basis of present prices.

Old Material.—The usual holiday lull in buying prevails, but a number of good sized inquiries for heavy melting steel are out for delivery over the first quarter. There is an absolute shortage in this grade and all signs point to prices again ascending for this and other grades. Shipments have been held up on account of shortage of cars and severe weather conditions. There is no change in last week's prices and we quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	$26.00 to $27.00
Low phosphorus	32.00 to 34.00
No. 1 railroad wrought	30.00 to 31.00
No. 1 railroad and machinery cast	23.00 to 24.00
Iron axles	45.00
Steel axles	45.00
Carwheels	23.00 to 24.00
Railroad malleable	23.00 to 24.00
Machine shop turnings	11.50 to 12.00
Heavy axle turnings	17.50 to 18.00
Clean cast borings	11.50 to 12.00
Iron rails	25.00 to 26.00
Locomotive grate bars	15.50 to 16.00
Stove plate	16.00 to 16.50
Wrought pipe	17.00 to 17.50
No. 1 busheling scrap	21.50 to 22.50
No. 2 busheling scrap	15.00 to 15.50
Bundled sheet scrap	17.00 to 18.00

St. Louis

ST. LOUIS, MO., Dec. 26, 1916.

Pig Iron.—The market showed no softening, though there was relatively little buying. Inventories and the holidays were taking the attention, a fact which the halt in buying allowed. All consumers are using material ahead of their expected requirements and are affected seriously by the car shortage. Basic iron is entirely out of the market so far as representatives here are concerned, none being in position to take on any business.

Coke.—Some especially urgent small lots were handled, according to some unconfirmed statements, at as high as $15 per ton for immediate delivery. The price of $10 to $10.50 per net ton at Connellsville ovens continues the figure for best selected 72-hr. coke for immediate and near future delivery. The by-product cokes of this territory are entirely out of the market, having been sold up for most of the coming year.

Finished Iron and Steel.—Specifications remain heavy, but there is little disposition to urge far future contracts, which the mill representatives are also discouraging. Standard section steel rails for 1918 delivery continue to be sought; a lot of 2500 tons was the largest bought in the week. Movement out of warehouse is large and consumers are willingly paying the high prices. We quote for stock out of warehouse as follows: Soft steel bars, 3.65c.; iron bars, 3.55c. to 3.60c.; structural material, 3.65c.; tank plates, 4.40c.; No. 10 blue annealed sheets, 4.55c.; No. 28 black sheets cold rolled, one pass, 5.15c.; No. 28 galvanized sheets, black sheet gage, 7.10c.

Old Material.—The market softened somewhat in the week, the big consumers proving that they are willing to buy only as prices are made attractive, and the dealers caught short on the recent sharp advance having measurably covered themselves. Local prices are now more nearly in line with the quotations of other scrap centers than they have been for some weeks. Buying for Eastern and Northern interests has also sagged somewhat. Relaying rails are entirely out of the market and unobtainable at any price, though there is considerable inquiry for them. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton

Cast iron rails	$27.00 to $27.50
Cast steel rails, re-rolling	27.50 to 28.00
Old steel rails, less than 3 ft.	27.00 to 27.50
Relaying rails, standard section, subject to inspection	33.00 to 34.00
Old carwheels	20.50 to 21.00
No. 1 railroad heavy melting steel scrap	24.00 to 24.50
Heavy shoveling steel	29.00 to 29.50
Ordinary shoveling steel	18.50 to 19.00
Frogs, switches and guards cut apart	24.00 to 24.50
Ordinary bundled sheet scrap	13.50 to 14.00

Per Net Ton

Iron angle bars	$26.00 to $26.50
Steel angle bars	22.00 to 22.50
Iron car axles	36.50 to 37.00
Steel car axles	37.50 to 38.00
Wrought arch bars and transoms	27.50 to 28.00
No. 1 railroad wrought	24.50 to 25.00
No. 2 railroad wrought	23.50 to 24.00
Railroad springs	23.50 to 24.00
Steel couplers and knuckles	24.00 to 24.50
Locomotive tires, 42 in. and over, smooth inside	26.00 to 26.50
No. 1 dealers' forge	19.00 to 19.50
Cast-iron borings	9.00 to 9.50
No. 1 busheling	17.50 to 18.00
No. 1 boilers, cut to sheets and rings	14.00 to 14.50
No. 1 railroad cast scrap	15.00 to 15.50
Stove plate and light cast scrap	10.50 to 11.00
Railroad malleable	16.50 to 17.00
Agricultural malleable	14.00 to 14.50
Pipes and flues	15.00 to 15.50
Heavy railroad sheet and tank scrap	14.50 to 15.00
Railroad grate bars	12.00 to 12.50
Machine shop turnings	9.50 to 10.00
Heavy axle and tire turnings	12.50 to 13.00

Birmingham

BIRMINGHAM, ALA., Dec. 26, 1916.

Pig Iron.—Several sales of prompt delivery foundry iron have been made by furnace interests at $25, with one sale of 600 tons for second half delivery at the same figure. One iron company, which was selling at $23 for last half, advanced about Dec. 20 to $25 for any delivery. That is now the basis of at least two furnace companies, while the largest foundry producer and one other quote a minimum of $24 for all deliveries. The leading interest is understood to have made additional sales of second half under the prices above mentioned, but they are exceptional, as it has also sold early delivery iron at $25. It is established that prompt delivery iron ranges around $24 and $25 with very little last half iron to be had under the first figure. All interests are so well booked that none is soliciting business. Basic orders, if accepted, would be at a higher range than foundry. Several additional sales for export at $25 were made, and there has been a brisk inquiry in that direction. The pipe people are expected to enter the market in the not distant future, but show no disposition to do so now. The week's sales were not large in volume and the average price obtained for all deliveries was probably around $24. The Southern melt is at maximum. The holidays will be short, manufacturers being anxious to fill orders with promptness. We quote, per gross ton, f.o.b. furnaces, as follows:

No. 1 foundry and soft	$24.50 to $25.50
No. 2 foundry and soft	24.00 to 25.00
No. 3 foundry	23.50 to 24.50
No. 4 foundry	23.00 to 24.00
Gray forge	23.00 to 24.00
Basic	24.50 to 25.50
Charcoal	26.00 to 26.00

Cast-Iron Pipe.—Orders are being restricted to small quantities for filling in. Manufacturers must soon get new business or curtail operations. Fortunately the rise in price of pig iron came at the usually dull pipe-making season. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., $39; 6-in. and upwards, $36, with $1 added for gas pipe and special sizes.

Coal and Coke.—Spot standard beehive coke is selling at $8.50 to $10 per net ton. Bookings at that price for Texas, general Southern delivery and California were made during the week by at least two makers. Furnace coke would bring from $4 to $4.50 per ton. Steam coal ranges around $3 per ton. The Imperial Coal Company will at once open a 1000-ton mine at Bradford, where it will also repair and light 100 bee-

hive coke ovens to make coke for a Mexican smelter. The Alabama Company is to open a new mine at Searles.

Old Material.—The scrap market has softened for no special reason, the demand being as good as ever. Some ascribe the weakening to stock market fluctuations. At any rate, during the past week the same consumer bought a special grade from a dealer at $20 and two days later obtained 700 additional tons at $18. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old steel axles	$25.00 to $26.00
Old steel rails	19.00 to 20.00
No. 1 wrought	19.00 to 20.00
Heavy melting steel	17.00 to 18.00
No. 1 machinery	16.00 to 17.00
Carwheels	16.00 to 17.00
Tram carwheels	17.00 to 18.00
Stove plate and light	12.50 to 13.00

Cincinnati

CINCINNATI, OHIO, Dec. 27, 1916.—(*By Wire.*)

Pig Iron.—A Canadian consumer bought through a local merchant 3000 tons of Northern foundry iron for last half shipment. Local business is quiet, and only a few lots of foundry iron have been placed lately for either future or prompt shipment. No changes have been made in quotations, and if anything the market is a trifle stronger for nearby shipment. There is probably more resale iron in the South than was generally supposed, but a large tonnage of this has been quietly moved and is now in the hands of consumers, so that it will not figure in any future price adjustments. Southern furnaces quote from $24 to $25, Birmingham, for first half shipment and from $23 to $25 for last half. Several sales around 200 tons each have been made in Ohio and Indiana, but no contracts of any size are under consideration. About 500 tons of Northern foundry iron was taken by a central Ohio melter at $30, Ironton, for last half delivery. An inquiry from Michigan calls for 1000 tons of mixed Northern and Southern foundry iron for last half. No interest is taken in either malleable or basic. Bessemer is hard to obtain at any price for nearby shipment, and all the way from $35 to $37 at furnace is quoted for any delivery next year. The Ohio silvery irons are also scarce, and the furnaces have practically withdrawn from the market for early delivery; based on an 8 per cent analysis, $35 at furnace is considered minimum for last half movement. The Southern high silicon irons can be obtained at a lower figure, but no sales have come to light lately in this territory. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	$26.40 to $28.40
Southern coke, No. 2 f'dry and 2 soft	25.90 to 27.90
Southern coke, No. 3 foundry	25.40 to 27.40
Southern coke, No. 4 foundry	24.90 to 26.90
Southern gray forge	24.40 to 26.40
Ohio silvery, 8 per cent silicon	37.25 to 38.25
Southern Ohio coke, No. 1	31.76
Southern Ohio coke, No. 2	31.26
Southern Ohio coke, No. 3	30.76
Southern Ohio malleable Bessemer	31.26
Basic Northern	31.26
Lake Superior charcoal	28.70 to 29.70
Standard Southern carwheel	33.40 to 34.40

Finished Material.—The holiday season has reduced business to a considerable extent, although prices are holding at the same level as last week. The nearby rolling mills did not close down for the entire holidays, and are now in full operation. The mill price of No. 28 black sheets is 5c., Cincinnati or Newport, Ky., and from 6.90c. to 7.15c. for No. 28 galvanized. We quote local store prices as follows: No. 10 blue annealed sheets, 4.40c.; steel bars and small structural shapes, 3.70c.; structural material, 3.80c., base; rounds and squares, 2 in. and over, 4.25c.; flat bars, 1 in. and over, 4.25c.; cold-rolled shafting, 10 per cent plus list; wire nails, $3.40 per keg, base; barb wire, $4.40 per 100 lb., base.

Coke.—A few sales of foundry coke were made the past week as high as $13 at oven. The scarcity of [illegible] is a serious question with oven operators in all districts. Prompt prices depend almost entirely on the ability of operators to get sufficient [illegible]. Some complaint is made as to the holdup in shipments, both on furnace and foundry coke.

Old Material.—Business is slow. While there has been a softening in prices, no definite changes were made last week. The following are dealers' prices, f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton

Bundled sheet scrap	$14.75 to $15.25
Old steel rails	25.00 to 25.50
Relaying rails, 50 lb. and up	28.50 to 29.00
Rerolling steel rails	25.00 to 25.50
Heavy melting steel scrap	21.00 to 21.50
Steel rails for melting	21.00 to 21.50

Per Net Ton

No. 1 railroad wrought	$21.75 to $22.25
Cast borings	7.00 to 7.50
Steel turnings	7.00 to 7.50
Railroad cast	16.50 to 17.50
No. 1 machinery cast	18.25 to 18.75
Burnt scrap	10.50 to 11.00
Cast axles	33.25 to 33.75
Locomotive tires (smooth inside)	27.00 to 27.50
Pipe and flues	14.00 to 14.50
Malleable cast	15.00 to 15.50
Railroad tank and sheet	12.00 to 12.50

New York

NEW YORK, Dec. 27, 1916.

Pig Iron.—Consumers have had little to do with the market, a condition rather due to the holiday quiet that was expected than to the talk of peace. While the New Haven Railroad has taken off its embargo the Pennsylvania Railroad has embargoed New York Harbor points east of Waverly, N. J., including Brooklyn, the order becoming effective Dec. 23. Foreign inquiry is still a factor, 15,000 tons of foundry iron being asked for in the past week on behalf of neutral countries on the Continent of Europe. Their inability to get British iron will continue to send these countries to the United States. Some small lots of Virginia iron were sold at $29 for first half of 1917 and $26 for second half. In the warrant market a few holders have been offering their warrants at $22.50 for No. 2 iron at Birmingham. Bargain hunters might be interested at $21 or less. A 3,000-ton sale of basic iron was made to a New Jersey interest for delivery in the first quarter of 1917 at a figure reported to be $30 at eastern Pennsylvania furnace. The Eastern pig iron market is interested in the Bethlehem Steel Company's purchase of the five Lackawanna furnaces in the Lebanon Valley, since it is expected they will discontinue making foundry iron for the market, being confined to basic and Bessemer iron for use at South Bethlehem. We quote at tidewater for early delivery: No. 1 foundry, $30 to $31; No. 2X, $29.50 to $30.50; No. 2 plain, $28.50 to $29.50; Southern iron at tidewater, $29 to $30 for No. 1 and $28 to $29 for No. 2 foundry and No. 2 soft.

Ferroalloys.—Very few sales or inquiries for either British or domestic ferromanganese have appeared in the past week. The British product is quoted at $164, seaboard, and the domestic is held at $175, delivered. The immediate wants of most consumers are pretty well cared for and deliveries on contract are satisfactory. The extent to which the proposed arming of British merchant ships will affect the receipt of British ferromanganese is causing some speculation be[illegible], according to the plan, all British alloy would have to come by way of Halifax. The market for 20 per cent spiegeleisen is strong at about $60, furnace, for forward delivery and it is reported that the material is hard to obtain for January delivery. The market for 50 per cent ferrosilicon is very strong, with contract material being sold at $99 to $100, depending on the quantity. Some sales for nearby delivery have been made as high as $120 delivered.

Finished Iron and Steel.—Inquiries continue in the volume of late weeks and the price advances intimated in last week's issue as likely to happen have already taken place, though it is not clear in the case of these new prices, which are for far future shipment, that any considerable volume of business has been done. [illegible] it would seem for the immediate future at least [illegible] not only will general prices hold, but the tendency [illegible]ard. In fact one plate manufacturer is asking

5c. for tank quality at three to four months' delivery. Another is getting the same price for small lots in two or more weeks, while 4½c. Pittsburgh, appears to be the minimum for universal plates in two to six weeks. One recent sale covers 3,000 tons of ship plates to Japan over the last half of 1917 at more than 5c. and 10c. for the same shipment has been paid for no less than 1,000 tons of marine boiler steel. It is stated that there is still all of 150,000 tons of ship plates awaiting mill acceptance. Billets for shells are still under consideration. Besides the advance made by the United States Steel Corporation of $2 per ton for bars, shapes, plates and hoops for future delivery, warehouse prices have gone up, a matter of $2 per ton for bars and $4 per ton for shapes. The business of the leading fabricator, both as regards inquiries and bookings, is reported to have been larger in December this year than in any previous December on record. New contracts, while not large, have totaled good figures. The American Bridge Company has taken 2,600 tons for the Baltimore & Ohio pier at Baltimore, Md., and 300 tons for a new building for the General Hospital at Philadelphia. The Baltimore Enamel & Novelty Company, Baltimore, Md., has awarded 300 tons for a new building, but the contractor's name is not made public. The American Bridge Company has bid on 200 tons for 4 bridges for the Philadelphia & Reading. Other new business before the market embraces 450 tons for a warehouse for Austin & Doten, Boston; 500 tons for a loft at Broad, South and Front Streets, New York City; 3,000 tons for the Cherry Street pier, Philadelphia, and 500 tons for the Tishman apartment on Eighty-fourth Street, New York City. An extension for the Abraham & Straus store, Brooklyn, 350 tons, is talked of. The largest new project will be bid upon Jan. 10, 1917, and will be for the Livonia Avenue line of the Public Service Commission for Brooklyn, taking 15,600 tons. We quote mill shipments of shapes in two to five months at 3.419c. to 3.669c., New York, at convenience of the mill 3.269c. New York, and warehouse shipments at a minimum of 3.95c., New York. We quote universal and ordinary tank plates at 4.169c. to 5.169c., New York, but Lloyd specification plates at 5.169c. to 6.169c., with little available before the third quarter of 1917 and for plates in the fourth quarter of 1917 and the first quarter of 1918 at 3.769c., New York. Out of store we quote 4.75c., New York, for plates under 36 in. in width and 5c. on wider plates. We quote mill shipments of steel bars at 3.169c. to 3.669c., New York, the lower price for indefinite delivery and the higher for small quantities in, say, three months. We quote mill shipments of bar iron at 3.169c., New York. Out of warehouse iron bars are 3.50c. and steel bars 3.85c., New York.

Old Material.—The market appears to be at a complete standstill. Brokers quote buying prices nominally as follows to local dealers and consumers, per gross ton, New York:

Heavy melting steel scrap (for eastern Pennsylvania shipment)	$20.00 to $20.50
Old steel rails (short lengths) or equivalent	22.00 to 22.50
Relaying rails	37.00 to 38.00
Rerolling rails	27.50 to 28.00
Iron and steel car axles (for export)	45.00 to 47.00
No. 1 railroad wrought	25.00 to 26.00
Wrought-iron track scrap	22.00 to 22.50
No. 1 yard wrought, long	22.00 to 22.50
Light iron (nominal)	6.50 to 7.00
Cast borings (clean)	11.00 to 11.50
Machine shop turnings	9.50 to 10.00
Mixed borings and turnings	7.00 to 7.50
Wrought pipe (not galvanized or enameled)	16.50 to 17.00

Dealers' quotations to consumers of cast scrap are nominally as follows, per gross ton, New York:

No. 1 cast	$22.00 to $22.50
No. 2 cast	19.00 to 19.50
Stove plate	15.50 to 16.00
Locomotive grate bars	15.50 to 16.00
Old carwheels	21.50 to 22.00
Malleable cast (railroad)	18.00 to 18.50

Cast-Iron Pipe.—Seasonable dullness prevails, although inquiry from private buyers is considerably greater than usual for the last week in December. Prices are maintained at $41.50 per net ton, tidewater, for carload lots of 6-in., class B and heavier, with class A and gas pipe taking an extra of $1 per ton.

British Steel Market

Ferromanganese Stronger—Higher Quotations for Semi-Finished Steel

(By Cable)

LONDON, ENGLAND, Dec. 27, 1916.

The pig-iron market is generally firm but quiet. Tin plates are firmer and export business is more difficult. Ferromanganese is quoted at £36 upward. Higher terms are checking business in semi-finished steel and 4-in. billets for January-June delivery are quoted at about $92 c.i.f. Liverpool. Wire rods for prompt shipment have been sold to France for £24 c.i.f. We quote as follows:

[illegible] Wales,

[illegible] black sheets, No. 28, export, f.o.b. Liverpool, £19 5s.

Hematite pig iron, f.o.b. Tees, 142s. 6d.

[illegible] Valnominal.

[illegible] Ferromanganese [illegible] Liverpool.

(By Mail)

Increasing Pig-Iron Output—Ferromanganese Stronger on Sales to Italy, France and Spain

LONDON, ENGLAND, Dec. 5, 1916.—The steel position generally is still difficult, though there is more hope of the enormous pressure of needs being met more successfully in the new year. Distinctly easier conditions have been experienced lately, however, in pig iron, even in hematite, though output on the Northwest Coast is still short of requirements. Additional relief, however, will be afforded there by four furnaces which are to be relighted shortly. In other directions endeavors to develop the output, combined with close official control of the exports, have certainly enabled much freer deliveries to be made to home consumers, whose needs now seem to be fairly well covered.

It has thus been possible to devote more attention to Allied countries' requirements in both Cleveland and hematite material, for which permits are more easily obtainable, so that this month's shipments may show an improvement. The total pig iron shipped from the Tees last month was only 31,656 tons (against 53,610 tons for October), of which 25,548 tons went to France, against 40,930 tons in October. The home demand has fallen off considerably and seems to be pretty well satisfied. There is no lack of forward inquiries, but producers are not eager to add to their commitments into next year.

It is understood that iron workers in the area covered by the Midland Iron and Steel Wages Board have been granted a further advance in wages of 5 per cent, the present rate of puddling being 17s. 3d. per ton, or the highest figure ever recorded.

The allocation of the deliveries of home semi-finished steel for special requirements is being, as far as can be gathered, increased further, so that the use in other directions looks like being reduced still more. The tin-plate mills are likely to be greatly handicapped in this respect, for it is thought that they will soon only draw about one-third of their normal supply of steel bars. American semi-finished steel rules very firm, the lowest terms quoted for 4-in. billets being $70 for January-March delivery, f.o.b. Liverpool. There is a demand for wire rods, but the much higher prices asked (up to about £25 a ton, c.i.f.) make business impossible.

The pooling arrangement in the Welsh tin-plate trade has helped to consolidate the market, in spite of the unsatisfactory state of export business. Stock plates are not coming out so freely and prices are hardening, while better terms are secured for orders against class A work under the regulations in force. The output, of course, is bound to fall off further.

The fact that British producers of ferromanganese are already sold up for next quarter, and that the Continental demand continues, has stiffened the market considerably, although there is very little doing for America. Sales have been made to Italy, France and Spain at prices ranging up to about £35, f.o.b., for loose.

Iron and Industrial Stocks

NEW YORK, Dec. 27, 1916.

Another period of pronounced liquidation overwhelmed the stock market the past week. It is stated that this outpouring of stocks was the greatest since the dark days of 1907. In one day, Thursday of last week, the sales on the New York Stock Exchange exceeded 3,000,000 shares, falling just short of a record. The immediate cause was the peculiar language used by Secretary of State Lansing in an effect to explain the peace note of President Wilson to the belligerent nations. It has been pointed out, however, that the underlying influence was the excessive speculation which had placed the stock market in a position to topple easily. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com	24	- 28⅞	
Allis-Chal., pref.	81	- 88½	
Am. Can, com.	44	- 51½	
Am. Can, pref.	107⅞	-108½	
Am. Car & Fdy., com.	62	- 69¾	
Am. Car & Fdy., pref.		116¼	
Am. Loco., com.	67¾	- 80¼	
Am. Loco., pref.	103	-106½	
Am. Ship, com.	53½	- 62	
Am. Ship, pref.	95	- 96	
Am. Steel Fdries.	59	- 64	
Bald. Loco., com.	52	- 65½	
Bald. Loco., pref.	98⅞	-101½	
Beth. Steel, com.	489	-515	
Beth. Steel, pref.	130	-143¼	
Cambria Steel	110	-115	
Carbon Stl., com.	101	-108	
Carbon Steel, 1st pref.		100	
Carbon Steel, 2nd pref.	70	- 80	
Central Fdry., com.	18	- 25½	
Central Fdry., pref.	37	- 40	
Chic. Pneu. Tool	66	- 73	
Colo. Fuel	40¾	- 47¾	
Cruc. Steel, com.	55¼	- 67¾	
Cruc. Steel, pref.	113⅛	-114¼	
Deere & Co., pref.		98	
Driggs-Seabury	45½	- 56½	
Gen. Electric	160½	-171½	
Gt. No. Ore Cert.	32	- 39¼	
Gulf States Steel.	100	-137	
Gulf States Steel, 1st pref.		107	
Gulf States Steel, 2nd pref.	108½	-115	
Harb-Walk. Refrac., com.		120	
Int. Har. of N. J., com.	118	-123	
Int. Harv. Corp., com	83	- 90¼	
La Belle Iron, com.	74½	- 81⅛	
Lacka. Steel	73¾	- 89½	
Lake Sup. Corp.	15	- 23¾	
Midvale Steel	51⅜	- 60⅞	
Nat. En. & Stm., com.	24	- 32	
pref.	90⅛	- 93½	
N. Y. Air Brake	140	-152¾	
Nova Scotia Stl.	105	-125	
Pitts. Steel, pref.	100¾	-101	
Pressed Stl., com.	69¼	- 78¼	
Pressed Stl., pref.	102⅛	-103	
Ry. Steel Spring, com.	46	- 52⅛	
Ry. Steel Spring, pref.	100	-101	
Republic, com.	69¾	- 81¾	
Republic, pref.	101	-106½	
Sloss, com	70½	- 66	
Un. Alloy Steel	47	- 52	
U. S. Pipe, com.	19	- 22	
U. S. Pipe, pref.	60¼	- 62	
U. S. Steel, com.	100⅞	-113	
U. S. Steel, pref.	117	-120	
Va. I. C. & Coke	45	- 50	
Warwick	9½	- 9¾	
Westing. Elec.	51½	- 56	

Dividends

The Cambria Steel Company quarterly [illegible] per cent, increase from a basis of 5 per cent to 6 per cent per year and extra dividend, 1½ per cent both payable Dec. 29.

The Atlantic Steel Company, regular quarterly, 1½ per cent and extra 1 per cent on the common stock payable Jan. 10.

The Sullivan Machinery Company, quarterly, 1½ per cent and extra 1 per cent, payable Jan. 15.

The Spicer Mfg. Corporation, initial quarterly, 2 per cent on the first preferred stock and 2 per cent on the second preferred, both payable Jan. 1.

The Westinghouse Electric & Mfg. Company, quarterly 1¾ per cent on the common stock, payable Jan. 31, an increase to a 7 per cent per year basis; also regular quarterly, 1¾ per cent, on the preferred, payable Jan. 15.

The Billings & Spencer Company, regular quarterly, 2 per cent, and extra 3 per cent, payable Jan. 1.

The American Screw Company, regular quarterly, 1¾ per cent, and extra 3 per cent, payable Dec. 30.

The Youngstown Sheet & Tube Company, regular quarterly, 1¾ per cent on the preferred, and [illegible] on the common stock, payable Jan. 1. The directors have decided to recommend to the stockholders at the annual meeting of the company, to be held Feb. 6, a common stock dividend of 100 per cent. The company has $20,000,000 of common stock outstanding and plans to increase this to $40,000,000. The additional common stock, if issued, will be eligible to participate in dividends from Jan. 1.

H. Collier Smith, Detroit, has recently completed for an Eastern customer a gigantic rotary shear, weighing 17½ tons, which will cut ¾-in. steel plate in straight lines, curves and reverse curves, or cut holes in the center.

Customs Decisions

MARINE ENGINE PARTS

Action was taken by the Board of General Appraisers on a protest by A. E. Outerbridge & Co., New York, after the Court of Customs Appeals had remanded the case to the lower customs tribunal for further testimony. The importers had protested the collector's action in assessing duty on marine engine parts intended for installation in vessels building in the United States, or as ship equipment. Duty at the rate of 20 per cent had been imposed on the ground that the parts were not provided for in the paragraph covering engines, and that accordingly the parts were relegated to paragraph 167 dealing with "manufactures of metal, not specially provided for." Judge Hay said that the additional testimony taken by the board showed that all of the merchandise was incorporated in and formed a part of a completed engine. In view of this, the board sustained the claim that entry accrued at 15 per cent under the provision covering engines, instead of at the higher rate under the metal paragraph.

PUMPS AND OTHER METAL SUPPLIES FOR VESSELS

C. B. Richard & Co., New York, protested the collector's action in levying 20 per cent duty on steam pumps, valves, guards, spring, studs, piston rods, rings and oil-bucket rings as manufactures of metal. It was claimed that the articles were intended as spare parts, and were to be used on board a vessel being constructed in an American shipyard. Free entry was claimed as ship's equipment under the terms of the Panama Canal act. The board held that a recent decision in the case of the Harlan & Hollingsworth Shipbuilding Corporation was applicable to the case, and the protest was sustained.

Norway's Steel Exports and Imports in 1916

Norwegian imports of iron and steel in the first half of 1916 as compared with the like periods in 1915 and 1914 were as follows in metric tons:

	1914	1915	1916
Pig iron	17,400	16,400	41,300
Bar iron and hoops	27,500	28,520	25,400
Plates and sheets	25,800	33,100	32,500
Tin plates and galvanized sheets	16,300	29,800	19,500
Wheels and axles	2,200	1,400	3,600

The increase in pig iron in 1916 is striking.

Important exports in the same half year periods were as follows in metric tons:

	1914	1915	1916
Ferrosilicon	2,521	3,525	10,906
Iron ore and manganese briquettes	272,000	192,300	173,700
Crude zinc	6,005	9,506	12,026

Norway's contribution of ferrosilicon has grown decidedly, and the same is true of zinc.

Spain's Imports and Exports of Steel

Spain's imports and exports or iron and steel for the first six months of this year and of 1915 are reported as follows in metric tons:

	Imports, Jan. to June		Exports, Jan. to June	
	1916	1915	1916	1915
[illegible]	16,308	4,717	22,131	58,99
[illegible]	1,048	553	....	....
[illegible] steel	....	....	51,584	25,074
[illegible] bars and plates	9,412	12,019	....	....
[illegible]	6,936	757	..	..

The Acme Steel Company, recently incorporated, proposes to erect a plant at Glassmere, Pa., for the manufacture of crucible tool steel. It will be in the market shortly for a steel building, also a 5-ton electric traveling crane, several furnaces, shears, bar mill and hammers. Specifications for all the equipment will be ready about Jan. 15, and inquiries should be [illegible] F. Denk, House Building, Pittsburgh, consulting

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c. Denver, pipe, 76.1c., minimum carload, 46,000 lb.; structural steel and steel bars, 83.6c., minimum carload, 36,000 lb. Pacific coast (by rail only), pipe, 65c.; structural steel and steel bars, 75c., minimum carload, 50,000 lb.; structural steel and steel bars, 80c., minimum carload, 40,000 lb. No freight rates are being published via the Panama Canal, as the boats are being used in transatlantic trade.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 3c. to 3.25c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs	.10
Angles, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft	1.55

No charge for cutting to lengths 3 ft. and over.

Plates.—Tank plates, ¼ in. thick, 6 in. up to 100 in. wide, 3.60c. to 5c., base, net cash, 30 days, or ½ of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras

	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers)	.10
Boiler and flange steel plates	.15
"A. B. M. A." and ordinary firebox steel plates	.20
Still bottom steel	.30
Locomotive firebox steel	.50

Marine steel, special extras and prices on application.

Gage Extras

Rectangular, ¼ in. thick, over 6 in. wide to 100 in. wide	Base
Lighter than ¼ in., to 3/16 in., up to 72 in. wide	.10
*Lighter than ¼ in., including 3/16 in., over 72 in. to 84	.20
*Lighter than ¼ in., including 3/16 in., over 84 in. to 96	.30
*Lighter than ¼ in., including 3/16 in., over 96 in. to 100	.40
*Lighter than ¼ in., including 3/16 in., over 100 in. to 102	.45
Lighter than 3/16 in., including No. 8, up to 72 in. wide	.15
*Lighter than 3/16 in., including No. 8, over 72 in. to 84	.25
*Lighter than 3/16 in., including No. 8, over 84 in. to 96	.35
Lighter than No. 8, including No. 10, up to 60 in. wide	.30
Lighter than No. 8, including No. 10, over 60 in. to 64	.35

Up to 72 in. and not less than 10.2 lb. per sq. ft. will be considered ¼ in.
Over 72 in. must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.
Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.
Over 72 in., ordered weight 3/16 in., take No. 8 price.
Over 72 in., ordered weight No. 8, take No. 10 price.

Width Extras

Over 100 in. to 110 in. inclusive	.05
Over 110 in. to 115 in. inclusive	.10
Over 115 in. to 120 in. inclusive	.15
Over 120 in. to 125 in. inclusive	.25
Over 125 in. to 130 in. inclusive	.50
Over 130 in.	1.00

Length Extras

Universal plates 80 ft. long up to 90 ft. long	.05
Universal plates 90 ft. long up to 100 ft. long	.10
Universal plates 100 ft. long up to 110 ft. long	.20

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over.

Lengths under 3 ft. to 2 ft. inclusive	.25
Lengths under 2 ft. to 1 ft. inclusive	.50
Lengths under 1 ft.	1.55
Circles 3 ft. in diameter to 100 in.	.30
Circles over 100 to 110 in. (width extra)	.35
Circles over 110 to 115 in. (width extra)	.40
Circles over 115 to 120 in. (width extra)	.45
Circles over 120 to 125 in. (width extra)	.55
Circles over 125 to 130 in. (width extra)	.80
Circles over 130 in. (width extra)	1.30
Circles under 3 ft., to 2 ft., inclusive	.55
Circles under 2 ft., to 1 ft., inclusive	.80
Circles under 1 ft.	1.85

Half circles take circle extras.
Sketches not over four straight cuts, inc. straight taper .10
Sketches having more than four straight cuts .20
Plates sheared to a radius take complete circle extras.

*Including extra for width.

Wire Rods.—Including chain rods, $70 to $75.

Wire Products.—Prices to jobbers effective Nov. 27: Fence wire Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, $2.95; galvanized, $3.65. Galvanized barb wire and staples, $3.85; painted, $3.15. Wire nails, $3. Galvanized nails, 1 in. and longer, $2 advance over base price; shorter than 1 in., $2.50 advance over base price. Cement coated nails, $2.90. Woven wire fencing, 53 per cent off list for carloads, 52 off for 1000-rod lots, 51 off for less than 1000-rod lots.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from Dec. 4, 1916, all full weight:

Butt Weld

Steel			Iron		
Inches	Black	Galv	Inches	Black	Galv
⅛, ¼ and ⅜	9	32½	⅛ and ¼	48	21
½	63	48½	⅜	49	22
¾ to 2	66	52½	½	52	35
			¾ to 1½	56	40

Lap Weld

2	59	46½	1¼	42	27
2½ to 6	62	49½	1½	48	34
7 to 12	59	45½	2	49	35
13 and 14	49½	..	2½ to 4	51	38
15	47	..	4½ to 6	51	38
			7 to 12	50	37

Reamed and Drifted

1 to 3, butt	64	50½	¾ to 1½, butt	51	34
2, lap	57	44½	1¼, lap	37	21
2½ to 6, lap	60	47½	1½, lap	43	28
			2, lap	44	29
			2½ to 4, lap	47	32

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	55	37½	⅛, ¼ and ⅜	48	31
½	60	47½	½	53	40
¾ to 1½	64	51½	¾ to 1½	57	42
2 to 3	65	52½			

Lap Weld, extra strong, plain ends

2	57	45½	1¼	44	29
2½ to 4	60	48½	1½	49	35
4½ to 6	59	47½	2	51	38
7 to 8	55	41½	2½ to 4	53	41
9 to 12	50	36½	4½ to 6	52	40
			7 to 8	46	34
			9 to 12	41	29

To the large jobbing trade an additional 5 per cent is allowed over the above discounts, which are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized, but in some sections of the country discounts on less than carloads are three (3) points less (higher price) than the carload discount on both black and galvanized steel pipe.

On butt and lap weld sizes of black iron pipe, discounts for less than carload lots to jobbers are four (4) points lower (higher price) than carload lots, and on butt and lap weld galvanized iron pipe are five (5) points lower (higher price).

Boiler Tubes.—Discounts on less than carloads, freight to be added, effective from Nov. 1, 1916, except 3 to 4½ in. steel from Nov. 20, are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1¼ in.	31	1¼ in.	23
1¾ and 2 in.	43	1½ and 2 in.	37
2¼ in.	40	2¼ in.	32
2½ and 2¾ in.	46	2½ and 2¾ in.	38
3 and 3¼ in.	46	3 and 3¼ in.	43
3½ to 4½ in.	46	3½ to 4½ in.	44
5 and 6 in.	45	5 and 6 in.	37
7 to 13 in.	42	7 to 13 in.	34

Locomotive and steamship special charcoal grades bring higher prices.

1¼ in., over 18 ft. and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Sheets.—Makers' prices for mill shipments on sheets of United States standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Blue Annealed Sheets

	Cents per lb.
Nos. 3 to 8	4.00 to 4.25
Nos. 9 to 12	3.75 to 4.00
Nos. 13 to 16	3.85 to 4.10

No. 17 and lighter gages are based on $4.50 per 100 lb. for No. 28 Bessemer black sheet.

Box Annealed Sheets, Cold Rolled

Nos. 17 to 21	4.30 to 4.55
Nos. 22 and 24	4.35 to 4.45
Nos. 25 and 26	4.40 to 4.65
No. 27	4.45 to 4.70
No. 28	4.50 to 4.75
No. 29	4.55 to 4.80
No. 30	4.65 to 4.90

Galvanized Sheets of Black Sheet Gage

Nos. 10 and 11	5.25 to 5.75
Nos. 12 to 14	5.35 to 5.85
Nos. 15 and 16	5.50 to 6.00
Nos. 17 to 20	5.65 to 6.15
Nos. 22 and 24	5.80 to 6.30
Nos. 25 to 27	5.95 to 6.45
No. 27	6.00 to 6.50
No. 28	6.25 to 6.75
No. 29	6.40 to 6.90
No. 30	6.55 to 7.05

Black Plate

Nos. 15 and 16	4.05 to 4.20
Nos. 17 to 21	4.10 to 4.25
Nos. 22 to 24	4.15 to 4.30
Nos. 25 to 27	4.20 to 4.35
No. 28	4.25 to 4.40
No. 29	4.30 to 4.45
No. 30	4.30 to 4.45
Nos. 30½ and 31	4.35 to 4.50

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin,	Lead		Spelter	
		Electro-					
Dec.	Lake	lytic	New York	New York	St. Louis	New York	St. Louis
20	32.00	32.00	41.62½	7.50	7.30	10.25	10.00
21	31.25	31.25	41.12½	7.50	7.30	10.00	9.75
22	31.00	31.00	40.50	7.50	7.30	9.75	9.50
23	31.00	31.00		7.50	7.30	9.75	
26	31.00	31.00	40.87½	7.50	7.30	9.75	

NEW YORK, Dec. 27, 1916.

Resale copper, after being offered at concessions, is steadier, in a market that is quiet on all sides. Tin is lower and uncertain. Lead is dull, with the leading interest taking only February business, and that on the basis of average quotations for the month. Spelter has declined and is dull. Antimony continues quiet and is lower.

New York

Copper.—The lower prices which are quoted for both Lake and electrolytic are those named for resale metal by speculators and, to a limited extent, by consumers. The speculative side of the market is not of large proportions, but there has been some effort to realize profits, also endeavors to sell short on future positions. Since the price touched 31c. for prompt, and 30.50c. for January, it has become firmer and yesterday was fairly steady although dull. First quarter is quoted at 30c., and second quarter at 29c. to 29.50c. The producers, in view of their sold up condition, have not changed their quotations for any part of the first half, but it is understood that they are doing nothing. A demoralized market might follow concessions on their part. The London market was inactive yesterday because of the regular Boxing Day holiday, consequently no cables arrived. The New York Metal Exchange has been closed and no exports have been reported since last week. The entire market is awaiting developments.

Tin.—On Dec. 20 the market was active, 400 to 500 tons changing hands, mostly for May and June delivery, from the Far East, the average price paid being 40.50c. On Dec. 21 there was less activity, but still a fair amount of metal was dealt in. Since then, the market has been quiet to the point of dullness, with considerable uncertainty because of the lack of information from London. The trade is much concerned over the action of Great Britain in putting under the ban all shipping news relating to the departure and arrival of vessels in English ports. So far as the trade can see, the move means an interference with the statistics of tin afloat and to arrive which supply important guidance to importers and dealers. The New York quotation for spot Straits yesterday was 40.87½c.

Lead.—There is a scarcity of spot lead in the East, such as frequently exists, and premiums have been paid where immediate delivery from stock in New York was wanted. For January delivery 7.50c., New York, is the quotation of all interests, although the largest producer is not selling at this price. It will sell for February delivery, settlement to be on the basis of the average price for that month. The St. Louis quotation of the independents is about 7.30c., although 7.40c. has been done.

Antimony.—Extreme dullness is all that can be reported, with prices nominally ranging from 14c. to 14.25c. for Chinese and Japanese grades.

Aluminum.—Quotations for No. 1 virgin metal, 98 to 99 per cent pure, are easier at 60c. to [illegible]

Spelter.—The market was steadier yesterday than it was last week, but it is not active by any means. The quotation for prompt at New York yesterday was 9.75c., and at St. Louis, 9.50c. Futures were sold late last week at low prices, orders having been placed for January to June at 9c. and 9.12½c., St. Louis, while first quarter sold at 9.25c., St. Louis. Since the low point was touched, first quarter has sold at 9.37½c. to 9.50c., St. Louis. Dealers were the chief sellers while the market was declining, but to-day the producers are favorably disposed to take business. Western transportation conditions are causing a great deal of trouble all around.

Old Metals.—The market is very unsettled. Dealers' selling prices are as follows:

	Cents per lb.
[illegible] heavy and crucible	29.00 to 31.00
Copper, heavy and wire	28.00 to 30.00
Copper, light and bottoms	25.00 to 26.00
[illegible] heavy	17.50 to 18.50
Brass, light	14.00 to 15.00
Heavy machine composition	24.00 to 25.25
[illegible] red brass turnings	18.00 to 18.50
[illegible] red brass or composition turnings	17.00 to 19.00
Lead, heavy	7.00
[illegible] tea	6.50
Zinc	7.50 to 8.00

Chicago

DEC. 26.—The general tendency of prices for nonferrous metals continues downward. Offerings of resale copper at concessions have added special pressure, and tin prices have been progressively lower. The leading interest's quotations for lead are now the top of the market. We quote: Casting copper, 29.75c.; Lake copper, 31.75c.; tin, carloads, 41c., and small lots, 43c.; lead, 7.45c.; spelter, 9.75c.; sheet zinc, 21c.; Cookson's antimony, 50c.; other grades, 17c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 25c.; copper bottoms, 22.50c.; copper clips, 25c.; red brass, 22c.; yellow brass, 17c.; lead pipe, 5.75c.; zinc, 6c.; pewter, No. 1, 26c.; tinfoil, 32c.; block tin pipe, 36c.

St. Louis

DEC. 26.—The week was quiet, with a sagging tendency in quotations. The close to-day was on lead in carload lots 7.25c. bid and probably salable at 7.50c.; spelter, carload lots, nominal at 9.87½c. In less than carload lots: Lead, 7.90c.; spelter, 11.50c.; tin, 46c.; Lake copper, 34c.; electrolytic copper, 33.50c.; Asiatic antimony, 17c. In the Joplin district all ore prices were very weak as a result of the conditions prevailing in the metal market. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 10.50c.; heavy yellow brass, 14c.; heavy red brass and light copper, 19c.; heavy copper and copper wire, 22c.; pewter, 25c.; tinfoil, 34c.; zinc, 7c.; lead, 5.50c.; tea lead, 4c.

Height Gage with a Vernier Attachment

The L. S. Starrett Company, Athol, Mass., has brought out a vernier height gage. The main bar of the gage is 10 in. long and has graduations which in conjunction with the vernier enable readings to 0.001 in. to be secured on measurements up to 8 in. high. The base is 2¾ in. long and 1 in. wide and is hardened with a view to securing long wear. The bottom of the base is recessed and the upper surface is ground at a right angle with the bar. An extension is furnished for the movable bar to enable reverse measurements to be taken from either side of the jaw and an attachment designed to permit measurements inside the frame of a jig to be taken or the depth of recesses to be measured is also furnished with the gage.

A Large Pinion of Noiseless Type

The Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa., recently made a large pinion of the noiseless type. It is 21 in. in diameter with an 8-in. face and is designed to transmit 100 hp. at 425 r.p.m. While the pinion is not the largest one of the noiseless type that has been produced, the size and the fact that no metal shroud was employed make it interesting. The pinion is of the Bakelite Micarta-D gear material consisting of heavy duck bonded together with Bakelite by heating under heavy pressure.

The iron-ore exports from Algeria in the first nine months of 1916 were 739,288 tons, compared with 625,- [illegible] tons to Oct. 1, 1915.

Large Orders for Locomotives

Orders for locomotives reported in the third week in December are the largest in many months and amount to 367. The American Locomotive Company has taken orders for 161 locomotives. Of these the French State Railways will take 100 80-ton consolidated locomotives each weighing 161,000 lb., and the Paris-Orleans Railroad will take 50 Mikado locomotives. The former order is not to be delivered until January and February, 1918, and the latter order until November, 1917. The same builder will also furnish 9 locomotives of various types for the Maine Central. The Baldwin Locomotive Works will furnish the St. Louis & San Francisco with 30 Santa Fes and the Chicago, Burlington & Quincy with 35 Mikados and 10 Santa Fes. The Russian Government has increased its order of 331 Decapod locomotives to 350 by ordering 10 more from the Baldwin Locomotive Works and 9 from the Canadian Locomotive Company. The British Government is reported to have ordered 40 locomotives from the Canadian Locomotive Company and it is also stated that the same company will furnish the Canadian Ministry of Munitions with 40 consolidated locomotives, 83 tons each. It is also stated that the William Dederich Company of London has ordered 24 light locomotives from the H. K. Porter Company of Pittsburgh. Recent inquiries amount to 39, the principal one being 25 for the Texas & Pacific. It is estimated that for the period ending with Dec. 23 total orders placed amounted to 657, of which 304 were for export. This total already exceeds that of November for 586 and is fast approaching the largest month of the year, which was October with 779. The December orders so far reported bring the total for the last half of this year to 2514, which, added to the 2124 for the first half of the year, make the total ordered to Dec. 23 inclusive 4638. This compares with 1972 in all of 1915.

Coating Basic Furnace Linings with Enriched Slags

Coating the bottom and sides of the basic lining of an open-hearth furnace with an enriched and thickened slag is the subject of a patent (U. S. 1,198,827—Sept. 19, 1916) taken out by Alfred E. Davies of Bilston, England, as a modification of the manufacture of steel by the basic open-hearth process. After the charge has been worked in the usual way until the bulk of the silicon and phosphorus has been removed the slag is tapped off by tilting the furnace, and further additions of lime, iron ore, and oxides are made in order to remove the last traces of impurities, thus forming in the second part of the process the rich slag which it is intended to retain in the furnace as a coating to the lining. The metal is tapped off when finished without allowing the slag to run out, and the slag is further enriched and thickened by lime and metallic oxide additions and the furnace repeatedly tilted so as to make the slag adhere to the bottom and sides, ready for the next charge of molten pig iron. When this is poured in a reaction begins which removes the bulk of the impurities, quickly bringing the process to the point where it started.

Investigation of Clay Refractories

One of the most elaborate investigations ever undertaken, dealing with tests of the finished clay refractories of the United States, has been started by the United States Bureau of Standards, in co-operation with the American Refractories Manufacturers' Association and the American Gas Institute. It is proposed to make this work the basis of a system of classification and specifications governing the several classes of fire-clay refractories. The bureau also has begun work on another investigation dealing with a phase of the same industry, using a dolomite in certain metallurgical furnaces as a refractory. Usually the burnt dolomite is placed directly in position in the furnace with tar or some other combustible material as a binder. When the lining was of such a nature that it had to be made of brick, magnesite brick was used, but the price of this has made it prohibitive. The bureau hopes to determine whether the dolomite might be burned in such a manner, or with the addition of such impurities, that the lime present would not slake, except after an extended period, making it possible to produce brick of this material which would replace magnesite brick.

Harris Engineering Company's Operations

After two years in the machinery manufacturing field, the H. E. Harris Engineering Company has found it necessary to triple the capacity of its present plant at 1041-1055 Broad Street and 116-118 John Street, Bridgeport, Conn. Much machinery has been purchased to equip the new plant which will be in operation by June, 1917. This machinery is principally used in making tools, but the company also manufactures a large variety of such products as tapping machines, automatic hub-grinding machines, notching machines for rifle sights, testing machines, taps, dies, cutting tools, jigs, fixtures, gages and punches. The company also acts as consulting engineer to manufacturers. Harry E. Harris, president, was formerly in charge of the mechanical department of the Western Electric Company's New York plant and has been superintendent and consulting engineer of the Greenfield Stamp & Die Corporation. Frank G. Hubbard, vice-president, was superintendent of the Hawthorne, Ill., plant of the same company. John Gelzenlichter, who has had 23 years' experience with manufacturing concerns, has been engaged as superintendent.

Increasing the French Steel Output

The French Minister of Public Works, the Under-Secretary of State and other officials recently attended an important conference at Caen, at which Director Schneider of the Creusot Works, leading public men and representatives of the Chamber of Commerce and of industry, were present. The minister told of the steps the Government had taken to open the iron mines now idle, and to start prospecting for coal immediately in the Litry district. For the latter purpose the government has asked a vote of $400,000. The railroad lines to Caen are to be improved, and the harbor deepened to accommodate vessels of 8000 tons. It was also stated that the coke ovens at the blast furnaces of Caen would be started at once, and that near the works producing raw materials plants for making guns and ammunition would also be established in the district.

New Heroult Furnace

The United States Steel Corporation has granted a license to the Milbury Steel Foundry Company, Milbury, Mass., for a 2-ton electric steel furnace. This will be used to make steel castings from cold scrap. The company at present is operating a crucible steel foundry. This installation brings the total furnaces of this type in operation or contracted for in the United States and Canada to 83.

The new 20-ton Heroult electric furnace at the plant of the Carnegie Steel Company, Duquesne, Pa., was successfully started about the middle of November and has been producing steel ever since from hot metal from the open-hearth department.

Rennerfelt Electric Furnaces

Two Rennerfelt electric steel furnaces have recently been successfully started. The 3-ton furnace at the plant of the American Foundry & Machine Company, Salt Lake City, [illegible] making steel ingots for the Utah Iron & Steel Company at Midvale, Utah.

The [illegible] ton, [illegible] castings, and has made over 50 heats.

The Central Steel Company, Massillon, Ohio, has started the erection of two additional 75-ton open-hearth furnaces. On their completion the company will have seven open-hearth furnaces of that capacity.

PERSONAL

The retirement of James Lord, president of the American Iron & Steel Mfg. Company, Lebanon, Pa., following the acquisition of that company by the Bethlehem Steel Company, concludes 45 years of continuous activity in the iron and steel manufacturing business. After 10 years' connection with the Reading Bolt & Nut Works he was appointed general manager of the Pennsylvania Bolt & Nut Company, in which capacity he served for 17 years. In 1899 he became general manager of the American Iron & Steel Mfg. Company, which was then formed to take over the Pennsylvania and several other bolt, nut and rivet plants. For the past 10 years he has acted as president of the company, and relinquishes at this time an authority which it is stated will be taken over by officials of the Bethlehem Steel Corporation.



John Penn Brock, who has been vice-president of the American Iron & Steel Mfg. Company, in charge of the operating departments both at Lebanon and Reading, will continue as superintendent of these plants for the Bethlehem Steel Corporation.

Francis D. Dutton, superintendent of the two Lebanon furnaces acquired some months ago by the Bethlehem Steel Company, will also assume charge of its new furnace interests at Lebanon, just purchased from the Lackawanna Iron & Steel Company.

R. A. Bull, who recently resigned as manager of production for the Commonwealth Steel Company, will become vice-president and general manager of the Chicago Steel Foundry in which he has also acquired an interest. The change becomes effective Feb. 1. Mr. Bull is a past president of the American Foundrymen's Association.

Charles H. Caler, Rochester, Pa., has been appointed deputy factory inspector, specializing in foundry work, succeeding J. R. Patterson, Beaver Falls, resigned.

M. R. Maclean, who has been with the American Steel Foundries nearly 10 years, has resigned and will spend the remainder of the winter in the South before establishing new connections. He was general sales agent located at Pittsburgh.

Sylvanus L. Schoonmaker, chairman of the board of directors of the American Locomotive Company, announces that W. M. Marshall, president of the company, has resigned as president and director, to take effect Dec. 31; that J. McNaughton, vice-president, has also resigned, his resignation to take effect Feb. 1, that these resignations have been accepted, and that Charles Hayden of the firm of Hayden, Stone & Co., has been elected a director to fill the vacancy in the board. On Tuesday, Dec. 26, the directors elected Andrew Fletcher president. He is president of the W. & A. Fletcher Company, manufacturer of marine engines, Hoboken, N. J., a director of the William Cramp & Sons Ship & Engine Building Company, president of the Consolidated Iron Works and the North River Derrick Company, and a director of the Hoboken Trust Company and the First National Bank of Hoboken.

At a meeting of the board of directors of J. G. White & Co., Inc., New York, R. B. Marchant, treasurer of the corporation, was elected to the office of vice-president.

E. S. Christiansen has been appointed manager of the Detroit office of the United Smelting & Aluminum Company, Inc., New Haven, Conn., effective Jan. 1, and W. T. Schmitt has been appointed assistant manager to take effect at once. Mr. Christiansen was purchasing agent of the Haydenville Company, Haydenville, Mass., for a number of years and Mr. Schmitt was formerly with the Bosch Magneto Company, Springfield, Mass. The Detroit office of the company is now located in the Dime Bank Building.

H. L. Lautenschleger, chief of the materials follow-up department of the Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa., now decides the purchase of castings for the company. He was recently elected secretary of the Veteran Employees Association, composed of men who have been in the service of the company 20 years or longer.

K. C. Li, Shanghai, China, president of the Hunan Government Lead Smelting Works, has been in San Francisco recently to purchase machinery and supplies.

George W. Knopf, for the last nine years assistant manager of the McClintic-Marshall Company's plant at Pottstown, Pa., has resigned. Except for a period of two years, when he was with the American Bridge Company at its New York offices, Mr. Knopf has since 1900 been connected with the McClintic-Marshall Company. F. T. Cadmus succeeds him.

John I. Reid has been made superintendent of the Longue Pointe plant of the Canadian Steel Foundries, Ltd., Montreal, Canada. He assumes his duties at once. He was formerly works manager of the American Steel Foundries' plant at Chester, Pa., and recently sales agent for the company at 30 Church Street, New York City.

OBITUARY

WILLIAM E. LEARD, of New Brighton, Pa., died at Southern Pines, N. C., Dec. 17, following a long illness, aged 74 years. He was born at Livermore, Pa., and served through the Civil War in a Pennsylvania regiment. Shortly after the war he engaged in the manufacture of drill presses in Cincinnati. In 1882 he established a plant in New Brighton, Pa., for the manufacture of connecting rods, strap joints, crankshafts and machine keys, and was in active charge of the business until about eight years ago. He leaves one son and two daughters.

WILLIAM SCHLEMMER, majority stockholder of Hammacher, Schlemmer & Co., large hardware merchants at 133 Fourth Avenue, New York, died Dec. 23, at his home in that city, after a short illness, aged 76 years. He was born in Germany, and came to this country in 1853. He became a messenger boy and clerk for the house with which he was connected 63 years. He was treasurer of the company. His only son, William F. Schlemmer, is president.

HENRY BINNS, head of the Binns Iron Foundry, Passaic, N. J., died Dec. 17, aged 77 years. Coming from England, he was connected for a long time with the Watts-Campbell Company, manufacturer of steam engines, Newark, and established the foundry which bears his name 30 years ago. While working in England, he is reputed to have taken an important part in making the first piece of armor plate used by the British navy.

THOMAS H. MARTIN, president American Shovel & Stamping Company, South Lorain, Ohio, died Dec. 10. He had been connected with the company since it was established 17 years ago.

ROBERT MAIN, mill superintendent, who was formerly connected with the Commonwealth Steel Company's plant at Granite City, Ill., died recently at Welland, Ont.

Manganese ore imports to the United States in October were 26,078 gross tons, the lowest amount for any month this year since March, which had 26,212 tons. The September total was 73,536 tons. The total for the 10 months to Nov. 1, 1916, was 495,300 tons, or [illegible] tons per month, against 20,087 tons, and 25,511 tons per month to Nov. 1, 1915 and 1914, respectively. The imports in the first three months of this year were only 51,545 tons.

Brass Manufacturers' Annual Meeting

Uniform methods in the conduct of business were adopted at the thirtieth annual meeting of the National Association of Brass Manufacturers, held at the Hotel Astor, New York City, Dec. 14. After Jan. 1 a uniform acceptance order blank will be used, making all orders of any magnitude a contract and not subject to cancellation. Goods will be shipped only at earliest convenience and at prices existing on the date of shipment. These measures were adopted, according to William M. Webster, commissioner for the association, because of conditions in the raw material market and the pressure of business. Purveyors of raw material were unable to make prompt deliveries or guarantee prices, he said, and, consequently, the manufacturers were compelled to protect themselves in a similar manner.

Several lines of products have been standardized. A resolution was passed, to become effective Jan. 1, that jewel cup tubes would be eliminated entirely from bath cocks and that sizes and threads would be made according to a uniform standard in order that all parts will interchange. Committees to report on further means of establishing uniform methods and products are as follows:

Standardizing Staple Goods and Fixtures: E. F. Niedecker, Hoffman & Billings Mfg. Company, Milwaukee; M. J. Koblitz, J. A. Cochrane Brass Mfg. Company, Cleveland, Ohio; C. S. Johnson, Northern Brass Mfg. Company, Waukegan, Ill.; A. I. Fischer, Glauber Brass Mfg. Company, Cleveland.

Uniform Cost System: Adolph Mueller, H. Mueller Mfg. Company, Decatur, Ill.; G. C. Hall, McRae & Roberts Company, Detroit; H. N. Gillette, Standard Sanitary Mfg. Company, Pittsburgh.

The association became affiliated with the Chamber of Commerce of the United States of America and appointed Adolph Mueller councillor and C. C. Hale, Peck Bros. & Co., New Haven, Conn., his alternate. Many members favored an affiliation with the National Industrial Conference Board, but no formal action was taken.

The election of officers resulted as follows: President, C. H. Downs, E. Stebbins Mfg. Company, Springfield, Mass.; first vice-president, Harold W. Wolff, L. Wolff Mfg. Company, Chicago; second vice-president, E. Rickersburg, Rickersburg Brass Company, Cleveland. The trustees are L. D. Lawnin, Edwardsville Brass Company, Edwardsville, Ill.; H. N. Speakman, Speakman Supply & Pipe Company, Wilmington, Del.; W. H. Wasweyler, Milwaukee Brass Mfg. Company, Milwaukee; A. I. Fischer, Glauber Brass Mfg. Company, Cleveland; H. N. Gillette, Standard Sanitary Mfg. Company, Pittsburgh; Adolph Mueller, H. Mueller Mfg. Company, Decatur, Ill.

Sixty manufacturers attended the convention, which was addressed by Prof. L. S. Wright and Francis J. Torrence. The next session will be held in Chicago March 21 and 22, 1917.

Registration of All British Firms

The British Registration of Business Names bill affects not only present enemy firms and persons, but every firm or person, British or foreign, having a place of business in the United Kingdom and carrying on business under a name which does not consist of the true surnames of all partners. All these firms and persons must register under pain of a fine of £5 for every day's default, and anybody may start proceedings against them. Besides, courts of law are not to enforce contracts entered into by firms or persons which omit to register, during the time they are in default, unless the court sees fit to give them relief. In addition to this, every registered firm must put the registered particulars in every catalog, circular, or business letter it sends out.

Warren Webster & Co., Camden, N. J., have disposed of their air conditioning department, and on and after Jan. 1 the Webster air conditioning apparatus will be manufactured and exploited by the Braemer Air Conditioning Corporation, Lafayette Building, Philadelphia.

TRIBUTE TO C. M. SCHWAB

Significant Statements Concerning Bethlehem Steel Company Policies

The tributes paid to Charles M. Schwab at a dinner given in his honor at the Lotus Club, New York, Dec. 21, and some of the statements made by Mr. Schwab in a carefully prepared speech made this a signal occasion among many at which he has been the chief figure. Referring to the Bethlehem Steel Company and its status since the acquisition of the Pennsylvania Steel Company properties, Mr. Schwab said:

Though Bethlehem, [illegible] the last about Bethlehem in which I need [illegible] that, whereas in 1915 we employed 25, [illegible] 7,000 men are on our payrolls. In 1914 our total payroll was $22,000,000; in 1916 it [illegible] at the rate of $5 [illegible] a month. The average earnings of each wage earner in our employ were a little over $900 per man in 1915, whereas our figures for 1916 show average earnings of nearly $1,200 per man, an increase of more than 30 per cent.

We at Bethlehem have felt great satisfaction during the last two and a half years at our affairs having been placed upon such a basis that in spite of the great increases in the costs of all materials we were able to supply all ordnance products to the United States Government at exactly the prices prevailing before the war in Europe began. We have felt that this was something worth doing for its own sake.

At the present time our navy is being rebuilt and enlarged. Greater ships are to be constructed and larger guns will be used than ever before in the history of the country. Realizing the need we have already undertaken, out of the profits derived from other business, to construct at a cost of $4,500,000 a plant fitted to build 16-in. guns, the plant to be of use for no other purpose. We have received no assurances from the Navy Department, and under no conceivable conditions can the orders which we may receive for this plant pay a fair return on the investment. But we felt that we must do this to play our part in protecting the nation.

Referring to trade conditions after the war, Mr. Schwab said that there will of necessity be a reduction in the demand for munition steel and some recession in steel prices would be seen. "But the domestic demands for steel rails, for building, and for numerous other purposes await only a more normal condition of trade to press forward for prompt satisfaction. Those domestic demands alone will absorb our steel capacity for many years. A period of depression will come some time, and it may be severe, but it will not become acute, in my judgment, until at least three to five years after the war is ended."

Another speaker was President E. G. Grace of the Bethlehem Steel Company, who told of the offer made to Mr. Schwab last year to sell his stock in the Bethlehem Steel Company at $600 a share and thus pass the control of the company to others. Though this would have meant $50,000,000 to him he refused to sell a share.

When Mr. Schwab came to Bethlehem the town had 13,000 inhabitants. To-day the employees of Bethlehem Steel alone are sufficient to make a city of 150,000 people. Ten years ago the annual sales of Bethlehem were $10,000,000. Last year they were $230,000,000.

During many of the years in which he worked hardest for the company [illegible] which the company could not borrow money unless Mr. Schwab personally indorsed its paper—he declined to accept [illegible]. Mr. Schwab, though himself the largest shareholder, for ten years or more kept pouring the earnings back into the property, denying himself any return on the large investment he had made. It is for such reasons [illegible] the phenomenal action of Bethlehem [illegible] it was only belated reflection of the meaning of a policy of [illegible] as magnificent as anything [illegible]

Australia Prohibits Tin-Plate Imports

The Australian Government has prohibited the importation of tin plate from the United States, according to a cablegram from U. S. Commercial Attaché Phillip B. Kennedy, Melbourne, dated Dec. 8, 1916. The order does not apply to shipments actually en route.

Wage Advances and Bonuses

The Pennsylvania Engineering Works, New Castle, Pa., has announced an increase of 10 per cent in wages of its employees from Jan. 1, affecting about 450 men.

The American Manganese Mfg. Company, operating two blast furnaces at Dunbar, Pa., has announced an increase in wages of outside employees of 10 cents a day, and of inside men, including the clerical forces, of 10 per cent.

The Ohio Iron & Steel Company, operating Mary furnace at Lowellville, Ohio, gave its employees a bonus of 10 per cent of their gross earnings for the year 1916.

Notices have been posted at several shops in the Youngstown district, notifying the molders and machinists of a voluntary wage advance, to take effect Jan. 1, but the exact amount of the increase has not yet been stated. Some time ago the molders in the district received a voluntary advance in wages considerably above the established wage scale that does not expire until next June, and the foundry owners, desiring to be absolutely fair with their employees, so as to permit them to meet the higher cost of living, will give another voluntary advance. The machinists will secure an increase in wages in consideration of their calling off the long strike, which lasted from May until November, and also because of the higher cost of living.

Life-insurance policies and profit-sharing premiums to the approximate value of $1,000,000, as reported, were distributed Dec. 23 to 900 employees of the Sperry Gyroscope Company, Brooklyn, N. Y., manufacturer of gyrocompasses, ship stabilizers and high-intensity searchlights. The profit-sharing premiums cover a period from Oct. 1 to Dec. 31, but will be continued in the future, the individual amounts depending upon the length of employment, but including all employees whether they had been with the company five years or only three months. The group life-insurance policies issued by the Travelers' Life Insurance Company are for each individual employee's last annual earnings, and include disability benefits.

President John Sargeant of the Domhoff & Joyce Company, Cincinnati, distributed a holiday bonus to each employee of the company of 10 per cent of the salary paid each one in 1916.

The Crane Company will pay its 12,000 employees in the Chicago and Bridgeport plants and branch houses a 10 per cent bonus. The total amount paid will be approximately $1,000,000.

The Commonwealth Steel Company, St. Louis, Mo., with plant at Granite City, Ill., in announcing last week an increase of 10 per cent in wages, affecting more than 2500 men, also stated that the company store operated at Granite City will henceforth be conducted without profit. The wholesale prices will be given to both cash and credit accounts, but only workmen at the plant will be permitted to make purchases.

For the past seven years the employees of Cleveland Crane & Engineering Company, Wickliffe, Ohio, have been given a bonus at the end of the year representing their share of the profits distributed for faithful service. Under this system 3000 hours have been taken as a year's work, and to each employee who has not been absent from work more than one day each month during the year one per cent of his yearly wages has been paid for each full year that he has been in the employ of the company. The employees were made doubly happy this year by the announcement by C. C. Robbins, general manager of the company, that because of the increase in the business of 1916 the bonus will be increased 100 per cent, the employees eligible receiving 2 per cent of their yearly wages for each full year they have been with the company. A number of the old employees will receive checks amounting to 20 per cent of their wages for this year. The majority of the company's employees will benefit this year under the system.

Every steel shipbuilding yard in Portland, Ore., now operating on the open-shop basis, is threatened with a strike for the closed shop. B. C. B[illegible] Willamette Iron & Steel Works, announces that his plant will be closed down if a strike materi[illegible] will remain closed until the force can be reorganized and the plant operated open shop. The unions have presented the various companies with an agreement, which they ask be placed in effect Jan. 1, insuring an 8-hr. day, closed shop, and a material advance in wages.

The directors of the Republic Iron & Steel Company have adopted a merit system of compensation, and a portion of the surplus earnings will be set aside for profit-sharing distribution, by which 6000 employees in Youngstown, Ohio, will be benefited. It is said only 7 per cent of the company's output consists of war orders.

Starrett Company Bonus to Employees

Employees of the L. S. Starrett Company, Athol, Mass., have been voted a bonus by the directors to be distributed as soon after Jan. 1 as practicable. The amount in each case will be a percentage of the wages paid the employee during this year. This percentage depends on the term of continuous employment with the company, as follows: One year or less, 2 per cent; one to three years, 3 per cent; three to five years, 4 per cent; five years or more, 5 per cent. This is the fourth year in which the Starrett Company has made such a distribution. The amount on the other occasions was 2 per cent of the year's wages. It will be more this time. In making the present announcement the company calls attention to the fact that the quality of production must be in the mind of all as the best security for business success and for steady employment.

The officials of the Lukens Iron & Steel Company, Coatesville, Pa., now expending about $3,000,000 in plant additions and extensions, will apply to the Pennsylvania authorities Jan. 16 for a charter for a new company to be known as the Lukens Steel Company. The plan is to recapitalize the business of the Lukens Iron & Steel Company on a basis of the present value of the plant and to take in some outside capital. A. F. Huston, president; Charles L. Huston, vice-president and general manager, and Joseph Humpton, secretary and treasurer, will retain control. In the formal notice of application for a charter for the new company William S. Evans, Frank H. Gordon, Graham Roberts and Gustave T. Schnatz are mentioned as the incorporators. Mr. Gordon is at present general sales agent of the company while the others are members of the sales force.

Announcement has been officially made that the Pullman Company will establish a plant at St. Louis, Mo., second only to that at Pullman, Ill., which will employ about 3000 men and will cost about $5,000,000. A Pullman settlement will be established in the vicinity of the shops and accommodations provided for a community of 10,000 to 12,000 persons. Options have been closed on an acreage tract in the northwestern part of the city and construction work will begin in a short time. In addition to building new passenger cars, it contemplates the largest repair plant of the company's ownership. The total area acquired under option is 64 acres.

The Whitaker-Glessner Company, Wheeling, W. Va., will build eight hot-sheet mills and the necessary cold mills at Beach Bottom, near Wheeling. The contract for the buildings, taking about 1500 tons of steel, has been placed with the McClintic-Marshall Company; for the foundations, to the Foundation Company; for the hot and cold mills and other equipment, with the Wheel[illegible]old & Foundry Company; and for the electrical equipment, with the Westinghouse Electric & Mfg. Company. Work will start at once, and it is hoped [illegible]e the mills ready for use before next autumn.

J. Coughlan & Sons, Vancouver, B. C., have taken [illegible]ts for three 8800-ton steel vessels, for delivery [illegible]t 12 or 15 months. The measurements of [illegible]ats are as follows: Length, 423 ft., 9 in.; beam, [illegible]h, molded, 29 ft., 9 in. The speed of [illegible] when loaded will be 10½ knots.

Contracts for Ford Blast-Furnace Plant

In connection with the litigation over the proposed blast-furnace plant of the Ford Motor Company, Detroit, an affidavit has been made by William B. Mayo, chief construction engineer of the company, which sets forth the following as the status of contract obligations to various equipment and supply companies:

To the Riter-Conley Company of Pittsburgh for [illegible] This contract was signed Oct. 31, 1916, and the Riter-Conley Company has ordered [illegible]

To Julius Kayser, chief engineer, [illegible] payable at the rate of $6,000 a month, beginning Sept. 1, 1916. This contract was signed Sept. 2, 1916, and payments have been made regularly.

To the Pere Marquette Railroad for constructing siding from its main line, $9,500. This work has been practically all done.

To the Michigan Central Railroad for constructing sidings from its main line, about $18,000. This work was practically done during the last two months.

Money paid to the Detroit Marine Construction Company for test piles, amounting to something over $1,300.

Considerable sums advanced for traveling expenses and engineers and other employees of the Ford Motor Company, conducting investigations and experiments for more than a year and a half.

Obligations to Wellman-Seaver-Morgan Company, amounting to approximately $252,000 for ore unloaders. This contract was closed by letters Oct. 26. The formal contracts are now ready to be signed. The Wellman-Seaver-Morgan Company has already placed its orders for materials.

Verbal orders for ore bridges to Mead, Morrison & Co. of Chicago, amounting to approximately $152,000. The Chicago concern placed its own orders for materials some time before the suit was begun. The formal contracts are ready for signature.

Verbal agreement with Hoover & Mason of Chicago for ore bins or pockets, amounting to approximately $350,000. The company's orders for materials have been placed and the work is now going on.

Verbal orders for firebrick or linings, amounting to approximately $200,000, to Harbison-Walker Refractories Company, Pittsburgh, $75,000; Niles Fire Brick Company, Niles, Ohio, $75,000, and Steere Engineering Company, Detroit, $50,000. The contracts with the first and third named concerns are in Mr. Mayo's office for signing.

Mr. Mayo declares besides that several of these obligations are legally binding and that all are morally binding. Several of the companies involved join him in stating that the damage will be irreparable both to themselves and the Ford Motor Company if their work is halted at this time.

The plans of the Ford company for the new plant on River Rouge involve an expenditure of more than $3,000,000.

Chain-Selling Arrangements Changed

Hendricks & Class, 30 Church Street, New York, have closed arrangements to represent the Columbus Chain Company in the metropolitan district, together with New Jersey, Long Island, New England, Philadelphia and vicinity, and also caring for the company's export business. The Columbus Chain Company has plants at Columbus, Ohio, and Lebanon, Pa., manufacturing stud-link, dredge, steam-shovel and hoisting chains, saddlery hardware and all kinds of wagon chains.

Hendricks & Class have continuously represented the Standard Chain Company for 17 years. Their new connection is made for the reason that the Standard Chain Company was sold recently to the American Chain Company, Bridgeport, Conn., and the latter company, which has factories at Mansfield and St. Marys, Ohio, and Marion, Ind., will sell through its own organization.

The Antimony & Compounds Company of America, Pissataway, N. J., has been incorporated with a capital stock of $200,000, to operate a smelting and refining plant for antimony and kindred products. Joseph Dhavermas, Eric Goodwin and Robert L. Hoguet are the incorporators.

Interstate Iron & Steel Company Acquires Grand Crossing Tack Company

The Interstate Iron & Steel Company, Chicago, has acquired all of the business and property of the Grand Crossing Tack Company, Chicago, and the combined businesses will be continued as the Interstate Iron & Steel Company. Silas J. Llewellyn continues as president; Samuel Hale, formerly with the Wisconsin Steel Company and later general manager of the Algoma Steel Company, becomes vice-president in charge of the steel plant operations, and George F. Davis is secretary and treasurer.

The Interstate Iron & Steel Company was organized in 1905, with assets of about $250,000, and began business with the purchase of a merchant bar mill at East Chicago, Ind. In 1915 a hard steel bar rolling mill was erected at Marion, Ohio, with an approximate capacity of 48,000 tons annually. At the present time the net worth of the company is about $2,000,000, the increase from the original assets being entirely from profits. A further expansion of the East Chicago plant was planned in 1916 to provide for an open-hearth steel plant. This extension is now to be carried out at the steel plant of the Grand Crossing Tack Company just acquired.

The Grand Crossing Tack Company was organized in 1883 with a capital of about $10,000 and at present has assets approximating $4,000,000. The properties include an open-hearth plant of two 40-ton furnaces built in 1902-3, to which two are now to be added (expected to be finished in April), a blooming mill, a wire mill and finishing plant. The products are ingots, billets, wire rods, barbed wire, woven wire fence, wire nails, rivets, staples and tacks. With the two additional open-hearth furnaces the steel plant will have capacity of 135,000 tons per year. The combined capacity of all of the plants of the Interstate Iron & Steel Company will now approximate 300,000 tons per year. The newly acquired steel plant is at 118th Street, South Chicago, and the wire rod and wire finishing mills are at Grand Crossing, Ill.

O. N. Hutchinson was president, treasurer and general manager of the Grand Crossing Tack Company and E. W. Hutchinson secretary and general sales manager. The company was incorporated in 1908.

Wagner Electric Mfg. Company Changes

The Wagner Electric Mfg. Company, St. Louis, incident to its expansion, will remove its branch offices as follows: The Chicago office to 918 South Michigan Avenue, the Boston office to 88 Brookline Avenue, the San Francisco office to 159 New Montgomery Street. Each will combine with the company's local service station.

P. B. Postelthwaite, formerly manager of the Cincinnati office, is now in charge of the service department with headquarters at St. Louis; J. W. Bryant, formerly in charge of the Buffalo and Syracuse offices, is now Cincinnati manager; C. P. McDonigal, of the Philadelphia office, will be in charge of the Syracuse and Buffalo offices; the Los Angeles office will be augmented by the services of H. W. [illegible], for many years with the New York office; the St. Louis service station is now under the direction of C. M. McCord, and the sales force of the home office has been augmented by E. V. Potter, E. Holstrum and O. J. Miller.

The Himoff Machine Company, Inc., and the Acme Gear Works, Inc., have removed their main offices and plant to 45 Mills Street, Astoria, Long Island, N. Y., adjacent to the Ninety-second Street ferry. The factory and equipment will be ready for inspection after Jan. 30. These companies make gear hobbers, turret lathes, heavy duty lathes, gears and tobacco-cutting machines. The sales office is located at 50 Church Street, New York.

Machinery Markets and News of the Works

LARGE RAILROAD LIST OUT

Great Northern to Purchase 289 Tools

Little Slackening to Buying—Embargoes and Car Shortages Growing Difficulties—The Bethlehem Steel Company Buying Cranes

One of the largest lists ever put out by a railroad has been issued by the Great Northern Railway Company, St. Paul, Minn. It covers every kind of shop equipment and is for a total of two hundred and eighty-nine tools. With the several railroad car and repair shop plants now being undertaken in the central and south west, it is not improbable that other lists may follow this one.

In all centers the machine-tool business shows a slight tapering off, although it is a lot better than it usually is at this time of the year. Delayed deliveries and price advances have not kept buyers off as much as might have been expected. The reports show that everywhere plans are taking into account the probable continuance of the present activity in the manufacturing field.

Export houses, also, expect their present large sales in Europe to keep up, whether peace comes early or late. It has been holding well, and was particularly strong following Germany's peace proposal.

As in other lines, the problem of deliveries becomes daily more and more troublesome, as embargoes and car shortages hold up shipments both incoming and outgoing. In New York embargoes are stopping shipments from the Middle West. At Milwaukee the situation is so bad that it is curtailing production, warehouses are filled, and no way is open to move the finished equipment.

The Bethlehem Steel Company has ordered some heavy-duty cranes for its gun-making plants, and it is believed will close shortly for 15 or more for its Sparrows Point plant.

New York

NEW YORK, Dec. 27, 1916.

General activity shows a slight tapering off, but it is still far better than is usual at this season. With so many orders on their books sellers of machine tools are more concerned with getting deliveries through than in writing new business. The volume of shipments from the tool-building companies does not increase to a satisfactory extent, and deliveries are hampered also by the embargoes on shipments from the West, which affects domestic as well as export deliveries.

That deliveries are far advanced in lines other than machine tools is indicated by the situation which exists with a maker of pumps and condensors whose best delivery is 18 months and which has machinery under contract for delivery 2½ years from now.

Single-tool orders continue to hold well, although [illegible] fairly large lots have been purchased. The General Electric Company is buying tools for the Sprague Electric Company works at Bloomfield, N. J. Several machines, including a boring mill and an open side planer, [illegible] be bought by the De Laval Steam Turbine Company, Trenton, N. J.

The Long Island Railroad is expected to issue a list after January 1.

The Bethlehem Steel Company has placed orders for 10, 40, 100 and 250 ton cranes for South Bethlehem, the largest one being for handling the giant guns to be built for the United States Government. The Bethlehem Steel Company is also expected to close within a few days for 15 or 18 cranes for its Maryland Steel Company plant at Sparrows Point, Md.

An export sale amounting to $20,000 was made by a dealer in the week, although with the dealers the recent export business has not been heavy. Large exporting companies say that the foreign demand is holding up well and was particularly strong in the week following Germany's peace announcement. One exporting company sold more tools abroad in that week than in the preceding month. Regardless of whether or not peace comes early exporters are confident of a continuance of buying activity in Europe. Refitting the arsenals will need a great amount of equipment, to say nothing of upbuilding the industries.

The Wright-Martin Aircraft Corporation, 60 Broadway, New York, has acquired all the capital stock of the Wright Company, the Glenn L. Martin Company, the Simplex Automobile Company, the Wright Flying Field, Inc., and the General Aeronautic Company of America, in accordance with its plans of last summer. At the Simplex plant at New Brunswick, N. J., it has erected an aluminum and iron foundry, increasing its capacity tenfold for the production of automobile and aeroplane motors. It is now equipped to manufacture at the rate of 3000 aeroplane motors per year and also 500 of the large Simplex cars and 800 small town-cars, and with the completion of its Eastern aeroplane factory, will be in a position to manufacture 700 complete aeroplanes a year. In connection with this development, the Simplex Automobile Company has increased its capital stock from $5,000,000 to $9,000,000.

The following increases in capital stock have recently been reported by the Secretary of State, Albany, N. Y.: The Albany Car Wheel Company, Albany, $100,000 to $300,000; the Himoff Machine Company, 45 Mill Street, Astoria, Long Island, N. Y., $20,000 to $100,000; the Ericsson Screw Machine Products Company, 607 Bergen Street, Brooklyn, $15,000 to $50,000; the Motor Car Equipment Company, 19 West Sixty-second Street, New York, $150,000 to $550,000; the Hunter Arms Company, Fulton, $150,000 to $750,000; the Bell Locomotive Works, 30 Church Street, New York, $20,000 to $50,000; the Kay Mfg. Company, 20 Morton Street, Brooklyn, maker of furniture springs, $30,000 to $50,000; the Higley Machine Company, Croton Falls, N. Y., $25,000 to $50,000; the Thomas Brothers Aeroplane Company, Ithaca, N. Y., [illegible] to $200,000 and the Bronze Products Society, 456 Fourth Avenue, New York, $1,000 to $75,000.

The H. W. Johns-Manville Company, Madison Avenue and Forty-first Street, New York, has decided not to erect a plant at New Rochelle, N. Y. It had this plan recently under consideration.

The Birdsall Engine Company, Auburn, N. Y., manufacturer of engines, saw mills and threshing machinery, has purchased the former Haywood factory at Newark, N. Y., consisting of a one-story building, 100 by 565 ft., with 8 acres of land. The company intends to install its own foundry later on. Emery Caldwell is president.

The Herschell-Spillman Company, North Tonawanda, N. Y., manufacturer of gasoline motors, has increased its capital stock from $250,000 to $750,000. The company will pay a 100 per cent stock dividend Dec. 30 and in addition a regular quarterly cash dividend of 2 per cent. The balance of the increased capital will be used to enlarge its present facilities. The company has just completed the construction of a four-story addition, 65 x 165 ft., for handling increased business. Guy White is vice-president and general manager.

The Kellogg Mfg. Company, Rochester, N. Y., manufacturer of air pumps and automobile accessories, has increased its capital from $25,000 to $75,000. It plans to erect a new building, 50 x 100 ft., three stories, as well as a new heating [illegible]. The offices will be re-established on the third floor. The [illegible] has purchased machinery to equip its new building.

Heughes & Co., Inc., Rochester, N. Y., is in the market [illegible] 3 in. angle bevel shear and for shears for cutting [illegible] up to 1 in. capacity.

Maher & Flockhart are enlarging and making extensive [illegible] to their jobbing foundry on Polk Street, Newark, N. J. [illegible] being razed and will be replaced at a cost

of from $10,000 to $15,000. The entire plant of the Tabor Sash Company on a lot of 100 ft. square, facing Polk Street, has been purchased by Maher & Flockhart. The use to which this will be put has not been determined.

The extensions to be made at the plant of the Charles Burroughs Company, 141 Commerce Street, Newark, N. J., manufacturer of hydraulic pumps and presses, will consist of a two-story machine shop and office, 75 x 88 ft., to cost about $18,000.

The American Synthetic Dyes, Inc., Newark, N. J., will build three one-story boiler-house additions to its plant on meadows, to be used for auxiliary service. An absorption tower for fumes will also be erected at an estimated cost of $18,000.

George F. Fischer, Newark, N. J., has had plans for an addition to his commercial garage and repair shop at 596 South Eleventh Street, 52 x 138 ft., with provision for a machine shop to handle different classes of work. The estimated cost is $11,000.

Igoe Brothers, Newark, N. J., manufacturers of wire and wire nails, have filed plans for an addition, 50 x 98 ft., at Avenue A and Pomier Street, estimated to cost $3,500.

The Union Smelting & Refining Company, New York, has purchased a tract of land on St. Charles Street, Newark, N. J., fronting on the Pennsylvania and Lehigh Valley railroads, and will build a plant for the production of tin, lead and other metals.

The Campbell Lamp Company, Jersey City, N. J., has been incorporated with a capital stock of $100,000 to manufacture gas and electric lamps, fixtures, etc. Charles A. Campbell and Henry W. Van Alen, Brooklyn, N. Y., and E. C. Abell, New York, are the incorporators.

The Grymes Engineering Company, Jersey City, N. J., operating a marine repair plant at the foot of Morris Street, has abandoned its proposed new repair and construction plant in the South Cove section, due to difficulties in acquiring the necessary site.

The Keyport Drydock Company, 77 River Street, Hoboken, N. J., has been incorporated with a capital stock of $100,000 to operate a shipbuilding and repair plant. Gilbert A. Williams, Keyport, N. J.; E. LeClere Vogt, Morristown, N. J.; and William A. Stuhr, Jr., Hoboken, are the incorporators.

Th Aero-marine Plane & Motor Company, Keyport, N. J., is building a plant for the manufacture of its products on the grounds of the local aviation school.

Fire, Dec. 16, destroyed part of the plant of the Empire Steel & Iron Company, Oxford, N. J., with damages estimated at $10,000.

The John W. Cowper Company, Buffalo, construction engineer, who is erecting the extensive dyeworks plant of the Schoellkopf Aniline & Chemical Works, at Abbott Road and the Buffalo River, will commence soon after the first of the year the erection of a power plant, a 200-ton ice-manufacturing plant and a machine shop for the same company. The boiler house will be 121 x 198 ft., the ice plant will be 97 x 125 ft., two stories, and the machine shop, 90 x 300 ft., two stories. The Cowper Company also has the contract for the machinery equipment of these buildings, including a battery of six 1000-hp. boilers, for the power plant; coal bunkers, coal and ash-handling machinery, stokers, air compressors, a 200-ton ice plant and machine shop equipment.

The West Shore division of the New York Central Railroad has built a scrap-handling plant and rolling mill at Buffalo, just east of its roundhouse and machine shop at the Lackawanna Railroad crossing, where wrought scrap material will be converted into round and flat bars, etc.

The Strong Steel Foundry Company, Buffalo, has let contract for an extension to its foundry, 80 x 152 ft., of steel and brick.

The Utilities Machines Company, Buffalo, has been incorporated with a capitalization of $100,000 by Leslie J. and Louis J. Bennett and W. H. Young, 110 Franklin Street. A factory will be erected at Main Street and Fillmore Avenue.

Plans have been drawn for a two-story factory for the manufacture of motors, to be erected on Niagara Street by A. B. Schultz, 786 Ashland Avenue, Buffalo.

Contract has been awarded to the J. G. White Engineering Corporation, 43 Exchange Place, New York, by the Eastern Pennsylvania Light, Heat & Power Company, for extensions and improvements to its power station at Palo Alto, including the installation of a 7500-kw. turbo-generator and transformers of 3000 kw. capacity, together with condensers, auxiliaries, etc.; the addition of one 500-kw. railway rotary, with transformers, and the installation of superheaters on all boilers.

The Ericsson Screw Machine Products Company, 601 Bergen Street, Brooklyn, N. Y., manufacturer of turned brass, steel and iron, has increased its capital stock from $15,000 to $50,000 in order to equip its new plant with additional machinery for which it has placed orders. It recently moved into new quarters at the above address in order to increase its facilities accordingly. E. W. Ericsson is president and general manager; C. J. Osterlind, vice-president and treasurer, and W. S. Bell, secretary.

The Samuel L. Moore & Sons Corporation, Elizabeth, N. J., is taking bids for the construction of an addition to its foundry, 40 x 200 ft., one story of steel frame and brick construction. It will about complete a previous foundry extension. The Post Cleaves Graham Company, Elizabeth, is the architect.

Catalogs Wanted

Francesco Cimetina, Via Principe Umberto 20, Milan, Italy, is in the market for engine lathes of all sizes, turret lathes, screw machines, milling machines of all types, grinding machines, planing machines, shaping machines, chucking and drilling tools etc., and desires price lists, catalogs and particulars covering equipment.

Philadelphia

PHILADELPHIA, PA., Dec. 26, 1916.

The Logan Coal Company, Harrison Building, Philadelphia, is in the market for a 5 to 8-ton, 36-in. track gage electric mine locomotive.

The Link-Belt Company, Nicetown, Philadelphia, will build a two-story, concrete and brick, machine shop, 230 x 250 ft.

The American Meter Company of Delaware, Philadelphia, has acquired from the American Meter Company of New York two factories at Seventeenth and Clearfield streets, and Race and Hicks streets, respectively, for manufacturing. The consideration is said to be $163,000 for both properties.

Wray C. Arnold and Louis M. Stiles, Philadelphia, have incorporated in Delaware the Gey Mar Company, with a capital stock of $100,000, to manufacture slot machines.

The Belmont Iron Works, Philadelphia, has been awarded contract by the Philadelphia Steel & Forge Company for the installation of a new crane runway at its plant, Milnor and Bleigh streets, to cost about $5,000.

The John A. Roebling's Sons Company, Trenton, N. J., manufacturer of wire and wire rope, is arranging for the early erection of a new wire rope plant, and having special machinery designed for installation. The structure will replace the wire rope works destroyed about a year ago by fire, with increased capacity.

The Consumers' Ice Company, Chester, Pa., will double the capacity of its ice-manufacturing plant on the Delaware River. The installation will consist of a 75-ton ice machine, water-tube boilers and engine, estimated to cost $135,000.

The Benjamin & Butler Iron Works, Hazleton, Pa., is building a new plant on the site of the former Hazleton sheet steel mill.

The Colton Demountable Rim Corporation has been incorporated at Dover, Del., with a capital of $2,500,000 to manufacture rims for automobiles. L. B. Sheldon and L. N. Downs, New York City, and George H. Roeder, Brooklyn, N. Y., are the incorporators.

The Hook Foundry Company has been incorporated at Dover, Del., with a capital stock of $50,000. Harry W. Davis, L. A. Irwin and M. L. Rogers, all of Wilmington, Del., are the incorporators.

The Philadelphia Supplies Company, Philadelphia, capital $10,000, has been incorporated by William Deissler, 40 Wyoming Avenue, Haverford; John G. Soulsby, 318 South Nineteenth Street, and Christian Finkbeiner, 4246 North Franklin Street, to manufacture safety guards for transmission machinery.

The Never-Break Products Company, Bangor, Pa., capital $10,000, has been incorporated by S. A. Teel, E. H. Stemitz and Lee Boyer to manufacture iron and steel brakeshoes.

New England

BOSTON, MASS., Dec. 26, 1916.

The Colts Patent Fire Arms Mfg. Company, Hartford, Conn., has received a contract for 1000 Vickers machine guns, extra parts, and accessories for the United States Government at a cost of about $6,200,000. The company expects to occupy its new building about Jan. 15. Enough work is in sight to keep the plant busy for a couple of years. Two years ago the company employed about 500 men and is now giving work to 1600, and it is expected the ultimate number of employees will be about [illegible].

The Lockwood Steel & Machine Company, Augusta, Me., has been incorporated with a capital stock of $1,800,000. [illegible] H. H. Turner, treasurer, and C. L. [illegible], Augusta, Me.

The Blatchley Avenue plant of the Maxim Munitions Corporation, New Haven, Conn., was to be sold at auction, Dec.

It is understood the building will be taken over by the A. C. Gilbert Company, which is now occupying part of the plant. One of the officials of the Mexia Munitions Corporation has stated that the purpose of the company in acquiring the plant was to manufacture machinery for its other plants on Grant Street, New Haven, and at Derby, Conn., and that this purpose having been fulfilled the shop and equipment are to be disposed of.

Baltimore

BALTIMORE, MD., DEC. 26, 1916.

Officials of the Arundel Sand & Gravel Company, Baltimore, are planning to build a shipyard at Locust Point, using a small plant the company has as a nucleus. Frank A. Furst, president, 1515 Fidelity Building, Baltimore, will head the company. It is said that the plans first call for the construction of wooden vessels.

The Flynn & Emrich Company, formed, [illegible] North Holliday Street, Baltimore, will build a one-story [illegible], 40 x 81 ft., at 307 to 311 North Holliday Street at a cost of about $2,000.

A. D. Newcomb, Norfolk, Va., president of the Newcomb Life Saving Boat Company, is understood to be looking for a site for a plant to manufacture non-destructible life boats.

Through the industrial department of the Baltimore & Ohio Railroad the Standard Grease & Glue Company will establish a plant at Curtis Bay, Md., at a cost of about $100,000. It will be of concrete construction. George A. Whiting, 1500 Continental Building, Baltimore, will be the president.

Chicago

CHICAGO, ILL., Dec. 26, 1916.

The Great Northern Railway Company, St. Paul, Minn., F. A. Bushnell, purchasing agent, has issued a list of equipment for which it is in the market. This is one of the largest lists ever put out by a railroad. Its extent can be inferred from the fact that the following covers only about one-tenth of it:

One 55-ft. transfer table.
One hand-power drill press.
One vertical milling machine.
Three double emery wheels.
One keyseater.
One grinding machine, 10-ft. centers.
One 24-in. engine lathe.
One 2000 cu. ft. air compressor.
Six 5-ton cranes.
One 7-ton crane.
One 100-ton crane.
One 51-in. vertical turret lathe.
Two 2¼ x 26-in. turret lathes.
One 42-in. engine lathe.
One 60-in. punch and shear.
One 1600-lb. steam hammer.
One 600-lb. steam hammer.

The Pheoll Mfg. Company, Chicago, [illegible], has purchased property at Twelfth Street and Waller Avenue at a cost of $36,000, and is having plans prepared for a one-story factory building estimated to cost $[illegible]. Myron Phelps is president.

The Chicago Screw Company, Chicago, Ill., will erect a new plant on property just acquired, which gives it a site of approximately 20 acres.

The Venn-Severin Machine Company, [illegible] West [illegible] Avenue, Chicago, will erect a one-story [illegible], 40 x [illegible], at a cost of $4,000, not $2,000, as has been reported.

The Holt Mfg. Company, Peoria, Ill., is having plans drawn for a foundry building 200 x [illegible] ft.

Fire did $200,000 worth of damage to the plant of the Brownell Improvement Company, Thornton, Ill., manufacturer of stone-crushing machinery.

The Stone Tractor Mfg. Company, Quincy, Ill., has been incorporated with a capital of $100,000 by G. M. Stone, W. G. Brady, and J. Leslie Fullton.

The National Tractor Company, organized with a capital of $250,000 will locate in Wichita, Kan. J. E. Jones is president.

C. D. Edwards, Albert Lea, Minn., will purchase a hand angle bender to roll coal bin [illegible], also a 3-hp. second-hand electric motor to operate [illegible] direct current.

The Hanna Engineering Works, 2059 Elston Avenue, Chicago, is in the market for electric traveling cranes, including one 20-ton to 30-ton crane, one crane with [illegible] and one 48-ft. span.

The Buss Machine Works, Holland, Mich., has increased its capital from $25,000 to $100,000.

Detroit

DETROIT, MICH., Dec. 26, 1916.

Little decrease is noted in the demand for machinery tools, in spite of the temporary slackening of manufacturing due to the season. Deliveries require from 3 to 6 months, and are unreliable. Prices continue their steady advance, and further increases are predicted. Detroit and the surrounding district are entirely free from labor troubles. Manufacturing plants are preparing for the biggest year in their history. Altogether 1917 will open with conditions more favorable for a great increase in the machine-tool business and similar lines than they have been in years.

To assist in relieving the freight congestion in this district, the Ford Motor Company has shut down for two weeks. The closing will cost the company thousands of dollars and throw it farther behind in its orders for machines, but the officers believed some remedy is necessary to relieve the freight condition in Detroit, which is threatening to paralyze all industries.

The Grand Rapids Grinding Machine Company, Grand Rapids, has been organized with S. Owen Livingston, J. DeKoning and Charles F. Hext incorporators, to manufacture grinding machines. Messrs. Livingston and DeKoning will have charge of the business, which is capitalized at $[illegible].

The Kawneer Mfg. Company, Niles, Mich., has let contract for the construction of a concrete factory which will add [illegible] sq. ft. to its present facilities. Francis J. Plym is president, which is incorporated at $1,200,000 to manufacture store fronts.

The St. Clair Brick Company, St. Clair, Mich., will use the proceeds of the sale of 3000 shares of stock to buy machinery to manufacture 20,000,000 brick per year.

The Murray-Kramer Motor Company, Detroit, has been incorporated with a capital stock of $15,000 by Mathew A. Kramer, Walter C. Murray and Edward W. Griffith.

The Chase-Prost Mfg. Company, Detroit, has been incorporated with a capital stock of $10,000 by Charles E. [illegible], W. C. [illegible] and F. W. Irwin.

The capital stock of the Universal Car Equipment Company, Detroit, has been increased from $50,000 to $100,000.

The Columbia Motor Truck & Trailer Company, Pontiac, has increased its capital stock from $35,000 to $100,000.

The Grand Rapids Refrigerator Company, Grand Rapids, Mich., has built an addition to handle its increased business. Two 15-ton double crank stamp presses will be installed, and new [illegible] furnaces added.

The Williams Iron Company, Detroit, has been incorporated with a capital stock of $[illegible] for the refining, smelting, and manufacture of metals, ores and minerals. The stockholders are Harry E. Williams, Jean M. Williams, and Thomas I. Cochran, Detroit.

The Pontiac Tractor Company, Pontiac, Mich., has been incorporated by Norman A. Wright, Fred S. Welch, and Martin D. Hubbard, Pontiac, with a capital stock of $42,000, to manufacture tractors, engines, and spraying machines.

The Arrow Tool & Reamer Company, Detroit, has been incorporated for the manufacture of machine and hand tools and supplies. John J. Kennedy, Roderick Mathieson, Jr., and Edward F. Griffith, Detroit, are the incorporators.

The Detroit Wood Products Company, Detroit, has been incorporated with a capital stock of $25,000 to manufacture [illegible], by M. L. Brown, A. L. Lott, E. S. [illegible].

The [illegible] Pump Company, Grand Rapids, Mich., has been incorporated at $10,000 to deal in pumping machinery and equipment. The stockholders are Robert B. Kellogg and M. V. Burlingame, Grand Rapids, and Charles [illegible].

The [illegible] Foundry Company, Mount Clemens Heights, [illegible], has completed a three-story brick and steel factory, [illegible] for the installation of equipment which will make it one of the most complete [illegible] in the State for the production of plumbing fitting castings.

The Campbell, Wyant, Cannon Foundry Company, Muskegon, Mich., has leased the entire foundry buildings of the Racine Boat Company, Muskegon, Mich., and will install additional equipment immediately. The newly-acquired [illegible] will be used for the casting of small parts for [illegible] Company, Muskegon.

The Lincoln Brass Works, Detroit, has been incorporated [illegible] for the manufacture of brass goods. E. H. [illegible], J. O. Stevens and B. Ellison, Highland [illegible], are the incorporators.

The [illegible] Motors Company, Muskegon, Mich., has [illegible] some additions to its plant. At least four [illegible] will be erected by the addition.

Milwaukee

MILWAUKEE, Wis., Dec. 26, 1916.

Milwaukee manufacturers are beginning to feel the worst effects of the car shortage and traffic congestion, and production is now at a rather low ebb. Shop owners are taking advantage of the holiday season to obtain some relief from the conditions. In some lines of machinery manufacture warehouses are filled to overflowing, because no way is open to move the product. The situation is the worst known in years, and is doubly unfavorable because of the urgent demand for machinery. Deliveries of machine tools are being seriously delayed at a time when the sold-up condition of shops already has obliged purchasers to wait an unusual length of time for the goods. Immediate business has slackened perceptibly, but not nearly to so large a degree as in past years at this season. In the face of the unusual and wholly unprecedented conditions surrounding machine-tool trade manufacturers in these lines feel that business is unusually brisk. Delayed deliveries and advanced prices have not kept buyers off, as might be expected, and at this time it appears certain that all tool builders in this district will have no trouble in keeping all available capacity fully occupied until the beginning of 1918.

The Filer & Stowell Company, 247 Becher Street, Milwaukee, maker of Corliss engines and sawmill machinery, will have plans prepared at once for a five-story pattern storage house, machine and blacksmith shop, to replace the buildings destroyed by fire Dec. 15. The loss is about $375,000. The plant again is in operation, only 75 to 80 of the total force of 600 men being idle. It is planned to start construction work soon after Jan. 1.

Marshfield, Wis., is taking bids until Jan. 5 for a sewage disposal system, requiring a pump of 700 to 1000 gal. per min. capacity. John Seubert is city clerk.

The Line Materials Company, South Milwaukee, Wis., manufacturing materials for electric transmission systems, is erecting a one-story addition, 60 x 125 ft., of reinforced concrete.

The Chicago & Northwestern Railroad will erect a 29-stall roundhouse and small shop at Beach, near Kenosha, Wis., on a tract of 60 acres.

The Department of Public Works, Milwaukee, will buy an engine lathe for the municipal garage and machine shop. F. G. Simmons is commissioner.

The West Allis Scrap Iron & Metal Company, West Allis, Milwaukee County, has been organized with a capital stock of $5,000 by S. Greenberg and N. Sherman.

The Board of Education, Escanaba, Mich., is calling for bids until Feb. 15 for an addition to the high school, to be devoted exclusively to manual training. It will be 47 x 100 ft., three stories and basement, and will require a complete equipment. The architects are G. Arntzen & Bro., Escanaba.

The Winther Motor Truck Company, Kenosha, Wis., is placing orders for a complete equipment of machine tools, etc., for its proposed factory, to be erected in the spring. Martin P. Winther is president.

The Charles W. Fish Lumber Company, Birnamwood, Wis., has decided to locate its third sawmill plant at Antigo, Wis. The Antigo Commercial Club furnishes a 30-acre site and $5,000 in cash. Work on the erection of a mill costing $50,000, and having an annual capacity of 8,000,000 ft. of logs, will begin about March 15. Charles W. Fish is president.

The Peerless Tire & Rubber Company, Green Bay, Wis., has been incorporated with a capital stock of $50,000 by F. E. Burrell, John P. Jessen, and A. W. Brown. A tire and rubber goods plant in Akron, Ohio, has been purchased by the company, and later it is intended to transfer operations to Green Bay. In the meantime marketing will be done from Green Bay.

The McClellan Refrigerating Machine Company, Fond du Lac, Wis., has been incorporated with a capital stock of $50,000 by J. W. Rosenbaum, A. Jens, and J. E. Ramsey, and is establishing headquarters at 12 East First Street, Fond du Lac.

The Gehl Brothers Mfg. Company, West Bend, Wis., maker of farm machinery and gas engines, is installing new machinery and equipment, including a bulldozer, punch, and riveting machine.

The Mechanical Appliance Company, 133 Stewart Street, Milwaukee, is building an addition, 45 x 60 ft.

Dr. Enoch Thulin, Landskrona, Sweden, manufacturer of aeroplanes, placed orders with the Gisholt Machine Company, Madison, Wis., for a number of lathes and other machine tools. He was accompanied by his factory superintendent, Robert Carlson, on his trip to Madison.

The McFarland & Westmont Tractor Company, Sauk City, Wis., has leased a factory building and equipment, where it will manufacture a new steel tractor.

The Wisconsin Iron & Wire Works, Milwaukee, Wis., will erect a factory at Becker and Booth Streets, to cost $22,000.

The Nelson Company, Menomonee Falls, Wis., has changed its name to the Menomonee Falls Mfg. Company and has elected the following officers: J. B. Whittaker, president; M. L. Wi[illegible], vice-president and C. F. Hen[illegible], secretary and treasurer. It has enlarged its plant and will manufacture shop equipment, specialties, and power transmission equipment.

Cincinnati

CINCINNATI, OHIO, Dec. 26, 1916.

[illegible] factor to be reckoned with is determining the selling value of a machine tool. Another important item is the high cost of high-speed steel.

[illegible] railroads were disappointing customers throughout the year, although many of them contracted for machine tools for replacement, and a few large lists were closed with the Eastern and Western railroads. All of these machines have not yet been bought. The Seaboard Air Line sent out a comprehensive list several months ago, but withdrew it after purchasing only a limited number of machines.

Business from the rolling mills was excellent throughout the year and orders from that source are still coming in.

Boiler and tank makers were busy the entire year, but the high cost of plates and heads held down production in the spring and fall. Makers of small motors, electric generators and motors, as well as portable electric drilling and grinding machines, experienced an excellent business, most of which was from abroad. Jobbing foundries melted more iron than in any previous year.

Definite totals from the city building commissioner's office are not yet available, but for 11 months ended Nov. 30, estimates for improvements will exceed the entire year of 1915. Manufacturing buildings now under construction include the immense machine-tool plants of the American Tool Works Company and of the R. K. LeBlond Machine Tool Company. In Oakley suburb the Cincinnati Planer Company, Cincinnati Milling Machine Company and the Modern Foundry Company all have extensive additions to their plants, and almost every manufacturing company in the city has added to its equipment. The John A. Oberhelmann Foundry Company has fitted up a large new foundry on Colerain Avenue and the Elmwood Castings Company reports that the addition to its plant recently completed is now in full operation.

The Cincinnati Screw Company, Cincinnati, has increased its capital stock from $500,000 to $1,000,000 and will enlarge the output of its plant fully 75 per cent. Practically all the necessary equipment has been purchased. B. B. Quillen is vice-president and general manager.

The Heekin Can Company, Cincinnati, has purchased a building in Norwood, a suburb, that will be fitted up as a branch plant for the manufacture of metal specialties. Its city plant will be devoted almost exclusively to making cans.

The Cincinnati Horseshoe & Iron Company, Cincinnati, has acquired a site adjoining its plant near Cleves, Ohio, and is having plans prepared for additions that will double its present output.

The Globe Soap Works Company, Cincinnati, has bought additional property adjoining its present plant and has tentative plans under way for increasing the capacity. Building details are lacking.

The Dexter Wire Wheel Company, Dayton, recently incorporated, has arranged for the purchase of the Dayton & Dandelion Company's plant in Edgemont, a suburb, and will use it for the manufacture of motor truck wire wheels.

The Monitor Motor Car Company, Columbus, Ohio, is in the market for equipment for its plant for the manufacture of automobiles. It recently increased its capitalization and its present output is [illegible] per month.

The W. F. Robertson Steel & Iron Company, Cincinnati, is in the market for rivet-heading machines for making cold rivets [illegible] machine.

The Paramount Motor Company, 1432 South Parsons Avenue, Columbus, Ohio, will purchase a 100 to 150-hp. Diesel engine, either stationary or marine type, single or multi-cylinder, in good shape.

Cleveland

CLEVELAND, O., Dec. 26, 1916.

The demand for machinery has fallen off slightly although dealers report a fair volume of orders for single tools and small lots. Peace talk has apparently had no effect on the local machinery market. Mention was made last week of an inquiry for a round lot of machinery for a plant to be established in Cleveland to manufacture steel wheels for automobile trucks. The company to operate this plant has been incorporated as the Loomis-Sielaff Company, and is now placing orders for its machine-tool equipment. The National Carbon Company has made further purchases of machinery. Some scattering business is now coming from the automobile trade, which has not been very active recently. Operations of manufacturing plants in Cleveland and vicinity are being seriously handicapped by railroad embargoes that are interfering with shipments of coal, raw stock and finished product.

The Valley Smelting Company, Cleveland, recently incorporated with a capital stock of $250,000, has leased a 13-acre site near the junction of the Cuyahoga River and the Baltimore & Ohio Railroad and will engage in refining waste material and dealing in non-ferrous metals. Cleveland and Detroit interests, represented by the Michigan Smelting & Refining Company, are promoting the new company. James Stillman, President Michigan Smelting & Refining Company, is president, Charles O. Patch, vice-president, H. B. McGraw secretary, and H. D. le Bel, general manager.

The National-Acme Company, Cleveland, has completed plans for the erection of its new screw machine products department at East 131st Street and Coit Road which includes two steel and concrete one-story buildings, 482 x 603 ft. and 52 x 603 ft. respectively. George S. Rider & Co. are the architects.

The Union Engineering Company, Cleveland, has purchased the box manufacturing plant of the J. H. Hahn Company, West Third Street, which it will remodel for the manufacture of hoisting and conveying machinery.

Announcement has been made to stockholders of a plan for the consolidation of the Cleveland Foundry Company, the Cleveland Metal Products Company and the Cleveland Factory Company into a corporation capitalized at $10,000,000, to be known as the Cleveland Metal Products Company. These companies are controlled by F. E. Drury and associates and no change will be made in the management. The Cleveland Foundry Company manufactures oil stoves; the Cleveland Metal Products Company makes aluminum sheets and aluminum utensils, and the Cleveland Factory Company owns the real estate upon which the plant of the Cleveland Foundry Company is located. According to the plan the Cleveland Metal Products Company will increase its present stock to $5,000,000 7 per cent preferred and $5,000,000 common stock, $4,000,000 of each to be issued at this time.

The Combination Stove Company, Cleveland, has been incorporated with a capital stock of $50,000 by Richard Ryan, N. C. Criswell, Warren C. Jones and others.

The Atlas Bolt & Screw Company, Cleveland, which will shortly begin the erection of a new plant, has increased its capital stock from $200,00 to $500,000.

The Carbo-Hydrogen Company, Cleveland, has just acquired a site on which it will erect a plant for the manufacture of carbo-hydrogen gas for welding purposes.

The Britton Carbureter Company, Cleveland, has been incorporated with a capital stock of $50,000 by L. M. and A. C. Diehl, P. C. Jones and others.

The Foster Bolt & Nut Mfg. Company, Cleveland, has increased its capital stock from $25,000 to $300,000.

The Premier Mfg. Company, Ravenna, Ohio, recently formed to manufacture lock washers, has elected the following officers: C. H. Judkins, Cleveland, president; R. D. Judkins, vice-president, and W. E. Judkins, secretary-treasurer.

The Buckeye Twist Drill Company, Alliance, Ohio, has increased its capital stock from $150,000 to $1,000,000 as preliminary to plant additions which it has under consideration. According to plans, a new building will be erected shortly and additional equipment required.

The Canton Metal House Company, Canton, Ohio, has been incorporated with a capital stock of $300,000 and plans to erect a plant, 50 x 300 ft., to manufacture portable metal buildings. H. S. Renkert, C. A. Weirich and others are active in the company.

The Sell House Goods Company, Canton, has been sold to Eastern interests and will be incorporated with a capital stock of $200,000. The plant will be enlarged to three times its present capacity and devoted entirely to the manufacture of sporting goods.

The Lima Metals Foundry Company, Lima, Ohio, has been incorporated with a capital stock of $15,000 by W. J. Newman, A. G. Bush and others.

The Vulcan Drop Forge Company, Sandusky, Ohio, has been incorporated with a capital stock of $350,000 by Gustave Von Densteinen, C. N. Horn, Paul J. Bickel and others. It is stated that the company will build a plant near that of the Sandusky Roller Bearing Company.

The Dover Mold & Foundry Company, Dover, Ohio, expects to have its new foundry, 84 x 270 ft., completed late in January. Three traveling cranes will be installed. It will make ingot molds and will consume about 100 tons of molten metal per day from the adjoining blast furnace of the Penn Iron & Coal Company.

The American Sewer Pipe Company, Akron, Ohio, will erect a new plant at Toronto, Ohio, on the site of the Ohio Valley Brick Works recently destroyed by fire. Plans are being prepared by Robert Russell, the company's chief engineer.

The Morral Heater Company, Morral, Ohio, has been formed to manufacture gas stoves. S. E. Morral is president; Charles Robbins, vice-president and general manager; D. D. Mahaffey, secretary, and J. T. Lucas, treasurer.

The Gilham Mfg. Company, Canton, Ohio, which recently increased its capital stock, did not change its name to the Gilham Company as stated in THE IRON AGE of Dec. 7. Huntlie Gordon, formerly president and treasurer of the Novelty Iron Works, and Clarence M. Converse, formerly general sales manager of the same company, have both been elected directors of the Gilham Mfg. Company, the former being also treasurer and the latter vice-president.

Indianapolis

INDIANAPOLIS, IND., Dec. 26, 1916.

The Catlin Robbins Mfg. Company, Indianapolis, has been incorporated with $25,000 capital stock to manufacture tin pails, etc. The directors are T. S. Catlin, H. W. Robbins and A. F. Catlin.

The Indianapolis Specialty Supply Company, Indianapolis, has been incorporated with $25,000 capital stock to manufacture fruit jar holders and other articles. T. S. Catlin, H. W. Robbins and A. F. Catlin are the directors.

The Stout Furniture Company's factory No. 1, at Salem, Ind., burned Dec. 19, with $150,000 loss. The flames spread to the plant of the Interstate Public Service Electric Company, which was also destroyed, with a loss of $50,000.

The Metal Washer Company, Muncie, Ind., has been incorporated with $10,000 capital stock to manufacture washers. The directors are J. A. Peterson, F. M. Williams and A. Williams.

The Indiana Truck Corporation, Marion, Ind., has been incorporated with $100,000 capital stock to manufacture motor vehicles. The directors are C. G. Barley, J. W. Stephenson and S. W. Winder.

The Whiteley Malleable Castings Company, Muncie, Ind., has increased its capital stock from $250,000 to $450,000.

The Globe Stove & Range Company, Kokomo, Ind., has increased its capital stock from $600,000 to $700,000.

The Hammon Optical Machine Mfg. Company, Vincennes, Ind., has been incorporated with $15,000 capital stock to manufacture optical supplies. The directors are R. R. James, J. H. Hammon and Joseph Maddigan.

The C. R. Folsom Iron Works, Walkerton, Ind., has been organized with a capital of $35,000 to manufacture tanks, gas holders and pipes. The incorporators are Oscar C. Shockney, William A. Endley, Vern W. Hardenbrook and Samuel D. Krentz.

The Central South

LOUISVILLE, KY., Dec. 26, 1916.

A temporary let-down is noted in the iron and machinery trades. Inquiries continue numerous, however, and manufacturers report continued difficulty in obtaining materials. A recent contract for installing motor drive in a local factory was decided on the basis of quick delivery of motors. A number of important ice-manufacturing projects are in hand, while [illegible] developments in Kentucky are reported.

The Frey Planing Mill, Louisville, Ky., is electrifying its plant, requiring 325 hp. in motors, ranging from 2 to 50 hp.

The Vogt Brothers Mfg. Company, Louisville, Ky., has purchased the business and plant of the Huetteman & Cramer Mfg. Company, Detroit, Mich., at a figure reported to be [illegible] and will move the equipment and stock to Louisville. The Louisville company will engage in the manufacture of [illegible] machinery.

[illegible] Motor Car Company, Lexington, Ky., has been incorporated with $20,000 capital stock by B. F. and Stanley Stone and William H. Philips.

The Perry Ice & Coal Company, Hazard, Ky., has increased its capital stock from $10,000 to $23,000, in consideration of improvements to be made.

The City Council, Owensboro, Ky., has approved the installation of an additional 1500-hp. turbine generator in the municipal power plant. A Westinghouse turbine will be purchased at a cost of $26,000.

The Hull Pump & Tank Company, Owensboro, Ky., will move its plant to Indianapolis at once. The company has business to the amount of $1,000,000 on its books and has experienced difficulty in obtaining materials in Owensboro. Nat D. Hull is president.

The Orchestral Pipe Organ Company, Nashville, Tenn., has been incorporated with a capital stock of $25,000 by M. H. Swalowski, R. R. Oglesby, W. E. Bridwell, and others.

The Southern Motor Car Company, Memphis, Tenn., will shortly let a contract for a new sales and garage building to cost $17,000. S. H. Butler, Como, Miss., is president.

The John G. Duncan Company, Knoxville, Tenn., wants dealers' prices on 16, 20, 30, 35 and 45-lb. relay rail, with lowest freight rate to Knoxville.

Birmingham

BIRMINGHAM, ALA., Dec. 26, 1916.

General trade conditions are better than at any time this year. Wholesale machinery reflects these conditions. A strong new demand is noticeable for mining equipment owing to a number of new and large openings. The demand for hydroelectric apparatus is still maintained. The sawmill trade is steady. With money easy and farmers prosperous, mills booked to capacity and wage advances all around, the outlook is excellent.

The Imperial Coal & Coke Company, Birmingham, Morris Bush president, will make a 1000-ton opening at Bradford mines in Jefferson County.

The Republic Iron & Steel Company, Birmingham, will expend $500,000 in improvement of its coal mines at Palos, Ala., its furnace property at Thomas, Ala., etc.

The American Forging Company, Birmingham, will install apparatus for making automobile forgings. R. I. Ingalls is president.

The Hanna Handle Company, Macon, Ga., incorporated with capital stock of $15,000 and privilege to increase to $100,000 by Clay Hanna, W. M. Fowler, and others, plans to manufacture handles for tools.

Ernest Kreher, Tampa, Fla., and associates, are reported as having perfected plans for the establishment of a shipbuilding plant to cost about $750,000.

The Port Wentworth Lumber Company, Savannah, Ga., has purchased 43,000 acres of timber in Georgia and South Carolina, at a cost of $350,000. A pulp mill is to be erected.

St. Louis

ST. LOUIS, MO., Dec. 26, 1916.

The machine-tool trade has been somewhat quieter than in the previous week on account of year-end activities. Practically all the demand from this territory continues to be for domestic needs and is not affected to any extent by the war conditions, or peace talk. The impression prevails that domestic needs will keep up at a high speed for some time.

The Del-Home Light Company, St. Louis, has been incorporated with a capital stock of $15,000 by W. O. Waldsmith, F. W. A. Vesper, and others, to manufacture electric light fixtures, etc.

The Wellston plant of the Polar Wave Ice & Fuel Company, St. Louis, was burned Dec. 22 with a loss of about $25,000.

The Jackes-Evans Mfg. Company, St. Louis, will equip a building, to be built for it at a cost of $100,000, for the manufacture of sheet-iron products.

The Double Drive Motor Company, Kansas City, Mo., has been incorporated with a capital stock of $500,000 by Theodore Ditmars, Walter Beck and S. B. Gatewood to manufacture automobiles, tractors, etc.

The Builders' Roofing Company, Kansas City, Mo., has been incorporated with a capital stock of $17,500 by A. J. Shirk, J. F. Stocker and E. A. Thompson to manufacture roofing material.

The Beard-Qualls Company, Box 359, Carthage, Mo., George W. Qualls, president, is in the market for equipment for the manufacture of both explosion and ignition fuse.

The Kansas City Folding & Marking Machine Company, Kansas City, Mo., has been incorporated with a capital stock of $10,000 by A. E. Isaiah, W. and W. C. Liggitt and will manufacture folding and marking machines.

The Beall Brothers Tool Company, Alton, Ill., will double its capital stock, [illegible] to $200,000, and will make additions to its tool making plant.

The St. Louis Southwestern Railway, St. Louis, Mo., will [illegible] shops, etc., at East St. Louis, Ill., to cost about $100,000.

The [illegible] Grain Milling Company, East St. Louis, Ill., was destroyed by fire Dec. 20 with a loss of about $100,000. The plant will be rebuilt.

The Little Rock Motor Car Company, Little Rock, Ark., has been incorporated with a capital stock of $10,000 by F. N. Fisher, D. M. and E. B. Armstrong, and others, and will equip a machine and repair shop.

George W. Fair will erect a garage at Little Rock, Ark., requiring about $5,000 worth of mechanical equipment.

The Citizens Gin Company, Bernadt, Ark., has decided to replace its cotton ginning and power plant, destroyed with a loss of $10,000.

The Earle Electric Light Company's plant, Earle, Ark., has been destroyed by fire, also the C. T. Whitman lumber plant, with a total loss of $60,000.

The E. L. Bruce Company, Little Rock, Ark., will rebuild its wood-working plant and hardwood-working machinery will be installed to cost about $75,000.

The Sapulpa Refining Company, Sapulpa, Okla., will increase its capital from $1,000,000 to $2,000,000 to increase its refining plant equipment.

The Consumers' Light & Power Company, Ardmore, Okla., has been incorporated with a capital stock of $1,000,000 by Paul E. Ekern, W. D. Potter and P. C. Kings to erect and equip public service plants.

The Laverne Electric Light, Ice & Power Company, Laverne, Okla., has been incorporated with a capital stock of $30,000 and will equip a plant at a cost of about $30,000. W. H. Lewis and others are interested.

Lindsay, Okla., has voted $8,000 for the purchase of machinery for its electric light and waterworks plants.

W. O. Cawthon, Muldrow, Okla., will equip a cotton ginning plant and is in the market for about $6,000 worth of machinery.

The Greenville Ice & Coal Company, Greenville, Miss., W. Isenberg, president, will equip a raw-water ice plant at a cost of $46,000 with a daily capacity of 125 tons.

The Trans-Mississippi Terminal Company, New Orleans, La., will expend about $350,000 for new equipment and extensions of its terminal facilities, especially mechanical loading and unloading devices.

The Southern Drydock & Shipbuilding Company, New Orleans, La., M. P. Doullot president, will install equipment for a shipbuilding plant. F. C. Hymee is manager.

Penick & Ford, New Orleans, La., will equip a cold storage plant at a cost of about $75,000 for machinery.

The Peavy-Wilson Lumber Company, Leesville, La., will equip a mill with a daily capacity of about 150,000 ft. A. J. Peavy, Shreveport, La., is president.

The Berry Iron & Steel Company, St. Joseph, Mo., will purchase a 10-ton jib crane with 16-ft. x 6-in. mast and 20-ft. jib.

Texas

AUSTIN, TEX., Dec. 23, 1916.

Prospects for an unusually large business in Texas and the Southwest in the coming year, are reported generally by the machinery and tool trades. The business for 1916 shows a substantial gain over that of the preceding year.

It is announced that the consolidation of the Texas Traction Company and the Southern Traction Company under the name of the Texas Railways Company will take place soon. The former company operates an interurban electric line between Dallas and Denison and the latter company a similar line between Dallas and Waco and Dallas and Corsicana. It is planned to extend the Waco line south to San Antonio, via Austin, a distance of about 185 miles, shortly after the merger goes into effect.

E. S. Brodix, Brownsville, and associates, plan to construct a harbor and port works at the mouth of the Rio Grande River. It is also announced that the de facto government of Mexico is considering plans for a similar improvement on the Mexican side of the river, adjacent to the mouth of that stream. The Monterey-Matamoros division of the National Railways of Mexico will be extended down the river from Matamoros, a distance of about 30 miles, as a means of [illegible] in the development.

The Celina Mill & Elevator Company, Sherman, has been reorganized with a capital stock of $160,000. It will build

[illegible] 1,000-bu. grain elevator. McKeever [illegible] G. B. R. Smith is president.

The Parkersburg Tank Company, manufacturer of cypress tanks, plans to move its plant from Beaumont to Houston. Additional machinery will be installed.

The Gates Handle Company, Beaumont, will install additional machinery and greatly enlarge its handle factory.

The Alexander Gilmer Lumber Company, Jasper, will rebuild its roundhouse [illegible] recently destroyed by fire.

San Francisco

SAN FRANCISCO, CAL., Dec. 19, 1916.

Machine-tool activity has increased materially in the last few weeks. Purchases [illegible] and the call for small groups and single tools is exceptionally active, although buyers complain at prices, and some business is lost on that account. Some of the largest manufacturing interests show great confidence in the future, buying quite largely for distant delivery. Automatic and special-purpose machinery is in stronger demand here than ever, with deliveries especially slow. General industrial development appears to be increasing.

The Dow Pump & Diesel Engine Company has just completed the adaptation of its 4-cycle true Diesel engine for marine use, and is ready to put it on the market.

The Holt Mfg. Company, Stockton, Cal., is starting work on another machine shop, 100 x 300 ft., and has ordered tools amounting to approximately $75,000 among local houses.

The Western Pacific Railroad shops near Sacramento are now employing 290 men, and have under way $130,000 worth of car construction.

The East Bay Foundry Company will open a new plant shortly at Chestnut and Thirty-second streets, Oakland. William Cobb is president.

The Pacific Coast Borax Company is preparing to install two new rotary kilns at its plant in Death Valley, Cal., increasing the output by 25 tons.

The General Roofing Mfg. Company, which recently built a plant at Richmond, Cal., is preparing to triple its capacity.

The Krogh Mfg. Company, 149 Beale Street, San Francisco, manufacturer of large irrigation pumps, concentrators, etc., has purchased a lot on Fremont Street for its local plant.

A. L. McKelvey has bought out [illegible] Robert Harron, Avalon, Cal.

The Mowry Machinery Company, Los Angeles, [illegible] incorporated with a capital to be [illegible] well, S. F. Mowry, and L. Bulkley.

The Sacramento Valley Colony Company, Willows, Cal., is preparing to install 70 electric pumping [illegible] tion.

The Pacific Northwest

SEATTLE, WASH., Dec. 19, 1916.

Box manufacturers in the Northwest are looking forward to a big trade in 1917. At present practically every plant in the Puget Sound country is working night shifts to fill present orders. The Anacortes Lumber & Box Company, Bellingham, Wash., is making extensions to its box-manufacturing plant, which will increase its capacity 40,000 ft. daily. The Morrison Mill Company of that city is also expending $6,000 in increasing the box department of its plant, and the Fleetge Lumber & Box Company is making extensions to care for increased business.

Figures available show that the Port of Seattle's waterborne commerce for the first eleven months of 1916 aggregated $380,651,842. These figures represent a gain of $145,495,895 over the same period for 1915. The figures show a tremendous expansion in foreign commerce. The customs business for the month of November amounted to $24,723,404, a gain of more than $5,000,000 over November, 1915.

Agents of the Entente Allies have resumed negotiations with lumbermen here for a supply of spruce to be used in construction of more airplanes, and a large order is reported to be pending. Lumber orders and production in the Northwest were both increased the past week [illegible] lighter. The unshipped balance of orders amounts to 11,831 carloads, about 6,000 above normal.

The City Council, Seattle, Wash., will take bids at once for furnishing equipment for the proposed addition to the auxiliary steam power plant operated by the city on Lake Union. The machinery will include air, water pumps, boiler feed, and service pumps, a turbo-generator, etc., and will cost $250,000.

The plant of the Kleeb Lumber Compa[illegible] troyed by fire recently with a loss of $200,000. It [illegible] the owners will rebuild.

The Scandinavian-American Shipbuilding Company, Portland, Ore., has recently been incorporated for $200,000 by Dr. E. T. Hedlund, Claude McCulloch, L. R. Bailey, and J. R. Rose, all of Portland. It has a site in Portland, and expects to start construction work about Jan. 1.

The [illegible] Idaho Water Light & Power Company, [illegible] has purchased the system and plant of the Lewiston & Clarkston Improvement Company, and plans a new power plant to develop 50,000-hp.

The Oregon Iron & Steel Company, Oswego, Ore., plans [illegible] its Oswego plant at once, having [illegible] large pipe contracts.

[illegible] Company, Seattle, has recently filed [illegible] corporation, marking its 50 years of operation in King County. This is the first reincorporation in the [illegible] Washington, provide that the life of a [illegible] years. The company is reincor[illegible] with Perry Polson, Seattle, A. B. Dunlap, La Conner, and O. H. Polson, Seattle, trustees.

The Northwestern Fisheries Company, Seattle, a subsidiary [illegible] Booth Fisheries Company, has recently purchased [illegible] Cannery Canning Company, its Roe [illegible] properties, both located in Alaska. It [illegible] to rebuild its plant at Kenai, Cook [illegible] the last May.

The Columbia Engineering Works, Portland, has recently [illegible] two steel auxiliary vessels, which [illegible] at its Linnton plants. Two tow steamers have recently been constructed. The contracts amount to [illegible].

The [illegible] & Power Company, Olympia, Wash., [illegible] auxiliary plant of 1,000-hp. [illegible] its present plant at Tumwater.

[illegible] Twohy Brothers, Portland, in connection with the proposed enlargements and extensions to their [illegible] also plan the installation of equipment for [illegible] large scale [illegible] contract for the construction [illegible] Point.

The [illegible] Manufacturing Company has recently moved [illegible] from the L. C. Smith Building to 3223 First Avenue South, Seattle, where it has installed a machine shop [illegible] F. S. Burbank is president.

The Lewis & Clark Mercantile Company, Spokane, Wash., has [illegible] to operate a patented tree-making [illegible].

The [illegible] Electric Co., St. Maries, Idaho, plans improvements [illegible] to cost $7,000. Machinery will be [illegible] Clark, is the proprietor.

The Hunter-Wiles Mfg. Company, Spokane, Wash., has [illegible] to establish a plant for the manufacture of a patented concentration table for mining mills. J. W. McBride, Robert Hunter, Carl Wiles, and others [illegible].

The Thomas Pulp & Paper Company, Vancouver, Wash., has been incorporated for $2,000,000 and plans the construction of a paper mill in Portland, Ore., to manufacture paper. [illegible] proposed will cost $1,000,000. Robert [illegible].

Canada

TORONTO, ONT., Dec. 26, 1916.

The National Steel Works, Toronto, which has recently [illegible] operations will make additions to its [illegible] orders for shell forgings.

The [illegible] Company, Toronto, will erect an addition to its plant, to cost $2,000.

[illegible] Machine Company, 163 Sterling Road, [illegible] contract to erect an addition to [illegible].

[illegible] Davie Avenue, Toronto, will erect at [illegible] factory, to cost $10,000.

[illegible] Ltd., Montreal, will double its [illegible] will provide for building vessels [illegible].

[illegible] Company, Hamilton, Ont., is in [illegible] on stiff-leg derrick, motor-driven.

[illegible] for the erection of a plant for the [illegible] Machinery Company, Bennett Street, Maisonneuve, [illegible] awarded to the Deacon Construction [illegible] Mayor Street, Montreal, and the steel work to [illegible] Company, Lachine, Que.

[illegible] purchased a site on the Bridge [illegible] B. C., where it will build a power plant.

The Adams Brothers Harness Mfg. Company, McDermott Avenue East, Winnipeg, is having plans prepared for the erection of a factory at Saskatoon, to cost $125,000.

The Huntley Mfg. Company, Silver Creek, N. Y., builder of cereal-milling and canning machinery, has purchased property at Tillsonburg, Ont., which it will equip for manufacturing. The company will erect another building there next spring.

The H Lougheed Machinery Company has taken over the building of the Canadian Woodworkers, Ltd., Sarnia, Ont., which it will equip for manufacturing purposes.

The Amalgamated Engineering & Drydock Company, Vancouver, B. C., is making preparations for the construction of a shipbuilding plant on Burrard Inlet, B. C., at a cost of $5,000,000.

The Dominion Iron & Wrecking Company, Quebec, has taken over the plants of the Standard Steel Foundries at Outremont and the Consolidated Brass Foundries at Point aux Tremble, Que., with the intention of consolidating for the manufacture of munitions. New equipment will be installed, including 15 electric furnaces, at the Consolidated Brass Foundries' plant.

The waterworks board, Aylmer, Ont., proposes to install two new gas engines in the waterworks plant. D. C. Davis is clerk.

John Rolston, Cayuga, Ont., is in the market for a gas engine, pump, etc.

Plans are being prepared by Bigonesse & Bigonesse, 60 Notre Dame Street East, Montreal, for the erection of a concrete and brick factory for the Dominion Aircraft & Mfg. Company at Laval de Montreal, Que., to cost $20,000. W. H Parker, 101 St. Luke Street, Montreal, is manager.

The New Brunswick Pulp & Paper Company, Ltd., Millerton, N. B., has commenced work on the erection of a new mill, to cost $150,000. J. D. Volckman is secretary.

T. G. Brighan, 85 Duke Street, Ottawa, is in the market for asphalt-handling machinery, including shafting, sprocket wheels, pulleys, chain drivers, bucket elevators, etc.

The Spencer Heater Company of Canada, Ltd., Toronto, has been incorporated with a capital stock of $500,000 by Tilman H. O'Neill, Albert T. Hawley, Archibald Campbell, and others, all of Winnipeg, to manufacture boilers, heaters, furnaces, etc.

The Stave Mfg. Company, Ltd., Montreal, has been incorporated with a capital stock of $50,000 by Harold Wooland, Walter H. Thomson, Walter F. Lee, and others to manufacture staves, etc.

Forgings, Ltd., Toronto, has been incorporated with a capital stock of $100,000 by William H. Irving, 10 Adelaide Street East; Henry H. Davis, 143 Bloor Street West; Edward H. Brower, and others to manufacture war munitions, shells, etc., and will commence the erection of a plant at Toronto.

The Cluff Ammunition Company, Ltd., Toronto, has been incorporated with a capital stock of $1,500,000 by Arthur W. Holmested, 20 King Street East; Lorne F. Lambier, Norman R. Kay, and others to manufacture explosives, munitions, shells, etc.

The Castle Mfg. Company, Ltd., Toronto, has been incorporated with a capital stock of $100,000 by John C. Macfarlane, 23 Adelaide Street East; Ernest C. Fetzer, Armond Whitehead, and others to manufacture toys, bicycles, metal castings, forgings, etc.

The Standard Stampings, Ltd., Toronto, has been incorporated with a capital stock of $45,000 by James F. Edgar, 59 Yonge Street, and Norman R. Tyndall, both of Toronto; James E. Maybee, Port Credit, Ont., and others to manufacture stampings, tools, etc.

The Groch Centrifugal Flotation, Ltd., Cobalt, Ont., has been incorporated with a capital stock of $25,000 by Frank Groch, John Raftis, Edward Donegan, and others to manufacture mining machinery, tools, implements, etc.

The St. Catharines Machinery Company, Ltd., St. Catharines, Ont., has been incorporated with a capital stock of $40,000 by Ernest W. Marks, George Wilson, Harry Shortt, and others to manufacture machinery, tools, shells, etc.

George W. Stout, Ltd., Hamilton, has been incorporated with a capital stock of $40,000 by George W. Stout, Louis D. Johnson, George Swanwick, and others to manufacture automobiles, trucks, engines, etc.

The South Bay Power Company, Ltd., Toronto, has been incorporated with a capital stock of $1,000,000 by Alexander Fasken, James Aitchison, 36 Toronto Street, and others.

The Rosedale Motors, Ltd., Toronto, has been incorporated with a capital stock of $200,000 by Walter G. Hammond, 24 King Street West; Alexander McInnes, and others to manufacture automobiles, trucks, etc.

The Climax Baler Company, Hamilton, Ont., is in the market for a 4-ft. power square shears to cut 2 1/2-in. plates.

The Cummer-Dowswell Company, Hamilton, Ont., manufacturer of clothes wringers, washing machines, etc., will build an addition to its plant, to cost $16,000.

The Canadian Allis-Chalmers, Ltd., Rockfield, Que., will build an addition to its forge plant.

The Russell Motor Car Company, Toronto, will erect a boiler house on Mowat Avenue, to cost $5,000.

Heller Brothers, Vancouver, B. C., plan the construction of an addition to their plant at Coal Harbor for the construction of aeroplanes.

The Aetna Iron & Steel Company, Ltd., Victoria, B. C., has been incorporated for $250,000, with David Milne, Joshua Knighan, Samuel M. Officer, trustees.

Plans for the plant of the Vulcan Iron Works, to be located on Industrial Island near Vancouver, B. C., are now under way, and include a main workshop and boiler room, 105 x 230 ft., and plate storeroom, 40 x 75 ft.

Government Purchases

WASHINGTON, D. C., Dec. 26, 1916.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until date not set, schedule 542, for one 30-in. x 5-ft. 3-in. lathe for Fort Mifflin, Pa.; schedule 546, for one 16-in. wood-working lathe, two 26-in. bandsaws and one 12-in. saw table, all for Philadelphia; schedule 548, for one motor-driven pressure blower, one 16-in. high-speed and one 30-in. radial drilling machine, one 14-in. and one 16-in. engine lathes, one 14 x 56-in. pattern-maker's lathe, one screw-cutting lathe, one milling machine, one 4-in. diameter hacksaw, one bandsaw with 30-in. wheels, and one column-shaping machine, all for Brooklyn; schedule 549, three lathes to swing 12-in. overhead, for Philadelphia; schedule 550, for two 26-in. turret lathes, for Brooklyn; schedule 551, for furnishing and installing an exhaust system, for Boston.

The chief of the Bureau of Yards and Docks, Navy Department, Washington, will receive sealed proposals until 11 a. m. Jan. 2 for furnishing two 300-kw. motor generator sets for Norfolk.

Bids were received at the Bureau of Supplies and Accounts, Navy Department, Washington, Dec. 19, for supplies for the naval service as follows:

Schedule 414, Ordnance

Class 13, Washington—Three geared head lathes—Bid 85, $1,680; 96, $1,600; 114, $1,560; 124, $1,058; 146, $1,657.

Class 14, Washington—Two geared lathes—Bid 85, $3,478; 96, $2,955; 116, $3,295.

Class 15, one power gap shears—Bid 22, $221.10 items 2 to 5; 96, $2,218; 118, $2,266.75; 124, $248.25, item 1 omitted; 146, $3,395; 159, item 1, $2,400.

Schedule 414, Ordnance

Class 16, Washington—Two electrically driven geared head lathes—Bid 85, $1,250 and $1,920; 96, $1,862.

Class 17, Washington—Two selective-geared head lathes—Bid 85, $1,988; 96, $2,045; 114, $1,832.

Class 18, Washington—One selective-geared head lathe—Bid 85, $2,033; 96, $2,140; 114, $1,900.

Class 19, Washington—Two plain high-power milling machines—Bid 13, $3,302; 85, $3,423.

Schedule 426, Ordnance

Class 45, Washington—Two hand-screw machines—Bid 9, [illegible] 13, $880 and $840; 85, $850, 108, $1,629; total; 125, $514; 149, $675.

Schedule 427, Construction and Repair

Class 51, Philadelphia—One pneumatic riveting machine—Bid 41, $[illegible] 104[illegible], $510 and $528; 161, $538.88; 176, $539.88; 180, $810.

Schedule 427, Construction and Repair

Class 52, Philadelphia—One portable punching machine—Bid 160, $1,040; 185, $1,800.

The names of the bidders and the numbers under which they are designated in the above list are as follows:

Bell Automatic Machinery Company; 13, Brown & Sharpe Mfg. Company; 22, James S. Barron & Co.; 41, Chicago Pneumatic Tool Company; 85, Kemp Machinery Company; 96, Manning, Maxwell & Moore, Inc.; 108, L. R. Meisenhelter Machinery Company; 114, Niles-Bement-Pond Company; 118, Niagara Machine & Tool Works; 124, D. Nast Machinery Company; 125, O'Brien Machinery Company; 146, Sherritt & Stoer Company, Inc.; 149, Swind Machinery Company; 159, D. H. Stoll Company, Inc.; 160, Southwick Foundry & Machine Company; 161, Southern Sales Company; 176, Vulcan Engineering Sales Company; 180, Watson-Stillman Company; 185, R. D. Wood & Co.

Judicial Decisions

ABSTRACTED BY A. L. H. STREET

INVASION OF TRADE RIGHTS.—Infringement of a valid trademark is actionable regardless of whether the infringer acted innocently. But where a complaining manufacturer does not rely upon such a trademark, but upon a claim of unfair competition consisting in the palming off of goods on the public by a competitor as having been produced by the former, intent to defraud is an essential element to be proved by the plaintiff. When the name under which a patented device was marketed during the life of the patent has become a term descriptive of the nature of the article, the patentee will not be protected in its exclusive use after expiration of the patent. Other manufacturers of the same type of device may use the same name, but not in such manner as unnecessarily to lead the buying public into believing that in buying articles not produced by the original manufacturer his product is being obtained. Although a manufacturer is entitled to enjoin a former employee from unconscionably divulging confidential information, derived in the course of the former employment, to aid a new employer, a competitor of the old, in diverting the old employer's trade, a manufacturer who has virtually covered the entire jobbing market, while protected in a monopoly by a patent on goods sold, cannot secure an injunction against solicitation of his old customers by a former employee, in the interest of a competitor on expiration of the patent, since that would virtually give him a continued monopoly. When a patent is about to expire, a competing manufacturer who intends to engage in the production of the same articles may lawfully write letters to the trade, stating those facts and make any other truthful statements bearing on the competition, but the courts will grant relief against the sending out of letters containing veiled and mysterious allusions tending to discourage persons in dealing with the original manufacturer. But before damages can be awarded on account of this, the complaining manufacturer must show with reasonable certainty what loss ensued. (United States District Court, Southern District of Iowa, American Specialty Company vs. Collis Company, 235 Federal Reporter, 929.)

AUTHORITY OF SALESMEN.—Persons dealing with salesmen are legally bound to take notice of limitations on their authority. So, when a representative of a manufacturer is authorized merely to secure orders from customers to be approved or rejected by the manufacturer, he cannot make a contract for an absolute sale binding on his employer. (West Virginia Supreme Court of Appeals, Toledo Scale Company vs. Bailey, 90 Southeastern Reporter, 345.)

LIABILITY IN PERSONAL INJURY CASES.—An employee, in suing at law to recover damages for injuries sustained through a defect in a tool or appliance used by him, does not establish a right of recovery by mere proof of the occurrence of the accident and of his consequent injury. It must be shown further that the employer was aware of the flaw or would have known of it if reasonable and proper inspection had been made. Where a defect arises in the course of the use of tools or appliances, the employer is not responsible for such defect in the absence of proof of sufficient time and opportunity to discover the flaw. Such incidental dangers arising during the course of employment are risks which the servant takes upon himself. He has better means of observing the imperfections than has the employer, and it is his duty to use proper care to discover them, and when discovered report them to his employer. (Pennsylvania Supreme Court, Weaver vs. Wohlsen, 98 Atlantic Reporter, 1078.)

LIABILITY FOR INJURY TO FACTORY VISITORS—Although a manufacturer who expressly or impliedly invites persons to visit his plant is liable to them for injuries sustained through his failure to use a reasonable degree of care to have the premises reasonably safe, the same strict liability does not apply to a person who is trespassing or who has called to visit an employee in the establishment. As to such a person, the manufacturer is merely bound to refrain from active and affirmative negligence tending to injury. Hence, where a factory visitor assumed the responsibility of finding his way out, after calling on an employee, and, disregarding a plain means of exit through a door in front of a stairway, walked around the stairs and opened a door into an elevator shaft, into which he fell, there was no liability on the part of the manufacturer. (New York Supreme Court, Ridley vs. National Casket Company, 161 New York Supplement, 444.)

INTERSTATE FREIGHT RATES—A contract for a freight rate less than that established in accordance with the interstate commerce act is invalid, although the lower rate was in force when the contract was entered into. Hence, a manufacturing company that established its plant on a certain railroad line under agreement that shipping facilities would be afforded at fixed rates is not entitled to the benefit of those rates on the tariffs being increased. The provision of the Federal Constitution which prohibits any State from passing a law impairing the obligations of contracts does not apply to acts of Congress in dealing with interstate commerce. (Mississippi Supreme Court, W. M. Carter Planing Mill Company vs. New Orleans, Mobile & Chicago Railroad Company, 72 Southern Reporter, 884.)

INJURY TO MACHINERY IN TRANSIT—In a suit against a railroad company for injury to mill machinery while in transit, the North Carolina Supreme Court holds that a consignee is not entitled to refuse to receive a shipment, as against the railroad company, merely because it has been damaged, where the damage is only partial, and subject to repair. He cannot reject the freight and recover its full value, but must accept it, and make claim for the amount of damage done, if the injury is one for which the carrier is liable. The damages recoverable in such case are the excess of the value of the machinery in an uninjured condition above its value in its actual condition on arrival. (Whittington vs. Southern Railway, 90 Southern Reporter, 505.)

WARRANTIES IN SALES OF MACHINERY—Motors were sold under a written contract containing the provision: "The company [the seller] agrees to correct, at its own expense, any defects of labor or material in said apparatus which may develop under normal and proper use within 30 days after the starting thereof, provided the purchaser gives the company immediate written notice of such defects, and the correction of such defects by the company shall constitute a fulfillment of its obligations to the purchaser hereunder." Held, in a suit brought by the seller to recover a balance due on the price and defended by the buyer on the ground of defects in the motors, that there could be no implied warranty as to the condition of the motors because the express warranty was exclusive, but that the express warranty against "any defects of labor or material which might develop within 30 days" covered latent as well as patent defects. The purchaser could not rely on defects discovered after the lapse of the 30-day period. When a seller's warranty is broken, and he fails to remedy the defects, the buyer may recover all damages following as a natural and direct consequence, not including such damages as might have been avoided by the buyer's exercise of reasonable diligence to minimize the loss. (South Carolina Supreme Court, Westinghouse Electric & Mfg. Company vs. Glencoe Cotton Mills, 90 Southeastern Reporter, 526.)

DUTY TO FURNISH CARS—A railroad company may validly agree to furnish cars to a shipper for loading at point on another line. It is within the scope of a traveling freight agent's implied authority to make such a contract. (Kansas City Court of Appeals, Kissell vs. Pittsburgh, Fort Wayne & Chicago Railroad Company 188 Southwestern Reporter, 1118.)

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